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Major General Paul F. Gorman  
Army War College  
21 January 1977

TRENDS IN THE ARMY'S TRAINING SYSTEM

Colonel Bullock (AWC Faculty):

Last Monday, General DePuy\* talked about some of the basic challenges which confront our Army. He emphasized the growing complexity of the US Army and the fact that we have more than seven-tenths of a major weapon system for each man in it. Following this he talked about the soldier's world and the necessity for the army to satisfy him in his job. Finally he zeroed in on the proper sharing of responsibility for individual training among the TRADOC and the field commands. Well, good training, good training management, and adequate training support are a big part of the solution to the problems facing the Army. This is the subject for today and I can't think of anyone better qualified to address these subjects than our speaker today. It is a pleasure for me to welcome back to the Army War College TRADOC's Deputy Chief of Staff for Training, Major General Paul F. Gorman.

(At this juncture a bat\*\* flew into the auditorium, and orbited the stage).

Major General Gorman:

Some of you may believe that is a bat from the TRADOC belfry, but I want you to know ladies and gentlemen, it is the Holy Ghost. Veni Creator Spiritus.

Here is what I am going to talk to you about today on this, the first day of President Carter's Administration. I am going to discuss Macro and Micro Management of training, and then four strategies which the Training and Doctrine Command now seeks to implement for training management, Armywide. Some of what I have to say will be unknown to you. In other words, I do not intend to discuss what I think you are already familiar with, but rather what I think you need to know, but may not.

**TRAINING MANAGEMENT**

- MACRO
- MICRO

**● TRAINING STRATEGIES**

- CRITERION REFERENCED INSTRUCTION
- INDIVIDUALIZATION
- EXPERIENTIAL LEARNING
- COMMUNICATIVE COMPRESSION

\* General William E. DePuy, Commanding General, TRADOC  
\*\*Genus Lasionycteris noctriagans

MACRO-MANAGEMENT

I think it would be most useful to begin with some of the considerations of what I call the macro-management of training. This is a subject which you, ladies and gentlemen, must consider as leaders of our armed forces. Here displayed is a summary of recent political comments on Army training. They are the Washington level perception of what goes on in the Army Training System. I call your attention to the pronouncements in the Democratic platform which identified training as one area of gross inefficiency in the Armed Forces. Mr. Carter, in several of his public statements during the campaign supported this platform.

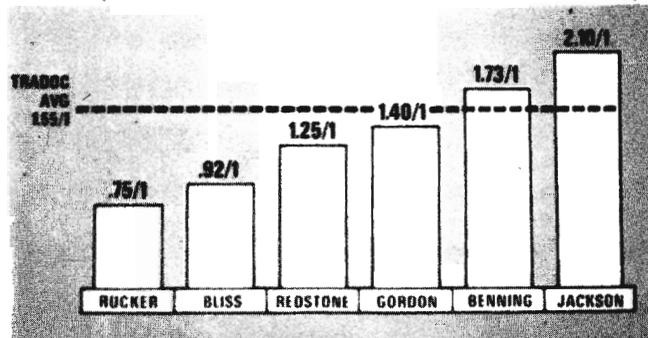
Whenever he answered questions about how he intended to trim five to seven billion dollars from the Defense budget he kept referring to the "grossly inefficient" service school system. The student/instructor ratio which was cited by Mr. Bleckman in his article on defense management\* in the January issue of Foreign Affairs has become a part of the Carter rhetoric. I predict that we are going to hear a great deal more about this subject as time goes on.

Now, let me give you some relevant facts about this problem of student support. If you look at instructor to student ratios in the United States Army, it is true that compared with the Meriden Connecticut Public High Schools or Harvard University, or perhaps even the Army War College we are lavish. If you go down to Fort Rucker where we teach people how to fly helicopters, you will see that this takes a large instructor load per student to accomplish this. It looks a little bit better out at the right end of the chart which shows the instructors required to train recruits.

**PRESSURE ON THE TRAINING BASE**

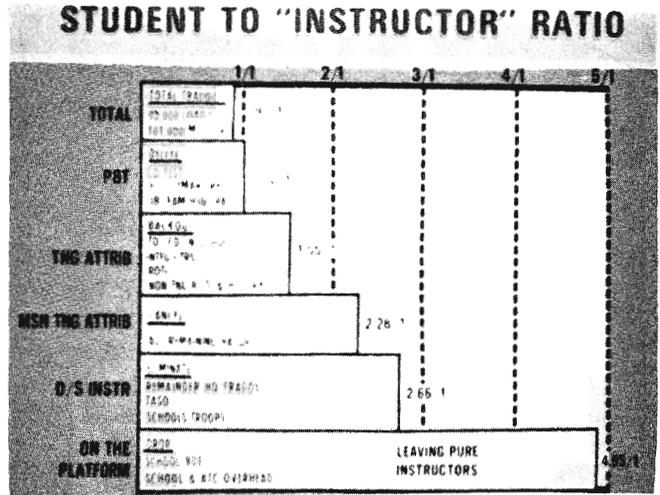
DATE	SOURCE	COMMENT
MAY 73	HAC/GAO	• INEFFICIENT ROTC UNITS
JUN 73	HASC	• CURRICULUM REVIEW
JUN 73	HAC	• RECRUIT TRAINING BASE
NOV 73	GAO	• INTERSERVICE TRAINING
DEC 74	CARTER	• DOD WASTE (16-BILLION)
APR 75	BROOKINGS INSTITUTE	• TRAINING COSTLY: STUDENT/INSTRUCTOR = 1.6/1
		• "PIPELINE" - ONE IN SEVEN
JUN 75	KENNEDY AMENDMENT	• STUDENT/ISON = 3 TO 1
JAN 76	FOREIGN AFFAIRS	• (SAME AS BROOKINGS)
JUL 76	DEMOCRATIC PLATFORM	• ENLISTED TO OFFICER RATIO
		• TRAINING EFFICIENCY
		• COMBAT / SUPPORT RATIO
		• REVISION OF ARMY DIVISIONS
JUL 76	CARTER (MEET THE PRESS)	• SUPPORTS PLATFORM
		• REDUCE DOD 15-TO 17-BILLION ANNUALLY
SEP 76	CARTER	• STUDENT/INSTRUCTOR INEFFICIENT
		• DOD WASTE -- 5% TO 6%

**TRAINING ATTRIBUTABLE (INCL B/O)  
STUDENT INSTRUCTOR RATIO**



\*Bleckman, Barry M. and Edward R. Fried, "Controlling the Defense Budget," Foreign Affairs, Vol 54, No. 2 (January 1976), pp 233-249. Mr. Bleckman is Senior Fellow at Brookings Institute.

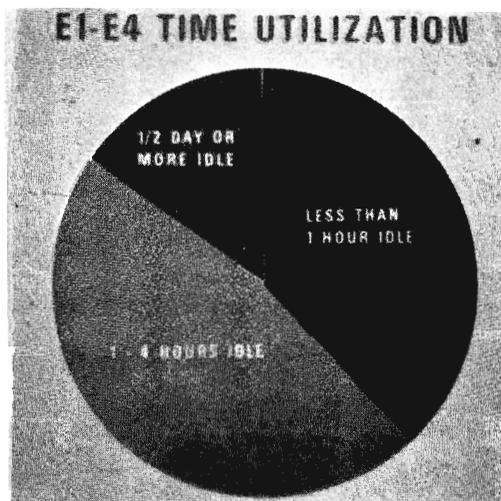
Now one could go to Congress and argue that, "Hey, you're counting in those numbers a heck of a lot of people that aren't really instructors!" Most of them are not standing on a platform delivering instruction as I am here with you. You can eliminate a lot of categories of people and can come up with different ratios. But this is not the issue. The major point that we must be able to communicate to the Congress is that the student/instructor ratio as a measure of effectiveness of a training system is utterly irrelevant.



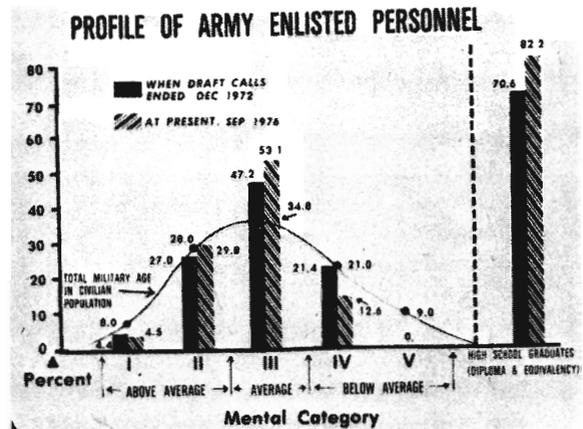
Why should TRADOC be compared with civilian schools, which have fixed school years, use of large lectures, and little of the intensive 24-hour-a-day supervision required in most military training? We can point with some pride to the fact that we school every year a quarter of a million young Americans in over a score of schools and training centers throughout the country. These soldiers pursue hazardous, physically and mentally stressful training programs, and we have a very creditable record for learning achievement and freedom from trainee abuse.

The true measure of effectiveness which should be applied to TRADOC is it's ability to develop skilled and disciplined soldiers in the least time. The most expensive Army resource is manpower, and, to the degree possible, that manpower should be concentrated in the operating forces. Every student manyear conserved in TRADOC is a manyear which can be counted towards the Army's primary purpose, training units for combat.

This slide which General DePuy used came from an Armywide survey last Fall. These statistics graphically illustrate that we have a lot of bored and idle soldiers out in units. One of the aspects of training management that concerns us is "How in the world do we influence that soldier? How can we motivate and energize him?"



This chart compares the distribution of mental groups. This thin line is the distribution of mental groups in the American military age population at large. The black bars compare the situation at the time the draft ended with the striped bars which show the situation as of September 1976. The distribution shows the percentages in each of the mental groups in the United States Army. Interestingly, the numbers in the lowest category, IV, has been decreasing steadily since the end of the draft. For example, this figure in March was 13½ percent. Now, that is not because the soldiers coming into the Army are getting any smarter--they aren't. It is going down because of the Army's 180-day discharge policy. It is going down because the training base has been filtering from the trainees those unfit to serve in the force at large.



TRADOC eliminates those soldiers who by reason of attitude, motivation, or ineptitude are unable to become good soldiers. General Blanchard\* made that point very forcibly to me in November. He said: "I don't know how the Army is doing it, but whatever you're doing is right, because in Europe the picture looks better month by month in terms of the quality of soldiers we receive as replacements. The men we receive are pretty good soldiers. They are disciplined and trainable."

For the purposes of our discussion today, recognize that the United States Army today is composed of very average men. In an Army that is becoming more complex day by day, with more and more sophisticated equipment to employ, we must face up to the fact that the human material with which we're dealing is definitely of average intelligence. (Although we are pretty well off as far as brighter categories are concerned when compared to where we were in December 1972.)

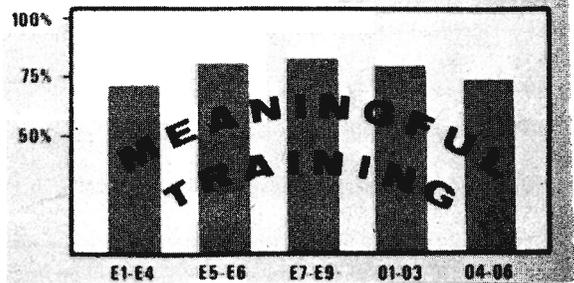
\*General George S. Blanchard, Commander in Chief, USAREUR

One evidence of progress that General Blanchard cited was the fact that he had just closed two correctional facilities in Europe. As you can see, the United States Army is doing very well in this year of our Lord 1976 vis-a-vis the traditional indicators of morale. Note that the worst year, historically, was 1971, I think any of you who were at Fort Carson, Colorado then or elsewhere out in the force at that time would agree the figures reflect the real situation. Note also, though, that in 1944 when presumably we had a very different situation with public support for the Army and for the Second World War, there was still a very high desertion rate. Today, Army statistics are better than those of the Navy and as good as the Air Force. In other words, these soldiers are doing fairly well by the traditional measures of morale.

AWOL/DESERTION RATE (In Thousands)			
		AWOL	DESERTION
WWII	1944	N/A	63.0
	1945	N/A	65.2
KOREA	1952	181.0	22.0
	1954	115.3	15.7
VIETNAM	1965	37.6	14.9
	1967	89.2	24.3
	1969	112.3	42.6
	1971	172.6	73.5
	1973	156.5	52.0
POST RVN	1974	108.0	41.2
	1975	76.2	26.8
	1976	60.6	14.3

The problem in hand is "How do we deal with a very average Army?" Answer: when you ask these soldiers what is it that you want, the answer is overwhelmingly training. These figures come from an Armywide survey in which we questioned 2,700 soldiers of all grades in eight divisions. There were about 700 in the sample of lower ranking enlisted men. Ladies and gentlemen, this is what the statisticians call a strong mandate. No matter how we asked the question of what can improve your morale and give you job satisfaction, and it was asked in several ways, the respondents overwhelmingly answered: "Give us meaningful training!"

