INNOVATIONS IN LAND COMBAT TRAINING

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INTRODUCTION

Since the last Industry Conference, we, at the Army Training Device Agency, have been getting a good deal of exposure throughout the Army. In the last 12 months we have had most of the CONARC Training Center Commanders visit us; in addition, General Westmoreland attended a demonstration of our Synthetic Flight Training System prior to its installation at Fort Rucker. On 1 July of last year, we changed our name to be more descriptive of what we do. (See figure 1.)

Figure 1. Name Change

Getting General Haines and General Hunt here today is indicative of the command interest in training devices and simulators. Fortunately, I had some prior knowledge of General Haines' presentation so I intend that my paper be considered an extension of General Haines' remarks with emphasis on the need for training devices and simulation techniques for land combat training.

I have divided my paper into several parts. Initially, I would like to tell you a little about the Board for Dynamic Training; secondly, what I saw in Europe at several foreign training centers last September; thirdly, a discussion of cost-avoidance on a trainer in use in Europe; and lastly, what the future looks like for land combat training device developments.

ARMY TRAINING POLICY

In September of last year, General Westmoreland released a message on the subject of Army training policy. This message established a Board for Dynamic

Training to forge a new link between the managers of combat arms training, including both the Reserve and National Guard, and the Army's extensive training establishment. The short and long range goals of this link are to provide the unit training managers the expertise found within the training establishment to accomplish their training mission within the assets locally available. This Board is headed by General Paul F. Gorman, Deputy Commandant of the U.S. Army Infantry School, and responsive to the direction of the Commanding General, CONARC. The primary thrust of the Board for Dynamic Training will be to produce a catalog of idea-stimulating material on how to organize and conduct effective, stimulating, adventurous training and how to conduct training on tactics and weapons despite limitations on training areas or conditions of under-strength.

I think I can say without hesitation that if you have any innovative ideas about any area of training, whether it is in the area of devices, methods, or literature, you will find in General Gorman and his people, a receptive audience.

FOREIGN TRAINING

In September of last year I was fortunate to be a member of a Department of the Army team, which visited several German, French, and British Army training facilities to see what innovations they had that our Army might use. We saw some simple and very interesting training methods. I would like to show you some pictures taken during my travels. Figures 2 and 3 show subcaliber firing at the German Artillery School with miniature targets located approximately 100 yards away at the outer perimeter of a small field.

Figure 2.

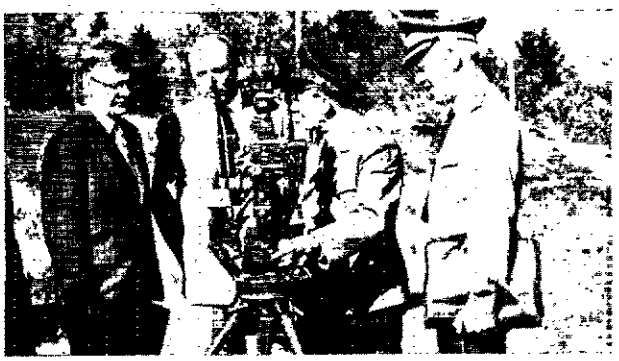

Figure 3.

Figures 2 and 3. Subcaliber Firing at the German Artillery School

This next series, figures 4, 5, 6, 7, 8, 9, and 10, taken in the German Tank School, show a miniature range and some of the various targets in use. Tanks are driven up to this range and the crew goes through a gunnery exercise with subcaliber ammunition, as they would if they were firing full-size live ammunition. We know of no such range as this in use in the U.S. for tank gunnery.

Figure 4.

