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REPORT NO. T4/85

**COMPARISON OF AEROBIC POWER AND DYNAMIC LIFT
CAPACITY WITH PERFORMANCE DURING A 5-DAY
SUSTAINED COMBAT SCENARIO**

**US ARMY RESEARCH INSTITUTE OF
ENVIRONMENTAL MEDICINE
Natick, Massachusetts**

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scenario. Neither VO_2 max nor APRT score correlated with performance, however, dynamic lift did correlate with performance during the scenario. ($r = .39$ p 0.05). The highest correlation ($r = .46$; p 0.005) was obtained when rank in VO_2 max and dynamic lift capability within the group was combined and compared to performance. Data comparisons from this study may have been somewhat hampered by the fact that as a group, these subjects were all in very good to excellent physical condition. All subjects met or exceeded the minimum physical fitness requirements which have been suggested for infantry soldiers. Therefore, it appears that if soldiers are in good physical condition, both in terms of aerobic power and muscle strength, and are given four hours of sleep each night, then they have little difficulty in meeting the physical demands of a five day simulated combat scenario. The results indicate that the U.S. Army should continue the strong emphasis on aerobic conditioning and increase the emphasis placed on upper body strength development.

HUMAN RESEARCH

Human subjects participated in these studies after giving their free and informed voluntary consent. Investigators adhered to AR 70-25 and USAMRDC Regulation 70-25 on Use of Volunteers in Research.

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Comparison of Aerobic Power and Dynamic Lift Capacity
with Performance during a
5-day Sustained Combat Scenario

by

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FOREWORD

Physical training requirements and physical fitness standards have traditionally been based on experience and subjective judgment rather than objectively determined requirements for successful performance. For example, passing scores (standards) for the Army Physical Readiness Test (APRT) are currently based on age and gender without consideration of military occupational specialty or operational needs of the unit. Commanders often train their unit to exceed these standards based on a perceived need for a higher level of fitness for morale, readiness, appearance and unit performance. There is a paucity of information indicating actual requirements for physical fitness (exercise capacity) for operational units in the Army which deal in situations such as sustained combat. This information is needed not only to establish actual fitness needs, but also to develop more appropriate and efficient physical training programs.

At a physical training study group meeting held on 19-21 April 1982 at the Army War College, the need to identify the fitness requirements of continuous combat operations was identified as the number one priority in applied fitness research. While this need exists for all types of combat units, it was decided that the requirements of light infantry would be an appropriate starting point as possibly the most demanding seen in the Army. The study reported here, in part, is the result of this decision.

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ABSTRACT

Thirty-three infantry soldiers (mean age 22.0, mean wt. 72.8 kg) underwent physiological and physical fitness testing in order to compare these tests with performance during a 5-day sustained combat scenario. Testing consisted of measurement of maximal oxygen consumption ($VO_2\text{max}$; $\bar{x} = 53.6 \pm 5.6$ ml/kg·min), dynamic lifting capability (pre-scenario $\bar{x} = 138.5 \pm 33.6$ lbs) and performance of the Army Physical Readiness Test (APRT, pre-scenario $\bar{x} = 269.4 \pm 28.3$ pts.). Field performance of the individuals and of the four squads that they made up was rated by senior NCO evaluators who accompanied squads at all times during the scenario. Neither $VO_2\text{max}$ nor APRT score correlated with performance, however, dynamic lift did correlate with performance during the scenario ($r = .39$ $p < 0.05$). The highest correlation ($r = .46$; $p < 0.005$) was obtained when rank in $VO_2\text{max}$ and dynamic lift capability within the group was combined and compared to performance. Data comparisons from this study may have been somewhat hampered by the fact that as a group, these subjects were all in very good to excellent physical condition. All subjects met or exceeded the minimum physical fitness requirements which have been suggested for infantry soldiers. Therefore, it appears that if soldiers are in good physical condition, both in terms of aerobic power and muscle strength, and are given four hours of sleep each night, then they have little difficulty in meeting the physical demands of a five day simulated combat scenario. The results indicate that the U.S. Army should continue the strong emphasis on aerobic conditioning and increase the emphasis placed on upper body strength development.

INTRODUCTION

Historically, physical fitness has been associated with success on the battlefield. Physical fitness also has been cited as a factor on the modern battlefield. The British experience in the Falkland Islands and the United States action in Grenada both presented examples of the value of physical fitness to the soldier. British commanders referred to the fitness and esprit of their troops as a "secret weapon" in the Falklands (1). At a meeting in February 1983, sponsored by the Royal Society of Medicine and entitled "Falkland Islands Campaign - Medical Lessons", physical fitness of all ranks was listed as one of the most important aspects of preventive medicine. In Grenada, U.S. paratroopers jumped onto the island with loads (>90 lbs) well in excess of those normally required with only one serious injury (broken ankle).

While the value of fitness to the soldier is unquestioned by most military observers, little scientific information is available on which components of fitness are most valuable. The objective of this study was to determine the physical fitness levels necessary to maintain effectiveness in light infantry operations during a five day sustained operation. In order to gain information on the relationship between fitness and performance of combat tasks, this study was undertaken at Ft. Lewis, Washington in the summer of 1983. Thirty-three male soldiers from the 2nd Battalion, 47th Infantry Regiment, 3rd Brigade, 9th Infantry Division completed all phases of the testing.

METHODS

After being briefed and signing an informed consent statement, subjects began testing. Initially, subjects underwent a series of physiological and fitness measures. In this report, results of the aerobic power test ($VO_2\text{max}$), incremental dynamic lift capacity and the Army Physical Readiness Test (APRT) will be presented. Aerobic power ($VO_2\text{max}$) was determined using an interrupted, uphill treadmill running protocol (2). The procedure begins by having the subject run at 6 mph and 0% grade for 6 minutes, followed by a 5-10 minute rest period. Two to four additional runs were performed, each 3-4 minutes in length and interrupted by rest periods. Runs were initially increased in work intensity by raising speed and/or grade. Final workloads were increased by raising grade only. During the last minute of each run, expired air was collected in plastic Douglas bags. Subjects breathed through a mouthpiece and low-resistance Kogel y-valve. A plateau in VO_2 uptake with an increase in workload was defined as $VO_2\text{max}$. A plateau was defined as an increase of less than 2.0 ml O_2 /kg of body weight per minute with an increase of 2.5% grade. Expired air volumes were measured with a Tissot spirometer and O_2 and CO_2 fractions with fuel cell and infrared analyzers, respectively.

For the incremental dynamic lift capacity test, all subjects began by lifting the 40 lb carriage of the device (3) to a height of 72 inches. Subjects continued to repeat this lift by adding 20 lbs to the carriage until they began to have difficulty lifting the weight. The weight was then incremented by 10 lbs each time until the subject could not lift the weight to 72 inches. The greatest weight successfully lifted to 72 inches was recorded as the final score. The maximum weight that could be lifted was 200 lbs (Figure 1).



Figure 1. Subject performing the dynamic lift test.

The standard APRT was administered with each subject being asked to perform to the best of his ability with regard to current age-adjusted standards. The APRT consists of sit-ups, push-ups and a timed two-mile run. The score for sit-ups and push-ups was the maximum number that could be performed in two minutes.

Following preliminary testing, subjects were given a day of rest, before beginning the five day scenario. The five day scenario consisted of offensive and defensive maneuvers on a near continuous basis. One four hour block of continuous sleep was allowed for each subject during every 24 hour period. The scenario lasted 5 days (120 hours). Four squads of at least 8 men each participated. The scenario was developed by the Airborne Board, Ft. Bragg, North Carolina and the portion of their report describing the scenario is in Appendix A. Basically the squads rotated on a daily basis through four different scenarios in four testing areas. In each area, squads were given a series of missions to be completed during the twenty-four hour period. Squads were continuously accompanied, monitored and rated by NCO evaluators who rotated every twenty-four hours. Squads were given either a "GO" (pass) or "NO GO" (Fail) rating on each mission that they were required to perform. In addition, each individual in the squad was given a performance rating on a scale of 1 to 10, with 10 being the highest rating. On days 1 and 5, squads performed the same missions in the same test area. At the end of the scenario, subjects repeated some of the test procedures. These included the incremental dynamic lift and the APRT as well as some of the other physiological measures not reported here.

RESULTS

The physical and physiological characteristics of the thirty-three subjects tested are listed in Table 1. These data were obtained during preliminary testing prior to the start of the scenario.

All subjects completed the maximal exercise testing without incident and most met the criteria for a plateau in oxygen consumption. In those subjects who did not plateau, peak oxygen uptake was defined as VO_{2max} .

Table 2 lists results obtained in the APRT both before and after the scenario.

The number of "GO" versus "NO GO" ratings and the mean performance ratings for each squad are summarized in Table 3. On day 1 all squads were given a Go rating for the 10 kilometer road march which began the scenario. Table 3 also includes the average performance scores of each day for all squads combined and the average performance for all squads combined in each area. The lowest average performance rating occurred on Day 3 with Area 3 having the lowest when determined by area. The success rate ("Go's/"Go's" plus No Go's X 100) ranged from 60 to 80 percent for each day and area except for Day 4 when the success rate was 91 percent.

In Table 4 the data obtained from each individual is listed. This data was used to perform several linear regression analyses in order to determine if there was any relationship between performance scores and laboratory testing. Table 5 summarizes the values obtained when individuals were grouped by either squad or rank. Table 6 lists values obtained on subjects as they were divided into three groups based on mean performance score during the scenario. Although there was some trends in VO_{2max} , two-mile run time and incremental lift, there were no statistically significant differences.

In Table 7 a summary of all the linear regressions performed on the data contained in Tables 5 and 6 is presented. Field performance correlated with lifting capability, as measured by the dynamic lift test, and with ranking in VO_2 max and dynamic lift. For the latter test, subjects were ranked in the group based upon their performance on the VO_2 max test and the dynamic lift. Subjects were given a number between 1 and 33 for each test. If two subjects scored the same on one test, they were both given the same ranking and the next highest score was assigned the rank corresponding to the number succeeding all those above him. For example, in the dynamic lift, two people lifted 200 lbs, which was the highest value, and both received a ranking of 1. The third and fourth individuals lifted 190 lbs and were both ranked at 3. The next highest score was ranked as 5. Under this system, the best combined ranking would be 2 and the lowest 66. The rankings ranged from 11 to 56 and these were correlated with the performance score. Dynamic lift was significantly ($p < 0.05$) correlated to the performance score ($r = .39$) and the combined ranking was negatively correlated with performance score ($r = -.46$; $p < 0.005$).

DISCUSSION

The results of this study demonstrate a low but statistically significant correlation between performance in a field operation and measures of physical fitness. The results also indicate that the subjects were in what would have to be considered very good physical condition. This may account for the fact that the subjects were able to complete the entire 5 days of the scenario with little difficulty. Medical and physical complaints reported by the test subjects to medics accompanying each squad are detailed in Appendix B. One

of the questions being posed at the beginning of this study was whether or not a VO_2 max of 45ml/kg.min was sufficient to successfully perform in a 5 day scenario. This question was not adequately addressed in the study because only three subjects had a VO_2 max of less than 45ml/kg.min and all of these were between 44-45ml/kg min (Table 5).

