Research Problem Review 78-10

ATTITUDES OF GUNNERS AND TEAM LEADERS TOWARD THE DRAGON WEAPON SYSTEM

Ward A. Harris

and

R. L. Palmer

FORT HOOD FIELD UNIT

U. S. Army
Research Institute for the Behavioral and Social Sciences

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JOSEPH ZEIDNER
Technical Director (Designate)

WILLIAM L. HAUSER
Colonel, US Army
Commander

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(10) Ward A. Harris [redacted] R. L. Palmer

ARI FIELD UNIT AT FORT HOOD, TEXAS

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Submitted as complete and
technically accurate, by
George M. Gividen
Field Unit Chief

Approved by:

A. H. Birnbaum, Acting Director
Organizations and Systems
Research Laboratory

Joseph Zeidner
Technical Director (Designate)
U.S. Army Research Institute for
the Behavioral and Social Sciences

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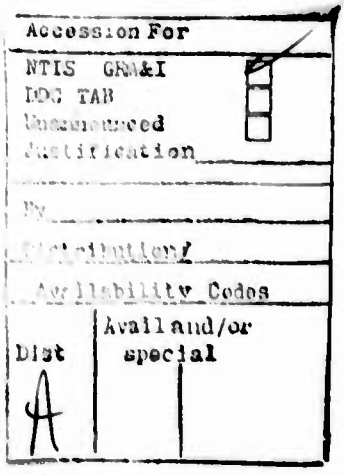
FOREWORD

By assessing the human performance aspects of man/weapon systems in field situations, the Fort Hood Field Unit of the Army Research Institute for the Behavioral and Social Sciences (ARI) provides frequent evaluation support to Headquarters, Training and Development Command (TRADOC), Combined Arms Test Activity (TCATA), formerly Modern Army Selected Systems Test Evaluation and Review (MASSTER).

The purpose of the ARI research reported here was to document user attitudes toward the DRAGON weapon system. The study supports DRAGON Operational Test III (MASSTER Test OT 24), which was designed to assess the effectiveness and utility of the DRAGON system in an operational environment. Test results are intended to assist in the determination of DRAGON production decisions.

This report is responsive to the objectives of Army RDTE Project 63743A775, "Human Performance in Field Assessment."

JOSEPH ZEIDNER
Technical Director (Designate)



ATTITUDES OF GUNNERS AND TEAM LEADERS TOWARD THE DRAGON WEAPON SYSTEM

BRIEF

Requirement:

The requirement was to conduct a field evaluation of the DRAGON weapon system and associated training through a survey of user troops and their leaders, and to identify factors contributing to the negative attitudes toward the DRAGON system allegedly held by user soldiers during previous DRAGON training.

Procedure:

Attitude questionnaires were administered to 39 DRAGON gunners and 29 leaders participating in DRAGON Operational Test III (OT 24, conducted by MASSTER). The questionnaires, related to four of the test objectives, were administered to all subjects twice--at the end of the field training exercise subtest and at the end of the live-fire subtest. Comparisons within and across the two administrations were made between gunners and leaders and among gunners with varying amounts of firing experience.

Principal Findings:

1. No general tendency was observed for gunners to change their attitudes toward the DRAGON system after acquiring more experience in firing the weapon.
2. Gunners and leaders tended to agree regarding most aspects of the DRAGON system.
3. That phase of training involving actual firing of inert rounds was considered the most beneficial aspect of training.
4. A majority of gunners and leaders felt that leaders should be trained in simulated firing.
5. Leaders indicated that platoons should have three DRAGON teams with two gunners and two assistant gunners per team.
6. Confidence in accuracy, reliability, and lethality of the DRAGON system was high.

7. DRAGON gunners may often be detected by the enemy because of the weight, bulkiness, and awkwardness of the round and tracker components, and because of the firing signature.

8. Fire commands were felt to be not needed or needed only occasionally.

Utilization of Findings:

The findings in this report have been integrated into MASSTER Operational Test 24 (DRAGON OT III), which was designed to provide data for use in determining production decisions involving the DRAGON weapon system.

ATTITUDES OF GUNNERS AND TEAM LEADERS TOWARD THE DRAGON WEAPON SYSTEM

CONTENTS

LIST OF TABLES

ATTITUDES OF GUNNERS AND TEAM LEADERS TOWARD THE DRAGON WEAPON SYSTEM

INTRODUCTION

The DRAGON is a one-man-portable, antiarmor-type weapon that employs a line-of-sight, wire-guided missile. It consists of a round (launch tube with a missile), and a tracker that is attached to the round and provides a telescopic sight, an infrared (IR) sensor, an electronic package, and a trigger mechanism. The round (tube) is expendable after discharging its missile, whereas the tracker can be mated with any number of rounds. The DRAGON was designed to replace the 90mm recoilless rifle and to provide a capability against hostile armor, field fortifications, heavy weapons emplacements, and other hard point targets.

The DRAGON system includes the following training equipment: a launch effects trainer, which is similar in size, shape, and weight to the DRAGON tactical round and provides trainees with simulated firing experience; a monitor, which scores the accuracy of the simulated firing; a launch signature simulator, which simulates the noise and recoil of firing, the flame that issues from the front end of the round, and the heat of the round on the gunner's neck and face; and a field handling trainer, consisting of an expended launcher with weight simulator and rear shock absorber installed to simulate the tactical round. The field handling trainer is used in field training exercises to give gunners experience in employment, handling, aiming, etc., in a field environment.

Testing of the various components of the DRAGON system began in 1972. The present evaluation supports DRAGON Operational Test (OT) III conducted by the Ground Combat Test Directorate of MASSTER (Test OT 24) in 1974 and 1975. DRAGON OT III included three subtests. The first was a training subtest, composed of four phases. The first phase consisted of classroom orientation regarding the DRAGON. The second phase involved dry-firing the launch-effects trainer. (By means of a monitoring set, each gunner trainee was scored on each simulated firing according to how closely he maintained the crosshairs on an IR target source, downrange.) The third phase was a wet-firing of the launch-effects trainer. (During wet-fire, a cartridge is fired in the breech of the launch-effects trainer and a weight is propelled forward within the launcher tube to simulate the recoil and weight change incurred when a missile is launched.) In the fourth phase, the trainees acquired experience with the launch signature simulator.

Subtest 2 of DRAGON OT III was a field training exercise designed to provide experience with the field handling trainers.

Subtest 3 provided gunners with experience in firing M223 inert rounds and was called the live-fire subtest. It involved firing inert rounds at targets located at various ranges.

PURPOSE AND OBJECTIVES

The purpose of DRAGON OT III was "to provide data and associated analysis regarding the operational effectiveness and military utility of the DRAGON weapon system in an operational environment on which to base a full-scale production decision." The majority of the findings presented in this report pertain to four of the five test objectives in DRAGON OT III. Those four objectives were:

1. To assess operational performance in mechanized infantry company operations;

2. To assess the proposed training program;

3. To assess the adequacy of proposed doctrine, tactics, and organization for the mechanized infantry company; and

4. To assess the adequacy of the proposed logistical support (supply and maintenance).

Two additional objectives associated specifically with the present study were:

1. To assess the attitudes of gunners and leaders toward the components of the DRAGON system, and

2. To assess the confidence of gunners and leaders in the DRAGON system.

The general purpose of the research discussed in this report was to obtain an evaluation of the DRAGON system, based on the attitudes of a sample of user troops and their leaders. Part of the impetus for this research came from the training subtest of DRAGON OT III, during which trainees registered certain negative attitudes toward the DRAGON system regarding length of training and selected characteristics of the system. Hence, this study was undertaken to assess more comprehensively the trainees' and leaders' attitudes toward training and the DRAGON system, and to identify factors that contributed to negative attitudes.

PROCEDURES

Attitudinal data were collected via questionnaires administered to the trainees (hereafter called "gunners") and their leaders (up to the company commander level). The questionnaires, constructed by the ARI Field Unit at Ford Hood in conjunction with the MASSTER test directorate,

were composed of questions pertaining to the six objectives previously listed. Copies of the questionnaires are included in Appendixes A, B, and C.

Questionnaires were administered to the gunners and their leaders twice. The first administration occurred at the end of the field training exercise (Subtest 2). At that time, however, 14 of the gunners had fired one or two inert rounds with the M223 component of the DRAGON system and had therefore begun the live-fire subtest (Subtest 3). All the leaders had observed the firing with inert rounds but had not fired themselves. This first administration of the questionnaires is referred to in this report as the pretest.