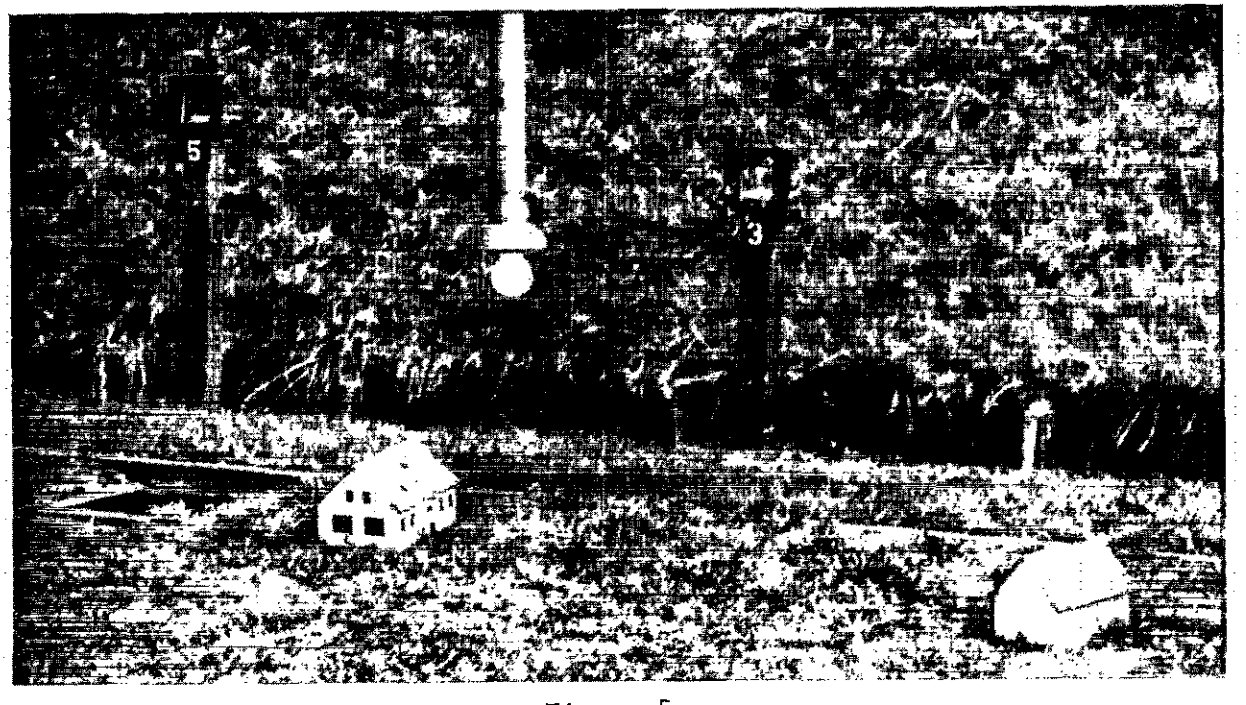

Figure 5.

Figure 6.

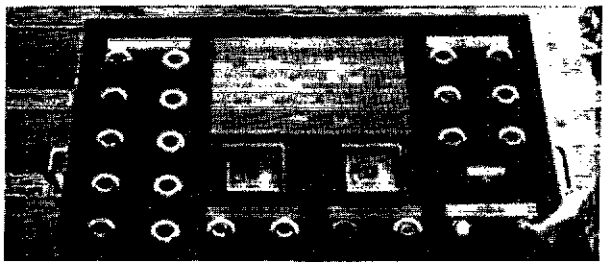

Figure 7.

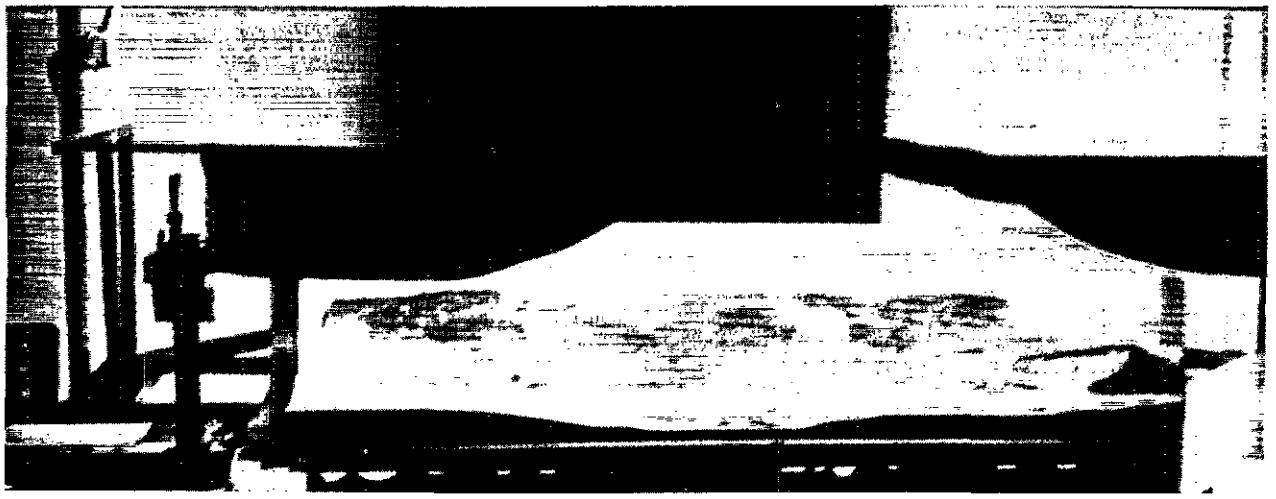

Figure 8.