The overall aerobic fitness level of the group was very good compared to military populations that have been studied in the recent past. The mean VO_2 max of 53.6ml/kg.min was 11.6-14% higher than that of a similar aged group of soldiers from the 1st Cavalry Division who were studied in 1978 (4). The average aerobic power in this group was about 2.4% higher than a group of trainees studied at the end of basic training (5). The difference may be accounted for by the increased emphasis in physical training, especially running, in the US Army over recent years.

A lack of endurance fitness did not in any way appear to be related to the inability to successfully complete any of the missions. In fact, on days 4 and 5, the success rate was greater than on days 1 thru 3 (Table 3); indicating that fatigue was not a factor in the ability to complete a task. This would seem to indicate that military tactical errors rather than lack of physical capacity was responsible for the greater failure rate early in the scenario. Interestingly, the most successful day for mission completion was Day 4, not Day 5 when the subjects were performing that scenario for the second time.

The results also indicate that for this population, four hours of sleep each night enabled them to perform the tasks required. While studies have shown that fitness does not provide any protection from the effects of sleep loss, these results indicate that this population was not greatly affected

when provided four hours of sleep each night. This concept has important implications for commanders in that if they can get their soldiers a minimum of four hours of sleep each night, they should not see any decrements in physical performance due to sleep loss.

Subjects received their lowest mean performance rating on day 3. Again this was not related in any way to physical fitness capacity. This day marked the middle of the scenario "hump day" and may have been the psychological low point for the subjects. The personal observation of several investigators (Daniels, Jones, Knapik) was that subjects seemed particularly lethargic on the morning of Day 3. In addition, on Day 3 it rained almost the entire day (.34 inches) and this may have had some effect on personal performance.

While aerobic performance did not correlate with performance in the field, there was a significant correlation between VO_2 max and the two-mile run (Table 7). This confirms previous data which show that the two-mile run is a very strong indicator of aerobic power (6). While there is no correlation between aerobic power and field performance, we cannot say that aerobic power is not an important factor for success in the field. The successful completion of the five day scenario may have been aided by the fact that as a group these individuals were in such good aerobic condition. In addition, we do not know if subjects would perform better if their aerobic fitness was higher or if performance would have been worse if their aerobic fitness lessened. Although there was a trend for those subjects with higher performance scores to have greater aerobic power, it was not statistically significant (Table 6).

Unlike aerobic power, dynamic lift capacity did correlate with field performance. All subjects were able to lift 80 lbs which has been recommended as the minimum level required for entry selection of an infantry SSI (7). It is also interesting to note that those individuals who were in the lower third of the group, in terms of performance score, had the lowest lifting capability. However, this difference was not statistically significant. This entire group averaged about 11 percent higher in dynamic lift than a comparably aged group tested before basic training and after basic and advanced individual training (USARIEM, unpublished data). The combined ranking of aerobic power and lift capability had the highest correlation with field performance. Although the correlation was not high, it was significant, and indicates the importance of total body conditioning to successful field performance.

It is interesting to note that the PT test results did not correlate well with field performance (Table 7). In addition, we attempted to look at any possible relationship between fatigue and fitness parameters. To do this, we compared the change in performance score (Day 5 - Day 1) with VO_2 max and dynamic lift, however, we found no correlation (Table 7).

In conclusion, physical fitness components did correlate with field performance. Lifting ability as measured by dynamic lift had the highest individual correlation with performance. The highest correlation with performance occurred when ranking in VO_2 max plus dynamic lifting was compared with field performance. These results plus those reported by Murphy et al (8) and the medical report prepared by Major Jones in Appendix B indicate the importance of upper body strength to the soldier. This indicates the need for attention to all components of fitness when striving for success on the

battlefield. This suggests that the Army should continue the strong emphasis on aerobic training and increase the emphasis placed on upper body strength development. The lack of a high correlation may be due to the fact that, as a group, these subjects were in good to excellent physical condition. All subjects essentially met or exceeded the minimum physical requirements which have been suggested for infantry personnel. It thus appears that if soldiers are in good physical condition and are given four hours of sleep per night, they are able to meet the physical demands of a five day simulated combat scenario. The results do show that soldiers who performed best have both good aerobic power and upper body strength.

TABLE 1. CHARACTERISTICS OF SUBJECTS

	AGE (years)	WEIGHT (kg.)	VO2 max (l/min)	VO2 max (ml/kg.min)	HRmax (bts/min)
x	22.0	72.8	3.92	53.6	193.6
S.D.	2.9	10.6	.52	5.6	8.3

TABLE 2. RESULTS OF ARMY PHYSICAL READINESS TEST (APRT)

	Sit-Ups (Reps)		Push-Ups (Reps)		Two-Mile Run (Minutes)		APRT Score (Points)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
x	66.8	61.6	66.2	59.8	14.37	15.60	269.4	246.5
S.D.	10.7	10.5	12.3	14.9	1.73	1.98	28.3	34.8

Sit-ups and push-ups represent the number of repetitions performed in two minutes in accordance with standards outlined in FM 21-20, "Physical Readiness Training".

TABLE 3. SUMMARY OF "GO"/"NO GO" RATINGS AND PERFORMANCE RATINGS

	DAY	GO/NO GO	PERFORMANCE RATING	TEST AREA
SQUAD 1	1	2/2	6.1	1
	2	2/1	6.2	2
	3	1/2	2.4	3
	4	2/0	5.6	4
	5	2/1	6.4	1
SQUAD 2	1	3/1	5.8	2
	2	0/3	N.A.	3
	3	1/1	5.3	4
	4	3/0	7.4	1
	5	3/0	6.7	2
SQUAD 3	1	4/0	6.9	3
	2	2/0	6.4	4
	3	2/1	7.0	1
	4	2/1	6.3	2
	5	3/0	4.3	3
SQUAD 4	1	2/1	7.6	4
	2	3/0	7.1	1
	3	3/0	5.1	2
	4	3/0	5.5	3
	5	0/2	4.3	4
ALL SQUADS	1	7/4*	6.60	
	2	7/4	6.57	
	3	7/4	4.95	
	4	10/1	6.20	
	5	8/3	5.43	
		11/4	6.80	1
		12/3	6.02	2
		10/5	4.78	3
		6/4	5.84	4

* DOES NOT INCLUDE 4 GO's/0 NO GO's FROM 10K MARCH.

TABLE 4. INDIVIDUAL DATA OBTAINED ON ALL SUBJECTS DURING TESTING.

SUBJECT NUMBER	AGE (years)	PERFORMANCE SCORE	VO2 max (ml/kg.min)	DYNAMIC LIFT(lbs)		TWO-MILE RUN (minutes)		APRT (points)	
				PRE	POST	PRE	POST	PRE	POST
9401	19	5.9	58.8	140	130	12.28	14.18	273	236
9402	20	6.6	63.0	160	180	14.50	14.18	288	291
9403	23	7.0	44.7	180	200	17.30	16.83	194	185
9404	19	5.5	53.9	150	150	15.47	17.70	280	261
9405	21	4.6	44.2	120	140	17.43	19.17	263	228
9406	25	6.5	53.3	140	160	14.27	16.60	270	215
9407	23	6.3	56.2	110	140	13.35	14.88	291	262
9408	20	6.2	62.1	150	190	13.62	13.40	285	279
9409	25	6.0	45.9	120	130	16.57	19.17	205	182
9410	21	6.7	54.5	130	140	12.93	15.97	294	264
9412	19	4.7	51.4	100	130	14.15	16.77	253	212
9413	18	5.3	60.8	100	100	12.27	11.73	274	286
9414	21	6.2	58.5	140	130	12.53	15.68	300	294
9415	23	6.3	44.6	140	170	16.75	17.75	269	219
9416	21	6.5	63.3	130	150	12.45	12.83	300	296
9417	20	6.3	56.2	180	190	13.33	14.25	298	290
9418	23	5.5	47.4	190	200	15.40	17.73	278	223
9419	25	4.9	50.2	120	120	12.65	17.08	280	227
9420	24	6.9	51.0	130	140	15.33	17.15	281	242
9421	21	6.5	59.0	130	140	13.37	14.90	297	273
9422	22	7.4	52.3	200	200	14.78	14.00	276	292
9423	19	6.4	52.5	180	190	17.65	15.32	279	251
9425	27	6.1	49.5	200	200	15.05	15.10	263	246
9426	29	6.1	50.7	120	110	14.55	15.40	236	236
9428	24	5.3	51.7	140	140	15.25	16.22	225	201
9429	19	4.1	45.7	110	130	15.97	16.22	226	198
9430	20	4.2	62.1	90	-	12.68	16.00	280	243
9431	22	7.0	56.5	180	200	12.70	13.10	275	260
9432	24	6.0	51.5	190	200	16.37	17.68	272	219
9433	18	5.9	52.1	120	120	12.48	13.70	294	278
9434	20	4.9	57.1	110	150	12.12	12.33	300	300
9435	29	7.1	51.8	80	80	12.82	14.53	246	249
9436	22	6.6	57.9	190	130	15.42	17.63	223	198
x	22.0	6.01	53.6	139	153	14.37	15.60	269	246
S.D.	2.9	0.82	5.	34	34	1.73	1.96	28	31

TABLE 5. MEAN VALUES OF MEASURED PARAMETERS WHEN SUBJECTS WERE GROUPED ACCORDING TO SQUAD OR RANK.

GROUP	n	VO2 max	PRE DYNAMIC LIFT	PRE TWO-MILE RUN	PRE PT SCORE	MEAN PERFORMANCE SCORE
SQUAD 1	8	53.0	137.5	14.3	264.4	5.4
SQUAD 2	8	54.8	135.6	14.1	274.4	6.4
SQUAD 3	8	55.4	132.5	13.5	276.6	6.2
SQUAD 4	8	51.3	150.0	15.5	261.5	6.0
E-5	6	50.2	156.7	14.9	258.0	6.7
E-4	7	52.0	140.0	15.2	253.9	5.8
E-3	6	51.7	111.3	14.9	260.1	5.5
E-2	14	57.3	136.8	13.5	286.0	6.0

TABLE 6. MEAN VALUES OF MEASURED PARAMETERS WHEN SUBJECTS WERE GROUPED BY PERFORMANCE SCORES.

GROUP	n	VO2 max (ml/kg.min)	PRE		PRE TWO-MILE RUN(min)	PRE PT SCORE	MEAN PERFORMANCE SCORE
			DYNAMIC LIFT	DYNAMIC LIFT			
UPPER THIRD	11	55.5	140.9	140.9	14.16	268	7.4-6.5
MIDDLE THIRD	12	53.7	147.5	147.5	14.54	276	6.4-5.9
LOWER THIRD	10	52.5	123.0	123.0	14.46	268	5.5-4.1

TABLE 7. SUMMARY OF CORRELATIONS PERFORMED ON DATA OBTAINED IN THIS STUDY.

