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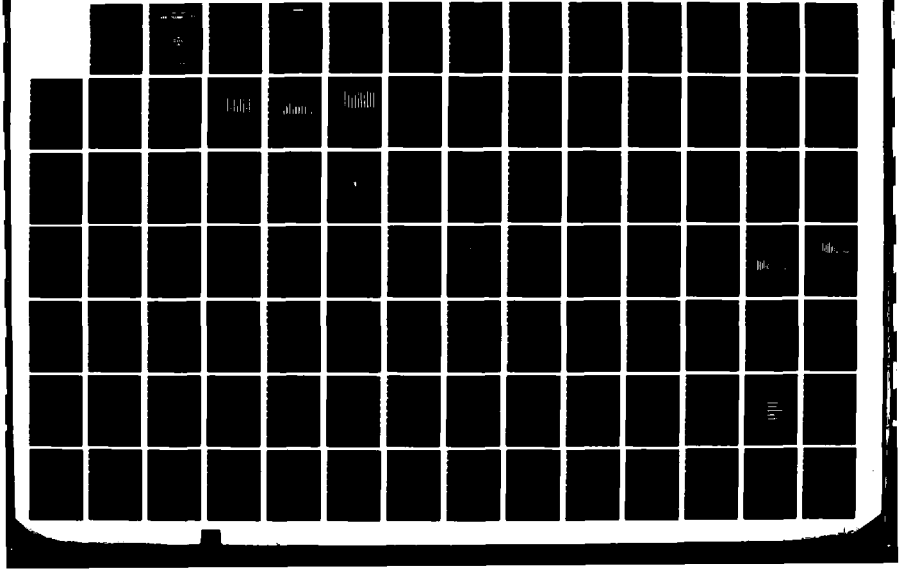

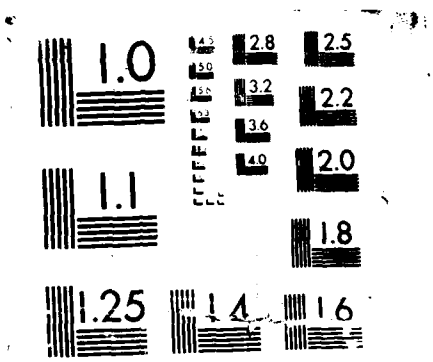

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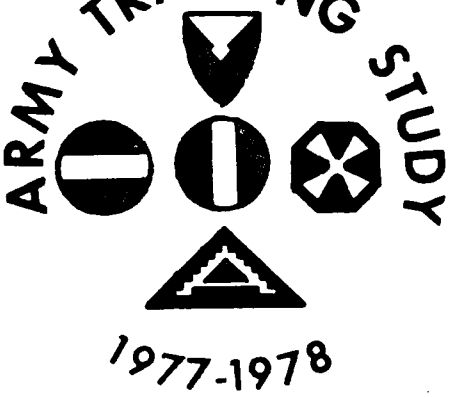
ARMY TRAINING STUDY



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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

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 field surveys at numerous continental US Army posts and schools. The data obtained was analyzed using the Training Effectiveness Analysis (TEA).

The Data Book volume lists and explains all of the data collected in the training surveys, field tests, and the opinions of military observers. It also explains the analysis of that data. The Data Book consolidates and categorizes the data.

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DATA BOOK

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INTRODUCTION

PURPOSE:

The purpose of the Training Data Book is to consolidate and categorize information collected during the course of the Army Training Study (ARTS) so that it can be used by several echelons of training management personnel. Information contained in this book includes data from the following sources as described below:

1. ARTS Training Effectiveness Analysis (TEA)
    - Field test data
    - Survey data
    - Opinions of military observers
2. ARTS Battalion Training Model
    - Graphs, charts, and tables generated by the model
    - Costing data obtained from "Best Battalion" Costing Program
3. Battalion Training Survey
    - Judgmental data of military trainers
4. Army Training Study Survey
    - Attitudinal data of military personnel with respect to current Army training programs
5. Other sources
    - Technical reports
    - ARTS concept papers

In each case, the information provided is annotated to describe its "quality." Since this is a prototype document, as information of higher quality is available in each of the respective areas, pages will be revised and distributed by the ARTS residual group. Hence, it is intended that this book be used as a job aid, a desk side reference which identifies areas of training strengths and weaknesses.

HOW TO USE THIS BOOK:

The Army Training Study patterned its efforts after the following representation of the training system (the ARTS model);

TRAINING RESOURCES → TRAINING PROGRAMS → TRAINING PROFICIENCY → VERIFICATION → COMBAT EFFECTIVENESS

DEFINITIONS:

Training Resources. Training resources consist of dollars, people, and time. For example, ammunition and fuel are expressed in dollars; people include both trainers and trainees.

Training Programs. Training programs encompass individual and collective training occurring in both the institution and unit.

Training Proficiency. Training proficiency is the degree to which any individual, crew, or unit is trained to perform an assigned mission.

Training Readiness. Training readiness is the sustained level of proficiency which is maintained over time by the individual, crew, or unit.

Objective Level of Training Readiness. The objective level of training readiness is the capability, on one day's notice, to engage and defeat repeatedly a sophisticated threat, at odds of three or more enemy to one friendly.

The last three definitions are related in that both training proficiency and training readiness imply the level of capability required in combat. For convenience, the abbreviated term "95%" is used. Thus, sustained 95% proficiency constitutes a 95% readiness which, in turn, equals the ability to engage and successfully defeat an enemy. As the family of documents matures, soldier's manuals and Army training and evaluation programs (ARTEP) will describe the tasks to be performed as well as the conditions and standards of performance to be achieved by individual soldiers and units to be ready to win on the 95% battlefield. Therefore, information included in the data book is, whenever possible, keyed to the soldier's manual or ARTEP as a doctrinal expression of the objectives of training.

ORGANIZATION:

Since the bulk of training management decisions involve resources, programs, and resultant proficiency and readiness, this book was developed accordingly. Key data areas were arrayed in a matrix against resources, programs, proficiency, and readiness. The complete matrix, coded to indicate the type of content in each cell, is on page 5. However, actual organization of material in each key data area is more parallel to the

training system, i.e., first institutional, then unit. Within the framework of institutional or unit the resources - programs - proficiency readiness sequence is followed whenever possible. In many cases, elements of information are too broad to fit the intended subdivisions of the data book. Therefore, the organization of this initial edition is general and flexible, not rigid or specific.

LIMITATIONS:

Several data areas contain only partial information. It is intended that this data book will become more comprehensive with time. The matrix organization permits that expansion.

A second limitation of the data book is the necessity of redundancy. Several elements of information have direct or peripheral implications within more than one data area. Therefore, some information is repeated for user convenience.

A third limitation is the quality and validity of the information presented. Some data is based on rigorously controlled tests, the statistical validity of which is high. Conversely, some information, though of lower quality, has been included to provide some valuable insights or to identify trends. Accordingly, each finding and conclusion is annotated with the source and quality level number as described on page 4.

FORMAT:

Information in the data book is listed under the title of its source. Narrative information is quoted whenever possible from the source document. This is indicated by quotation marks. Occasionally, for ease of reading, the source document has been paraphrased. This is indicated parenthetically. Data available only in draft form is so labeled and does not include reference page numbers (these will be added at a later date when the final documents are published). In any event, the quality level of the information is also noted parenthetically following the statement. Quality level definitions are on page 4, and for reader convenience are also found on a foldout inside the back cover.

Charts or tabular data are likewise found under the title of their source. In some cases ARTS has generated new charts or formulations from several sources. In this case, the title of the illustration is parenthetically annotated with (ARTS) followed by the quality level code.

Whenever it has been considered potentially useful, the user is referred to other data areas or ARTS volumes.

QUALITY LEVEL DESCRIPTIONS

QUALITY LEVEL	TEST RESULTS	SURVEY RESULTS	BATTALION TRAINING MODEL OUTPUT
(QL1)	Multiple valid tests and $\alpha \leq .05$	Unbiased questionnaire, controlled sample, valid analysis.	Relative trend correct, absolute value of data validated by field testing.
(QL2)	Valid test and $\alpha \leq .20$	Biased questionnaire, controlled sample, valid analysis.	Relative trend correct, absolute value of data consistent with professional judgment and/or survey data.
(QL3)	Data collected and trends indicated.	Unbiased questionnaire small sample, no analysis.	Relative trend correct, absolute value of data unvalidated.
(QL4)	Insights, not directly supported by data.	Biased questionnaire, small sample, no analysis.	Relative trend unvalidated.
(QL5)	Information of marginal validity. Included primarily because no better information exists. Use only with deliberate caution.		
(QL6)	Information judged to be of insufficient quality to include.		

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KEY DATA MATRIX

Key Data Areas TAB	Resources	Programs	Proficiency	Readiness
A SOLDIER QUALITY	I/A	I/A	I/A	I
B TRAINER QUALITY	A		D/I/A	D/I/A
C TRAINING DISTRACTORS	A	A	D/A	D/A
D TURBULENCE/TURNOVER	D/A	I/A	D/A	D/A
E SIMULATION	I	D/I/A	I/A	I/A
F TRAINING PACKAGES	D	I/A	I	I
G INDIVIDUAL TRAINING	D	I	D/I/A	A
H COLLECTIVE TRAINING	A	A	D/A	D/A
I INTEGRATED TRAINING	A	A	A	A
J TRAINING READINESS	I	I/A	D/I/A	
K EVALUATION	A	A	A	

Legend

D = Data

I = Insight

A = Attitudinal Information

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DATA AREA: Soldier Quality

Based on the ARTS sample, the training base appears to be effective in training all mental categories in the institutional share of Skill Level 1 tasks. Lower mental categories require modest amounts of additional training time to attain specified levels of competence. Usually AFQT and aptitude scores are reasonable predictors for performance during training as well as the on the job. Lower mental categories are perceived as a greater problem in the unit training environment, in terms of the frequency and duration of sustainment trainin efforts. The rate of learning or forgetting varies greatly by type of task. While rate of learning clearly varies by mental category, the corresponding rate of forgetting appears to be relatively unpredictable. The Battalion Training Model suggests that a high density of lower mental category personnel in units can preclude attainment of high levels of unit training readiness.

TEST RESULTS:

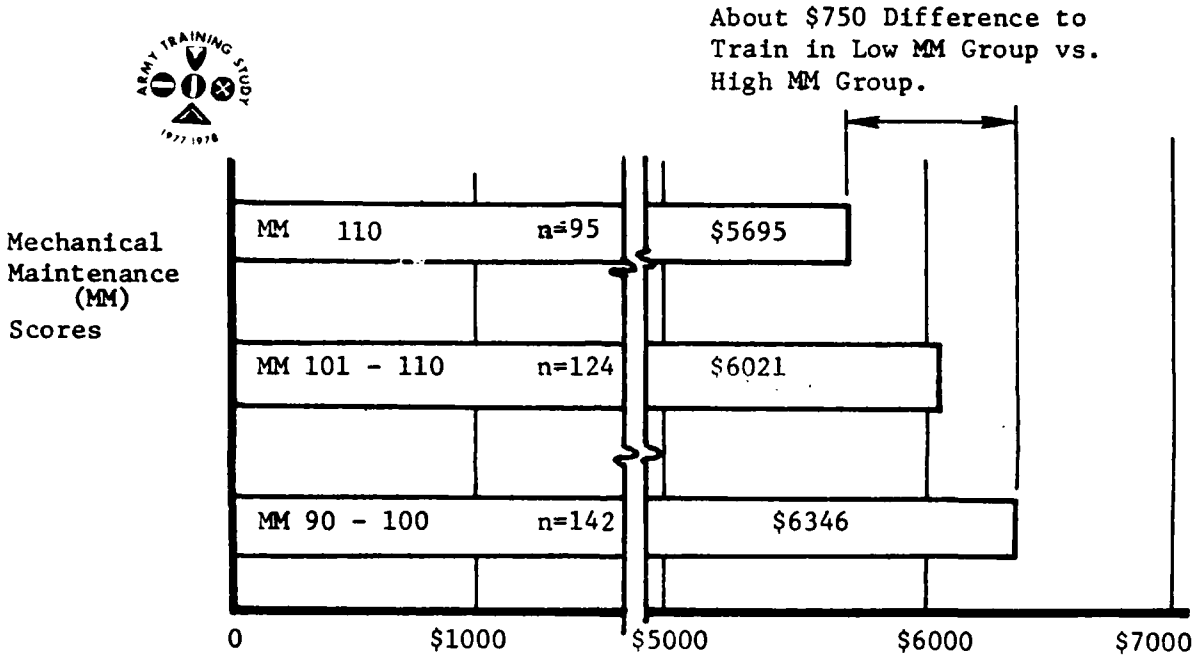
1. Proficiency Development Profiles, USAOCCS, 1 July 1978.

Individuals of all current prerequisite aptitude levels seem to have the ability to learn 63C/H skills for Skill Level 1 (paraphrased, pg. 62, QL3). In analyzing the time taken to complete the self-paced course, AFQT does not seem to be a discriminator. (Paraphrased, Supplement 2, pg. 15-16, QL2)

AFQT	SAMPLE SIZE	AVERAGE COMPLETION TIME (WEEKS)
<46	142	9.7
46-62	62	9.4
<46	142	9.7
≥63	89	9.3
46-62	62	9.4
≥63	89	9.3

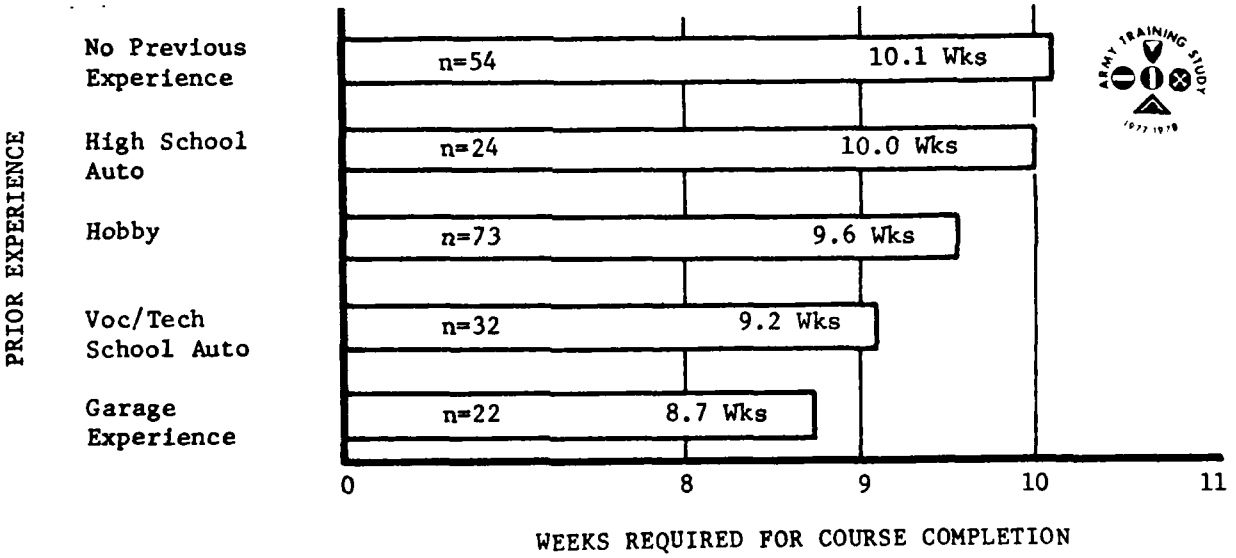
Comparison of Completion Time in the 63H10 Course by AFQT Levels (Supplement 2, pg. 16, QL4)

"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." (Supplement 2, pg. 2, QL2)



Comparison of Costs of Self-Paced 63H
By Mechanical Maintenance (MM) Scores (ARTS, QL2)

Prior experience also seems to influence training time. One or more years of garage experience, vocational/technical school automotive training, and hobby experience reduce initial training time in the 63H course while having high school automotive training does not seem to result in any reduction of training time over the no experience group. A soldier with one or more years on the job as a mechanic can be trained for about $750 less than the soldier with no experience. (Paraphrased , Supplement 2, pg. 17, QL3)



Comparison of 63H10 Self-Paced Course Completion Time with Prior Experience (ARTS, QL3)

Both MM and AFQT scores can be used to compare proficiency over time as a function of ability. The spread between the number of tasks performed correctly was so small that no inference is made concerning this aspect of the test. (Paraphrased, pgs. 20, 27, QL4)

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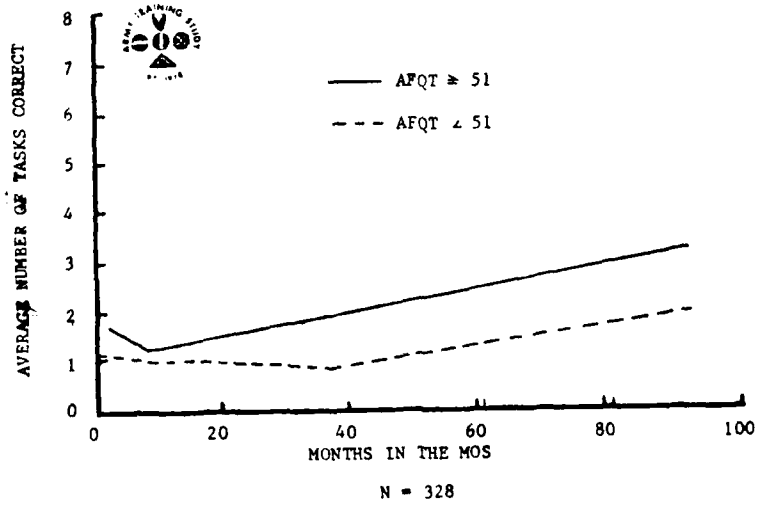
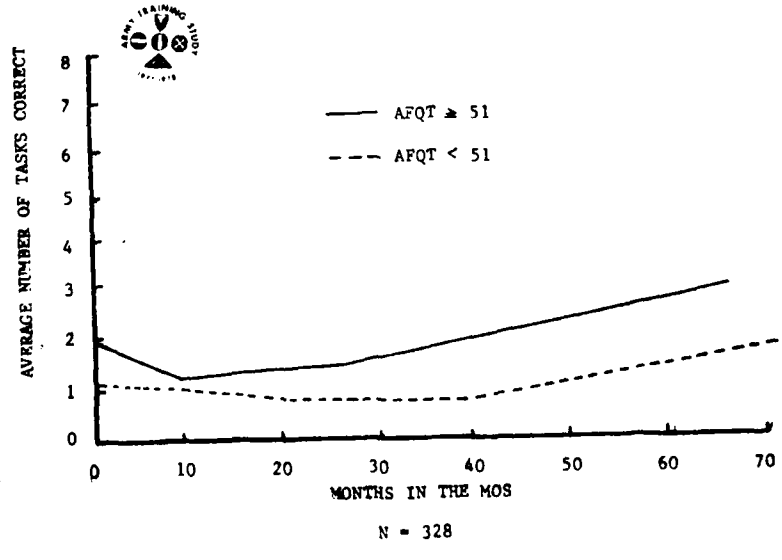
The USAOCCS selected and administered eight hands-on performance tests to 63C MOS holders. Similarly, eight tests were selected and administered to MOS 63H. The results of these tests are shown below.

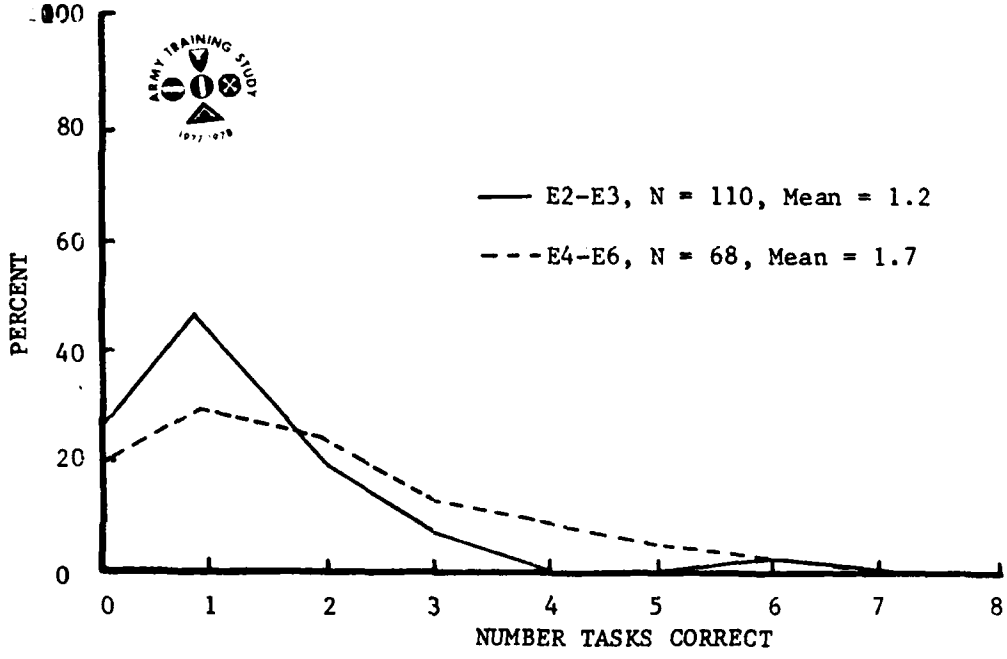


63C Proficiency Curves for High and Low AFQT Groups with Zero Prompts. (pg. 28, QL4)

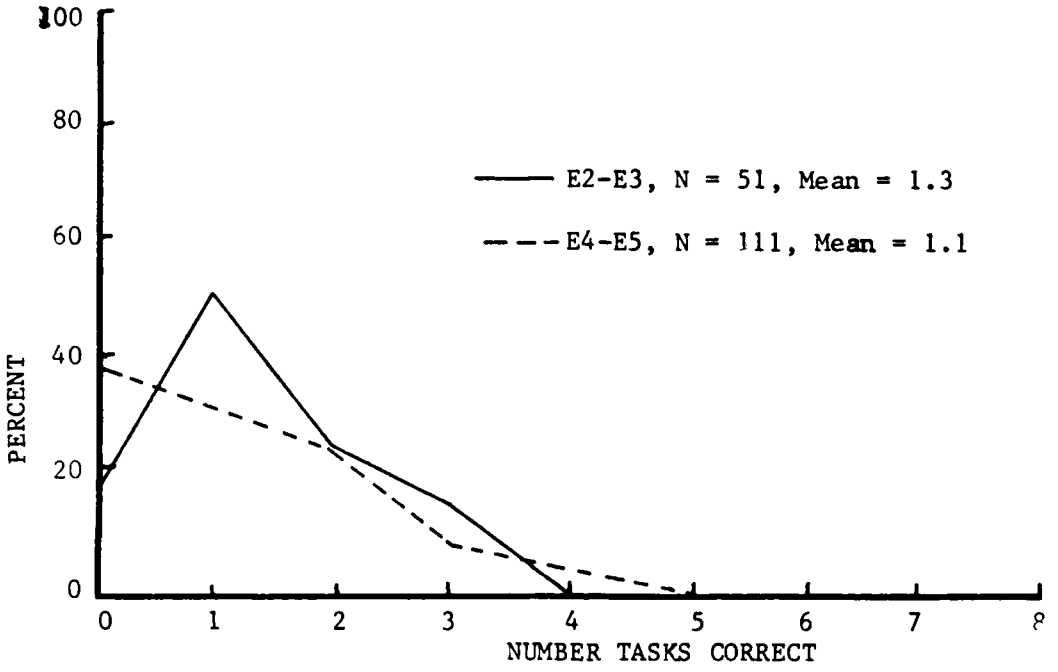


63H Proficiency Curves for High and Low AFQT Groups with Zero Prompts. (pg. 31, QL4)

Many soldiers in grades E4-E7 did not appear to be more proficient than lesser experienced soldiers (E1-E3). In fact, tests showed that 63H E2-E3 slightly outperformed 63 H E4-E5. (Paraphrased, pg. 2, QL3)



Comparison of 63C E2-E3 and E4-E6 Performance for the Zero Prompting Condition (no supervision). (pg. 46, QL3)

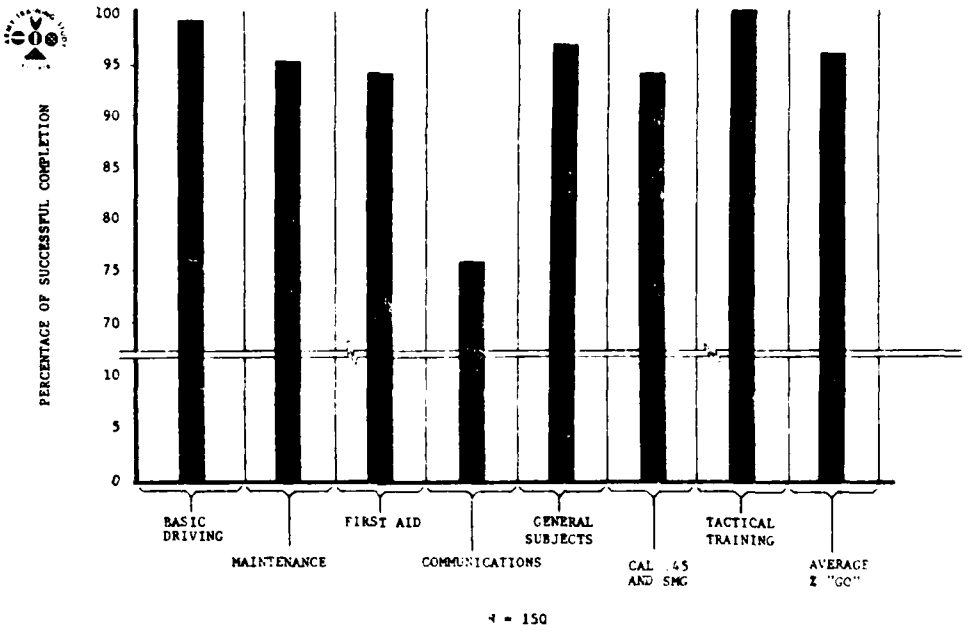


Comparison of 63H E2-E3 and E4-E5 Performance for the Zero Prompting Condition (no supervision). (pg. 49, QL3)

While soldiers of all aptitude level studies can learn the desired skills, if reinforcement does not occur, these fragile skills decay with the performance of low aptitude soldiers being consistently lower. No systematic on-the-job training program for maintenance personnel was observed with the units visited. (Paraphrased, pg. 2, QL3)

2. The Learning and Retention of Basic Armor Skills Within the Institutions, USAARMC, May 1978.

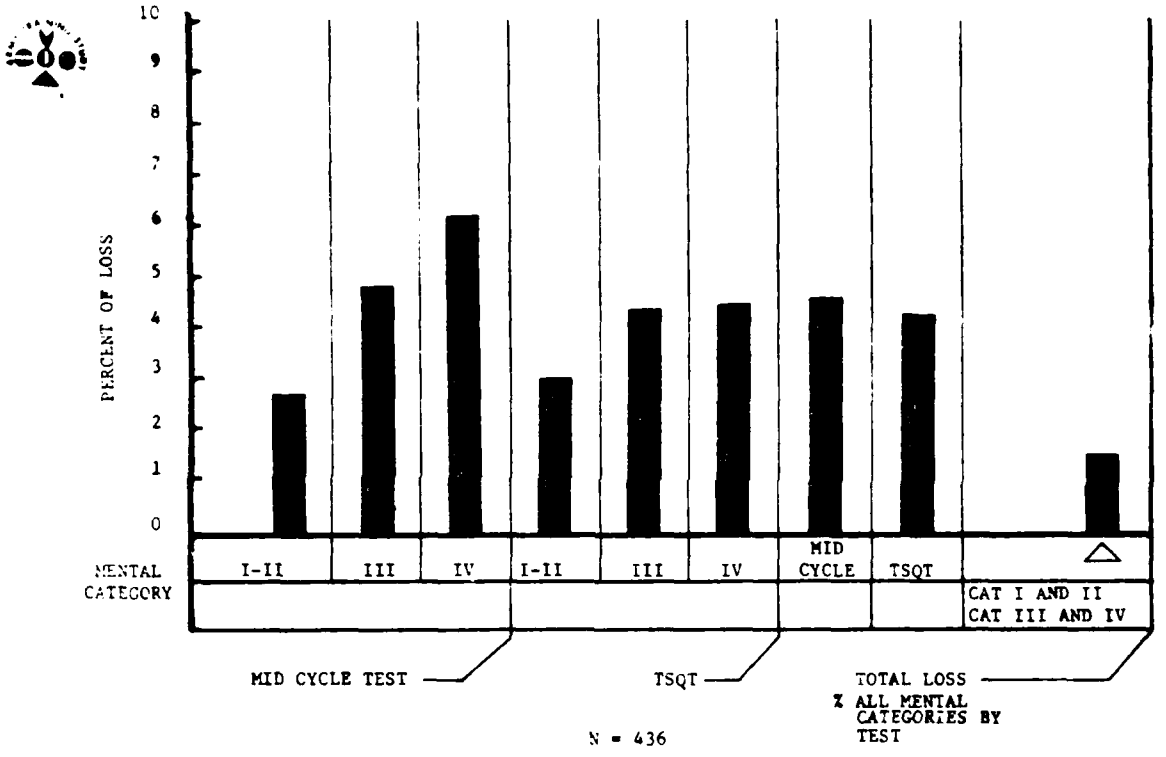
Approximately 96 percent of the Basic Armor Training (BAT) graduates demonstrated the requisite proficiency on all the test items prior to graduation. (Paraphrased, pg. 46 QL3).



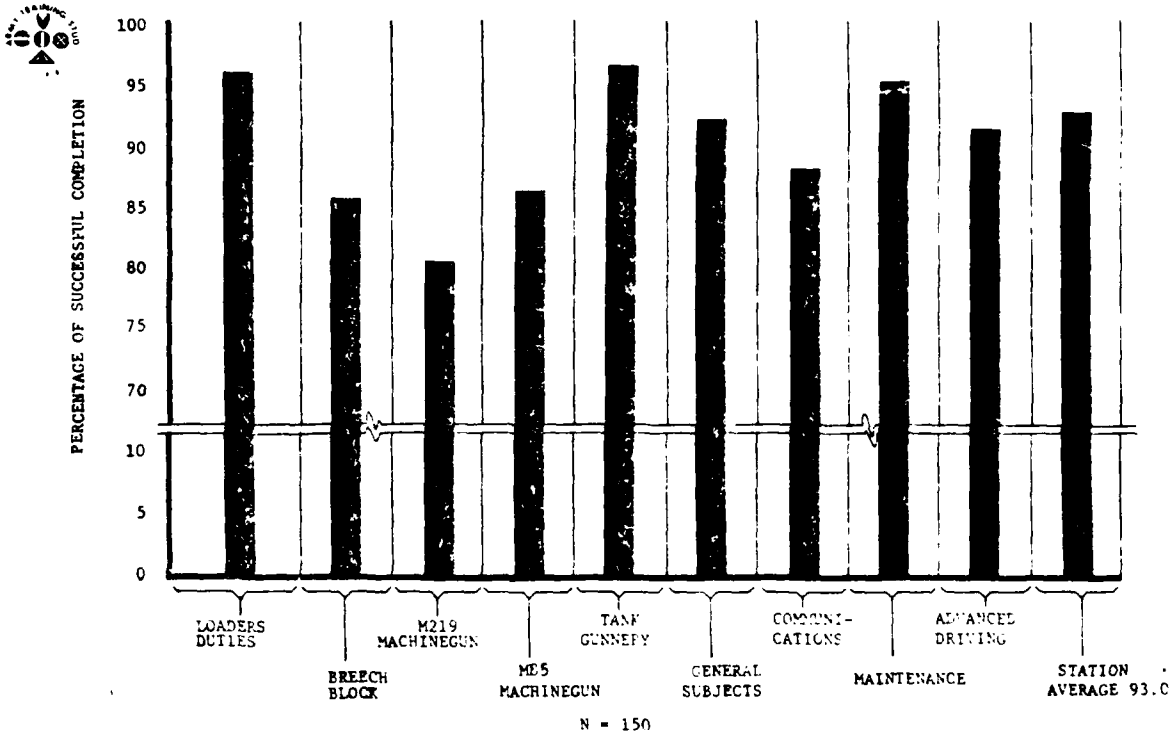
Initial Mid-Cycle Test Results (%) Average by Station and Overall. (ARTS, QL4).

Results comparing mid-cycle test scores (Go/No Go criteria) indicate that individual proficiency was much greater on those tasks involving fewer subtasks. Retention was reduced on those tasks involving multiple, precise, sequential subtasks, and cognitive skills such as communications. The fact that the more intricate tasks involved interrelationships, any one of which could cause a No Go should not be ignored, for actual skill complexity itself could have been the cause of many of the No Go's. Results of testing on the end of course Tanker Skills Qualification Test are shown below. (Paraphrased, pgs. 46-49, QL4).

Results show that lower mental groups require more training to maintain proficiency. Overall retention performance in the institution by mental category is shown below. (Paraphrased, pgs. 25, 46-49, QL3)



Mid-Cycle and Tanker Skill Qualification Test (TSQT) Retention Loss Results (%) by Mental Category (ARTS, QL4)



TSQT Retention Results (%) and by Station Overall (ARTS, QL4)

Retention testing of both the mid-cycle test and Tanker Skills Qualification Test indicate that:

A high degree of learning takes place within the institution. On average, 96.7 percent of mid-cycle and 96.1 percent of TSQT performance responses were "Go" at the first try. (Paraphrased, pg. 34, QL3)

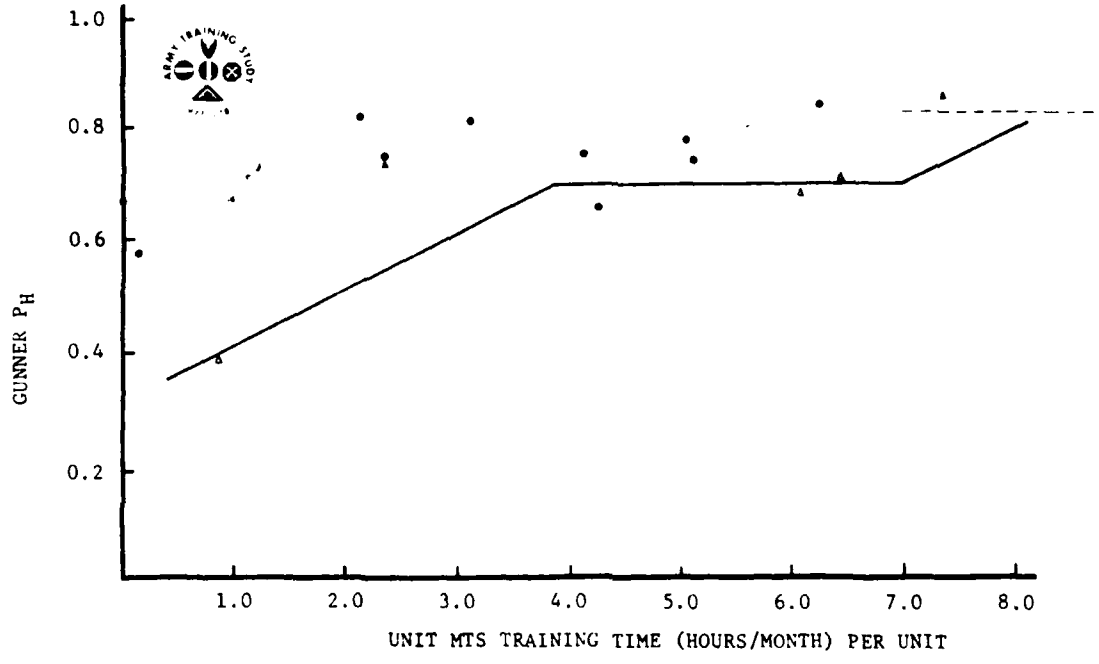
Data indicates that communication tasks were least well learned. (Paraphrased, pg. 47, QL3)

Overall, comparing mid-cycle results with TSQT end-of-cycle results, it is concluded that performance retention is high for three weeks in the institution. (Paraphrased, pg. 46, QL3)

Distribution of 436 examinees across mental categories was I-3.1 percent, II - 13.4 percent, III - 75.1 percent and IV - 8.3 percent. Approximately 66 percent of the examinees were high school graduates even though 83.4 percent were in the lower mental groups. (Paraphrased, pg. 25, QL3)

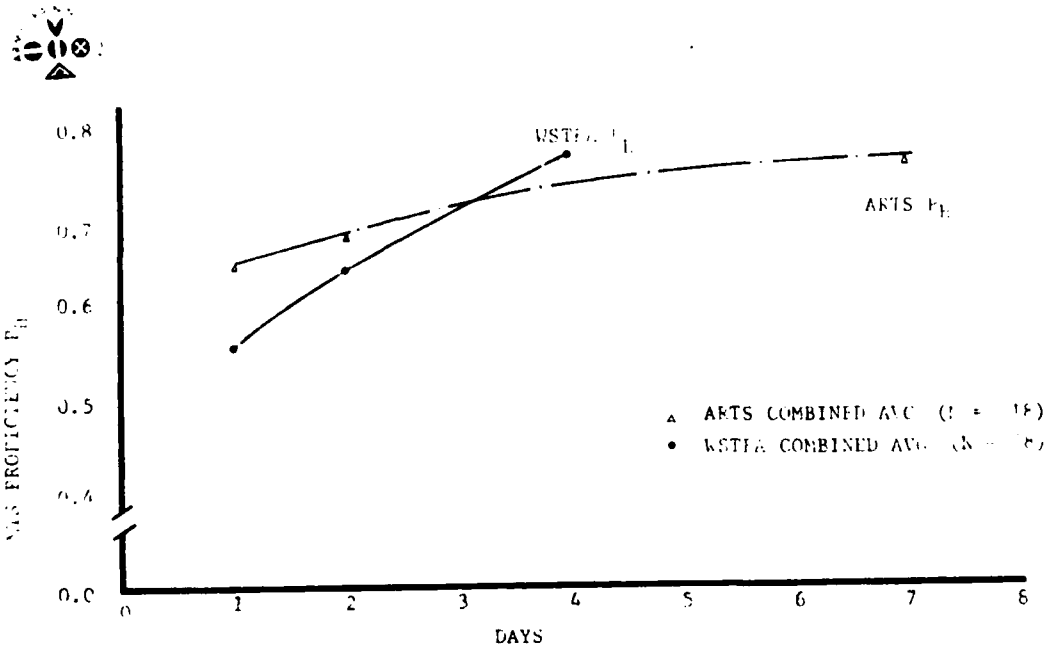
3. REDEYE Weapons System, Technical Report 6-78, TRASANA, August 1978.