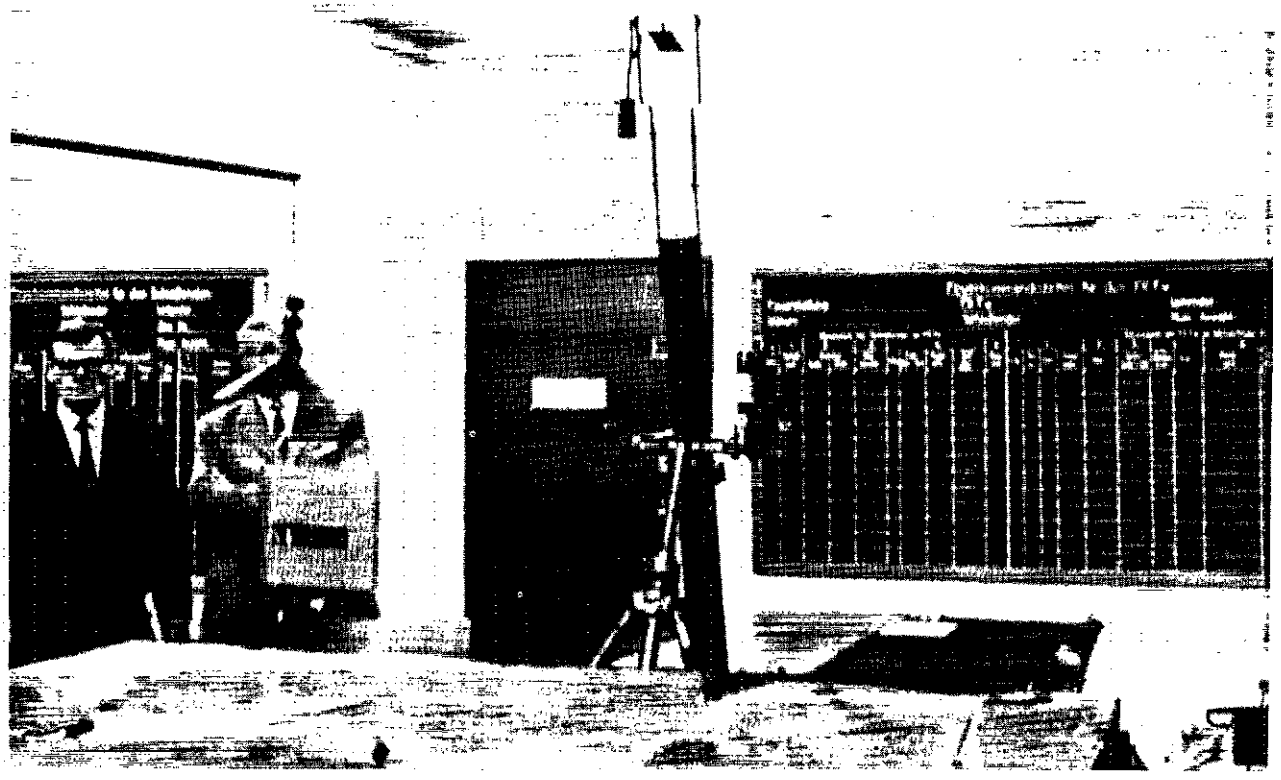

Figure 9.

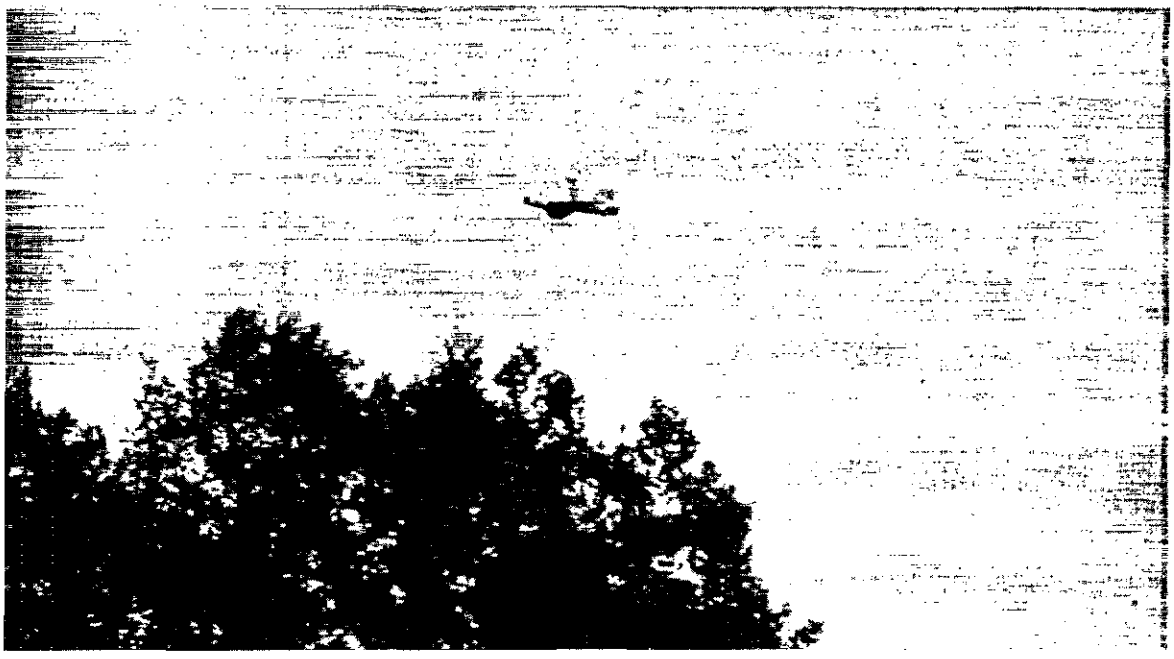

Figure 10.