WHAT CAN PROVIDE A REMEDY FOR PROBLEMS OF MOTIVATION, MORALE & JOB SATISFACTION FOR YOU?

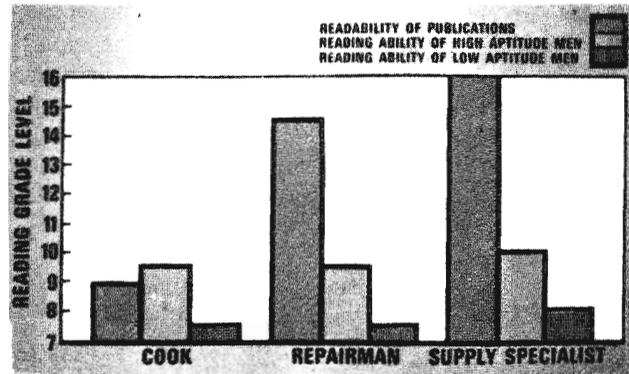


Now, we all have a problem: "How can we organize the Army in such a way that we can provide meaningful training for soldiers that are very average in terms of mental ability. Remember that "average" means that their reading ability is low\*.

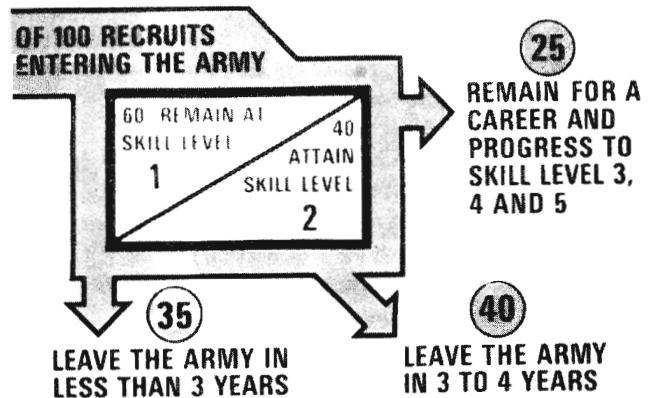
\*Reading level 5th grade

## READABILITY OF PUBLICATIONS VS. READING ABILITY

This graph compares the readability of publications shown by the left bar in each group, the middle bar in each group is the reading ability of Categories I & II and the right hand bar shows the reading level of the mental categories III & IV. Obviously the Army has a very substantial problem in terms of adapting the materials that we use to train the soldier for his job to his mental capabilities.



Here is a diagram which I call the "Loss Model." It shows how many people out of 100 leave the service before 3 years, at three years and how many stay in service. I have to tell you further that the numbers shown here are not accurate. They're not right because at the time that we compiled these statistics there wasn't anybody in Washington who could tell us what the right numbers were. Since then we have developed a computer program that permits us to go into the personnel files of the Army, and determine the right numbers. If you were to ask me how many soldiers with MOS 63C, the Track Vehicle Mechanic, out of 100 stay on after their first enlistment, I'd have to tell you that that number is 11. Now, when a division commander tells you he has only 53 percent of his authorized 63C Track Vehicle Mechanics, what he is reporting is that we haven't succeeded in retaining enough men in this MOS. I feel that the main reason we are losing soldiers after their initial enlistment is because we have failed to come to grips with meaningful training to fill the idle time of soldiers with average mental ability. We must give him a job that he can understand and pursue with a great deal of job satisfaction. On top of this, we currently plan on introducing 44 major new weapons systems based upon technologies that the Army has never had to grapple with before.



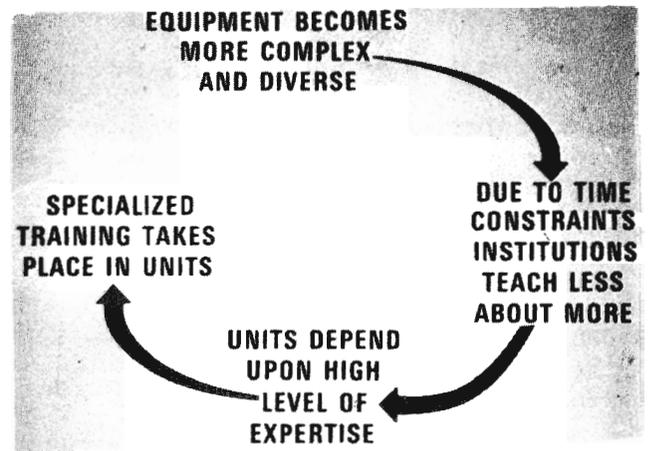
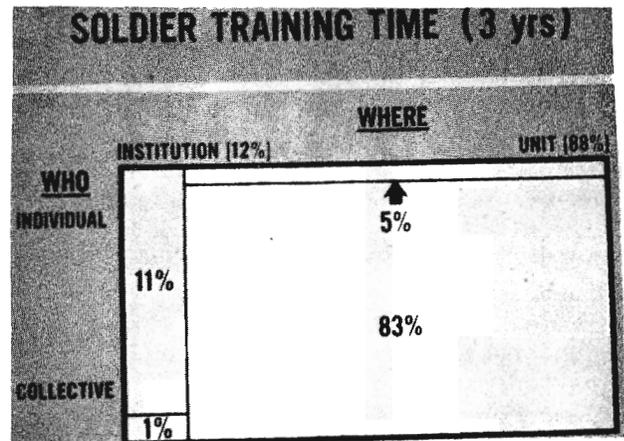
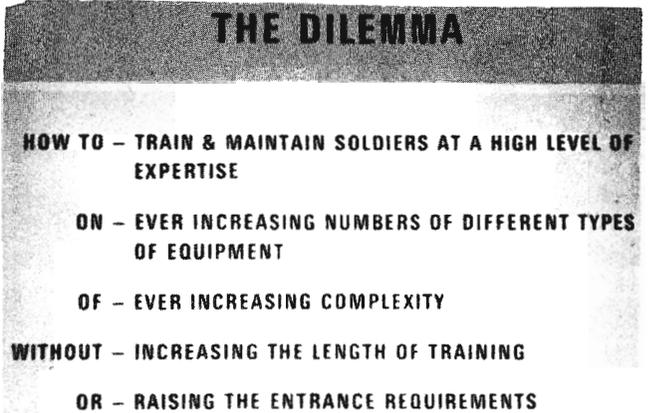
## INCREASING COMPLEXITY

- THREE HUNDRED PERCENT INCREASE IN NUMBERS OF TANK & ANTI-TANK WEAPONS IN A DIVISION (OVER PAST 20 YRS)
- PRESENTLY 0.71 SYSTEMS PER SOLDIER (NOT INCLUDING SMALL ARMS)
- PROGRAMMED INTRODUCTION OF 44 NEW SYSTEMS (IN THE NEAR FUTURE)

I am continually approached by senior officers who tell me that we have got to go back to teaching theory in our courses because soldiers don't understand enough about basics, electronics for example. I reply: "General, what do you want me to teach them?" They say: "Ohm's Law, circuit theory, etc.," and I say: "General, but all of the circuits these soldiers will use are digitized. There is no way that the TRADOC will be able to teach digital electronics to entry level soldiers. Especially since most of them will be leaving the Army within three years. No way!" Here is the dilemma.

The fact of the matter is that, if you look at the Army from the point of view of macro-management of training, soldiers spend most of the time in units and they spend the greater part of their time training collectively, practicing team work. A relatively small amount of time is available for individual training either in schools or in units. What we have got to do is capitalize on this time in units where most of the opportunity lies in order to make the training system work.

The TRADOC has been working to solve this problem, using this as a sort of a basic guide. We strongly believe that we have got to build systems that permit effective specialized training to occur in units. Now I'm sure there isn't a one of you here who has been a unit commander that isn't saying something profane to himself about that mad general who thinks that individual training can occur out in today's hostile training environment--what with all of the special duty and the elimination of civilian personnel and the



post support that takes the sergeants out of the units, and assures that we don't have the NCO's there in the unit in the first place. "How do you expect to get specialized training in units?" We understand your question. The problem is how to come to grips with it? How do you cope with it? Because we can no longer afford to train more skills in the service schools. I cannot stress strongly enough this business here. Army training suffers from the fact that everybody in the Army is an expert on it. If asked, there isn't a one in the room here that wouldn't admit to being an expert on training because that's what you've been doing all your life. I'm going to show you in a moment that our ignorance on some of the rudiments of our profession is abysmal. We simply don't know enough about how to do it, or how to select appropriate standards for training. Much needs to be done in terms of training macro-management, and, in particular, in the area of developing management systems must have understanding, the support and the participation of ladies and gentlemen of your ilk.

I deal everyday with action officers in the Army staff. I can tell you that there isn't one in a hundred that has any idea of what we're trying to do down at the Training and Doctrine Command. That's our fault in part for failing to communicate with them, but it's also the fault of the Army General Staff which has always assumed that somewhere out there is a large group of experts that know exactly how to do needed training and that is something DA can leave to the field. So you find in the Army staff that the DCSPER is in charge of all individual training.

## TRAINING IN UNITS

### FOR THE TRAINING THAT MUST BE ACCOMPLISHED IN UNITS:

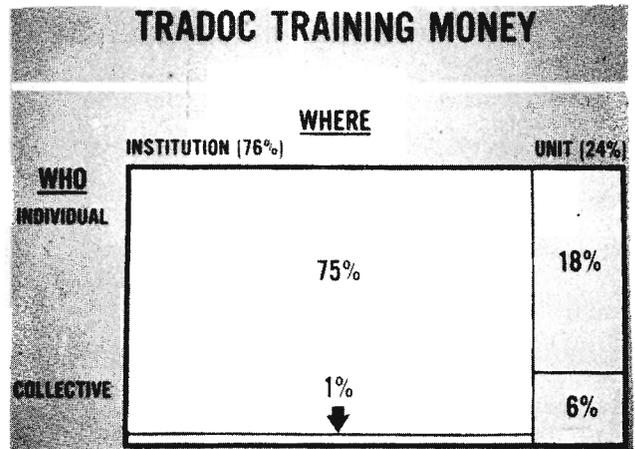
- CRITERIA MUST BE CLEARLY IDENTIFIED
- TRAINING SUPPORT MUST BE PROVIDED BY INSTITUTION
- UNIT MUST BE ABLE TO ACHIEVE STANDARDS

## WHAT NEEDS TO BE DONE

- DETERMINE SCORE OF SPECIALIZATION
- CRITICAL TASKS CONDITIONS STANDARDS
- WHERE TAUGHT LEVEL OF PROFICIENCY
- DEVELOP POI'S & TRAINING PACKAGES
- READJUST TRAINING RESOURCES
- DEVELOP MANAGEMENT SYSTEM
  - TRAINING
  - DISTRIBUTION
  - UTILIZATION
  - DEVELOPMENT

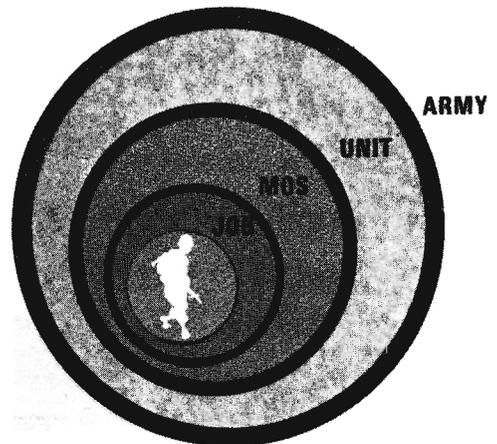
Yes, but he only handles the P8 program, which provide the resources for training in institutions. He has not recognized his responsibility for supporting individual training in units. Then we have the DCSOPS who has responsibility for unit training, by which he means collective training in units. Somehow we have allowed the individual proficiency of the soldiers of the US Army to fall through the cracks. An example of our individual training deficiency is in order. By actual count, of the infantry soldiers tested over the past six months on the simple task of emplacing a Claymore mine, 57 percent Armywide were unable to do it. Is that a weapons system? Has the money that we've invested in a Claymore paid off? Obviously not. Who's going to worry about that on the Army staff? The answer at the moment is nobody!

