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# Retention of Military Skills Acquired in Basic Combat Training

by  
Robert D. McDonald

HumRRO Division No. 3 (Recruit Training)

December 1967

Prepared for:  
Office, Chief of  
Research and Development  
Department of the Army

Contract DA 44-188-ARO-2

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HumRRO Division No. 3 (Recruit Training)  
Presidio of Monterey, California  
The George Washington University  
HUMAN RESOURCES RESEARCH OFFICE

Technical Report 67-13  
Work Unit STRANGER  
Sub-Unit I

The Human Resources Research Office is a nongovernmental agency of The George Washington University. The research reported in this *Technical Report* was conducted under contract with the Department of the Army (DA 44-188-ARO-2). HumRRO's mission for the Department of the Army is to conduct research in the fields of training, motivation, and leadership.

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

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## FOREWORD

The objective of the Human Resources Research Office in Work Unit STRANGER is to examine and obtain a better understanding of long-term memory of motor skills.

This report provides preliminary information on how well soldiers retain certain skills acquired during Army Basic Combat Training. The significance of such information is related not only to the effectiveness of the initial training, but also to the determination of whether, when, and what type of refresher training is required.

Work Unit STRANGER is conducted by HumRRO Division No. 3 (Recruit Training) at the Presidio of Monterey, California. The Director of Research during that portion of the Work Unit reported here was Dr. Howard McFann.

Military support for the study was provided by the U.S. Army Training Center Human Research Unit. Military Chief of the Unit at the time the study was begun was LTC Robert H. McClay. Present Unit Chief is LTC David S. Marshall.

The study was carried out by Dr. Robert D. McDonald and Dr. Harry A. Burdick. Military assistants were PFC Louis E. Moore, PFC Donald Knell, and PFC Eugene Brown.

HumRRO research for the Department of the Army is conducted under Contract DA 44-188-ARO-2 and Army Project 2J024701A712 01, Training, Motivation, Leadership Research.

Meredith P. Crawford  
Director  
Human Resources Research Office

## SUMMARY AND CONCLUSIONS

### Problem

The combat effectiveness of the soldier—either individually or in units—depends, in part, upon how well he remembers certain military skills acquired in Basic Combat Training (BCT). While various proficiency tests are used at the end of training cycles to determine how much the soldier has *learned*, little evaluation has been carried out at a later time to determine how much he *remembers*.

The soldier often experiences long periods without direct practice on certain motor skills learned in BCT. A combat support soldier such as a cook, for example, may have had little occasion to practice his rifle marksmanship until he is involved in fighting off a guerrilla attack in Vietnam.

Therefore, the aim of this study was to provide data on the pattern of retention, over a period of about one year, of military skills learned in BCT.

### Method

Performance data over time were collected in the three general BCT proficiency areas, which are evaluated by the performance portion of the Army Training Test 21-2 (1). These evaluations are: the Basic Rifle Marksmanship (BRM) weapons qualification test, the Physical Combat Proficiency Test (PCPT), and the end-of-cycle test, a series of two paper-and-pencil and six motor-skill subtests.

Performance was sampled (a) during BCT, (b) during Advanced Individual Training (AIT) and Combat Support Training (CST), and (c) for permanent-party personnel (clerical and Ordnance MOSs) who have been in the Army for 6 to 12 months. Different groups of soldiers were sampled at each of the cited levels of training. Some additional data on rifle marksmanship were collected on a small sample of soldiers, a few weeks prior to their separation from the service.

Data were collected at three Army Training Centers (ATCs), under comparable weather conditions. Achievement was sampled during regular Army test administration, carried out by the appropriate committee group at each ATC, according to established criteria. The soldiers to be tested were selected randomly (from available rosters), by research personnel, who also monitored each test administration. With some exceptions, 60 enlisted men made up each group tested. Comparisons were then made between groups within each proficiency area.

### Results

In general, results on the three tests indicated somewhat lower performance levels at later testing points than in the original BCT testing. While these performance decrements were statistically significant over time, the percentage decrements from the basic trainee level were relatively small.

### Conclusions

It was concluded that, on a practical basis and as measured by regular Army tests and procedures, the training received in BCT in the three proficiency areas was effective in terms of remembering or recalling these skills, at least for the time period and the MOSs sampled.