Figures 4 to 10. Miniature Range and Various Targets in Use at the German Tank School

The following figures 11, 12, 13, and 14 show a British method of training tank crews which is very similar to the methods in use in Germany. While we did not see the French Armor School, we were told they trained in a similar fashion.

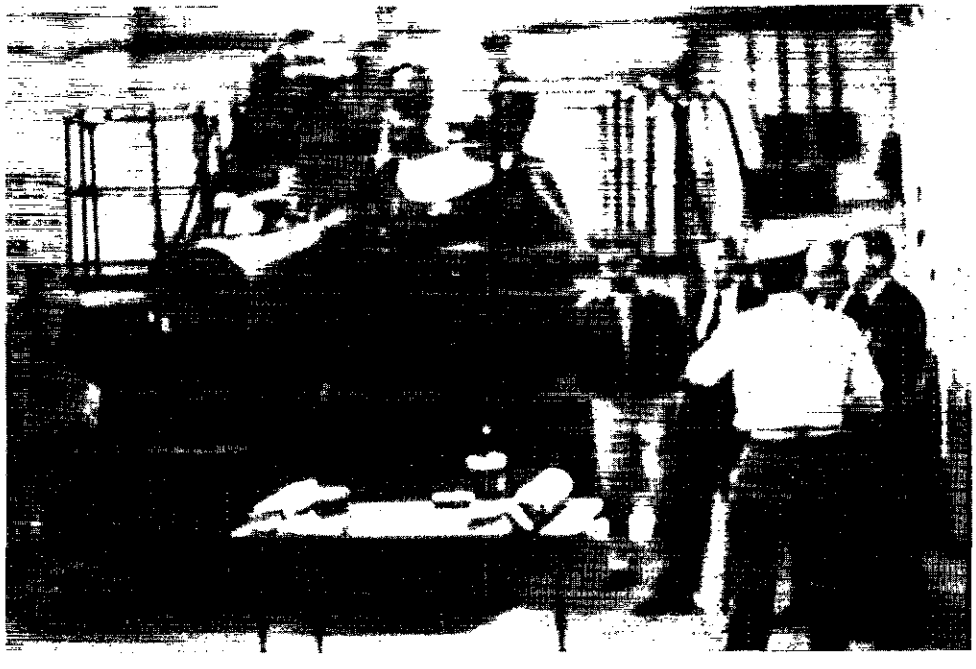

Figure 11.