The Army staff has a big job facing it in training macro-management. TRADOC has been making some progress in pushing money into this area, building better support and management systems for individual training in units. The amount spent in units for individual training is up from 12 percent previous fiscal year. But it's still not high enough. We want to increase it, but we're having a hell of a time getting the Army staff to understand the importance and urgency of so doing. Later, I'll show you some of the specific programs that we have devised to solve this problem.



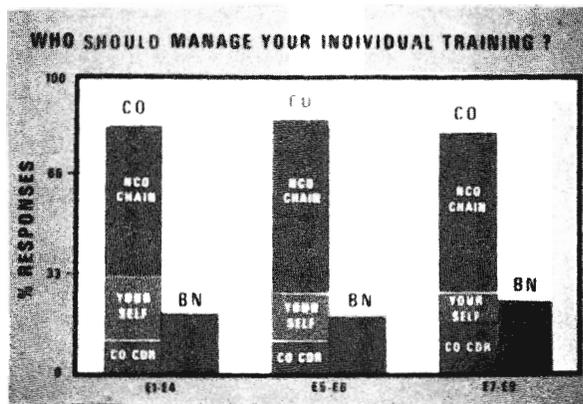
MICRO-MANAGEMENT

This may be the most important chart I'm going to show you all day. What it says is that we know surely from all of the surveys that have been conducted and from the reports of the Organizational Effectiveness Staff Officers throughout the force, that in the perception of the ordinary soldier, the Army is a large amorphous, ill-defined area that's well outside his ken. He doesn't understand "Army." He sees the Army essentially in terms of his job, or some in terms of his MOS. Outside of that, sort of at the outer limits of his vision and



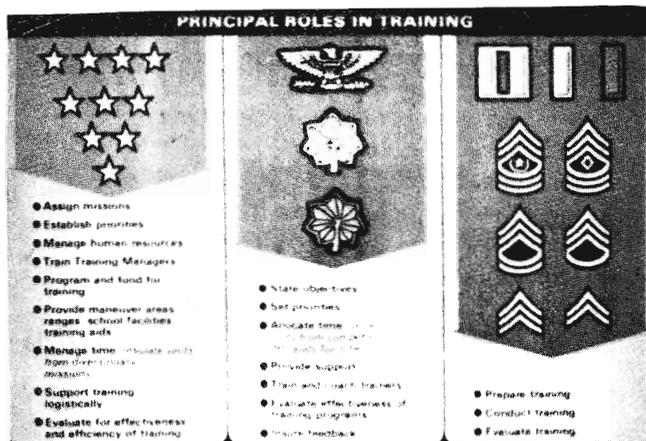
understanding is the unit in which he is serving. It is a rare soldier for whom that is a unit larger than his battalion. Many of them do not see much beyond their company. But like it or not that is the universe for the soldier. Seeing this, you now have to understand in macro-management terms what the TRADOC does for a living. What we do for the Army. We are involved in managerial attacks trying to define the relationship between the soldier and his job. That is of course what Soldier's Manual, Skill Qualification Tests, and all the supporting material are all about. We are also defining the relationship between the soldier and this unit, which is what the Army Training and Evaluation Program does. If we can achieve success near the soldier we will have gone a long way toward solving many problems in training and elsewhere. If we can solve this equation inside the soldier's world, I submit we will have gone a long way towards managing Army training properly.

Here is some more data from that survey to which I referred earlier. Across the whole spectrum of soldiers in the Army of whatever grade. There's a strong conviction that NCO's ought to be managing the job of individual training. I scarcely need tell this audience that that means we must provide a very clear definition of what we expect of him. We have got to establish specific standards, specific guidance and provide the sergeants with the support they require to discharge these training responsibilities. I'd also, however, call your attention to the implication that runs through these figures that show the soldiers think they can do a great deal of training themselves. That is a very important phenomenon in today's Army. One that we cannot ignore.

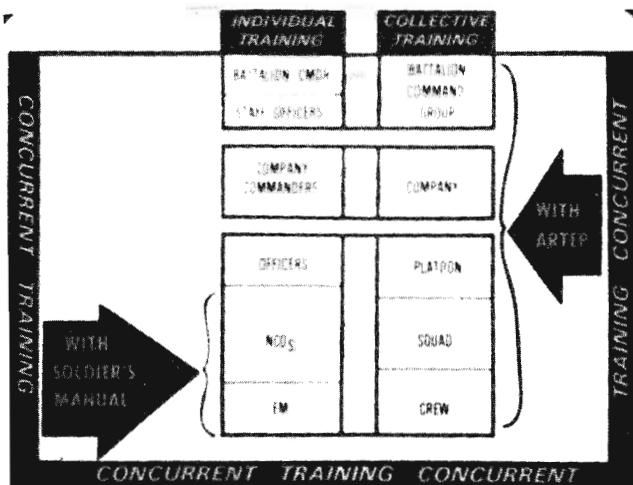


Note that very few of the soldiers listed the battalion S3. And yet, all of us have at one time or another succumbed to the "S3 syndrome" where you thought that you had to legislate everyone's training in the battalion; telling them precisely what they were to do every hour. This just shows you that we don't, in our micro-management systems, capitalize on this information sufficiently.

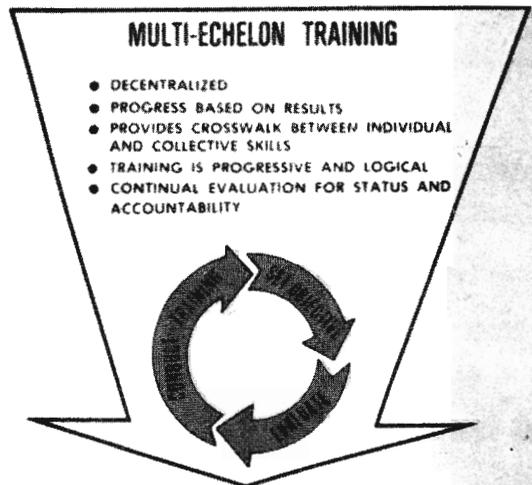
I'm going to show you now some actual cuts from a publication called Training Circular 21-5-7 which may not have come to your attention. It's been out in the force now for several months. It is called Training Management In Battalions. It attempts to come to grips with some of the problems of decentralized training and some of the problems of implementing Army Regulation 350-1. This chart says that the generals have a clear role in decentralized training shown in their column. The colonels and majors, those field grade swine, have a big training management job and that's shown in the center. It is at this level that the Army has a great problem. The lieutenant colonels and colonels in the United States Army can't do their jobs very well. Down at company level we find the trainers and their jobs are clearly defined. Most of their functions are laid out in FM 21-6, How to Prepare and Conduct Military Training.



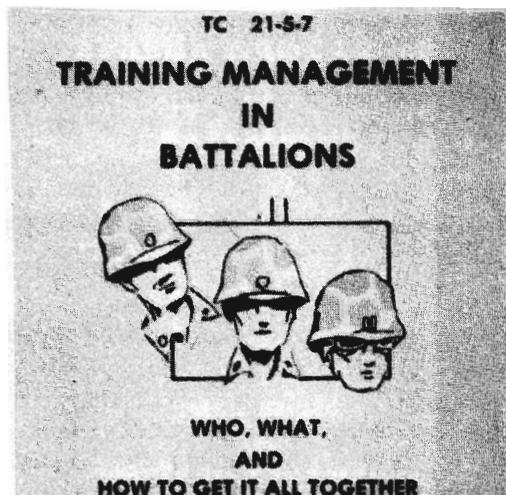
This is another diagram from that same publication. It says that officers worry about collective training defined in the Army Training Evaluation Program. The individual training column shows what NCO's and soldiers worry about over here. And all of this training, at many echelons has got to be going on concurrently. This new manual discusses how to manage that program. The terminology, "multi-echelon" has been used in many ways over the years it's an attempt to sort that out. Now does this work?



Well, it does in some units. In others it has not worked too well. We have a number of tests underway right now, two divisions in Europe, the 82d Airborne Division, the 7th Division at Fort Ord, and the 4th Division at Fort Carson in which we're fiddling around with various attacks on that trying to identify what works, and what doesn't but what we've got to do managerially in order to set this all of this straight. To date we're encouraged. By golly, when units turn to and really try this some very interesting things happen.



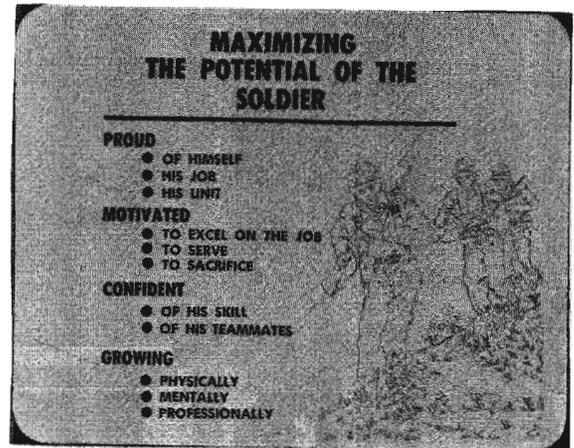
That's the publication to which I refer. It you haven't seen it you ought to look at it. I believe we've been keeping the Army War College abreast on our work in training management. Just as a matter of interest, LTG Bob Shoemaker\* called his officers together down in the theater at Fort Hood recently, held up TC 21-5-7 and told them that this year III Corps was going to try to follow this book. We are following the results of the Fort Hood test, too.



\*LTG Robert M. Shoemaker, Commanding General III Corps

There's another illustration from the book that shows the real target of our efforts--the soldier. In terms of micro-management down at the battalion, that's what we want to get at. I believe that tells you that we are worried about the right things. Now the Army has been in the training business for a long time, and most of its lore on how to train is sound enough. I do not want anyone to walk out of here with the impression that TRADOC rejects traditional or conventional training methods. What I want to convey to you is a few facts about our search for better ways.

TRADOC has a theory behind all of its undertakings. We say that most meaningful improvements in training occurs in one or another ways shown on this slide. Whether you are talking about micro-management, that is managing training at the unit level, or macro-management, DA level problems, if these considerations are kept in mind it is possible to devise a training strategy for the Army.



## HOW TO LEARN?

- **DISCOVERY**
- **INTERNALIZATION**
- **ADAPTATION**
- **PERFORMANCE**

## TRAINING STRATEGIES

I chose to talk to you in terms of strategies today because I want to introduce you to some new concepts that excite me and, I think, has fascinated many of those who work for me. Now some of this may appear to be jargon, but I want to show you new terms which refer to new ways to approach training. These are what we are talking about when we say training strategies. Strategies for attacking the training problems to which I've made reference.

## CRITERION REFERENCED INSTRUCTION

Let's turn to CRI. Criterion referenced instruction involves the first step in the training development process shown on the left-- choosing the job or the task that you want to be performed. I cannot over-emphasize how important this step is. As an example let's take a criterion that we have used for years in training tank crews, Table VIII familiar to the tankers in the audience. There are a lot of things that are wrong with Table VIII. Taken as a whole, it is not a very useful measure of effectiveness of preparation for combat.

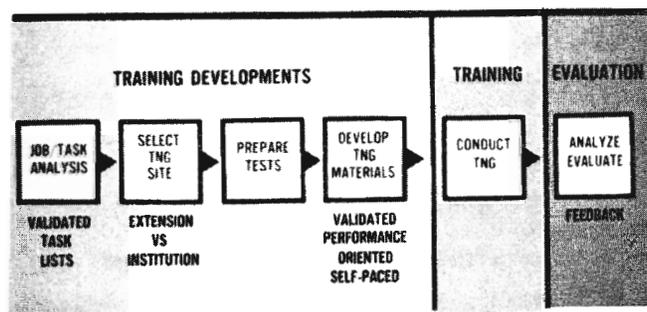
## ● TRAINING MANAGEMENT

- MACRO
- MICRO

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## SYSTEMS APPROACH TO TRAINING



## TABLE VIII DEFICIENCIES

- TARGET ACQUISITION
- UNEXPECTED TARGETS
- MULTIPLE TARGETS
- TARGET MOVEMENT
- RANGE TO TARGETS
- AMMUNITION LIMITATIONS
- LACK OF HOSTILE ENVIRONMENT

### CONCLUSION:

**A POOR MEASURE OF EFFECTIVENESS**

Now here is a more realistic criterion. Experienced analysts started by attempting to figure out exactly what a tank company commander would be up against if his unit was manning the front where the Russians chose to breakthrough in Europe. We came up with this situation. The tank company would probably have to destroy 60 targets. Now, these targets could be either tanks or BMP's depending on the particular type unit attacking but there would be 60 targets coming at the company. The average inter-visibility distance in Germany and closing time would give present a situation similar to this. The terrain might slow the enemy down more than this, but the closing time is somewhere between 7 and 15 minutes. That tank company commander has got to service 60 targets in that time. Now, when we showed this situation to the Israeli Army they said, "Yes! That is right. Your Table VIII is all wrong because it recreates only one tank in trouble. The problem which will confront you in combat is a large mass of tanks attempting a breakthrough and the defenders have a limited period of time to defeat or neutralize them." Now who has practiced that in the United States Army? Who has set that as a criterion for training? Well, I'm happy to tell you in this point in time the answer is the 7th US Army in Europe in late October and November they actually took a company to Grafenwohr, posed this problem for them and had them execute their defense in live fire.