The second administration of the questionnaires--the posttest--took place at the end of the live-fire subtest, at which time a larger number of gunners (but not all) had fired several inert rounds each, and the leaders had observed a larger number of rounds fired.

The study included 39 gunners and 29 leaders. The gunners fell into three groups, as follows:

1. Group A (experimental): gunners who had not fired before the pretest but had fired before the posttest (N = 8),

2. Group B (control): gunners who had fired before the pretest (N = 14), and

3. Group C (control): gunners who did not fire at all (N = 17).

No control group was available for the leaders, because all leaders had observed the firing of inert rounds before the pretest.

A primary point of interest was whether or not the gunners' attitudes toward the DRAGON system would change when they fired the inert round. Therefore, the responses of Group A on the pre- and posttests were compared to determine whether gunners' attitudes had changed. Gunners in Groups B and C were considered comparison groups. If changes occurred in the responses of Group A but not in the responses of Group B or C, it would be inferred that the change was due to Group A's having fired inert rounds between the pretests and the posttests.

The overall pattern of attitudes exhibited by gunners was also of interest because it would indicate the general acceptability of the DRAGON system. The responses of gunners on the posttest were taken as the best indicator of acceptability, because this test was administered after the gunners had more experience with the system.

Three types of significance tests were applied to the data. First, in comparing attitudes exhibited during the pretest with those exhibited during the posttest, each subject served as his own control. The Wilcoxon matched-pairs, signed-ranks test[1] was selected as an appropriate means of testing these differences, the null hypothesis being no pre-to-post change in attitude.

Second, when the responses of one group were compared with responses of another on the pretest or the posttest, a test for unrelated samples was required; the Mann-Whitney U test, (Siegel, 1956) was used. The null hypothesis for each comparison was that the groups did not differ in attitudes.

Third, to compare percentages, a nomograph provided by Oppenheim[2] was employed. All differences were tested for significance at the .05 level.

RESULTS

The findings for each questionnaire item are presented under the objective to which they pertain. Three types of data are shown: (a) For some items, the percentages of respondents who gave each different response are reported; (b) for items that required respondents to record a rating on a 4- or 5-point scale, the mean rating is shown (scoring keys are provided to aid in interpreting these means); and (c) for questionnaire items that required respondents to record a number as their answer, the median and range of numbers given by the group are presented. (The median was selected because it would be less influenced by extreme scores.) Both gunners and leaders occasionally provided comments related to the questionnaire items. Comments that contained additional thoughts of some significance are included in the narrative and identified as supplementary comments.

The findings are presented here in 25 tables, each corresponding to a particular questionnaire item. Each table should be examined in conjunction with the relevant discussion.

Findings Regarding Operational Performance (Objective 1)

Two items of the questionnaire dealt with topics relevant to operational performance.

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[1] Siegel, S. Nonparametric Statistics. New York: McGraw-Hill, 1956.

[2] Oppenheim, A. N. Questionnaire Design and Attitude Measurement. New York: Basic Books, 1966.

Table 1. As indicated in the table, the DRAGON gunners were asked to indicate which of 15 characteristics of the DRAGON system they disliked when firing inert rounds. Two findings are notable.

First, the percentages of gunners in Group A who indicated a dislike for particular characteristics remained fairly constant. The largest change occurred for the first characteristic listed, but that was a shift of only two subjects. Percentages for the other two groups also remained stable for most characteristics, indicating that what the gunners disliked at the time of the pretest they continued to dislike at the posttest.

Second, taking 25% as a cutoff and considering responses to the posttest only, seven of the characteristics (1,4,7,11,13,14, and 15) appear to have given the most trouble to the gunners. The posttest results are employed here because they reflect the gunners' evaluations after they had gained more experience with the system.

Table 2. This table concerns the expected detectability of DRAGON gunners. The findings are shown in terms of mean ratings given on a 5-point scale, and the scoring key shows the value assigned to each scale point. All groups of gunners and the leaders tended to agree that DRAGON gunners may be detected by the enemy. On the average, they expected that it would be somewhere between borderline and easy for the enemy to make that detection.

Findings Regarding the Training Program (Objective 2)

Three questionnaire items pertained to training of DRAGON gunners.

Table 3. This table shows attitudes of gunners toward the six phases of training. The average ratings, which can be interpreted with the scoring key, indicate that most gunners felt that all phases of training helped at least a little. Perhaps classroom training and the exercise with the field handling trainer were considered least helpful. Firing the inert rounds was considered most helpful by Groups A and B; Group C did not fire inert rounds. Group A increased their rating of the launch-signature-simulator training from pretest to posttest, and ratings of the launch signature simulator by the other groups remained more constant. The experience of firing the inert rounds appears to have persuaded Group A gunners that the launch-signature-simulator training was more worthwhile than they had previously thought.

Table 1

Operational Performance: Live Fire of Inert Rounds

Questionnaire Item[a]

What things did you dislike when firing the M223 inert round? If you have not yet fired an inert round, what things do you think you will dislike when you fire? (Check all that apply)

DRAGON characteristic		Percentage of gunners who checked characteristic					
		Group A		Group B		Group C	
		Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
1.	Weight of round and tracker	50	25	43	36	29	47
2.	Shape of round and tracker	0	0	7	21	6	18
3.	Length of round	0	0	7	29	0	6
4.	Comfort of tube on shoulder	50	63	79	50	71	41
5.	Shape and material of eyepiece	0	0	7	29	6	12
6.	Trigger mechanism	13	0	7	7	6	6
7.	Standing firing position	13	25	50	29	29	29
8.	Kneeling firing position	25	13	43	36	35	12
9.	Sitting firing position	13	0	21	14	18	24
10.	Having to hold breath when firing	13	13	29	29	35	41
11.	Having to hold cross-hairs on target until hit occurs	25	13	43	36	18	29
12.	Kick/recoil when I fire	13	0	7	7	18	18
13.	Noise when I fire	38	50	64	71	53	24
14.	Heat from flame at end of tube when I fire	38	38	29	64	35	29
15.	Heat of tube on my neck and face when I fire	75	63	50	71	59	59

[a]Posttest version. Pretest version asked: "What things do you think you will dislike when firing a live round?"

Table 2

Operational Performance: Gunner Detectability

Questionnaire Item[a]

How easy/difficult do you believe it will be for the enemy to detect you and identify you as a DRAGON gunner? (Consider such things as shape, silhouette, signature, and ease of concealing the DRAGON.) (Check one)

Group	Mean response	
	Pretest	Posttest
Gunners		
A	-.25	-.13
B	-.57	-.64
C	-.35	-.40
Leaders	-.62	-.64

Note. Scoring key: +2 = very difficult; +1 = difficult; 0 = borderline; -1 = easy; -2 = very easy.

[a]Gunner version. Leader version stated: "How easy/difficult do you believe it will be for the enemy to detect a gunner and identify him as part of a DRAGON team?"

Table 3

Training Program: Helpfulness

Questionnaire Item

You have completed several phases of training with the DRAGON system. Evaluate each phase of training according to how much you think it helped you to learn to employ and fire the DRAGON system.

Training phase	Mean rating					
	Group A		Group B		Group C	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Classroom training	2.25	2.75	1.79	2.07	1.88	1.88
Dry-fire launch-effects trainer	1.63	2.38	2.08	1.79	2.00	2.19
Wet-fire launch-effects trainer	2.25	2.50	2.38	2.00	2.41	2.00
Fire launch-signature simulator[a]	(2.13)	(2.88)	2.54	2.43	1.59	1.94
Field handling trainer	2.25	1.88	2.38	1.86	1.00	1.67
Firing inert rounds	----	3.00	----	2.86	----	----

Note. Scoring key: 4 = helped me very much; 3 = helped me quite a lot; 2 = helped me a moderate amount; 1 = helped me a little; 0 = did not help me at all.

[a]Ratings for Group A (in parentheses) are significantly different from each other at the .05 level.

Table 4. As shown, gunners and leaders both believed it would be moderately easy to maintain gunner proficiency with the DRAGON. According to opinions expressed in the posttest, all groups had a positive mean rating, which indicates that the bulk of the respondents expressed opinions toward the "easy" end of the scale. Leaders showed a significant change in their ratings from pretest to posttest. This change seems to indicate that, with the additional experience received between tests, the leaders came to feel that maintaining their gunners' proficiency levels would be easier than they had thought. In supplementary comments, some leaders indicated that they believed proficiency could be maintained with use of the launch-effects trainer. Others thought gunners would have to fire inert or live rounds periodically to maintain proficiency.

Table 4

Training Program: Maintaining Proficiency

Questionnaire Item[a]

How easy/difficult do you think it will be for you to maintain your proficiency with the DRAGON system?