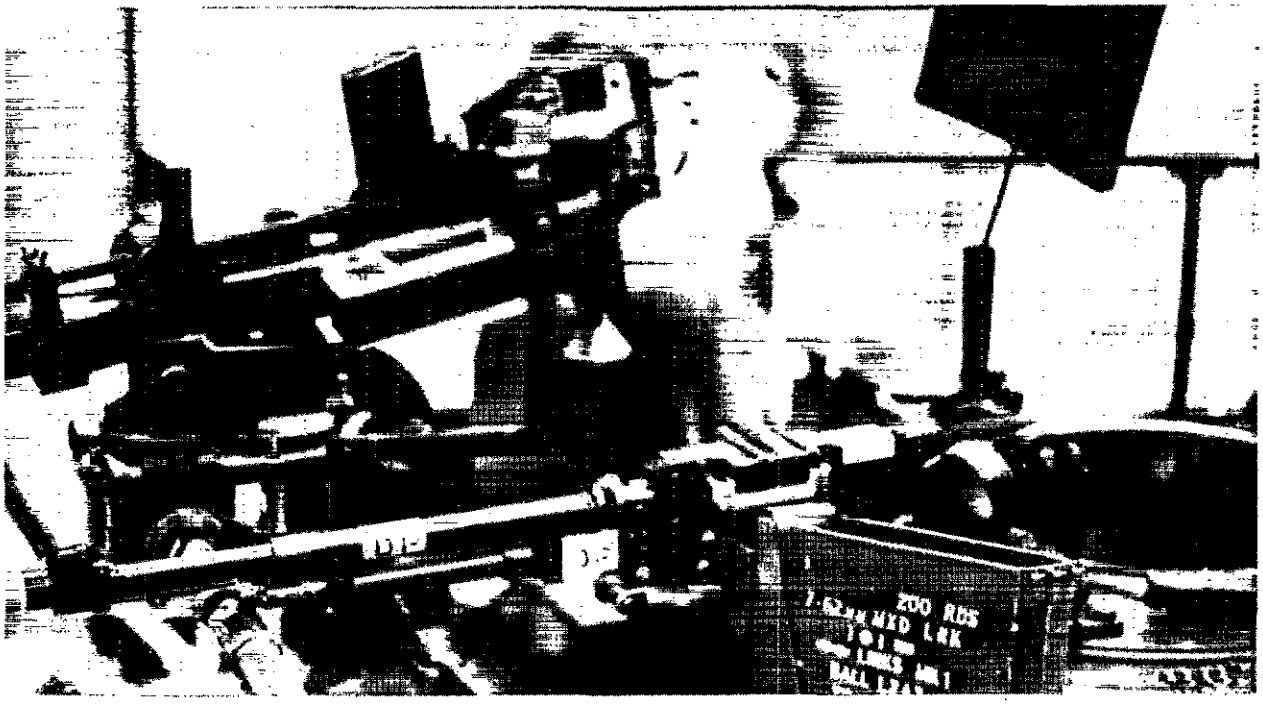

Figure 12.

Figure 13.

Figure 14.

Figures 11 to 14. British Training Tank Crews

A French missile trainer is illustrated in figures 15 and 16. The gunner controls a spot of light which simulates wire-guided missiles. It appeared to be somewhat similar to what we had done in our Shillelagh trainer. The most sophisticated trainers were the driver trainers in use in both Germany, Belgium, and England, utilizing a terrain board 10' x 30' with a television pickup. The device is used to train tracked vehicle drivers. It simulates various types of terrain and is capable of training in emergency procedures. The driver's compartment contains a motion platform with either two or four degrees of freedom.

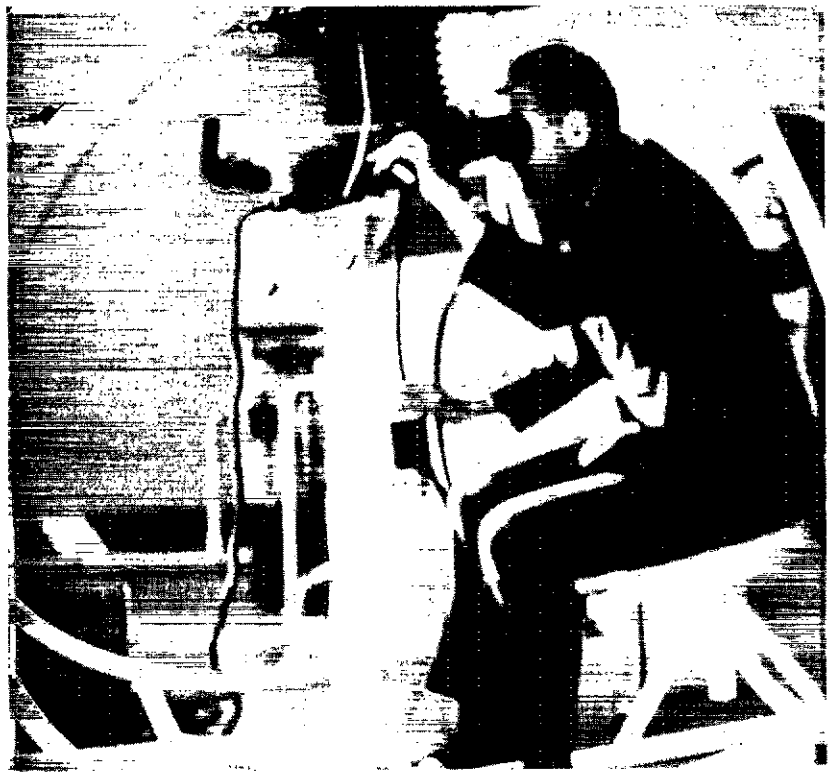

Figure 15. French Missile Trainer (Side View)

Figure 16. French Missile Trainer (Rear View)

Concerning this trainer, I would like to discuss an aspect of cost-avoidance, (figures 17a, b, and c), or cost savings, (figures 18a and b), which illustrates the economics of an effective trainer. The figures apply to the procurement of a driver trainer for the Leopard tanks which are used by both the German and Belgian armies. (See also figures 19 and 20.)

COST-AVOIDANCE -- TANK DRIVER TRAINER

COST STUDIES UNDERTAKEN INDEPENDENTLY BY THE FRENCH ARMY FOR THE AMX-30 TANK AND BY THE BELGIAN ARMY FOR THE LEOPARD TANK REVEAL THAT THE USE OF SIMULATORS FOR TRAINING TANK DRIVERS SAVES APPROXIMATELY 60% OF NORMAL TRAINING COSTS.