## TARGET SERVICING PROBLEM 60 TANKS

TIME @ 10KPH  
7.3 MINS



AVERAGE  
INTERVISIBILITY  
FRG

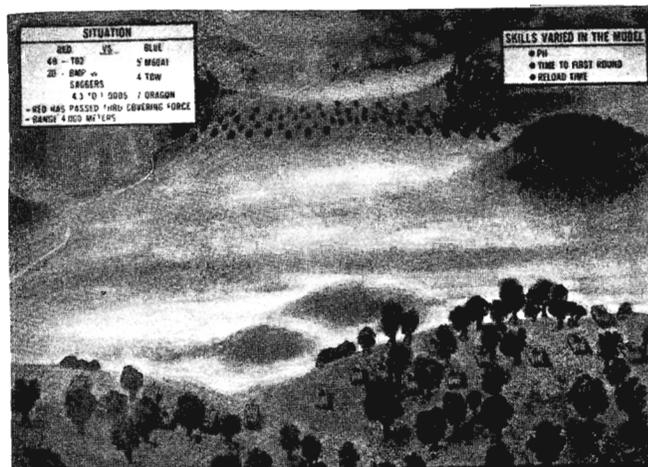
1200m

US TANK CO TEAM  
12 TANK  
4 APC  
4 TOW  
4 DRAGON



THE PROBLEM:  
HOW TO SERVICE 60 TARGETS WITHIN THE TIME  
WHILE UNDER SUPPRESSIVE FIRES

The problem posed in Europe in November was identical to that shown in the following series of pictures. A fight takes place out here, the attacking force is engaged by the covering force or by forward echelon of the defending battalion and this is the enemy force that comes over the hill. Shown at the bottom is the defending force. The situation was analyzed first in a war game, a computer simulation, in which we varied in our math model three functions of crew proficiency:



probability of hit, the time to get first round on target, and the reload time. First we assumed that the force was capable of shooting as well as we had observed crews firing at the peak of their proficiency. This would be during their tank gunnery season. The outcome of the battle using a company with highly trained crews is shown here. In this engagement only a few of the Dragon Anti-tank weapons have fired and the Light Anti-tank weapons (LAW) have not fired. Yet some friendly tanks survived. In the judgment of the analysts, the US company would have succeeded in defending their position.



But look at what happens if you degrade the proficiency of those tank crews by just 25 percent. Three months after the gunnery season at Grafenwohr the average tank battalion in Europe has fallen in proficiency by at least 25 percent. We determined this loss of proficiency by actual tests. Therefore, when we go to war most of the battalions are going to be down at least that much. And if you postulate that this is the enemy force that the less well trained tank company contends with when the enemy is in the last 600 yards the US force clearly loses the battle.



Now you can observe what has been happening in USAREUR tank gunnery. This chart shows the situation in calendar year 74 in the left hand column. The right hand column shows where they had progressed by 1976. They are moving rapidly. This is a result of the work that was done there this fall, jointly by USAREUR

USAREUR TANK GUNNERY 1974 — 1976			
	CY 74	CY 76	
P R O G R A M	CALIBER	MOSTLY 105mm	SUB-CAL INTRODUCED
	REFERENCE	OLD FM 17-12	SIMILAR TO DRAFT FM 17-12
	REALISM	FIXED TARGETS SINGLE EXPOSURES TARGET LOCATION KNOWN EXAMINER ON BOARD	THREAT ORIENTED MULTIPLE MOVING TARGETS TARGET LOCATION UNKNOWN INTRODUCING POP-UP TARGETS
S T A N D A R D S	QUALIFICATION	NOT SOLELY DEPENDENT ON MAIN GUN HITS	MAIN GUN HITS ESSENTIAL (70 HITS TO QUALIFY WITH 5 FIRST ROUND HITS)
	ENGAGEMENT TIME STANDARDS	15 SEC (ACQUISITION NOT INCLUDED)	LINKED TO TARGET HITS (20 SEC AVERAGE (INCLUDING ACQUISITION))

and the TRADOC. I think that we can say that USAREUR is improving their criterion for the training of individuals, crews, platoons, and companies systematically.

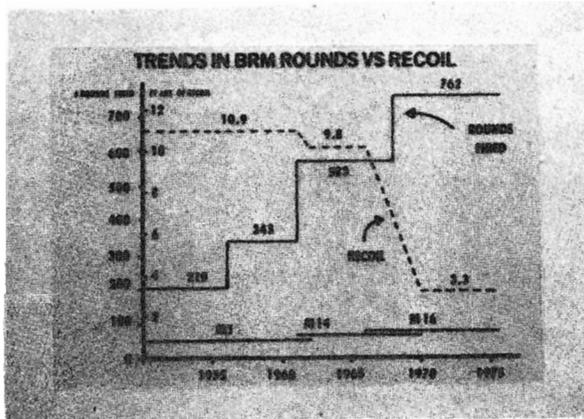
The differences by actual shooting is interesting. 7th Army in calendar year 76 was shooting much better than it was 1975. These are the results of all M60 tanks in USAREUR. It cost more, but we have a lot more lethal Seventh Army at end '76 than in '75. And the shooting at TRAINCON '76 reflected that.

	CY 75	CY 76
TOTAL HITS	6.6/11*	8.3/11*
FIRST ROUND HITS	4.2/11*	7.3/11*

\* NUMBER OF HITS / NUMBER OF TARGET EXPOSURES

### BASIC RIFLE MARKSMANSHIP

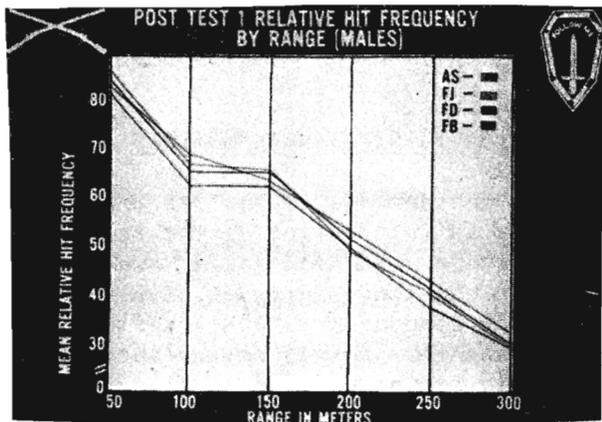
Here's another system, not as expensive and not as interesting as the tanks. It is also one which you would have thought that we had long since set proper training standards -- Basic Rifle Marksmanship. If you review the history of rifle training during the past 25 years you will see clearly that we have systematically increased the number of rounds employed to teach soldiers how to shoot the rifle despite the fact that the recoil of the rifle in terms of foot pounds at the shoulder has been declining. Whatever else this proves, it is obvious that those who contend that the criterion for rifle training is related to recoil certainly aren't right. The reason that the ammunition expenditure continued to rise was that trainers did not see any improvement in the overall performance of the soldiers. Well, of course when the weapons experts at the Infantry School looked at this, they said: "Oh well that's obvious! Number of rounds is not what makes the difference. It's the number of hours of instruction and how you teach that makes the difference." We then said OK you put together four marksmanship programs which vary widely in number of rounds, hours of instruction and methods.



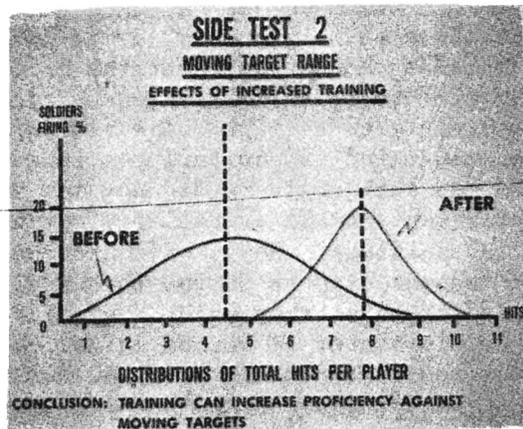
The program on the top (ASUBJSCD) is the traditional Army way of approaching a training problem using hour management. How many hours of training should be required? How much ammunition should we invest in it? To test the four programs, we took 4,400 firers at Fort Jackson and ran them through a very carefully controlled test. Can anyone tell me which of those four programs is going to produce superior marksmen? I see you have all been around too long. You all guessed the answer. It doesn't make any difference whatsoever gentlemen, the difference between the least and most expensive of these programs, which is the standard Army Subject Schedule, amounts to about 6 million dollars each year in TRADOC alone. Is the present criterion for our rifle marksmanship correct? I'm going to show you today several evaluations that says absolutely not.

**BRM PROGRAM COMPARISON**

	HOURS	ROUNDS
ASUBJSCD	72	778
USAIC	35	334
FORT DIX	49	262
FORT JACKSON	62	560



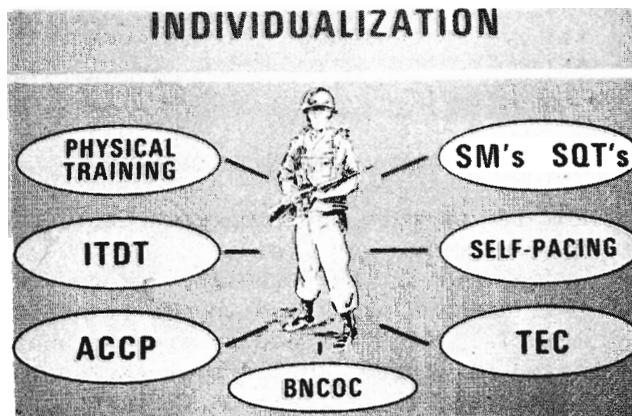
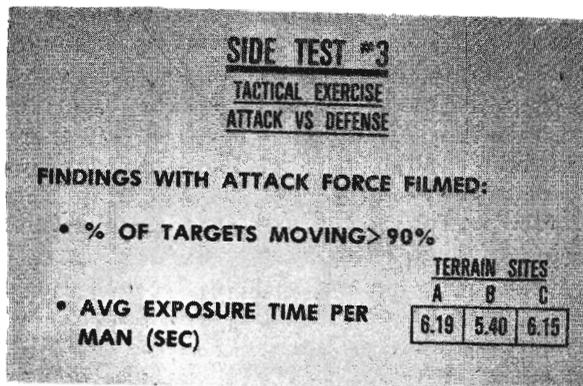
Our present criteria for training assume that we want the soldier to fire at pop-up targets that will appear for 10 or 12 seconds, perpendicular to the firing line. The target does not move angularly relative to the firer. Now the first thing we know surely from our CDEC tests is that over 90 percent of all targets detected by infantrymen on the battlefield are moving at an angle to the firer. If you take a group of soldiers and ask them to shoot at moving targets they will not get many hits. Now if you will invest a modest amount of training in firing at moving targets with the rifle the hit probability will go up substantially.



These are actual test results from Combat Development Experimentation Command, in which we proved that it can be done. CDEC also ran some tests in which they ran attacks on defensive positions and filmed the attackers and we were able to ascertain, over three varieties of terrain, that the average exposure time is around 6 seconds. Thus, setting a target up out there for a firer to shoot at for 10 seconds or more is unrealistic. It is just not a proper combat criterion. Now I could go on and on with other examples, but I believe you should now see that you have got to set the proper standard from the beginning. If you do not all of your training will suffer or be of little real use. Now, when we say Criterion Referenced Instruction we mean training aimed at mastery of a task selected as critical. CRI is the way TRADOC develops training, whether for institutions or unit training. The selection of criteria is a high art, one to which we are applying the most advanced methods at our disposal.

### INDIVIDUALIZATION

The second major strategy which I wish to discuss in our attempts to solve the Army's training problems is what I call individualization. The TRADOC has attempted to build learning instruments which take the training directly to the individual soldier. We seek as a part of the development of training materials to get a commitment from each individual being trained. We want him to be involved in it, discovering, adapting, and really committed to the success of training. I think that we have had a substantial amount of success.