Three additional hours of Moving Target Simulator (MTS) training resulted in a slight increase in proficiency. However, actual benefit was not apparent because of the lower AFQT scores of the test subjects. (Paraphrased, section 8, pg. 73, 74, QL3)



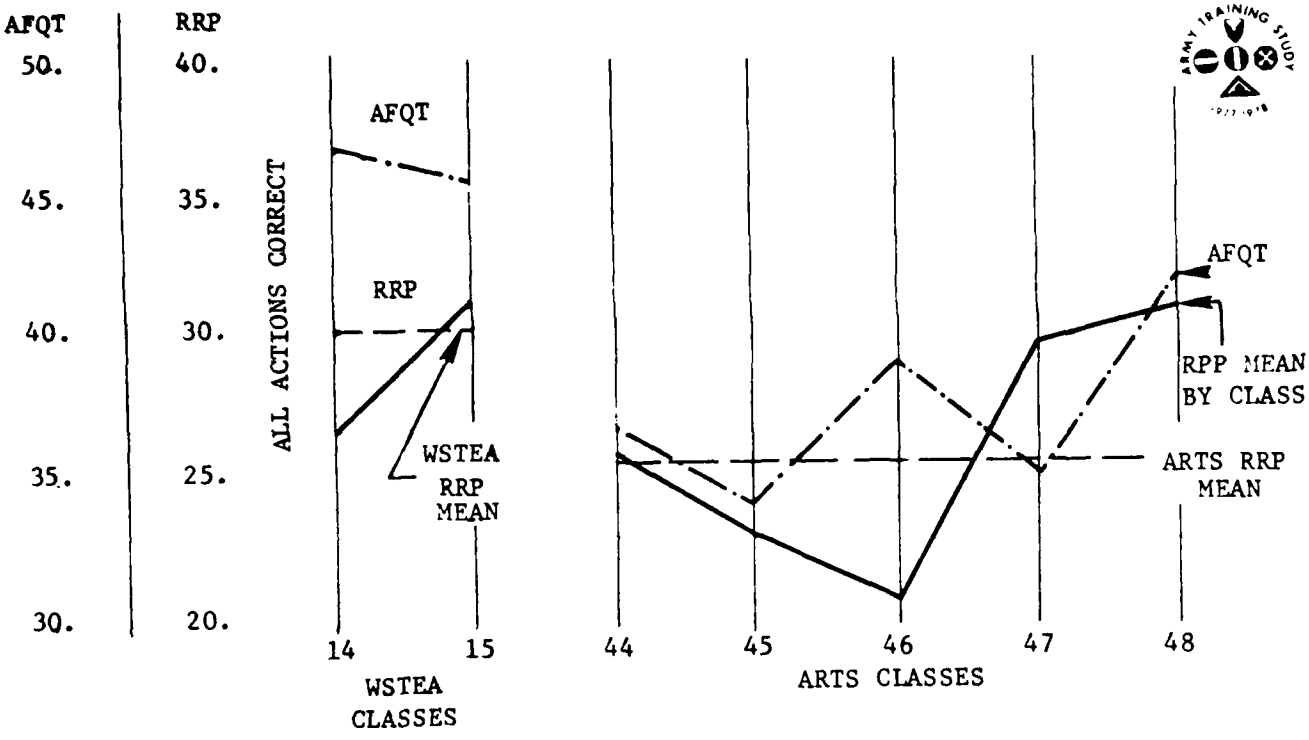
Unit MTS Training Time vs Proficiency (ARTS, QL3)

Additional moving target simulators (MTS) and tracking head trainers (THTs) are required to provide increased "hands-on" training capability for lower mental category personnel, who, as has been shown, require more frequent refresher trainer to maintain acceptable levels of proficiency. (Paraphrased, Section 7, pg. 47, QL3)



AIT MTS Proficiency Growth (Section 8, pg. 9, QL3)

The markedly lower range ring profile (RRP) proficiency for ARTS subjects was attributed to the lower AFQT scores. A direct relationship between RRP and AFQT score was demonstrated. (Section 8, pg. 73, QL3)



AFQT and RRP Proficiency Mean Scores for AIT Classes (Section 8, pg. 17, QL2)

Mental category IV gunners achieved an acceptable level of proficiency on the MTS. (Paraphrased, Section 8, pg. 19, QL3)

"Determination of range ring profile coverage is the most difficult task for all gunners of all categories." (Section 8, pg. 19, QL3)

SURVEY RESULTS:

1. The ARTS Survey

The ARTS Survey respondents, when asked to rank order the susceptibility of five common soldier tasks to forgetting, selected the verbal task as easiest to forget, decision-making next and procedural tasks as least susceptible to forgetting. (QL2)

2. The Battalion Training Survey

The Battalion Training Survey of career officers and noncommissioned officers revealed the belief that training frequency must be increased by 53.8 percent to maintain a unit at fully combat ready training proficiency with a majority of E1-E4 in Mental Category IV. Further, they stated that the time to train the average task or mission would increase by 41.9 percent.

TRAINING TIME AND FREQUENCY IMPACT OF MENTAL CATEGORY IV (QL-4)

	x	Std Dev	95% Confidence Interval
% Training time increase, majority of unit Cat IV vs majority of unit Cat III.	41.924	26.340	37.585 - 46.263
% Training frequencies increase, majority of unit Cat IV vs majority of unit Cat III.	53.868	42.754	46.993 - 60.742

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquisition of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for training, grade substitution, and soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions each in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC, and the Sergeants Major Academy. Institutional responses were received from the two surveyed

divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel. For further information, see the Battalion Training Survey volume.

RELATED INFORMATION:

1. Battalion Training Model (BTM):

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95% battlefield; determining the sensitivity of the model to varying personnel conditions; and development of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance time, and nontraining time. Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

As part of the BTM sensitivity analysis, an examination was made of the effect of lower mental category soldiers (Category IV) on a training program designed to reach 95% battlefield standards. Results are shown below.

Effects of Mental Category IV Trainees on the Analytical Baseline (ARTS QL4)

	Baseline	Cat IV
Training Days	213	307
Nontraining Days	0	0
Maintenance Days	58	58
P2 Costs ($M)	.52	.76
Ammunition Costs	2.43	3.38
Program Completion	100%	90%

The BTM run was based on data obtained from the Battalion Training Survey which indicated that for a unit with a majority of lower mental category soldiers, the length of training sessions would have to be increased by 1.4 and the frequency of repetition by 1.5.

The net impact on the training program was to increase the number of required battle drills from 68.7 to 109.6, of which only 80.4 were completed even though costs increased by $1.2M.

Unit proficiency declines 10 percent, at least, in terms of the unit's capabilty to execute a training program designed for the standards of the 95% battlefield.

2. Retention of Motor Skills: Review, ARI Technical Paper (Draft) June 1978.

"Individual Ability Levels: In the acquisition of motor tasks, individuals having higher initial ability levels generally require less time to attain a specified criterion than individuals having lower initial ability levels. This conclusion appears to generalize across a wide range of military...and nonmilitary...training conditions and a number of different operational definitions of the term "initial ability." Thus, research using eight training tasks ranging in complexity from a simple reaction time task (monitoring) to a combat plotting task problem solving...other research employing a 92-step procedural task...and still other research using 13 Basic Training Skills...defined initial ability in terms of the trainees' Armed Forces Qualification Test scores and indicated faster learning by trainees having higher mental aptitudes. Other studies, defining initial ability in terms of the learner's early performance on a to-be-retained balancing task...or, using expert judgments of motor proficiency as an index of initial ability on five novel gross motor tasks...obtained analagous results." (Pg. 17-18, QL4)

3. ARTS concept paper, "Unit Training Programs"

"One aspect of individual training which has a major impact in design of unit training programs is retention. Researchers have established some broad parameters describing acquisition and retention for certain types of tasks:

a. Simple motor tasks: rapid acquisition, slow loss

b. Complex procedural tasks: gradual acquisition, fast loss

c. Fine, precise skills: slow acquisition, immediate loss

"Clearly there will be a requirement that the unit training program provide for repetition of individual skills to retain proficiency. Few data to date are very useful in establishing the required frequency of repetition

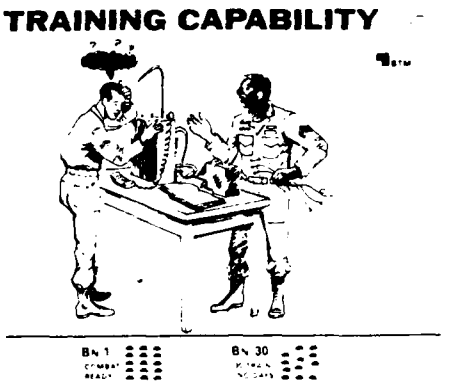
for sustainment of individual military skills. Based on the complexity of equipment entering the inventory, it is reasonable to assume that the requirement for frequent repetition of individual skills will increase." (pg. A-11)

4. Aptitude Level and the Acquisition of Skills and Knowledge in a Variety of Military Training Tasks, Technical Report 69-6, HumRRO, May 1969.

"Trained in different mixes of eight training tasks, in general, the low aptitude subjects were slower to respond, required more guidance and repetition of instruction, and were decidedly more variable as a group than the middle and high aptitude subjects. Depending on the particular task, low aptitude subjects required from 2 to 4 times as much training time, from 2 to 5 times as many trials to reach criterion, and from 2 to 6 times as much prompting as did the high aptitude subjects. The learning performance of the middle aptitude subjects was typically intermediate between that of the high and low aptitude groups, but more like the high aptitude groups." (Summary and Conclusion pages, QL4).

DATA AREA: Trainer Quality

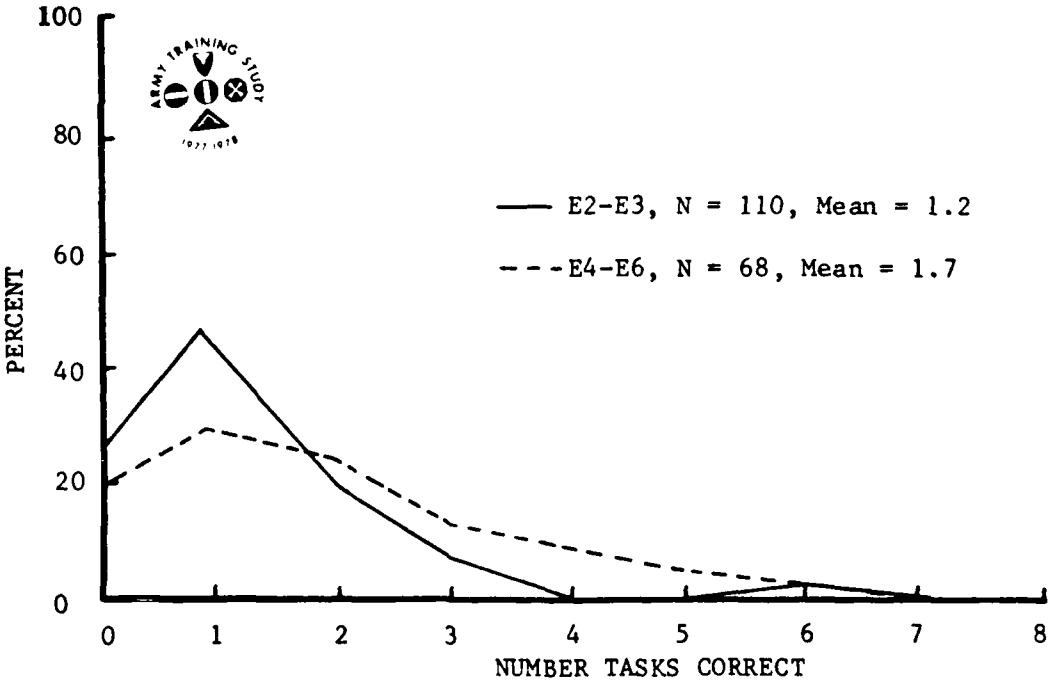
There is some evidence that many non-commissioned officers lack competence in the tasks they are responsible to train to their subordinates as well as expertise in managing and implementing training programs. The implications of lesser quality trainers, in terms of additional time to conduct training programs, as well as the cumulative effects on an annual training program, are hypothesized using the Battalion Training Model.



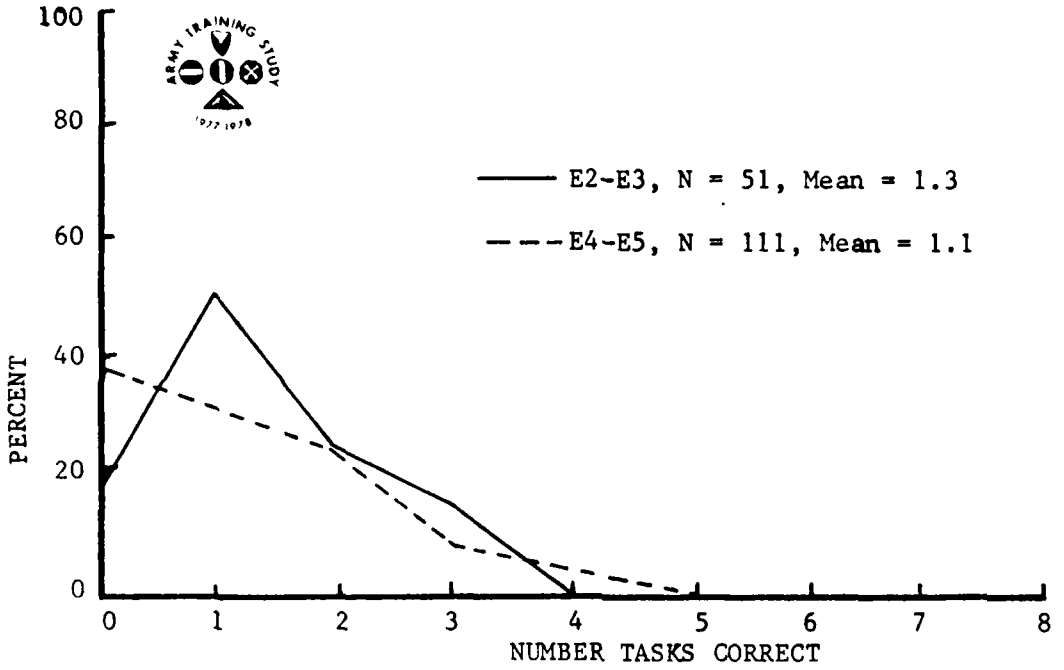
TEST RESULTS:

1. Proficiency Development Profiles, USAOCCS, 1 July 1978.

Testing of 63C and 63H in eight common maintenance tasks yielded the following results:



Comparison of 63C E2-E3 and E4-E6 Performance for the Zero Prompting Condition (no supervision). (Pg. 46, QL4)



Comparison of 63H E2-E3 and E4-E5 Performance for the Zero Prompting Condition (no supervision). (p. 49, QL4)

SURVEY RESULTS:

1. ARTS Survey:

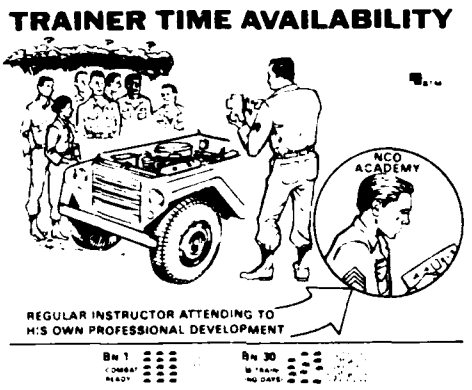
ARTS Survey addressees were asked the following question. Their mean responses are shown by arrows on the next page.

"The following statements describe potential problems which may apply to a unit. Please indicate the extent to which you think each of the following is a problem:"

$\bar{X}$		To A Very Great Extent	To A Great Extent	To Some Extent	To A Little Extent	To A Very Little Extent
4.0	Lack of motivated officers willing to perform their duties	1	2	3	4	5
2.2	Too many nontactical requirements imposed on the unit	1	2	3	4	5
2.3	Shortage of qualified NCOs	1	2	3	4	5
3.0	Lack of experienced administrative personnel in the hard skill areas	1	2	3	4	5
2.9	Complete turnover of personnel every 7 or 8 months and the impact on training	1	2	3	4	5
3.7	The officers and NCO's are called to perform duties well beyond the normal experience level--for example--line companies commanded by lieutenants with less than two years service	1	2	3	4	5
2.4	The training load made difficult by changing priorities of higher headquarters	1	2	3	4	5
3.0	Insuring day-to-day training is conducted	1	2	3	4	5
2.9	Lack of motivated NCOs willing to adequately perform their duties	1	2	3	4	5
3.5	Shortage of qualified officers	1	2	3	4	5
2.4	Discipline. The need for stronger discipline in the new changing Army	1	2	3	4	5

2. Battalion Training Survey

The Battalion Training Survey (BTS) was used to investigate the effects of trainer grade substitution.



Trainer grade substituton refers to the effect on training of substituting a trainer of a lower grade than prescribed by the Table of Organization and Equipment. The basic premise is that the less experienced trainer would require more time per training period to train his men to the same level of competence. The Survey respondents felt that the following factors should be applied to the length of time to train.

Effect of Length of Training Period (for 95% Proficiency) Caused by Trainer Grade Substitution - % (QL3)

Tnr Grade Subs	10%	15%	20%	25%	30%	40%
Time Factor	.86	1.00	1.18	1.39	1.64	2.31

In other words, if in a unit which has 15 percent trainer grade substitution, the average time to train a task is one hour when all instructor's time requirements are considered, the average time for all instructors to train the same task in a unit characterized by 10 percent trainer grade substitution is .86 hours.

This survey provided the majority of the data for the training program section of the BTM and was of essential importance to current sensitivity analyses. The survey included acquisition of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for

training, grade substitution, and soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor training positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions each in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC, and the Sergeants Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study personnel.

For further information, see the Battalion Training Survey Volume.

RELATED INFORMATION:

1. Battalion Training Model:

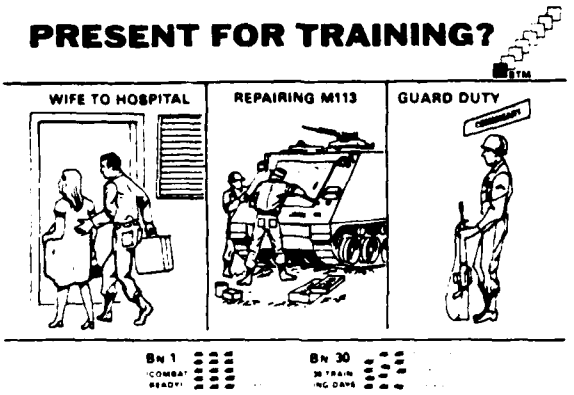
The initial analytical efforts using the Battalion Training Model fell into three broad areas: selecting a first generation training program which represented a realistically achievable program for the 95% battlefield; determining the sensitivity of the model to varying personnel conditions; developing of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the "Best Battalion" Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar costs. Training time was broken into the categories of training program time, maintenance time, and non-training time. Dollar costs are expressed as ammunition, gasoline, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and other dollars are determined by the number of days required for training.

The Battalion Training Model (BTM) was used to apply the Battalion Training Survey results for trainer grade substitution to the BTM simulation of a battalion's training environment. Factors of 10, 15, and 40 percent grade substitution were applied to the BTM analytical baseline which contains the training program for 95 percent proficiency (Bn-1) at

environmental conditions of 35 percent quarterly changes in duty position and a 25 percent daily rate not present for training.



Shown below are the results of varying the level of trainer grade substitution.

Effects of High and Low Trainer Grade Substitution
on the Analytical Baseline (QL3)

	10%	15%	40%
Training Days	190	213	307
Nontraining Days	5	0	0
Maintenance Days	58	58	58
P2 Costs ($M)	.47	.52	.61
Ammunition Cost ($M) (QL4)	2.43	2.43	2.32

Improvements in trainer grade substitution (reduction to 10 percent) give less dramatic results than variations in either turbulence or present for training. Due to the nature of trainer grade substitution, the training program is the same as the base case in terms of number of repetitions of battle drills and is executed. The program is executed in 23 fewer days.

The worst substitution, 40 percent grade substitution, results in a program that only reaches 83 percent completion, despite an increase in training of 94 days. The 40 percent case is, however, a more drastic change from either turbulence or not present for training. Note that in this case the dollar cost dropped off somewhat from the base case simply because the training program could not be executed. The limiting constraint on program execution is trainer man days. (QL3)

The following series of charts was extracted from the Battalion Training Model (BTM). The primary hypothesis examined is the relative change in training effectiveness due to lower grade trainers being substituted for the current grade quality trainer. Trainer grade substitution is a direct result of incomplete personnel fill in the leadership grades or fill of TOE positions by personnel who do not hold the appropriate rank. Lower grade personnel are normally less experienced and/or less qualified. Trainer grade substitution is expected to affect the quality of training integration which can be conducted and the length of time required to conduct training to a given standard. Reducing quality by using less experienced personnel results in lower program achievement at a greater cost in time and dollars.

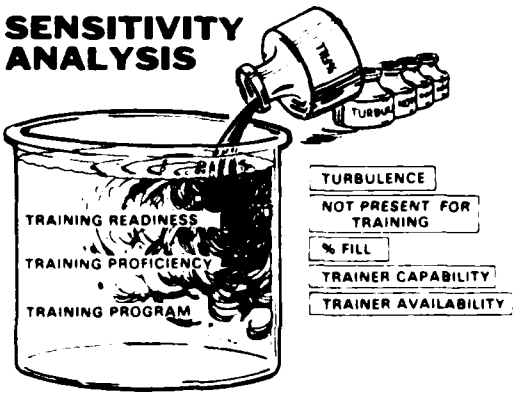


Chart 1 (QL3)

Chart 2 (QL3)

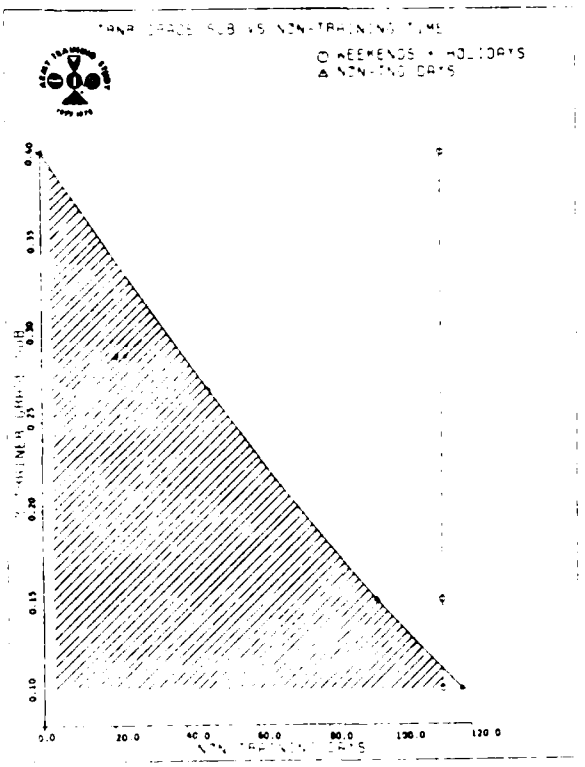


Chart 1 The X axis depicts the total number of training days required for a 95 percent training program. The Y axis depicts variations in percentages of trainer grade substitution.

The trainer grade substitution factor increase the time to complete level of accomplishment. This results in severe competition for time at the company and lower level. Training readiness becomes exceedingly difficult as trainer grade substitution approaches 40 percent.

CHART 2 The X axis portrays the number of nontraining days computed. Weekend/holidays are indicated by the vertical line at 112 days. The Y axis is identical to Chart 1.

The total impact of time anemia is seen here. The white area to the left of 112 nontraining days depicts weekend and holiday time that is needed for training by a battalion that has high levels of trainer grade substitution. They must work weekends and holidays just to keep pace with other battalions with more favorable personnel conditions.

Chart 3 (QL3)

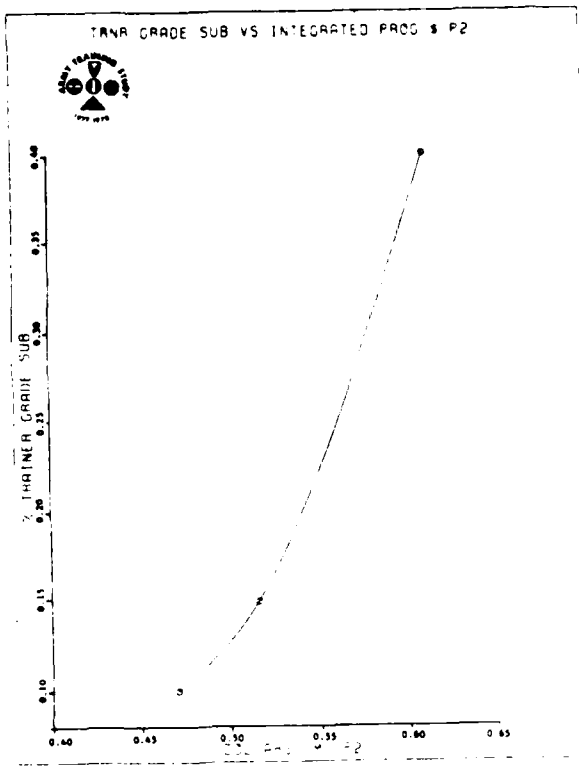


Chart 4 (QL3)

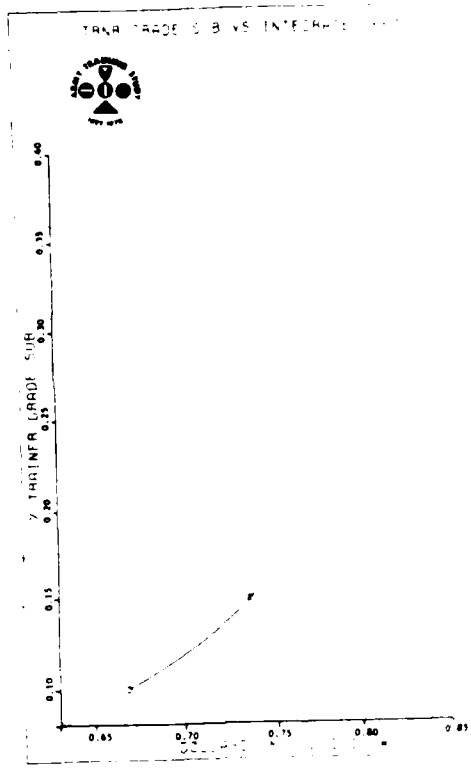


CHART 3 The X axis is total computed dollars of P2 funds (POL and Repair Parts). The scale is tenths of a million. The Y axis is identical to Chart 1.

The sensitivity of training cost to trainer grade substitution increases is plotted on this chart. Individual categories of ammunition (CL V), POL (Cl III) and repair parts (Cl IX) show similar trends.

CHART 4 The X axis is the computed cost of POL ranging from $72K through $92K. The X axis is identical to Chart 1. Less experienced trainers use more time and correspondingly more POL for a reduced level of training achievement. (QL3)

Chart 5 (QL4)

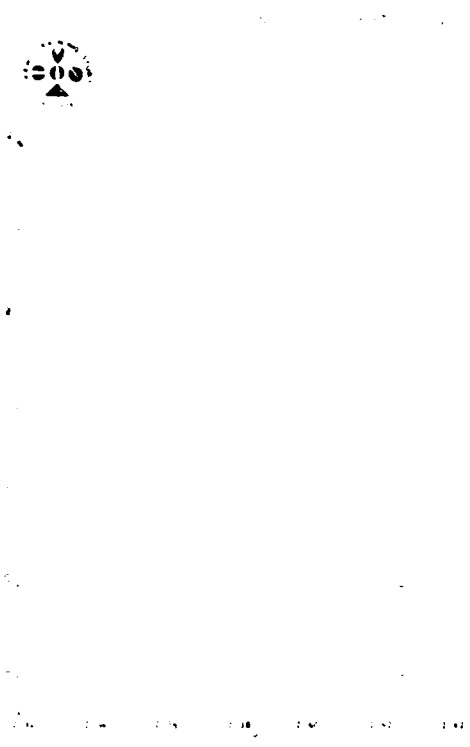


Chart 6 (QL3)

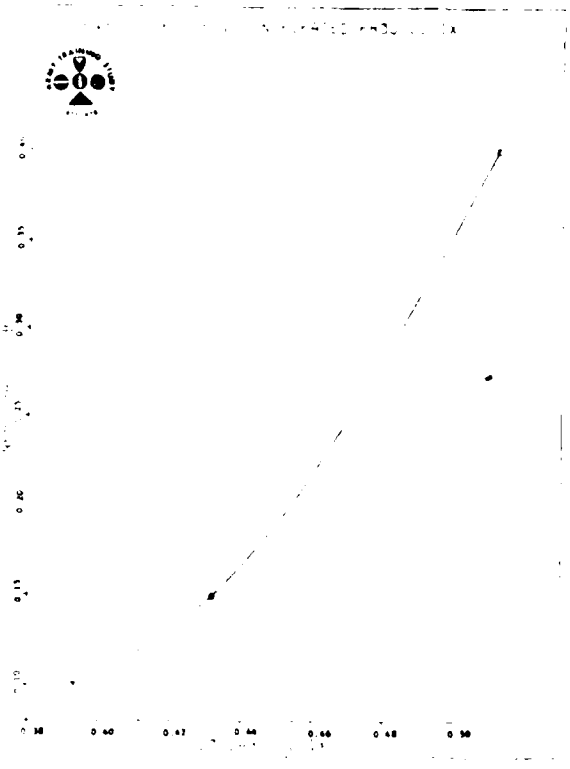
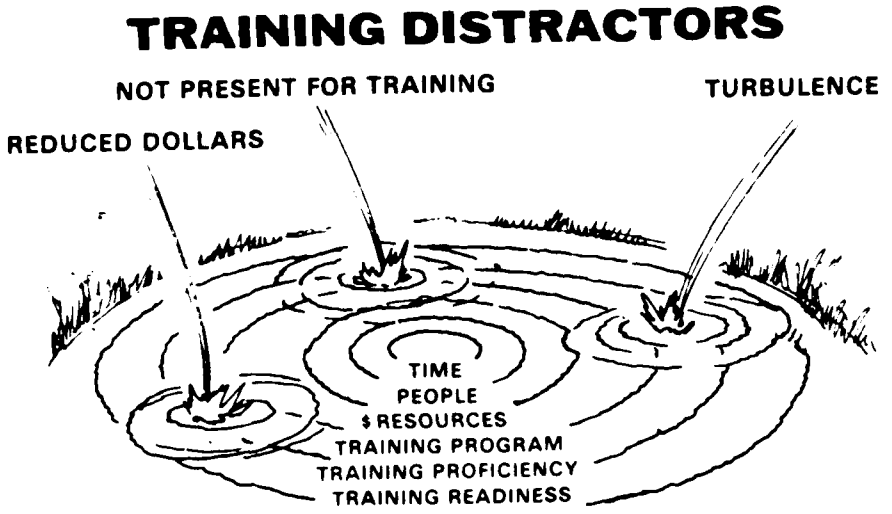


CHART 5 The X axis is the expenditure of millions of dollars for ammunition. The Y axis is the same as Chart 1. The reduction in ammunition costs as trainer grade substitution increases is the direct result of less training occurring. As shown in Chart 3, Chart 4, and Chart 6, the use of resources is increased. The net total is a slightly less expensive program at high percentage of trainer grade substitution. However, the programs conducted do not meet the 95% standard and are significantly less cost effective.

CHART 6 The X axis is the cost of repair parts in tenths of a million dollars. The Y axis is identical to Chart 1. Less efficient use of training time results in increasing repair parts costs. These costs could be avoided by policy changes to restrict (less than 10 percent) NCO grade substitution in all battalions.

DATA AREA: Training Distractors

Distractors are perceived as a major obstacle to accomplishing training objectives. The Battalion Training Survey solicited opinions on effects of the distractors. Subsequently, the Battalion Training Model quantified the projected impact.



SURVEY RESULTS:

1. M60A1 Modified Weapon System Training Effectiveness Analysis (WSTEA), TRASANA, June 1978.

There were numerous crewmen complaints as to the adverse impact of outside influences on their ability to train to proficiency. While the data does not discriminate as to the nature of these distractors, it is assumed that across the sample of ten battalions these distractors are related to guard, housekeeping, and support reqirements as well as to mandatory training subjects not directly related to tank crew proficiency. Seventy percent (70%) of CONUS crews (438 crewmen) and sixty percent (60%) of USAREUR crews (358 crewmen) stated that a "big improvement" on Table VIII scores would result if they could train more as a full crew. (Paraphrased, Appendix B, QL 4)

2. ARTS Survey

Survey respondents selected post support, command directed activities, and shortage of capable NCOs as the three leading distractors to individual training. Similiarly, post support, command directed activities, and lack of time were selected as leading distractors to collective training. The two source questions and their mean responses are shown on the following page:

"Listed below are 12 obstacles to effective individual training. Rank order them 1 (worst obstacle) to 12 (least obstacle)."

$\bar{X}$	
5.8	Personnel turbulence (unit generated)
6.5	Resource (money, fuel, ammo) constraints
4.9	Command directed activities
4.5	Post support requirements
6.6	People programs (EEO, Drug/Alcohol, OE, etc.)
6.9	General administration
8.0	Maintenance
5.2	Shortage of capable NCOs
8.4	Shortage of training areas
6.7	Inadequate training management
5.3	Lack of time for proper training
8.6	Shortage of qualified officers

"Listed below are 12 obstacles to effective collective training. Rank order them 1 (worst obstacle) to 12 (least obstacle)."

6.0	Personnel turbulence (unit generated)
5.7	Resource (money, fuel, ammo) constraints
4.9	Command directed activities
4.8	Post support requirements
7.0	People programs
7.2	General administration
7.8	Maintenance
5.7	Shortage of capable NCOs

7.7 Shortage of training areas

6.8 Inadequate training management

5.3 Lack of time for proper training

8.5 Shortage of qualified officers

ARTS Survey addressees were asked the following question. Their mean responses are shown by arrows on page TD-4.

"The following statements describe potential problems which may apply to a unit. Please indicate the extent to which you think each of the following is a problem:"

$\bar{X}$		To A Very Great Extent	To A Great Extent	To Some Extent	To A Little Extent	To A Very Little Extent	I don't know
4.0	Lack of motivated officers willing to perform their duties	1	2	3	4	5	8
2.2	Too many nontactical requirements imposed on the unit	1	2	3	4	5	8
2.3	Shortage of qualified NCOs	1	2	3	4	5	8
3.0	Lack of experienced administrative personnel in the hard skill areas	1	2	3	4	5	8
2.9	Complete turnover of personnel every 7 or 8 months and the impact on training	1	2	3	4	5	8
3.7	The officers and NCO's are called to perform duties well beyond the normal experience level -- for example -- line companies commanded by lieutenants with less than two years service	1	2	3	4	5	8
2.4	The training load made difficult by changing priorities of higher headquarters	1	2	3	4	5	8
3.0	Insuring day-to-day training is is conducted	1	2	3	4	5	8
2.9	Lack of motivated NCOs willing to adequately perform their duties	1	2	3	4	5	8
3.5	Shortage of qualified officers	1	2	3	4	5	8
2.4	Discipline. The need for stronger discipline in the new changing Army.	1	2	3	4	5	8

ARTS Survey addressees were asked the following question which highlights negative reaction to post support requirements. Their mean responses are as indicated.

"On the average, how much time do you personally devote each week to:"

	Less than one hour	1-2 hours	3-5 hours	More than 5 hours	
Reading training support materials (SM, TEC, ARTEP, ETC.)					
This is how it is now	1	2	3	4	X 1.9
This is how I'd like it to be	1	2	3	4	X 2.8
Reading all administrative literature except training support materials (DA Pamphlets, Circulars, etc.)					
This is how it is now	1	2	3	4	X 2.2
This is how I'd like it to be	1	2	3	4	X 2.3
Planning for training					
This is how it is now	1	2	3	4	X 2.6
This is how I'd like it to be	1	2	3	4	X 3.3
Meeting post support requirements					
This is how it is now	1	2	3	4	X 2.9
This is how I'd like it to be	1	2	3	4	X 1.6
Performing small unit (SQD/PLT) training					
This is how it is now	1	2	3	4	X 2.1
This is how I'd like it to be	1	2	3	4	X 3.1
Performing company size unit training					
This is how it is now	1	2	3	4	X 2.2
This is how I'd like it to be	1	2	3	4	X 3.1
Performing large unit (BN/BDE) training					
This is how it is now	1	2	3	4	X 1.9
This is how I'd like it to be	1	2	3	4	X 2.7

3. Battalion Training Survey (BTS)

As described above, ARTS survey respondents selected post support, command directed activities, and shortage of capable NCOs as the three leading distractors to individual (and, by inference, collective) training. The effects of a shortage of capable NCOs can be roughly equated to the effects of trainer grade substitution. Post support and command directed activities have two effects on training - reduction of personnel present for training and complete elimination of meaningful training on certain days (creation of nontraining days).

Trainer grade substitution means the use of a trainer of a lower grade than prescribed by the Table of Organization and Equipment. The premise is that a lower grade, and, therefore, less experienced trainer would require more time per training period to train his men to the same level of competence. The BTS respondents felt that the following factor should be applied to the length of time required to train a given task.

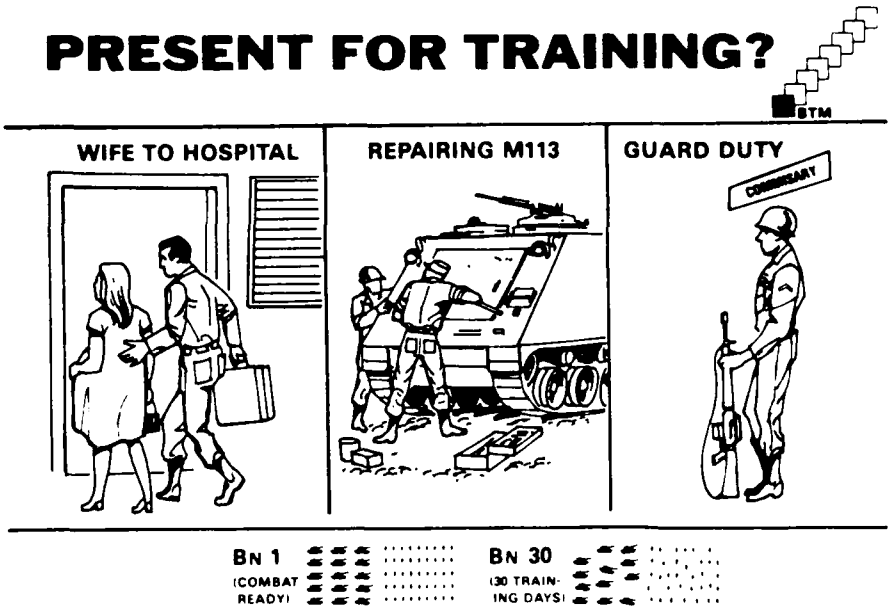
Effect on Length of Training Period
(for 95% Proficiency)
Caused by Trainer Grade Substitution (%) (QL3)
n = 227

Analytical Baseline

Trainer Grade Substitution	10%	15%	20%	25%	30%	40%
Time Factor	.86	1.00	1.18	1.39	1.64	2.31

Reduction of personnel present for training has the effect of increasing the average number of times training on a given task must be presented to insure that an adequate number of unit personnel maintain proficiency so that the unit as a whole can demonstrate combat ready standards.

PRESENT FOR TRAINING?