Figure 17a.

EXAMPLE

NUMBER OF TRAINEES: 600 DRIVERS PER YEAR.
TRAINING TIME PER DRIVER: 11 HOURS ON THE TANK - OR
7 HOURS ON THE SIMULATOR
+4 HOURS ON THE TANK

AVAILABILITY OF TANKS FOR TRAINING: 250 HOURS PER YEAR.

HOURLY COST OF TRAINING ON TANKS: $325.00 PER HOUR (INCLUDING DEPRECIATION COSTS OF TANK, MAINTENANCE, SPARE PARTS, FUEL, ETC.).

AVAILABILITY OF A TANK SIMULATOR: AT LEAST 160 HOURS PER MONTH, OR 1920 HOURS PER YEAR.

ACTUAL USE, DEPENDING ON TRAINING PROGRAM: 1500 HOURS PER YEAR.

HOURLY COST PER SIMULATOR: $40.00 PER HOUR (INCLUDING DEPCRECIATION COSTS OF SIMULATOR, MAINTENANCE, SPARE PARTS, ELECTRICAL POWER CONSUMPTION, ETC.).

Figure 17b.

COST OF TRAINING DRIVERS

600 DRIVERS, EACH SPENDING 11 HOURS ON THE TANK, REQUIRE A TOTAL OF 6600 HOURS PER YEAR.

THIS REQUIRES $\frac{6600}{250}$ = 27 TANKS - AT A COST OF $325.00 X 2400 = $780,000.

600 DRIVERS, EACH SPENDING 7 HOURS ON THE SIMULATOR, REQUIRE A TOTAL OF 4200 HOURS PER YEAR.

THIS REQUIRES $\frac{4200}{1500}$ = 3 SIMULATORS - AT A COST OF $40 X 4200 = $168,000.

TRAINING THEREFORE REQUIRES A TOTAL OF 10 TANKS + 3 SIMULATORS AT A COST OF: $780,000 + $168,000 = $948,000.

Figure 17c.

SAVINGS

THIS COST ANALYSIS SHOWS ANNUAL SAVINGS OF: $2,745,000 - $948,000 = $1,197,000, OR APPROXIMATELY $\frac{\$1,197,000}{600}$ = $1,995 PER DRIVER, OR A PERCENTAGE SAVING OF 56%.

THE EQUIPMENT REQUIRED AMOUNTS TO: 10 TANKS + 3 SIMULATORS INSTEAD OF 27 TANKS.

Figure 18a.

ADVANTAGES

-TRAINING CAN BE ACCOMPLISHED INDEPENDENTLY OF LOCAL WEATHER AND TOPOGRAPHICAL CONDITIONS.
-TRAINEES CAN FAMILIARIZE THEMSELVES WITH ALL-WEATHER OPERATIONS, WITH COLD-WEATHER STARTING (-15°C), DRIVING ON ICY OR SNOW-COVERED SURFACES, ROUGH GROUND AND MOUNTAIN ROADS, FAST DRIVING ON DRY OR WET ROADS, ETC.
-THE INSTRUCTOR CAN INTRODUCE MALFUNCTIONS WITHOUT DANGER AND REPEAT AN EXERCISE AS OFTEN AS NECESSARY.
-THE INSTRUCTOR CAN MONITOR TRAINEE'S PERFORMANCE UNDER SIMULATED EMERGENCY CONDITIONS SUCH AS POWER FAILURE, BRAKE FAILURE, LOSS OF TRACK, ETC.
-A SIMULATOR CAN BE USED AT LEAST 160 HOURS PER MONTH, WITH AN AVAILABILITY FACTOR ON THE ORDER OF 99%. THE TANK IS AVAILABLE FOR APPROXIMATELY 20 HOURS PER MONTH.
-TRAINING IS NOT SUBJECT TO WEATHER CONDITIONS OR TANK MAINTENANCE SCHEDULES, ALLOWING FOR UNINTERRUPTED TRAINING PROGRAMS.
-SIMULATOR UTILIZATION CAN BE INTENSIFIED DURING PERIODS OF EMERGENCY WHEN A LARGE STUDENT LOAD IS REQUIRED.

REDUCED TANK MAINTENANCE

BY STARTING TRAINEES ON THE SIMULATOR BEFORE ALLOWING THEM INTO REAL TANKS AVOIDS ELEMENTARY FAULTS WHICH CAN CAUSE VEHICLE DAMAGE (GEAR-BOXES, TRACKS, ETC.), WITH A RESULTING DECREASE IN MAINTENANCE.

Figure 18b.