For instance, I am pleased to report that as of two days ago we now have a standard Army physical fitness program, one that is individualized for our soldiers. We call it the Baseline Program, that would be designed for people going to school or on staffs. But it prescribes six separate paths to physical fitness. Proficiency tests are set up so that the individual can go in, take a diagnostic test, measure his improvement from periodically and then take a test that will measure achievement of the desired standards. We are finally individualizing the physical training business. Going around the circle of letters counterclockwise, is Integrated Technical Documentation and Training (ITDT), the Army Correspondence Course Program (ACCP), the Basic Noncommissioned Officer Course (BNCOC), Training Extension Course Program (TEC), Self-Pacing, Soldier's Manuals and SQT's, I want to make a few brief remarks on each of those.

First of all, General DePuy mentioned to you the other day the Commander's Manual. A Commander's Manual is simply a compendium of the Soldier's Manuals for a series of Military Occupational Specialties laid out in a way that is useful to the company or battalion commander. Each Commander's Manual explains who is doing the initial training job, what references are available and what is expected in the way of training out in the unit. Used with the Soldier's Manual, these books lay out the requirements for individual training which are the noncommissioned officers' responsibility.

**WHAT THE SOLDIER NEEDS TO KNOW**

- TASKS, CONDITIONS, STANDARDS
- REFERENCES/SUPPORT
- ROADMAP TO SUCCESS



**WHAT COMMANDER NEEDS TO KNOW**

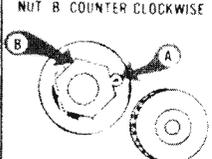
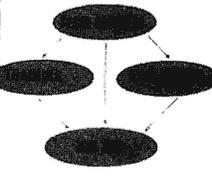
- TASKS FOR MOS
- SUPPORT REQUIRED
- WHERE TAUGHT (SCH. VS UNIT)



ITDT

Now let us turn to Integrated Technical Documentation and Training. We have got to get rid of the verbalized procedures that are now presented in our technical manuals. What we need to produce what is an effective job aid that can be just as meaningful in training in institutions or in units. These aids must also be useful in actually doing the job, and of course they will be used to evaluate whether the soldier can do the job or not.

# • ITDT •

<p><b>IT'S SIMPLE</b></p> <p>PULL COTTER PIN A AND TURN NUT B COUNTER CLOCKWISE</p> 	<p><b>IT'S A BIGGER ROLE</b></p> 																
<p><b>IT'S COST EFFECTIVE</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr><td>REDUCES ERROR RATE</td><td style="text-align: right;">75</td></tr> <tr><td>REDUCES SPARE PARTS DEMAND</td><td style="text-align: right;">30</td></tr> <tr><td>REDUCES TIME IN TRAINING</td><td style="text-align: right;">25</td></tr> <tr><td>REDUCES MANPOWER REQ</td><td style="text-align: right;">35</td></tr> </table> <p style="text-align: center;">   <b>OVERALL MTTR REDUCTION OF 40%<sup>1</sup></b>  <b>VERSUS</b>  <b>150% INCREASE IN INITIAL COST</b> </p>	REDUCES ERROR RATE	75	REDUCES SPARE PARTS DEMAND	30	REDUCES TIME IN TRAINING	25	REDUCES MANPOWER REQ	35	<p><b>IT'S A PARTNERSHIP VENTURE</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px;">DARCOM</td> <td style="padding: 2px;">TRADOC</td> </tr> <tr> <td colspan="2" style="text-align: center;">  </td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">FY 76</td> <td style="padding: 2px;">30</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px;">FY 77</td> <td style="padding: 2px;">15</td> </tr> </table> <p style="text-align: center; font-size: small;">FOR BOTH FIELDED AND DEVELOPING SYSTEMS</p>	DARCOM	TRADOC			FY 76	30	FY 77	15
REDUCES ERROR RATE	75																
REDUCES SPARE PARTS DEMAND	30																
REDUCES TIME IN TRAINING	25																
REDUCES MANPOWER REQ	35																
DARCOM	TRADOC																
																	
FY 76	30																
FY 77	15																

There have been 90 separate tests in all three services on the ITDT approach that we are taking. We have come up with results that show ITDT manuals have reduced the error rate by 75%, reduced spare parts usage, reduced time to train and the manpower. But it is very much more expensive than the old method of producing unintelligible Technical Manuals. This is because of the front-end analysis required. This is necessary to establish the criteria at the beginning.

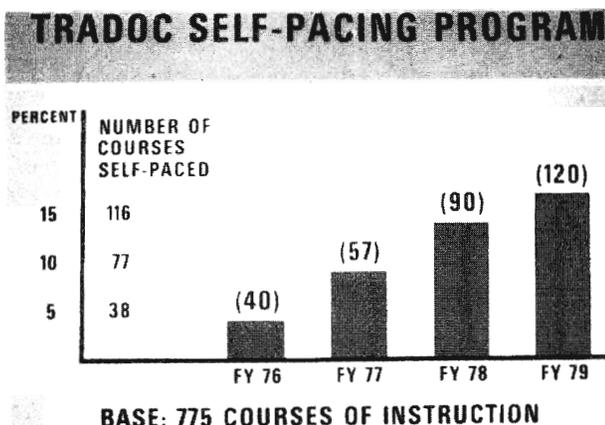
The expense has deterred much investment in this project up to now. Yet, we can report some progress, we now have a jointly funded program between DARCOM and TRADOC to produce more of these manuals. We are moving ahead and we are preparing documents for both fielded and developing systems. If I had to identify the most important thing that General Deane\* has done, during the tenure of his command, from the point of view of the TRADOC, I would cite the ITDT program. It goes directly to the problem of building materials with which the kind of soldiers that we're going to have now and for the foreseeable future can actually work.

Individualized instruction operates on these general propositions. Lock step refers to the notion that you bring in a class on a date certain and they graduate on date certain after they've had X of instruction. This contrasts with systems developed self-pacing, by which we mean that it's the criteria that we keep constant, and we'll keep any soldier in the program for whatever length of time needed to allow him to master the criterion test. We also say that we want the instruction centered on the student. Well, how do you do that? Once again, we find that we have to put a lot of money behind it to set proper criteria. Often we have contractors, outside the Army, because the conventional wisdom of soldiers and civil servants militates against our building workable courses quickly with in-house resources. At any of our institutions where we have applied this strategy, there has been massive resistance at the outset. But once we get a course, the resistance collapses, and we then have converts who become fervent in their application of the program. But we're making progress, steadily.

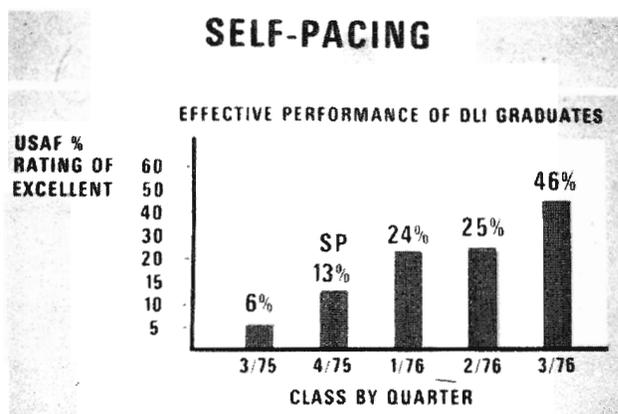
MODE OF INSTRUCTION	CONSTANT	VARIABLE	ORIENTATION
LOCK STEP - OR "CONVENTIONAL"	LEARNING TIME	STUDENT PERFORMANCE	INSTRUCTOR CENTERED (INSTRUCTOR PRESENTS)
SELF-PACED SYSTEMS DEVELOPED	STUDENT PERFORMANCE (SIMILAR TO SQT)	LEARNING TIME	STUDENT CENTERED (INSTRUCTOR COUNSELS)

\*General John R. Deane, Jr., Commanding General, US Army Material Development and Readiness Command

In this year, 2,000 manyears were saved for the force by the reduction of time in the training base. This year 3,000 manyears; next year 5,000 manyears, I'm talking you know fellows, about brigades worth of manpower for the United States Army



Here is sort of an example of applying self-pacing at one end of the learning spectrum. These are Defense Language Institute graduates, privates who learned a foreign language preliminary to going into communications intercept jobs. This measure of effectiveness was established not by the Army but by the Air Force. At Goodfellow Air Force Base, when a soldier comes in he is given a diagnostic test to determine his degree of language proficiency. From the time that we began self-pacing courses in the 4th Qtr of '75, the Goodfellow test, which has not changed, shows language proficiency has been going up steadily. And as we get more and more courses at the



DLI converted to self-pacing, we've been seeing this kind of thing. Incidentally, the student incident rate at the DLI is down 50 percent, and student morale is noticeably higher. There is a much higher degree of student cohesion and class spirit. Colonel Sam Stapleton, the guy who runs DLI, will tell you that individualization is the greatest thing that's happened at the DLI in thirty years. Incidentally, if any of you are outbound for USAREUR take the German Gateway course, you will find out about individualized instruction.

## DISCIPLINE AND SELF-PACING

Individualization does not require arcane or esoteric skills; it works with some of the more humble courses in the TRADOC, like the Wheeled Vehicle Mechanic, or the Cook's Course. Where we put in self-pacing we have seen almost immediately, dramatic changes in the behavior of the students, as evidenced by the factors shown on this chart. This alone would tell us that we're on the right track using individualization as a training strategy.

	CHANGE IN DISCIPLINE INDICATORS AFTER SELF-PACING	
	WHEEL VEHICLE MECHANIC COURSE 63B10	COOK COURSE 94B10
ATTRITION	-60%	-40%
AWOL	-33%	-52%
ARTICLE 15	42	NO CHANGE

Here are the statistics from actual courses as of December 1976. Note that the fastest graduate may leave as early as two weeks. This bothered General Rogers\* who wondered how in the world we could turn out a mechanic in only two weeks. The answer is this is that the fast burners come to us with a substantial amount of skill, usually having been a mechanic in civil life. They can pass the proficiency tests early in the course. Why have such a soldier hang around Fort Dix? We say send him to the field. But observe the record for the slower graduate -- this is the fellow who has trouble reading.

This is the fellow who is well motivated and wants to be a good mechanic. He has the aptitude, but simply can't move through the program as rapidly. But individualization says that we will work with him. On the average, over half the class is getting out early. The same thing is occurring in the Driver's Course shown in the right hand column. In almost every one of our schools where we have put in self-paced programs, officer and enlisted, we have had similar results. So individualization is a strategy that I commend to your attention, not as a panacea, but as a training strategy which makes for an interesting difference in training results.

## FT DIX AIT SELF-PACE COURSES AS OF DEC 76

	63B WHEEL VEHICLE MECHANIC	64C WHEEL VEHICLE OPERATOR
LENGTH OF STD CRS	8 WKS	7 WKS
AVG STUDENT LENGTH WITH SELF PACING	7.3 WKS	6.5 WKS
FASTEST GRADUATE	2 WKS	4 WKS
SLOWEST GRADUATE	12 WKS	11 WKS
% GRADUATED EARLY	59.5%	47.5%

\*General Bernard W. Rogers, Chief of Staff of the US Army

ARMY CORRESPONDENCE  
COURSE PROGRAM (ACCP)

Now let me talk to you about a TRADOC individual training that reaches out to a lot of people. In our Fall survey of the Army, we asked: "What is the greatest asset to individual training that the Army presently makes available to you?" You know, I had sort of hoped that we would receive many responses that said the Training Extension Course Program, but they didn't. Less than 10 percent of the respondents said that. Yet 960 of the 2,000 odd respondents to the survey cited the Army Correspondence Course Program as our most important support for their training.

Look at the enrollment figures -- a quarter of a million people distributed like that. I think you can see the importance of that for the Reserve Components. The single most important problem in Reserve Component training is the individual training of individual soldiers, and correspondence is their best approach to getting it.

Last year we took a graduate of your institution, Colonel Bob Brumbach and we put him in charge of the Army Correspondence Course Program. We charged him to make this a much better program than it's been. Brumbach came back to me with this chart. I don't expect you to read it in detail, I just want you to note that this is a road map of idiocy. The lighter numbers show the number of courses prepared by the proponent school. What this tells you for example, is that the Infantry School has a 143 sub-courses that it produces itself. But in its correspondence course program it teaches some 201 sub-courses, the rest of the sub-courses it must get from other schools put the USAIS cover on them, and reship. So, we have been for years operating on the notion that the way you run this is that you go to all of the other schools, have them produce a sub-course, and then print it, and ship it to the Infantry School.