The "not present for training" category describes the daily turmoil within a unit in terms of soldiers who are not available for training due to details, administrative requirements, medical appointments, or other reasons. Battalion Training Survey results are shown below:

Effects on Frequency of Sustainment Training (at 95% Proficiency Level) Caused by Changes in "Not Present for Training" (Average Daily %) (QL3)

Trainer Grade Substitution	15%	20%	25%	30%	40%	50%	60%
Time Factor	.71	.85	1.00	1.16	1.54	2.00	2.57

Factors shown in the table above serve as multipliers to the battle drill frequencies to define a training program for the specified level of "not present for training."

Days on which training cannot be conducted (nontraining days) have the effect of reducing the training which can be fitted into a year. It is apparent that every day during which other activities prevent training places a tighter constraint on the time resource and a resultant reduction on the ability to complete the 95% training program.

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquistion of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on

these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for training, grade substitution, and soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC and the Sergeant's Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel. For further information, see the Battalion Training Survey volume.

RELATED INFORMATION:

Battalion Training Model

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95 percent battlefield; determining the sensitivity of the model to varying personnel conditions; and development of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95 percent battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance time, and nontraining time. Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

The factors developed in the Battalion Training Survey were applied to the Battalion Training Model in the following manner. One pair of sensitivity runs addressed the joint effect of changes in not present for training and trainer grade substitution.

Effects of Simultaneous Changes in "Not Present for Training" and Training Grade Substitution (QL3)

PERSONNEL CONDITONS

Resources:	Turbulence	20%	20%	% Change
	Not Present Tng	20%	25%	+ 5%
	Tnr Grade Subs	10%	15%	+ 5%
Training Days		124	162	+23%
Nontraining Days		71	33	-115%
Maintenance Days		58	58	0%
P2 Cost ($M)		.37	.43	+67%
Ammunition Cost ($M)		1.67	1.89	+12%

The impact of the distractors can be seen on the following six charts which portray sensitivity runs of the BTM.

This chart series depicts the impact of personnel factors on training time. The five alternatives computed for this series considered turbulence per quarter, average percentage not present for training, and percentage of NCO trained grade substitution. The specific percentage values are explained in the table below:

Detractor Level	Turbulence	Not present for training	Trainer Grade Substitution
1	20%	15%	15%
2	20%	20%	10%
3	20%	20%	15%
4	20%	25%	15%
5	35%	25%	15%

Chart 1 (QL3)

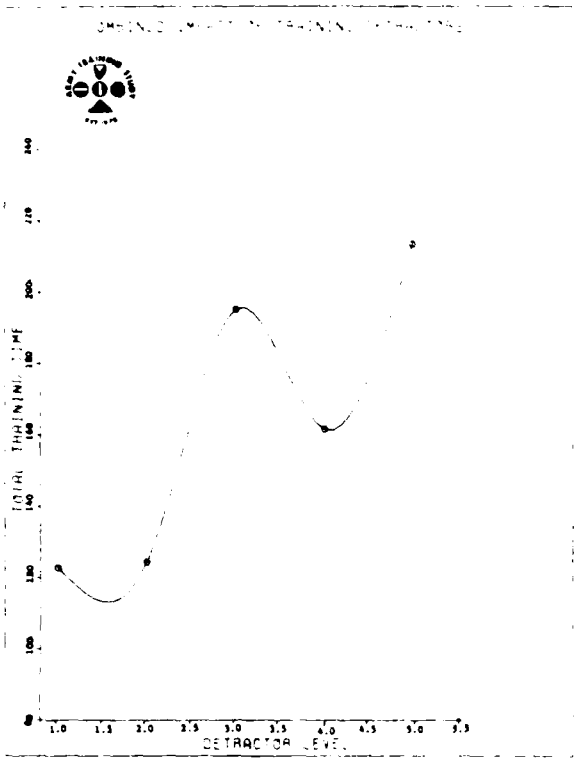


Chart 2 (QL3)

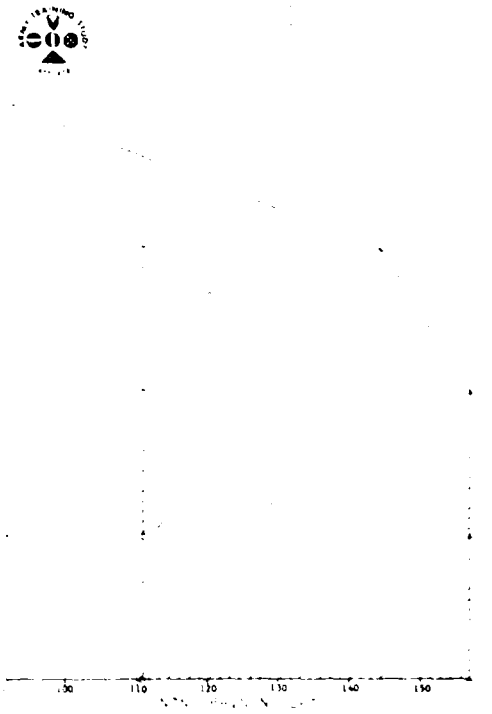


Chart 1 The X axis portrays the 5 detractor levels as defined above. The Y axis porcrays the computed total training days required for a 95 percent program.

The total training time chart indicates the number of days required to complete a program requiring 95 percent proficiency. The number of days required generally increases as personnel conditions degrade a unit's capability for training. The dip noted at Level 4 can be attributed to a training program where the present for training strength caused the computer selection of quick easy-to-complete retraining in lieu of longer more complex retraining. At Level 5, the absence of NCO trainers and increased turbulence substantively slowed the retraining process. Level 5 may be compared to statistics characteristic of many battalions today.

Chart 2 The X axis depicts the number of nontraining days computed. Weekends and holidays are indicated by the vertical at 112 days. The X axis is detractor levels as defined above. The time remaining after the required program achieved is plotted as nontraining days. The hashed area to the left of 112 weekend & holidays indicates that Level 5 conditions seriously detract time from other very important functions found at the battalion level. If conditions improve to Level 4 or better, well balanced programs are possible at the battalion level. The remaining charts deal with dollars of the total P-2 program as well as its major components of CIII (POL), CL V (Ammo, CL IX (Repair Parts).

Chart 3 The X axis depicts the detractor levels as defined above. The Y axis is the computed cost of P2 mission dollars in tenths of a million. P2 dollars appear to be stable at Level 1, but become very sensitive at levels 2 thru 5. Levels 4 to 5 show great senstitivity to increasing costs. The BTM was not operated above Level 5 during BTM analyses at publication time, thus extrapolations will have to be run at a later date. At some higher level the P2 cost should attenuate.

Chart 4 The X axis depicts the detractor levels as defined above. The Y axis is the computed cost of POL ranging from $57K thru $79K. POL costs constantly increase as personnel conditions degrade. Both diesel and MOGAS estimates are included in these figures. Battle drill estimates of fuel consumption were derived from the FORSCOM Training Management Contol System (TMCS). See Battalion Training Model Volume, Chapter II for more details.

Chart 3 (QL3)

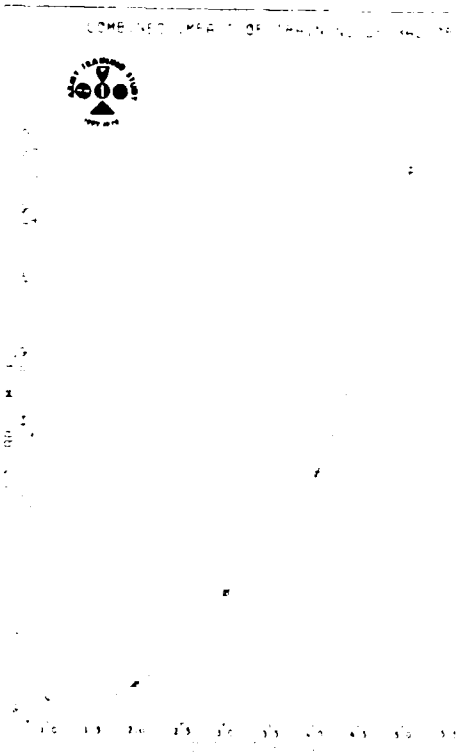


Chart 4 (QL3)

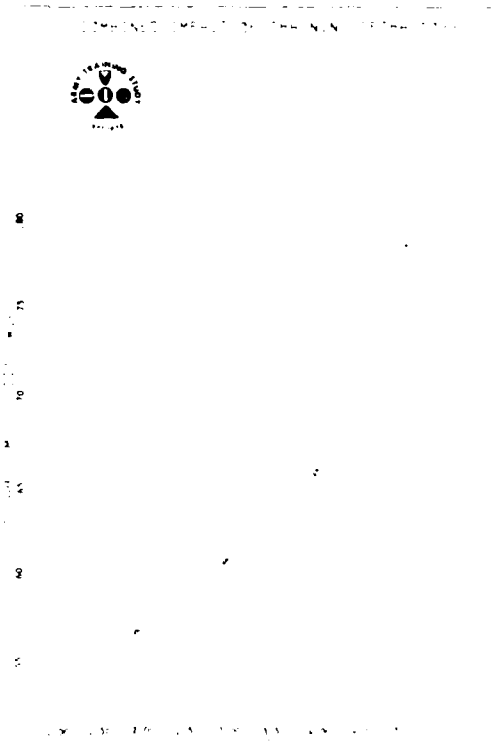


Chart 5 The X axis depicts detractor levels as defined above. The Y axis denotes the computed ammunition expense in millions of dollars. The flattening of the graph between Level 2 and Level 3 indicates a relative increase in Trainer Grade Substitution from 10 percent to 15 percent causes no change in ammunition cost. However, a decrease in present for training (from 80 percent to 75 percent) markedly increases costs. This demonstrates that the combined interaction of detractors must be considered in any basic explanation of cost attribution.

Chart 6 The X axis depicts detractor levels as defined above. The Y axis in the computed cost of repair parts expended. Repair parts demonstrate a cost sensitivity similar to Class II (POL). The greatest increase is noted in Level 4 to Level 5. Turbulence is the driving factor in this increase. For a detailed analysis of Turbulence see Section E in this book.

Chart 5 (QL4)

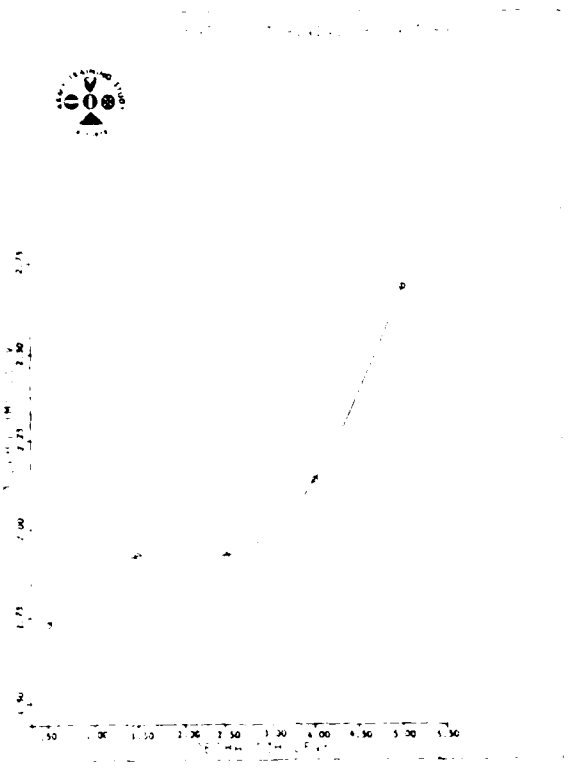
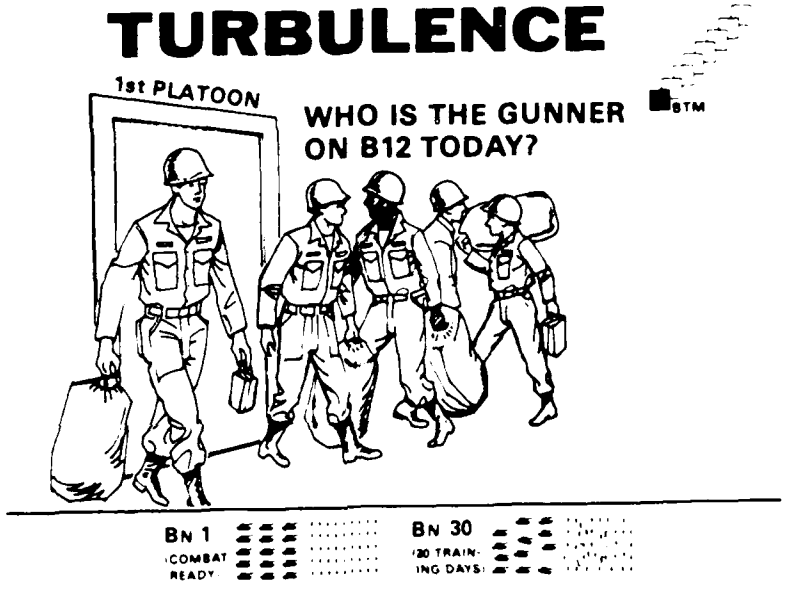


Chart 6 (QL3)

DATA AREA: Turbulence/Turnover

ARTS tests and surveys revealed extensive turbulence (movement of personnel within the unit) and turnover (movements due to the normal processes of the personnel system). Survey responses of field trainers suggest an attitude of acceptance of turbulence/turnover up to a certain level. The Battalion Training Model projects the impact of turbulence/turnover on battalion training proficiency.



TEST RESULTS:

1. THE EFFECTS OF TANK CREW TURBULENCE ON TANK GUNNERY PERFORMANCE, (Draft) ARI, Fort Knox Field Unit, June 1978.

There was considerable turbulence in the five USAREUR Armor battalions evaluated. Complete crews had been together on the average of 1.2 months, while typical tank commander/gunner pairs had been together for an average of 2.5 months. Typical tank commanders, gunners, drivers, and loaders had held their positions 24.3, 8.9, 7.7, and 4.1 months, respectively. Variation was great on both length of time crewmen had worked together and length of time individuals had assigned their respective positions as shown on the following page. (Paraphrased, pg. 12, QL2)

Descriptive Statistics for Phase I, Tank Crew Turbulence (Pg. 12, QL2)

Crew Stability (n =)	Mean	Median
1. Months crew assigned together (211)	2.2	1.2
2. Months crew assigned on Table VIII tank (210)	1.9	1.1
3. Months crew trained together (211)	1.5	.8
4. Months TC and GR assigned together (211)	3.5	2.6
5. Months TC and GR assigned on Table VIII tank (211)	3.4	2.5
6. Months TC and GR trained together (211)	2.9	1.9
7. Months TC on Table VIII tank (211)	6.8	4.1
8. Months TC assigned as TC (208)	36.6	24.3
9. Months TC trained as TC (209)	28.1	24.4
10. Months TC on M60 tanks (208)	47.7	45.5
11. Months GR on Table VIII tank (211)	5.3	3.4
12. Months GR assigned as GR (209)	12.6	8.9
13. Months trained as GR (209)	13.5	8.4
14. Months GR on M60 tanks (208)	27.4	24.3
15. Months DR on Table VIII tank (200)	5.4	3.2
16. Months DR assigned as DR (204)	11.1	7.7
17. Months DR trained DR (204)	11.2	7.6
18. Months DR on M60 tanks (199)	16.3	12.5
19. Months LR on Table VII tank (198)	4.0	2.1
20. Months LR assigned as LR (199)	7.3	4.1
21. Months LR trained as LR (200)	7.4	4.0
22. Months LR on M60 tanks (199)	13.4	9.3

The experience of the tank commander and the gunner in their respective position was positively correlated with Table VIII performance. The more experience the tank commander had in the position also correlated with shorter opening times. The longer the tank commander and gunner had served together was also correlated with shorter opening times.

TURBULENCE - GUNNERY RELATIONSHIPS (pg. 14, QL1)

Note: The more negative the opening time, the better. Conversely, the more positive the number of targets hit, the better the correlation.	Analysis of Transformed Table VIII Scores	
	Opening Time	Targets Hit
1. Months crew assigned together	-.14	+.03
2. Months crew assigned on Table VIII tank	-.12	+.03
3. Months crew trained together	-.12	-.01
4. Months TC and GR assigned together	-.15	+.02
5. Months TC and GR assigned on Table VIII tank	-.14	+.04
6. Months TC and GR trained together	-.19*	+.02
7. Months TC on Table VIII tank	-.21*	+.02
8. Months TC assigned as TC	-.28**	+.03
9. Months TC trained as TC	-.23**	-.01
10. Months TC on M60 tanks	-.13	-.06
11. Months GR on Table VIII tank	-.12	-.02
12. Months GR assigned as GR	.00	+.10
13. Months GR trained as GR	+.05	+.10
14. Months GR on M60 tanks	-.03	+.11
15. Months DR on Table VIII tank	-.10	-.10
16. Months DR assigned as DR	-.14	-.02
17. Months DR trained together	-.07	-.02
18. Months DR on M60 tanks	-.17	-.10
19. Months LR on Table VIII tnak	-.11	-.01
20. Months LR assigned as LR	+.03	-.05
21. Months LR trained as LR	-.01	-.03
22. Months LR on M60 tanks		

$184 \leq N \leq 211$

* $p < .01$

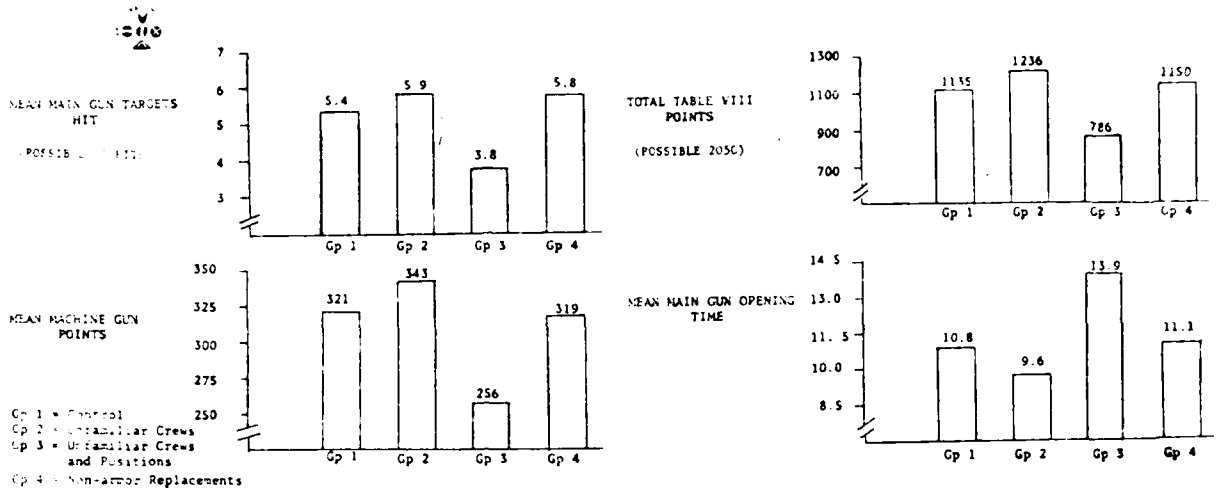
** $p < .001$

Earlier testing established a relation between a tank commander's position familiarity and gunnery performance and a relation between tank commander/gunner stability and gunnery performance. Causal relationships, however, were not clearly shown. The test continued with one CONUS armor battalion to further investigate these causal relationships by artificially creating levels of turbulence to facilitate the evaluation of their effects on gunnery performance. To create the necesary levels and types of turbulence the experiment used four structured groups. Group one was

the control group. The other three groups were experimental groups representing the different states of turbulence. Personnel in groups one, two, and three held 11E MOS and had recently completed Table VIII firing. In Group 4, nonarmor crewmen were assigned duties as gunners and loaders. The purpose of including Group 4 in this test was to determine the validity of performance based, individually paced, tank crewmen skills training (TCST) concepts as applied to accelerated tank crew replacement training. These crewmen received three days of intensive training specifically designed to prepare them to fire Table VIII. The hypothesis was that such personnel, given a training module which also includes maintenance training and tactical training, could become adequate tank crew replacements in post-mobilization emergencies. All members of group four were assigned to unfamiliar tanks and were unfamiliar to each other.

Results indicate that unfamiliarity with duties of the tank commander and gunner has a serious effect on Table VIII gunnery performance. (Paraphrased, pg. 48, QL3)

Group 1, the control group, was composed of crews which had recently completed Table VIII, in their normally assigned tanks. This group achieved a mean score of 1135 of a possible 2050, with mean main gun target hits totalling 5.4 out of 10 possible with a mean of 10.8 seconds for the control group. Group 3, composed of trained 11E crewmen serving in unfamiliar positions, was markedly poorer in gunnery performance. Group 3 tank commanders had been replaced by their gunners, and gunner positions were filled by loaders. Driver and loader positions were filled with men who had held those positions during the recently completed gunnery program. Group 3 crewmen had not previously worked or trained together. The mean gunnery performance as a function of a group assignment is shown of the following page. (Paraphrased, pgs. 47, 48, 49, QL3)



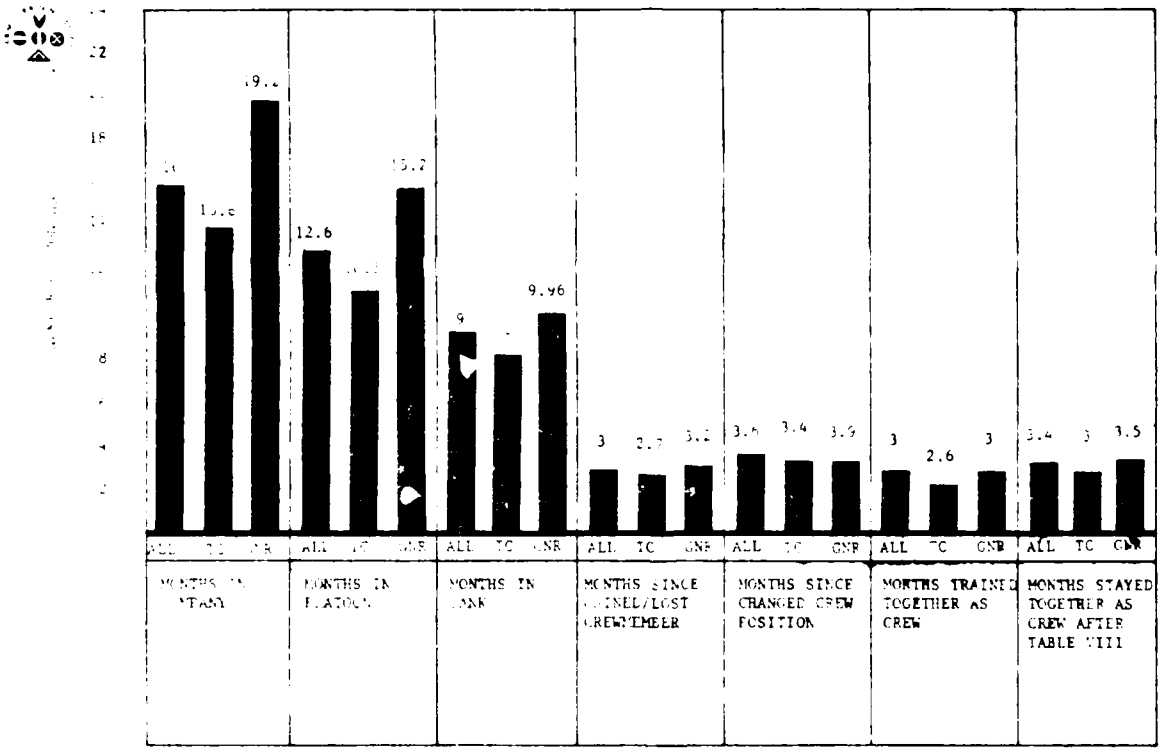
Tank Gunnery Performance as a Function of Group Assignment
(Pg. 34, QL3)

In summary, whole crew personnel familiarity d.d not have a significant effect on gunnery performance. Experience in a particular position appears as a significant factor in gunnery performance. Changing a crewman's duty position without training him for his new duties leads to markedly reduced performance. Incorporation of nonarmor personnel into crews as gunners and loaders did not degrade gunnery performance. Baseline gunnery performance, however, was well below acceptable standards. Crew unfamiliarity with the specific tank used on Table VIII appeared to have only limited impact on gunnery performance. This may have been because baseline turbulence was such that few crews in the tested unit could have trained for long periods on an assigned tank. (Paraphrased, pgs. 42-46, QL3)

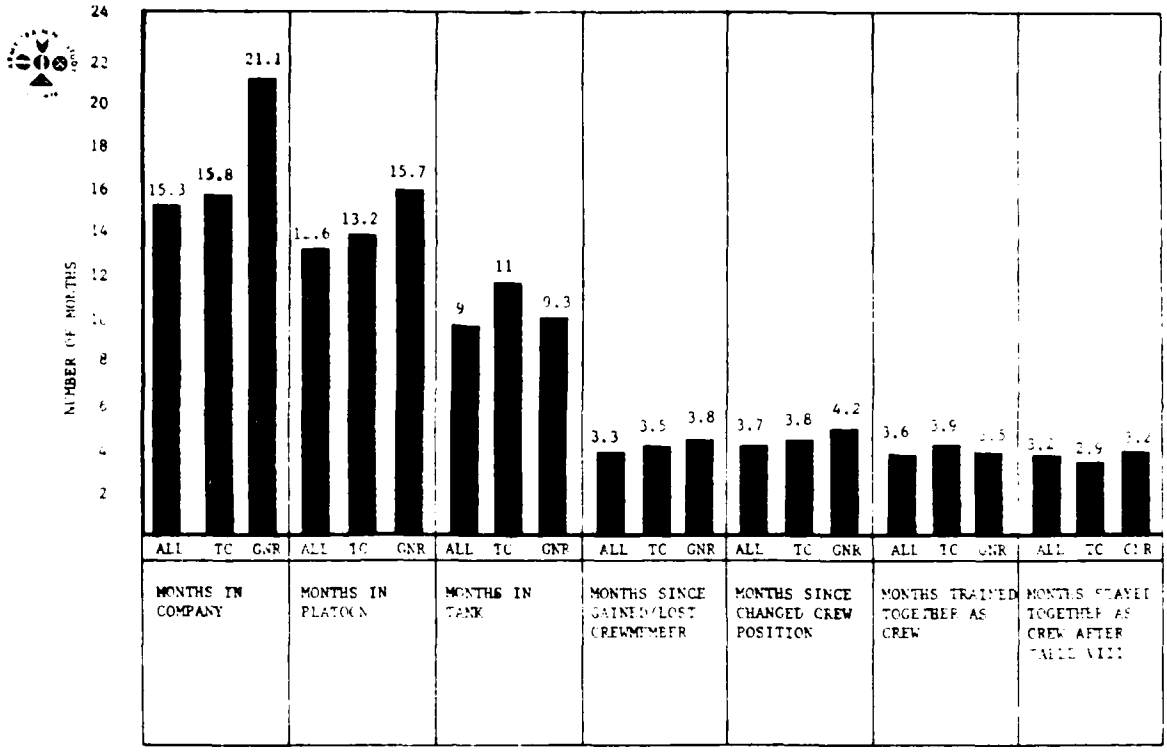
The level of turbulence within the test battalion in CONUS is consistent with turbulence levels reported in the M60A1 WSTEA study. Turbulence of this magnitude at the crew/platoon level may have precluded the establishment of an adequate baseline from which to measure the effects of turbulence to tank gunnery performance. In other words, the potential performance of crews which have been stablized through a series of tank gunnery programs is unknown. This conclusion is reinforced by analysis of crew performance in both studies wherein all groups fired considerably below design capability. The baseline group in this study exhibited a combined Heat/Armor Piercing Discarding Sabot Ph mean of .5366 while firing Table VIII the second time. (ARTS, QL4)

2. M60A1 Modified Weapons System Training Effectiveness Analysis (WSTEA), TRASANA, June 1978.

The average crewman has been assigned to his tank company 16 months (mean) in USAREUR and 15.4 months (mean) in CONUS. However, the mean time the crew has trained together is 3.1 months in USAREUR and 3 months in CONUS. While the standard deviation is large (10 and 6 months respectively) for these data, it is evident that a significant amount of turbulence within crews/platoons is being internally generated within the unit. This conclusion is reinforced by data showing that 50.6% of the crewmen did not fire Table VIII with their assigned crew. (Paraphrased, Appendix D, QL2)



Turbulence (CONUS) (n = 662) (ARTS, QL2)



Turbulence (USAREUR) (n = 626) (ARTS, QL2)

Additionally, the M60A1 WSTEA concluded the following availability for training, possibly resulting in part from turbulence;

PERCENT OF CREWMEN AVAILABLE FOR TRAINING (ARTS, QL2)

CONUS	NO ONE ASSIGNED	NEVER	SELDOM	HALF THE TIME	USUALLY	ALWAYS
Driver	10%	2%	3%	5%	19%	60%
Loader	26%	6%	8%	7%	18%	25%
Gunner	7%	4%	6%	8%	21%	54%
Tank Commander	1%	2%	4%	3%	14%	76%
USAREUR						
Driver	5%	1%	2%	5%	15%	73%
Loader	19%	4%	4%	6%	16%	52%
Gunner	5%	3%	2%	5%	17%	68%
Tank Commander	2%	3%	2%	3%	11%	80%

SURVEY RESULTS:

1. Battalion Training Survey.

For different weapons systems there are different numbers of personnel changes within the crew that can be accepted before it is necessary to conduct training to rebuild the team.

Among crew members (not leaders/vehicle commanders) how many personnel changes can occur before crew retraining is required: (example: can you lose a loader on a tank and not have to retrain the crew immediately to maintain fully combat ready (95%) status?

	Mean	S.D.	.95% Conf. Int.
Tank 1	1.037	0.698	0.918-1.157
TOW 1	1.062	0.601	0.903-1.160
RIFLE SQUAD 3	3.162	1.082	7.986-3.338
MORTAR 1	1.371	0.724	1.226-1.586
RIFLE PLATOON 10	9.785	3.928	9.188-10.43

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquisition of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for training, grade substitution, and soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC and the Sergeants Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel. For further information, see the Battalion Training Survey volume.

2. REDEYE Weapons System, Technical Report 6-78, TRASANA, August 1978.

Instability within Redeye sections is presently about 50 percent per year in long tour areas and 100 percent per year in short tour areas. Based on questionnaire responses, the turnover rate of Redeye gunners is approximately 30 percent per year. Based upon the number of gunners available for retesting in the units visited during during the WSTEA, however, the actual instability in the Redeye sections was approximately 50 percent per year. (Paraphrased, Section 8, QL4)

3. ARTS Survey.

ARTS Survey addressees were asked the following four questions relating to minimum present for duty strengths at various organizational levels. Their mean responses as well as comparable responses from the 1971 Gorman Survey (BFDT) are shown below;

	ARTS Survey (%)		Gorman Survey (%)	
	ENL	NCO/OFF	ENL	NCO/OFF
What do you consider to be a minimum platoon "present for duty" strength to achieve dynamic plt. training? (Please answer in terms of TOE strength, not assigned strength.)	76.8	81.2	75.0	76.0
What do you consider to be a minimum company "present for duty" strength to achieve dynamic co. training? (Please answer in terms of TOE strength, not assigned strength.)	79.2	80.2	76.?	75.0

	ENLISTED	NCO/OFFICER
What do you consider to be the maximum platoon turbulence (personnel shifts within the platoon including movement from one squad/crew to another as well as personnel shifts out of the platoon to achieve Dynamic Platoon Training (Please answer in terms of TOE strength, not assigned strength.)	22.6%	19.6%
What do you consider to be the maximum company turbulence (personnel shifts within the company and outside as well) to achieve Dynamic Company Training (Please answer in terms of TOE strength, not assigned strength.)	23.0%	19.8%

Three additional questions focused on turbulence as an obstacle to optimum unit capabilities. Analysis of these questions revealed is displayed below:

Listed were 12 obstacles to effective collective training. Among them, "personnel turbulence" was ranked:

	(1) worst obstacle to (12) least obstacle	percent distribution
	1	11.4
	2	7.5
	3	9.6
	4	10.7
	5	8.5
Personnel Turbulence =	6 ◄	9.9
	7	6.5
	8	7.7
	9	8.1
	10	4.9
	11	7.7
	12	7.5
		100.0%

To what extent do you think "complete turnover of personnel every 7 or 8 months and the impact on training" is a problem?

$\bar{X} = 2.9$	percent distribution
(1) To a very great extent	18.1
(2) To a great extent	24.3
(3) To some extent	30.7
(4) To a little extent	16.2
(5) To a very little extent	10.7
	100.0%

How important do you think the "personnel turnover" is in determining how well a unit performs?

$\bar{X} = 3.2$	percent distribution
(1) Very Unimportant	2.2
(2) Fairly Unimportant	12.2
(3) Fairly Important	50.8
(4) Very Important	34.8
	100.0%

The importance attributed to turbulence as a problem seems slightly ambiguous. When respondents were asked about the extent to which complete turnover of personnel was a "training" problem, the most popular response was "to some extent" which is basically a neutral area between "to a great extent" and "to a little extent." However, when asked about the importance of personnel turnover in determining a unit's "performance" 85.6% of the respondents said it was important. Yet, when asked to rank turbulence among other "training" obstacles the mean ranking was only 6 (in a list of 12 obstacles). Moreover, the distribution of ranks assigned to turbulence showed no concensus among respondents.

In actual combat, how important do you think squad or platoon solidarity is to a unit's accomplishment of its mission?

$\bar{X} = 3.6$	percent distribution	percent saying unimportant and important
(1) Very Unimportant	1.2	3.5
(2) Fairly Unimportant	2.3	
(3) Fairly Important	27.2	96.5
(4) Very Important	69.3	
	100.0%	100.0%

It could be that the respondents have shown a distinction between the turbulence effect on "training" and it's effect on "performance." Essentially all of the respondents thought that group solidarity was important to a unit's performance in combat; and, 85.6 percent claimed turbulence to be an important part of unit performance. It may be that the lesser importance attributed to turbulence reflect the respondents' views that the personnel turnover is not great enough to be very problematic to military training. However, a unit's subsequent performance may be affected.

Since there was little consensus on the training items, analyses were continued to compare the responses given by soldiers in different theaters, branches, and ranks. The analysis of variance technique was incorporated; and, the information relevent to statistical interpretation is presented below:

Listed were 12 obstacles to effective collective training. Among them, "personnel turbulence" was ranked.
(1) worst obstacle to
(12) least obstacle

To what extent do you "complete turnover of personnel every 7 or 8 months and the impact on training" is a problem?
Scaled: (1) To a very great extent; thru (5), To a very little extent

	THEATER	X	SD	X	SD
(n=367)	CONUS	5.76	3.49	2.71	1.37
(n=140)	USAREUR	6.76	3.41	3.26	1.46
		F=8.58 sig. at .0035		F=15.79 sig. at .0001	

	BRANCH	X	SD	X	SD
(n=119)	INFANTRY	6.52	3.38	2.93	1.12
(n=72)	ARMOR	5.63	3.80	2.67	1.34
(n=105)	FIELD ART.	6.20	3.40	2.62	1.26
(n=12)	AIR DEF.	5.73	3.17	2.33	.89
(n=103)	COMBAT SUP.	5.59	3.35	3.00	1.54
(n=92)	SERVICE SUP.	6.12	3.49	3.09	1.71
		F=1.09		F=2.00	
		sig. at .37		sig. at .08	

	RANK	X	SD	X	SD
(n=30)	O-6	4.24	3.03	2.40	1.04
(n=72)	O-5	6.60	3.67	2.81	1.31
(n=61)	O-4	6.85	3.42	2.74	1.22
(n=195)	O-1 to O-3	5.68	3.23	2.76	1.37
(n=86)	E-7 to E-9	6.12	3.65	2.92	1.60
(n=66)	E-1 to E-6	6.31	3.54	3.35	1.46
		F=3.20		F=2.66	
		sig. at .007		sig. at .02	

The Effect of Turbulence on Unit Training Broken Down by Theater, Branch, and Rank.

CONUS gave turbulence a mean rank of 5.76 among 12 obstacles which was one full rank higher than that given soldiers in USAREUR (and, this difference was found to be statistically significant). Those in CONUS again perceived turbulence as more problematic to training than those in USAREUR (and, again, the difference was significant).

When breaking these two items down by branch, there was no consistency between branch ratings.

A breakdown by rank (in the lower section of the Table) showed that, on both items, colonels saw turbulence as significantly more problematic to training than did the other ranks. Moreover, on both items, enlisted men below E-7 rated turbulence as less of a problem than did most other rank groupings.

RELATED INFORMATION:

1. Battalion Training Model

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95% battlefield; determining the sensitivity of the model to varying personnel conditions; and development of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance time, and nontraining time. Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

Turbulence is described as changes in duty position, i.e., the personnel movements within the unit. Data for this computation were taken from the Battalion Training Survey. Survey results are shown below:

STD DEV = .27
SAMPLE SIZE = 171

Effects on Frequency of Sustainment Training (At 95% Proficiency Level) Caused By Changes In Turbulence (% Per Quarter) (QL3)

20%	30%	40%	50%	60%
.72	.89	1.14	1.51	2.04

Factors shown in the table above can be used as multipliers to the battle drill frequencies to define a new training program based on the specified level of turbulence. For analysis purposes, turbulence levels of 20 percent and 50 percent were selected. In the BTM, goals, in number of battle drills, were multiplied by .72 (reflecting 20 percent change in duty position per quarter) and 1.51 (reflecting 50 percent change in duty position per quarter).

Varying turbulence to 20 percent and 50 percent from a baseline 35 percent yields the results shown below. Summarized turbulence results are shown on the following page:

Effects of High and Low Turbulence (% per Quarter) on the Analytical Baseline (QL3)

	20%	35%	50%
Training Days	162	213	307
Non-training Days	33	0	0
Maintenance Days	58	52	58
P2 costs ($M)	.43	.52	.67
Ammunition costs ($M) (QL4)	1.89	2.43	3.41

The variations of conditions, high and low, are equal (that is 15 percent from the baseline), but the results are distinctly unequal. At the high turbulence level, which some units may be experiencing now, an additional 94 training days are required, a 44 percent increase above a program that is already practically unexecutable. Stated another way, the high turbulence case would require that 94 days be taken from what would normally be weekends and holidays in order to conduct minimum training and maintenance, not including any time required for nontraining activities. On the other hand, lowering turbulence an equal amount frees 51 days from training (due to decreased repetitions) so that 33 days are available. The number of battle drills required varies from 68.7 for the analytical baseline to 49.46 for the low case and 103.74 for the high. Likewise the costs vary asymmetrically, decreasing 17 percent P2 and 22 percent CIV (ammunition) in the improved case, and increasing 29 percent (P2) and 40 percent CIV (ammunition) for the worsened turbulence.

The following charts were extracted from the Battalion Training Model (BTM). They were designed to display the impact of turbulence on a totally integrated program of training. Turbulence causes a predictable increase in training time and resource cost. For a more detailed discussion see BTM volume.