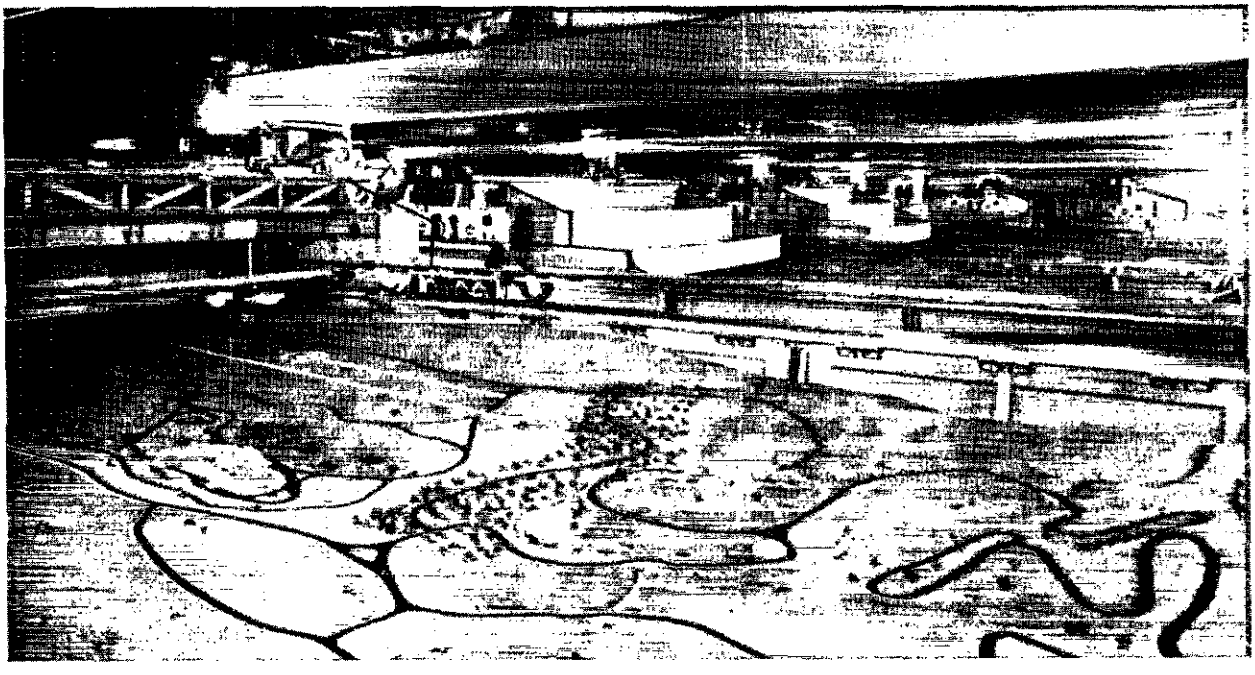

Figure 19. Leopard Tanks Simulated Terrain

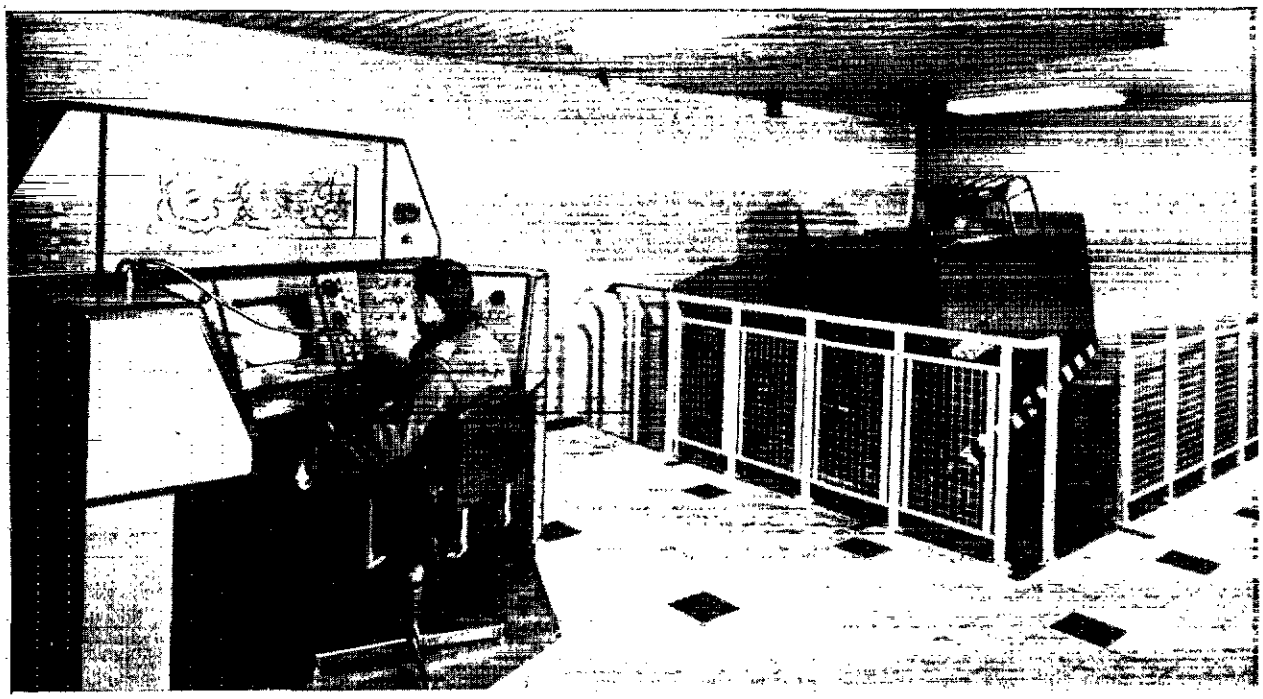

Figure 20. Driver Trainer-Leopard Tanks

These figures show how the Belgians reduced the number of tanks to be procured for the training of drivers from 27 to 10 by buying three simulators. I feel sure a similar case can be made for most major weapons; however, we must get into the picture at the earliest possible time. Whether or not trainers or simulators are bought is not important—what is important is that the alternatives are considered.

What I have shown you are just a few of the items we saw in Europe; however, of particular significance was how the training was accomplished. For example: In the British Armor Training Center at Bovington, the schools train instructors selected from units who, after completing their schooling, are reassigned to their units as instructors.

Secondly, it appears that the Europeans are satisfied with a lot less sophistication in their training than we are, because historically their land areas are limited and they have never had the quantities of ammunition nor the training areas that we have had in this country.

Lastly, both the French and the British mount trainers on both land combat vehicles, and helicopters, to simulate weapon firing. This is done even though it may require a reduction in the payload of the vehicle or aircraft. Both the British and French indicated that it was important for fighting vehicles to carry trainers to maintain gunner proficiency.

As I mentioned earlier, we have received a considerable amount of high-level interest in our business. We have conducted an intensified selling program, and the next two figures 21 and 22 show the result of that effort. Two years ago this list contained four or five items—today it is an indication of the added emphasis on training and training devices.

TRAINING DEVICE REQUIREMENTS

LASER TANK GUNNERY TRAINER, XM55 (3A110)
ARMED AIRCRAFT QUALIFICATION RANGE SYSTEM
SYNTHETIC FLIGHT TRAINING SYSTEM (SFTS)
AEROSCOUT AERO VISUAL TARGET ACQUISITION TRAINER