NONRESIDENT INSTRUCTION		
SOURCE OF STUDENTS	TOTAL ENROLLMENT	PERCENT ENROLLED
ACTIVE ARMY	147 262	54
USAR	43 837	16
NG	53 162	20
USAF	881	
US NAVY	868	
COAST GUARD	105	
USMC	1,013	
ROTC	1,745	
FOREIGN MIL	1,527	10
FOREIGN CIV	786	
US CIVILIAN	19,704	
<b>TOTAL</b>	<b>270,890</b>	

COURSE	TC	AD	MM	CH	EN	INT	AR	IN	AV	FA	INA	QM	SIG	DD	IR	MP	ASA	TOTAL
TC	185	2	1	0	0	0	3	0	11	0	0	10	0	5	2	0		226
AD	3	123	8	3	3	3	3	3	3	2	3	3	3	3	3			178
MM	0	6	98	0	0	0	0	0	0	0	0	0	4	0	0			100
CH	2	2	2	96	2	2	0	2	2	1	2	2	2	2	2			123
EN	2	4	3	2	136	2	3	3	1	1	3	3	3	2	3			174
INT	4	4	1	4	7	34	4	4	4	4	2	4	4	5	4			99
AR	7	5	2	4	5	4	128	4	1	3	3	5	5	5	4			180
IN	22	29	23	18	18	30	19	143	22	11	18	18	26	16	26			401
AV	5	2	0	1	2	2	2	2	68	2	1	2	2	2	2			119
FA	4	7	8	5	4	4	4	4	85	3	5	6	5	5	4			156
INA	9	10	0	9	10	9	8	9	11	11	124	9	9	11	9			259
QM	16	6	7	8	5	5	5	8	5	4	3	148	8	10	8			249
SIG	2	10	8	2	2	4	2	2	5	0	3	2	223	4	2			275
DD	11	16	22	7	8	7	15	6	7	4	4	15	15	320	7			469
IR	24	35	42	19	19	12	12	13	27	15	6	15	22	22	171			466
MP	2	2	1	2	2	2	2	2	1	1	2	2	2	2	2			105
<b>TOTAL</b>	<b>280</b>	<b>264</b>	<b>214</b>	<b>180</b>	<b>223</b>	<b>120</b>	<b>212</b>	<b>201</b>	<b>193</b>	<b>147</b>	<b>175</b>	<b>243</b>	<b>330</b>	<b>418</b>	<b>251</b>	<b>184</b>	<b>2202</b>	<b>3895</b>

USAGA is not included at this time

The Infantry School then puts its own cover on it, and mails it out to the soldiers. What the chart amounts to is several millions of dollars worth of mailing costs, and tons and tons of paper passing through the mails around the country. Colonel Brumbach has not figured out a way to make the system more rational. He is the only colonel in the United States Army that has his own zip code number. He has a couple of large, air-conditioned warehouses, and he is about to go into the business of dealing with those quarter of a million soldiers directly. That is kind of an interesting challenge for a colonel in the US Army.

TRAINING EXTENSION  
COURSE PROGRAM (TEC)

There's a Training Extension Course Program which I mentioned earlier. It's an individualized program designed for use in units. To support individual training in units.



Here shown are the representations we make about it. It must be validated before it goes to the field.

● **SOLDIER TESTED**

1. DESIGN PROTOTYPE LESSON
2. TEST ON SOLDIERS FROM TARGET AUDIENCE
3. REDESIGN LESSON
4. RETEST ON UP TO 30 SOLDIERS
5. REDESIGN

**GUARANTEED TO TEACH!**

BASIC NONCOMMISSIONED  
OFFICER COURSE (BNCOC)

As a wrap up to my discussion of individualization I want to show how it has been applied in a key new course for preparing promising young NCO for greater responsibility, BNCOC. As you can see the course is set up in three distinct phases, the first of which concentrates on the individual's ability to train his subordinates. This phase begins with a diagnostic test to determine where the NCO is in the way of skills. Those subjects in which he is already proficient do not need to be done again. Thus his course of instruction is tailored to his own requirements. The students can spend more time on weak areas and are not bored by repetitious instruction. The NCO who have been through this Basic NCO Course like it and feel that it serves their own needs in preparing for increased responsibility.

**BASIC NCO COURSE FOR COMBAT ARMS (BNCOC/CA)**

PHASE I INDIVIDUAL TRAIN TO TRAIN	PHASE II TRAIN IN MOS CRITICAL TASKS USING TECHNIQUES ACQUIRED IN PHASE I	PHASE III TRAIN AS COLLECTIVE TRAINER
DIAGNOSTIC TESTING	11B - INFANTRYMAN	COLLECTIVE TRAINING TECHNIQUES  FIELD EXERCISE (ARTEP EVENTS REALTRAIN TECHNIQUES)
CONDUCT OF PERFORMANCE ORIENTED TRAINING (USE OF TRAINING MATERIALS, TECHNIQUES AND DEVICES)	11C - INDIRECT FIRE INFANTRYMAN	
	11D - ARMOR RECONNAISSANCE SPECIALIST	
	11E - ARMOR CREWMAN	
	12B - COMBAT ENGINEER	
	13B - FIELD ARTILLERY CREWMAN	
	12C - FA CANNON OPERATION/FIRE DIRECTION ASSY	
	16P - CHAPARRAL CREWMAN (HEVEVE)	
	10R - SHORT RANGE AIR DEFENSE ARTILLERY CREWMAN	

NOTE: THE CORE BNCOC/CA CURRICULUM WILL REQUIRE APPROXIMATELY FOUR WEEKS TO CONDUCT. HOWEVER, THE LOCAL COMMANDER MAY INCREASE COURSE LENGTH TO INCLUDE ADDITIONAL TRAINING DEEMED NECESSARY.

EXPERIENTIAL LEARNING

Let me turn now to experiential learning. We hold that most learning occurs when soldiers are doing as opposed to sitting, listening, or looking. It is always easy to lecture, and it has always been difficult and expensive to provide peacetime experience which is truly relevant to wartime skills.

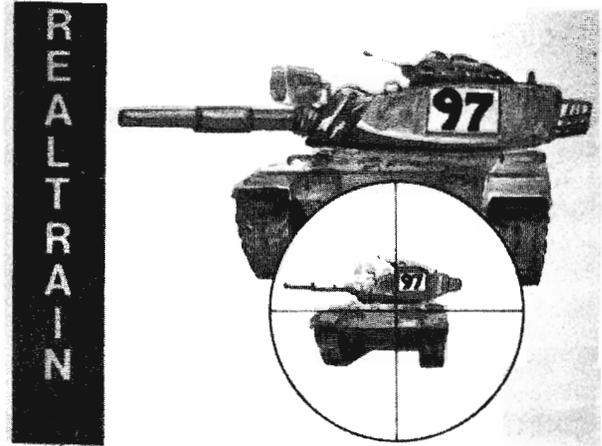
ENGAGEMENT SIMULATION

The chief approach, or strategy that we've employed in this respect is what we have termed engagement simulation. This is the definition of engagement simulation. In the survey to which I have been referring, over half of the soldiers who could possibly have seen an engagement simulation exercise, responded that it was a superb aid to their training.

**EMPLOYMENT OF TRAINING SYSTEMS OR DEVICES WHICH REALISTICALLY SIMULATE THE COMBAT ENVIRONMENT TO INCLUDE**

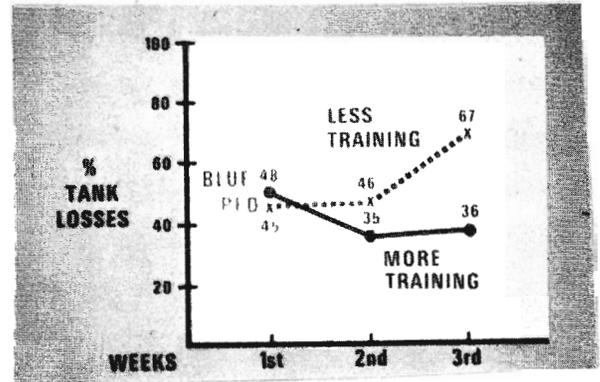
- TWO-SIDED FREE-PLAY TACTICAL EXERCISES.
- OBJECTIVE & REAL TIME CASUALTY ASSESSMENT.
- REALISTIC SIMULATION OF MODERN WEAPON'S LETHALITY.
- SIMULATION OF ALL WEAPONS SIGNATURES.
- ACCURATE RECONSTRUCTION OF THE TACTICAL EXERCISE.

REALTRAIN is the engagement simulation system which most of them could have seen, because this is the system we fielded in Europe last year and are fielding in Korea and FORSCOM this year.



Here are results of training with REALTRAIN which shows that it does teach combat critical skills. The Blue Force is one that was kept in training for three weeks in a row. The Red Forces were composed of different platoons each in Week 1, Week 2 and Week 3. Note how the Blue Force outperforms the Red over time. Thus the Blue Force ends up being a very much more capable force, than it was at the outset. These figures, incidentally, are from a large number of trials in four different training areas in Germany.

### COMPARISON OF TANK CASUALTIES FOR MEETING ENGAGEMENTS



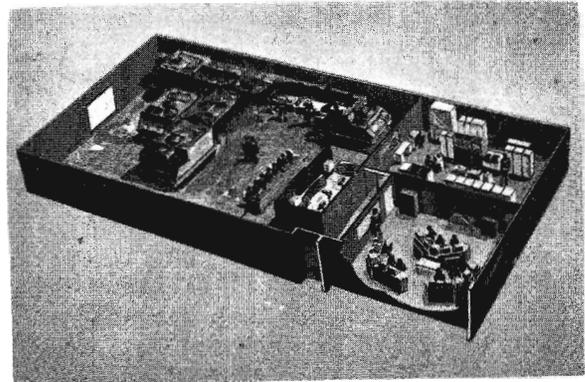
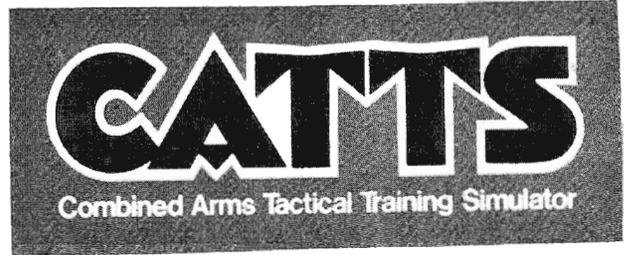
Or you can look at this sort of data. Note particularly the far right hand column which shows the difference between the first and third week. Team A is the Blue experts, Team B is the Red tyros. You can see over the whole experiment there was a big change in the performance of the Blue team. They had been gathering experience and momentum with the engagement simulation exercises as they progressed.

### COMPARISON OF SURVIVABILITY FOR WEEKS 1 AND 3

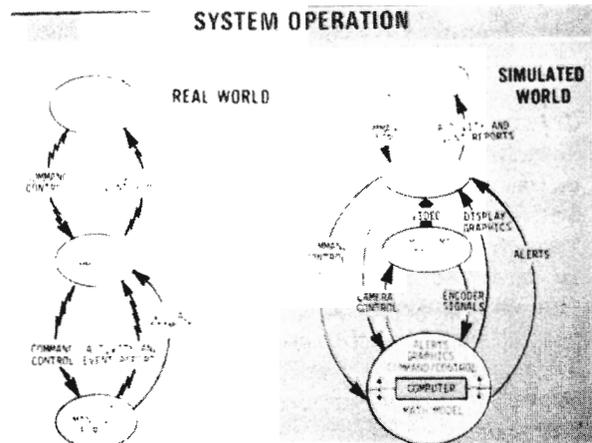
	PERCENT CASUALTIES WEEK 1		PERCENT CASUALTIES WEEK 3		PERCENT CHANGE WK 1 TO WK 3		PERCENT DIFFERENCE IN CASUALTIES FOR WEEK 3 (B-A/A)
	TEAM A	TEAM B	TEAM A	TEAM B	TEAM A	TEAM B	
OWN TANK CASUALTIES	48.0%	44.7%	35.7%	66.7%	-25.6%	+49.2%	86.8%
OWN INFANTRY CASUALTIES	34.3%	49.2%	29.7%	54.5%	-13.4%	+10.8%	83.5%
OWN APC CASUALTIES	60.0%	55.0%	35.0%	40.0%	-41.7%	-27.3%	14.3%
OWN TOW CASUALTIES	90%	90%	33.4%	44.4%	-63.9%	-50.7%	32.9%

COMBINED ARMS TACTICAL  
TRAINING SIMULATOR

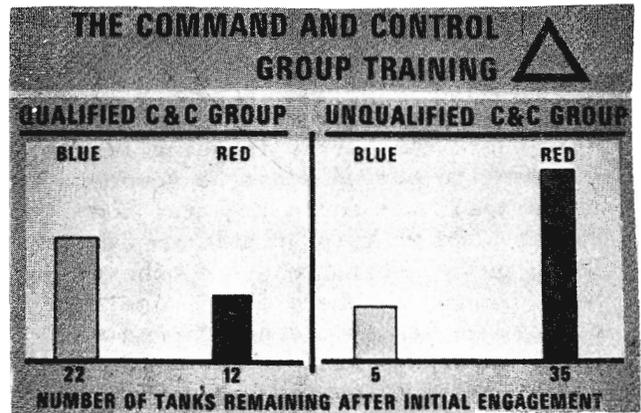
CATTS is a type of experiential learning familiar to some of you. This apparatus is now out at Leavenworth. It is a big computer, a Xerox Sigma 9, and it uses television systems, and other sophisticated devices. You might say, Holy Hannah, what are we getting into here. Well, the name of the CATTS game at Leavenworth is to bring in actual battalion command groups from both Active and Reserve Components and let them fight a war in the Middle East, using this device. Instead of the traditional methods of controlling a CPX, controllers with CATTS have a more realistic way of driving the exercise and it is wholly freeplay.