Turbulence is regarded by many as the Army's primary detractor from training. If the personnel conditions shown in the base case are realistic conditions for today's Army, then even if a unit is accomplishing fully integrated training it is still falling short of the standards required for the 95% battlefield. If the personnel conditions are worse, the training situation becomes impossible if the objective is 95% proficiency, that is, combat ready tomorrow. On the positive side, however, a relatively modest improvement in turbulence results in a substantial improvement in training days.

Chart 1 (QL3)

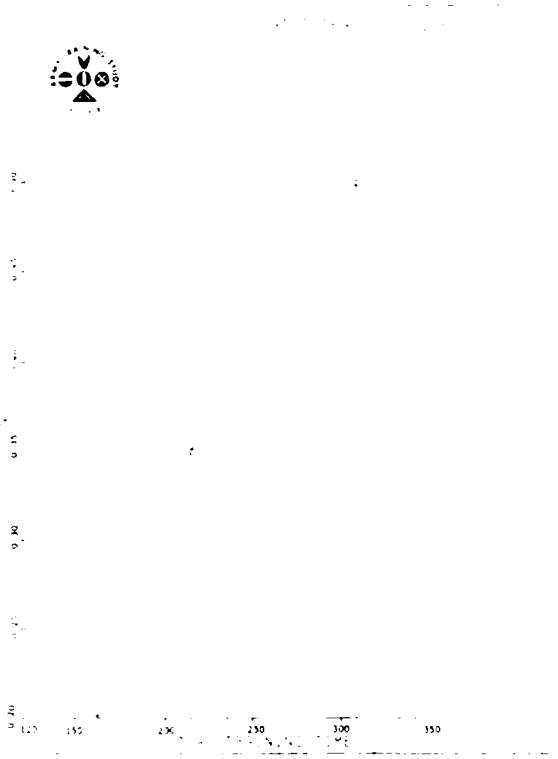


Chart 2 (QL3)

Chart 1.

The X axis depicts the training time required for a 95% proficiency program. The Y axis depicts the percentage turbulence per quarter.

Chart 2.

The X axis depicts the computed nontraining days. Weekends and holidays are indicated by the vertical lines at 112 days. The Y axis is identical to Chart 1. The hatched area represents weekends needed to complete a 95% program.

Turbulence as used in this context represents changes in job position; that is, the results of moving troops to new duties both as a result of transfers in and out of the battalion and of reassigning troops to other duties within the unit. As a rule of thumb, developed from limited data, it appears that turbulence is approximately twice the quarterly turnover rate reflected in the 2175 report.

The excessive training time required detracts from other competing time requirements at about 30 percent turbulence per quarter. The Battalion falls into a training "catch-up" position that results in either low levels of accomplishment or poorly completed training programs. Lowering the turbulence rate to 20 percent made a substantial increase in the availability of nontraining time. Quarterly turnover rates of 10 percent, in conjuntion with intensified action at unit level to minimize shifting of personnel within the unit, would resolve the turbulence condition.

Charts 3 thru 6 show the impact of turbulence by resource area. The impact is consistent for ammunition, POL, and repair parts. The only difference between the charts is a change in scale of the X axis (Dollars-M). The dominating cost factors are ammunition (CL V) and repair parts (CL IX). The constantly rising costs are due to an increase in training frequency as turbulence increases. Turbulence causes the frequency of training to increase for basically two reasons: the soldier may have to acquire some new individual skills peculiar to his new job, and collective training will have to be conducted more often to develop team work as crews and squads are shifted. Thus, the total amount of training the soldier must receive increases. Substantive economic managerial decisions can be generated from this approach. See the Battalion Training Model conclusions and recommendations for more information.

Chart 3 (QL3)

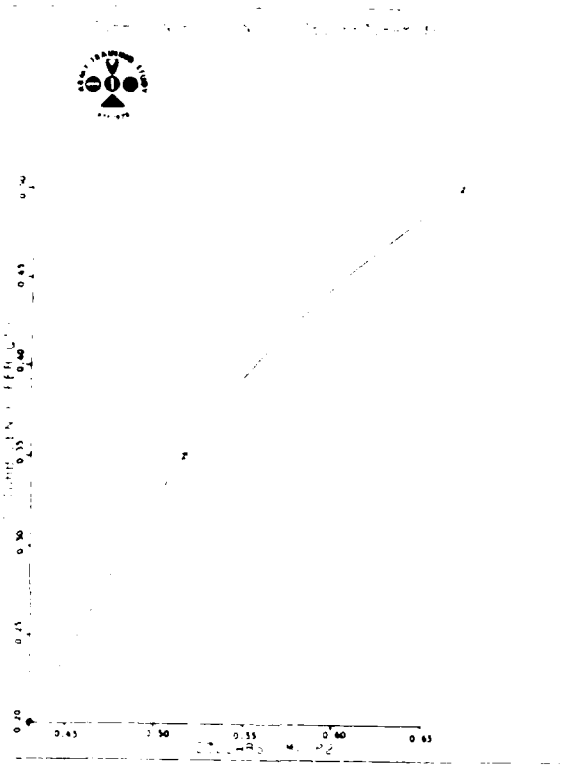


Chart 4 (QL3)

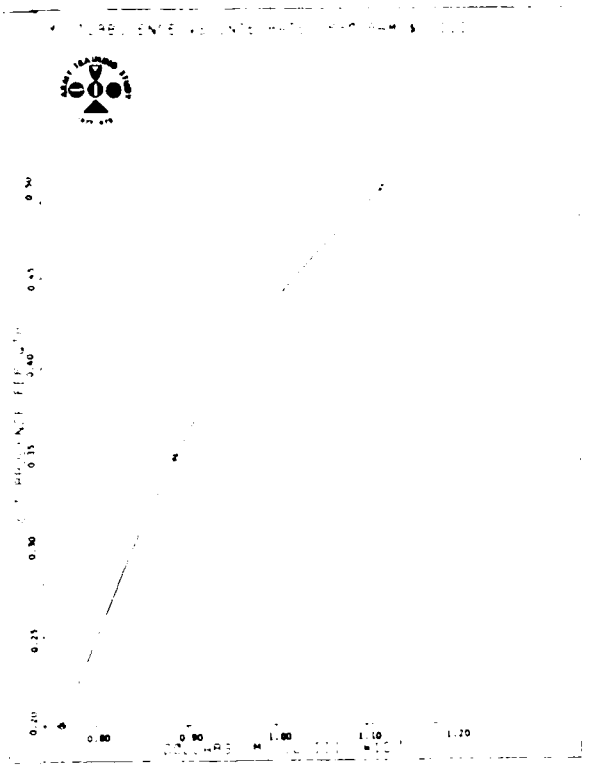


Chart 5 (QL4)

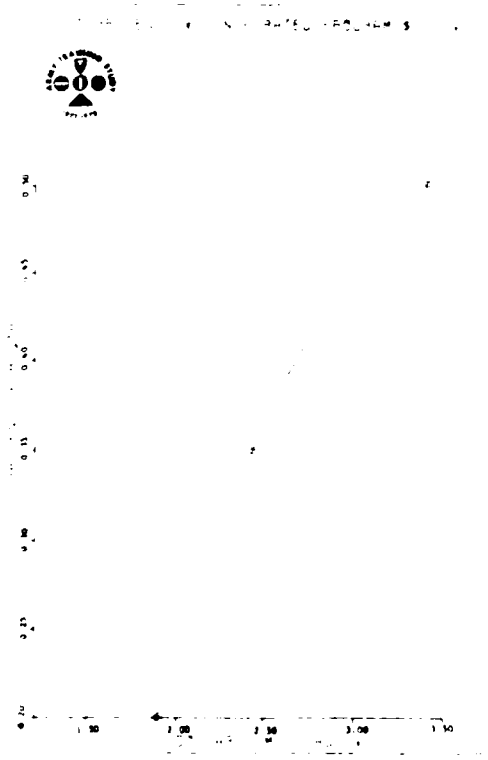
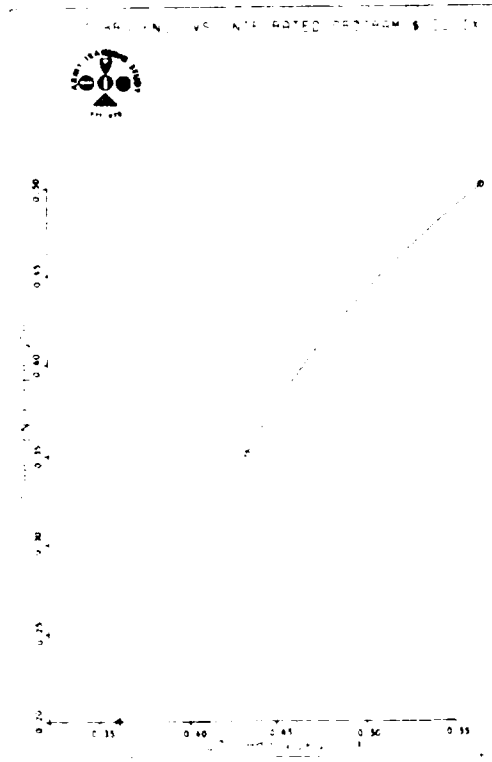


Chart 6 (QL3)



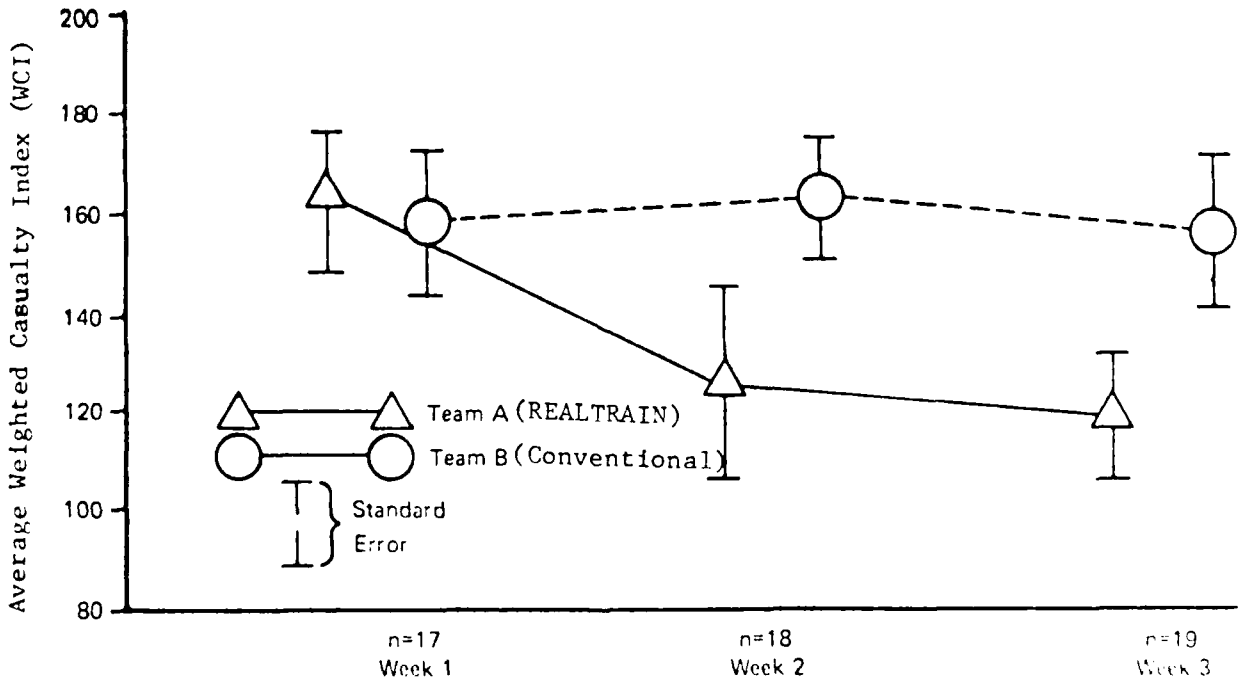
DATA AREA: Simulation

Within their design training objectives, fielded simulation packages appear to be more efficient and effective than conventional training toward the same objectives. Participant enthusiasm is characteristically high. Those inexperienced in simulation tend to express doubt and favor traditional training approaches which suggests simulation initiatives are not welcomed by a ready market.

TEST RESULTS:

1. Initial Validation of REALTRAIN with Army Combat Units in Europe, US Army Research Institute, October, 1976.

"Training effectiveness results are impressively positive and consistent: Team A won 16 meeting engagements; Team B won 4; 13 resulted in ties. Casualty results show that in Week 3 across all sites the vehicle casualty ratio (vehicles killed/vehicles played) was .36 for Team A, .52 for Team B; personnel casualty ratios were similar. As measured by a Weighted Casualty Index (WCI), the performance difference between Team A performance for Weeks 1 and 3 was also statistically significant. Team B showed no significant difference in performance between Weeks 1 and 3." (Brief, QL3)



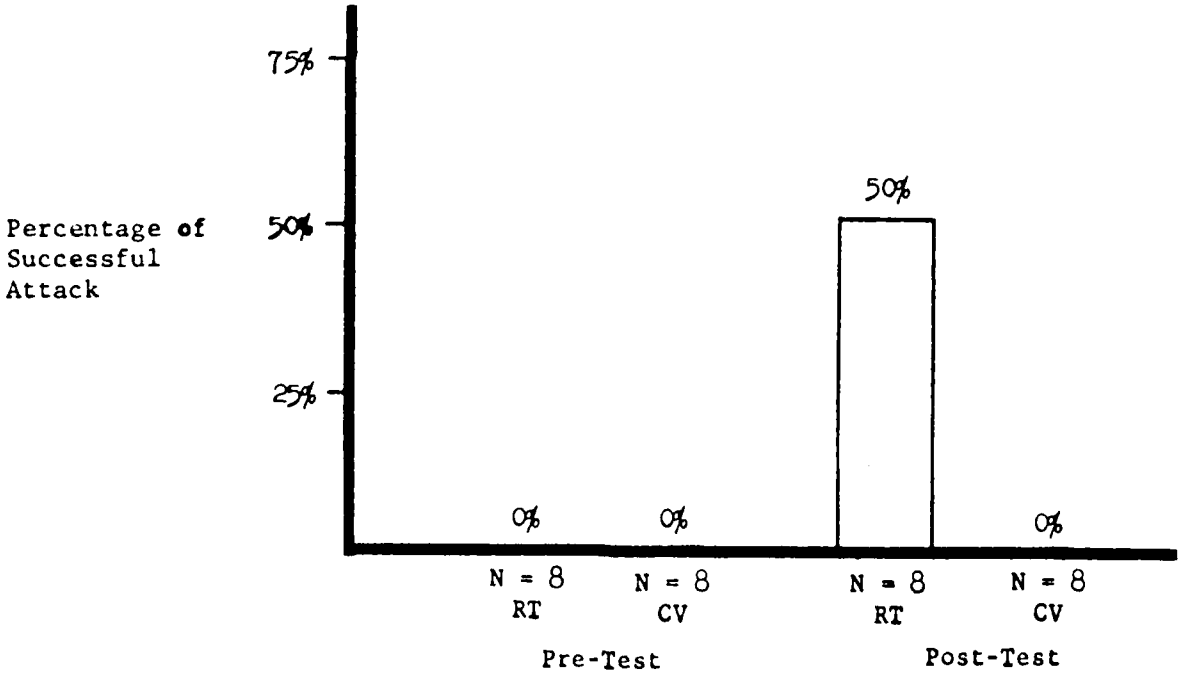
Average Weighted Casualty Index (WCI) for All Exercises by Weeks (Pg. 25 QL3)

2. REALTRAIN Validation for Rifle Squads, Army Research Institute, October, 1977.

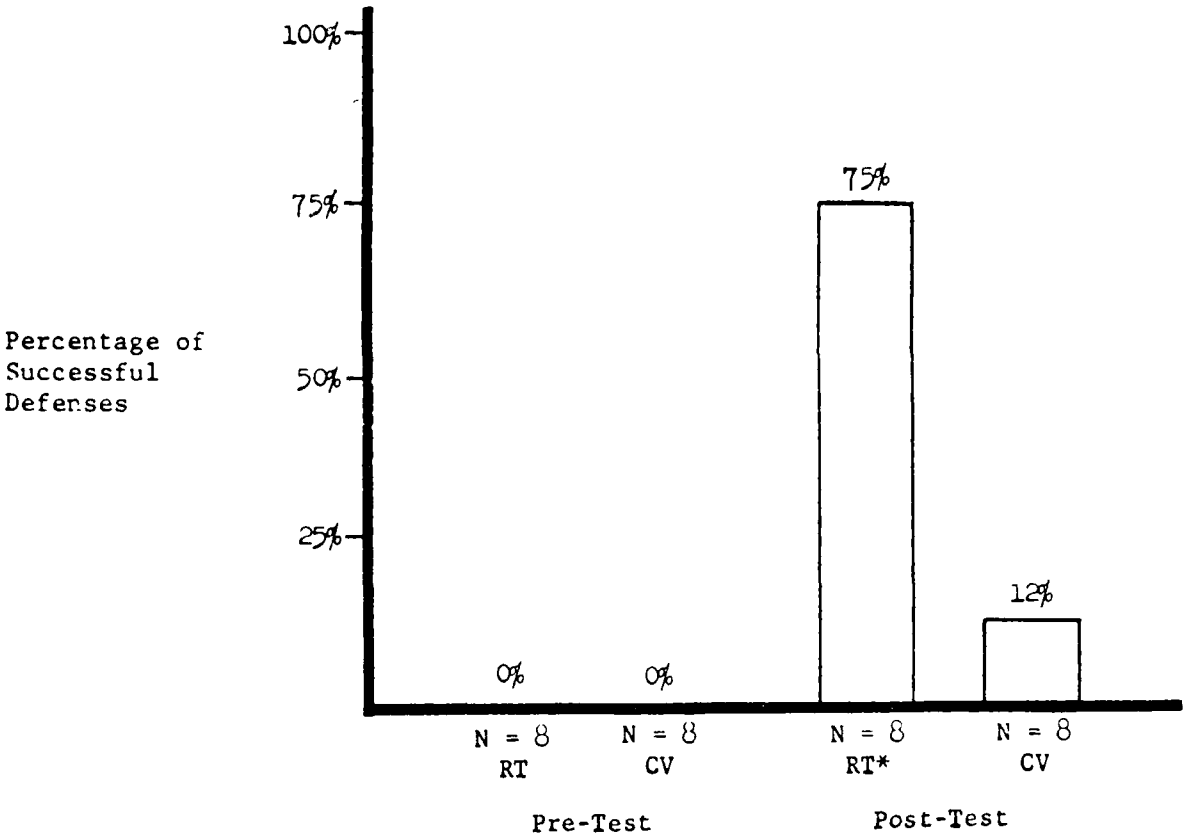
The results have shown that REALTRAIN training can dramatically increase the tactical proficiency of rifle squads. Increases in the quality of tactical performance occurred across a broad range of measures and performance on intermediate tasks were closely related to mission outcomes. (Paraphrased, pgs. 4-20, QL3)

REALTRAIN units showed a dramatic improvement in tactical performance during posttraining tests and were far superior to conventional squads. In addition, performance on intermediate tasks were highly correlated with terminal mission outcome. (Paraphrased, pgs. 4-20, QL3)

REALTRAIN squads showed a dramatic improvement across a variety of performance measures following three days of tactical training. In contrast, conventionally trained squads showed little improvement following training. The performance of REALTRAIN and conventional squads were similar during pre-testing tests. But during posttraining test, REALTRAIN squads performed better than conventionally trained squads. (Paraphrased, pgs. 4-20, QL3)



Mission Accomplishment for Attack on OP (Pg 10, QL3)



*One engagement was a draw.

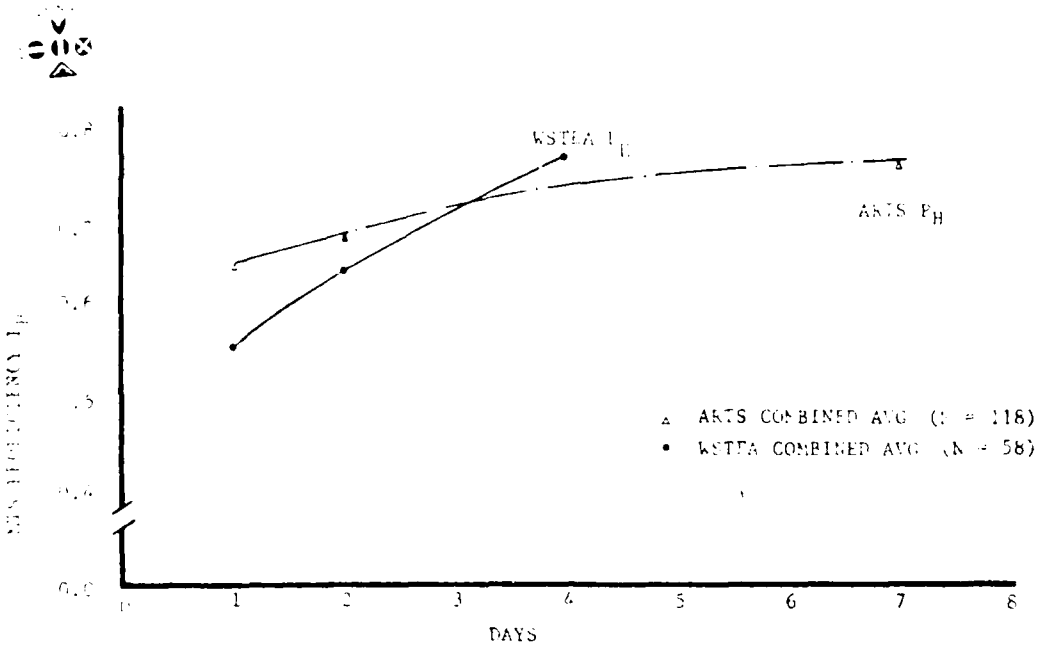
Mission Accomplishment for Hasty Defense (pg. 11, QL3)

3. REDEYE Weapons System, Technical Report 6-78, TRASANA, June, 1978.

War models simulations for Redeye should be improved by expanding the number of parameters used to better define the engagement sequence. (Paraphrased, section 8, pg. 19, QL4)

Additional moving target simulator (MTS) and tracking head trainers (THTS) are required to provide increased "hands-on" training capability for lower mental category personnel, who as has been shown, require more frequent refresher training to maintain acceptable levels of proficiency. (Paraphrased, section 7, pg.47, QL3)

Three additional hours of MTS training, which were implemented following the WSTEA recommendations, resulted in a slight increase in proficiency during ARTS tests. Actual benefit, however, was not apparent because of the lower AFQT scores of the ARTS subjects when compared to the WSTEA subjects. (Paraphrased, section 8, pg. 73, QL3)



ARTS MTS Proficiency Growth (Section 8, pg. 9, QL3)

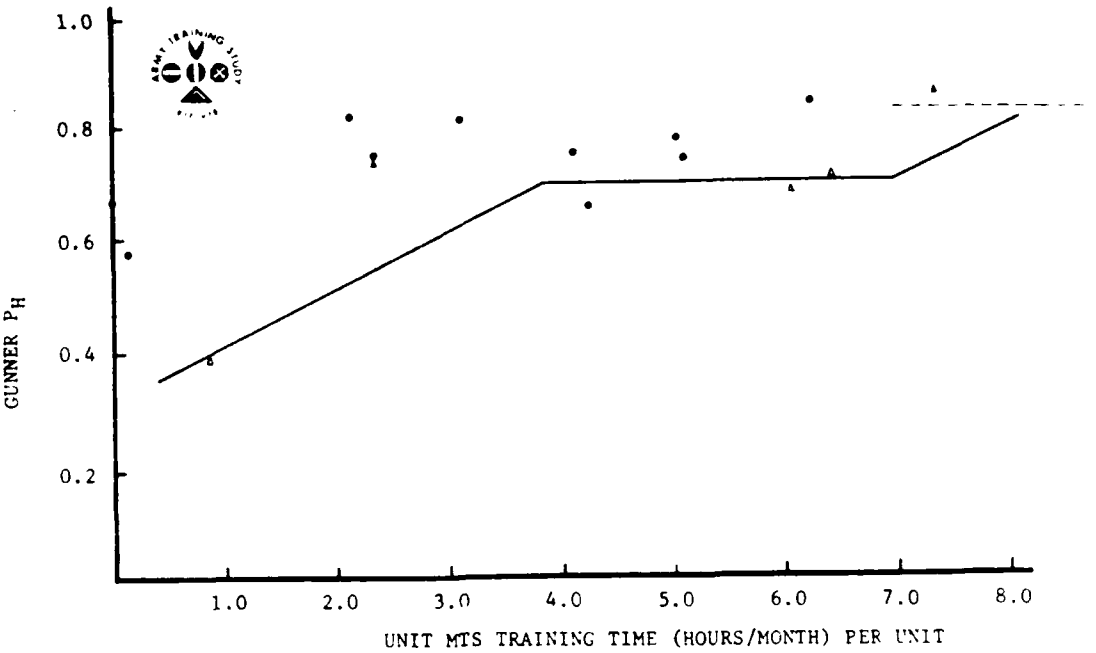
The use of higher resolution war models which allow variation in values assigned to individual steps in the engagement sequence will allow more accurate determination of the relationships between those steps and decreased proficiency. Tied to these higher resolution war models is the need for increased instrumentation of the MTS to record the time at which a gunner performs each step in the engagement sequence. Once these values are available, they can be used to determine incremental reduction in proficiency compared to the AMSAA curves. The values can then be used to demonstrate the additional costs of using lower mental category personnel on Redeye and should provide firm justification for additional resources to train these personnel. (Paraphrased, section 9, pg. 15, QL4)

Proficiency with Redeye involves more than the ability to complete the engagement sequence. The additional factors of proper employment of Redeye should be reflected in war models. (Paraphrased, Section 8, Pg. 19, QL4)

The results of the war model simulation indicate there is a direct relationship between the gunner's proficiency and the number of aircraft downed. (Paraphrased, section 9, QL3)

Training within the MTS yields the greatest increase in gunner Ph and, therefore, should be maximized. (Paraphrased, section 8, QL2)

The frequency of MTS training in units is insufficient. In some cases, this appears to be due to lack of time." (Paraphrased, section 8, QL3)

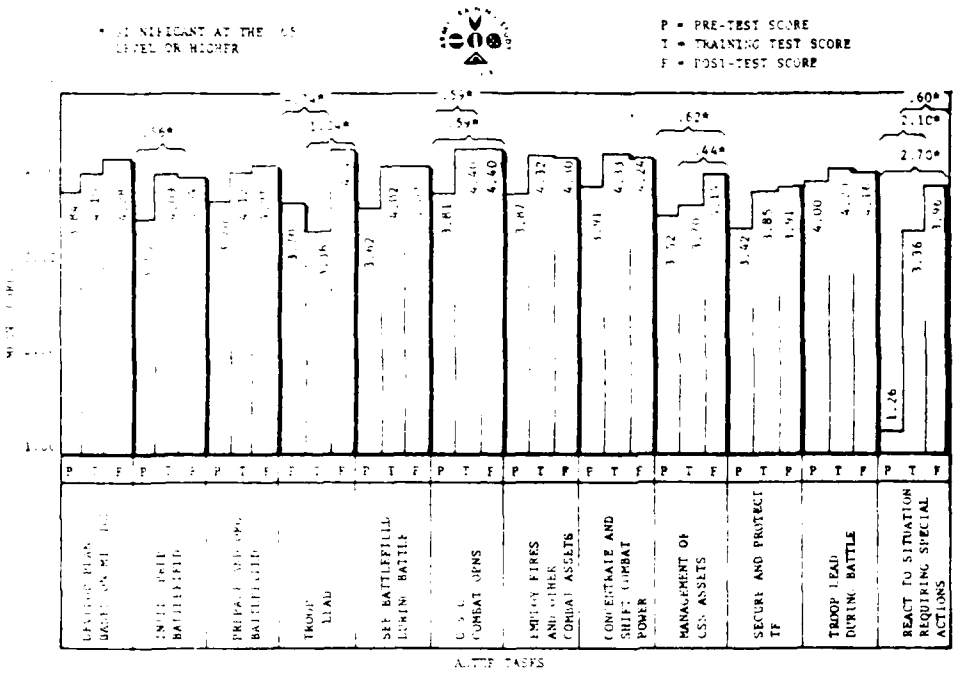


Unit MTS Proficiency vs MTS Training Time (Section 8, Pg. 45, QL3)

4. Computer Assisted Map Maneuver System, CATRADA and ARI, July 1978.

While the small sample size used in the CAMMS TEA testing should be noted, there are useful insights to be drawn from the study. The limited sample size together with the other limitations of the study make this effort a prime candidate for the TEA '79 effort. It would be extremely valuable to incorporate both CAMMS and CATTS in the TEA effort. This would provide separate training and testing vehicles. (ARTS, QL4)

n = 5



ARTEP TASKS (ARTS, QL3)

"CAMMS shows evidence of being an effective training vehicle for improving battalion command group proficiency as subjectively judged by the consistent and positive changes in performance across exercises and through differentiation among ARTEP tasks, subtasks, and elements within exercises." (Pg. 26, QL4)

"The development of a greater number of objective measures of command group performance in CAMMS is feasible to supplement and supplant some of the existing subjective ratings. It will take time and should not be expected to completely eliminate subjective ratings." (Pg. 26, QL4)

"The relationship of command group performance to battalion outcomes is complex, and no single measure of performance yet identified can be adequately interpreted in isolation from other measures or from the conditions of the exercise." (Pg. 26, QL4)

"Performance of some ARTEP subtasks appears to influence battlefield outcomes. Additional effort will be required to determine the influence of other subtasks as well as to determine other useful measures more fully reflecting the total dimensions of battlefield performance." (pg. 26-27, QL4)

"Organizational process measures did not discriminate performance differences among the various measures themselves or change performance as a function of the training exercise, but their outcome measures warrant further investigation." (pg. 27, QL4)

"CAMMS has the potential for fulfilling the requirements of a training research vehicle for pursuit of TEA '85 objectives. Some modifications are indicated, but these are relatively modest and generaly concern improvements which would occur in the normal CAMMS evolution." (pg. 27, QL4)

SURVEY RESULTS:

1. ARTS Survey.

Before analyzing attitudes toward the utility of gaming/simulation ARTS sought to establish the experience level of the respondents in the ARTS sample with respect to this training aid. In response to the question "What experience have you had with the use of gaming/simulation (CATTS, CAMMS, BATTLE DUNN-KEMPF, etc)?", 34.8 percent said they had no experience, 14.7 percent said they had heard or read about them, 12.8 percent had seen them used, 33.3 percent had some experience as player or controller and 4.4 percent had extensive experience as player or controller. With roughly three experience levels significantly represented in the sample, this question became a useful control variable.

Respondents were asked to compare the training effectiveness of gaming/simulation with the traditional training of command post exercises and field training exercises. The table below contains the distribution of the overall sample on these two questions.

CPX (%)	FTX (%)	
10.9	3.2	(1) Gaming/Simulation is much more effective
20.0	7.0	(2) Gaming/Simulation is somewhat more effective
10.7	8.3	(3) Gaming/Simulation is equally effective
11.5	17.9	(4) Gaming/Simulation is somewhat less effective
4.3	24.7	(5) Gaming/Simulation is much less effective
42.7	39.0	(6) I don't know
100 %	100 %	

Training Effectiveness of Gaming/Simulation compared to CPX AND FTX. (QL3)

In the table above, a large portion of the sample (40%) felt they did

not know enough about gaming/simulation to give an opinion. Of those who did express a sentiment, gaming/simulation was deemed most effective when compared to command post exercises where approximately 30% found it somewhat or much more effective than CPX. Only 10% could say the same when comparing gaming/simulation to FTX.

Taking into account experience, it was found that those with experience in gaming/ simulation accounted for this difference.

In the tables above, it may be observed that those with at least some experience as player of controller rate gaming/simulation as more effective than CPX, as do those with no experience. Those with little experience rate gaming/simulation less favorably when compared to CPX but, even here, those who have seen it are more likely to rate it as more effective than CPX than are those who have only read or heard about it.

Experience plays a different role when comparing gaming/simulation to FTX. In this case even those individuals with extensive experience with gaming/simulation rate it is less or much less effective than training through field training exercises.

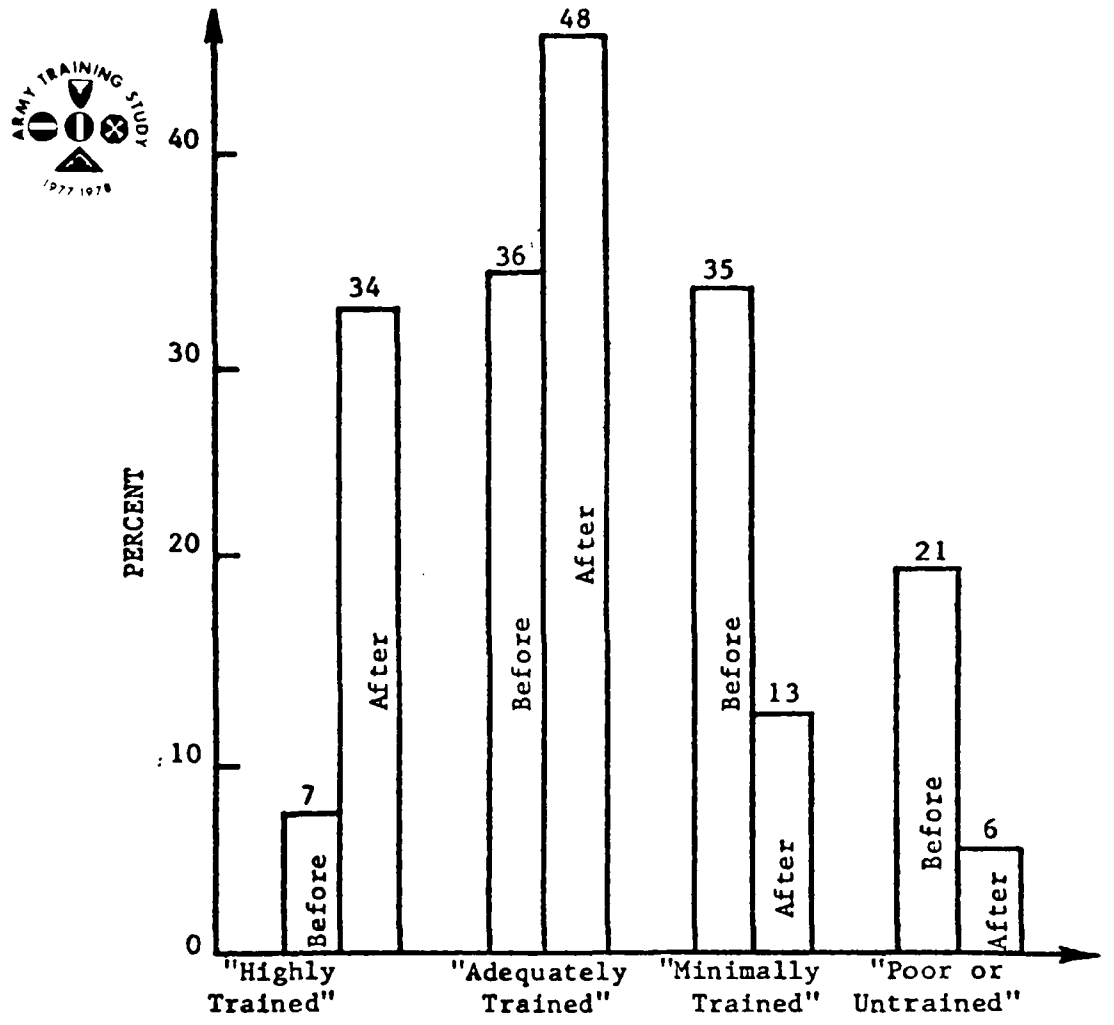
2. Initial Validation of REALTRAIN with Army Combat Units in Europe, ARI October 1976.

In conjunction with the REALTRAIN exercises, a participant questionnaire was completed by 542 participants: 302 with an infantry MOS (56 percent) and 240 with an Armor MOS (44 percent). They felt that REALTRAIN compared to normal unit training was "much more effective," 63 percent; "more effective," 21 percent; "equal," 10 percent and "less effective," 5 percent. (pg. 52, QL2)

A leader-controller questionnaire was administered to 343 controllers and 38 leaders (squad and platoon NCOs and officers) ranging in grades from E-4 to E-3). Responses were typically quite favorable to REALTRAIN. Compared to other exercises, REALTRAIN was reported by 77 percent as more effective than live fire, by 97 percent as more effective than drill. (Paraphrased, pg. 53, QL2)

For specific tactical training, REALTRAIN was considered "very effective" by 62 percent in employment of indirect fire, and by 73 percent in employment of all available weapons. Almost all controllers (99 percent) felt adequately prepared by their week of training to implement REALTRAIN in their unit. (Paraphrased, pg. 55, QL2)

Subjective data represented by interviews by the REALTRAIN effectiveness on the part of controller trainees and participants alike. Interviewer responses strongly support the date generated in the Participant and Leader/Controller Questionnaires regarding the benefits of REALTRAIN as a learning experience. (Paraphrased, pg. vii, QL2)



Trainee's Perception of Units State of Training
Before and After REALTRAIN (pg. 52, QL2)

EXPERIENCE WITH GAMING/SIMULATION

		NONE	READ ABOUT IT	SEEN IT USED	PLAYED SOME	PLAYED A LOT
Effectiveness of Gaming/ Simulation compared to CPX	Much More Effective	21.1	3.2	7.7	21.3	50.0
	More Effective	31.5	22.6	26.9	39.6	36.4
	Equal	26.3	32.3	25.9	15.2	4.5
	Less Effective	5.2	29.0	30.8	18.3	4.5
	Much Less Effective	15.8	12.9	9.6	5.5	4.5
		100 %	100 %	100 %	100 %	100 %

Gaming/Simulation Compared to CPX by Experience with Gaming/Simulation

EXPERIENCE WITH GAMING/SIMULATION

		NONE	READ ABOUT IT	SEEN IT USED	PLAYED SOME	PLAYED A LOT
Effectiveness of Gaming/ Simulation comared to FTX	Much More Effective	16.0	.0	1.8	5.4	9.1
	More Effective	8.0	22.2	7.1	9.6	22.7
	Equal	28.0	13.9	10.7	13.9	4.5
	Less Effective	20.0	27.8	28.6	32.5	22.7
	Much Less Effective	28.0	36.1	51.8	38.6	40.9
		100 %	100 %	100 %	100 %	100 %

Gaming/Simulation Compared to FTX by Experience with Gaming/Simulation

RELATED INFORMATION:

1. ARTS Concept Paper entitled Unit Training Programs, quoting from "Tactical Engagement Simulation - Experimental Learning," Army Training Support Center:

"Tactical engagement simulation represents a marked step forward in the conduct of collective training." (pg. A-7, QL 4)

"Just as performance-oriented, individual training is intended to develop experience on the part of an individual, experiential learning techniques are being developed for collective training. In order to develop the proper responses (that is, responses that are transferrable to a combat environment), the experiential training environment must have the following characteristics:

The individual must be an active participant in the situation, rather than a passive observer.

The cues to which the individual responds should resemble as closely as possible those he would encounter in combat.