ALL SUBJECTS (n=33)	r
PERFORMANCE SCORE vs DYNAMIC LIFT(Pre)	.39*
PERFORMANCE SCORE vs DYNAMIC LIFT(Post)	.30
PERFORMANCE SCORE vs PT SCORE(Pre)	.04
PERFORMANCE SCORE vs VO2 max	.16
PERFORMANCE SCORE vs TWO-MILE RUN(Pre)	.00
PERFORMANCE SCORE vs AGE	.33
PERFORMANCE SCORE vs VO2 max + DYNAMIC LIFT(Pre)	-.46**
PERFORMANCE SCORE(Day 5-Day 1) vs VO2 max	.00
PERFORMANCE SCORE(Day 5-Day 1) vs DYNAMIC LIFT(Pre)	.03
VO2 max vs TWO-MILE RUN(Pre)	-.69**
<u>E-5's (n=6)</u>	
PERFORMANCE SCORE vs DYNAMIC LIFT(Pre)	.18
PERFORMANCE SCORE vs VO2 max + DYNAMIC LIFT(Pre)	.11
PERFORMANCE SCORE vs VO2 max	.07
<u>E-4's (n=7)</u>	
PERFORMANCE SCORE vs DYNAMIC LIFT(Pre)	.27
PERFORMANCE SCORE vs VO2 max + DYNAMIC LIFT(Pre)	.28
PERFORMANCE SCORE vs VO2 max	.58
<u>E-3's (n=6)</u>	
PERFORMANCE SCORE vs DYNAMIC LIFT(Pre)	.12
PERFORMANCE SCORE vs VO2 max + DYNAMIC LIFT (Pre)	-.89*
PERFORMANCE SCORE vs VO2 max	.92**
<u>E-2's (n=14)</u>	
PERFORMANCE SCORE vs DYNAMIC LIFT(Pre)	.66*
PERFORMANCE SCORE vs VO2 max + DYNAMIC LIFT(Pre)	-.68*
PERFORMANCE SCORE vs VO2 max	.28

* p<0.05

** p<0.005

REFERENCES

1. Time magazine, 14 June 1982.
2. Mitchell, J.H., J. Sproule and C.B. Chapman. The physiological meaning of maximal oxygen uptake test. *J. Clin. Invest.* 37:338-347, 1957.
3. McDaniel, J.W., Skandis, R.J. and S.W. Madole. Weight Lift Capabilities of Air Force Basic Trainees AFAMRL-TR-83-0001, May 1983.
4. Wright, J.E., J.A. Vogel, J.B. Sampson, J.J. Knapik, J.F. Patton and W.L. Daniels. Effects of Travel Across Time Zones (Jet-Lag) on Exercise Capacity and Performance. *Aviat, Space and Environ Med.* 54(2): 132-137, 1983.
5. Patton, J.F., W.L. Daniels and J.A. Vogel. Aerobic Power and Body Fat of Men and Women During Army Basic Training, *Aviat. Space Environ. Med.* 51(5):492-496, 1980.
6. Mello, R.P., M.M. Murphy and J.A. Vogel. Relationship Between the Army Two-Mile Run Test and Maximal Oxygen Uptake, USARIEM Technical Report, In preparation.
7. Earley, Pete. A plan for more women GIs. *Boston Globe* 19 Oct 83.
8. Murphy, M.M., J.A. Vogel, J.J. Knapik and F.R. Drews. Relationship of Anaerobic Power Capacity to Performance during a 5-day Sustained Combat Scenario. USARIEM Technical Report T5/84, 1984.

APPENDIX A

TRAINING SCHEDULE: SCENARIO

DAY/DATE	TIME	AREA	SUBJECT	INSTRUCTOR
	0600	I	Mission 1: Raid	
	0800		Second Situation: React to NBC	
	0930		Third Situation: React to Enemy Mortar Fire	
	1200		Fourth Situation: Establish Rally Point	
	1300		Fifth Situation: Conduct Raid	
	1500		Mission 2: Roadblock/Vehicular Ambush	
	1700		Second Situation: Conduct Ambush	
	2000		Mission 3: Point Reconnaissance /Raid	
	2100		Second Situation: React to NBC	
	2200		Third Situation: Establish Rally Point	
	2300		Fourth Situation: Conduct Raid	
	0100		Mission 4: Establish Patrol Base	
	0500		Stand Down	
			Stand To and Move to Resupply Point 28500950	

TRAINING SCHEDULE: SCENARIO

DATE	TIME	AREA	SUBJECT	INSTRUCTOR
	0600	II	Secure Site and Conduct Resupply	
	0600		Mission 1: Area Reconnaissance	
	0300		Second Situation: Establish Rally Point	
	0900		Third Situation: Establish Personnel Ambush	
	1200		Fourth Situation: Conduct Ambush and Process POW	
	1600		Mission 2: Defend Eastman and Folsom Hills	
	1500-1900		Second Situation: React to Sniper (two times)	
	1500-1900		Third Situation: React to Enemy Fire (two times)	
	2040		Fourth Situation: Defend Eastman Hill	
	2200		Fifth Situation: Defend Eastman Hill	
	2230		Sixth Situation: Withdraw Under Pressure	
	2230		Seventh Situation: Defend Folsom Hill	
	2400		Critique and Recovery	
	0100		Stand Down	
	0500		Stand to and Move to Resupply Point 37651040	

TRAINING SCHEDULE: SCENARIO

DAY/DATE	TIME	AREA	SUBJECT	INSTRUCTOR
	0600	III	Secure Site and Conduct Resupply	
	0630		Mission 1: Movement to Contact	
	0700		Second Situation: React to Ambush/NBC	
	0800		Third Situation: Evacuate Wounded	
	1000		Fourth Situation: React to Sniper/Process POW	
	1020		Fifth Situation: Secure Site/Conduct Evacuation of Wounded and POW	
	1100		Mission 2: Establish Ambush	
	1330		Second Situation: Conduct Ambush	
	1400		Mission 3: Area Reconnaissance	
	1900		Second Situation: Locate Enemy Outpost	
	2030		Third Situation: Attack & Seize Outpost	
	2200		Fourth Situation: Defend Outpost	
	0030		Mission 3: Establish Patrol Base	
	0100		Stand Down	
	0500		Stand to and Move to Partisan Link-up 38801510	

TRAINING SCHEDULE: SCENARIO

DAY/DATE	TIME	AREA	SUBJECT	INSTRUCTOR
	0600	IV	Partisan Link-up and Resupply	
	0800		Mission 1: Raid/Rescue	
	1300		Move to Rally Point	
	1400		Conduct Raid	
	1500		Second Situation: Evacuate Wounded/Partisan Link-up	
	1600		Mission 2: Secure and Hold Landing Strip	
	1600-2045		Second Situation: React to Enemy Fire/Sniper	
	2100		Third Situation: Enemy Illumination/Fire on Landing Strip	
	2300		Fourth Situation: Defend Landing Strip	
	2400		Critique and Recovery	
	0100		Stand Down	
	0500		Stand to and Movement to Resupply Point 40801365 (AREA I)	

AREA I

Scenario - Mission 1

1. General Situation (To Be Provided).
2. Initial Situation:

When squad arrives at resupply point (Day 1 - 39150955/Sequence -40801365), evaluators change over; squad receives/distributes chow and ammo (see Logistics Annex); squad continues to secure site tactically; chief evaluator issues following order to squad leader:

"Recent intelligence reports indicate the presence of a guerrilla logistics outpost, used as a resupply point for enemy patrols operating in the sector bounded to the east and west by the Chicago, et. al. and Burlington Northern railroads, and to the south of Muck Creek. Forces on the site are of undetermined strength, though believed to be not greater than a fire team (4 -5 men). During the past 48 hours, there have been sporadic contacts between friendly patrols operating in the sector and vehicle (¼-ton) mounted insurgents, armed with automatic weapons; intelligence indicates that a convoy of undisclosed strength may be arriving at the logistics site within the next 12 hours. Of particular note, the enemy has employed nonpersistent chemical agents, identified by a yellowish smoke, and mortar fire to deny our forces approach to his strongholds.

"The company, as part of the battalion task force, is continuing its action against the aggressor in the forest areas north of Muck Creek. However, there will be no other friendly patrols operating in the area for the next 48 hours. No fire support is available.

"One medic will be attached to the squad and two cadremen from a newly formed regiment will accompany the squad as observers.

"The squad's mission is to conduct a raid on a suspected guerrilla logistics outpost, located in the vicinity of 39551200, NLT 1200 hours (today's date), secure the site, and be prepared to inderdict the enemy convoy moving to the site.

"The squad's present location is at (Day 1/Sequence - see above); movement boundries are the (Day 1 - Chicago RR to the east and swamp to the west/Sequence -road parallelling the swamp to the east and nonbroken N-S trail to the west). Recent rainfall has raised the water level of the swamps and streams in the area up to 8 feet in parts.

"The LD is 50 meters (Day 1 - north/Sequence - south) of the squad's present location.

"Each man will carry three C-rations and basic ammo load (as provided during resupply).

"All enemy contact will be reported in SPOT report format to the company CP (frequency: _____/call signal: _____); a SITREP will be submitted to the CP following the raid as soon as the site is secured.

"Time now is _____."

3. First Requirement:

Actions and orders of leaders. Movement across the line of departure.

4. Subsequent Situations:

a. Second Situation - The squad moves across the line of departure. At 400 to 600 meters from the start point, squad encounters chemically contaminated area/enemy chemical attack. Evaluator will fire two yellow smoke grenades in the vicinity of the squad to simulate the chemical environment.

b. Second Requirement - Actions and orders of leaders. Reaction of the squad to chemical agent (all squad members mask within 9 seconds). Remain masked until "all clear" given, 50 meters.

c. Third Situation - Squad is hit with enemy mortar fire, vicinity (Day 1 - 396107/Sequence - 403131). Evaluator fires three grenade/artillery simulators in the vicinity of the squad to simulate mortar fire.

d. Third Requirement - Actions and orders of leaders. Reaction of the squad to mortar fire. Change or maintenance of formation.

e. Fourth Situation - Squad moves into objective rallying point. Squad leader and selected personnel (assault/support element leaders) move to make reconnaissance of objective. Evaluator informs aggressors when squad arrives at ORP.

f. Fourth Requirement - Actions and orders of leaders. Actions of the squad at the ORP. Conduct of the leaders' reconnaissance.

g. Fifth Situation - Following leaders' recon, squad moves into assault position and conducts raid on objective site. Objective is captured.

h. Fifth Requirement - Actions and orders of leaders. Conduct of raid. Actions of squad during reorganization and consolidation.

i. Critique - Conducted by evaluator(s) IAW ARTEP check lists, off the objective site.

NOTE: Squad evaluator will be in radio contact with aggressor controller during conduct of exercise, directing aggressors to critical points of squad movement (e.g., in ORP/as noted in scenario, when squad is moving along/crossing roads in the sector).

Time Schedule (see Schedule Annex).

Scenario - Mission 2

1. Initial Situation:

Following critique of squad (Mission 1), evaluator issue new mission order to squad leader:

"Based on new information acquired by battalion intelligence units, a convoy of guerrilla vehicles (1/4-ton trucks) of undetermined strength, though suspected NMT 3, will be moving from the north to pick up/resupply from the just raided logistics outpost NLT 1600 hours (today's date). As in previous situation, enemy is expected to be armed with small arms and possibly vehicle-mounted automatic weapons.

"The squad's mission is to set up a roadblock and conduct a vehicular ambush to the north along the road between 39301290 - 39401280 to interdict guerrilla convoy/vehicle movement NLT 1600 hours (today's date); be prepared to maintain roadblock until further orders. Materials for construction of the roadblock and ambush are to be salvaged from the logistics outpost as no resupply is available. Any hasty minefields will be marked/recorded; hasty fighting positions, to include forward security, are to be camouflaged.