In the computer is a math model of the terrain, the weapons, the enemy and the opposing forces. The entire exercise moves in real time. You can put a battalion commander and his staff in there for eleven hours and they live war, believe me.



We've had over 40 commanders and their staffs through there, and we have seen marked differences among the command groups. This chart shows two groups, both rated C1, incidentally. In the opening engagement, with this battalion on the left, the friendly force came out of it with 22 tanks and cut the enemy down to 12. The other commander in exactly the same situation, came out of it with 5 facing an enemy with 35. Incidentally, the odds for both are about 4 to 1 going in.



Here are some opinions from your colleagues, the battalion commanders who participated in the exercise. There were a few commanders who did not like CATTs, mostly the ones that lost, but most of them heartily endorse it.

**COMMENTS FROM BATTALION COMMANDERS**

"CATTs IS THE BEST TRAINING DEVICE AVAILABL OF ITS KIND THIS TYPE OF TRAINING CANNOT BE DUPLICATED IN A UNIT EXCEPT AT GREAT EXPENSE IN PEOPLE AND MONEY

"I WOULD NOT HAVE DONE AS WELL AS I DID ON MY ARTEP UNLESS I HAD HAD TRAINING ON CATTs

"I WISH I HAD HAD AN OPPORTUNITY TO TRAIN ON CATTs PRIOR TO TAKING MY ARTEP "

"CATTs PROVIDES THE MOST REALISTIC TRAINING ENVIRONMENT FOR A BATTALION COMMANDER AND STAFF FOR COMBAT OPERATIONS THAT I HAVE EVER EXPERIENCED "

"I HAD TO COMPLETELY REWRITE MY TACTICAL SOP AS A RESULT OF MY TRAINING EXPERIENCE ON CATTs."

General Rogers and General Blanchard, who have both been out to Fort Leavenworth to look at CATTs are very anxious to proceed with the CATTs program. We regard it in the TRADOC as in the experimental stage, but we are persuaded that we have a very effective tool for teaching skills and knowledge that have eluded us prior to this. I'm sure that you recognize that over 90 percent of the instruction in service schools on the problem of command in battle deals with planning for operations, not the execution of operations. CATTs permits us to teach experientially the execution of operations.

**COMMENTS ON CATTs**

"THE ARMY NEEDS TO EXPEDITE THE DEVELOPMENT OF THIS SYSTEM (CATTs) FOR USE IN THE FIELD "

GENERAL ROGERS  
CHIEF OF STAFF OF THE ARMY

"I WOULD LIKE TO HAVE A CATTs DEVICE IN EUROPE AS SOON AS POSSIBLE. IN THE INTERIM, I WANT TO SEND SELECTED USAREUR COMMAND GROUPS TO FT. LEAVENWORTH, KANSAS, AT MY EXPENSE FOR TRAINING. FURTHER, I WOULD LIKE TO HAVE A PRIORITY ON TRAINING BRIGADES 75 AND 76 ON THIS SYSTEM PRIOR TO DEVELOPMENT TO EUROPE."

GENERAL BLANCHARD  
C/USAREUR

When we say "environment" we mean not only where the battle is being fought (we want to set up a battle scenario in Europe), but where the training occurs. We want to be able to export CATTs out to Fort Lewis or Rochester, New York, or anywhere else. And, of course, we want to be able to make CATTs interface with troop units in actual maneuver on the ground employing engagement simulation.

### FUTURE DEVELOPMENTS

- DEVELOP NEW ENVIRONMENTS
- EXAMINE ALTERNATIVE FRIENDLY FORCE STRUCTURES
- TRAIN AGAINST REALISTIC THREAT CAPABILITIES
- DEVELOP SYSTEMS TO EXPORT TRAINING TO THE FIELD
- DEVELOP SYSTEMS TO INTERFACE WITH ENGAGEMENT SIMULATION

#### 3x5 TANK PLATOON TEST

The next example of experiential learning which I would like to relate concerns the testing of new tank platoon organizations. These experiments in experiential learning tell us that we are on the right track. They were conducted down at Fort Hood, Texas by TRADOC's Combined Arms Test Agency, TCATA. Here we have brought laser devices to bear in order to simulate the weapon fire. The situation had us committing a friendly platoon composed of either 3 or 5 tanks against a force that outnumbered it 4 to 1. The two exercises that I will be talking about are the top two, the defensive exercises.

### 3 X 5 TANK PLATOON TEST

SUBTEST	TYPE TEST	R:B RATIO
1	DAY DEFENSE	4:1
2	NIGHT DEFENSE	4:1
3	DAY ATTACK	2:1
4	LIVE PBR	VARIED

We had 4 attacking Red Tanks versus 1 defending Blue tank, whether the Blue platoon as 3 or 5 tanks. In week 1, we configured one platoon with 3 tanks and then the next week with 5. Another Blue platoon started with 5 tanks, then fought the next week with 3. What happened in week two is that this platoon picked up 2 tanks that had not participated in the first week's training.

### TEST DESIGN

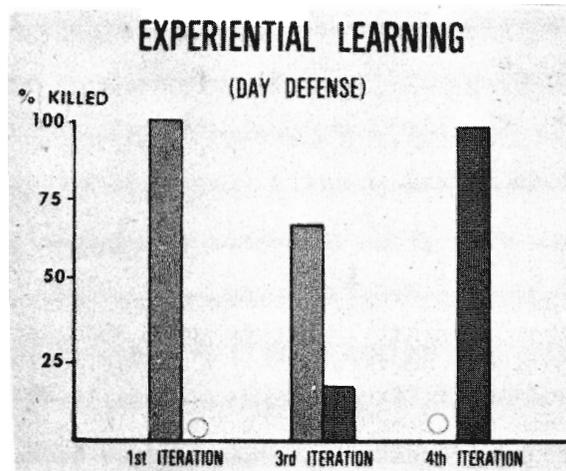
	WEEK 1	WEEK 2
PLATOON A	3 TANKS	5 TANKS
PLATOON B	5 TANKS	3 TANKS

That difference affected the outcome. Remember that we had doctrine for the 5 tank platoons but didn't have any doctrine for that with 3 tanks. There are no manuals written on how to fight a 3 tank platoon in the American Army. So if doctrine could help, the five tank outfit had the edge. But, and this is the point, in the course of the exercise the soldiers themselves came up with a way to fight three tank platoons.

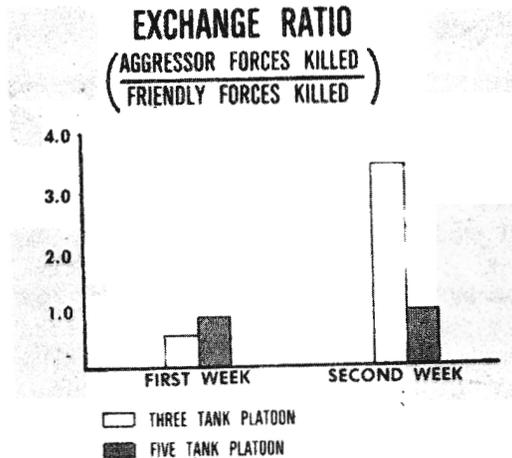
Now guess what? We compared the doctrine they had invented with Israeli's who have been fighting 3-tank platoons and they said: "Yes! They've got it all right." Sergeants devised a doctrine for fighting those 3-tank platoons that resonated well with what the Israeli Defense Forces feels ought to be the doctrine.

Look at what happened over several exercises. During the first run, all friendlies get killed, (we lost the second iteration, incidentally it got dumped from the computer) by the third interation they were looking better, and by the fourth iteration these Blue forces were killing all enemy attackers with a four to one advantage. They learned how to fight that platoon.

DOCTRINE	
5 TANK PLATOON OPERATIONS	3 TANK PLATOON OPERATIONS
● WELL STATED	● NON-EXISTANT
● DOCUMENTED	● EXPERENTIALLY EVOLVED
● PROVEN	
● INGRAINED	



Here is displayed the way the two Blue platoons stacked up. Now, to understand what happened understand that the five tank platoon during the first week became the three tank platoon on the second week, so they dropped two tanks. All three of the crews in that platoon had been through the first week training and learning was going on, 1st, 2d, 3d, 4th iteration. In the other platoon they picked up 2 crews, shown on the right, that had not undergone the first week's training. It was fascinating. The testers noted that those were the first two tanks killed in every trial. See, they hadn't been through that experiential learning during the first week. This other platoon, unencumbered by those untrained crews got 4 to 1 odds in terms of kills.



In TCATA's judgment, this is the way to train tank platoons: Get some lasers, perfect your engagement simulation method and you are going to teach people how to fight on the battlefield.

It is also fascinating for me to report to you that in the TRAINCON Exercise in Europe, where we went to the collective criteria for the tank company, we actually fired at 60 targets in 12 minutes at the ranges that we could expect to engage enemy targets and what the company commander came to use was three tank platoons. The first time the company did it, less than half the targets were engaged. The last time he did it over 90 percent of them were hit. The company commander noticed the first time out that he lost volume of fire when his light sections came up to engage. To remedy this he took his headquarters tanks and broke them down to reinforce the light sections.

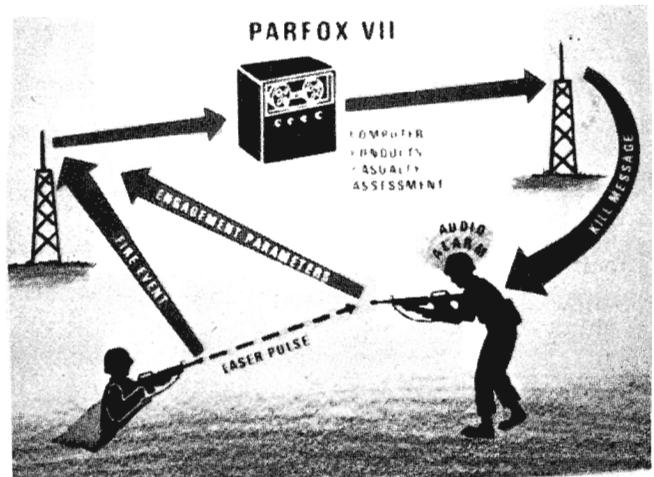
**CONCLUSION**

**THE PLATOON BATTLE RUN COURSE ALONG WITH REAL-TIME HIT/KILL SIMULATION EXERCISES CAN PROVIDE THE COMBAT EXPERIENCE WHICH WILL ENHANCE THE CAPABILITY OF THE ARMY TO FIGHT AND WIN OUTNUMBERED.**

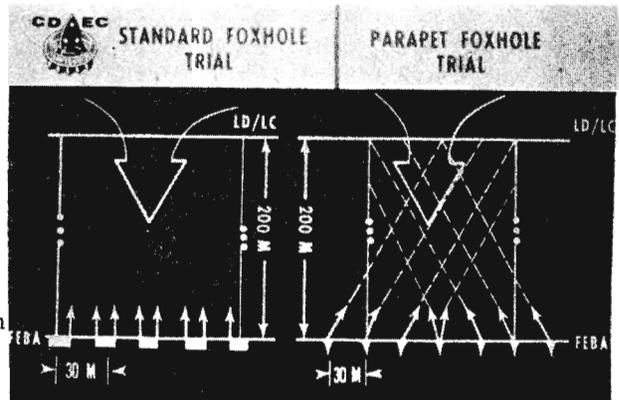
He put one tank commander in charge of each group of three, so that in effect he went to fighting three tank platoons. He did this without any guidance or prodding whatsoever. The name of the game was to go out and find out how to solve a problem and he came up with platoons composed of three tanks each, each shooting under the control of one man. Incidentally, the most successful tactic with the three tank platoon is volley fire. Hold your forces in defilade until the last minute, then bring them all up simultaneously and get off a volley. After this the entire platoon immediately goes back under cover. The platoon then moves, comes up again, and the opposition seldom gets off a shot. So two locations as remote as Grafenwohr and Fort Hood, we say exactly the same phenomena. Needless to say, we were pleased with these results.