The situation must change realistically as a result of the individual's action.

Feedback that occurs as a consequence of the individual's action should be immediate and realistic.

Subsequent objective postexercise feedback must be provided to the individual on the appropriateness of his actions in order to reinforce good tactical behavior and eliminate mistakes.

The complexity of the simulated tactical situation must increase as more elementary tactical skills are mastered in order to expand the individual's experiential base.

As the learning of tactical skills is situation-specific, sufficient training opportunities must be provided across varying conditions (missions, terrain-visibility, etc.) to ensure the learning of all relevant skills." (pg. A-14, QL 4)

Corrected Copy 29 September 1978

DATA AREA: Training Packages

Training packages to support unit training are a useful objective which remains to be fully realized in effectiveness and/or scope. Thus far, they yield less than their design or desired results. Experimentation with specific Armor training packages showed inconclusive results. While experimental group trainees could be quickly be brought to the level of the control group, the control group baseline performance was unacceptably low.

TEST RESULTS:

1. The Learning and Retention of Basic Armor Training Skills within Units, USAARMC, August 1978.

Training in the unit did not correlate with retention of proficiency except that the 36.7% who had used TEC did exhibit slightly higher retention. However, use of TEC was not wide-spread. In all cases, those who reported use of TEC had done so only once or twice. (Paraphrased, Chapter V, pg., 8-9, QL3)

2. The Effects of Tank Crew Turbulence on Tank Gunnery Performance, ARI, August 1978.

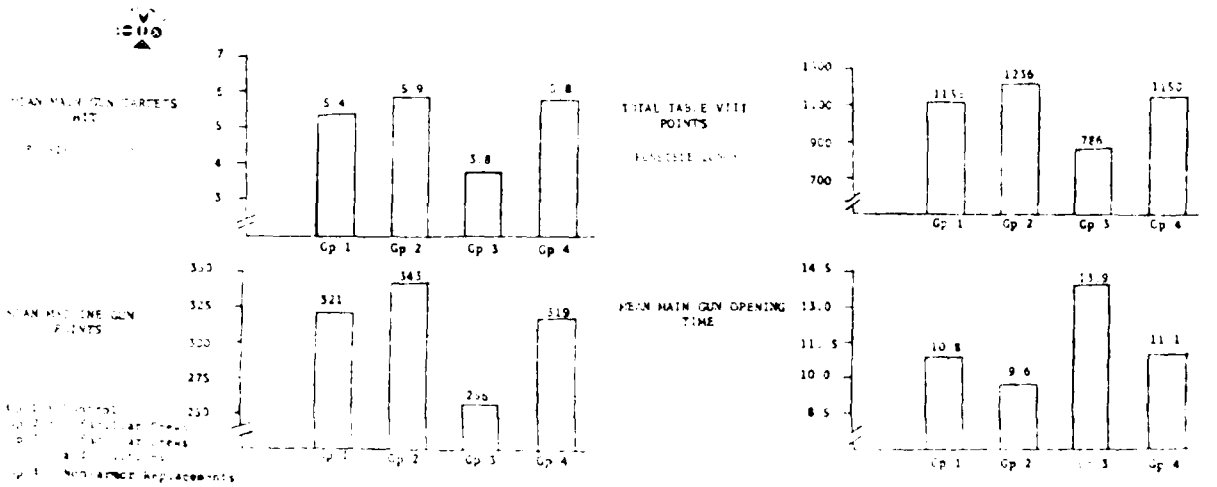
Results for the 4 groups tested in Phase II are listed below:

Group 1, the control group whose crews had recently completed Table VIII as crews in their same tanks, achieved a mean score of 1135 with mean main gun target hits totalling 5.4 and an average opening time of 10.8 seconds. (Parphrased, pg. 34, QL3)

Group 2, whose crewmen retained their Table VIII positions within unfamiliar crews on different tanks, achieved a mean score of 1236 with an average of 5.9 main gun hits, and an average of 9.6 seconds opening time. (Paraphrased, pg. 34, QL3)

Group 4, whose non-armor MOS gunners and loaders were trained in three days also outperformed the control group with a mean score of 1150 an average of 5.8 main gun hits. Only opening time was slower with an average of 11.1 seconds as opposed to a mean of 10.8 seconds for the control group. (Paraphrased, pg. 34, QL3)

Group 3, composed of trained 11F crewmen serving in unfamiliar positions, was markedly poorer in gunnery performance than any of the other groups. Group 3 tank commanders were replaced by their gunners and gunner positions were filled by loaders. Driver and loader positions were filed with men who had held those positions during the recently completed gunnery program but as members of other groups. (Paraphrased, pg. 34, QL3)



Tank Gunnery Performance as a Function of Group Assignment (pg. 34, (QL3)

GROUP MEANS ON TANK GUNNERY PERFORMANCE VARIABLES (pg. 35, QL3)

	Day and Night Combined			
Group:	1	2	3	4
OPENING TIME				
Stationary Battlesight	7.16	6.85	10.47	8.00
Stationary Precision	14.77	12.77	19.44	14.69
Moving Target	10.77	10.20	12.95	9.90
TOTAL Main Gun	10.77	9.54	12.95	11.06
TARGET HITS				
Stationary Battlesight	3.27	3.40	2.11	3.10
Stationary Precision	1.45	2.00	1.33	1.90
Moving	0.64	0.60	0.44	0.60
Within Time Standard	1.45	2.50	0.78	1.10
TOTAL Main Gun	5.36	5.90	3.78	5.80
TABLE VIII POINTS				
Machine Gun Points	321.36	342.90	256.33	318.60
Main Gun Points	763.55	845.80	488.11	788.40
TOTAL	1134.91	1236.20	786.11	1149.50

This recapitulation covers the training cost for the Armor battalion to conduct the tank crew modular training program (TCMTP). Group 4 (non-11E gunners and loaders) costs of the Tank Crewman Skills Training (TCST) program are listed separately and are included in total costs. Costs of turbulence testing have not been included so as to portray tank battalion tank gunnery costs in isolation from test activities. This is believed to be the more meaningful data. The overall cost of the three-day modular training program, including costs of people, ammunition, and POL is depicted below. Class IX fixed and variable base operations costs could not be determined due to the short duration of the test and small sample size. (ARTS, QL3)

ACTIVITY	PERSONNEL COSTS	AMMUNITIONS COSTS	POL COSTS
PRE-TEST	7,136.99	-	129.00
TABLE V	28,859.65	70,458.66	2706.98
TABLE VII	58,962.99	442,535.40	5864.27
TABLE VII	64,164.25	164,385.72	1104.17
GROUP IV	14,984.27	25,779.27	672.98
POST-TEST	5,750.53	-	43.00
TOTAL COST	179,858.69	705,159.05	10,570.40

Overall Cost of Tank Crew Modular Training Program. (ARTS, QL3)

Significant findings from Phase III of the test (available only in draft) reveals the following:

The crews averaged 37% main gun hits overall. (QL4)

Averaged over the two training periods the group trained 1-day did slightly better than the 3-day group. (QL4)

Averaged over training groups (1-day and 3-day), those from the first week did substantially better than those from the second. (QL4)

The 1-day group did better than the 3-day in Week 1; the 3-day group did better than the 1-day in week 2. (QL4)

Tabular data from Phase II firing is displayed in the two tables below.

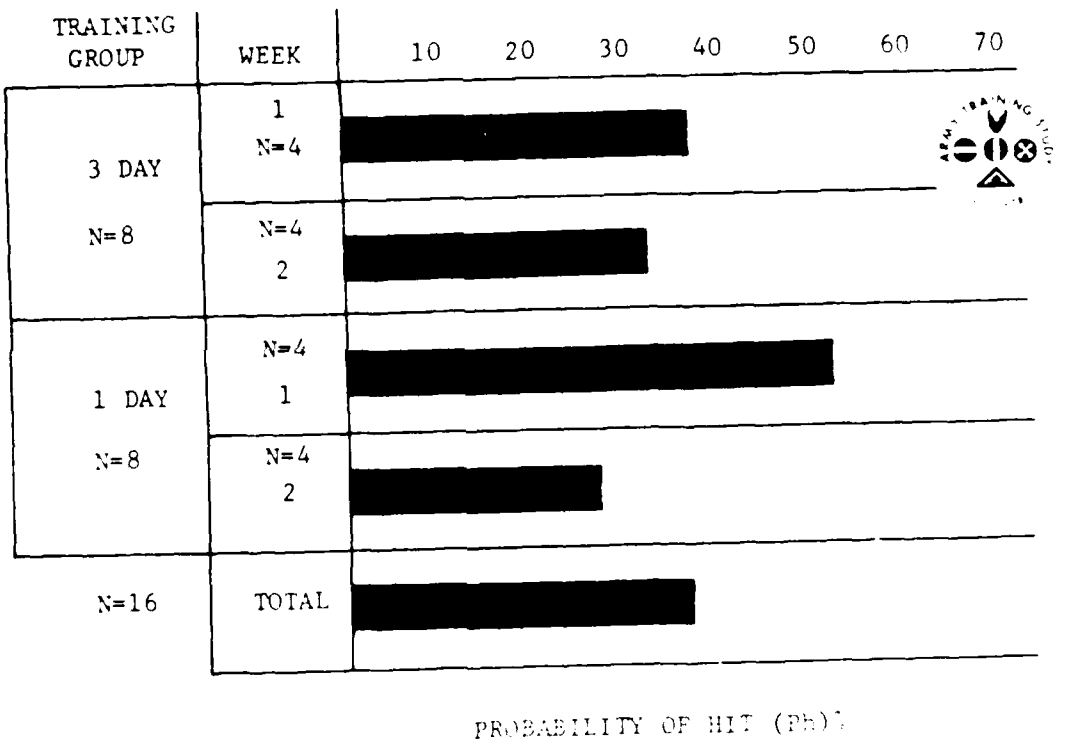
- Differences in performance are not statistically significant due to the small sample size.

TRAINING WEEK	TRAINING GROUP		
	3-DAY	1-DAY	TOTAL
1	1/4	2/4	3/8
2	0/4	0/4	0/8
3	1/8	2/8	3/16

Relative Number of Crews Qualifying on Table VIII by Training Group and Training Week (ARTS, QL4)

TRAINING WEEK	(N)	3-DAY	(N)	1-DAY	(N)	TOTAL
			TRAINING GROUP			
1	(4)	3.25	(4)	4.75	(8)	4.0
2	(4)	3.0	(4)	2.5	(8)	2.75
TOTAL	(8)	3.125	(8)	3.625	(16)	3.375

Average Number of Table VIII Engagements Successfully Fired (ARTS, QL4)



Proportion of Table VIII Main Gun Hits (Ph) by Training Group and Week (ARTS, QL4)

3. Proficiency Development Profiles, USAOCCS, 12 July 1978.

"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." (Supplement 1,pgs. 1, 2, QL4)

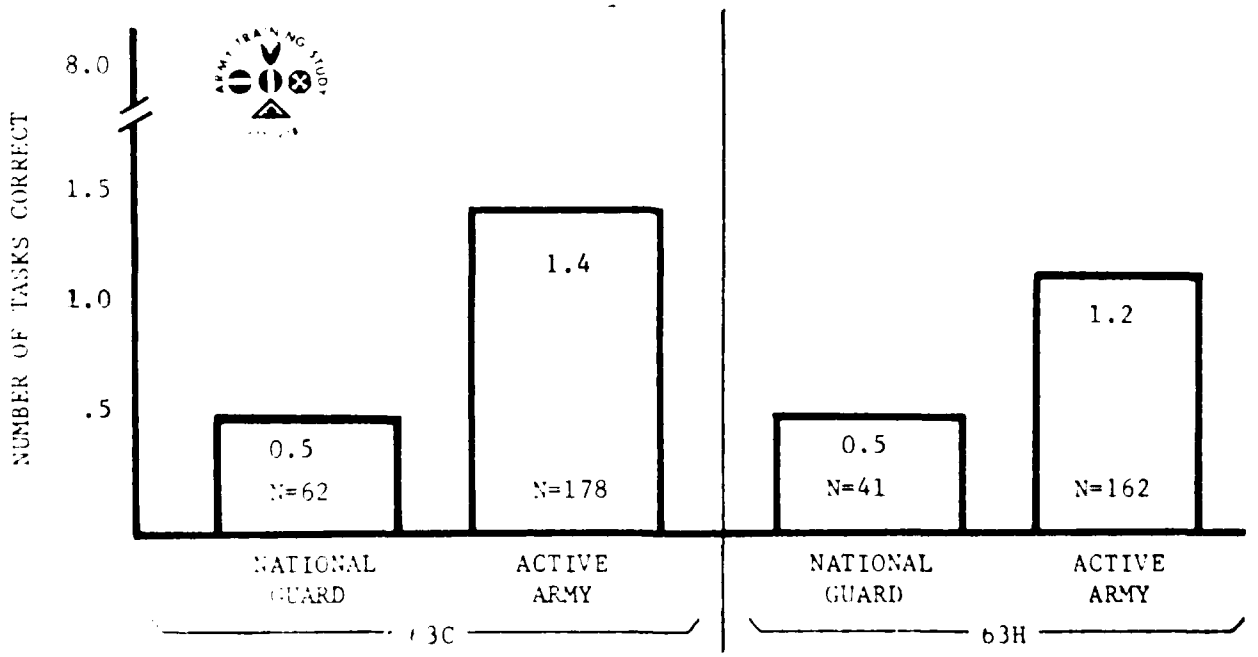
MEAN PERFORMANCE LEVEL

MOS	COMPONENT	PROMPTS
63C	Active Army N=178	1.4 (1.2)*
	National Guard N=62	0.5 (0.8)
63H	Active Army N=162	1.2 (1.1)
	National Guard N=41	0.5 (0.7)

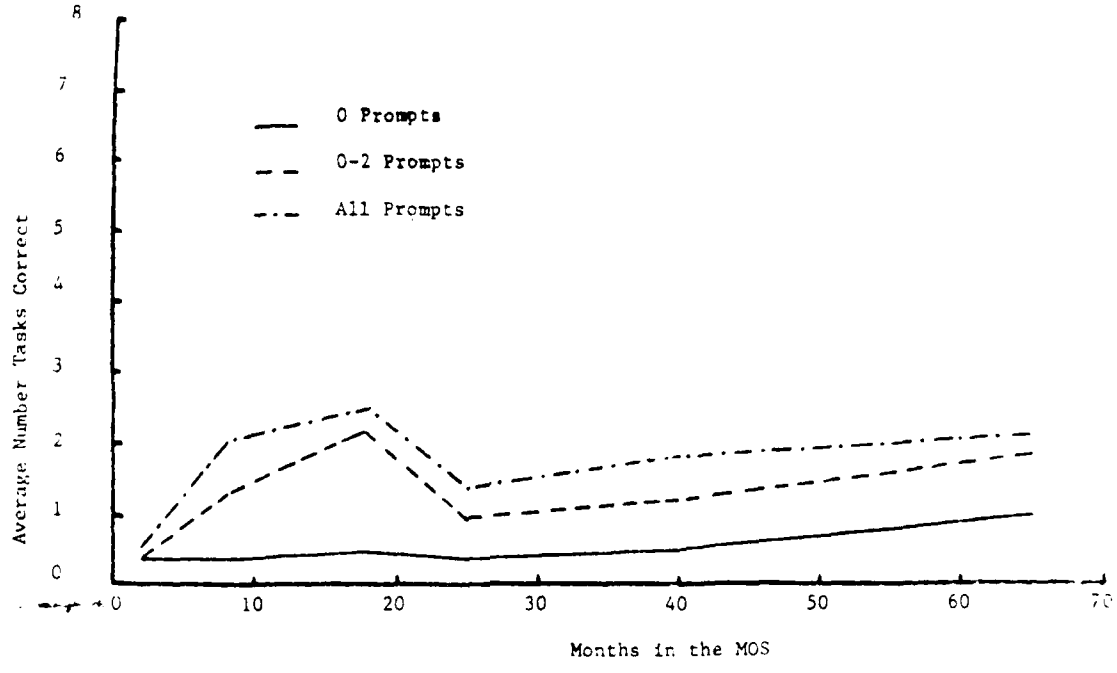
*Standard deviation provided in parentheses.

Comparison of Mean Performance Levels Between Active Army and National Guard Groups. (Supplement 1, pg. 6, QL4)

Institutional training can be effective in developing broad spectrum maintenance capabilities in a relatively short period of time. (Paraphrased, Supplement 2, pg. 3, QL4)



Comparison of Mean Performance Levels of 63C/H National Guard and Active Army for the Zero Prompting Condition (No Supervision) (QL4)



Proficiency Curves for National Guard Personnel in MOS 63C (Supplement 1, pg. 8, QL3)

While the mode of training, conventional or self-paced does not seem to effect either the initial level of learning or the retention level, self-pacing usually results in a training time savings, and is, thus, the most cost effective. (Paraphrased, Supplement 2, pg. 2, QL3)

TOTAL TRAINING COST FOR VARIOUS INSTITUTIONAL TRAINING PROGRAMS (Supplement 2, pg. 11, QL3)

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]
[illegible]	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.

"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 1 training and others would require Skill Level 2 training programs." (Supplement 1, pg. 2, QL4)

SURVEY RESULTS:

1. Retention of Basic Armor Training Skills Within the Units, USAARMC, August 1978.

In the Basic Armor Training Retention Test, 36.7% of the test population indicated they had used TEC once or twice. These TEC users exhibited slightly better retention test scores. (Chapter V, pgs. 8-9, QL3)

2. MOS 05C, USASC&FG, July 1978.

The instructor and supervisor survey data indicated that the 05C self-paced course produced a better graduate. The cost per graduate decreased for the self-paced 05C course, based on data from TRADOC. In summary, USASC&FG concluded that the 05C self-paced course produced a more proficient graduate graduate at a slightly reduced cost with approximately the same rate of academic attrition, but a reduced rate of total attrition. (Paraphrased, pg. 15-19, QL4)

RELATED INFORMATION

1. Battalion Training Model:

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95% battlefield; determining the sensitivity of the model to varying personnel conditions; and development of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from

the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effect under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance time, and non-training time. To be realistic, time distribution was based on 253 usable training days. This figure was arrived at by subtracting from 365 days the weekends (104 days) and eight holidays. The goal program was prioritized to ensure that training and maintenance were given first priority, consuming nontraining time and exceeding 253 days if necessary. Only the 365 calendar day limit was firm; time was disturbed within that limit.

Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

The BTM was utilized to develop a series of readiness-keyed training programs, that is, programs that consisted of postmobilization training packages geared to a given number of training days, and matched sustainment training programs. A battalion with five training days available postmobilization is referred to as Bn-5, ten training days Bn-10, etc. Data collected by the Battalion Training Survey indicated tnat time between training periods could be doubled if the time length of the training were increased by one third for each training session. The BTM produced the attached training programs.

The BTM was utilized to develop a series readiness-keyed training programs, that is, programs that consisted of postalert training packages geared to a given number of training days, and matched sustainment training programs. A battalion with five training days available postmobilization is referred to as Bn-5, ten training days Bn-10, etc. A more detailed discussion is contained in the BTM volume. The BTM produced the attached training programs.

Post-Alert Training Packages* (QL3)

Package	Bn-5	Bn-10	Bn-20	Bn-30
Training Activities (Repetitions)				
ARTEP	0	0	1	1
Move Co	1	1	1	1
Move (Plt/Squad)	1	1	1	1
Shoot Co	1	1	1	1
Shoot (Plt/Squad)	0	0	0	1
F&M Co	0	0	1	1
R&S Co	0	1	1	1
Comm Co	1	1	1	1
BP/H Co	0	1	1	1
BP/H (Plt/Squad)	0	0	1	1
Sustain Co	1	1	1	1
Sustain (Plt/Sqaud)	0	0	0	1
Support Co	1	1	1	1
NBC	0	0	1	1
MOBA	0	1	1	1
(Days)				
Ldr Tng	0	0	5	5
NCO Tng	5	5	5	5
Scout Tng	0	5	5	5
Redeye Tng	5	5	5	5
GSR Tng	5	5	5	5
P2 $	12,543	27,303	59,277.	69,699.
CL V $ (QL4)	90,250	111,480	230,865.	550,130.

*The goal programming algorithm attempts to conduct as many battle drills as possible within the time constraint, thus it will select the shorter drills first. The drills vary in length, hence the number of drills cannot be directly related to the number of days.

Below are a series of charts depicting the time and dollar and requirements of a training package that would support a postalert training program varying from 1 to 30 days. The programs are denoted by Bn-1 for a 1 day program, Bn-5 for a 5 day program, etc. This group of resource requirements is a Training War Reserve that must be prestocked to insure they are also available on short notice. This system also requires sustaining program to balance the prealert training with postalert training. For more details see the BTM volume.

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	95% Baseline Training Program	Bn-5 Sustaining Program	Bn-10 Sustaining Program	Bn-20 Sustaining Program	Bn-30 Sustaining Program
Days					
Tng Pgm	141	137	133	125	115
Maintenance	58	58	58	58	58
Non Tng	54	58	62	70	80
Wknd/Hol.	112	112	112	112	112
%/253 Days					
Tng Pgm	56	54	53	49	45
Maintenance	23	23	23	23	23
Non Tng	21	23	23	28	32
Total P2 $	396,625.	384,020.	376,232.	362,385.	352,419
Total CL V $ (QL 4)	1,674,708.	1,569,070.	1,545,283.	1,500,265	1,118,662

Chart 1 (QL3)

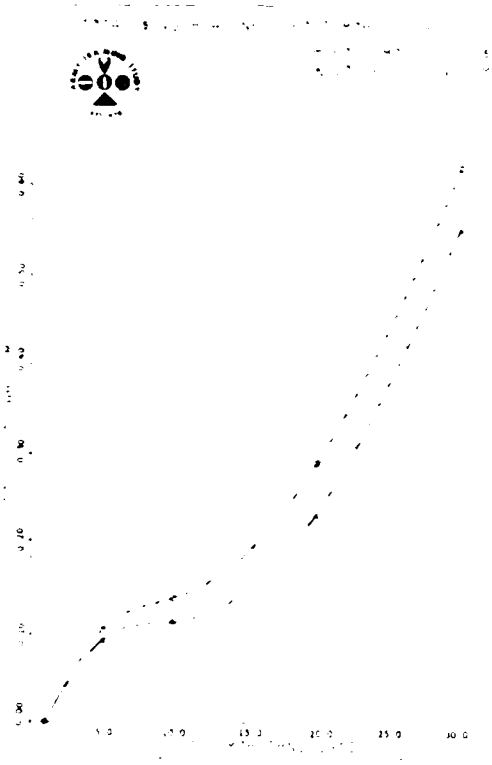

Chart 2 (QL3)

Chart 1 depicts the total cost of a postalert training package. The vertical axis is in fractions of a million dollars, plotted against the 5, 10, 20, and 30 day packages. Class V (ammunition cost) is displayed separately since it is the major cost element. Note that ammunition costs rise sharply for the 20 and 30 day programs, since there is more time available for firing.

Chart 2 displays the P2 cost (Classes III and IX) for the various packages. The vertical adds is in fractions of a million dollars (vertical scale on chart 2 differs from chart 1). The slope flattens out after 20 days as the training pace becomes less intense. Charts 3 and 4 break out Class III and Class IX.

Chart 3 (QL3)

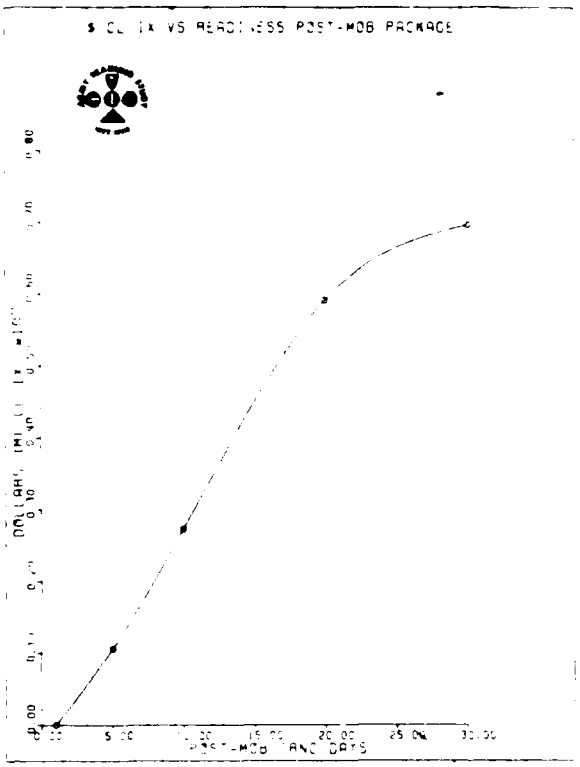

Chart 4 (QL3)

Charts 3 and 4 reflect the costs of class III (POL) and class IX (repair parts) for the various training packages. The vertical axis on both is dollars (in millions) although the scale differs.

The readiness-keyed training packages provide a methodology for relating resources to mission and deployment time. They provide bench-marks against which a unit's training program can be compared with the standards of the 95% battlefield. However, some cautions are in order. The postalert training packages selected by the BTM goal program may not represent the best utilization of a specific unit's postalert time. Military judgment would have to be applied to tailor a program for a particular unit. Many of the data elements represent small sample sizes and require further review. While the basic approach and comparative results are valid, the absolute values presented require further review. For a more detailed discussion, see BTM volume.

While the annual dollar savings associated with the readiness-keyed programs are not that large, these savings would occur annually during peacetime. The postalert would be a one-time cost, however, it would be

immediately available upon mobilization. There may be realistic restrictions such as range availablity that make this approach impractical for units deploying in less than 20 or 30 days.

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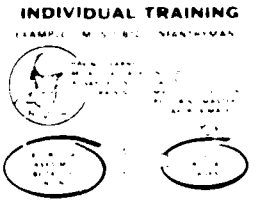
DATA AREA: Individual Training

Limited examination suggests the training base is effectively training the institutional share of Skill Level 1 tasks. Further, self-pacing initiatives appear to be realizing increased efficiencies. Proficiency measurements in the field suggest unit individual training is not comparably effective. However, surveyed commanders and training managers show modest contentment with the state of individual training. When questioned in detail about the frequency and duration of training required on a task by task basis, respondents describe quantities of training well beyond that being executed today.



TEST RESULTS:

1. Proficiency Development Profiles, USAOCCS, 12 July 1978.

"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. 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 and the cost of training the average student on the self-paced version is estimated to be $6,170; a savings of over $3,000 per graduate." (Supplement 2, pg. 15, QL3)

2. MOS 05C, USASC&FG, 12 July 1978.

The 05C Radio Teletypewriter Operator self-paced course, when compared to the group-paced course, produces a more proficient graduate at a slightly reduced cost with approximately the same rate of academic attrition, but a reduced rate of total attrition. USASC&FG findings are that the graduates of the self-paced 05C control group (at the .01 level of significance on common tasks) and the 05B control group (at varying levels of significance on common tasks--.01 through .25). The competion time of the 05C self-paced course could not be accurately compared with the 05C group-paced course. Too many factors entered into the training environment to make a meaningful comparison. (Paraphrased, pg. 15-19, QL4)

USASC&FG findings were that the 05C job holders who had completed group-paced training performed better on two of three written components of the test (radiotelephone and radioteletypewriter procedures). Conversely, the 05C job holders who had completed self-paced training performed better on four of five hands-on components of the test. The latter differences, however, were not statistically significant, except for one component which was at the .145 level. Additional data on these last findings are being analyzed at this time. (Paraphrased, pg. 29-31, QL4)

Conversely, the 05C job holders who had completed self-paced training performed better on four of five hands-on components of the test. The latter difference, however, was not statistically significant (Paraphrased, pg.41, QL3).

3. The Learning and Retention of Basic Armor Skills Within the Unit. (DRAFT), USAARMC, May 1978.

The types of skills showing relatively low performance levels were map reading, M85 machine gun and breech block tasks. The majority of "No Go's" related to failure on tasks requiring cognitive skills involving reading, interpreting and remembering, and sequential skills, indicating that these types of skills are forgotten most rapidly. This finding is consistent with institutional portion of this study which found that cognitive and sequential skills were most difficult to learn (Paraphrased, Chapter V, pg. 11, QL3).

Training in the unit did not correlate with retention of proficiency except that 36.7 percent who had used TEC did exhibit slightly higher retention. However, use of TEC was not widespread. In all cases, those who reported use of TEC had done so only once or twice (Paraphrased, Chapter V, pgs. 8-9, QL3).

4. REDEYE Weapons System, Technical Report 6-78, TRASANA, August 1978.

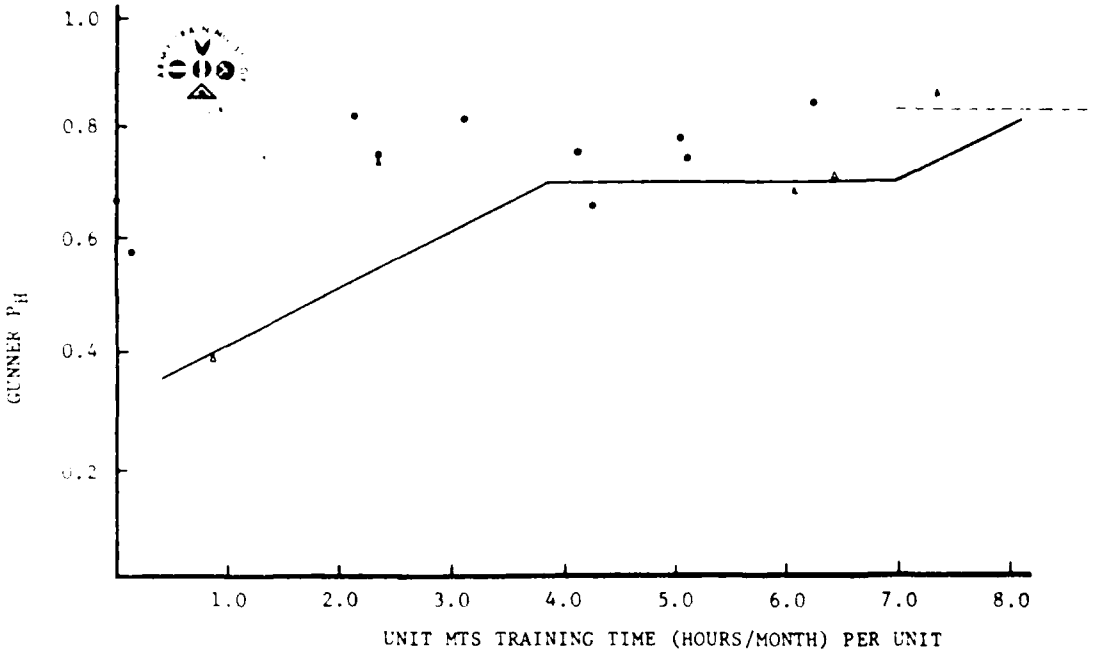
The unit which fared the poorest during the WSTEA testing in both MTS and Range Ring Profile (RRP) training time as well as MTS Ph and RRP had marked increases in training times with associated increases in test scores during ARTS testing (Unit 1). Conversely, the unit which fared best under the WSTEA study in the same area of training time and scores, decreased their training time in both areas with a resultant decrease in ARTS test scores in both areas (Paraphrased, Section 8, pg. 57, QL3).

COMPARISON OF PROFICIENCY OF UNIT TESTED FOR WSTEA AND ARTS VS TRAINING TIME (Section 8, QL3)

UNIT NO	WSTEA	ARTS	WSTEA	ARTS
	MTS TNG TIME (HRS)		MTS Ph	
1	0.88	6.23	0.42	0.73
2	----	----	----	----
3	3.16	3.09	0.80	0.81
4	4.00	3.39	0.60	0.81
5	9.27	8.00	0.90	0.84
AVG	4.34	4.56	0.70	0.81
	WSTEA	ARTS	WSTEA	ARTS
	RRP TNG TIME (HRS)		RRP RESULTS % (ALL ACTIONS)	
1	1.10	2.87	22	33
2	----	----	-----	-----
3	4.50	3.14	39	41
4	1.80	1.90	28	39
5	4.20	1.90	37	34
AVG	3.10	2.40	33	38

Training within the MTS yields the greatest increase in gunner Ph and, therefore, should be maximized. (Paraphrased, Section 8, QL3)

The frequency of MTS training in units is insufficient. In some cases, this appears to be due to lack of time. (Paraphrased, Section 8, QL3)



Unit MTS Training Time (Hours/Months) per Unit (Section 8, pg. 85, QL3)

Three additional hours of MTS Training, which were implemented following the WSTEA recommendations, resulted in a slight increase in proficiency during ARTS tests. Actual benefit, however, was not apparent because of the lower AFQT scores of the ARTS test subjects when compared to the WSTEA subjects. (Paraphrased, Section 8, pg. 73, QL3)

The relationship between type training hours/month/Redeye gunner and probability of hit is shown in the following two charts.

ARMY UNIT	TRAINING HOURS/GUNNER/MONTH	P_hRR
1	2.9	0.33
2	4.5	0.43
3	3.8	0.42
4	1.8	0.38
5	2.1	0.34
6	1.5	0.39
7	7.2	0.47
8	2.9	0.31
9	3.2	0.32
10	7.7	0.34
11	4.9	0.27
12	3.5	0.31
13	3.3	0.30
14	3.2	0.24
15	3.2	0.37
16	3.7	0.41
17	3.5	0.27

MARINE UNIT	TRAINING HOURS/GUNNER/MONTH	P_hRR
1	4.9	0.38
2	2.9	0.34
3	4.4	0.39

RESERVE UNIT	TRAINING HOURS/GUNNER/MONTH	P_hRR
1	4.75	0.27
2	NA	0.33
3	NA	0.34

Range Ring Profile Training Time and Proficiency (pg. 64, QL2)

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TACTICAL ARMY UNIT	TRAINING HOURS/GUNNER/MONTH	PROFICIENCY (P_h)
1	6.1	0.73
2	8.0	0.87
3	3.2	0.81
4	3.2	0.80
5	8.0	0.84
6	3.2	0.72
7	0.4	0.58
8	4.5	0.76
9	6.8	0.78
10	NA	NA
11	2.2	0.64
12	3.1	0.60
13	1.5	NA
14	NA	0.67
15	4.4	0.87
16	4.2	NA
17	0.9	NA
USMC TACTICAL UNIT		**PROFICIENCY (P_h)**
1	NA	0.77
2	NA	NA
3	NA	NA
RESERVE UNIT		**PROFICIENCY (P_h)**
1	7.5	0.77
2	NA	0.62
3		0.5[illegible]

MTS Proficiency (P_h) Unit Performance (pg. [illegible])

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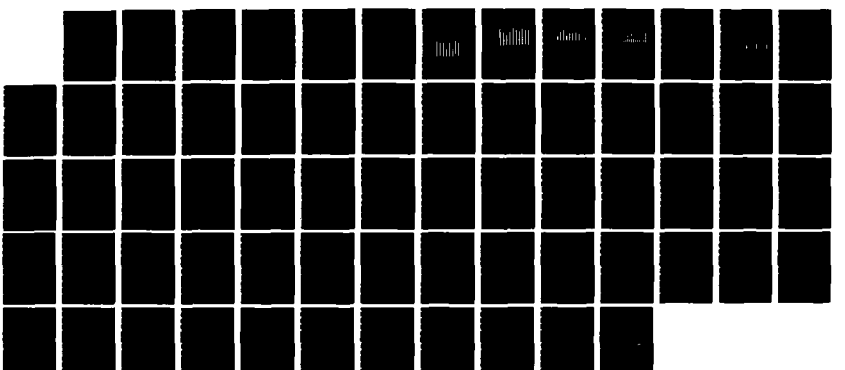
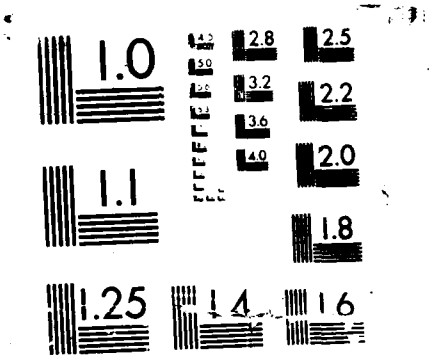
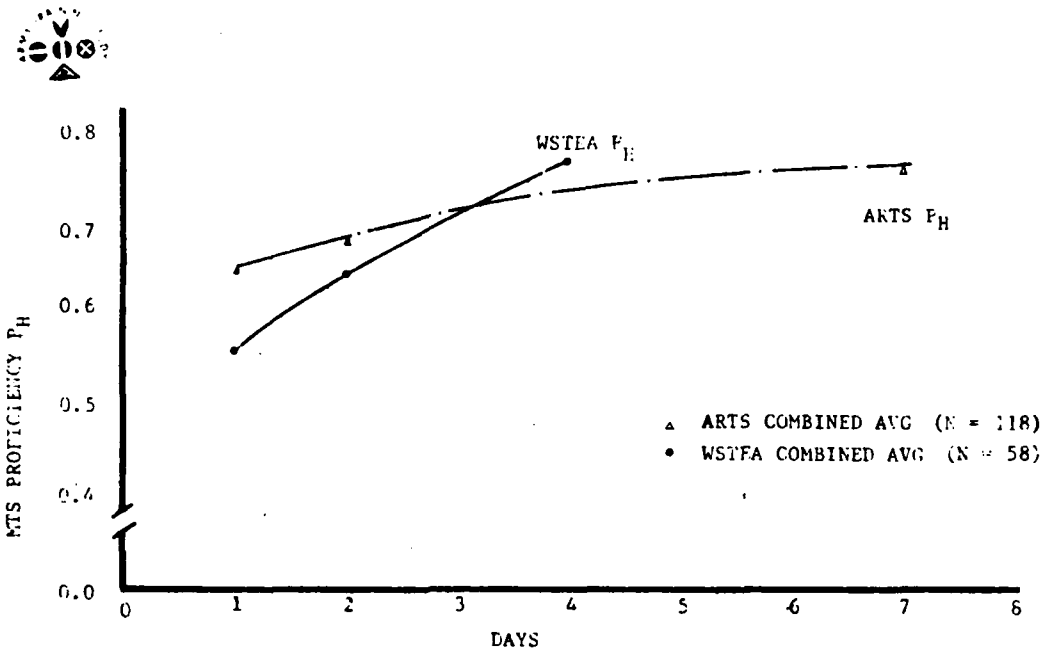




MICROCOPY RESOLUTION TEST CHART



ARTS MTS Proficiency Growth (Section 8, pg. 9, QL3)