Group	Mean response	
	Pretest	Posttest
Gunners		
A	-.13	.25
B	.93	.86
C	.47	.31
Leaders[b]	(-.07)	(.52)

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

[a]Gunner version. Leader version stated: "How easy/difficult do you think it will be to maintain the proficiency of your DRAGON gunners?"

[b]Ratings in parentheses are significantly different from each other at the .05 level.

Table 5. This table shows that the majority of both gunners and leaders felt that leaders should participate in training with the launch-effects trainer. While the percentages declined slightly from pretest to posttest, the respondents still tended to prefer such training for leaders.

Table 5

Training Program: Launch-Effects Trainer

Questionnaire Item

Should fire team leaders and squad leaders go through Launch-Effects Training (LET)?

Group	Percentage of subjects answering "yes"	
	Pretest	Posttest
Gunners		
A	88	63
B	86	71
C	94	88
Leaders	79	77

Findings Regarding Doctrine, Tactics, and Organization (Objective 3)

Eight questionnaire items were relevant to this objective.

Tables 6 and 7. The two questionnaire items shown in these tables elicited opinions about the ease of carrying and displacing with the DRAGON system. All groups indicated there would be some difficulty both in moving with the DRAGON and in displacing when in contact with the enemy. All mean ratings were negative. While there was a slight decrease in negative opinion from pretest to posttest for gunners and a significant decrease in negative opinion for leaders, all means remained negative. The weight of the round and tracker (see Table 1) possibly contributed to this attitude. Supplementary comments by leaders indicated that the DRAGON is heavy, bulky, and difficult to carry with an M16 and other gear (although not as bad as the 90mm recoilless rifle, which the DRAGON was designed to replace). Displacing with the DRAGON under fire was anticipated to be difficult also, especially when rough terrain or water is to be traversed.

Table 6

Doctrine, Tactics, Organization: Carrying the DRAGON Weapon

Questionnaire Item[a]

How easy/difficult do you think it will be to carry the DRAGON system when you are moving on foot, but not in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking and running.) (Check one)

Group	Mean response	
	Pretest	Posttest
Gunners		
A	-1.13	-.75
B	-.21	-.57
C	-.47	-.25
Leaders[b]	(-1.14)	(-.57)

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

[a]Gunner version. Leader version stated: "How easy/difficult do you think it will be for DRAGON teams to carry the DRAGON system when they are moving on foot, but not in contact with the enemy?"

[b]Ratings in parentheses are significantly different from each other at the .05 level.

Table 7

Doctrine, Tactics, Organization: Displacing Under Enemy Contact

Questionnaire Item[a]

How easy/difficult to you think it will be to displace with the DRAGON system when you are in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking, running, and crawling with the system from one position to another under fire.) (Check one)

Group	Mean response	
	Pretest	Posttest
Gunners		
A	-.75	-.38
B	-.57	-.29
C	-.53	-.13
Leaders[b]	(-1.10)	(-.57)

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

[a] Gunner version. Leader version stated: "How easy/difficult do you think it will be for DRAGON teams to displace when they are in contact with the enemy?"

[b] Ratings in parentheses are significantly different from each other at the .05 level.

Table 8. This table shows the mean safety rating given to the DRAGON by gunners and leaders. It appears that most subjects believed the DRAGON would be relatively safe for the gunner but less safe for other troops in the vicinity. Comments of respondents indicated concern about the back-blast and the signature of the DRAGON.

Table 8

Doctrine, Tactics, Organization: Safety of DRAGON System

Questionnaire Item

Do you think the DRAGON system will be safe or dangerous to friendly troops in the platoon when a missile is fired in combat?

Group	Mean response	
	Pretest	Posttest
Safety to gunners		
Gunners		
A	.88	1.25
B	.85	.50
C	.65	.47
Leaders	.50	.43
Safety to other troops		
Gunners		
A	-.29	.25
B	.14	-.09
C	-.18	-.36
Leaders	.14	.36

Note. Scoring key: +2 = very safe; +1 = safe; 0 = borderline; -1 = dangerous; -2 = very dangerous.

Table 9. The gunners and leaders were by no means unanimous in their preference for an antitank weapon. As shown in the table, roughly half preferred the DRAGON at the time of the posttest, except for Group A, who increased their preference for the DRAGON to 87% on the posttest. Slightly less than half preferred the 90mm recoilless rifle, and a smaller percentage chose other weapons.

Table 10. This table presents the data concerning the need for a fire command when employing the DRAGON. The most frequent response of gunners who had fired inert rounds with the weapon (Groups A and B) was that a fire command was not necessary or only occasionally necessary. Leaders tended to agree with this opinion. The only group casting more votes for "frequently" or "always" having a fire command was Group C. This group had not fired inert rounds; consequently, their opinion on this item should not be given as much weight as the opinions of the other groups.

Tables 11 and 12. The two questionnaire items shown in these tables were answered by leaders only. Their responses to the first item indicated they felt that DRAGON teams would be easiest to employ in defensive situations, most difficult to employ in attack situations, and moderately difficult during delay situations. When asked how easy it would be to control fire of DRAGON teams, the leaders indicated they expected only slight difficulty.

Table 13. This table shows the mean number of DRAGON teams, gunners, and assistant gunners preferred by the 29 leaders. Both the range of numbers and the median remained the same from pretest to posttest. Most leaders preferred three teams in a platoon, with two gunners and two assistant gunners per team. If the DRAGON team is defined by doctrine as consisting of one gunner and one assistant gunner, the leaders' preferences would yield six DRAGON teams per platoon.

Table 9

Doctrine, Tactics, Organization: Preference for DRAGON System

Questionnaire Item

Which weapon system would you prefer to have in your platoon for antitank protection? (Check one)

Group	Percentage of subjects choosing weapon	
	Pretest	Posttest
DRAGON system		
Gunners		
A	37	87
B	64	50
C	47	35
Leaders	41	50
90mm recoilless rifle		
Gunners		
A	13	0
B	29	37
C	47	47
Leaders	52	47
Other weapons: LAW, TOW, 106mm recoilless rifle		
Gunners		
A	50	13
B	7	13
C	6	18
Leaders	7	3

Table 10

Doctrine, Tactics, Organization: Fire Commands

Questionnaire Item

Is a fire command necessary when employing the DRAGON system? (Check one)

Answer	Percentage of subjects choosing answer							
	Gunners						Leaders	
	Group A		Group B		Group C			
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Always	25	0	7	0	18	25	24	21
Frequently	13	13	21	29	13	37	3	7
Occasionally	37	62	7	14	31	19	28	36
Not necessary	25	25	64	57	38	19	45	36

Table 11

Doctrine, Tactics, Organization: Tactical Utilization

Questionnaire Item

How easy/difficult do you think it will be to employ DRAGON teams in a tactical situation? (Consider such things as position, back-blast area, range, signature, resupply, and time required for mating and tracking.)

Mission	Mean rating of mission by leaders	
	Pretest	Posttest
Attack	-.66	-.68
Defense	.79	1.12
Delay	.10	.19

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

Table 12

Doctrine, Tactics, Organization: Fire Control

Questionnaire Item

How easy/difficult do you think it will be to control fires of DRAGON teams when in contact with the enemy? (Consider such things as communications, fire commands, and sector of fire.) (Check one)

Test	Mean rating of question by leaders
Pretest	-.03
Posttest	-.11

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

Table 13

Doctrine, Tactics, Organization: Team Assignment and Composition

Questionnaire Item

Considering the value of the DRAGON system to a platoon's combat effectiveness:

a. How many DRAGON teams should be assigned to a platoon?

b. How many gunners--and how many assistant gunners--should be assigned to each team?

Question component	Means (M) and ranges (R) or leaders' responses			
	Pretest		Posttest	
	M	R	M	R
Teams per platoon	3	1-9	3	1-9
Gunners per team	2	1-4	2	1-4
Assistant gunners per team	2	1-4	2	1-4

Findings Regarding Logistical Support (Objective 4)

Three questionnaire items related to the logistics objective dealt with ease of maintenance, adequacy of basic load, and resupply procedures.

Table 14. As shown in this table, the bulk of gunners and leaders felt that maintenance of the DRAGON would be fairly easy. There was a small decline in the degree of positive attitude on this topic from pretest to posttest, but the change was not statistically significant. Supplementary comments indicated a concern that the DRAGON may be too fragile to hold up under combat conditions.

Table 14

Logistical Support: Maintenance

Questionnaire Item

How easy/difficult do you think it will be to perform maintenance on the DRAGON system? (Consider such things as cleaning, inspection, and turn-ins.)