"Logistics and communications structures are unchanged from initial situations. Water should be available at the logistics outpost. Time now is _____."

2. First Requirement: Actions and orders of leaders. Ambush site security. Preparation of roadblock (IAW FM 7-8, see except). Preparation of ambush positions.

3. Subsequent Situations:

a. Second Situation - At 1600, evaluator alerts aggressors at TOC to proceed down N-S road from north until contact is made with the roadblock. Ambush is initiated on prearranged signal by SL and vehicle is neutralized in kill zone. Site is searched following ambush, with security maintained.

b. Second Requirement - Actions and orders of leaders. Conduct of ambush. Search of ambush site and SITREP to company CP (TOC).

c. Critique conducted by evaluator(s) IAW ARTEP check lists, off the objective site.

4. Time Schedule (see Schedule Annex).

Scenario - Mission 3:

1. Initial Situation:

Following critique of squad (Mission 2), evaluator issues new mission order to squad leader:

"Two days ago, patrols moving near the battalion's operational boundaries reported an unusual amount of cross-border activity to the southeast. During the same period, intelligence monitoring stations have picked up a series of burst transmissions and moderate amount of electromagnetic static; outlying radio nets have reported EW jamming and transmissions interdiction. Observation helicopter overflight earlier today has confirmed the presence of a structure surrounded by what looked like short range antennas, located vic. of 39900890 (site of old, now nonexistent radio towers). Limited activity around the site indicates a small guerrilla contingent, basically serving as on-site security, in addition to one or two signal equipment operators. Since the location is across the border, the guerrillas do not anticipate any US action against their sanctuary. For the same reason, it is unlikely that chemical agents will be employed south of the Chicago, et. al. railroad line. Enemy weapons will probably be small arms and possibly a vehicle mounted automatic weapon, used by guerrillas to maintain security near the border.

"The squad's mission is to conduct a point reconnaissance of the suspected transmitting station at 39900890 and provide an intel report to the battalion through the Company CP NLT 2130 hours (today's date). Following battalion's estimate of the situation, be prepared to neutralize the on-site force, preferably obtaining POWs for interrogation, and destroy the station.

"Same logistics/communication structure, with no supporting fires; insure all squad members are topped off on water prior to departure. Pick up demolitions from the guerrilla logistics outpost raided earlier today. Movement boundaries will be the swamp to the west and road immediately south of the objective to the south. Again, be cautious in route selection in the vicinity of the swamp.

"The LD is is 50 meters south of our present location. Time now is _____."

2. First Requirement: Actions and orders of leaders, movement across the line of departure.

3. Subsequent Situations:

a. Second Situation - The squad moves across the line of departure. Squad movement will be cross-country, avoiding roads/trails. Evaluators will maintain contact with aggressor controller, alerting aggressors when squad is moving along/crossing roads in the sector. At vicinity 399103, the squad will encounter a contaminated area/enemy chemical attack. Evaluator fires two yellow smoke grenades to simulate the chemical environment.

b. Second Requirement - Actions and orders of leaders. Reaction of the squad to chemical agent. "All clear" given by evaluator after 50 meters.

c. Third Situation - Squad moves into objective rallying point. Evaluator will alert the aggressors when the squad crosses E-W road 095. Squad conducts reconnaissance of the objective without being compromised, returns to ORP within the designated time, and submits intel report to CP.

d. Third Requirement - Actions and orders of leaders. Actions of the squad at the ORP. Conduct of reconnaissance. Squad debriefing and content of intel report submitted to the CP.

e. Fourth Situation - CP (TOC) or evaluator informs squad that battalion orders squad to neutralize on site personnel (attack or, preferably, capture as POWs) and destroy station with demolitions NLT 2230 hours (today's date). Evaluator will use simulators for demo designation. No physical contact with aggressors.

f. Fourth Requirement - Actions and orders of leaders. Conduct of assault/capture of enemy personnel. Demolition of radio station. Actions of squad during reorganization and consolidation.

g. Critique - conducted by evaluator(s) IAW ARTEP check list, off objective site.

NOTE: POWs, if captured, will be released at time of squad critique (after processing and SITREP to TOC).

A 5-gallon water can will be on the site for squad members.

5. Time Schedule (see Schedule Annex).

Scenario - Mission 4:

1. Initial Situation: Following squad critique (Mission 3), evaluator issues following mission order:

"With enemy contact imminent following the last action, the squad's mission is to move tactically and establish a clandestine patrol base vic. 38901045; patrol base to be established NLT 0045, with 100% alert until 0100 hours (today's date). No changes to either the enemy or friendly situations."

2. First Requirement: Actions and orders of leaders. Squad establishes clandestine patrol base, 100% alert/security until 0100 hours.

NOTE: At 0100 hours, all squad members go to sleep.

- Stand to at 0500 hours, squad instructed to move to 38500950 road intersection and secure site for resupply/evaluator changeover. Squad will be at site NLT 0600 hours; travel along roads/trails is authorized, though in tactical formation.

- At resupply site, evaluator will critique squad on movement and occupation of the patrol base; evaluator will insure all data forms (ARTEP evaluation sheets) are completed and physiological tapes collected before changing over with new evaluator team. Evaluators will bring AREA I books and tapes back with them to the TOC, in addition to all special equipment (i.e., radio).

3. Time Schedule (see Schedule Annex).

AREA I

Aggressor Scenario - Mission I

- a. Personnel - 5 EM Aggressors (E-1 thru E-4), 1 Aggressor Controller (E-6/E-5).
- b. Uniform and Identification - (see annex).
- c. Equipment: $\frac{1}{4}$ -ton with M-60.

(On objective site, 39551200):

Simulated demolitions
5-gallon water cans
Camouflage net
Field table with chairs
Four ammunition boxes (mortar) covered by tarp
Training claymore mines
Training LAWS
Training AT/personnel mines
Two motorola radios
CEOI
Time schedule
Concertina wire
Trip flares
Grenade/artillery simulators
Smoke grenades
Sandbags

- d. Duties and Conduct: (see Scenario, Mission 1).

(1) Aggressors will move from bivouac site (if one other than the objective site) to log base by vehicle; vehicle will receive day's supplies from TOC (proceed to TOC NLT 0600). Three aggressors will set up objective site by covering avenues of approach and perimeter with concertina wire and trip flare devices. The aggressors plus controller will remain on the site without patrolling the vicinity; enemy contact is not to be expected.

(2) Two aggressors in $\frac{1}{4}$ -ton truck with mounted M-60 machine gun will patrol the trails in the sector (see map). Evaluator will notify aggressors when the squad is moving along/crossing trails. If the squad is spotted, contact may be initiated by the aggressors, though of "hit and run" intensity (e.g., do not fix squad down in position but use harrassing fire).

(3) Squad evaluator will alert aggressors when the squad occupies the OP. From that time, the on-site personnel will be alerted for squad movement during the leaders' recon (engage squad if detected) and the $\frac{1}{4}$ -ton truck with two aggressors will move to the TOC area until further orders.

(4) During the squad raid, two aggressors plus aggressor controller will be "killed" by squad fire and one aggressor will be "wounded." Aggressors will be unsuspecting of the raid (unless squad compromises itself moving into its attack position) and will not engage in exchange of fire with the squad. Once the squad has secured the objective site, it will search the site and aggressor personnel (see annex concerning procedures). The "wounded" aggressor will be treated and processed as a wounded POW.

Aggressor Scenario - Mission 2

- a. Personnel - (as per Mission 1).
- b. Uniform and Identification - (see annex).
- c. Equipment: $\frac{1}{4}$ -ton truck with M-60 motorola radio
(additional equipment, as required by squad, from list in Mission 1).
- d. Duties and Conduct: (see Scenario, Mission 2).

(1) Squad will use materials from the Mission 1 objective site (e.g., concertina wire, training mines/LAWs) for construction of roadblock and setup of vehicular ambush. Water resupply for the squad will be provided by the 5-gallon water cans. Aggressors will move off the site during the squad's Mission 1 critique but will not reestablish the objective site until the conclusion of Mission 2.

(2) When notified by the squad evaluator/TOC, the aggressor vehicle will move from the TOC down N-S trail to Mission 1 site (see map for route). Vehicle will encounter roadblock, stop, and attempt to go around it. Aggressors in vehicle will not suspect presence of or attempt to engage squad unless ambush site is clearly compromised before vehicle hits roadblock.

(3) When vehicle stops at roadblock, squad will initiate ambush, "killing" both aggressors. Site will be searched (see Procedures Annex) and squad will move off for its critique. When squad departs for its next mission, aggressors will move from Mission 1 site, recover equipment from ambush site, and reconstruct log outpost. Once roadblock is dismantled and site reconstructed, three aggressors will return to the bivouac site (if one other than log base vicinity).

(4) $\frac{1}{4}$ -ton vehicle, two aggressors, plus aggressor controller will proceed to Mission 3.

Aggressor Scenario - Mission 3

a. Personnel - 2 EM Aggressors, 1 Aggressor Controller (ranks as per Mission 1).

b. Uniform and Identification - (see annex).

c. Equipment: ¼-ton truck with M-60
5-gallon water can
Concertina wire
Flashlights
Training demo blocks, det cord, M-60 firing mechanism
(with squad)

d. Duties and Conduct: (see Scenario, Mission 3).

(1) Squad evaluator will inform aggressor controller when squad is crossing/moving along roads/trails in the sector (especially Chicago, et. al. railroad, E-W road 095, N-S road/trail 400). Vehicle with three aggressors (including controller) will patrol all trails in the sector, especially in areas of squad movement, and engage squad when detected.

(2) When squad crosses E-W road 095, evaluator will notify aggressor controller, who will move with the vehicle to Mission 3 objective (radio station building). Aggressors will set up fire and prepare activity around site/in building. A strand of concertina will be brought by vehicle.

(3) During the squad's reconnaissance of the objective, the aggressors will not patrol around the site nor suspect squad activity but may engage the squad if it is clearly compromised.

(4) Upon completion of recon, squad will neutralize aggressors at objective, by either capture or raid (option with the SL). Aggressors will not engage in physical (i.e., hand to hand) combat with squad members but may return fire if undetected (e.g., within the building) during the squad's assault. Simulators will not be used by the aggressors. When attack is completed, all aggressors will be either "killed" or captured (for processing as POWs).

(5) Following neutralization of aggressors, squad will plant training demolitions at the "radio station"; squad evaluators will use grenade/artillery simulators to designate actual demolitions. Once squad moves off site for critique, all training devices and wire will be recovered by the aggressors, who will return to the Mission 1 site/bivouac area (as designated).

NOTE: Stand - to for all aggressors at 0530 hours; pick up rations/supplies from TOC, and set up Mission 1 site.