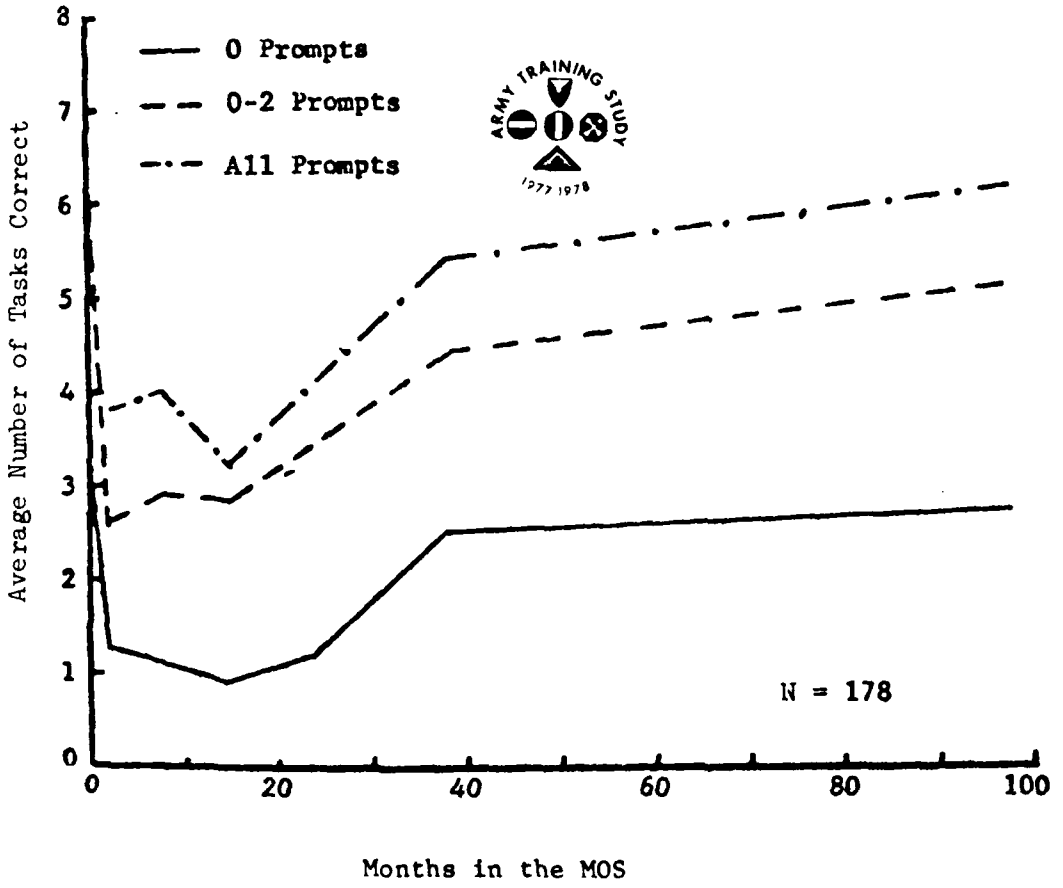
The RELS training package is an effective training aid to reduce fear and build confidence. While it may be too late in the Redeye life cycle to acquire the RELS, the Stinger Launch Simulator (STELS) would be effective as a training aid. Redeye studies demonstrate that all mental categories were trained to an acceptable level of proficiency on the RELS in the alloted time in the institution. The proficiency of personnel in lower mental categories dropped markedly in comparison to that of higher mental categories. This decay indicates the need for more frequent training for selected individuals if proficiency is to be maintained. (Paraphrased, Section 8, pg. 53, QL4)

Determination of range ring coverage is the most difficult task for all gunners of all categories. (Paraphrased, Section 8, QL3)

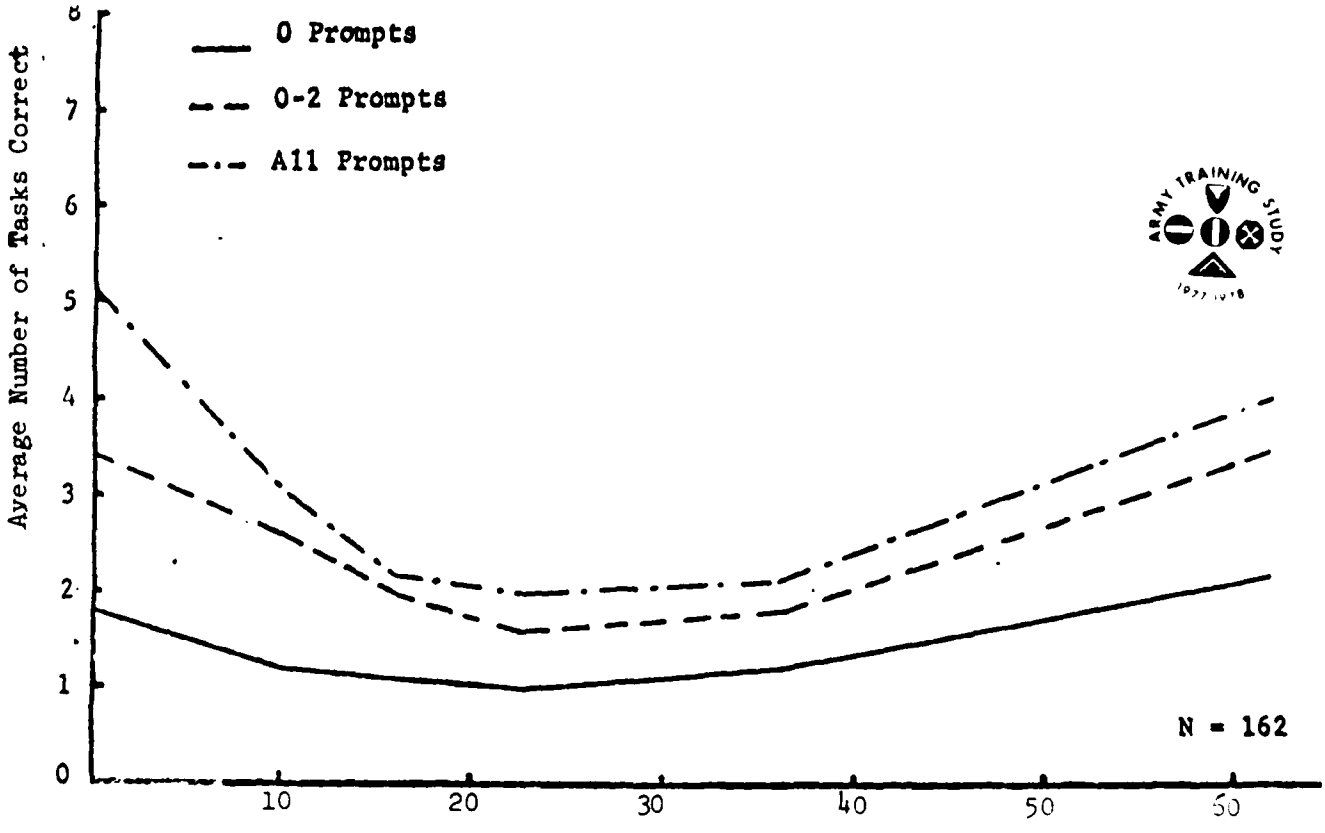
5. Proficiency Development Profiles, USAOCCS, 1 July 1978.

63C/H personnel were tested in tasks in the categories of remove and replace, adjust and troubleshoot. Performance was consistently lower on troubleshooting tasks. Testing of 63H automotive mechanics at graduation on six tasks which had been taught to criteria during AIT, the mean performance level was approximately two tasks. Many soldiers in grades

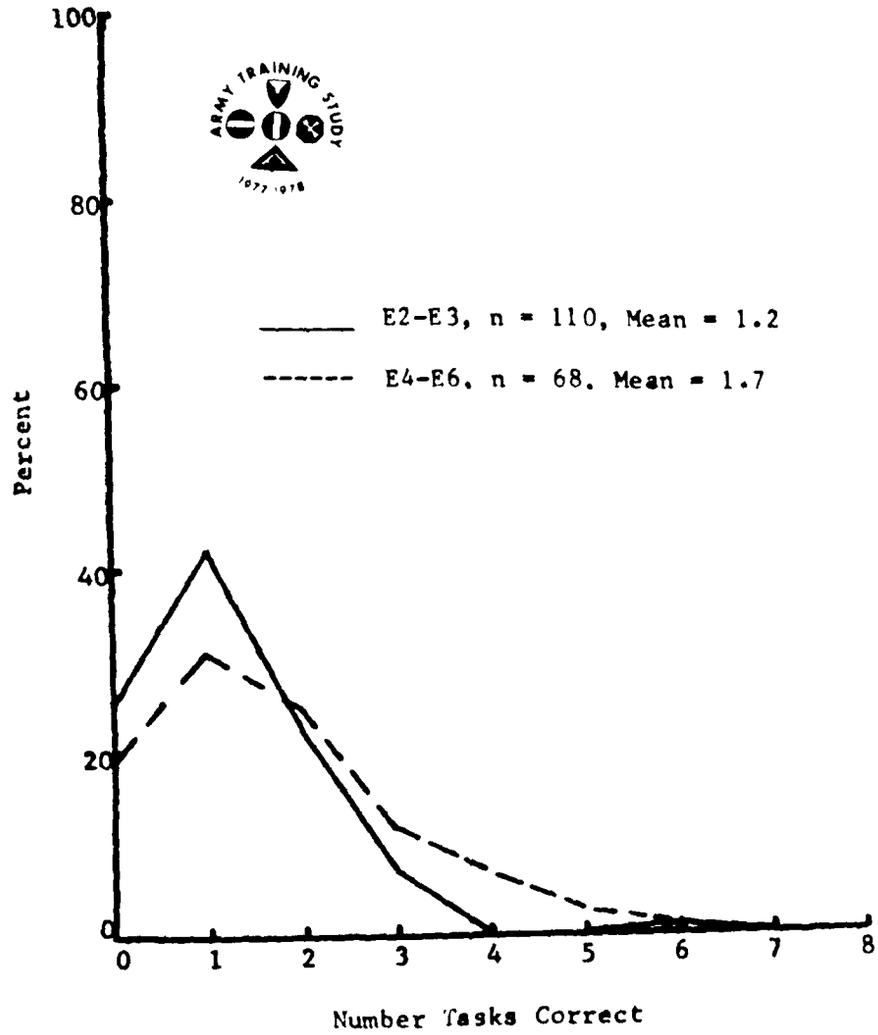
E-4 - E-7 did not appear to be more proficient than lesser experienced soldiers (E-1 - E-3). In fact tests showed that 63H E-2 - E-3 slightly outperformed 63H E-4 - E-5. (Paraphrased, pgs. 46-49, QL3)



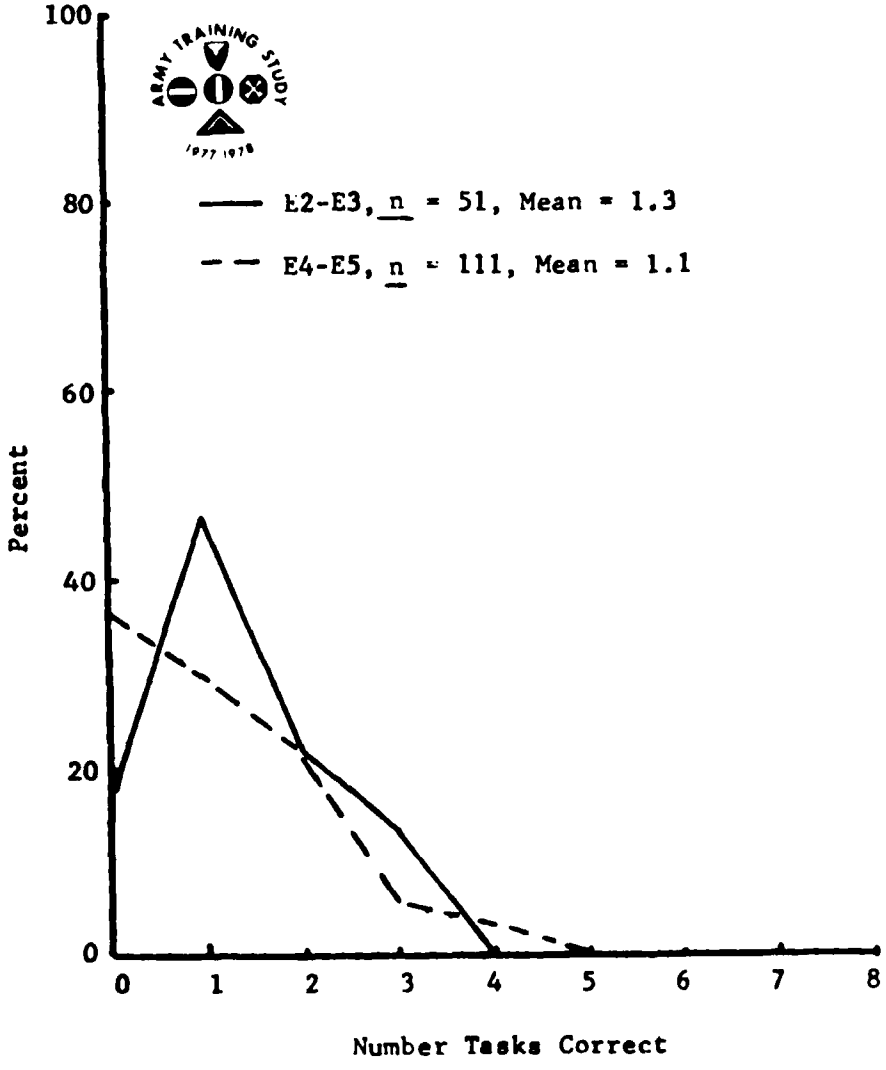
Proficiency Profiles for 63C Personnel in Grades E1 - E6. (pg.18, QL3)



Proficiency Curves for 63H Personnel in Grades E1 - E5. (pg. 19, QL3)



Comparison of 63C E2 - E3 and E4 - E6 Performance for the Zero Prompting Condition (no supervision) (pg. 46, QL3)



Comparison of 63H E2 - E3 and E4 - E5 Performance for the Zero Prompting Condition (no supervision). (pg. 49, QL3)

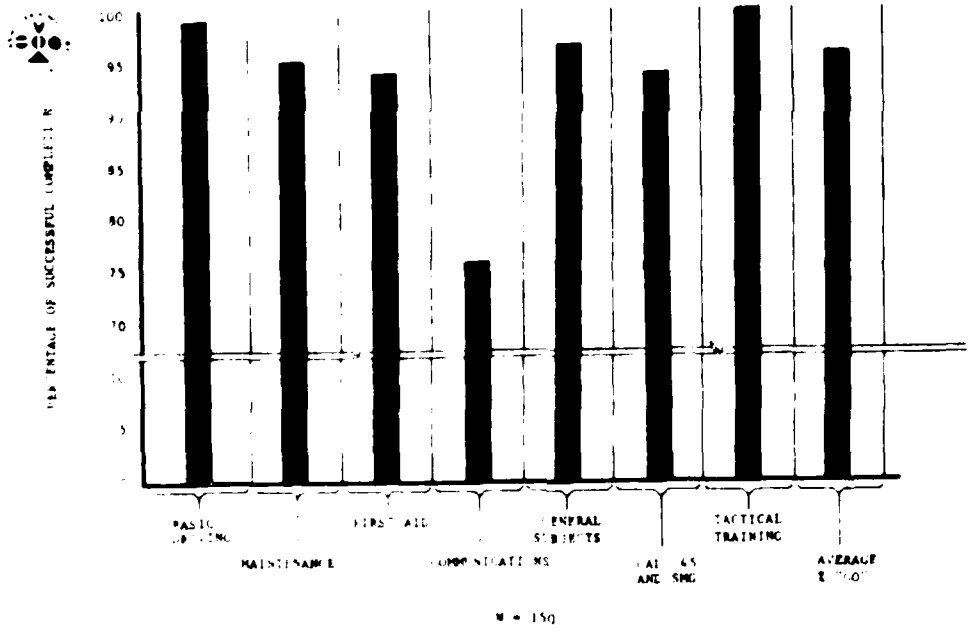
While soldiers of all aptitude levels can learn the desired skills, if reinforcement does not occur these fragile skills decay with the performance being consistently lower for low aptitude soldiers. No systematic on-the-job training program for maintenance personnel was observed with the units visited. (Paraphrased, pg. 62, QL3)

6. The Learning and Retention of Basic Armor Skills Within the Institution, M60A1 System Work Team, August 1978.

Ninety-six percent of the BAT graduates had demonstrated the requisite proficiency on all test items prior to graduation. (Paraphrased, pg. 93, QL3)

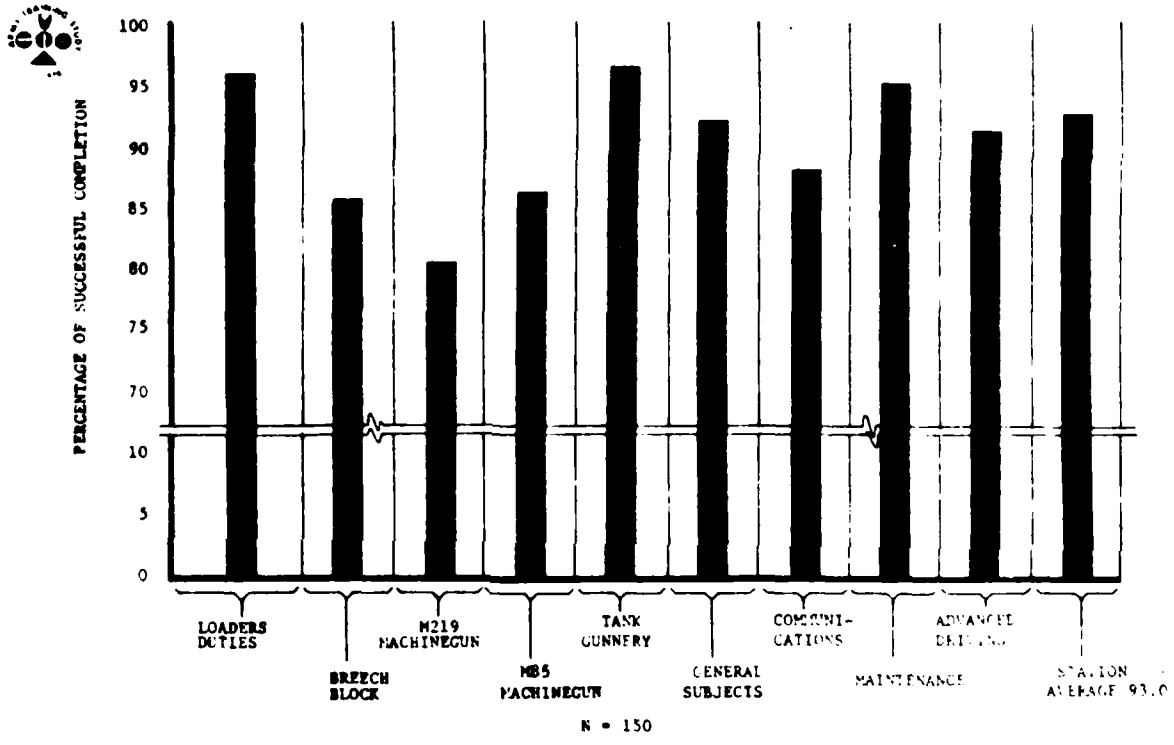
Results comparing mid-cycle test scores (Go/No Go Criteria) indicate that individual learning was much greater on those tasks involving fewer subtasks. Retention was reduced on those tasks involving multiple, precise, sequential subtasks such as communications, first aid, vehicle recognition and maintenance. (Paraphrased, pgs. 46-49, QL3)

A high degree of learning takes place within the institution. On average, 96.9 percent of mid-cycle and 96.1 percent of TSQT performance responses were "Go" at the first try. (Paraphrased, pg. 92, QL3)



Initial Mid-Cycle Test Results (%s) by Station and Overall Performance Results in Percentages (ARTS, QL4)

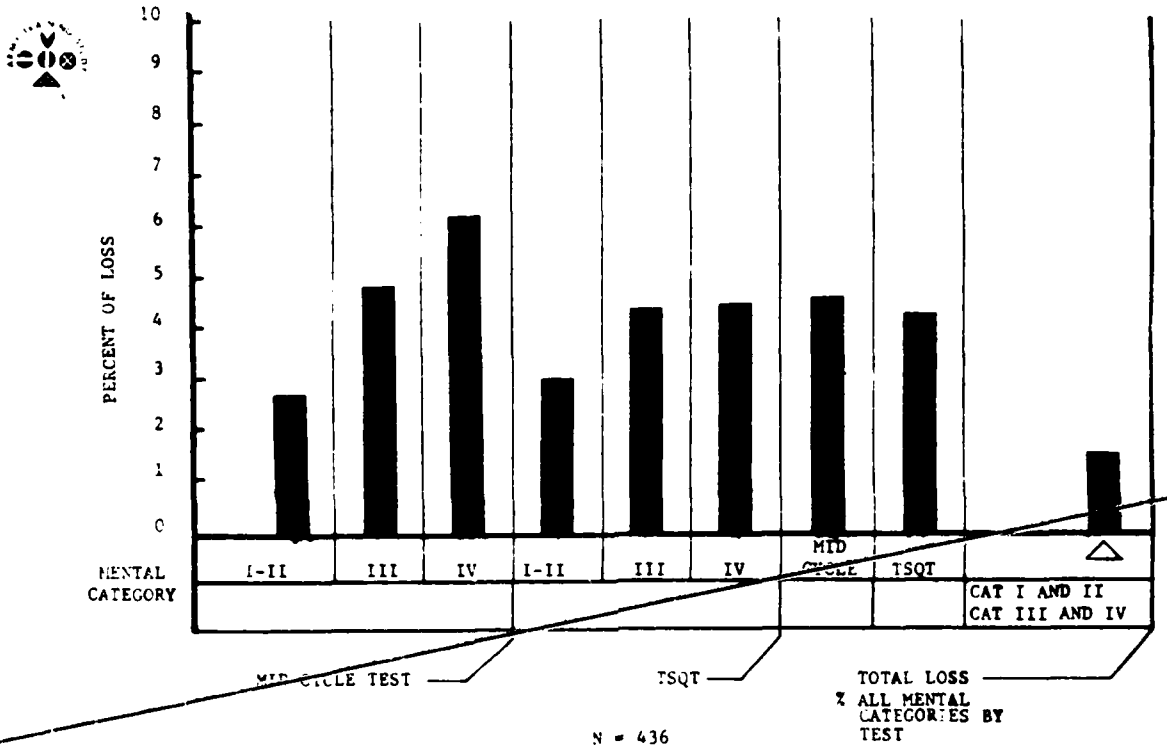
Results of testing on the end of course Tanker Skills Qualification Test (TSQT) are shown.



Mid-Cycle and Test TSQT Overall Retention Loss Results (%) by Station Overall (ARTS, QL3)

Overall, comparing mid-cycle results with TSQT end cycle results, it is concluded that retention performance is high for three weeks in the institution. (Paraphrased, pg. 46, QL3)

Lower mental groups require more training to maintain proficiency. Overall retention performance in the instituion by mental category is shown in below:



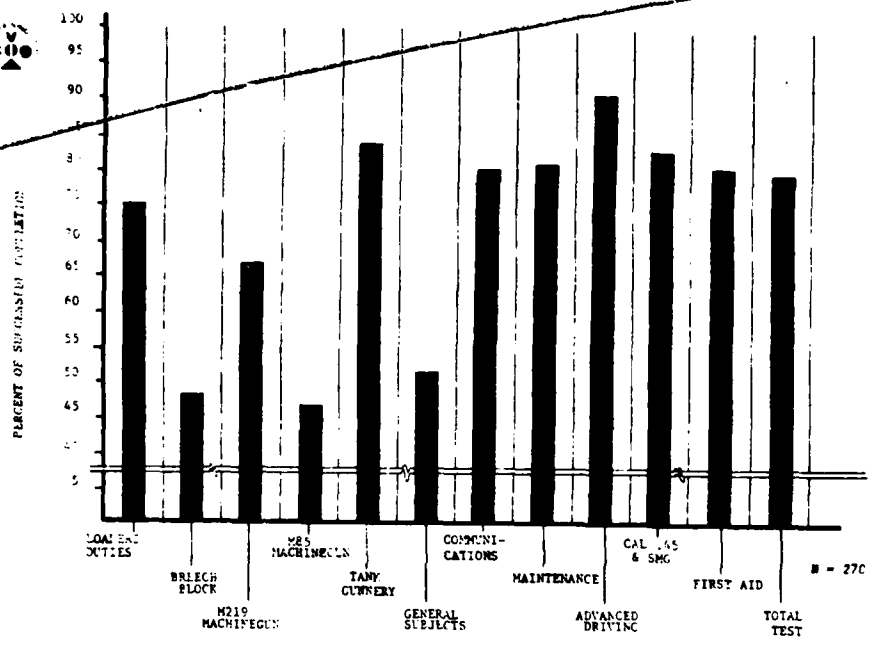
Mid-Cycle and TSQT Overall Retention Loss Results (%)
Mental Category (ARTS, QL4)

Distribution of 436 examinees across mental categories was I - 3.1 percent, II - 13.4 percent, III - 75.1 percent, and IV - 8.3 percent. Approximately 66 percent of the examinees were high school graduates even though 83.4 percent were in the lower mental groups. (Paraphrased, pg. 25, QL3)

7. Retention of Basic Armor Training Skills Within the Unit, (Draft), USAARMS, 1978.

Personnel were able to perform properly (i.e., receive a "Go" on about 80 percent of basic armor skills 2 to 25 weeks after their assignment to the unit. (Paraphrased, Chapter V, QL3)

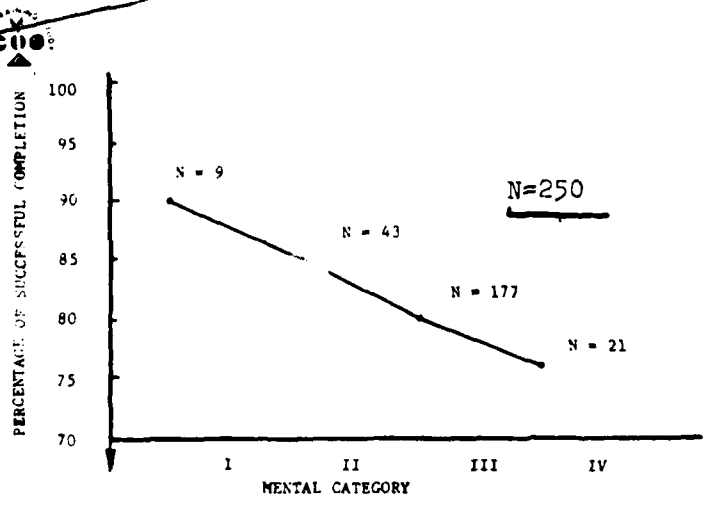
No correlations were found between time from BAT graduation and retention. (Paraphrased, Chapter V, QL3)



Average Percent Go By Test Stations in Unit.
Loss Over Time 2 - 25 Weeks in Unit. (ARTS, QL4)

The only demographic variable significantly related to retention was mental category. Lower aptitude personnel (mental categories III & IV) performed at a significantly (statistically) lower level overall than categories I and II taken as a group. Their difficulties were concentrated in cognitive tasks involving memory retrieval and decision making. This is consistent with trends and indicators reported in the institutional study as to performance by lower mental category personnel. These categories to talled 79.2 percent of this sample. The scarcity of mental category I and II personnel and the preponderance of mental category III personnel (70.8 percent) are typical distributions of the armor trainee population at this time. (Paraphrased, Chapter V, 15, QL3).

The figure on the following page depicts performance loss by mental category.



Performance Loss in Units by Mental Category (QL3)

SURVEY RESULTS

1. M60A1 Modified Weapon System Training Effectiveness Analysis (WSTEA), TRASANA, June 1978.

Many TCs and Gunners did not know proper placement of sight reticles during battlefield gunnery engagements. The approximate .1 Ph attained by CONUS crews on first round of precision engagements testifies to their lack of precision. (Paraphrased, pg. 22 (QL4)

FREQUENCY OF FIELD TRAINING

CONUS	VERY OFTEN	OFTEN	SOMETIMES	RARELY	NEVER
Driver	19%	27%	18%	12%	23%
Loader	22%	16%	16%	25%	24%
Gunner	21%	20%	17%	25%	17%
Tank Commander	14%	15%	19%	16%	36%
Overall	19%	19%	18%	19%	25%
USAREUR					
Driver	22%	16%	12%	20%	30%
Loader	15%	17%	11%	21%	36%
Gunner	19%	17%	16%	23%	26%
Tank Commander	23%	15%	13%	13%	36%
Overall	20%	16%	13%	19%	32%

2. ARTS Survey:

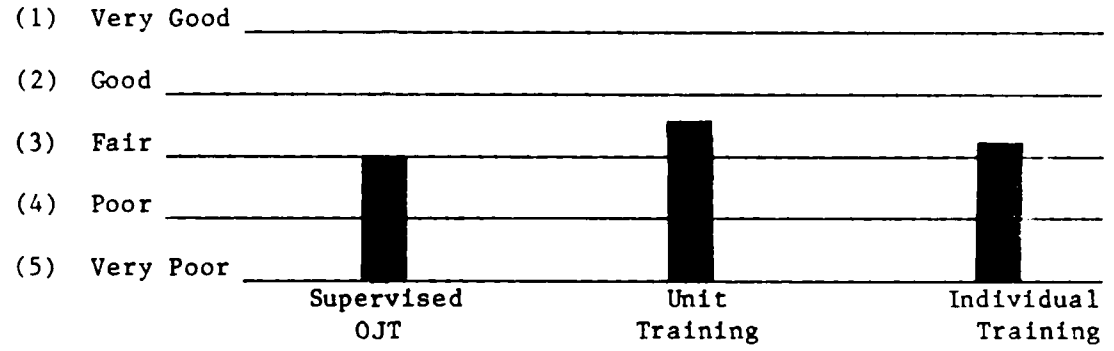
In the ARTS Survey, respondents indicated a strong desire for more training to be conducted in the CONUS service schools.

In the ARTS Survey, respondents indicated that units must provide between 50 and 75 percent of the individual training to produce a trained soldier.

ARTS Survey addressees were asked several related questions. An analysis of their mean responses are shown below:

ARTS Survey respondents rated their units current state of individual training as fair to good. An ARTS Survey question and the mean responses are shown below:

"What is your unit's current state of training in the following areas?"



When respondents were segregated by command, there was a statistically significant difference in the perception of individual training:

"What is your unit's current state of training in the following areas?"

(Scaled: (1) Very Good (2) Good (3) Fair (4) Poor (5) Very Poor

	OJT		UNIT		INDIVIDUAL	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
CONUS (n = 366)	3.00	1.02	2.43	.55	2.73	.94
USAREUR (n = 132)	2.92	1.06	2.28	.90	2.54	.96
	F = .58 Sig. at 145		F = 3.12 Sig. at .08		F = 3.98 Sig. at .05	

When respondents were segregated by branch, there was no readily interpretable difference concerning perceptions of individual training.

"What is your unit's current state of training in the following areas?"

(Scaled: (1) Very Good (2) Good (3) Fair (4) Poor (5) Very Poor)

	OJT		UNIT		INDIV	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Infantry (n=117)	3.00	.97	2.29	.84	2.46	.54
Armor (n=73)	3.08	.97	2.30	.84	2.53	.98
Field Art. (n=108)	3.12	1.03	2.26	.79	2.79	.88
Combat Sup. (n=91)	2.93	1.09	2.56	.93	2.80	1.00
Service Sup. (n=91)	2.69	1.05	2.51	.87	2.89	.02

Correlating another related question in the survey, the pattern of mixed perceptions of state of individual training continued.

"What is your unit's level of proficiency at the following levels?"

(Scaled: (1) Very Good (2) Good (3) Fair (4) Poor (5) Very Poor)

	IND		SQT		PLT		CO		BN	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
O-6	2.40	.67	2.37	.67	2.17	.65	2.00	.59	2.03	.76
O-5	2.50	.86	2.37	.62	2.13	.62	2.08	.69	2.10	.88
O-4	2.52	.79	2.45	.59	2.40	.72	2.11	.63	2.19	.83
O-1, O-3	2.59	.75	2.43	.75	2.33	.80	2.30	.78	2.49	.90
E-7, E-9	2.34	.85	2.29	.80	2.14	.75	2.25	.80	2.26	.84
E-1, E-6	2.46	.84	2.34	.86	2.38	.83	2.43	.90	2.56	.89
	F = 1.38 sg. at .23		F = .65 sig. at .66		F = 2.57 sig. at.082		F = 2.57 sig. at .025		F = 4.28 sig. at .001	

When respondents were segregated by rank, there was a "ranking-ordering" pattern in perceptions of unit training, but no parallel in perceptions of individual training.

"What is your unit's current state of training in the following:"

(Scaled: (1) Very Good (2) Good (3) Fair (4) Poor (5) Very Poor)

	OJT		UNIT		INDIVIDUAL	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
0-6 (n=30)	2.57	.86	1.97	.61	2.47	.63
0-5 (n=71)	3.03	1.04	2.18	.69	2.73	.92
0-4 (n=62)	3.28	.86	2.32	.78	2.66	.94
0-1 to 03 (n=189)	3.07	.99	2.52	.85	2.76	.89
E7 to E9 (n=84)	2.80	1.07	2.29	.93	2.43	1.05
E1 to E6 (n=68)	2.79	1.17	2.58	1.05	2.79	1.06
	F = 3.40		F = 4.33		F = 2.01	
	Sig at .005		Sig at .001		Sig at .076	

"In your opinion, what should be done to prevent individual soldiers from forgetting critical skills?"

1.1%	Overtrain individual (teach more intially so individual remembers better)
66.5%	Conduct frequent individual refresher training
26.3%	Both A and B
6.1%	None of the above

"Where can a soldier best learn the tasks necessary to meet combat proficiency levels?"

18.3	Service School
.8	Shadow School
60.6	Unit Training Program
20.3	Supervised On the Job Training
____	No answer
100%	

3. Battalion Training Survey

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquisition of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying levels of integration, change in duty position (turbulence), not present for training, grade substitution, and soldier quality. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students from the Army War College, CGSC, and the Sergeants Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel.

For further information, see the Battalion Training Survey volume.

The Battalion Training Survey included questions dealing with individual training. Specifically, respondents were asked their opinions as to the frequency and time length per training period required for training groups at individual tasks. Results are shown on following page; for further detail, see the Battalion Training Survey Volume.