Group	Mean response	
	Pretest	Posttest
Gunners		
A	1.00	1.00
B	1.29	1.07
C	.94	.76
Leaders	1.21	.82

Note. Scoring key: +2 = very easy; +1 = easy; 0 = borderline; -1 = difficult; -2 = very difficult.

Table 15. Here it is indicated that most gunners and leaders were satisfied with the basic load carried by the company for attack and delay missions (even though the percentage of leaders who preferred a larger load for attack missions increased significantly from pretest to posttest). For defense missions, however, most gunners and leaders indicated on the posttest a preference for a larger basic load. An exception was Group A, in which the majority of gunners preferred the current basic

Table 15

Logistical Support: Basic Load of Rounds

Questionnaire Item

What is your evaluation of the company basic load of 5 rounds per tracker currently used with the DRAGON system? (Assume 3 rounds with the team and 2 rounds on call for resupply.)

	Percentage of subjects giving answer							
	Gunners						Leaders	
	Group A		Group B		Group			
Answer	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
In the attack								
Need more[a]	0	0	29	21	24	29	(3)	(21)
Present load OK	75	100	64	64	76	71	72	71
Need fewer	25	0	7	14	0	0	24	7
In the defense								
Need more[a]	37	13	36	50	35	69	(36)	(64)
Present load OK	50	87	64	43	65	31	57	36
Need fewer	13	0	0	7	0	0	7	0
In the delay								
Need more	0	0	7	14	12	25	11	14
Present load OK	87	100	86	71	82	69	86	82
Need fewer	13	0	7	14	6	6	3	4

[a]The percentage of leaders (shown in parentheses) who preferred a larger load increased significantly (.05 level) from pre- to posttest.

load. (Again, the percentage of leaders who preferred a larger load increased significantly from pretest to posttest.) The groups that indicated a preference for more rounds showed little agreement on how many more should be added. Numbers from one to five more per tracker were mentioned.

Table 16. As shown, when leaders were queried about their evaluations of the resupply procedures for DRAGON rounds, they indicated a moderate degree of dissatisfaction. Most dissatisfaction seemed to center around the speed of resupply and the lack of storage facilities at company level.

Table 16

Logistical Support: Resupply of Rounds

Questionnaire Item

What is your evaluation of the resupply procedures by which the platoon receives and distributes DRAGON rounds? (Check one)

Test	Mean response to question by leaders
Pretest	-.19
Posttest	-.11

Note. Scoring key: +2 = very satisfactory; +1 = satisfactory; 0 = borderline; -1 = unsatisfactory; -2 = very unsatisfactory.

Findings Regarding DRAGON System Components (Objective 5)

Three questionnaire items were concerned with gunners' attitudes toward characteristics and components of the DRAGON system. These items are related to several of the preceding objectives as well, but since they are not subsumed by any one of them, they are treated as a separate group.

Table 17. This table shows results for a pretest questionnaire item that asked gunners to rate various characteristics of the DRAGON system on a 5-point scale, based on their experience during previous training phases. The item is quite similar to the item reviewed in Table 1 in that both deal with attitudes toward the various aspects of firing the DRAGON. Hence, the results are similar. However, Table 1 refers specifically to experiences during the live-fire subtest, whereas Table 17 refers primarily to experiences prior to the live-fire subtest.

In Table 17, characteristics 1, 4, 13, 14, and 15 were viewed with some disfavor by most gunners (as in Table 1). The greatest dislike occurred for characteristics 1 and 15. However, the table also shows that gunners had notably favorable attitudes toward characteristics 5, 6, and 9. Only one of the differences between groups was significant: Group A indicated positive attitudes toward the standing firing position, while Group B exhibited negative attitudes. Table 1 indicated that this difference had largely disappeared by the time of the posttest.

Supplemental comments from gunners indicated dissatisfaction with the lack of waterproofing of the compartment containing lens paper, and with the bipod legs, which did not stay down. Comments were also made about the length of time crosshairs had to be held on target, the lack of padding where the launch tube rests on the shoulder, and the lack of protection for the neck from the heat of the tube.

Table 18. The findings in this table indicate that gunners were not enthusiastic about firing the launch-effects trainer or the launch-signature simulator. While most of them would not try to avoid firing these devices, they certainly had no desire to increase their experience with them. They did, however, exhibit a positive interest in more firing of inert rounds. (Since Group C had never fired inert rounds, the questions concerning inert rounds were not applicable to that group.) These findings agree with the findings reported in Table 3, which dealt with attitudes toward training and indicated that firing of inert rounds was considered more helpful to gunners than other aspects of the training.

Table 19. The ratings indicate that all groups of gunners had a desire to fire live rounds with a DRAGON. Groups A and B indicated a desire to fire during both the pretest and posttest, while Group C showed a significant decrease in interest from the pretest to posttest. It should be recalled that Group C was not allowed to fire any inert rounds. Thus, the decrease in interest by Group C may reflect discouragement in not receiving the attention and experience that the other gunners received.

Table 17

DRAGON System Components: Firing Characteristics

Questionnaire Item

Below are listed several characteristics of the DRAGON system. Based on your experience during all phases of training and qualification firing, indicate how much you like or dislike each characteristic. Place a check in one box in front of each characteristic.

Characteristic of DRAGON	Mean rating of DRAGON characteristic on pretest		
	Group A	Group B	Group C
1. Weight of round and tracker	-.88	-.07	-.71
2. Shape of round and tracker	.00	.00	-.18
3. Length of round	-.13	.08	.06
4. Comfort of tube on shoulder	-1.25	-1.31	-1.06
5. Shape and material of eyepiece	.50	.77	.47
6. Trigger mechanism	1.13	1.00	.65
7. Standing firing position[a]	(.88)	(-.79)	.24
8. Kneeling firing position	-.25	.29	.29
9. Sitting firing position	1.00	1.23	.94
10. Having to hold breath when firing	-.25	-.21	-.29
11. Having to hold crosshairs on target until hit occurs	-.38	.23	-.29
12. Kick/recoil when I:			
a. Wet-fire the launch-effects trainer	-.25	.00	-.29
b. Fire the launch-signature simulator	-.13	-.23	-.24
13. Noise when I:			
a. Wet-fire the launch-effects trainer	-.25	-.62	-1.00
b. Fire the launch-signature simulator	-.38	-.58	-.81
14. Heat from flame at end of tube when I fire	-.88	-.50	-.28
15. Heat from tube on my neck and face when I fire	-1.00	-.86	-.94

Note. Scoring key: +2 = like it very much; +1 = like it; 0 = neither like nor dislike it; -1 = dislike it; -2 = dislike it very much.

[a]Difference between Groups A and B (shown in parentheses) is significant at the .05 level.

Table 18

DRAGON System Components: Attitude Toward Firing

Questionnaire Item

If you were asked to, would you mind firing the following training device several times again to check your proficiency?

Training device	Mean rating of training device on pretest		
	Group A	Group B	Group C
Dry-fire launch-effects trainer	.25	.60	.31
Wet-fire launch-effects trainer	.63	.57	.71
Fire launch-signature simulator	.50	.50	.67
Fire inert round	1.50	1.50	---

Note. Scoring key: +2 = would like to fire; +1 = have no desire to fire, but will if asked; -1 = don't want to fire; -2 = will not fire if it can be avoided.

Table 19

DRAGON System Components: Desire To Fire a Live Round

Questionnaire Item

How do you feel about firing a live round from the DRAGON?

Gunner group	Mean response	
	Pretest	Posttest
A	1.25	1.75
B	1.29	1.29
C[a]	(1.44)	(.62)

Note. Scoring key: +2 = would like to fire; +1 = have no desire to fire, but will if asked; -1 = don't want to fire; -2 = will not fire if it can be avoided.

[a]The difference between the pre- and posttest is significant at the .05 level (indicated in parentheses).

Findings Regarding Confidence in the DRAGON System (Objective 6)

The last eight questionnaire items were designed to assess the confidence of gunners and leaders in the DRAGON system. The primary interest was in the expectations of the respondents rather than the accuracy of the responses. In other words, if a gunner expects only 1 missile out of 100 to misfire, he is expressing a high degree of confidence in the system regardless of whether or not his estimate is accurate.

Tables 20 and 21. These two tables are concerned with the confidence of gunners regarding their ability to hit targets with the DRAGON. The data in Table 20 indicate that most gunners felt their chances of hitting the target increased as they received more training. All three groups had similar expectations for the first five phases of training. After the sixth phase, however, Group A tended to have the most confidence in its own ability. The confidence of Group B, which had fired inert rounds earlier, remained slightly lower.