AREA II

Scenario - Mission 1

1. General Situation (To Be Provided)
2. Initial Situation:

When squad arrives at resupply point (Day 1 - 39000955/Sequence - 38500950), evaluators change over; squad receives/distributes chow and ammo (see Logistics Annex); squad continues to secure site tactically; chief evaluator issues following order to squad leader:

"Intelligence reports submitted by patrols operating in the sector between the Burlington Northern Railroad to the west and Muck Creek swamps to the east and south indicate the presence of small unit guerrilla outposts and infiltration of guerrilla patrols from the north. With the battalion task force having secured the area to the east (bordered by the Chicago, et al Railroad), confirmation is required of enemy presence in the Bower Woods sector and identification of units and weapons. For the battalion to extend its operations west of the Muck Creek swamps, enemy concentrations need to be fixed so that coordinated attack may be conducted against those forces. On the basis of previous patrol reports, guerrillas are equipped with small arms and one or two vehicle-mounted automatic weapons. The enemy has a tendency to hold to high ground and uses the roads/trails in the sector extensively. There have been no reports of use of chemical agents.

"The company, as part of the battalion task force, is continuing operations west of the Muck Creek swamps. However, there will be no other friendly patrols operating in the area for the next 36 hours. No organic fire support is available.

"One medic will be attached to the squad and two cadremen from a newly formed regiment will accompany the squad as observers.

"The squad's mission is to conduct an area reconnaissance of Bower Woods, bounded by Eastman/Folsom Hills to the north, the Burlington Northern railroad to the west, E-W trail 103 to the south, and N-S road 377 to the east, and locate any enemy activity/concentrations NLT 1100 hours (today's date); be prepared to conduct offensive operations against enemy small units on order from the company CP. The squad's present location is at (Day 1/Sequence - see above); movement boundaries are the same as for the reconnaissance. Recent rainfall has raised the water level of the Muck Creek swamps; these should, therefore, be avoided (tactically cross at prepared points (e.g., roads)).

"The LD is 50 meters west of the squad's present location.

"Each man will carry three C-rations and basic ammo load (as provided during resupply).

"All enemy contact will be reported in SPOT report format to the company CP (frequency: _____/call signs: _____); a SITREP will be submitted to the CP at the completion of the area reconnaissance.

"Time now is _____."

3. First Requirement:

Actions and orders of leaders. Movement across the line of departure.

NOTE: Squad evaluator will maintain radio contact with aggressor controller, alerting aggressors when squad moves across N-S road 377.

4. Subsequent Situations:

a. Second Situation - The squad moves across the line of departure. Squad establishes ORP at direction of SL and conducts area reconnaissance of Bower Woods area. Squad locates presence of guerrilla outpost at vic 37251075 (base of Folsom Hill).

b. Second Requirement - Actions and orders of leaders. Security of ORP. Conduct and debriefing of area reconnaissance within designated time frame. SITREP submitted to CP/TOC.

c. Third Situation - Following debriefing of reconnaissance, POC/evaluator will inform squad leader that squad is to establish personnel ambush against fire team-size enemy unit along road/trail, 36401040 - 36701020, NLT 1230 hours (today's date), direction of movement unknown.

d. Third Requirement - Actions and orders of leaders. Establishment and security of ambush site.

e. Fourth Situation - On signal from the squad evaluator (1230 hours/when ambush in position), four aggressors will move west along E-W trail 103. Ambush will be initiated on signal from the SL. Three aggressors will be "killed" and one "wounded."

f. Fourth Requirement - Actions and orders of leaders. Conduct ambush. Search site and reorganize squad on ambush site. Process wounded POW. SITREP to TOC/CP, requesting evacuation for POW.

NOTE: Following request for evacuation of POW (by squad) and on signal from squad evaluator to aggressor controller, a ¼-ton vehicle with two aggressors will proceed west on E-W trail 103 to ambush site. Aggressor uniforms will be modified for partisans. Materials required for construction involved in Mission 2 and water will be within the vehicle. Materials will be off-loaded following the critique.

g. Critique - conducted by evaluator(s) IAW ARTEP check lists, off the objective site.

5. Time Schedule (see schedule annex).

Scenario - Mission 2

1. Initial Situation:

Following critique of squad (Mission 1), evaluators issue new mission order to squad leader:

"Company operations in the sector west of the Muck Creek swamps have pressed enemy forces to the western border, near Burlington Northern Railroad. Intelligence reports indicate that the guerrillas may be attempting a break-through to the east or infiltration in a small group through our FEBA towards the Muck Creek swamps and to the north. Friendly forces remain the same with company positions along the western edge of Bower Woods.

"The squad's mission is to prepare a defensive position to the west on Eastman Hill to hold the high ground against potential enemy attack NLT 2000 hours (today's date); on order, be prepared to withdraw to prepared position on Folsom Hill.

"Materials for construction of positions are being provided by partisans who are picking up the POW wounded in the ambush. Positions should be prepared with overhead cover; a squad sector sketch will be delivered to the company CP (to evaluator) NLT 1800 hours to include sectors of fire, location of LP/OP, and location of supplementary/alternate positions (dug in without overhead cover). Folsom Hill positions will be without overhead cover. Your squad has been given four targets (81mm mortar), to include an FPF; these will be plotted and sent up to the CP (TOC, with copy to evaluator), encoded (CEOI), NLT 1830 hours. All positions must be camouflaged. Patrols may be sent out as designated by the SL. Enemy activity in the area requires that security be maintained during the construction of positions against enemy snipers and harassing mortar fire.

"Communications with the CP will be by radio, same frequency and call signs.

"Again, defense must be in place NLT 2000 hours.

"Time is now _____."

2. First Requirement: Actions and orders of leaders. Preparation of defensive position IAW FM 7-8.

3. Subsequent Situations:

a. Second Situation - Between 1500 and 1900 hours, evaluator will contact aggressor controller for aggressors to initiate sniper fire (two times).

b. Second Requirement - Actions and orders of leaders. Squad reaction to sniper fire (pursuit of sniper further than 200 meters from defensive positions not authorized). Short range patrols dispatched by SL.

c. Third Situation - Between 1500 and 1900 hours, evaluator will fire three grenades/artillery simulators (two times) to simulate enemy mortar fire in vicinity of squad defensive positions.

d. Third Requirement - Actions and orders of leaders. Reaction of squad to mortar fire.

e. Fourth Situation - At 2040 hours, evaluators will alert aggressors to begin illumination; at 2100 hours, evaluator will alert aggressors to conduct initial attack against squad defensive positions from west (illuminated night attack). Aggressors will break contact in 15 - 20 minutes and fall back.

f. Fourth Requirement - Actions and orders of leaders. Conduct of defense.

g. Fifth Situation - At 2200, aggressors reattack defensive positions from N-NW for 15 - 20 minutes; aggressors will break contact and fall back but maintain illumination.

h. Fifth Requirement - Actions and orders of leaders. Conduct of defense. On order from evaluator during aggressor attack, begin withdrawal to positions on Folsom Hill. Continue withdrawal following attack but maintain minimum force on Eastman Hill.

i. Sixth Situation - At 2230, aggressors reattack Eastman Hill positions from west, closing in to occupy positions.

j. Sixth Requirement - Actions and orders of leaders. Withdrawal of all squad personnel to positions on Folsom Hill, maintaining contact against aggressors on Eastman Hill.

k. Seventh Situation - At 2330 hours, aggressors move against Folsom Hill positions in an illuminated night attack; break contact after 15 - 20 minutes.

l. Seventh Requirement - Actions and orders of leaders. Conduct of defense.

m. Critique - Conducted by evaluator(s) at 2400 hours (after final attack by aggressors) at Folsom Hill site IAW ARTEP check lists.

NOTE: After critique, squad members will move administratively to fill in positions on Eastman Hill/clean site. Down (sleep) time for squad will begin at 0100 in Folsom Hill positions.

.. Time Schedule (see Schedule Annex):

NOTE: Stand-to at 0500 hours; squad fills in positions on Folsom Hill, recovers any special equipment/early warning devices. Squad then moves to road intersection at 37651040 for resupply/evaluator changeover. Squad will be on site NLT 0600 hours; travel along roads/trails is authorized, though in tactical formation.

At resupply site, evaluators will conduct final squad critique, and insure that all data forms (ARTEP evaluation sheets) are completed and physiological tapes collected before changing over with new evaluator team. Evaluators will bring book and tapes back with them to the TOC, in addition to all special equipment (i.e., radio). All construction materials from Area II mission will be recovered by TOC vehicle.

AREA II

Aggressor Scenario - Mission 1

- a. 5 EM Aggressors (E-1 thru E-4), 1 Aggressor Controller (E-6/E-5).
- b. Uniform and Identification (see annex).
- c. Equipment:
 - 1/4-ton truck with M-60
 - 5-gallon water cans
 - Grenade/artillery simulators
 - Concertina wire
 - Smoke grenades
 - 2 Motorola radios
 - Pioneer tools (OVM)
 - Trip flares
 - TA-312 with wire
 - Sandbags
- d. Duties and Conduct: (see Scenario, Mission 1).

(1) Two aggressors will move by vehicle from bivouac site (363099) to TOC to pick up day's supplies NLT 0600 hours. Three aggressors will set up a patrol base at vicinity 37251075 (base of Folsom Hill) and prepare an on-site fire NLT 0700 hours. The 1/4-ton vehicle with three aggressors will patrol N-S road 377; controller will be notified by squad evaluator when patrol crosses road 377. If squad is spotted, contact ("hit and run") may be initiated by the aggressors.

(2) At the patrol base site, aggressors will not be anticipating the squad and will not patrol the area. If squad compromises itself during the reconnaissance, aggressors will engage squad, break contact, and move to trail at 377107. Vehicle with three aggressors will be at the trail intersection after evaluator confirms that patrol has crossed N-S road 377; equipment for Mission 2 (above) will be procured from the TOC at this time (if not done earlier). When evaluator informs aggressors that the area recon has been completed, all aggressors will link up at 377107 and proceed to intersection of E-W trail 103.

(3) At approximately 1200 hours, when notified by squad evaluator, four aggressors will move on foot west along E-W trail 103 and into ambush site. If squad's positions are clearly compromised before ambush is triggered, aggressors may engage the squad. When ambush is initiated, with aggressors in kill zone, three aggressors will be "killed" and one aggressor "wounded." Squad will search site and aggressor personnel (see annex concerning procedures). The "wounded" aggressor will be treated and processed as POW. When squad calls in request for POW evacuation, controller will give signal to two aggressors in vehicle, who will proceed west along E-W trail 103 to ambush site; the two aggressors will be in "partisan" uniform (see annex). At the site, the construction materials (for Mission 2) and water will be picked up by the squad, and aggressors will be loaded onto vehicle. Vehicle will then proceed to end of E-W trail 103 and to bivouac site; await evaluator/controller instructions.

Aggressor Scenario - Mission 2

- a. Personnel (as per Mission 1).
- b. Uniform and Identification (see annex).
- c. Equipment: (as for Mission 1).

plus - Smoke grenades
White star clusters
Parachute flares

- d. Duties and Conduct: (see Scenario, Mission 2).

(1) When directed by squad evaluator (approximately 1500 hours), aggressors will move with vehicle to 36351110 (near railroad) to attack position against squad. Aggressors will stay concealed from squad patrols/observation. When signaled by evaluator (twice between 1500 and 1900 hours), two aggressors will move not closer than 150 meters from squad defensive position (36951105 - Eastman Hill). Staying concealed, one aggressor will fire not more than four rounds at 10-second intervals to simulate sniper fire. Both aggressors will return to aggressor attack location following each engagement; snipers will take precautions against capture/observation by squad.