Battalion Training Survey Results (QL3)

SOLDIER'S MANUAL TASKS

Task Grouping		Hrs	x	Per	=	Prod
1. Maintenance	M	3.6		25		90
	Lo	3.2		21		67
	Hi	4.0		29		11
2. 81MM Mortar	M	3.6		16		142
	Lo	7.7		14		108
	Hi	10.1		19		192
3. 107MM (4.2 in) Mortar	M	9.2		17		156
	Lo	8.0		14		112
	Hi	10.4		19		198
4. NBC Training (Ind)	M	3.5		8		28
	Lo	3.2		7		22
	Hi	3.8		8		30
5. NBC Training (Track or wheel)	M	2.3		6		14
	Lo	2.1		6		13
	Hi	2.5		7		18
6. NBC Training (Tank)	M	2.2		6		13
	Lo	2.0		5		10
	Hi	2.5		7		17
7. Individual Movement Skills	M	3.9		8		31
	Lo	3.5		7		25
	Hi	4.3		9		39
8. Individual Movement Skills (Mortar)	M	2.7		7		19
	Lo	2.4		6		14
	Hi	3.0		7		21
9. Vehicle Positioning	M	2.2		7		15
	Lo	2.0		6		12
	Hi	2.4		7		17
10. Vehicle Movement	M	3.3		7		23
	Lo	3.0		6		18
	Hi	3.7		8		30
11. M16 Rifle	M	2.2		7		15
	Lo	2.0		6		12
	Hi	2.4		8		19

M = mean

Lo/Hi = 95% Confidence Limits

Battalion Training Survey Results (QL3)

SOLDIER'S MANUAL TASKS

Task	Grouping		Hrs	x	Per	=	Prod
12.	Claymore	M	1.9		5		10
		Lo	1.7		5		9
		Hi	2.0		6		12
13.	AP/AT Mines	M	2.6		4		10
		Lo	2.5		4		10
		Hi	2.8		4		11
14.	90MM RCLR	M	2.6		6		16
		Lo	2.5		5		12
		Hi	2.8		7		20
15.	Dragon	M	2.6		9		23
		Lo	2.3		8		18
		Hi	2.9		10		29
16.	REDEYE Maintenance Checks	M	2.7		9		24
		Lo	2.3		8		18
		Hi	3.0		11		33
17.	M60 Machine-gun	M	2.2		9		20
		Lo	2.0		7		14
		Hi	2.4		10		24
18.	Cal .50 Machinegun	M	2.8		9		25
		Lo	2.6		8		21
		Hi	2.9		10		29
19.	.45 Caliber Pistol	M	1.7		5		9
		Lo	1.5		4		6
		Hi	1.8		6		11
20.	M113A1 Operator Training	M	2.8		11		31
		Lo	2.5		9		23
		Hi	3.1		14		43
21.	1/4 Ton Vehicle Training	M	2.2		8		18
		Lo	2.0		7		14
		Hi	2.4		9		22
22.	M3A1 Sub-Machinegun	M	1.8		5		9
		Lo	1.7		4		7
		Hi	2.0		6		12

M = mean

Lo/Hi = 95% Confidence Limits

Battalion Training Survey Results (QL3)

SOLDIER'S MANUAL TASKS

Task	Grouping		Hrs	x	Per	=	Prod
23.	Auxiliary Generator Tracked Vehicle	M	2.0		7		14
		Lo	1.9		6		11
		Hi	2.2		8		18
24.	TOW	M	3.6		12		43
		Lo	3.3		10		33
		Hi	4.0		14		56
25.	Night Vision Sight	M	2.3		7		16
		Lo	2.1		6		13
		Hi	2.6		8		21
26.	106MM RCLR	M	4.3		7		30
		Lo	3.7		6		22
		Hi	4.9		8		39
27.	M16 Plotting Board	M	4.2		11		46
		Lo	3.8		10		38
		Hi	4.6		12		55
28.	Loader Duties	M	4.3		9		39
		Lo	3.9		8		31
		Hi	4.8		10		48
29.	Driver Duties	M	5.5		18		99
		Lo	4.7		15		71
		Hi	6.3		21		132
30.	M60A2 Specific	M	5.4		19		103
		Lo	4.5		15		68
		Hi	6.3		23		145
31.	M60A1 Specific	M	5.6		12		67
		Lo	4.7		10		47
		Hi	6.4		13		83
32.	Casualty Removal	M	1.3		4		5
		Lo	1.2		3		4
		Hi	1.4		4		6
33.	Tank External Phone	M	1.0		4		4
		Lo	.9		4		4
		Hi	1.1		5		6

M = mean

Lo/Hi = 95% Confidence Limits

Battalion Training Survey Results (QL3)

SOLDIER'S MANUAL TASKS

Task Grouping		Hrs	x	Per	=	Prod
34. Camouflage/ Concealment	M	7.1		9		64
	Lo	6.3		8		50
	Hi	7.9		10		79
35. Radio Procedures	M	2.0		8		16
	Lo	1.8		7		13
	Hi	2.1		9		19
36. OP Operation	M	2.5		5		13
	Lo	2.2		5		11
	Hi	2.8		6		17
37. Intel/ Security	M	2.5		6		15
	Lo	2.2		6		13
	Hi	2.7		7		19
38. Commo Equipment	M	2.6		8		21
	Lo	2.4		7		17
	Hi	2.9		9		26
39. Coax Machinegun	M	4.3		9		39
	Lo	3.9		8		31
	Hi	2.6		10		26
40. Surveillance	M	2.9		6		17
	Lo	2.6		5		13
	Hi	3.3		6		20
41. Ground Navigation	M	5.7		7		40
	Lo	5.3		6		32
	Hi	6.1		7		43
42. Redeye	M	6.0		15		90
	Lo	5.3		12		64
	Hi	6.8		17		116
43. Visual Commo	M	2.0		6		12
	Lo	1.8		3		9
	Hi	2.2		6		13
44. Fire Safety	M	1.1		4		4
	Lo	1.0		3		3
	Hi	1.2		6		13
45. Enemy Mines	M	2.3		5		12
	Lo	2.2		5		11
	Hi	2.5		6		15
46. Fire Support	M	3.1		7		22
	Lo	2.9		7		20
	Hi	3.3		8		26
47. First Aid	M	3.0		6		18
	Lo	2.7		5		14
	Hi	3.2		6		19
48. Hostile Aircraft	M	1.7		5		9
	Lo	1.6		5		8
	Hi	1.9		6		11

M = mean

Lo/Hi = 95% Confidence Limits

Battalion Training Survey Results (QL3)

SOLDIER'S MANUAL TASKS

Task	Grouping		Hrs	x	Per	=	Prod
49.	Enemy Vulner-abilities	M	1.9		5		10
		Lo	1.7		5		9
		Hi	2.0		6		12
50.	Aircraft Identifi-cation	M	2.0		6		12
		Lo	1.8		5		9
		Hi	2.2		7		15
51.	Security	M	1.9		3		6
		Lo	1.7		3		5
		Hi	2.1		4		8
52.	CEOI Security	M	2.2		7		15
		Lo	2.0		7		14
		Hi	2.4		8		19
53.	Vehicle Training 1/4 Ton	M	2.5		3		8
		Lo	2.3		3		7
		Hi	2.7		4		11
54.	Vehicle Training M113A1	M	3.1		4		12
		Lo	2.8		3		8
		Hi	3.4		4		14
55.	Map Reading	M	4.4		6		26
		Lo	4.1		6		25
		Hi	4.8		7		34
56.	Forward Observer Procedures	M	3.9		7		27
		Lo	3.5		6		21
		Hi	4.2		7		29
57.	Range Firing-Mor-tar, Mounted	M	5.4		6		32
		Lo	4.8		5		24
		Hi	6.1		7		43
58.	Firing - Claymore	M	1.9		3		6
		Lo	1.7		3		5
		Hi	2.0		3		6
59.	Night Firing - M16A1	M	2.8		4		11
		Lo	2.6		3		8
		Hi	3.0		4		12
60.	Day Firing - M16A1	M	4.1		5		21
		Lo	3.7		4		15
		Hi	4.4		5		22
61.	Firing - LAW	M	2.6		5		13
		Lo	2.4		4		10
		Hi	2.8		5		14
62.	Hand Grenades	M	2.1		3		6
		Lo	1.9		3		6
		Hi	2.3		3		7
63.	Firing - Grenade Launcher	M	2.5		4		10
		Lo	2.3		4		9
		Hi	2.7		5		14

M = mean

Lo/Hi = 95% Confidence Limits

Battalion Training Survey Results (QL3)
SOLDIER'S MANUAL TASKS

Task	Grouping		Hrs	x	Per	=	Prod
64.	Night Firing	M	3.1		5		16
		Lo	2.9		4		12
		Hi	3.4		5		17
65.	Demolition Training	M	2.5		3		8
		Lo	2.3		3		7
		Hi	2.7		3		8
66.	Firing - .45 Caliber Pistol	M	2.3		3		7
		Lo	2.1		3		6
		Hi	2.5		3		8
67.	Firing - Caliber .50 Machinegun	M	2.8		5		14
		Lo	2.5		4		10
		Hi	3.0		5		15
68.	Night firing - Cal .50 Machinegun	M	2.9		4		12
		Lo	2.7		3		8
		Hi	3.1		4		12
69.	Firing - Mortar, Dismounted	M	4.5		4		18
		Lo	4.1		4		16
		Hi	4.8		4		19
70.	Firing - TOW	M	4.7		7		33
		Lo	4.3		6		26
		Hi	5.1		8		41
71.	Firing - 107MM RCLR	M	4.5		6		27
		Lo	3.9		5		20
		Hi	5.1		7		36
72.	Firing - Dragon	M	4.3		8		34
		Lo	3.9		7		27
		Hi	4.7		9		42
73.	Firing - M3A1 Sub-Machinegun	M	2.3		3		7
		Lo	2.1		3		6
		Hi	2.5		3		8

M	1970
Lo	1513
Hi	2472

M = mean

Lo/Hi = 95% Confidence Limits

RELATED INFORMATION:

1. ARTS concept paper entitled Unit Training Programs

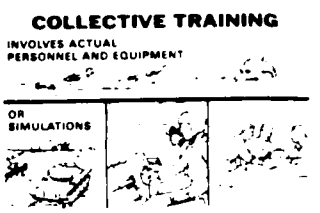
Individual training conducted in the unit should make maximum use of relevance to the job environment. Training should be tailored to the individual's job performance and measured against known standards. Both trainee and trainer should receive diagnostic feedback. (pg. A-16)

Individual training will have to be repeated periodically to account for individual forgetting. The more complex the task the individual is expected to perform, the more often it will have to be repeated to maintain individual proficiency. (A-16)

Corrected Copy 29 September 1978

DATA AREA: Collective Training

Limited testing results indicated states of proficiency below present expectations. However, surveys suggest mixed perceptions by the field. In general, commanders see their units able to maintain about 70 percent combat ready proficiency. The survey responses, as to the time and frequency of various collective training tasks are included.



TEST RESULTS:

1. M60A1 Modified Weapons System Training Effectiveness Analysis (WSTEA), TRASANA, June 1978.

The standard used by ARTS to evaluate tank gunnery proficiency is probability of hit (Ph) essentially equal to the AMSAA curve to be combat ready. Minimum acceptable standards for the tested units (all forward deployed or early deploying units) should be 95 percent of the AMSAA curve. As indicated by the Tank Exchange Model output, proficiency achieved was 40 to 50 percent below the standard (Paraphrased pg. 23, QL4).

A major finding of this study was that those crews who had previously fired well continued to do so, and those that did not, continued to fail. This finding gives rise to a conclusion that the evaluation feedback mechanism necessary to design and implement corrective training associated with tank Table VIII is not wholly effective (Paraphrased, pgs. 14, 15, QL4).

Commanders in the Battalion Survey expressed judgments that tank gunnery training should be conducted quarterly. This is supported by the findings that large numbers of tank commanders and gunners in CONUS and USAREUR did not know proper placement of sight reticles during battlefield gunnery engagements, and that a first round Ph of approximately [illegible] was attained by CONUS crews in precision engagements (Paraphrased, pg. 21, [illegible]).

SURVEY RESULTS:

1. Related ARTS Survey questions and their responses are listed on the next page.

"In your opinion, what percentage of ARTEP tasks do soldiers in the field believe to be critical for combat success?"

12.6	100%
52.0	75%
26.7	50%
4.3	25%
4.4	Less than 25%
—	No experience with ARTEP
100%	

"What percent of combat-ready proficiency is your unit able to maintain? (Individual and collective skills)"

	100%	60%	20%
	90%	50%	10%
	80%	40%	—
$\bar{X}$=71%	➤ 70%	30%	Do not belong to a TOE Unit or no answer

---

"Where can a soldier best learn the tasks necessary to meet combat proficiency levels?"

18.3%	1.	Service School
.8%	2.	Shadow School
60.6%	3.	Unit Training Program
20.3%	4.	Supervised On-The-Job-Training
—	9.	No answer
100%		

2. Battalion Training Survey

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquisition of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for training, grade substitution, and the soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollar, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC, and the Sergeants Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel. For further information, see the Battalion Training Survey volume.

Survey respondents were asked their opinions on how often ARTEP and collective tasks should be trained and how long each training period should be. Results are on the following pages.

As stated, commanders in the Battalion Training Survey expressed judgments that tank gunnery training should be conducted quarterly. This is supported by the findings that large number of tank commanders and gunners in CONUS and USAREUR did not know proper placement of sight reticles during battlefield gunnery engagements, and that a Ph of less than 0.1 was attained by CONUS crews in precision engagements. (QL4)

Battalion Training Survey (QL3)
Frequency and Time of Training - ARTEP Missions

M = mean Hi/Lo = 95% Confidence Limits

		Bn Level Hrs x Per = Prod			Co Level Hrs x Per = Prod			Plt Level Hrs x Per = Prod			Sqd Level Hrs x Per = Prod		
1.	Move to Contact	M	6.0	3	18	6.3	4	25	5.4	5	27	4.3	5	21
		Lo	5.4	3	16	5.7	4	23	4.9	4	20	3.8	5	19
		Hi	6.5	3	20	6.9	5	35	5.8	5	29	4.8	6	29
2.	Hasty Attack	M	5.6	3	17	5.8	4	23	5.1	6	31	4.1	5	21
		Lo	5.0	3	15	5.2	4	21	4.5	5	23	3.6	5	18
		Hi	6.1	3	18	6.3	5	32	5.7	6	34	4.6	6	28
3.	Delib Attack	M	7.9	3	24	7.3	4	29	5.8	5	29	5.0	5	25
		Lo	7.2	3	22	6.7	4	27	5.2	5	26	4.4	5	22
		Hi	8.6	4	34	8.0	5	40	6.4	6	38	5.6	6	34
4.	Exploi-tation	M	5.8	3	17	5.4	3	16	4.4	3	13	3.7	4	15
		Lo	5.2	2	10	4.9	3	15	3.9	3	12	3.1	3	9
		Hi	6.3	3	19	6.0	3	18	5.0	4	20	4.4	4	18
5.	Night Attack	M	8.2	4	32	7.9	4	32	7.1	5	36	5.9	4	24
		Lo	7.4	3	22	7.2	4	29	6.4	5	32	5.2	4	21
		Hi	8.7	4	35	8.5	5	43	7.8	5	39	6.6	5	33
6.	Defense	M	12.2	3	37	11.2	4	45	9.7	6	58	6.5	6	39
		Lo	10.9	3	33	10.1	4	40	8.6	5	43	5.7	5	29
		Hi	13.4	4	54	12.4	5	62	10.8	6	65	7.2	6	43
7.	Delay	M	9.6	3	29	9.2	5	46	7.6	6	46	5.3	5	27
		Lo	8.5	3	26	8.2	4	33	6.6	5	33	4.6	5	23
		Hi	10.7	4	43	10.2	5	51	8.6	6	52	6.0	6	36
8.	Disen-gage	M	6.5	3	20	6.2	4	25	5.6	4	22	4.8	4	19
		Lo	5.8	3	17	5.5	4	22	5.0	4	20	4.1	4	16
		Hi	7.1	4	28	6.9	4	28	6.2	5	31	5.5	5	28
9.	Defend Built-up Area	M	6.7	2	13	6.6	3	20	6.2	4	25	5.4	4	22
		Lo	6.0	2	12	5.9	3	18	5.6	3	17	4.7	3	14
		Hi	7.4	3	22	7.3	3	22	6.8	4	27	6.2	4	25
10.	Prepare Strong Point	M	9.5	3	29	9.5	4	38	6.8	4	27	5.8	4	23
		Lo	8.2	2	16	8.3	3	25	6.1	4	24	5.0	4	20
		Hi	10.7	3	32	10.6	4	42	7.5	5	38	6.6	4	26
11.	Antiarmor Ambush	M	6.0	3	18	5.8	4	23	6.0	6	36	5.6	5	28
		Lo	5.1	3	15	5.2	3	16	5.4	5	27	4.9	4	20
		Hi	6.9	3	21	6.4	4	26	6.6	6	40	6.3	5	32

Battalion Training Survey (QL3)
Frequency and Time of Training - ARTEP Missions

M = mean Hi/Lo 95% Confidence Limit

		Bn Level Hrs x Per =			Co Level Hrs x Per =			Plt Level Hrs x Per =			Sqd Level Hrs x Per =		
12. Passage of Lines	M	5.3	3	16	4.4	4	18	3.9	4	16	3.5	4	14
	Lo	4.8	3	14	3.9	3	12	3.4	4	14	2.9	4	12
	Hi	5.8	3	17	4.9	4	20	4.4	5	22	4.1	4	16
13. River Crossings	M	6.8	3	20	5.6	3	17	5.0	3	15	4.6	3	14
	Lo	6.2	2	12	5.0	3	15	4.5	3	14	3.9	3	12
	Hi	7.4	3	22	6.2	4	25	5.6	4	22	5.2	4	21
14. Patrolling	M	6.3	3	19	6.1	4	24	6.6	5	33	6.7	6	40
	Lo	5.1	3	15	5.3	4	21	5.9	4	24	5.9	5	30
	Hi	7.4	3	22	6.8	4	27	7.2	5	36	7.4	6	44

Frequency and Time of Training - Collective Tasks

		Bn Level Hrs x Per = Prod			Co Level Hrs x Per = Prod			Plt Level Hrs x Per = Prod			Sqd Level Hrs x Per = Prod		
1. Tactical Movements	M	8.8	4	35	7.2	6	43	6.7	7	47	5.6	7	39
	Lo	7.5	3	23	6.1	5	31	5.7	6	34	4.7	7	33
	Hi	10.1	4	40	8.2	6	49	7.7	8	62	6.4	8	51
2. Security & Intel. Opn.	M	5.3	3	16	5.1	4	20	4.5	4	18	3.4	5	17
	Lo	4.6	3	14	4.5	3	14	4.0	4	16	3.0	5	15
	Hi	6.1	3	18	5.7	4	23	5.1	5	26	3.8	6	23
3. Cover & Concealm't	M	6.6	4	26	6.0	5	30	5.8	6	35	4.8	8	38
	Lo	5.4	3	16	5.0	5	25	5.0	6	30	4.2	7	29
	Hi	7.7	4	31	6.9	6	41	6.7	7	47	5.4	9	49
4. Combat Support Use	M	8.1	5	41	6.4	5	32	4.4	5	22	3.5	5	18
	Lo	6.9	4	28	5.3	5	27	3.7	4	15	2.8	4	11
	Hi	9.4	5	47	7.4	6	44	5.1	6	31	4.3	6	26
5. Combat Arms	M	5.8	3	17	5.3	4	21	5.5	5	28	5.7	7	40
	Lo	4.8	3	14	4.7	4	19	5.0	5	25	5.0	6	30
	Hi	6.8	4	27	5.8	5	29	6.0	6	36	6.3	8	50
6. Fighting Vehicles	M	8.9	4	36	8.5	6	51	7.4	8	59	5.9	8	47
	Lo	7.5	4	30	7.4	5	37	6.4	7	45	5.2	7	36
	Hi	10.4	5	52	9.7	6	58	8.4	8	67	6.7	9	60

Battalion Training Survey (QL3)
Frequency and Time of Training - Collective Tasks

M = mean Hi/Lo = 95% Confidence Limits

		Bn Level Hrs x Per = Prod			Co Level Hrs x Per = Prod			Plt Level Hrs x Per = Prod			Squad Level Hrs x Per = Prod		
7. Antitank Weapons	M	8.0	4	32	7.3	6	44	6.9	7	48	5.9	9	53
	Lo	6.6	4	26	6.3	5	32	6.0	6	36	5.2	7	36
	Hi	9.3	5	47	8.2	7	57	7.8	7	55	6.7	10	67
8. Organic Mortars	M	7.6	4	30	6.8	5	34	5.5	6	33	4.9	7	34
	Lo	6.3	4	25	5.8	4	23	4.8	5	24	4.2	6	25
	Hi	8.8	4	35	7.8	5	39	6.1	7	43	5.5	9	50
9. Fire & Maneuver	M	8.4	4	34	80	6	48	7.8	8	62	7.4	8	59
	Lo	7.1	3	21	6.9	6	41	6.9	7	48	6.3	7	44
	Hi	9.7	4	39	9.1	7	64	8.7	9	78	8.5	9	77
10. Reconn.	M	6.9	4	28	5.3	5	27	5.7	6	34	5.0	6	30
	Lo	5.9	3	18	4.7	4	19	5.0	6	30	4.4	6	26
	Hi	8.0	4	32	5.9	5	30	6.4	7	45	5.5	7	39
11. Reorganize Consolidate	M	4.7	4	19	4.5	5	23	4.1	5	21	3.1	6	19
	Lo	4.1	3	12	4.0	5	20	3.6	5	18	2.7	5	14
	Hi	5.3	4	21	5.1	6	31	4.6	6	28	3.5	6	21
12. Night Operations	M	8.9	4	36	8.2	7	57	7.7	7	54	6.5	7	46
	Hi	7.9	4	32	7.3	6	44	6.8	7	48	5.8	7	41
	Lo	10.0	5	50	9.2	7	64	8.6	8	69	7.1	8	57
13. NBC Operations	M	4.4	3	13	4.5	6	27	4.1	6	25	4.0	7	28
	Lo	3.9	3	12	4.0	5	20	3.6	6	22	3.6	6	22
	Hi	5.0	4	20	5.0	6	30	4.6	7	32	4.5	7	32
14. Combat in Built-up Areas	M	5.1	3	15	5.5	4	22	5.3	5	27	4.9	5	25
	Lo	4.5	2	9	4.9	4	20	4.7	4	19	4.4	4	18
	Hi	5.7	3	17	6.1	5	31	5.8	5	29	5.4	5	27
15. TAC Air Environ.	M	5.0	4	20	4.1	4	16	3.1	5	16	2.9	5	15
	Lo	4.2	3	13	3.5	4	14	2.7	5	14	2.6	4	10
	Hi	5.7	4	23	4.7	5	24	3.5	6	21	3.3	5	17
16. Commo in EW Environ.	M	7.3	5	37	5.5	6	33	4.6	6	28	3.7	5	19
	Lo	6.2	5	31	4.7	5	24	4.0	5	20	3.2	5	16
	Hi	8.5	6	51	6.2	6	37	5.2	6	31	4.2	6	25

Battalion Training Survey (QL3)
Frequency and Time of Training - Collective Tasks

M = mean Hi/Lo = 95% Confidence Limits

		Bn Level Hrs	x Per	= Prod	Co Level Hrs	x Per	= Prod	Plt Level Hrs	x Per	= Prod	Squad Level Hrs	x Per	= Prod
17. Battle Positions	M	9.0	4	36	9.5	5	48	8.0	6	48	7.3	6	44
	Lo	7.6	3	23	8.3	4	33	7.1	6	43	6.4	5	32
	Hi	10.3	4	41	10.8	5	54	8.9	7	62	8.3	7	58
18. Mines & Obstacles	M	4.5	3	14	4.2	4	17	3.9	4	16	3.7	4	15
	Lo	4.0	3	12	3.7	3	11	3.5	4	14	3.4	4	14
	Hi	5.1	3	15	4.6	4	18	4.2	5	21	4.1	4	16
19. Service Support Use	M	9.3	5	47	7.9	6	47	4.7	5	24	3.7	5	19
	Lo	7.9	5	40	6.6	5	33	3.8	5	19	2.8	4	11
	Hi	10.8	6	65	9.2	7	64	5.6	6	34	4.5	6	27
20. Leader Skills	M	8.6	7	60	8.9	8	71	8.8	9	79	7.4	9	67
	Hi	7.2	6	43	7.5	7	53	7.4	8	59	6.1	8	49
	Lo	9.9	7	69	10.4	9	94	10.3	9	93	8.7	10	87

The time and frequencies shown above were incorporated into the BTM - designed 95% Baseline Training Program. See BTM Volume for details.

4. M60A1 Modified Weapons System Training Effectiveness Analysis (WSTEA), TRASANA, June 1978.

IMPORTANCE FOR COMBAT READINESS (QL3)

CONUS	KEEPING CREWS TOGETHER	SPENDING MORE TIME ON UNIT TRAINING WITH MY TANK IN THE FIELD	HAVING COMPLETE FOUR MAN CREWS AT ALL TIMES
All	32%	5%	30%
Tank Commander	27%	7%	32%
Gunner	32%	3%	30%
Loader	35%	5%	29%
Driver	34%	5%	29%
USAREUR			
All	27%	5%	38%
Tank Commander	31%	4%	47%
Gunner	31%	3%	39%
Loader	19%	6%	29%
Driver	26%	5%	37%

RELATED INFORMATION:

1. ARTS Concept Paper entitled Unit Training Programs

The key elements to a team training program may be summarized as realism which creates a series of emergent situations that cause the team to exercise its team coordinative skills and an objective diagnostic feedback system. This establishes a team training program comparable to the "functional context" approach which has proven effective in individual training (pg. A-13 QL4).

Little hard data exists on team performance (pg. A-16 QL4).

Team members must have requisite individual skills if the team is to function effectively (pg. A-16 QL4).

Team training is required to develop the coordinating skills required (pg. 16 QL4).

Performance feedback is essential to both teams and individuals (pg. A-16 QL4).

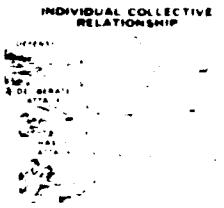
Job relevance (realism) is significant to team training as well as individual training (pg. A-16 QL4).

Engagement simulation is a promising approach to team training (pg. A-16 QL4).

The starting point for unit collective training is the Army training and evaluation program (ARTEP). The ARTEP is intended to describe the minimum set of mission capabilities for the unit. There is, at this point, no collective equivalent to the SQT (pg. A-50 QL4).

DATA AREA: Integrated Individual and Collective Training

Integrated individual and collective training refers to imbedded value in collective training for refreshing individual skills. This concept is based on the pioneering work done by the Combat Arms Training Board on the interface between soldier's manuals and ARTEP's. The Battalion Training Survey was used to quantify the imbedded value while the Battalion Training Model was used to project the impact of integrated multiechelon training.



Survey Results:

1. Battalion Training Survey.

This survey provided the majority of the data for the training program section of the BTM and was of overriding importance to current sensitivity analyses. The survey included acquistion of time and frequency data relative to individual/collective tasks and ARTEP missions and the impact on these times and frequencies of such issues as varying proficiency levels, integration, change in duty position (turbulence), not present for training, grade substitution, and soldier capability. Finally, survey questions provided a meaningful tool to change training programs as time, dollars, and people resources are decremented.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in mech/armor trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3's from eight battalions in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC, and the Sergeants Major Academy. Institutional responses were received from the surveyed divisions, III and V Corps, and the Infantry and Armor schools. The survey was administered in the field by Army Training Study Group personnel. For further information, see the Battalion Training Survey volume.

The effects of integrated training were among the subjects addressed in the Battalion Training Survey. Survey respondents were queried regarding the relative training benefit to be derived from training on a task in the context of training primarily aimed at various different echelons. A value of one was assigned to a unit training at its own echelon (i.e., a squad conducting squad training, a platoon conducting platoon training , etc.), and respondents were asked to assign a value to training at other echelons.

The results were consistent among all sets. In every case, the response indicated that the greatest training benefit occurred during training at the next higher echelon. The results are summarized on the following page.

TRAINING ECHELON BENEFIT FACTORS (ARTS, QL4)

All Respondents, ≥ 3 Years

Mech Inf- Armor Experience

Mean
95% Conf Int

Echelon of Training	Unit			
	Individual	Squad/Crew	Platoon	Company
Individual	1.000			
Squad/Crew	1.644 (1.482 - 1.824)	1.000		
Platoon	1.089 (.951 - 1.247)	1.191 (1.074 - 1.322)	1.000	
Company	0.587 (.511 - .576)	0.695 (.602 - .803)	1.194 (1.076 - 1.325)	1.000
Battalion	0.300 (.254 - .354)	0.314 (.254 - .388)	0.644 (.553 - .751)	1.146 (1.033 - 1.271)

RELATED INFORMATION:

1. Battalion Training Model.

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95% battlefield; and development of training programs associated with varying levels of readiness.

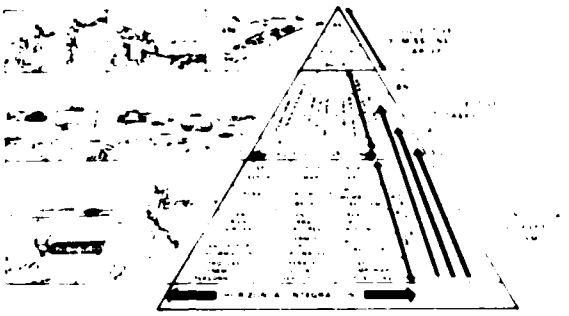
The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideraion, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance

time, and nontraining time. Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

The effects of integration are an integral part of the Battalion Training Model.

INDIVIDUAL/COLLECTIVE RELATIONSHIP



The Battalion Training Survey, through aggregative techniques, obtained input data (time and frequencies for all ARTEP 71-2 Mech/Tank Task Forces) individual/collective tasks and ARTEP missions. These times and frequencies were aggregated into battle drills. The mutual training integration and benefit within and among ARTEP missions and battle drills was estimated and included in the preliminary/integrating runs of the BTM. This integration resulted in a large reduction in the total required annual training time over that which would have been necessary if there were no integration effect, and each task had to be taught separately. The time requirements for the two approaches are shown on the following page. The unfavorable training conditions cited were 35 percent turbulence per quarter, 25 percent not persent for training and 15 percent trainer grade substitution.

	Mean Time Requirement: No Integration (Unfavorable Training Situation) Battle/Training Drill			Mean Time Requirement: Integration (Unfavorable Training Situation) Battle/Training Drill		
	Time	Frequency	Hrs/Yr	Time	Frequency	Hrs/Yr
Move Co	7	6	42	7	1	7
Move P/S	22	7	154	22	3.7	81.4
Move Ind	3	4	12			*
Shoot Co	5	4	20	5	4	20
Shoot P/S	42.9	6	245..	42.9	4	168.6
F & M Co	21	6	126	21	4	84
F & M P/S	49	8	392	49	6	294
R & S Co	16	4	64	16	5	80
R & S P/S	46	7	322	46	3	138
R & S Ind	2	4	8			*
Comm Co	6	5	30	6	4	24
Comm P/S	2	5	60	12	3	36
Comm Ind	5	4	20			*
BP/H Co	6	5	30	6	4	24
BP H P/S	12	5	60	12	4	48
BP H Ind	5	4	20			*
Sustain Co	11	6	66	11	6	66
Sustain P/S	34	7	238	34	4	136
Sustain Ind	3	24	72			*
Support L/CS	63	5	315	63	5	315
Support L	40	3	120	40	3	120
NBC	15	7	105	15	5	75
NBC Ind	3	4	12			*
MOUT	14	4	56	14	3	42
ARTEP Total (from page IN-5)			994.4			

ARTEP: 994.4 hrs/yr
Battle/Training Drill: 2589.4 hrs/yr

Total Time: 3583.8 hrs/yr

SM TNG Days (High Decay Ind Tng) 15.33 days x 8 hrs/day = 122.64 hrs

Total Time: 1981.6 hrs/yr

(Co = Company)
(P/S = Platoon/Squad)
(Ind = Individual)

* Individual training integrated into battle/training drills.

ARTEP Mean Time Requirement No Integration
(Unfavorable Training Situation)

ARTEP

	Time	Frequency	Hrs/Yr
MVMT CNT Bn	6.0	3	18.0
MVMT CNT Co	6.3	4	25.2
MVMT CNT Plt	5.4	5	27.0
MVMT CNT Sq	4.3	5	21.5
Hasty ATTK Bn	5.6	3	16.8
Hasty ATTK Co	5.8	4	23.2
Hasty ATTK Plt	5.1	6	30.6
Delib ATTK Bn	7.9	3	23.7
Delib ATTK Co	7.3	4	29.2
Exploitation	5.8	3	17.4
Night ATTK Bn	8.1	4	32.4
Night ATTK Co	7.9	4	31.6
Defense Bn	12.2	3	36.6
Defense Co	11.2	4	44.8
Defense Plt	9.7	6	58.2
Delay Bn	9.6	3	28.8
Delay Co	9.2	5	46.0
Disengage Bn	6.5	3	19.5
Disengage Co	6.2	4	24.8
Def. BLTVP Bn	6.9	2	13.8
Def. BLTVP Co	6.6	3	19.8
Def. BLTVP Plt	5.2	4	20.8
Def. BLTVP Sq	5.0	4	20.0
Prep St Pt Co	9.5	4	38.0
Prep St Pt Plt	6.5	4	26.0
Antiarm Amb	5.4	5	27.0
Pass Lines Bn	5.3	3	15.9
Pass Lines Co	4.4	4	17.6
Cross H20 Bn	6.8	3	20.4
Cross H20 Co	5.6	3	16.8
Cross H20 Plt	5.0	3	15.0
Cross H20 Sq	4.6	3	13.8
Recon Patrol	6.7	6	40.2
For Mar/Lifi	3.0	6	18.0
Veh Fire Prof	3.0	4	12.0
Del ATTK Live Fire Co	8.0	4	32.0
Del ATTK Live Fire Plt	4.0	4	16.0
Def Agnst Air Craft	4.0	6	24.0
Def Live Fire	8.0	4	32.0
Total			994.4

2. ARTS Concept Paper on Unit Training Programs.

The Army Training Board feels that the development of the ARTEP/SM interface concept, whatever its physical format, was the key that unlocked the door to a rational battalion training management system. The shift to the printed page format, and the inclusion of the addition training information makes the interface a much more usable tool. Ultimately, the board sees its transformation into a type of "how to train" book. The process of refinement is not finished. Users of the interface are strongly encouraged to modify it, change it, expand it to better fit their own needs, and share their experiences with the rest of the Army by keeping the ATB informated of the lessons they have learned. (pg. A-57, QL4)

A step toward accomplishing multiechelon, integrated training is use of traditional crew drills. Crew drills were once a way of life in Army training, and still are to a large extent in the weapons systems oriented branches such as Armor and Artillery. The crew drills accomplish two primary purposes. First, each individual in the crew learns his job within the context of the crew task. Second, the drills are standardized so that when a soldier goes from crew to crew or unit to unit, the particular techiques associated with his tasks remain constant. Crew drills, thus, serve to ameliorate the effects of personnel turbulence by ensuring maximum transferability of previously learned skills. The concept of crew drill can be expanded beyond drills that cover the equipment functions to include tactical actions. (pg. A-39, QL4)

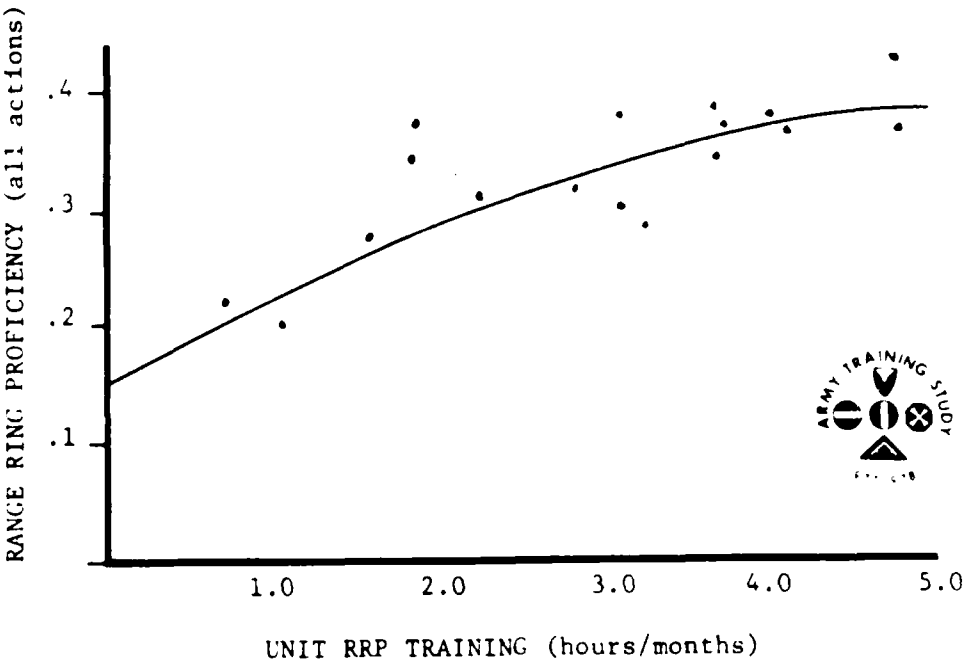
DATA AREA: Training Readiness

Whereas tests suggest marginal training readiness, survey perceptions suggest a general satisfaction about the state of individual and unit training. This may be interpreted as an indication of low expectations resulting from the multiple demands which compete with training for the time of a unit. On the other hand, this may indicate routine acceptance of low standards of readiness . The Battalion Training Model was used to extrapolate several characteristics of training to threat-defeating standards

TEST RESULTS:

1. REDEYE Weapons System, Technical Report 6-78, TRASANA, August 1978.

A direct relationship between Range Ring Profile (RRP) training and RRP proficiency followed the same trends in both the WSTEA and ARTS (Paraphrased, pg. 42, QL3).



Unit RRP Training Time vs Proficiency (section 8, pg. 42, QL3)

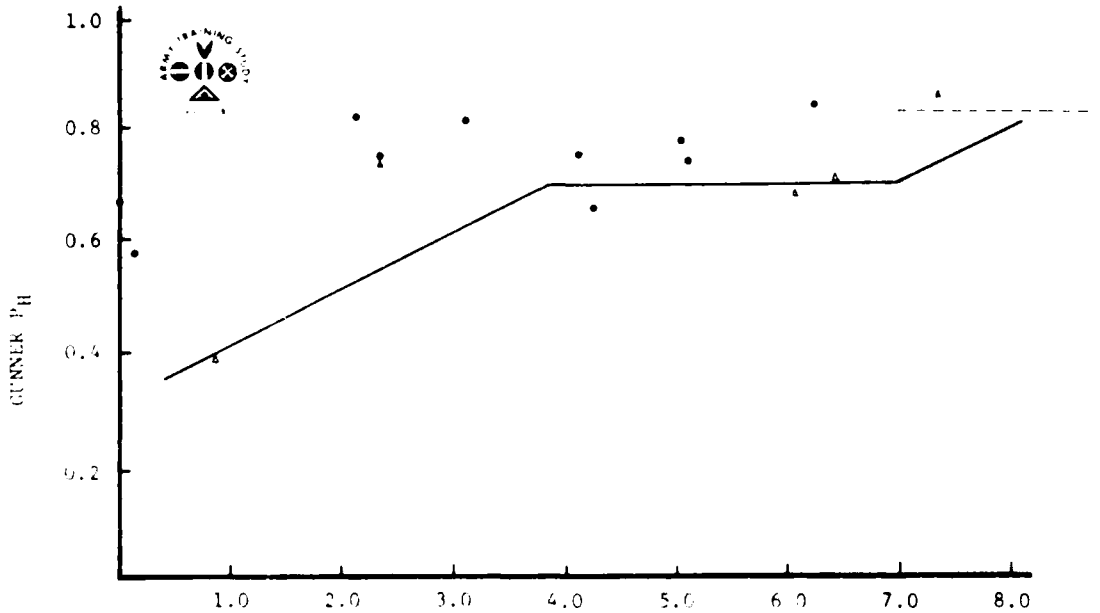
The Stinger system (follow-on to REDEYE) would require soldiers of higher mental category than the mimimum currently acceptable for Redeye. This is demonstrated by the fact that mental category IIIB and IV personnel cannot presently judge range ring coverage for REDEYE. It is reasonable, then, that they could not operate Stinger with its complex RRP, infrared (IR) tone selection, requirement and identification friend or foe system (IFF). (Paraphrased, Section 14, pg. 18, QL4)

The Stinger system requirement to detect, acquire, identify and activate by the time the attacking aircraft reaches 1/6 range ring coverage is unrealistic. The best gunners could not be trained to accomplish effectively this requirement. (Paraphrased, Section 14, pg. 18, QL4)

The Stinger system (follow-on to REDEYE) has a complex RRP and IR tone system as well as an IFF capability. If the existing system, Redeye, is already so complex that many assigned personnel are unable to operate it at its design Ph, then it is logical to assume that Stinger will require a well designed supportive training package. This package must be developed in parallel with the weapons system. A Training Effectiveness Analysis is clearly warranted. (Paraphrased, Section 14, pg.18, QL4)

"Training within the MTS yields the greatest increase in gunner Ph and, therefore, should be maximized." (Paraphrased, Section 8, QL3)

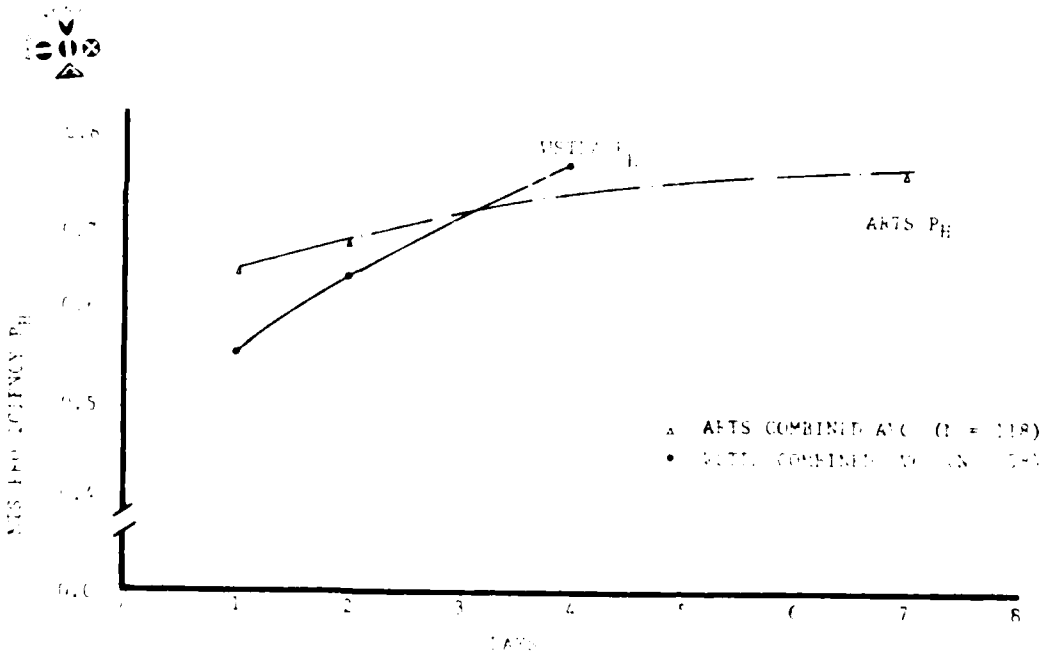
"The frequency of MTS training in units is insufficient. In some cases, this appears to be due to lack of time." (Paraphrased, Section 8, QL3)



Unit MTS Proficiency vs MTS Training Time (Section 8, pg. 45, QL3)

The use of higher resolution war models which allow variation in values assigned to individual steps in the engagement sequence will allow more accurate determination of the relationships between those steps and decreased proficiency. Tied to these higher resolution war models is the need for increased instrumentation of the MTS to record the time at which a gunner performs each step in the engagement sequence. Once these values are available, they can be used to determine incremental reduction in proficiency compared to the AMSAA curves. These values can then be used to demonstrate the additional costs of using lower mental category personnel on Redeye and should provide firm justification for additional resources to train these personnel. (Paraphrased, Section 9, pg. 15, QL4)

Three additional hours of MTS training, which were implemented following the WSTEA recommendations, resulted in a slight increase in proficiency during ARTS tests. Actual benefit, however, was not apparent because of the lower AFQT scores of the ARTS tests subjects when compared to the WSTEA subjects. (Paraphrased, Section 8, pg. 73, QL3)



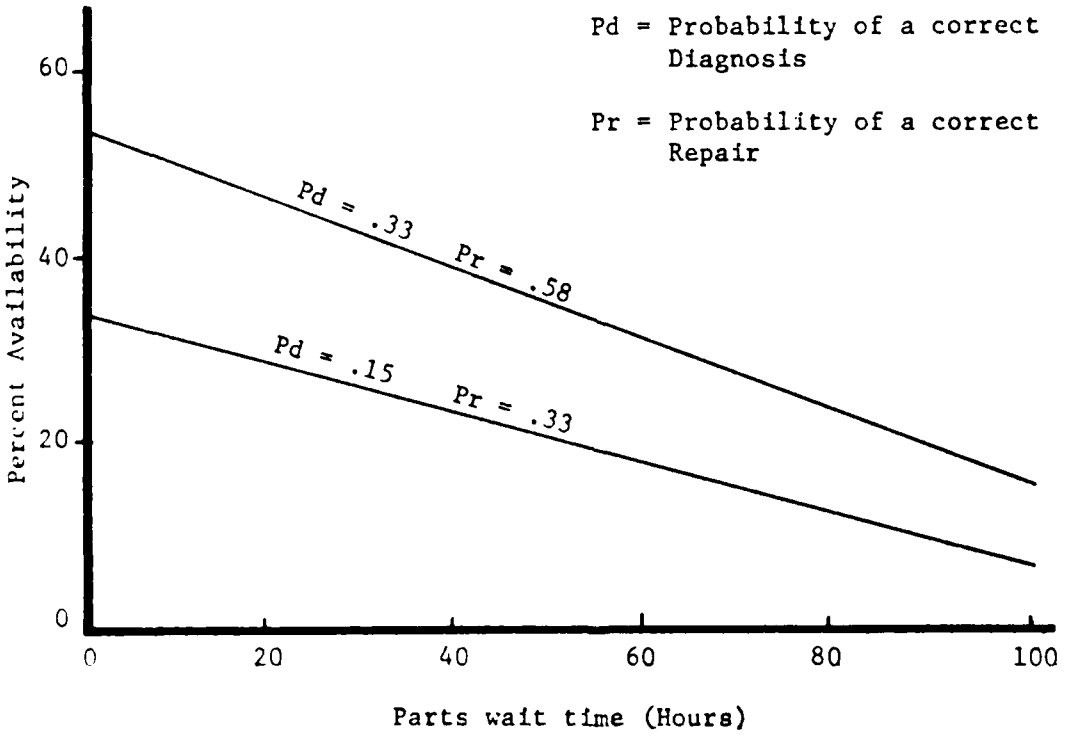
AIT MTS Proficiency Growth (Section 8, pg. 9, QL3)

REDEYE studies demonstrate that all mental categories were trained to an acceptable level of proficiency in the alloted time in the institution. The proficiency of personnel in lower mental categories dropped markedly in comparison to that of higher mental categories. This decay indicates the need for more frequent training for selected individuals if proficiency is to be maintained. (Paraphrased, Section 8, pg. 19, QL4)

The RELS training package is an effective training aid to reduce fear and build confidence. While it may be too late in the REDEYE life cycle to acquire the RELS, the Stinger Launch Simulator (STELS) would be effective as a training aid. (Paraphrased, Section 8, pg. 53, QL4)

2. Proficiency Development Profile, USAOCCS, 1 July 1978.

Operational availability would be reduced severely if availability depended primarily on individual diagnostic and repair proficiency. By using extraordinary management practices, such as overspecialization of personnel and heavy reliance on replacement rather than repair, commanders and supervisors are currently able to maintain a high level of availability. If supply conditions were to change such that replacement components were not as fully available as they are currently (e.g. wartime conditions), these extraordinary management practices might fail with the potential result being a dramatic drop in equipment availability. The need for extraordinary management practices would lessen if systematic efforts were made in the field to increase the proficiency of maintenance personnel. Such efforts were not observed during the conduct of the test. (Paraphrased, pg. 4, QL4).