WEAPON STATION TRAINER, MICV-70
COMBINED ARMS TACTICAL TRAINING SIMULATOR
HIT-KILL INDICATOR FOR MBT
FLASH BANG SIMULATOR FOR MBT
XM803 WEAPONS SYSTEM TRAINER
XM803 DRIVER FAMILIARIZATION TRAINER
XM803 DRIVER POSITION TRAINER
XM803 GUNNER FAMILIARIZATION TRAINER
XM803 GUNNER POSITION TRAINER

Figure 21. List of Training Devices

TRAINING DEVICE REQUIREMENTS

XM803 TANK COMMANDER'S FAMILIARIZATION TRAINER
FIELD ARTILLERY FORWARD OBSERVER TRAINER
LARGE SCALE INDIRECT FIRE ADJUSTMENT SIMULATOR
AERIAL TARGET ENGAGEMENT RIFLE (ATER)
LASER RIFLE FIRE SIMULATOR
GROUND OBSERVER RECOGNITION (GOAR) KIT
SAM-D MISSILE TRAINING ROUND/HANDLING TRAINER
SAM-D ORGANIZATIONAL MAINTENANCE TRAINER
SAM-D SYNTHETIC TARGET SYSTEM
AN/PDR-60 RADIACMETER
SATELLITE COMMUNICATIONS EARTH TERMINAL REPAIR TRAINING DEVICE
SAM-D OPERATOR/TACTICS TRAINER

Figure 22. List of Training Devices

LAND COMBAT TRAINING

To begin any discussion of training device requirements for land combat training, the item that immediately comes to the forefront is the recently approved requirement for the Combined Arms Tactical Trainer.

This was alluded to very briefly by General Haines. This device will use a digital computer and a visual display to create simulated combat situations for the Battalion Commander trainee. Training programs will be designed to permit changes in friendly and enemy weapon systems, techniques and organizational structure with the objective of simulating an enemy on various terrains. The intent will be to generate problems and present situations from various perspectives from the Platoon Leader to the Brigade Commander. This device will be the most sophisticated and complex trainer ever undertaken for use by the land combat forces. If it is successful, similar items are envisioned for each of the combat arms schools. This program is a phased development schedule over a three to four year period.

We like to draw an analogy between CATTS (Combined Arms Tactical Training Simulator) for the Army and some of the Navy's sophisticated Fleet Tactics Trainers.