(2) Starting at 2040, when signaled by squad evaluator, aggressors will begin illumination towards Eastman Hill, firing one white star cluster/flare at 5-minute intervals.

(3) When notified by evaluator (approximately 2100 hours), aggressors will move in illuminated dismounted attack against squad defensive positions on Eastman Hill. Vehicle with M-60 will move up as support element. Aggressors will attack using smoke, flares, and simulators, not closing with squad positions closer than 50 meters. After 15 - 20 minutes of contact, aggressors will break contact and move back to attack position; signal will be prearranged by aggressor controller (i.e., green star cluster).

(4) Aggressors will reattack squad positions from North - Northwest on evaluator's signal (approximately 2200 hours) in same manner as initial attack, closing to within 25 meters of squad positions and breaking contact after 15 - 20 minutes of engagement. Aggressors will fall back to initial assault position. Illumination will be maintained at 5-minute intervals between the attacks.

(5) Aggressors will conduct a final attack against Eastman Hill positions on evaluator's signal (approximately 2230 hours), moving in to occupy the positions. No physical contact will be made with squad personnel (squad will withdraw to Folsom Hill positions). Vehicle will move to hill crest with aggressors. Illumination will be maintained in direction of Folsom Hill at 10-minute intervals.

(6) On the evaluator's signal (approximately 2330 hours), aggressors will attack Folsom Hill positions with 4-ton and M-60 remaining on Eastman Hill. Aggressors will break contact with 15 - 20 minutes and, with vehicle, move back to assault position and bivouac site.

NOTE: Evaluator may request aggressor assistance in filling in/dismantling defensive positions. If requested, aggressors will remain on Eastman Hill and assist squad members in filling in positions NLT 0030 hours.

NOTE: Stand-to for aggressors is 0530 hours; proceed with schedule as outlined for Mission 1. All aggressor supplies will be located at TOC (including radios, which require changeover every 24 hours).

AREA III

Scenario - Mission 1

1. General Situation (To Be Provided).
2. Initial Situation:

When squad arrives at resupply point (Day 1 - 37650950/Sequence - 37651040), evaluators change over; squad receive/distributes chow and ammo (see Logistics Annex); squad continues to secure site tactically; chief evaluator issues following order to squad leader:

"As a consequence of intensive company operations in the southern sector (between Burlington Northern RR and Muck Creek swamps) during the past several days, guerrilla units have been withdrawing to the north. Contact made by friendly patrols in the north indicates that the insurgents are using ambushes, snipers, and nonpersistent chemical agents to cover their withdrawal routes, particularly along main avenues of approach (i.e., roads) to the north. With the battalion task force established along the southern boundaries and in control of the Bower Woods region, friendly forces are planning a thrust to the north in pursuit of insurgent forces and towards expansion of the battalion operational area. On the basis of previous encounters, guerrillas are known to be equipped with small arms and vehicle mounted automatic weapons. To avoid large unit concentrations, they are operating in small groups of fire team to squad size.

"One medic will be attached to the squad and two cadremen from a newly formed regiment will accompany the squad as observers. There will be no other friendly patrols operating in the area for the next 24 hours. No organic fire support is available.

"The squad's mission is to conduct a movement to contact along N-S road 377 as a forward element of the company task force until the intersection at 37701315 NLT 1100 hours (today's date); on order, be prepared to defend to the north.

"The squad's present location is at (Day 1/Sequence - as above).

"Movement boundaries are restricted to 50 meters on each side of the road. Recent rainfall has raised the water level of lakes and swamps in the sector; alternate routes to circumvent these areas should be selected.

"The LD is 50 meters north along N-S road 377 from the squad's present location.

"Each man will carry 3 C-rations and the issued ammo load (as provided during resupply).

"All enemy contact will be reported in SPOT report format to the company CP (frequency: _____, call signs: _____); a SITREP will be submitted to the CP upon arrival at 37701315.

"Time now is _____"

3. First Requirement:

Actions and orders of leaders. Movement across the line of departure.

4. Subsequent Situations:

a. Day 1 only -

Situation: Squad moves across the line of departure - Squad encounters chemically contaminated area at 37551000. Evaluator fires two yellow smoke grenades to simulate contaminated area.

Requirement: Actions and orders of leaders. Squad's reaction to chemical agent. No "all clear" given until second Day 1 situation.

Situation: Squad crosses contaminated area masked. Squad hit by enemy ambush from right side of road at 37701050. Evaluator alerts aggressors when squad is masked during preceding action. Aggressors break contact after NLT 5 seconds.

Requirement: Actions and orders of leaders. Squad reaction to enemy ambush.

(NOTE: Squad will not pursue aggressors beyond 50 meters. "All clear" given 50 meters north of ambush site.)

b. Second Situation (for Day 1 and Sequence) - Squad disengages from ambush/moves across the line of departure. Evaluator alerts aggressors as squad crosses Sequence LD. Squad hit by enemy ambush from left side of road at 37601185. Aggressors break contact after NLT 8 seconds. Two squad members are designated as wounded by the evaluator.

c. Second Requirement - Actions and orders of leaders. Squad reaction to enemy ambush.

(NOTE: Squad will not pursue aggressors beyond 50 meters.)

Treatment of wounded (to be carried on field expedient litters until 37701315).

d. Third Situation - Squad moves from ambush site with two litter - evacuated wounded. Squad encounters chemically contaminated area. Evaluator fires two yellow smoke grenades at 37701210 and aggressors fire smoke pot off side of road to indicate contaminated area.

e. Third Requirement - Actions and orders of leaders. Squad masks and negotiates contaminated area. Wounded squad members are assisted in masking within designated time frame (9 seconds). "All clear" given 100 meters north along road.

f. Fourth Situation - Squad receives "all clear" from evaluator and un.masks (100 meters from contaminated area). Squad is hit by sniper fire (6 shots, 10 seconds apart) at 37551355. Sniper is captured or/surrenders as a POW.

g. Fourth Requirement - Actions and orders of leaders. Squad reacts to sniper fire. Squad processes sniper as POW.

h. Fifth Situation - Squad reaches objective (37701315), secures site and requests evacuation of wounded and POW.

i. Fifth Requirement - Actions and orders of leaders. Squad consolidation and security of road intersection.

(NOTE: SPOT report must be called in to company CP/TOC following each contact with aggressors/NBC.)

j. Critique - conducted by evaluator(s) IAW ARTEP check list, at objective site.

5. Time schedule (see Schedule Annex)

Scenario - Mission 2

1. Initial Situation:

Following critique of the squad (Mission 1), evaluators dismiss POW aggressor and issue new mission order:

"Elements of the company task force have begun movement north along N-S road 377 from E-W road 095. The squad's mission is to secure Road 377 at this intersection to the north; specifically, to establish a hasty ambush to interdict the movement of any enemy reinforcements to the south. Probable enemy unit strength will not exceed a squad or 1 - 2 gun jeeps. The ambush must be in position NLT 1300 hours (today's date); it will remain in position until passage of lines is conducted by friendly units from the south or until time directed by CP. Communications and logistics structure same as for earlier mission. Time now is _____"

2. First Requirement: Actions and orders of leaders. Ambush site established, using available equipment NLT 1300 hours.

3. Subsequent Situations:

a. Second Situation - Evaluator alerts aggressor vehicle to proceed south along N-S road 377 at 1330 hours. Vehicle with two aggressors enters kill zone; ambush initiated by SL. Simulators are used to designate claymore/AP mines.

(NOTE: Water resupply will be in the aggressor vehicle.)

b. Second Requirement - Actions and orders of leaders. Conduct of ambush. Squad search of and reorganization on ambush site. SITREP to CP (TOC).

c. Critique - Conducted by evaluator(s) IAW ARTEP check lists, off objective site.

4. Time Schedule (see schedule annex).

Scenario - Mission 3

1. Initial Situation:

Following critique of the squad (Mission 2), evaluator(s) issue new mission order:

"Intelligence reports recently obtained from partisans operating northeast of the battalion's sector indicate a concentration of guerrilla forces in the woods bordered by swamps, vic. grid square 3813. This confirms aerial reconnaissance photos of base camps and fortified defensive positions, oriented southwest. Enemy vehicular patrols and use of nonpersistent chemical agent in the area point to the enemy's intention to create a blocking force against advancing friendly units.

"The squad's mission is to conduct an area reconnaissance of the woods in grid square 3813, with 100-meter boundaries outside the designated area, to locate and identify the presence and strength of any enemy outposts/defensive positions NLT 1900 hours (today's date). A detailed intelligence report is to be submitted to the company CP/TOC upon completion of the reconnaissance. On order, be prepared to conduct offensive operations against designated targets in the area.

The LD is 50 meters east of the squad's present location.
Logistics and communications structure remains unchanged.

Time now is _____"

2. First Requirement:

Actions and orders of leaders. Movement across the line of departure.

(NOTE: Squad evaluator will maintain contact with the aggressors, alerting vehicle-mounted patrol when squad is crossing the road in the sector.)

3. Subsequent Situations:

a. Second Situation - The squad moves across the line of departure. Squad establishes ORP at direction of the SL and conducts area reconnaissance of designated area. Squad locates presence of enemy outpost at 39001375 (hilltop) without compromising reconnaissance.

b. Second Requirement - Actions and orders of leaders. Security of ORP. Conduct and debriefing of area reconnaissance within designated time frame. Intel report submitted to CP/TOC.

c. Third Situation - Following debriefing of recon, TOC/evaluator will inform squad leader that squad is to conduct an attack on the enemy outpost at 39001375 NLT 2030 hours to seize and hold the outpost location and prepare against counterattack by enemy forces NLT 2130 hours. Squad will be informed to be prepared for use of chemical agents by enemy forces. Evaluator alerts aggressors when squad moves into attack position.

d. Third Requirement - Actions and orders of leaders. Squad attack of enemy outpost, under NBC conditions (masked). Squad secures and consolidates on aggressor positions, prepares to defend against enemy counterattacks.

e. Fourth Situation - Evaluator signals aggressors at 2200 hours to counter-attack squad position on hilltop. Aggressors break contact after 15 ~ 20 minutes.

f. Fourth Requirement - Actions and orders of leaders. Conduct of defense against counterattack. Reorganization of defense following contact.

g. Critique - Conducted by evaluator(s) IAW ARTEP check lists, on objective site.

5. Time schedule (see Schedule Annex).

Scenario - Mission 4

1. Initial Situation:

Following critique of the squad (Mission 2), evaluator(s) issues new mission order:

"Following the last contact with guerilla forces, a reinforced platoon is moving up to occupy your present defensive position. The squad's mission is to move to 38551440 to establish and occupy a clandestine patrol base NLT 0030 hours (today's date); the patrol base should be bordered by the swamp and include passive early warning devices oriented to the north. No enemy activity is expected in the area for the next 12 hours. However, an alternate patrol base site will be designated in case the main one is compromised. Time now is _____."

2. First Requirement: Actions and orders of leaders. Squad moves to and occupies clandestine patrol base. Squad informs TOC when in position at patrol base.

(NOTE: Squad will remain at 100% alert until 0100 hours, at which time all squad members will go to sleep.)

NOTE: Stand to at 0500 hours. Squad moves to resupply site at 38751470 to secure and occupy site NLT 0600 hours. Resupply will be conducted by means of partisan link-up; new evaluator will be in partisan uniform (see Uniform Annex), with challenge/password for new day from CEOI.

