TRAINING DEVICES MAKE DOLLARS AND SENSE

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Gentlemen, in behalf of the personnel of the U.S. Army Participation Group here at the Naval Training Device Center, I want to add a warm welcome from all of us to all of you. Together with our Navy colleagues, we are confident that this important conference will prove beneficial to all of us from a professional viewpoint.

It is a pleasure to have the opportunity to address the conference again this year. I have titled my presentation, "Training Devices Make Dollars and Sense." I selected that title for two reasons: First, it is consistent with the conference theme, "Cost Effectiveness of Training Devices," and second, it expresses the views of the personnel of the U.S. Army Participation Group regarding the important role of training devices in Army training and the maintenance of operational readiness. However, the scope of my presentation will be wider than the title implies.

I will talk to you briefly about the U.S. Army Participation Group and how we interface with the Naval Training Device Center and with other Army Commands, discuss our rationale for expanding the use of training devices in the Army, and present our estimate of the Army training device development potential for the next few years.

The U.S. Army Participation Group was established as a result of an agreement in 1950 between the Secretary of the Army and the Secretary of the Navy. While our Group is collocated with the Naval Training Device Center, it is a separate Army unit reporting directly to Headquarters, U.S. Army Materiel Command (AMC) in Washington. The Army Materiel Command is responsible for wholesale logistical support of the Army including research and development, production and procurement, storage and distribution, inventory management and disposal of practically everything the Army uses.

The primary mission of the U.S. Army Participation Group is to coordinate and manage the research, development, and procurement of training devices responsive to requirements approved by Department of the Army. We are also responsible for life cycle management of all non-standard training devices except those locally procured and fabricated by Training Aids Centers.

Since our Group is authorized only 8 officer and 20 civilian personnel, we utilize the technical and administrative services of the Naval Training Device Center in carrying out our mission. For this support, the Army pays a proportionate share of the Center's operating cost—currently, about 15 percent.

This arrangement is an outstanding example of cost effectiveness. It makes available to the Army the wealth of experience and technical expertise in simulation technology acquired by the Naval Training Device Center in over 27 years and obviates the need for the Army to attempt to develop a comparable capability which would be extremely costly in resources and time.

In my presentation at the Industry Conference last year, I expressed two views that I consider still valid and want to reiterate: first, that the potential for increased use of training devices in the Army is almost unlimited, and second, that we should not consider the prospect of reduced defense spending in the years ahead as a bad omen for the future of training devices.

I indicated then that the principal reason for these views was COST EFFECTIVENESS. It still is. Our weapons, aircraft, tanks, and other major items of equipment are becoming increasingly sophisticated, costly to procure, and costly to operate and maintain. As our resources are reduced, we simply must have more efficient and less costly ways of training our troops and maintaining a high degree of operational readiness.

The Army is striving for more than just dollar savings. We also want to improve training effectiveness and, at the same time, reduce the number of instructor personnel required in our training base and the time required for soldiers to reach specified standards of proficiency. Therefore, all courses in the Army's service schools and training centers are being reviewed and redesigned as appropriate through application of systems engineering procedures.

Wherever they are being used, training devices are contributing to achievement of all these goals. Other devices under development will make major contributions when they are put into service. However, more are needed. As I indicated earlier, we believe that the potential for additional trainers in the Army is almost unlimited.

The Army, like all other services, presently is faced with the task of achieving better mission accomplishment with reduced resources. As part of this effort, there is, in our view, an urgent need for the Army training establishment to determine and document additional training device requirements.

Last July, Department of the Army published a new Army Regulation which is revitalizing interest and stimulating increased action in the training device area. Among other things, the new regulation transferred responsibility for the preparation of training device requirements, now called TDR's, and their submission to Department of the Army for approval from the U.S. Combat Developments Command to the U.S. Continental Army Command (CONARC) which is responsible for practically all individual training in the Army. This should reduce significantly the time required from first recognition of a need for a device to approval and funding of the requirement.

While training device requirements may originate at any level in the Army, most of them are initiated by the Army service schools under CONARC. Each of the schools prepares and forwards requirements for training devices needed to conduct instruction in its assigned areas of responsibility. This includes training devices required to support instruction in new systems being developed by Army Material Command project managers. The Qualitative Materiel Requirements for new systems, as approved by Department of the Army, do not contain preliminary requirements for needed trainers. Specific training device requirements are established by the concerned school after system development under the AMC project manager has progressed to the point that he can provide essential information about the characteristics and configuration of the basic item. Such requirements are forwarded through CONARC to Department of the Army for approval. Approved requirements are passed to Army Materiel Command for action.

The U.S. Army Participation Group is the Army Materiel Command's trainer development agency. As soon as potential needs for training devices come to our attention, we provide the responsible service schools advice and assistance in the preparation of the training device requirements. From then on, we are intimately involved and work closely with all agencies concerned in an effort to assure that cost-effective trainers are delivered to Army users by the date they are required for training.