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**Retention of Military Skills  
Acquired in Basic Combat Training**

## INTRODUCTION

The overall research objective of Work Unit STRANGER is to examine and obtain a better understanding of the long-term memory processes of motor skills. This report provides data on how much is remembered over time in the three areas evaluated by the Army in Basic Combat Training (BCT): performance on Basic Rifle Marksmanship (BRM), performance on the Physical Combat Proficiency Test (PCPT), and performance on end-of-cycle tests.

The general approach was to look for gross changes in performance in these three areas rather than try to obtain detailed information. Thus, a general picture could be obtained in a relatively short period of time, and if a skill or knowledge was found to be satisfactory, no further effort would be expended in that area. If and where gross decrements of sufficient magnitude occurred, a more refined examination of that area would subsequently be carried out.

## METHOD

Performance data over time for independent groups of soldiers were collected in the three BCT proficiency areas. No special or unusual test conditions were established. Trainee achievement scores on the Army's conventionally administered tests constituted the sample scores for the research.

### Population

All subjects were enlisted men who had been in the Army for various lengths of time and who had various Military Occupational Specialties (MOSs).<sup>1</sup> At each test site, subjects were randomly selected for testing by research personnel from available rosters. Generally, at each Training Center, the groups tested consisted of approximately 60 subjects.

### Performance Sampling

Initially, performance on each of the three proficiency tests was sampled from totally independent groups, at the trainees' regular testing time, during or at the end of BCT. For example, at each Training Center, one group was sampled on BRM performance, another on PCPT performance, and a third on end-of-cycle tests.

In addition, performance was sampled at specially scheduled times from Infantry personnel during Advanced Individual Training (AIT), and from non-Infantry personnel during Combat Support Training (CST). Data were also collected on the test performance of non-Infantry personnel (in this case, clerical and Ordnance personnel) with from 6 to 12 months in the Army, and on BRM performance of Infantry and non-Infantry personnel a few weeks prior to their time of separation from the service.

<sup>1</sup>At the time of sampling, no breakdown in MOSs was noted beyond the general categories of Infantry and non-Infantry. The representation of non-Infantry MOSs was varied and Ns small, which discouraged the treatment of separately designated MOSs within the non-Infantry groups.

Due to the expanded commitment associated with the Vietnam conflict, it was not possible to sample the performance of Infantry personnel on any of the three tests at the interval of 24-52 weeks in the Army.

### Description of Tests

#### Basic Rifle Marksmanship (BRM)

During the fourth week of BCT (the fifth week in the Army)<sup>1</sup> the soldier fires the rifle for qualification on two record rifle ranges in order to determine his level of competence with this weapon. This qualification firing consists of two separate times of firing at individual and multiple targets, which "pop up" at various distances, and are visible for 5 to 10 seconds. One point per target hit is given, with a maximum possible score of 84. Rifle range personnel count the number of targets hit and score manually.

To qualify with the rifle, the soldier must have a score of at least 30. Category designations with respect to number of targets hit are: Marksman (30 to 44 hits), Sharpshooter (45 to 59 hits), and Expert (more than 60 hits).

A complete description of BRM is given in U.S. Army Field Manual 23-71, 27 July 1964 (2), and revisions.

#### End-of-Cycle Test

During the eighth week of BCT (the ninth week in the Army), the soldier takes the end-of-cycle test in order to determine his competence in a number of military subjects. The test consists of eight subtests which are given in a sequential fashion and are scored manually by test company personnel.

The subtests and their maximum possible scores are:

- (1) Military Courtesy and General Subjects (11 points)
- (2) Military Justice and Code of Conduct (10 points)
- (3) Drill and Ceremonies (14 points)
- (4) First Aid and Individual Protective Measures (8 points)
- (5) Guard Duty and Reporting (5 points)
- (6) Individual Tactical Training (9 points)
- (7) Hand-to-Hand Combat (6 points)
- (8) Bayonet (6 points).

The first two of these subtests are paper-and-pencil tests, while the remainder are tests of motor skill performance. In order to pass the test, a soldier must achieve 70% (49.5) of the 69 possible points.

A description of subjects and associated training evaluated by the test may be found in U.S. Army Field Manuals 21-11 (3), 21-40 (4), 21-75 (5), 21-150 (6), 22-5 (7), and 26-5 (8). A complete description of the test is given in U.S. Army Training Test Manual 21-2, 2 July 1965 (1), and revisions.