Table 20

Confidence in DRAGON System: Hit Probability Related to Training

Questionnaire Item

If you had been required to fire a live round at a tank (moving laterally at 500 m and 15 MPH) after each phase of your training, what chance would you have had of hitting the tank? (Check one for each phase of training.)

Training phase	Mean response on pretest		
	Group A	Group B	Group C
Classroom	2.33	2.57	3.31
Dry-fire launch-effects trainer	2.71	2.79	3.21
Wet-fire launch-effects trainer	3.00	3.00	3.29
Fire launch-signature simulator	3.43	3.29	3.19
Carry field handling trainer	3.43	3.43	3.47
Fire inert round	4.51	3.43	----

Note. Scoring key: 5 = very high chance; 4 = high chance; 3 = moderate chance; 2 = low chance; 1 = very low chance.

Table 21

Confidence in DRAGON System: Hit Probability Related to Distance

Questionnaire Item

Estimate your chances of hitting a tank moving laterally at 15 MPH at each of the following ranges. (Check one for each range)

Range	Mean response					
	Group A		Group B		Group C	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
200 m	3.57	4.50	3.57	3.36	4.06	3.63
400 m	3.86	(4.63)[a]	3.57	(3.29)	3.84	3.60
600 m	3.86	4.38	3.71	3.57	3.44	3.40
800 m	3.38	3.88	3.86	(3.93)[a]	3.06	(3.00)
1,000 m	2.86	(3.00)	3.43	(4.00)[a]	2.31	(2.63)

Note. Scoring key: 5 = very high chance; 4 = high chance; 3 = moderate chance; 2 = low chance; 1 = very low chance.

[a]Significantly larger at .05 level than other number(s) in parentheses in same row.

The data in Table 21 indicate that most gunners believed they had a moderate to high chance of hitting a target at ranges from 200 to 1,000 m. While some of the differences between groups are statistically significant, there is no pattern indicating that one group had consistently higher confidence than another.

Table 22. This table portrays the degree of confidence that gunners and leaders had regarding the ability of gunners (other than themselves) to hit targets. Groups A and C showed no significant difference in confidence from pretest to posttest; Group B and the leaders, however, showed a significant increase.

Table 22

Confidence in DRAGON System: Hit Probability of "Other" Gunners

Questionnaire Item[a]

Upon completion of training, if all the gunners in your platoon were to fire a DRAGON missile at a tank in combat (500 m away and moving laterally at 15 MPH), what percentage of them do you think would hit the tank with their first round?

Group	Median percentage		Range of percentages	
	Pretest	Posttest	Pretest	Posttest
Gunners				
A	50	85	10-85	20-100
B[b]	(60)	(70)	3-80	50-100
C	75	80	10-100	4-90
Leaders[b]	(70)	(80)	3-100	30-100

[a]Gunner version. Leader version stated: "Now that they have fired inert rounds, if all the gunners in your platoon were to fire a DRAGON missile at a tank in combat (500 m away and moving laterally at 15 MPH), what percentage of them do you think would hit the tank with their first round?"

[b]The difference between medians (in parentheses) is significant at the .05 level.

Tables 23 and 24. Information is provided regarding the confidence of gunners and leaders in the reliability and lethality of the DRAGON round. In Table 23, the results of the posttest, which was administered after the subjects had gained more experience with the system, show that most of the subjects believed that 10% to 13% of the rounds would misfire. Leaders had less confidence and anticipated a 20% failure rate. These estimates can be interpreted as indicating a moderately high degree of confidence in the reliability of the round. Table 24 indicates that nearly all gunners and leaders expected that if a tank were hit with a DRAGON missile, it would be killed. This fact reflects a high degree of confidence in the lethality of the missile.

Table 23

Confidence in DRAGON System: Probability of Misfires

Questionnaire Item

If 100 DRAGON missiles were fired in combat, how many do you think would misfire? (Consider misfires which may occur for any reason, including factory errors, moisture, mud, dirt, bumps, and other rough handling.)

Group	Median percentage		Range of percentages	
	Pretest	Posttest	Pretest	Posttest
Gunners				
A	15	10	5-85	3-30
B	25	10	0-95	0-95
C	10	13	0-60	0-98
Leaders	13	20	1-75	2-98

Table 24

Confidence in DRAGON System: Lethality

Questionnaire Item

If 100 tanks were hit at center of mass with DRAGON missiles, how many of the tanks do you think would be put out of action?

Group	Median percentage		Range of percentages	
	Pretest	Posttest	Pretest	Posttest
Gunners				
A	80	100	2-100	2-100
B	100	100	0-100	1-100
C	100	100	75-100	98-100
Leaders	100	100	10-100	10-100

Table 25. In this questionnaire item, the subjects were asked to compare the DRAGON with other antitank weapons in terms of how concerned they would be if the enemy had such a weapon. Most gunners and leaders indicated that they would be slightly more concerned about a DRAGON-type weapon. Even though Group B decreased their ratings significantly from pretest to posttest, the result of this comparison of the DRAGON can be interpreted as further confidence in the effectiveness of the DRAGON system.

Table 25

Confidence in DRAGON System: Comparison With Other Weapons

Questionnaire Item

If you were in a mounted attack and the enemy had a weapon like the DRAGON to use against APC's, would you be more or less concerned about that weapon than other antiarmor weapons? (Check one)

Group	Mean response	
	Pretest	Posttest
Gunners		
A	.50	.63
B[a]	(.79)	(.07)
C	.47	.29
Leaders	.48	.50

Note. Scoring key: +2 = much more concerned about the DRAGON-type weapon; +1 = more concerned about the DRAGON-type weapon; 0 = equally concerned with all types of antiarmor weapons; -1 = less concerned about the DRAGON-type weapon; -2 = much less concerned about the DRAGON-type weapons.

[a]The difference between the pretests and posttests (indicated in parentheses) is significant at the .05 level.

CONCLUSIONS

Very few of the differences tested proved statistically significant at the .05 level. These results indicate two things. First, gunners in Group A did not tend to change their attitudes toward the DRAGON system after they had had an opportunity to fire inert rounds. Second, all gunners and leaders tended to agree in their opinion of most aspects of the DRAGON system. (Because of this general lack of significant differences, exercise caution in interpreting the differences portrayed in the tables of results. For the same reason, interpret with some caution the comments offered in connection with these tables.)

Although it cannot be concluded that many observed differences between the pretests and posttests and between subject groups represent real differences, DRAGON gunners and leaders did exhibit both positive and negative attitudes toward the DRAGON system during the evaluation. The following discussion attempts to summarize those areas of positive and negative attitude that appear most salient.

The physical characteristics of the DRAGON that generated the most dissatisfaction were the weight, bulkiness, and awkwardness of the round and tracker. According to the respondents, these characteristics made the DRAGON difficult to carry for any distance and difficult to displace when in contact with the enemy.

The physical characteristics noted in the previous paragraph apparently contributed to the gunners' opinion that they might be easily detected by the enemy. This belief was probably strengthened by the signature generated when the DRAGON is fired. Another factor that was believed to endanger gunners was the prolonged time that gunners must remain exposed to enemy fire while they hold the crosshairs of the weapon on target until the hit occurs. The possibility of increased vulnerability may also be why the standing firing position was held in disfavor by many gunners. All of these problems were noted by gunners and leaders as undesirable aspects of the DRAGON system.

Other characteristics of the system that gunners disliked were the noise generated when the DRAGON is fired, the heat from the flame at the end of the tube, and the heat of the tube on the gunner's neck and face. None of these problems, however, were so great that they would prevent most gunners from willingly firing inert and live rounds.

Most gunners and leaders felt that fire commands were needed only occasionally or not at all when the DRAGON was employed.

Physical characteristics especially favored by gunners were the trigger mechanism and the shape and material of the eyepiece.

Of the three firing positions, the sitting position was particularly desired by most gunners.

Nearly all gunners who had fired inert rounds with the DRAGON strongly desired to fire more inert rounds and to fire live rounds. The sixth phase of training, which involved firing of inert rounds, was considered the most beneficial of all training phases.

Most gunners and leaders felt that leaders should participate in training with the launch-effects trainer. Such training would provide leaders with the familiarization needed to employ the DRAGON team more effectively.

Most subjects considered ease of performing maintenance on the DRAGON to be satisfactory. However, some had reservations about whether the DRAGON is too fragile for use in combat.

Leaders tended to agree that each platoon should have three DRAGON teams and that each team should consist of two gunners and two assistant gunners. Most gunners and leaders agreed that the basic load per tracker presently carried by the company is satisfactory.

