

## U. S. ARMY PARTICIPATION GROUP

## PRESENT AND FUTURE

COLONEL L. H. LEVINE, U. S. A.  
Commanding Officer

I would like to add my welcome to those of Admiral Owen and Dr. Wolff, and hope that this conference will prove helpful and fruitful to all of us.

During last year's NTDC/Industry Conference, you were given a presentation by LTC Phillip Cunningham which presentation concerned itself generally with the organization and mission of the U. S. Army Participation Group, and what we were doing in the way of training-device developments at that time. Neither our organization nor mission has substantially changed during the past year. Consequently, rather than be repetitive, I would prefer to discuss what's new in Army training-device development, what some of our more critical training problems are, and what we can see in the future for the Army Participation Group and for Industry.

We have several major programs pertaining to the development of training devices at NTDC, for example:

- a. The Synthetic Flight Training System for the Army Aviation School
- b. A training-device requirement study for the Main Battle Tank-70
- c. And third, the Moving Target Simulator for Redeye.

Each of these programs has a potential of many millions of dollars, provided that the developmental effort is successful.

The Synthetic Flight Training System represents a giant step forward in training devices for Army Aviation. This trainer will represent a 20-year advancement in training simulators for rotary-wing aircraft over what is presently being used. We expect to take one giant step from the old Blue Box trainer to digital, multi-cockpit, simulation. This concept is expected to be the most expensive training-device development undertaken by the Army to date. The design of this trainer should include:

- a. Multi-cockpit configuration
- b. Complete flight simulation
- c. Adaptive training
- d. Motion platform.
- e. Adaptability to UHID, Hueycobra; CH47A, Chinook; and possibly the AH56A, AAFSS (Advanced Aerial Fire Support System).

One of the other major programs to which we are addressing ourselves is the Main Battle Tank-70. This program is responsive to development of the Joint US/FRG Tank. To assist in this effort, we are attempting to develop training-device requirements through an independent contractor study. Out of this study we anticipate some realistic training device requirements.

There are some unique features to this tank which will probably require new types of trainers. Some of these features are:

- a. The driver is in the turret compartment

- b. A stabilized sight
- c. A suspension system capable of reducing the height of the silhouette
- d. An automatic loader
- e. An underwater fording capability and, finally,
- f. Operation in a nuclear environment.

By new types of trainers we mean trainers which incorporate new developments. An example might be a weapon-system trainer operating in a simulated visual environment. Even beyond that we anticipate several tank trainers, each in its own simulated environment, operating in teams as opposing forces with visual displays reproduced for monitoring performance. This type of training would provide for the tanker what the operational flight trainer is doing for the aviator. It would enable a tanker to "shoot, move and communicate" in a simulated environment.

With present-day tanks costing in excess of \$500,000 and each missile costing in excess of \$3,000, training in the weapon system and in the conduct-of-fire for such tanks, as well as maintenance of proficiency in that skill, has become a serious problem. Simulation must be the answer because of the high cost of equipment and ammunition. As a consequence, the MBT-70 represents a potential of 25 million dollars in training devices.

We are expending much manpower and many dollars in an attempt to develop a suitable moving target simulator for use by gunners utilizing the Redeye trainer. The Moving Target Simulator consists of a 20-foot quarter spherical screen on which are projected a background of terrain, sky and moving aircraft targets enabling a gunner using a simulated Redeye weapon to fire at the synthetic targets. This simulator will provide a means to train Redeye gunners indoors without regard to weather conditions, time of day, and need for expensive live aircraft targets.

The moving target simulator is an indoor trainer which we hope can be adapted for Chaparral and Vulcan, the new anti-aircraft artillery weapons. As taxpayers, we are always attempting to utilize a single trainer for multiple application. We have provided the project manager for Vulcan/Chaparral with several studies concerning trainers, but Small Development Requirements have not been approved as of this date. However, we see nothing to prohibit approval shortly. As in the case of our conduct-of-fire trainers for the Shillelagh system, we have a common trainer for the Sheridan and M60 tanks, with possible application to MBT-70. Likewise, in the case of surface-to-air missiles, we hope to develop an acceptable device which will be adaptable to Redeye as well as to Vulcan/Chaparral.

What are some of the problems? A major area is hit indication. We can divide this problem into two categories: the first is hit indication through simulation of live ammunition for use in platoon-or company-size tactical exercises using infantry and tanks. In this category, we have a series of trainers labeled 3F43 series. The Army has been using both RDT&E and production funds in an attempt to provide simulation for the 105mm tank gun and the M14 rifle. To date we do not have a satisfactory device for either of these weapons. The requirement for a rifle-hit indicator probably dates back to George Washington's day, and we still have not solved the problem. At the present time we are staffing a new Small Development Requirement (SDR) for a hit indicator system for those tanks mounting the Shillelagh missile: the M551 Sheridan, M60, and the MBT-70. We will continue to work on this problem and invest money in it because it represents one of the greatest dollar-savings potentials in training devices as well as conveniently providing realistic training.

The other category in the problem of hit indication is visual hit registration of live ammunition on targets. Regardless of the amount and type of simulation we can develop, Army gunners will always require some amount of live firing. New targets and target

material are required for the entire family of new weapons, from the M16 rifle to the Shillelagh. In the case of the high-velocity tank gun, the ranges are getting greater and greater, while at the same time land areas are shrinking so that new target material and mechanized registration systems must be devised. Target material must be inexpensive, long lasting, and easily handled. In this connection, a non-material target may be the answer for large caliber weapons. The 5.56 ammunition and high rate of fire of the M16 rifle, on the other hand, require a new look at the present target material and mechanical registration devices presently being used on the small-arms ranges.