#### Physical Combat Proficiency Test (PCPT)

During the eighth week of BCT, the soldier also takes the PCPT for an evaluation of his physical condition. This test consists of five subtests given in a sequential fashion and scored manually by the test committee.

The subtests, each with a possible maximum of 100 points, are: the one-mile run; the 40-yard low crawl; the horizontal ladder; the dodge, run, and

<sup>1</sup>The soldier's first week in the Army, commonly called "zero" week, is devoted primarily to testing, immunization, and assignment.

jump; and the grenade throw. The soldier must achieve a combined total of at least 300 points to pass the test.

A complete description of the test is given in the U.S. Army Training Test Manual 21-20, 8 October 1957 (9), and revisions.

### Test Administration

To insure geographically representative samples, data were collected at ATCs at Fort Ord, California, Fort Dix, New Jersey, and Fort Jackson, South Carolina, in coordination with USCONARC and administrative personnel at each ATC. All testing was carried out by the appropriate test committees at each ATC in the regular manner and in accordance with Department of the Army standards. No experimental restrictions or innovations were imposed upon the test procedures. In all instances after BCT, subjects were transported to the regular test site and were tested according to conventional procedures. Research personnel who observed each test noted only minor procedural differences between ATCs. General weather conditions at the three ATCs were comparable.

### Basic Rifle Marksmanship

For collection of data on BRM after the BCT firing, some procedural changes in test administration were necessary. For these administrations, enlisted men were issued weapons and instructed to set battle sights (orientation periods included a description of battle sight or battlefield zero setting procedures).

One sample of soldiers ( $N=64$ ) was re-fired on BRM just prior to time of separation from the Army. This sample was divided into two groups of 32 soldiers each, one of Infantrymen and one of non-Infantrymen. At the time these men were tested, approximately 96 weeks had elapsed since their initial record firing (in BCT), and 48 weeks had elapsed since their annual rifle qualification firing. Data for these groups were treated separately, comparisons being made between this record re-firing and their previous annual rifle qualification performance.

Ten other independent groups of soldiers were used for the BRM evaluation. With one exception ( $N=49$ ), all groups consisted of 60 men each. Three groups of basic trainees (one at each ATC) fired for the record during their fourth week of BCT as the usual part of their training. The three AIT and the three CST groups (one of each at each ATC) re-fired for qualification during their fourth to fifth week of AIT or CST (approximately 10 to 11 weeks after their initial basic training record firing). The permanent-party group, which was the same used for the end-of-cycle and PCPT assessments, re-fired the record ranges after an average of 34 weeks since their basic training rifle qualification. Comparisons were made between these groups.

### Physical Combat Proficiency Test

Ten independent groups of enlisted men were used for the PCPT evaluation. With one exception ( $N=49$ ), all groups consisted of 60 men each. Three BCT groups (one at each of the ATCs) took the PCPT during their seventh to eighth week, as the customary part of their training. Three AIT and three CST groups (one of each at each ATC) were retested on the PCPT during their fourth to fifth week of AIT or CST (that is, six to eight weeks had elapsed since their testing in BCT). The permanent-party group of soldiers was retested on the PCPT an average of 34 weeks after basic training PCPT. Comparisons were made between these groups.

### End-of-Cycle Test

The end-of-cycle evaluation was similar to that used for the PCPT. Nine groups of soldiers were tested, three each at each ATC during BCT, AIT, and CST. The tenth, permanent-party group was the same one used in the PCPT evaluation. With two exceptions ( $N=47$ ,  $N=50$ ), all groups consisted of 60 men each. Comparisons were made between these groups.

## RESULTS AND DISCUSSION

It should be kept in mind that the data of this study are subject to some limitations. Because of the pressures of the Vietnam conflict, it was not possible to sample Infantrymen with 24 to 52 weeks in the Army. This circumstance makes comparisons difficult, since there are differences in Infantryman and non-Infantryman training.

In addition, there is a question of statistical versus practical significance. For example, a performance decrement on a particular skill may be statistically significant, but is this decrement of any practical military significance if the decrement is relatively small? The determination of practical significance with respect to these results would have to be a matter of expert military interpretation.

### Basic Rifle Marksmanship

An overall picture of BRM performance for the groups used in this study is presented in Figure 1.