Confidence of gunners regarding their ability to hit targets was fairly high, as was their confidence in the reliability of the DRAGON round. Their confidence in the lethality of the missile was high.

APPENDIX A

GUNNER PRETEST

The questionnaire provided in this appendix was administered to gunners as the pretest. While only one form (Form A) of the questionnaire is shown here, two parallel forms were actually employed. Form B was the same except that the order of response alternatives was reversed. This procedure was followed to counteract possible response bias because of the order of response alternatives.

Form A

GUNNER EVALUATION
OF DRAGON SYSTEM

NAME _____ GRADE _____ UNIT _____

POSITION _____ MOS _____

How many rounds have you fired with the M222? _____
How many rounds have you seen fired with the M222 by other people? _____

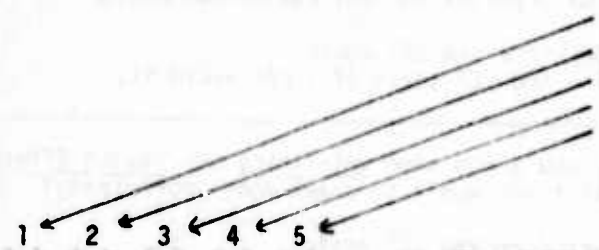
INSTRUCTIONS: Please indicate your opinion of the DRAGON system on each item below. If you need more room for comments, write on the back of the page.

1. You have completed several phases of training with the DRAGON system. Evaluate each phase of training according to how much you think it helped you to learn to employ and fire the DRAGON system.

1 = Helped my very much
2 = Helped me quite a lot
3 = Helped me a moderate amount
4 = Helped me a little
5 = Did not help at all

1	2	3	4	5	TRAINING PHASE
[ ]	[ ]	[ ]	[ ]	[ ]	Classroom Training
[ ]	[ ]	[ ]	[ ]	[ ]	Dry-fire LET
[ ]	[ ]	[ ]	[ ]	[ ]	Wet-fire LET
[ ]	[ ]	[ ]	[ ]	[ ]	LSS Training
[ ]	[ ]	[ ]	[ ]	[ ]	Field exercise with Field Handling Training

2. Below are listed several characteristics of the DRAGON system. Based on your experience during all phases of training and qualification firing, indicate how much you like or dislike each characteristic. Place a check in one box in front of each characteristic.



1	2	3	4	5	CHARACTERISTIC
[ ]	[ ]	[ ]	[ ]	[ ]	The weight of the LET and tracker.
[ ]	[ ]	[ ]	[ ]	[ ]	The shape of the LET and tracker.
[ ]	[ ]	[ ]	[ ]	[ ]	The length of the LET.
[ ]	[ ]	[ ]	[ ]	[ ]	Comfort of the tube on my shoulder.
[ ]	[ ]	[ ]	[ ]	[ ]	The shape and material of the eyepiece.
[ ]	[ ]	[ ]	[ ]	[ ]	The trigger mechanism.
[ ]	[ ]	[ ]	[ ]	[ ]	The standing firing position.
[ ]	[ ]	[ ]	[ ]	[ ]	The kneeling firing position.
[ ]	[ ]	[ ]	[ ]	[ ]	The sitting firing position.
[ ]	[ ]	[ ]	[ ]	[ ]	Having to hold my breath when firing.
[ ]	[ ]	[ ]	[ ]	[ ]	Having to hold crosshairs on target until the hit occurred (exposes gunner).
					The kick/recoil when I fired the:
[ ]	[ ]	[ ]	[ ]	[ ]	Launch Effects Trainer-Wet (LET-W)
[ ]	[ ]	[ ]	[ ]	[ ]	Launch Signature Simulator (LSS)
					The noise when I fired the:
[ ]	[ ]	[ ]	[ ]	[ ]	LET-W
[ ]	[ ]	[ ]	[ ]	[ ]	LSS
[ ]	[ ]	[ ]	[ ]	[ ]	The heat from the flame at the end of the tube when I fired the LSS.
[ ]	[ ]	[ ]	[ ]	[ ]	The heat of the tube on my neck and face when I fired the LSS.
[ ]	[ ]	[ ]	[ ]	[ ]	Other (specify): _____
					_____
[ ]	[ ]	[ ]	[ ]	[ ]	_____
					_____

3. If you were asked to, would you mind dry-firing the Launch Effects Trainer (LET) several times again to check your proficiency? (Check one)

[ ] I would like to dry-fire the LET again.
[ ] I have no desire to dry-fire the LET again, but would fire if asked to.
[ ] I don't want to dry-fire the LET again.
[ ] I will not dry-fire the LET again if I can avoid it.
[ ] Other (specify) _____

4. If you were asked to, would you mind wet-firing the Launch Effects Trainer (LET) several times again to check your proficiency? (Check one)

[ ] I would like to wet-fire the LET again.
[ ] I have no desire to wet-fire the LET again, but would fire if asked to.
[ ] I don't want to wet-fire the LET again.
[ ] I will not wet-fire the LET again if I can avoid it.
[ ] Other (specify) _____

5. If you were asked to, would you mind firing the Launch Signature Simulator (LSS) again? (Check one)

[ ] I would like to fire the LSS again.
[ ] I have no desire to fire the LSS again, but would fire if asked to.
[ ] I don't want to fire the LSS again.
[ ] I will not fire the LSS again if I can avoid it.
[ ] Other (specify) _____

6. Now that you have completed qualification firing, how do you feel about firing a live round from the M222? (Check one)

[ ] I would like to fire a live round.
[ ] I have no desire to fire a live round, but will fire if asked.
[ ] I don't want to fire a live round.
[ ] I will not fire a live round if I can avoid it.
[ ] Other (specify) _____

7. What things do you think you will dislike when firing a live round? (Check all that apply)

[ ] The weight of the round and tracker.
[ ] The shape of the round and tracker.
[ ] The length of the round.

[ ] Comfort of the tube on my shoulder.
[ ] The shape and material of the eyepiece.

(Question 7 continued)

[ ] The trigger mechanism.
[ ] The standing firing position.
[ ] The kneeling firing position.

[ ] The sitting firing position.
[ ] Having to hold my breath when firing.
[ ] Having to hold crosshairs on target until hit occurs (exposes gunner)
[ ] The kick/recoil when I fire.
[ ] The noise when I fire.
[ ] Heat from the flame at the end of the tube when I fire.

[ ] Heat of the tube on my neck and face when I fire.
[ ] Other (specify) _____

_____

_____

Any comments on firing a live round _____

_____

_____

8. If you had been required to fire a live round at a tank (moving laterally at 500 meters and 15 MPH) after each phase of your training, what chance would you have had of hitting the tank? (Check one for each phase of training)

	Classroom	Dry-fire LET	Wet-fire LET	LSS	Field Exercise with Field Handling Trainer
Very high chance	[ ]	[ ]	[ ]	[ ]	[ ]
High chance	[ ]	[ ]	[ ]	[ ]	[ ]
Moderate chance	[ ]	[ ]	[ ]	[ ]	[ ]
Low chance	[ ]	[ ]	[ ]	[ ]	[ ]
Very low chance	[ ]	[ ]	[ ]	[ ]	[ ]

9. Estimate your chances of hitting a tank moving laterally at 15 MPH at each of the following ranges: (Check one for each range)

	200M	400M	600M	800M	1000M
Very high chance	[ ]	[ ]	[ ]	[ ]	[ ]
High chance	[ ]	[ ]	[ ]	[ ]	[ ]
Moderate chance	[ ]	[ ]	[ ]	[ ]	[ ]
Low chance	[ ]	[ ]	[ ]	[ ]	[ ]
Very low chance	[ ]	[ ]	[ ]	[ ]	[ ]

10. How easy/difficult do you think it will be for you to maintain your proficiency with the DRAGON system?

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

11. How easy/difficult do you think it will be to carry the DRAGON system when you are moving on foot, but not in contact with the enemy? (Consider such things as weight, shape, bulk and ease of handling when walking and running)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

12. How easy/difficult do you think it will be to displace with the DRAGON system when you are in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking, running, and crawling with the system from one position to another under fire)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

13. How easy/difficult do you believe it will be for the enemy to detect you and identify you as a DRAGON gunner? (Consider such things as shape, silhouette, signature, and ease of concealing the DRAGON)

[ ] Very difficult
[ ] Difficult
[ ] Borderline
[ ] Easy
[ ] Very easy

14. How easy/difficult do you think it will be to perform maintenance on the DRAGON system? (Consider such things as cleaning, inspection, and turn-ins)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

15. Do you think the DRAGON system will be safe or dangerous to friendly troops in the platoon when a missile is fired in combat?