Those of us in USAPG stress continuously the need for greater use of training devices in the Army. However, we often encounter the attitude that there is no better training device than the operational item of equipment. In some cases, we agree.

In our view, there are a number of factors that favor the use of training devices in many situations instead of operational items, particularly those that are costly to operate and maintain. We believe the principal factors are increased effectiveness, efficiency, flexibility, safety, and reduced cost. Cost always is an important consideration.

Each of the other four factors contributes to reduced training cost.

In many situations, properly designed training devices prove significantly more effective than operational equipment in training personnel to perform the same functions The training device usually permits better supervision and control of the training situation; reduces interference caused by noise, weather, and other distractions; allows a sequence of tasks to be established; and provides for immediate evaluation of training performance.

Efficiency of training can be improved substantially through use of training devices that permit an increase in the student-to-instructor ratio. Required skills frequently can be acquired in less time than would be

required if operational equipment were used. Training devices may reduce the requirement for maintenance and supporting supplies and facilities.

Training devices also provide greatly increased flexibility. They may provide for training many individuals in one single function or one individual in a series of increasingly difficult functions. They permit training to be conducted without being constrained by lack of suitable weather or availability of facilities such as ranges.

Many training devices enhance safety by eliminating or reducing significantly the possibility of death or injury to trainees and instructors.

All of these factors contribute to better training at less cost.

I want to illustrate these points by discussing a few trainers currently in use or under development.

This is an artist's concept of the field unit subsystem of the Army's SYNTHETIC FLIGHT TRAINING SYSTEM, or SFTS, which is currently under development. It consists of four UH-1 helicopter cockpits mounted on motion platforms, an instructor console, and a third generation digital computer. It is designed to provide instrument flight training to four pilots simultaneously under the control of one instructor. (Figure 1.)

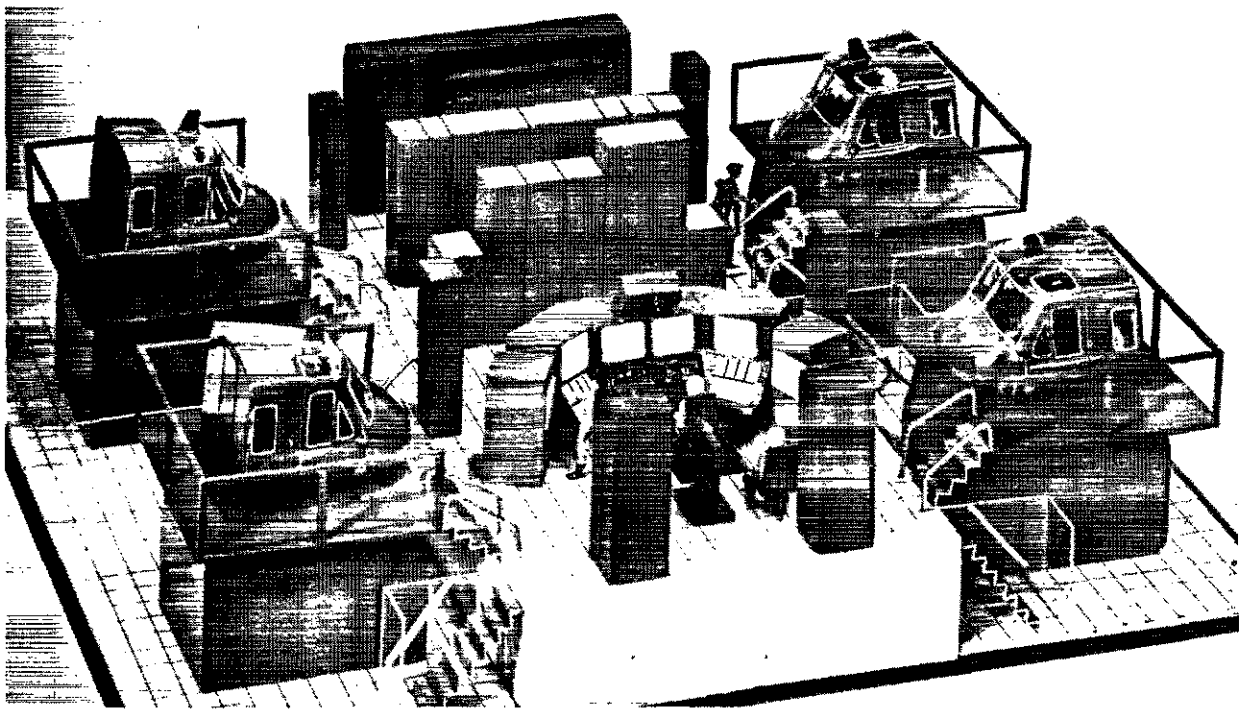

Figure 1. Artist's Concept of the Field Unit Subsystem of the Army's Synthetic Flight Training System

The SFTS incorporates the latest state of the art in training device design and technology. Instruction will be almost fully automated.