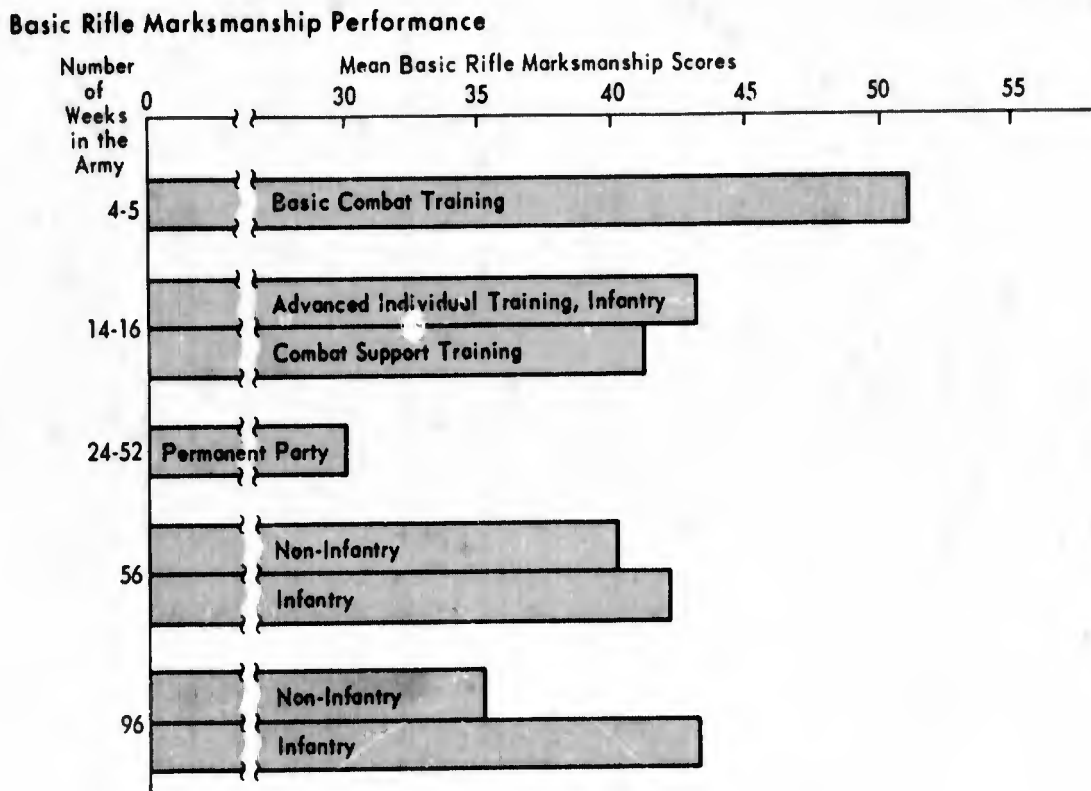


Figure 1

Table 1  
Means and Standard Deviations of  
Group Scores on Basic Rifle Marksmanship

Study Group	N	Mean	SD
Basic Combat Training -4th week (4-5 weeks in Army)	180	51.3	11.1
Advanced Individual Training, Infantry (14-16 weeks in Army)	180	42.7	11.1
Combat Support Training (14-16 weeks in Army)	169	40.6	11.2
Permanent Party (24-52 weeks in Army)	60	30.2	8.7
Non-Infantry (56 weeks in Army)	32	40.1	9.2
Infantry (56 weeks in Army)	32	42.3	10.7
Non-Infantry (96 weeks in Army)	32	34.6	8.5
Infantry (96 weeks in Army)	32	43.0	13.5

Group mean scores and standard deviations are presented in Table 1. A general decrement in rifle marksmanship from the BCT level may be seen. However, Infantry personnel seem to reach a level of achievement during AIT which they retain at least to the end of their second year in the Army. No statistically significant differences were found.