TO THE GUNNER	TO OTHER TROOPS IN PLATOON
[ ] Very safe	[ ] Very safe
[ ] Safe	[ ] Safe
[ ] Borderline	[ ] Borderline
[ ] Dangerous	[ ] Dangerous
[ ] Very dangerous	[ ] Very dangerous

16. What is your evaluation of the company basic load of 5 rounds per tracker currently used with the DRAGON system? (Assume 3 rounds with the team and 2 rounds on call for resupply)

a. In the attack:

[ ] Need more rounds. How many more and who carries them?

_____

[ ] Present basic load is satisfactory.

[ ] Need fewer rounds. How many fewer and who loses them?

_____

b. In the defense:

[ ] Need more rounds. How many more and who carries them?

_____

[ ] Present basic load is satisfactory.

[ ] Need fewer rounds. How many fewer and who loses them?

_____

(Question 16 continued)

c. In the delay:

[ ] Need more rounds. How many more and who carries them?

_____

[ ] Present basic load is satisfactory.

[ ] Need fewer rounds. How many fewer and who loses them?

_____

17. If 100 DRAGON missiles were fired in combat, how many do you think would misfire? (Consider misfires which may occur for any reason, including factory errors, moisture, mud, dirt, bumps, and other rough handling.)

_____

18. Upon completion of training, if all the gunners in your platoon were to fire a DRAGON missile at a tank in combat (500 m. away and moving laterally at 15 MPH), what percentage of them do you think would hit the tank with their first round? ___ ____

19. If 100 tanks were hit at center of mass with DRAGON missiles, how many of the tanks do you think would be put out of action? _____

20. Which weapon system would you prefer to have in your platoon for anti-tank protection?

[ ] DRAGON system

[ ] 90 mm recoilless rifle

[ ] Other (specify) _____

21. Is a fire command necessary when employing the DRAGON system?

[ ] Always necessary
[ ] Frequently necessary
[ ] Occasionally necessary
[ ] Not necessary
[ ] Other (specify) _____

22. Should fire team leaders and squad leaders go through Launch Effects Training (LET)?

[ ] Yes
[ ] No
[ ] Other (specify) _____

23. If you were in a mounted attack and the enemy had a weapon like the DRAGON to use against APC's, would you be more or less concerned about that weapon than other anti-armor weapons?

[ ] Much more concerned about the DRAGON type weapon
[ ] More concerned about the DRAGON type weapon
[ ] Equally concerned with all types of anti-armor weapons
[ ] Less concerned about the DRAGON type weapon
[ ] Much less concerned about the DRAGON type weapon

APPENDIX B

GUNNER POSTTEST

The questionnaire provided in this appendix was administered to gunners as the posttest. While only one form (Form A) of the questionnaire is shown here, two parallel forms were actually employed. Form B was the same except that the order of response alternatives was reversed. This procedure was followed to counteract possible response bias because of the order of response alternatives.

FORM A

GUNNER EVALUATION
OF DRAGON SYSTEM

NAME _____ GRADE _____ UNIT _____

POSITION _____ MOS _____

How many rounds have you fired with the M223 (inert rounds)? _____

How many rounds have you seen fired with the M223 (inert rounds) by other people? _____

INSTRUCTIONS: Several weeks ago you answered a questionnaire about the DRAGON System. Now that you have fired several inert rounds with the DRAGON we would like you to answer this questionnaire to see if your opinions about the DRAGON have changed. Please answer each question below.

1. You have completed six phases of training with the DRAGON System. How much did each phase of training help you to learn to employ and fire the DRAGON?

   Phase 1 - Classroom Training. (Check one)

   [ ] Helped me very much
   [ ] Helped me quite a lot
   [ ] Helped me a moderate amount
   [ ] Helped me a little
   [ ] Did not help me at all
   [ ] Other. Specify: _____

   Phase 2 - Dry-firing the LET. (Check one)

   [ ] Helped me very much
   [ ] Helped me quite a lot
   [ ] Helped me a moderate amount
   [ ] Helped me a little
   [ ] Did not help me at all
   [ ] Other. Specify: _____

   Phase 3 - Wet-firing the LET. (Check one)

   [ ] Helped me very much
   [ ] Helped me quite a lot
   [ ] Helped me a moderate amount
   [ ] Helped me a little
   [ ] Did not help me at all
   [ ] Other. Specify: _____

(Question 1 continued)

How much did each phase of training help you to learn to employ and fire the DRAGON?

Phase 4 - Firing the LSS. (Check one)

[ ] Helped me very much
[ ] Helped me quite a lot
[ ] Helped me a moderate amount
[ ] Helped me a little
[ ] Did not help me at all
[ ] Other. Specify: _____

Phase 5 - Field Exercise with the Field Handling Trainer. (Check one)

[ ] Helped me very much
[ ] Helped me quite a lot
[ ] Helped me a moderate amount
[ ] Helped me a little
[ ] Did not help me at all
[ ] Other. Specify: _____

Phase 6 - Firing the M223 inert round. (Check one)

[ ] Helped me very much
[ ] Helped me quite a lot
[ ] Helped me a moderate amount
[ ] Helped me a little
[ ] Did not help me at all
[ ] Other. Specify: _____

2. If you were asked to, would you mind firing M223 inert rounds several more times to check your proficiency? (Check one)

[ ] I would like to fire more inert rounds.
[ ] I have no desire to fire more inert rounds, but will fire if asked.
[ ] I don't want to fire more inert rounds.
[ ] I will not fire more inert rounds if I can avoid it.
[ ] Other. Specify: _____

3. Now that you have fired M223 inert rounds, or observed others firing inert rounds, how do you feel about firing a live round from the M222? (Check one)

[ ] I would like to fire a live round.
[ ] I have no desire to fire a live round, but will fire if asked.
[ ] I don't want to fire a live round.
[ ] I will not fire a live round if I can avoid it.
[ ] Other. Specify: _____

4. What things did you dislike when firing the M223 inert round? If you have not yet fired an inert round, what things do you think you will dislike when you fire it? (Check all that apply)

[ ] The weight of the round and tracker.

[ ] The shape of the round and tracker.

[ ] The length of the round.

[ ] Comfort of the tube on my shoulder.

[ ] The shape and material of the eyepiece.

[ ] The trigger mechanism.

[ ] The standing firing position.

[ ] The kneeling firing position.

[ ] The sitting firing position.

[ ] Having to hold my breath when firing.

[ ] Having to hold crosshairs on target until hit occurs (exposes gunner).

[ ] The kick/recoil when I fire.

[ ] The noise when I fire.

[ ] Heat from the flame at the end of the tube when I fire.

[ ] Heat of the tube on my neck and face when I fire.

[ ] Other. Specify: _____

_____

_____

Any comments on firing the inert round: _____

_____

_____

5. Estimate your chances of hitting a tank moving laterally at 15 MPH at each of the following ranges: (Check one for each range)

	200M	400M	600M	800M	1000M
Very high chance	[ ]	[ ]	[ ]	[ ]	[ ]
High chance	[ ]	[ ]	[ ]	[ ]	[ ]
Moderate chance	[ ]	[ ]	[ ]	[ ]	[ ]
Low chance	[ ]	[ ]	[ ]	[ ]	[ ]
Very low chance	[ ]	[ ]	[ ]	[ ]	[ ]

6. How easy/difficult do you think it will be for you to maintain your proficiency with the DRAGON system? (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

7. How easy/difficult do you think it will be to carry the DRAGON system when you are moving on foot, but not in contact with the enemy? (Consider such things as weight, shape, bulk and ease of handling when walking and running.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

8. How easy/difficult do you think it will be to displace with the DRAGON system when you are in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking, running, and crawling with the system from one position to another under fire.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

9. How easy/difficult do you believe it will be for the enemy to detect you and identify you as a DRAGON gunner? (Consider such things as shape, silhouette, signature, and ease of concealing the DRAGON.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

10. How easy/difficult do you think it will be to perform maintenance on the DRAGON System? (Consider such things as cleaning, inspection and turn-ins.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

11. Do you think the DRAGON system will be safe or dangerous to friendly troops in the platoon when a missile is fired in combat?