### PARFOX VII TEST

Now here's another example, again involving engagement simulation with lasers, used for test purposes but resulting in measurable experiential learning. This test was conducted out at Combat Development Experimentation Command. This equipment is much more complicated than what we'd like to see in training because of the presence of this large computer and the radio links. The test measured the performance of various kinds of foxholes used in defensive positions against an attacking force. The attacking force outnumbered the defenders in some 150 exercises by 3 to 1; 8 defenders, 23 attackers. There was a mechanism in the system which tells people when they are being shot at, so suppression played a role. There were also hit indicators so that immediate hit and kill factors were in the game.



The course looked like this. There are a variety of defensive positions set up in which traditional foxholes were established, the sort that permit the defender to see in all directions and to engage in whatever direction he wants. And then a series of foxholes that were built with parapets which provide cover against frontal suppressive fire, and restrict the field of fire of the soldier to certain angles. The defensive position looks at this from the point of view of fire distribution. The attacker was permitted to pick any tactic that he wished to use. The 150 iterations were carefully set up so as to compensate for the results any differences in terrain or weather.



Well, what did we learn? Three types of foxholes were examined; one with a complete frontal parapet, one with a split parapet--a hole in the middle through which the soldier could observe to the front--and one of the standard foxholes which has 360 degree observation. Consistently, throughout the test, the frontal parapet foxhole produced performances that are better than the standard foxhole. I want you to look beyond those numbers to the learning curve, as you see how these ratios change. Look at how very much more superior the defender is to the attacker in the first type exercise. But the best learning in this exercise was that done by the attackers. The defenders were suppressed less by the attackers fire with the parapets, but that is less interesting than the fact that the attackers learned their jobs and did them better each time.

**CASUALTY EXCHANGE RATIOS BY FOXHOLE TYPE FOR DAY TRIALS (EXPECTED KILLS)**

TRIAL SET	FOXHOLE TYPE		
	FRONTAL PARAPET	SPLIT PARAPET	STANDARD
DAY COMPLETE (1)	$\frac{18.21}{2.58} = 7.1$	$\frac{13.00}{2.13} = 6.1$	$\frac{12.95}{2.65} = 4.9$
DAY MISSING POSITION	$\frac{11.61}{2.44} = 4.8$	$\frac{12.33}{2.57} = 4.8$	$\frac{10.19}{4.39} = 2.3$
DAY COMPLETE (2)	$\frac{12.07}{2.13} = 5.7$	$\frac{10.25}{2.27} = 4.5$	$\frac{11.06}{4.19} = 2.6$
TOTAL DAY	$\frac{14.40}{2.33} = 6.2$	$\frac{11.10}{2.18} = 5.1$	$\frac{11.40}{4.00} = 2.9$

**PERCENT OF TIME DEFENDERS WERE SUPPRESSED POSTURE**

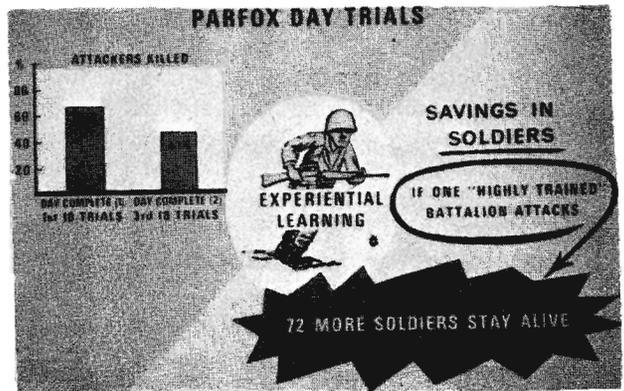
	PARAPET	SPLIT PARAPET	STANDARD
TIME SUPPRESSED	34.6	38.4	48.9

Here is one that is more important from the standpoint of rifle criteria. We discovered in this experiment that even though the defender in the standard foxhole could fire directly to his front, the mean angle of engagement was 20 degrees off from the front and it wasn't much different even when parapets were placed in front. In other words, not only do targets move angularly with respect to the firer, but most engagements occur somewhere off to the left or right front, which is of course very different from the perpendicular engagements we lay out on the TRAINFIRE ranges.

**MEAN ANGLE FOR DEFENSE INITIAL ENGAGEMENTS**

	PARAPET	SPLIT PARAPET	STANDARD
DAYLIGHT	32.1	27.1	20.1
NIGHT	37.7	26.5	21.8

Now here are the results for the attacker. Look! They went from 67 percent killed on the first day to 47 percent killed in subsequent exercises and that is per attack. That equates to 72 soldiers in a battalion alive at the end of the training.



Many of you who have been through that dreadful equation in combat, can understand the advantage of having soldiers trained to this level of proficiency who will live to fight another day.

Now here's another interesting facet of this example. The platoon leaders were allowed to devise their own tactics for hitting those positions. Remember the tactics were not dictated. We observed that you could cluster the tactical methods into four groups as shown on the bottom of this slide. Of course, the superior tactic was this Tactic #3. So this tells you how to organize an attack. It tells you something important about the centrality of fire power. Most infantrymen look at this and say yes, we need a squad automatic weapon. I look at these results and say we need a 25mm cannon in a hurry.

**CD E C**

**ANALYSIS OF TACTICS (DAYLIGHT TRIALS)**

	FRONTAL PARAPET	SPLIT PARAPET	STANDARD	TOTAL
TACTIC 1	25% N=8	9% N=11	43% N=7	25% N=24
TACTIC 2	67% N=3	33% N=3	67% N=3	56% N=9
TACTIC 3	86% N=7	67% N=3	100% N=6	88% N=16
TACTIC 4	- N=0	0% N=1	50% N=2	33% N=3

TACTIC 1	1 FIRE SUPPORT, 2 MANEUVER
TACTIC 2	1 FIRE SUPPORT PLUS AT WEAPONS, 2 MANEUVER
TACTIC 3	2 FIRE SUPPORT, 1 MANEUVER
TACTIC 4	3 SQUADS ON LINE

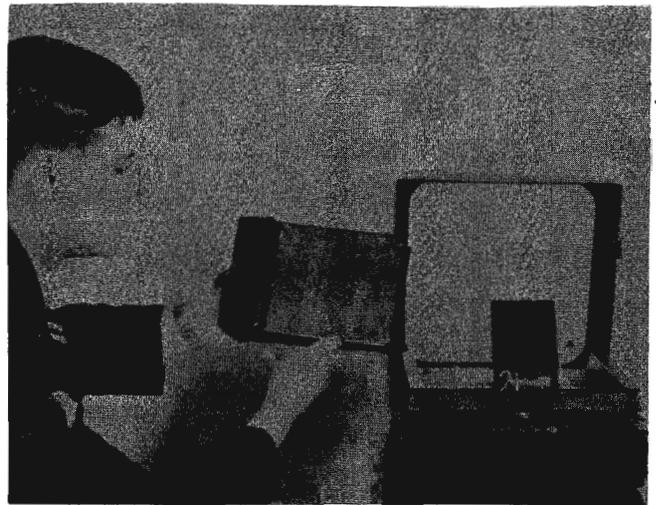
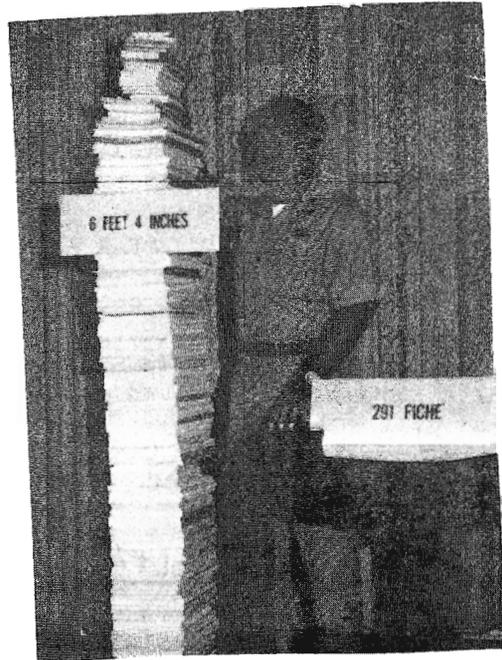
## COMMUNICATIVE COMPRESSION

The last of the categories of training strategies to which I referred is communicative compression. We are all facing, all services, a kind of dreadful spiral upward in the amount of documentation needed to support our equipment. As weapons systems become more complex, we require more and more books, regulations and other printed matter to support them. The Army's experience is exactly the same as the other services, our tanks and helicopters require ever-increasing amounts of paper.

Here is the amount of technical documentation required to run a tank company today. Of course, one solution to the problem is to put all of this paper on microfiche. Next to the fellow in the picture on the table is all of that documentation in a package for a tank company.

Here in my hand is a reader that you can carry around in a tank, and you can have all of that pile on 291 fiche. You've seen these fiche, they contain about 98 standard frames and measure 3x5 inches.

Even better, you could go to a reader like this. This is the Informant. It is portable, fairly rugged, battery-operated microform reader. It can also be operated off a line cord. We have fielded this in a brigade in Germany, the one at Weisbaden, in order to test this method in a unit. It enables you to put in a squad carrier for example all the technical documentation, field



manuals, etc., that a squad might want to reference. The cover comes off so that you can project up on a wall if the NCO wants to talk to a large group. He can use his graphic training aids on weapons, or any subject, so every sergeant in the battalion can have access to a full library of training aids. We are trying to find out whether this is worth our while. Microform or microfiche is one way of going. Now understand the compression ration we're dealing with here; visualize an 8 by 10 page full of printed material. One of those pieces of film that I just showed you will carry 98 full pages. With this sort of a device you can show it in that size or put it on the wall and enlarge it for a group.

Now here in my hand is another way of compressing information. You can put it onto a floppy disc computer memory. This is a device that's actually in use in the United States Navy, built by the Hughes Corporation, this is a floppy disc for the computer. On it you can store 1,000 pages of technical information and call them up at will, and it will respond interactively through this mini-computer with the operator. This is the computer, this is the CRT over here. Disregard that display on the left. Those are the two devices on the right. Now the next question is:

"Is this field worthy?" Well, we don't know, but we are going to find out.



I think, most of you understand the Cathode Ray Tube (CRT) technology is moving very rapidly. In our commanders' conference at Fort Monroe we demonstrated this year an actual flat screen television, a solid piece of plastic with some computer deposited coating inside, with an umbilical cord coming off, that you could hold in your hand and watch a television program. Or you could watch CRT-like Alpha Numeric displays.

But, this is where I think we want to be. This is video-disc. This is an operative system, that we demonstrated at our Commanders' Conference. It is laying there on the table and it'll play over anybody's television set. This one I'm holding up happens to be a recording of General DePuy talking to the TRAINCON at Grafenwohr in November, it's in color and you can play it with full motion. The beauty of it is, that you could stop and look at the pictures one frame at a time. I could also put on this piece of film 54 thousand pages, and look at them one at a time. And each of them can be individually addressed. There's a digital code for

each one of them. That's what the stripes are here for. With a little micro-processor, I could go in and find any one of those pages, and look at them one at a time. Imagine combining that with that solid state screen that I was just talking about, and you can see the advantages video-disc offers in being able to get a lot of information out to the field in useable forms rapidly. Incidentally, this can be reproduced on any ozalid machine, or office copier. We are sort of down in the cost realm that I think the Army must be. Forty cents to make a copy of one video-disc. This isn't pie in the sky stuff fellows.

TRADOC's a "show me" command. We say to sellers that if they want to talk to us about such material they must be prepared for little shows and tells. In this particular case we expect to have four of these systems out in units this spring for test.

So that's communicative compression. You can take a lot of information, put it out there at the disposal of soldiers, sergeants, or anyone and make it work.

### CONCLUSION

My final thought is simply this: General DePuy talked to you about this, one of the key questions facing the United States Army today. These problems may not be as sexy as strategy for the defense of Europe, but unless DA training management comes to some resolution of the problem of how to strike a balance between TRADOC and the field commands, with due consideration of how much money, how much men, and how best to use the time and equipment that are available, we will not be able to get forward with any of the larger strategic questions before the United States Army, and before the people of the United States. Thank you.

(Exit the bat!)