The percentages of men falling into each of the levels of qualification (Expert, Sharpshooter, Marksman) or unqualified are presented in Table 2. The column labeled "Percent Unqualified" may be misleading, as most of the

Table 2  
Percentage of Men in Each Group Qualifying and  
Non-Qualifying on Basic Rifle Marksmanship

Study Group	N	Percent Expert (60+)	Percent Sharpshooter (45-59)	Percent Marksman (30-44)	Percent Unqualified (0-29)
BCT (4-5 weeks in Army)	180	18.9	43.3	33.3	4.5
AIT, Infantry (14-16 weeks in Army)	176	12.5	45.4	34.1	8.0
CST (14-16 weeks in Army)	169	5.9	30.8	47.9	15.4
Permanent Party (24-52 weeks in Army)	60	0.0	5.0	48.3	46.7
Non-Infantry (56 weeks in Army)	32	0.0	37.5	50.0	12.5
Non-Infantry (96 weeks in Army)	32	0.0	15.6	46.9	37.5
Infantry (56 weeks in Army)	32	3.1	46.9	34.4	15.6
Infantry (96 weeks in Army)	32	3.1	40.6	31.3	25.0

### Physical Combat Proficiency Test Performance

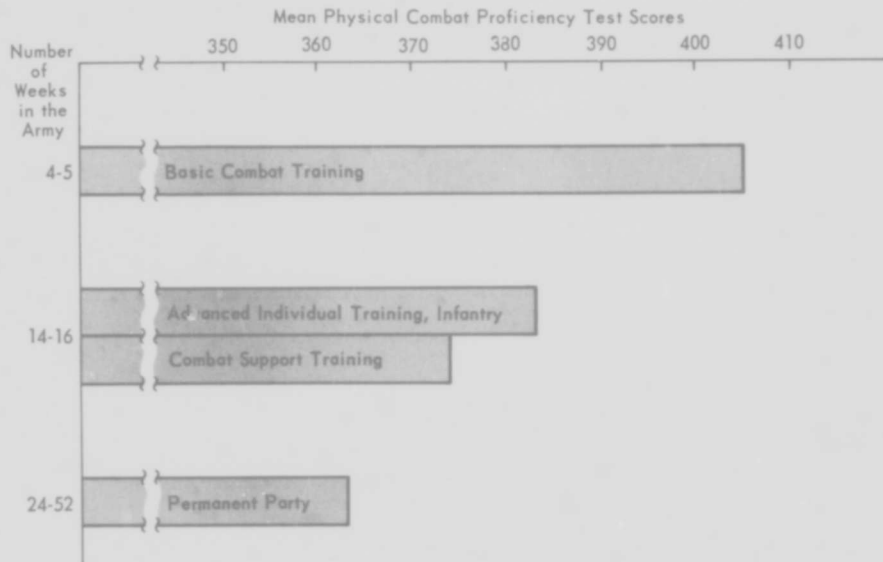


Figure 2

men designated as "unqualified" scored 26-28 target hits. However, it should be noted that the percentage of Infantry personnel unqualified at 56 and 96 weeks in the Army is relatively high, especially since it may be assumed that their exposure to rifle training and experience exceeded that of any other group.

In the table data are presented for non-Infantry and Infantry personnel at two different time intervals. The 56-week designation indicates the qualification level achieved at the soldier's first annual rifle qualification. The 96-week designation is the re-firing of the same soldiers under the battle sight conditions of this study. Performance at all levels for both groups was better at the 56-week point than at 96 weeks. These differences were slight and were attributed to the practice that precedes the formal annual rifle qualification.

Table 3  
Means and Standard Deviations of  
Group Scores and Percentage of Men  
Passing the Physical Combat Proficiency Test

Study Group	N	Mean	SD	Percent Passing
BCT (8-9 weeks in Army)	180	405.0	49.2	95
AIT, Infantry (14-16 weeks in Army)	180	383.6	52.5	93
CST (14-16 weeks in Army)	169	374.8	52.1	91
Permanent Party (24-52 weeks in Army)	60	363.2	46.6	90

The most striking differences are in the comparison of the performance of permanent-party personnel and the non-Infantry personnel at 56 weeks.

#### Physical Combat Proficiency Test

An overall picture of PCPT performance for the groups used in this study is presented in Figure 2.