At resupply site, evaluators will conduct final squad critique and insure that all data forms (ARTEP evaluation sheets) are completed and physiological tapes collected before changing over with new evaluator team. Evaluators will bring Area III book and tapes back with them to TOC in addition to all special equipment (i.e., radio).

3. Time schedule (see Schedule Annex).

AREA III

Aggressor Scenario - Mission 1

a. Personnel - 5 EM Aggressors (E-1 thru E-4), 1 Aggressor Controller (E-6/E-5).

b. Uniforms and Identification - (see annex).

c. Equipment: 1/4-ton truck with M-60

Smoke grenades
Smoke pots
Grenade/artillery simulators
Trip flares
Two Motorola radios

d. Duties and Conduct: (See Scenario, Mission 1).

(1) Day 1 only: Aggressors will move from bivouac site (379141) to set up ambush site at 37701050, right side of N-S road 377. Aggressors will have all supplies and equipment issued day prior. Vehicle with one aggressor will remain at 379011070 at intersection of trails to rear of road 377. Ambush site will be set up with trip wires connected to simulators 15 meters off far side of the road. Squad evaluator will alert aggressor when patrol crosses the LD. Ambush will be initiated from concealed position when squad enters kill zone; contact will break after 5 seconds. Aggressors will move to vehicle and proceed off N-S road 377 to second objective.

(2) (Both Day 1 and Sequence): Aggressors will move to set up ambush site at 37601185 on right side of the road; vehicle will pick up day's supplies/equipment from TOC NLT 0600; ambush site will be set up as above (1) NLT 0645 hours. Ambush will be coordinated and conducted as above, except will be NMT 8 seconds in duration. Also, evaluator will notify aggressors when squad passes trail at 378110. At conclusion of ambush, aggressors will move off road with smoke pots to 37701210 to set up NBC site. One aggressor in vehicle (with radio) will move up road to TOC after employing initial ambush site. One aggressor (sniper) will move from ambush site to 37551355 (sniper position). Sniper aggressor should preferably speak a language other than English.

(3) At 37701210, four aggressors will emplace two smoke pots on right side of road. Smoke pots will be lit when squad is 20 meters off. Evaluator will also fire two yellow smoke grenades to simulate a contaminated area. When squad passes contaminated area, aggressors will remain off the road and move toward intersection at 37701315; aggressors will remain concealed until Mission 1 is completed and will not engage squad.

(4) Sniper will find a concealed position on left side of road at 37551355. Squad will be engaged at 20 meters out. Sniper will fire six shots

at 10-second intervals. If not located by squad, sniper will surrender for processing as a POW. Sniper should preferably not speak English during processing by squad. Sniper will then accompany squad to 37701315.

Aggressor Scenario - Mission 2

- a. Personnel - (as per Mission 1).
- b. Uniforms and Identification - (see annex).
- c. Equipment: 1/4-ton truck with M-60

Motorola radio
5-gallon water can

- d. Duties and Conduct: (See Scenario, Mission 2.)

(1) On signal from squad evaluator (approximately 1330 hours), aggressor in vehicle will proceed south along N-S road 377 until hit by squad ambush at 37701315. Aggressor will stop vehicle and be "killed." When ambush is completed, squad will receive and search the objective site and aggressor (see annex concerning procedures). Water resupply will be available for squad personnel in the vehicle (5-gallon cans).

(2) During the squad critique off the objective, all aggressors and controller will consolidate on the ambush site, return to TOC to pick up materials for Mission 3, and proceed to set up Mission 3 site (39001375).

Aggressor Scenario - Mission 3

- a. Personnel - (as per Mission 1).
- b. Uniform and Identification - (see annex).
- c. Equipment: (as per Mission 1) plus -

- Concertina wire
- Camouflage net
- Sandbags
- Pioneer tools (OVM)
- 5-gallon water cans
- Flashlights
- White star clusters/parachute flares

- d. Duties and Conduct: (See Scenario, Mission 3.)

(1) Aggressors will move with above equipment to hilltop at 39001375 to establish outpost position. Position will be constructed as follows: Three foxholes, camouflage net over site, sandbagged fighting positions, early warning devices (i.e., flares, simulators)/smoke pots emplaced forward of positions. Outpost will be oriented west/southwest. Four aggressors will prepare site and occupy position.

(2) Two aggressors with vehicle (and radio) will move to patrol N-S trail in sector. Squad evaluator will notify aggressors when squad is crossing the trail. Squad should not be "hunted" but may be engaged if its movement is clearly compromised. Squad ORP may be set up west of the road, in which case the vehicle will continue patrolling the road until evaluator alerts that the patrol has returned to ORP for recon debriefing. Aggressors will remain on road until squad crosses it in its movement to the attack position. At this time vehicle will move to the outpost position; one aggressor will move to foxhole positions, vehicle will remain on trail to east of hilltop or (at controller's discretion) occupy position near the outpost to cover site with automatic fire.

(3) During the squad's recon, aggressors at the outpost positions will be alert for squad movement but will not patrol around site. Aggressors may engage squad members if recon is clearly compromised.

(4) At approximately 1930 hours, squad evaluator will alert aggressors that squad is moving into attack position. Aggressors will occupy outpost fighting positions and be alert for squad attack. During the attack (approximately 2030 hours), aggressors will utilize smoke pots/yellow smoke (simulate chemical agents) forward of the positions and maintain contact for 15 - 20 minutes before withdrawing from positions to road (east of outpost). Aggressors will not engage in physical combat (i.e., hand-to-hand) with squad members. Use of thrown simulators will be controlled by aggressor controller. Once consolidated on the road, aggressors will maintain concealed position.

(5) At approximately 2200 hours, on signal from the squad evaluator, the aggressors will counterattack the outpost, now occupied by the squad, in an illuminated night attack. Counterattack will be of mid-intensity, with contact broken after NMT 15 - 20 minutes. Aggressors will move off the road until the squad has departed for its next mission. Aggressors will then recover equipment (i.e., water cans, camouflage net) off the site before returning to the bivouac area.

NOTE: Stand-to for all aggressors at 0530; pick up rations/supplies from TOC, and proceed with Mission 1.

AREA IV

Scenario - Mission 1

1. General Situation (To Be Provided).
2. Initial Situation:

When squad arrives at resupply point (Day 1 - 38801510/Sequence - 38751470), squad conducts partisan link-up with new evaluator team for resupplies (CEOI for challenge/personnel, current day), continues to secure site tactically; evaluators change over; squad receives/distributes chow and ammo (see Logistics Annex); chief evaluator issues following order to squad leader:

"Several days ago, a reconnaissance aircraft flying east of the border (east of swamps) was shot down near the Chicago, et al Railroad. Indications are that the action was conducted by one of several cross border enemy strongholds equipped with Soviet ADA weapons. Intelligence reports received yesterday from partisans operating in that area have identified the aircraft's pilot, wounded and presently held captive by guerrillas at a secure base camp located in the vicinity of 42101340. On board the aircraft was a highly sensitive, classified electronics system known as a "black box", steel construction, with dimensions of a large ammo can. Having searched the aircraft wreckage, partisans have confirmed that the black box has been recovered by the guerrillas, though its significance has probably not yet been determined. At the camp, guerrilla forces number in fire team size, equipped with small arms and vehicle-mounted automatic weapons. Approaches to the site are probably mined or booby-trapped.

"Friendly forces are continuing operation in the western sector, vicinity Creek Hill. There will be no friendly patrols operating in the area for the next 36 hours. No organic fire support is available. One medic will be attached to the squad and two cadremen from a newly formed regiment will accompany the squad as observers.

"The squad's mission is to conduct a raid on the guerrilla patrol base at 42101340, rescue the captured pilot and recover the electronics system ("black box") NLT 1400 hours (today's date). Upon completion of mission, the squad will move to 41601380 to conduct a link-up with partisan forces for the evacuation of the pilot and equipment. On order, move back to friendly lines to link up with battalion units.

"The squad's present location is at (Day 1/Sequence - as above).

"Movement boundries are the Chicago, et al Railroad to the east and grid line 13 to the south. Recent rainfall has raised the water level of lakes and swamps in the sector; passage points and alternate routes for crossing swamps should be selected.

"The LD is 50 meters east of the squad's present location.

"Each man will carry 3 C-rations and the issued ammo load (as provided during resupply).

"All enemy contact will be reported in SPOT report format to the company CP (frequency: _____, call signs: _____); challenge and password for the partisan linkup will be current from the CEOI; a SITREP will be submitted to the CP following linkup with partisan forces.

"Time now is _____."

3. First Requirement: Actions and orders of leaders. Squad crosses line of departure. Squad moves into ORP; leaders' reconnaissance conducted. Squad raids aggressor base, rescues pilot and retrieves "black box."

NOTE: During squad's movement to the objective, especially at landing strip site and crossing N-S road 4075, evaluator will be in contact with aggressor controller to alert aggressors about squad movement across these areas.

*Evaluator will inform aggressors when squad moves into ORP.

4. Subsequent Situations:

a. Second Situation - Squad consolidates on raid objective. Squad moves with pilot and wounded POW (on field expedient stretchers), and "black box", to link-up with partisan at 41601380 for evacuation of both. Squad conducts linkup.

b. Second Requirement - Actions and orders of leaders. Link up with partisans.

c. Critique - for raid, conducted by evaluator(s) using ARTEP check lists, off linkup site.

5. Time schedule (see Schedule Annex).

Scenario - Mission 2

1. Initial Situation:

Following critique of the squad (Mission 1), evaluators issue new mission order to the squad leader:

"Over the past 2 days, the battalion task force has been conducting operations against guerrilla strongholds east of Cheek Hill. Intelligence reports received during the past 12 hours indicate a large buildup of enemy forces in the northeast, vic Spanaway Lake, composed of both guerrilla and conventional units. Movement of this force southwest, as either reinforcements for the guerrillas or as a second front, will allow for reconsolidation of the presently dispersed and defending guerrilla units. At 0530 hours (tomorrow's date), a company size blocking force will be inserted by helicopter at 403139 (landing strip) to interdict the enemy force. Recent enemy activity in the vicinity of the landing strip has been restricted to small unit vehicle-mounted patrols, snipers, and 60 mm mortar fire.

"The squad's mission is, as part of a reinforced platoon, to secure and hold the landing strip (39901425 - 40451360) from NLT 2045 hours (today's date) until the airmobile at 0530 hours (tomorrow's date). The squad will secure the northwest approaches to the landing strip from 39901425 to 39951395.

"Primary positions will be prepared to cover avenues of approach from the north and west, with alternate positions covering approaches from the east (top of landing strip); a squad sector sketch will be prepared NLT 1800 hours. Your squad has been given six targets (81 mm mortar), to include an FPF; these will be plotted and sent up to the CP (TOC, with copy to evaluator), encoded (CEOI) NLT 1830 hours. All positions will be no closer than 20 meters from landing strip and will be camouflaged. Early warning devices should be prepared as the squad will be spread thin in the area to be covered. Patrols may be sent out as designated by the SL. The enemy activity in the area requires that security be maintained during construction of the defense. Should the guerrillas anticipate the arrival of the blocking force, all attempts will be made to either seize or destroy the landing strip.