We have some fairly sophisticated requirements for visual simulation. The problem is to develop better visual simulation in all of our trainers. We need some new and fresh ideas in this area. For example, in Viet Nam we require gunships to fly 50 feet off the ground during a suppressive fire mission in a hostile area. In training for such missions we need some type of visual representation of what the pilot sees during this type of combat operation. I ask this question: Can we develop visual simulation with enough definition to pick out targets on the ground from 50 feet up?

Another of the major problems which we have and one which many manufacturers fail to consider is maintainability. The Army must utilize draftees who are in uniform for two years only. We find that in reviewing some of our evaluation reports and talking to our users, one of the major reasons for the rejection, and even the non-use of a training device, is the inability of the soldier to maintain it. There is nothing more discouraging to the instructor than to have classes scheduled to receive instruction by means of a training device and in the middle of the instruction period have the device break down. You get the same feeling when running out of chalk in the middle of a blackboard lecture. The limited amount of time available for training prohibits any rescheduling; therefore, a training device which continuously fails to function or is extremely difficult to maintain is worse than no trainer at all.

It is incumbent upon all of us to design for maintainability. Our drive for technical sophistication is outstripping our ability to produce a draftee with the degree of intelligence and capability frequently required to maintain and operate some of the equipment we produce. We have a draftee for two years only; from this period we deduct time spent, for example, in teaching him to be a soldier; time for leave, administrative requirements, sickness, and travel. His productive time in uniform is then reduced to 19 months before we can send him to any school whatsoever. What does this mean? We have learned that anytime we propose a complex, sophisticated training device, we must prove to the individuals who are in the position to approve or disapprove a requirement the cost effectiveness of the training in both dollars and training time.

We are always looking for new ideas and new methods to solve our training problems. You may have seen the article in "TIME" magazine, dated 14 July 1967, wherein the Army plans to use "B. B. guns" at all basic training centers to teach instinct shooting for eventual employment with the M16 rifle. Here is an example of an idea proposed by someone outside of the Army and which was tested and adopted in less than six-months' time. Here again, cost savings are tremendous. It is unlikely that this program will involve any development in that the only requirement is to modify the stock of the conventional air rifle so that the entire rifle will be equal in weight and length to the M16 rifle in order to facilitate transition to that weapon rapidly.

What does the future look like? We have had discussions with the NIKE-X representatives concerning our capabilities in the training-device area. I feel quite sure that we will be called upon at least to assist in the identification and development of training devices for that weapon system. Also, in the area of air defense, there is the SAM-D missile. We are watching the development of this item closely, and we expect that we will get involved. In the area of air-to-ground gunnery, Fort Rucker has a major requirement in the Synthetic Armed Aircraft Training System. This training device will synthesize the aerial gunnery training problem, by allowing the gunner and pilot to operate as a team in a flight simulator

with visual simulation of targets to provide training in target acquisition and engagement. The design basis of the aircraft will be the AH56 (AAFSS) Advanced Aerial Fire Support System and its associated gun system. We have made preliminary studies concerning a suitable training device and anticipate its approval by the Department of the Army sometime this fiscal year. As an associated project to the Synthetic Armed Aircraft Training System, we are currently processing a Department of the Army approved Small Development Requirement for an Armed Aircraft Range Qualification System. The system eventually selected will incorporate immediate and accurate scoring readout information on the live helicopter gunnery range. Such a device is expected to provide a marked improvement in instruction, both quantitatively and qualitatively, at our rotary-wing gunnery school.

In conclusion, we can state fairly accurately that one of our big jobs is selling—selling the U. S. Army Participation Group coupled with the Naval Training Device Center and its capabilities. Secondly, seeing to it that we produce effective training devices which meet our customers' requirements at the least possible cost. We see that in reviewing the long-range operational requirements, trainers are becoming an absolute necessity because of the increased sophistication of new weapons and the increased skills required to operate and maintain them. And finally, simulation, because of the increasing costs of weapon systems and ammunition, will continue to play an ever-large role in Army training.

Again, my sincerest welcome and best wishes for a most productive conference. Thank you.

#### U. S. MARINE CORPS

#### TRAINING BY SIMULATION

MAJOR R. R. SHEAHAN, U. S. M. C.  
Training Services Officer

Gentlemen—We can no longer afford the luxury of exclusive use of actual operational Weapons Systems and Support Systems for training.

Heretofore, the feeling has been that training to the real situation in a real environment cannot be simulated. Recognizing the current simulation state-of-the-art this precept is only partially true. Additionally, expenses involved in operating modern complex tactical systems, restrictions on operating areas on land, sea and in the air, and the extensive training required to gain crew combat capability, collectively dictate a requirement to accomplish such required training through some form of accurate, meaningful, simulation.

The cockpit trainers and weapon systems trainers we deal with today provide a spring-board from which future simulators can be brought to fruition. I believe we have barely scratched the surface.

Accurate simulation achieved a meaningful break through, from an aviation viewpoint, with the advent of the venerable LINK trainer—to instruct instrument flying. This was further refined by follow-on trainers such as the 2F23 which subjected jet pilots to an accurately simulated all-weather flying environment from takeoff to landing, including jet penetrations and radar recoveries.

A student in the training command could, for the first time, develop his confidence in all-weather flying by watching and reacting to his instruments in a simulated environment—the flight trainers. Why was this done—rather than in the aircraft—or in the place where the