Equipment Availability as a Function of Diagnostic Capability, Repair Capability, and Spare Parts Availability. (Pg. 56, QL4)

The concept of training and development of maintenance personnel on a broad spectrum MOS basis as opposed to specific job or duty position requirements needs reevaluation. (ARTS, QL3)

National Guard personnel in MOS 63C and 63H of the one unit visited performed at a generally lower level than their active Army counterparts on a broad spectrum of MOS tasks. (Paraphrased, Supplement 2, pg. 1, QL4)

3. M60A1 Modified Weapon System Training Effectiveness Analysis WSTEA, TRASANA, June 1978.

CONUS M60A1 tank crews did not perform at the quasi-combat effectiveness baseline level. (Paraphrased, pg. 23, QL3)

The Ph for USAREUR M60A1 tank crews was higher than that of CONUS crews when both engaged with battlefield gunnery (battlesights) techniques. (Paraphrased, pg. 23, QL3)

The M60A1 WSTEA revealed Ph 40-50 percent below the quasi-combat effectiveness baseline. However, USAREUR crews attained or exceeded the quasi-combat Ph curve at 1100 - 1300 meter ranges. (Paraphrased, pg. 23, QL3)

Seventeen (17) and twenty-one (21) percent of the tank commanders in USAREUR and CONUS, respectively, did not know where to aim on a target when engaging with battlesights. (Paraphrased, pg. 23, QL3)

Twenty-one (21) and twenty-eight (28) percent of the gunners in USAREUR and CONUS, respectively, did not know where to aim when engaging a target with battlesights. (Paraphrased, pg. 23, QL3)

The strongest influence on hit performance was past proven ability and experience on Table VIII. (Paraphrased, pg. 23, QL1)

4. REALTRAIN Validation for Rifle Squads: Mission Accomplishment, ARI, October 1977.

The results have shown that REALTRAIN training can dramatically increase the tactical proficiency of rifle squads. Increases in the quality of tactical performance occurred across a broad range of measures. Performance on intermediate tasks was closely related to mission outcomes. (Paraphrased, pgs. 4-20, QL3)

SURVEY RESULTS:

1. ARTS Survey

ARTS Survey respondents were asked whether or not they thought a measure of training readiness was necessary in addition to a commander's judgment in order to support requests for training resources. The respondents were divided on this question with 8.2 percent saying some measure is not necessary at all, 29.2 percent saying such a measure is somewhat necessary, 37.4 percent saying such a measure is very necessary. No significant differences are observed when the respondents are analyzed by theatre, service specialty, or grade.

Other related ARTS Survey questions and their respective aggregate reponses are below:

If ARTEP were to be used as a readiness test; in your opinion, what percentage of events passed would equal C-1 in training? (Do not consider personnel and equipment ratings.)

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
0	1	2	3	4	5	6	7	8	9	10

Mean Response = 7.6

Soldier's manuals/SQT describe skills necessary for the individuals contribution to:

	Code	
4.6	1	ARTEP success
13.1	2	Combat mission accomplishment
79.2	3	Both 1 and 2
3.1	7	Other
100.0%		

Successful completion of ARTEP is a valid test of unit training readiness:

	Code	
15.0	1	Strongly agree
55.5	2	Agree
15.2	3	Neutral or undecided
11.4	4	Disagree
2.9	5	Strongly disagree
100.0%		

Unit readiness reporting procedures should be changed to make the training rating (C-1 to C-4) more objective (less a matter of the Commander's judgment):

	Code	
15.0	1	Strongly agree
39.7	2	Agree
20.4	3	Neutral or undecided
18.3	4	Disagree
6.6	5	Strongly disagree
	9	No answer
100.0%		

In your opinion, what percentage of ARTEP tasks do soldiers in the field believe to be critical for combat success?

	Code	
12.6	01	100%
52.0	02	75%
26.7	03	50%
4.3	04	25%
4.4	05	Less than 25%
	99	No experience with ARTEP
100.0%		

Mean Response = 7.0

In your opinion considering all the tasks required for combat success (in your unit), what percentage are covered by SQT's?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Mean Response = 7.1

Suppose the SQT were used an an individual combat readiness test, what percentage of tasks passed should equal combat readiness?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Mean Response = 2.1

In your opinion what percentage of SQT tasks are not required for combat success:

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

In your opinion what should be done to prevent individual soldiers from forgetting critical skills?

	Code	
1.1%	01	Overtrain individual (teach more initially so individual remembers better)
66.5%	02	Conduct frequent individual refresher training
23.3%	03	Both A and B
6.1%	04	None of the above. (Write in another method)

Mean Response = 3.9

What percent of combat-ready proficiency is your unit able to maintain? (Individual and collective skills)

100%	60%	20%
90%	50%	10%
80%	40%	0%
➤70%	30%	Do not belong to a TOE unit

RELATED INFORMATION

1. ARTS concept paper entitled Unit Training Programs

The major resources of concern to the company commander are facilities and time. He must tailor his training program to make use of the facilities which are available to him. There are considerable demands on the unit's time other than training. To lessen the effects of competing demands, units generally block out time into three components: a period with primary emphasis on collective training (prime time), one devoted to post support, and an in-between period. Even so, there is some evidence this approach is not entirely effective (pg A-32, QL4).

ACTIVITY AREAS	TRAINING DAYS % OF TNG DAY TOTAL	NON-TNG DAYS % OF NON-TNG DAY TOTAL	ALL DAYS % OF ALL DAY TOTAL
Unit Tng	14	4	9
Indiv Tng	15	4	10
Indiv Tng (PT)	8	10	10
Support/Garrison	31	56	43
Personal Care	14	10	12
Teaching Activity	1	1	1
Absences	18	15	16

NOTES:

Average number of men per squad: Training = 8.03
Non-Training = 8.46
All Days = 8.25

Distribution of Total Time Units by Major Activity Areas (pg A-31, QL3)

ACTIVITY	% OF TOTAL TIME ABSENT		
	TNG DAY	NON-TNG DAY	COMBINED DAY
Medical	10%	3%	7%
Personal	4%	1%	3%
Military Education	21%	28%	25%
Personal Education	8%	4%	7%
Details/CQ	27%	25%	26%
Disciplinary	0%	11%	6%
Leave	8%	11%	10%
Clearing	10%	1%	6%
Comp Time	7%	5%	7%
Other	3%	11%	3%
TOTAL TIME ABSENT	1 hr 18 min	1 hr 2 min	1 hr 13 min

Breakdown of Activities Engaged in While Absent from Duty (pg A-31, QL4)

The training program must be flexible enough to adapt to changing personnel and the availability of facilities. It must be designed to get the maximum training benefits from brief periods of time since personnel turn over rapidly, and the opportunities for bringing entire squads and platoons together are few (pg A-32, QL4).

To hold its own against the requirements of the maintenance system, training needs to be measured against objective standards and related to the resources necessary for its accomplishment (pg A-32, QL4).

2. ARTS concept paper entitled Sustainment of Training Proficiency

Training readiness is defined as the sustained level of proficiency that is maintained over time. Training proficiency is defined as the degree to which any performing entity is trained to perform an assigned mission. The performing entity can be an individual, crew, or any level of a unit.

Training proficiency of either individual or collective entities is dynamic. For example, units are usually obligated to contribute to post support, usually on a cyclical basis. Between post support periods, training enjoys higher priority than otherwise. It is reasonable to assume that proficiency fluctuates according to the amount of time spent on training. For the reason given in this example, plus numerous other distractors, training proficiency becomes a dynamic state, rising and falling, usually in a cyclical pattern. Obviously, the depth of proficiency decay is affected by the period of the cycle. However, a generic trace of cyclical proficiency over time would look like the following:

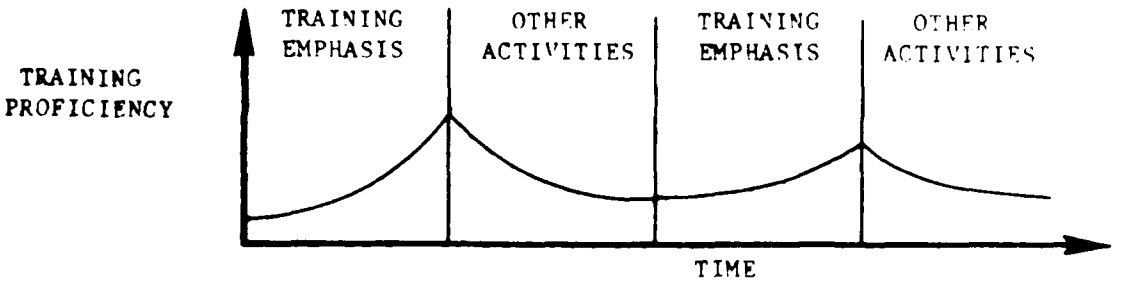


Figure 1-1. Cyclical Proficiency

A trace of cyclical proficiency over time but with elongated periods of training emphasis would suggest higher peaks and valleys as shown below:

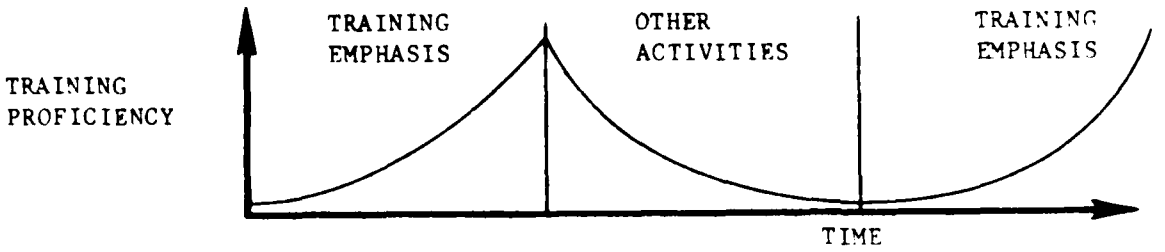


Figure 1-2. Proficiency With Lengthened Cycle

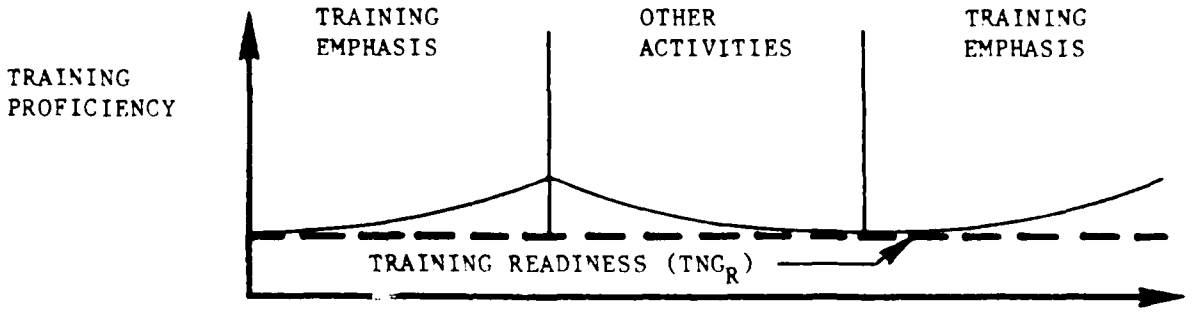


Figure 1-3. Proficiency Versus Training Readiness

Having training proficiency above the training readiness baseline is not meant to imply additional training tasks. It may involve manipulation of criteria or standards. For example, to sustain the ability to don a protective mask in nine seconds, the standards during periods of training emphasis might be to do so in eight seconds. Thus, conceptually there are really two levels of training readiness for either individuals or units. The higher readiness level is what is necessary at the beginning of combat. The lower readiness level is the maintenance level (TNG_R), carefully engineered to match the deployment plan versus conflict scenarios. The movement from the maintenance level to the combat level must be tied to the time available as well as availability of other key resources.

3. Battalion Training Model

The initial analytical efforts using the Battalion Training Model fell into three broad areas: selection of a first generation training program which represented a realistically achievable program for the 95% battlefield; determining the sensitivity of the model to varying personnel conditions; and development of training programs associated with varying levels of readiness.

The analytical baseline was developed by combining the 95% battlefield training program with the results of the Battalion Training Survey and the Best Battalion Costing Program. The baseline conditions were taken from the Battalion Training Survey, specifically 25 percent not present for training, 35 percent turbulence per quarter, and 15 percent trainer grade substitution.

For each analysis, BTM inputs were adjusted to model the effects under consideration, and key outputs were examined. Outputs selected for examination were the training time distribution and dollar cost. Training time was broken into the categories of training program time, maintenance time, and nontraining time. Dollar costs are expressed as ammunition, gasoline, diesel, spare parts, and total P2 dollars. In the BTM, ammunition costs are associated with battle drills, and the other dollars are determined by the number of days required for training.

The BTM was utilized to develop a series of readiness-keyed training programs, that is, programs that consisted of postalert training packages geared to a given number of training days, and matched sustainment training programs. A battalion with five training days available postalert is referred to as Bn-5, ten training days as Bn-10, etc. The BTM produced the attached training programs.

Post Mobilization Training Packages* (QL3)

Package	Bn-5	Bn-10	Bn-20	Bn-30
Training Activities (Repetitions)				
ARTEP	0	0	1	1
Move Co	1	1	1	1
Move (Plt/Squad)	1	1	1	1
Shoot Co	1	1	1	1
Shoot (Plt/Squad)	0	0	0	1
F&M Co	0	0	1	1
R&S Co	0	1	1	1
Comm Co	1	1	1	1
BP/H Co	0	1	1	1
BP/H (Plt/Squad)	0	0	1	1
Sustain Co	1	1	1	1
Sustain (Plt/Sqaud)	0	0	0	1
Support Co	1	1	1	1
NBC	0	0	1	1
MOBA	0	1	1	1
(Days)				
Ldr Tng	0	0	5	5
NCO Tng	5	5	5	5
Scout Tng	0	5	5	5
Redeye Tng	5	5	5	5
GSR Tng	5	5	5	5
P2 $	12,543	27,303	59,277.	69,699.
CL V $ (QL4)	90,250	111,480	230,865.	550,130.

*The goal programming algorithm attempts to conduct as many battle drills as possible within the time constraint, thus it will select the shorter drills first. The drills vary in length, hence the number of drills cannot be directly related to the number of days.

	95% Baseline Training Program	Bn-5 Sustaining Program	Bn-10 Sustaining Program	Bn-20 Sustaining Program	Bn-30 Sustaining Program
Days					
Tng Pgm	141	137	133	125	115
Maintenance	58	58	58	58	58
Non Tng	54	58	62	70	80
Wknd/Hol.	112	112	112	112	112
%/253 Days					
Tng Pgm	56	54	53	49	45
Maintenance	23	23	23	23	23
Non Tng	21	23	23	28	32
Total P2 $	396,625.	384,020.	376,232.	362,385.	352,419
Total CL V $ (QL 4)	1,674,708.	1,569,070.	1,545,283.	1,500,265	1,118,662

This series of charts was extracted from analysis of the Battalion Training Model (BTM). The series depicts the total annual cost and time required to support a Training Readiness Program that relied upon an intensive training package to be implemented upon notification. The time for training at mobilization is represented as Bn-1 (immediate), Bn-5 (5 days), Bn-10 (10 days), Bn-20 (20 days) and Bn-30 (30 days). For each training period there also is associated a sustainment program that supports the Bn concept. The lower level line in each plot represents a sustainment program. The hatched area represents a Training War Reserve that is required to support postalert training consistent with the sustaining package. For a more detailed discussion of this concept, refer to the BTM volume. The data presented mixes a one-time nonrecurring cost (Postalert) with the annual sustaining cost (pre-alert). No discounting was utilized. The personnel conditions were: turbulence 20 percent per quarter, "not present for training" 20 percent, and trainer grade substitution 15 percent. It is interesting to note that total costs upon mobilization are approximately equal regardless of the Battalion Bnx status in sustainment prior to mobilization. Discounting factors would change this plot if the years to mobilization were used as in classical life cycle management costing schema.

CHART 1 (QL3)

CHART 2 (QL3)

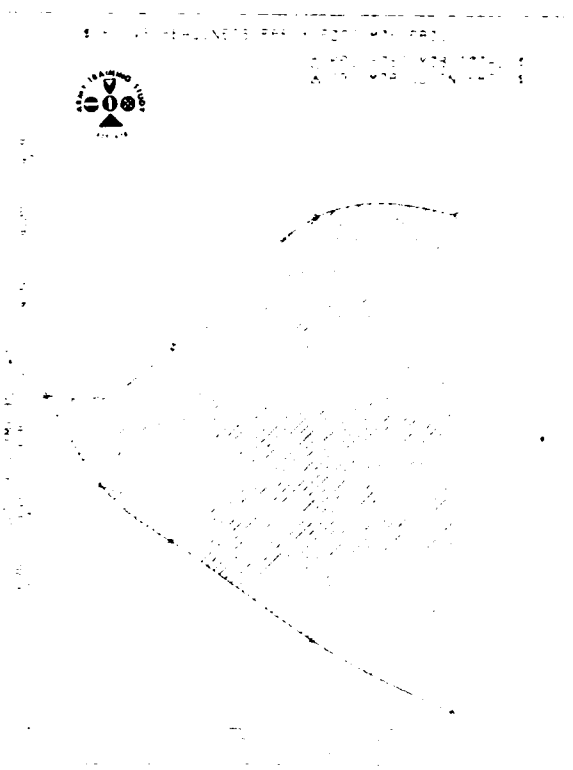


Chart 1

The total annual cost of training in a Battalion can be reduced by a systematic plan for training readiness. This chart depicts the sensitivity of a training sustaining program to allowable training time at mobilization. The lower curve is the sustaining program. The upper curve is the total cost curve.

Chart 2

This is a summary chart for P2 dollars. It suggests that Bn-5 is a better peacetime alternative than Bn-1 if 5 days of training were possible. The actual mix for a peacetime Division could be balanced by a system of optimally mixed training program systems consistent with the Division's warning time and mission status.

CHART 3 (QL3)

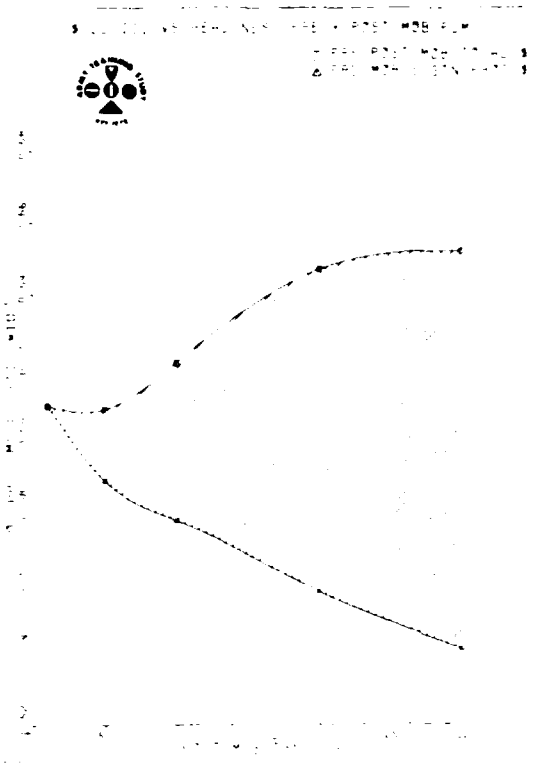


CHART 4 (QL4)

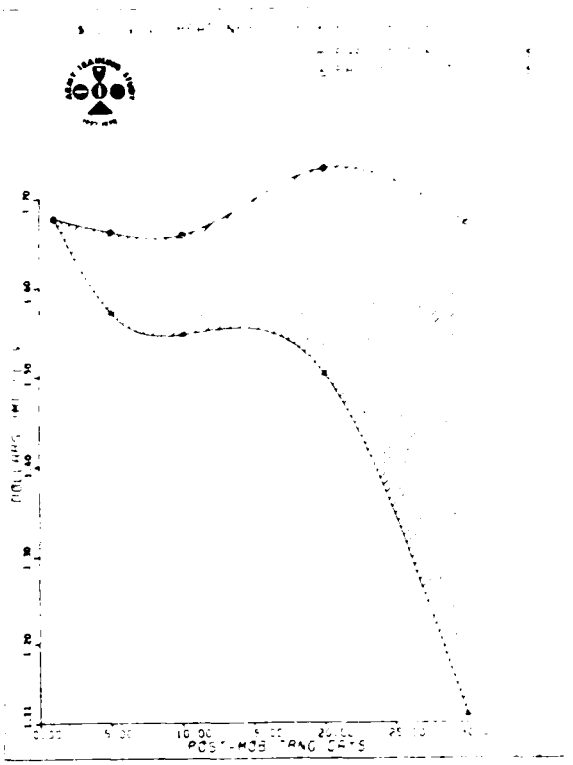


Chart 3

This chart depicts the POL consumption under a readiness-keyed system consistent with total expenditures. Class III approximates 29 percent to 36 percent of total expenditures.

Chart 4

The dominating economic factor in costing is ammunition (CL V). This graph indicates a slight economy in a Bn-10 program, but the definition of the battle drills to be performed upon mobilization needs more refinement in the area of ammunition. The War Reserve stockage of CL V becomes very significant for any system beyond Bn-20.

CHART 5 (QL3)

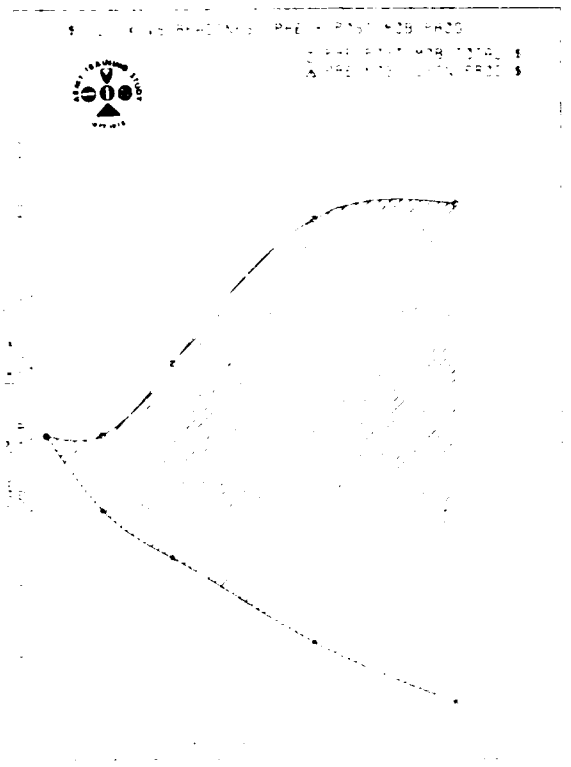


Chart 5

The repair parts necessary to conduct a surge training program are significant for any program system greater than Bn-5. Consideration must be given for how a division could maintain and store a significantly larger stockage of repair parts for an optimally balanced system for Divisional training readiness.

CHART 6 (QL3)

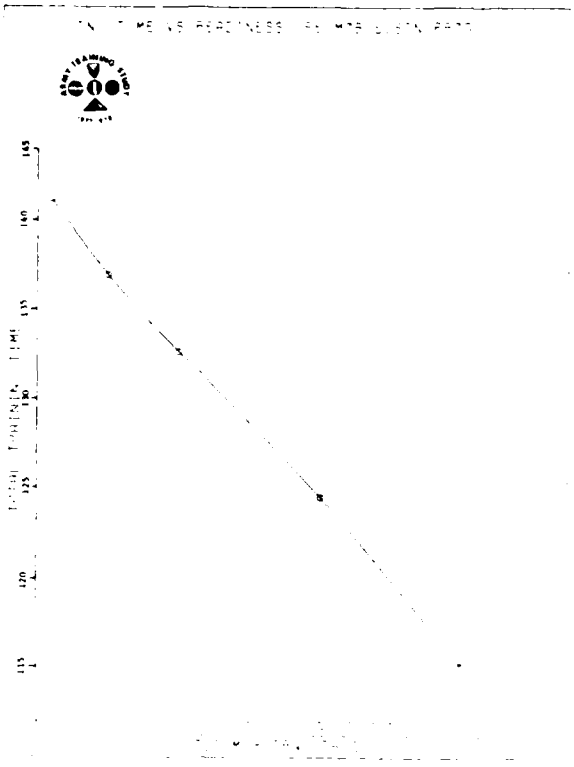


CHART 7 (QL3)

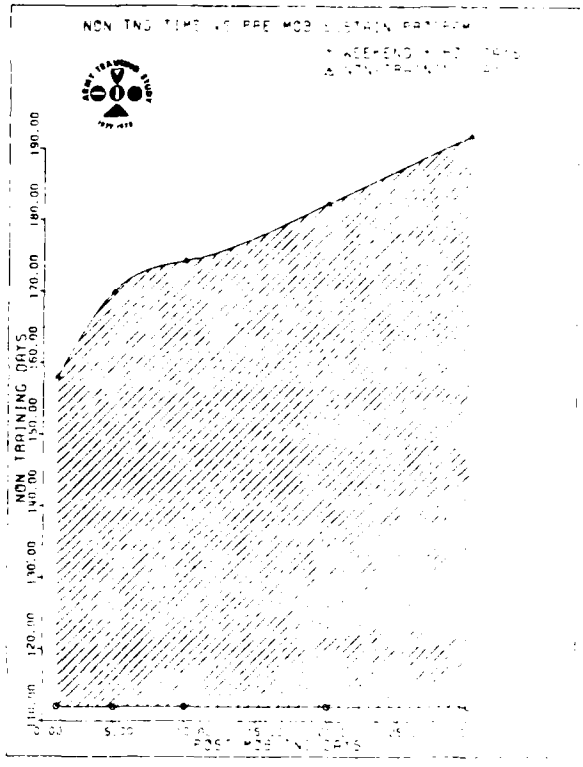


Chart 6

The time devoted to formal training is reduced as the Bn-x days of post-mobilization training increases. The training time for the National Guard and Reserves were not computed in this BTM series, but the technique could be expanded to accomodate their training time challenges.

Chart 7

This chart depicts available time for nontraining activities. The peace-time volunteer Army needs this time to accommodate life support functions and necessary post activities. All the programs calculated allow for week-ends and holidays to be allocated according to the commander's requirement, i.e., training not programmed for weekends.

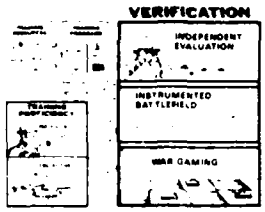
The readiness-keyed training programs provide a means to relate resources to deployment times, missions, and 95% battlefield standards.

The sustainment training programs were developed by reducing the frequencies of the battle drills which appear in the postmobilization package by one-half.

The readiness-keyed training packages provide a methodology for relating resources to mission and deployment time. They provide benchmarks against which a unit's training program can be compared with the standards of the 95% battlefield. However, some cautions are in order. The postalert training packages selected by the BTM goal program may not represent the best utilization of a specific unit's postalert time. Military judgment would have to be applied to tailor a particular program. Many of the data elements represent small sample sizes and require further review. While the basic approach and comparative results are valid, the absolute values presented require further review. For a more detailed discussion, see the BTM volume.

While the annual dollar savings associated with the readiness-keyed programs are not that large, these savings would occur annually during peacetime. The postalert training would be a onetime cost, however, it would be esential that the goods represented by the dollars be immediately available upon mobilization. There may be realistic restrictions such as range availability which makes this approach impractical for units deploying in less than 20 or 30 days.

DATA AREA: Evaluation



Surveyed perceptions on the subject of evaluation of Army training proficiency are mixed. Generally, senior officers are most supportive of the present system. Present evaluation instruments receive only modest levels of support, and opinion is divided on new approaches. The evaluative use of the ARTEP, as opposed to a purely diagnostic function, persists. Confidence in the training portion of the readiness reporting system is tentative at best.

SURVEY RESULTS:

1. ARTS Survey

ARTS Survey respondents individually rated current measures of training readiness in the fair to good range. Further, they exhibited no consistent opinion toward new measurement approaches. (QL2)

	Very Good	Good	Fair	Poor	Very Poor
The number of days training required to be fully combat ready as estimated by the commander.	1	2	3	4	5
The commander's general judgment	1	2	3	4	5
SQT results	1	2	3	4	5
ARTEP results	1	2	3	4	5
REALTRAIN	1	2	3	4	5
Gaming/Simulations (CAMMS/ CATTS) results	1	2	3	4	5

Respondents rated ARTEP as the best measure of training readiness and gaming/simulation results as the poorest. The rank-order of the other measures from best to worst is commander's general judgment, REALTRAIN results, and the commander's judgments concerning the number of days training required to be fully combat ready, and finally, SQT results. No significant differences were observed by theatre or branch, but significant differences in three areas were observed when respondents were analyzed by grade. ARTEP results were rated as good ($x = 1.6$) by 06 officers but, as grade decreases, the feeling concerning the adequacy of this measure also declines, receiving its lowest evaluation among the enlisted personnel, E-1 through E-6 and E-7 through E-9 ($x = 2.1$). The pattern is reversed, however, for REALTRAIN, results and gaming/simulation results with higher grade officers rating both of these measures as poor relative to the opinions of junior officers and enlisted. It may be that the "realness" or competitive nature of these later tests is more attractive to these individuals. (QL1)

From the overall responses, the unit commander's evaluation is rated as being the most effective choice for the Army to evaluate unit effectiveness ($x = 3.6$), followed by unscheduled evaluations ($x = 2.9$), and scheduled evaluations ($x = 2.8$). When these responses were analyzed according to responses to the previous question--the need for a measure of training readness, it was found that those favoring a measure gave more favorable ratings to the effectiveness of each of the measures. Effects of theatre and service specialty were not observed, except that those in combat support specialties consistently gave lower than average ratings to all methods of evaluation. (QL1)

All of this may ultimately suggest that considerations of objective and better measurement of the training product are important to the Army's leaders, inasmuch as those programs and training guides, as well as methods of evaluation, which are perceived as objective and positive are evaluated as the most effective measures in training effectiveness and readiness.

RELATED INFORMATION:

1. ARTS concept paper entitled "The Sustainment of Training Proficiency."

"As one studies the recognized authors in educational psychology or, for that matter, the writings of general psychologists, there is usually a section on how to teach, how to study more effectively, how to improve retention, and the like. In spite of the fact that some authors appear to favor different theories, they are remarkably consistent in describing the techniques to improve learning and retention. Their conclusions are far from arbitrary. They are based on consistency of results and their attitudes might be called pragmatic. Therefore, this common list of guidelines is presented and compared to current Army training. The common guidelines are;

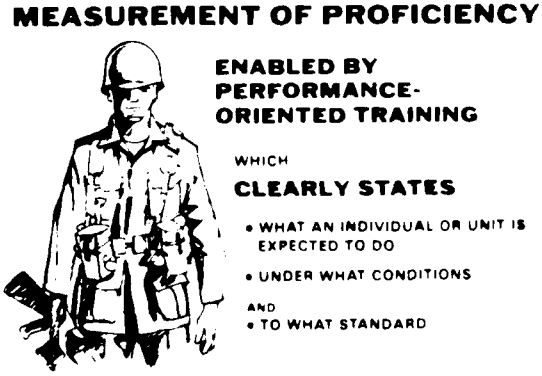
a. Provide learning objectives with criteria.

b. Ensure the meaningfulness and relevance of the objectives.

c. Provide motivation and reinforcement.

d. Ensure organization of material to be learned.

e. Provide distributed practice followed by immediate testing and prompt corrective feedback." (pp. 10-11, QL4)



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Appendix 1

The ARTS Survey

The Army Training Study Survey was developed to meet two objectives. The first was to learn the field Army's current thinking about the training system; the second to make a link over time with the groundbreaking Board for Dynamic Training (BFDT) Study of 1971.

The target population consisted of those people the study group thought had the greatest influence, directly or indirectly, on the Army's training system in the field: the brigade commander and brigade S-3; the battalion commander and battalion S-3; company commanders, platoon leader and squad leaders. Based upon the O-6 command criteria a representative random sample of FORSCOM and USAREUR units were selected: 28 combat arms brigades, 12 combat support brigades, and 5 combat service support brigades.

The survey was mailed during the last week of April 1978, and the study group received 75% return by the third week of May. With the assistance of the Military Sociology Department at the University of Maryland an analysis of the data was undertaken. Using the Statistical Package for the Social Sciences (SPSS), a number of different analyses were attempted. They include: univariate frequency distributions, cross tabulations of various responses by rank, branch, theater, and analysis of variance. Where applicable, data was compared with the results of the BFTD Survey.

Battalion Training Survey (BTS)

The BTS provided the majority of the data for the training program section of the BTM. The Survey included data on the acquisition of time and training frequency relative to individual/collective tasks and ARTEP missions, and identified the impact of such issues as varying proficiency levels, integration, turbulence, not present for training, trainer grade substitution and soldier capability on these times and frequencies. Finally, survey responses provided a meaningful tool to change training programs as time, dollar and people resources are decremented.

The BTS addressed only the Mechanized Infantry/Armor task force. With the number of tasks to be addressed and the sophistication required, it has been impractical to address other battalions within the time limits of the study.

The Battalion Training Survey was administered to 277 officers and NCOs who were currently in trainer positions or had just left such positions. Respondents represented battalion and company commanders and battalion S-3s from eight battalions each in the 4th Division (Mech) at Fort Carson and the 3d Armored Division in the FRG. Other respondents represented students and faculty from the Army War College, CGSC and the Sergeants Major Academy. Institutional responses were received from the two surveyed divisions, III and V Corps, and the Infantry and Armor Schools.

The survey was administered in the field by Army Training Study Group personnel to the smallest groups possible to obtain maximum response accuracy.

Detailed survey results and analysis are outlined in the Actuarial Research Corporation's final report, which is incorporated into a separate ARTS volume.

QUALITY LEVEL DESCRIPTIONS

QUALITY LEVEL	TEST RESULTS	SURVEY RESULTS	BATTALION TRAINING MODEL OUTPUT
(QL1)	Multiple valid tests and $\alpha \leq .05$	Unbiased questionnaire, controlled sample, valid analysis.	Relative trend correct, absolute value of data validated by field testing.
(QL2)	Valid test and $\alpha \leq .20$	Biased questionnaire, controlled sample, valid analysis.	Relative trend correct, absolute value of data consistent with professional judgment and/or survey data.
(QL3)	Data collected and trends indicated.	Unbiased questionnaire small sample, no analysis.	Relative trend correct, absolute value of data unvalidated.
(QL4)	Insights, not directly supported by data.	Biased questionnaire, small sample, no analysis.	Relative trend unvalidated.
(QL5)	Information of marginal validity. Included primarily because no better information exists. Use only with deliberate caution.		
(QL6)	Information judged to be of insufficient quality to include.		

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