"Communications and logistics structure remain the same.

"Time now is _____."

2. First Requirement: Actions and orders of leaders. Movement to the objective. Security of objective site. Preparation of defensive position IAW FM 7-8.

3. Subsequent Situations:

a. Second Situation: During preparation of positions, squad reacts to harassing sniper and mortar fire. Evaluator alerts aggressors at two intervals (approximately 1 hour apart) to provide sniper fire. Mortar fire is simulated by evaluator firing grenade/artillery simulators vicinity squad's positions, at evaluator's discretion but not more than two times until 2045 hours.

b. Second Requirement: Actions and orders of leaders. Squad security during defense preparation. Squad reaction to sniper/mortar fire.

c. Third Situation - At 2100 hours, evaluator will alert aggressors to begin illumination of the landing strip site at 10-minute intervals. Evaluator may use grenade simulators once between 2100 and 2130 hours to simulate mortar fire. At 2130, evaluator will alert aggressors to conduct attack against landing strip from northwest avenues of approach (trails); aggressors will break contact after 10 - 15 minutes. Squad will not pursue aggressors, who will close to within 50 meters of the positions. All attacks will be under illumination.

d. Third Requirement - Actions and orders of leaders. Conduct of defense. Reorganization following attack.

e. Fourth Situation - Aggressors will maintain illumination and simulator fire in 10 - 15-minute intervals. Evaluator will alert aggressors to attack at 2300 hours, conducting illuminated attack from N-S trail 398; aggressor vehicle will enter landing strip from east (E-W trail 143) and proceed south on landing strip. Vehicle will turn around and attack positions from rear. Contact will continue for 30 minutes; no physical combat (i.e., hand-to-hand) between aggressors and squad. Aggressors will not overrun positions.

f. Fourth Requirement - Actions and orders of leaders. Conduct of defense. Reorganization following enemy attack.

g. Critique - Evaluator(s) will conduct critique IAW ARTEP requirements sheets. Following critique, all positions will be filled in/early warning devices/roadblocks dismantled until 0100 hours. At 0100 hours, all squad personnel will go to sleep.

NOTE: Stand-to at 0500 hours. Squad personnel will clear site (i.e., recover equipment, fill in positions). Squad will move to and secure resupply site at 40801365 NLT 0600 hours. Tactical movement along trails/roads is authorized.

NOTE: At resupply site, evaluator will conduct final squad critique and collect all data forms, physiological tapes, and special equipment prior to changing over. All AREA books and tapes will be brought back by evaluators to the TOC in addition to all special equipment (i.e., radio).

AREA IV

Aggressor Scenario - Mission 1

a. Personnel - 5 EM Aggressors (E-1 thru E-4), 1 Aggressor Controller (E-6/E-5).

b. Uniforms and Identification - (see annex).

c. Equipment: ¼-ton truck with M-60
Concertina wire
Field table with chairs
Grenade/artillery simulators
Smoke grenades
Trip flares
Sandbags
Camouflage net
5-gallon water cans
Two motorola radios
Training AT/claymore mines
5 ammunition boxes
1 set overalls
"Black box" (provided by USAABNBD)

d. Duties and Conduct: (see Scenario, Mission 1)

(1) Aggressors will move by vehicle from bivouac site to TOC at 0600 hours for pickup of Mission 1 supplies/equipment, shuttling four aggressors and equipment to objective at 42101340 (vic "ruins" on map). Aggressors will set up patrol base as follows: camouflaged net surrounded by concertina wire, trip flares/simulators as early warning devices around avenue of approach to site, ammo boxes/sandbags stacked in perimeter under net, field table/chairs set up, "black box" concealed on site. Patrol base should be not less than 20 feet in perimeter. One aggressor will be dressed in pilot uniform (overalls), with bandage around head and leg. Site will be adequately secured against possible enemy attack.

(2) As soon as personnel and equipment are delivered to the patrol base, vehicle with two aggressors will return to patrol open areas vic landing strip (4013 grid square) and N-S road 4075. Aggressors will not "hunt" squad but will engage personnel if movement is compromised. Evaluator will alert aggressors when squad is crossing these areas.

(3) At approximately 1300 hours, the squad will move into its assault ORP to conduct a leader's reconnaissance of the objective. Evaluator will alert the aggressors when squad crosses N-S road 4075 and when it moves into the ORP. Aggressors on the site will not patrol around the objective but may engage squad members if the recon is compromised; the "pilot" will at this time be tied up and under guard, aggressors will be employed in base camp functions on the site. The vehicle will patrol the N-S trail west of the base camp until

alerted by evaluator that squad has completed its recon. At that time, 1 aggressor from the vehicle will return to the base camp while the vehicle will move to trail intersection at 41601380; aggressor with the vehicle will change into partisan uniform (see annex).

(4) During the squad's raid, three aggressors will be "killed" and one "wounded"; aggressors may engage in firefight with the attacking squad but for not more than 5 seconds. Squad will consolidate on site, search site and locate the "black box," transmit a SITREP to the TOC, and prepare to evacuate the pilot, wounded POW, and "black box" to 41601380. Water resupply for the squad will be on the sites.

(5) At linkup site, aggressor with vehicle (in partisan uniform) will respond to CEOI challenge/password and pickup wounded and "black box." If squad does not conduct linkup properly, "partisan" may open fire. All aggressors will return to objective to reconstruct site and return to aggressor uniform during squad critique at link up site. Once site is reconstructed, aggressors continue to Mission 2.

Aggressor Scenario - Mission 2

- a. Personnel: (same as for Mission 1)
- b. Uniform and Identification: (see annex).
- c. Equipment: M151 ¼-ton truck with M-60
Smoke grenades
Parachute flares/white star clusters
Green star clusters
Grenade/artillery simulators
5-gallon water cans
- d. Actions and Conduct: (see Scenario, Mission 2).

(1) Following reconstruction of Mission 1 site, aggressors will move by vehicle to bivouac site. Squad evaluator will alert aggressor to move a sniper from north of landing strip against squad position (twice between 1600 and 2000 hours). Sniper will not move closer than 100 meters from positions and should remain concealed in woodline. Sniper will fire 4 - 5 shots at 10-second intervals during each engagement. If squad pursues sniper, he should break contact and return to bivouac site, avoiding capture.

(2) At 2030 hours, aggressors with vehicle will move into attack position at 399144, remaining concealed. At 2100 hours, on signal from the evaluator, aggressors will fire white star clusters/parachute flares in direction of the squad positions at 10-minute intervals.

(3) At 2130 hours, on signal from the squad evaluator, aggressors will attack dismounted against the N-W corner of the landing strip. Contact will be broken after 10 - 15 minutes. M-60 on vehicle will be in support but will not advance on positions. Aggressors will not move in closer than 50 meters against squad positions; use of simulators will be controlled by the aggressor controller. Attack will be illuminated.

(4) On pre-arranged signal (i.e., green star cluster) from the controller, aggressors will fall back to their attack position. Illumination against positions will continue in 10-minute intervals.

(5) At 2300 hours, on signal from the evaluator, aggressors will attack the squad positions from the west of the landing strip (N-S trail 398). Attack will be illuminated with contact maintained for next 30 minutes (conduct of attack same as above but aggressors will close to within 20 meters of positions). Positions will not be overrun by the aggressors and no physical (i.e., hand to hand) combat will be engaged in with squad members. The vehicle will enter the landing strip from the east side, proceed south down the strip, and (after 10 minutes wait time at southern end) move north

towards rear of the squad position. Vehicle will engage squad from rear using M-60 and simulators but will not close in on/overrun positions. All aggressor contact will be broken NLT 2320 hours, with aggressors reconsolidating at the attack position and returning to the bivouac site.

NOTE: Stand-to for aggressors is at 0530 hours, with vehicle proceeding to TOC to pick up supplies NLT 0600 hours.

APPENDIX B

SUBJECT: Debriefing of Medics after 5 day field scenario

FOR STUDY OF: Physical Fitness Requirements for Sustained Combat Operations of Light Infantry

REPORTED BY: Bruce H. Jones, MAJ, MC

1. During the course of the 5-day field exercise, which began Monday, 25 July 1983 the medics observed and/or treated a number of general and specific physical or medical complaints (see Table 1). In all 15 different complaints (4 general and 11 specific) were identified. General complaints were those problems which were identified as:

- a. Common (involving all squads and most squad members).
- b. Vague in nature and,
- c. Required no medical treatment other than reassurance or advice from the medic.

2. Specific complaints had:

- a. A clearly defined medical diagnosis and
- b. Treatment (see Table 1).

Also, only a few members of some squads suffered from these maladies. The most common area of complaint was the foot (eight injuries) which was followed in frequency by the low back (five injuries). The only serious medical problem of the study was a low back problem diagnosed as "severe muscle spasms" which required one soldier to be removed from the field and dropped from the study.

3. In regards to the itemized injuries the medics made several observations which might be helpful in anticipating or preventing such injuries. These observations were as follows:

a. For foot problems:

(1) They were more common than the eight which were clearly identified, treated and noted.

(2) Individuals with anatomical deformities of the feet such as bunions, overlapping toes, or growths such as warts and corns were most likely to suffer from blisters and foot pain.

(3) Many of the complaints, primarily ingrown nails, blisters and "immersion foot" could have been prevented by better foot care - dry socks, use of foot powder and adequate drying of feet at night and properly trimmed nails. Paranthetically, the one individual who suffered "trench foot", did not change his socks once during 24 hours when it rained intermittently for the whole day. More marching in boots prior to extended field exercises might also have toughened feet.

b. For back problems and muscle soreness:

(1) These were more common in individuals with a history of prior back injury or anatomical deformity such as scoliosis.

(2) Individuals with lack of prior field experience were also more likely to complain of these problems.

(3) Generalized back pain and muscle soreness might to some extent have been prevented by more marching with ruck sacks and weapons both on the road and cross country, as a group (squad, company, etc.) rather than as individuals during training.

(4) It was also felt that more concentration or development of upper body strength might have been helpful since some squad members were so weak they could not carry the radio in addition to their other gear. All squads had some difficulty carrying a litter with a man on it.

c. Cuts and lacerations:

The point man was most likely to suffer cuts and lacerations primarily on hands and arms.

d. Squad members were reluctant to consult with the medics unless directly confronted by them or their problem was perceived as extremely debilitating.

TABLE I

Injuries and Illnesses during 5 day field exercise

Injury/Illness	Number of injuries	Treatment
General complaints:		
1. Fatigue	Universal	-
2. Back and Shoulder Soreness	Universal	-
3. Weakness	-	-
4. Leg (muscle) soreness	-	-
Specific complaints:		
1. Blisters	3	Lance, clean, dry, pad with mole skin
2. Immersion foot	1	dry foot, dry socks, powder
3. Ingrown toe nails	2	dry feet, pad affected toe
4. Foot pain	2	refer to podiatry on return
5. Low back pain	5	advise on proper load carriage, 1 subject removed from study and referred to hospital.
6. Leg cramps	2	maintain adequate fluids, and salt intake
7. cuts and lacerations	3	clean and bandage when necessary
8. Upper respiratory infection	1	decongestant
9. Hay fever	1	decongestant
10 Headaches	3-4	aspirin or tylenol
1. gastirtis (stomach pain/nausea)	1	antacids

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