TO THE GUNNER (Check one)	TO OTHER TROOPS IN PLATOON (Check one)
[ ] Very safe	[ ] Very safe
[ ] Safe	[ ] Safe
[ ] Borderline	[ ] Borderline
[ ] Dangerous	[ ] Dangerous
[ ] Very dangerous	[ ] Very dangerous

12. What is your evaluation of the company basic load of 5 rounds per tracker currently used with the DRAGON system? (Assume 3 rounds with the team and 2 rounds on call for resupply.)

a. In the attack: (Check one)

[ ] Need more rounds. How many more rounds? _____
[ ] Present basic load is satisfactory.
[ ] Need less rounds. How many less rounds? _____

b. In the defense: (Check one)

[ ] Need more rounds. How many more rounds? _____
[ ] Present basic load is satisfactory.
[ ] Need less rounds. How many less rounds? _____

c. In the delay: (Check one)

[ ] Need more rounds. How many more rounds? _____
[ ] Present basic load is satisfactory.
[ ] Need less rounds. How many less rounds? _____

13. If 100 DRAGON missiles were fired in combat, how many do you think would misfire? (Consider misfires which may occur for any reason, including factory errors, moisture, mud, dirt, bumps, and other rough handling.) _____

14. Now that they have fired inert rounds, if all the gunners in your platoon were to fire a DRAGON missile at a tank in combat (500 m. away and moving laterally at 15 MPH), what percentage of them do you think would hit the tank with their first round? _____

15. If 100 tanks were hit at center of mass with DRAGON missiles, how many of the tanks do you think would be put out of action?

_____

16. Which weapon system would you prefer to have in your platoon for anti-tank protection? (Check one)

[ ] DRAGON system

[ ] 90 mm recoilless rifle

[ ] Other. Specify: _____

17. Is a fire command necessary when employing the DRAGON system? (Check one)

[ ] Always necessary
[ ] Frequently necessary
[ ] Occasionally necessary
[ ] Not necessary
[ ] Other. Specify: _____

18. Should fire team leaders and squad leaders go through Launch Effects Training (LET)? (Check one)

[ ] Yes
[ ] No
[ ] Other. Specify: _____

19. If you were in a mounted attack and the enemy had a weapon like the DRAGON to use against APC's, would you be more or less concerned about that weapon than other anti-armor weapons? (Check one)

[ ] Much more concerned about the DRAGON type weapon
[ ] More concerned about the DRAGON type weapon
[ ] Equally concerned with all types of anti-armor weapons
[ ] Less concerned about the DRAGON type weapon
[ ] Much less concerned about the DRABON type weapon

APPENDIX C

LEADER PRE- AND POSTTEST

The questionnaire provided in this appendix was administered to leaders as both pre- and posttests. Only the instructions were changed. While only one form (Form A) of the questionnaire is shown here, two parallel forms were actually employed during each administration. Form B was the same except that the order of response alternatives was reversed. This procedure was followed to counteract possible response bias because of the order of response alternatives.

FORM A

LEADER EVALUATION
OF DRAGON SYSTEM

NAME _____ GRADE _____ UNIT _____

POSITION _____ MOS _____

How many rounds have you seen fired with the M223? (inert rounds?) _____

INSTRUCTIONS: Several weeks ago you answered a questionnaire about the DRAGON system. Now that you have seen many rounds fired with the DRAGON, we would like you to answer this questionnaire to see if your opinions have changed? Please answer each question below.

1. How easy/difficult do you think it will be to maintain the proficiency of your DRAGON gunners? (Check one)

   [ ] Very easy
   [ ] Easy
   [ ] Borderline
   [ ] Difficult
   [ ] Very difficult

   Comments: _____

   _____

2. How easy/difficult do you think it will be for DRAGON teams to carry the DRAGON System when they are moving on foot, but not in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking and running). (Check one)

   [ ] Very easy
   [ ] Easy
   [ ] Borderline
   [ ] Difficult
   [ ] Very difficult

   Comments: _____

   _____

3. How easy/difficult do you think it will be for DRAGON teams to displace when they are in contact with the enemy? (Consider such things as weight, shape, bulk, and ease of handling when walking, running, and crawling from one position to another under fire.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

Comments: _____

_____

4. How easy/difficult do you think it will be to employ DRAGON teams in a tactical situation? (Consider such things as position, back blast area, range, signature, resupply, and time required for mating and tracking.)

IN AN ATTACK (Check one)	IN A DEFENSE (Check one)	IN A DELAY (Check one)
[ ] Very easy	[ ] Very easy	[ ] Very easy
[ ] Easy	[ ] Easy	[ ] Easy
[ ] Borderline	[ ] Borderline	[ ] Borderline
[ ] Difficult	[ ] Difficult	[ ] Difficult
[ ] Very difficult	[ ] Very difficult	[ ] Very difficult

Comments: _____

_____

5. How easy/difficult do you think it will be to control fires of DRAGON teams when in contact with the enemy? (Consider such things as communications, fire commands, and sector of fire.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

Comments: _____

_____

6. What is your evaluation of the resupply procedures by which the platoon receives and distributes DRAGON rounds? (Check one)

[ ] Very satisfactory
[ ] Satisfactory
[ ] Borderline
[ ] Unsatisfactory
[ ] Very unsatisfactory

Explain your answer: _____

_____

7. How easy/difficult do you believe it will be for the enemy to detect a gunner and identify him as part of a DRAGON team? (Consider such things as shape, silhouette, signature, and ease of concealing the DRAGON.) (Check one)

[ ] Very difficult
[ ] Difficult
[ ] Borderline
[ ] Easy
[ ] Very easy

Comments: _____

_____

8. How easy/difficult do you think it will be to perform maintenance on the DRAGON system? (Consider such things as cleaning, inspection, and turn-ins.) (Check one)

[ ] Very easy
[ ] Easy
[ ] Borderline
[ ] Difficult
[ ] Very difficult

Comments: _____

_____

9. Considering the value of the DRAGON system to a platoon's combat effectiveness:

a. How many DRAGON teams should be assigned to a platoon? _____

b. How many gunners - and how many assistant gunners - should be assigned to each team? Gunners _____, Assistant Gunners _____

10. Do you think the DRAGON system will be safe or dangerous to friendly troops in the platoon when a missile is fired in combat?

TO THE GUNNER (Check one)	TO OTHER TROOPS IN PLATOON (Check one)
[ ] Very safe	[ ] Very safe
[ ] Safe	[ ] Safe
[ ] Borderline	[ ] Borderline
[ ] Dangerous	[ ] Dangerous
[ ] Very dangerous	[ ] Very dangerous

Comments: _____

_____

11. What is your evaluation of the company basic load of 5 rounds per tracker currently used with the DRAGON system? (Assume 3 rounds with the team and 2 rounds on call for resupply.)

a. In the attack: (Check one)

[ ] Need more rounds. How many more rounds? _____

[ ] Present basic load is satisfactory.

[ ] Need less rounds. How many less rounds? _____

b. In the defense: (Check one)

[ ] Need more rounds. How many more rounds? _____

[ ] Present basic load is satisfactory.

[ ] Need less rounds. How many less rounds? _____

c. In the delay: (Check One)

[ ] Need more rounds. How many more rounds? _____

[ ] Present basic load is satisfactory.

[ ] Need less rounds. How many less rounds? _____

12. If 100 DRAGON missiles were fired in combat, how many do you think would misfire? (Consider misfires which may occur for any reason, including factory errors, moisture, mud, dirt, bumps, and other rough handling.) _____

Comments: _____

_____

13. Now that they have fired the M223 inert rounds, if all the gunners in your platoon were to fire a DRAGON missile at a tank in combat (500 meters away and moving laterally at 15 MPH), what percentage of them do you think would hit the tank with their first rounds? _____%

14. If 100 tanks were hit at center of mass with DRAGON missiles, how many of the tanks do you think would be put out of action? _____

15. Which weapon system would you prefer to have in your platoon for anti-tank protection? (Check one)

[ ] DRAGON system

[ ] 90 mm recoilless rifle

[ ] Other (Specify): _____

16. Is a fire command necessary when employing the DRAGON system? (Check one)

[ ] Always necessary
[ ] Frequently necessary
[ ] Occasionally necessary
[ ] Not necessary
[ ] Other (Specify): _____

17. Should fire team leaders and squad leaders go through Launch Effects Training (LET)? (Check one)

[ ] Yes
[ ] No
[ ] Other (Specify): _____

18. If you were in a mounted attack and the enemy had a weapon like the DRAGON to use against APC's, would you be more or less concerned about the weapon than other anti-armor weapons? (Check one)

[ ] Much more concerned about the DRAGON type weapon
[ ] More concerned about the DRAGON type weapon
[ ] Equally concerned with all types of anti-armor weapons
[ ] Less concerned about the DRAGON type weapon
[ ] Much less concerned about the DRAGON type weapon