Group mean scores, standard deviations, and percentages of men in each group passing the PCPT are presented in Table 3. Although mean scores

## End-of-Cycle Test Performance

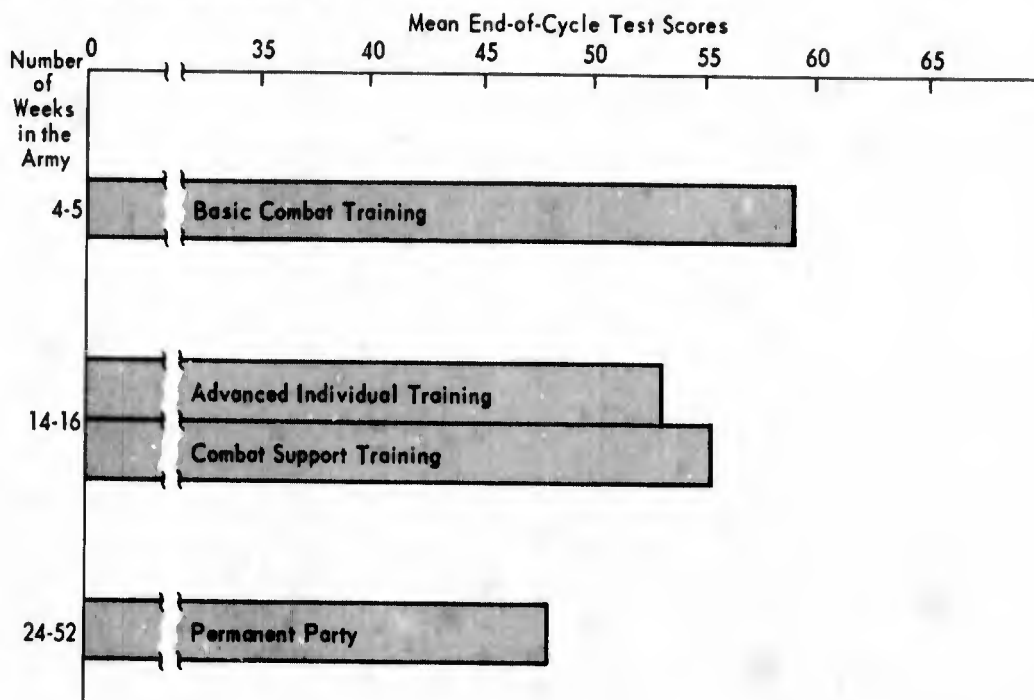


Figure 3

decreased slightly from the BCT level, little change in the physical conditioning status of the enlisted men tested in this study was indicated.

### End-of-Cycle Test

An overall picture of performance on the end-of-cycle test for the groups used in this study is presented in Figure 3. A general decrement in performance from the BCT level may be seen.

Group mean scores, standard deviations, and percentage of men in each study group passing the tests are presented in Table 4. The greatest percentage of failures occurred with the permanent-duty enlisted men. Most of the men failing the tests, however, had scores in the high 30s or low 40s. These results are interpreted as the effect of little or no practice on the specific subtests over time.

The performance of the groups on each of the subtests was examined. A general decrement in performance from the BCT level was evident on all subtests. Generally, the largest differences occurred between the permanent-duty personnel and the basic trainees. There appeared to be no striking performance differences between men in AIT or CST. In terms of maximum possible points on each subtest, the performance level of each group was at least 50%.

Table 4

Means and Standard Deviations of Study Group Scores on End-of-Cycle Test

Study Group	N	Mean	SD	Percent Passing
BCT (8-9 weeks in Army)	180	59.0	3.4	99.9
AIT, Infantry (14-16 weeks in Army)	180	52.9	4.7	70.0
CST (14-16 weeks in Army)	169	55.5	5.1	87.0
Permanent Party (24-52 weeks in Army)	60	47.6	4.9	45.0

## SUMMATION

The results indicated the expected decrement in performance as a function of time since original instruction. These decrements are small in terms of actual percentage loss, which leaves serious doubt as to their practical significance. The findings of the study are, perhaps, best summarized in terms of the percentages of men in each group who qualified or passed the specific test at different points in time, as shown in Table 5.

It is concluded that, on a practical basis and as measured by standard Army tests and procedures, the training received in BCT in the three proficiency areas was effective in terms of remembering or recalling these skills, at least for the time period and the MOS designations sampled.

Table 5  
Percentage of Men Qualified at Each Stage of Testing

Study Group	BRM Percent Qualified	PCPT Percent Passed	End-of-Cycle Percent Passed
BCT (4-5 weeks in Army)	95.5	95.0	99.9
AIT, Infantry (14-16 weeks in Army)	92.0	93.0	70.0
CST (14-16 weeks in Army)	84.6	91.0	87.0
Non-Infantry (24-52 weeks in Army)	53.3	90.0	45.0
Non-Infantry (96 weeks in Army)	62.5		
Infantry (96 weeks in Army)	75.0		

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