A radical innovation is the adaptive training mode. Pilot trainees will be able to progress as rapidly as their skill warrants.

The SFTS will have the flexibility to adapt to modification of training programs and changes in aircraft.

Eight units such as shown here are programmed for the Army Aviation School at Fort Rucker, Alabama. It was estimated that net flight training costs at Fort Rucker in a one-year period could be reduced substantially if 10 hours of training in the SFTS could be substituted for 10 hours of instrument flight training in operational aircraft. This estimate appears to be conservative.

In Fiscal Year 1969, 5,892 aviators received instrument flight training at Fort Rucker in five different courses. If the SFTS had been available for full use, more than 67,000 hours of operational flying could have been avoided. That reflects a cost avoidance, however, the cost of operation and maintenance of the SFTS would have to be deducted to determine net savings.

While potential cost savings with the SFTS are high, there are other major advantages. Standardization of training not possible in existing training devices or in operational aircraft will be achieved. This will lead to greater efficiency in aviator performance and a lower aircraft accident rate.

Needless to say, we are most anxious to see this system developed successfully, accepted for Army use, and put into service.

This is the CONDUCT OF FIRE TRAINER for the SHILLELAGH Missile System on the SHERIDAN Vehicle. It consists of a visual effects simulator and an instructor control unit on the near vehicle and an infrared target system on the distant vehicle. This system is used for training SHILLELAGH gunners. It simulates very realistically the firing of a SHILLELAGH missile and provides an effective and critical means for examining a gunner's ability. (Figure 2.)

Reports on use of the CONDUCT OF FIRE TRAINER in Germany and here in the States indicate that it is a very effective trainer. Soldiers trained with the CONDUCT OF FIRE TRAINER have demonstrated significantly better tracking capability and scored more hits in firing live missiles than those who have been trained only on the operational system

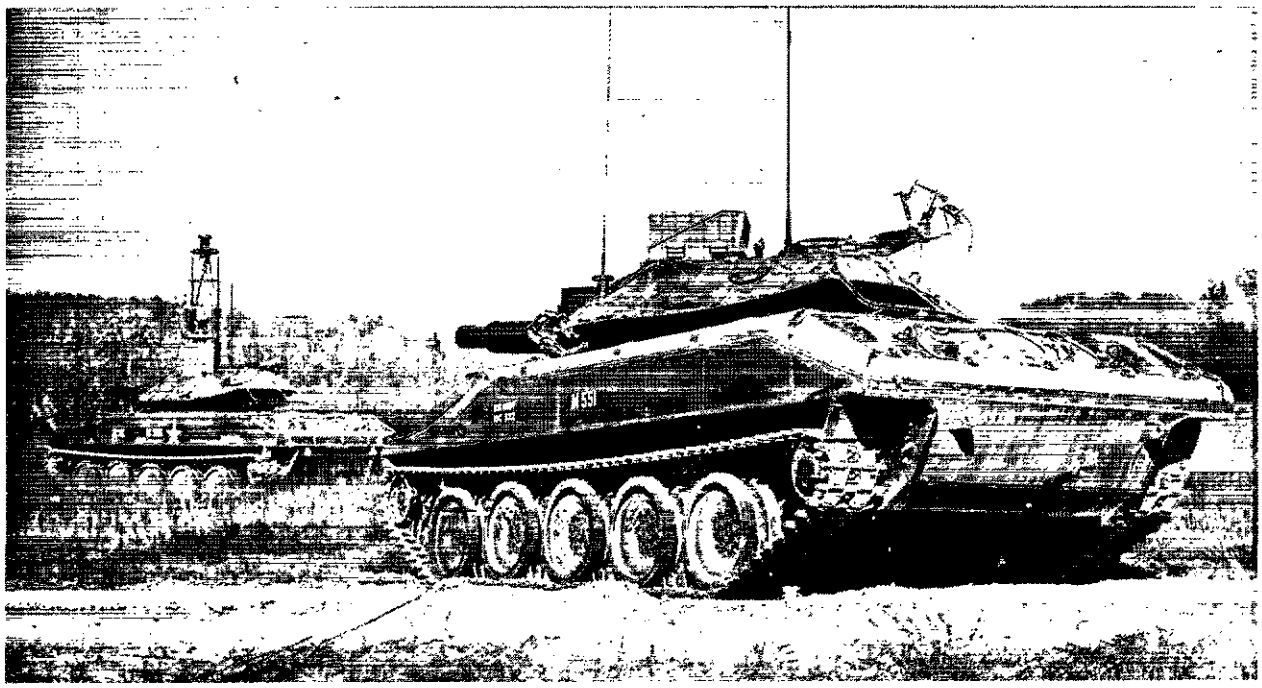

Figure 2. Conduct of Fire Trainer for the Shillelagh Missile System

The Armor School at Fort Knox originally estimated that the gunner in each SHERIDAN crew would have to fire seven SHILLELAGH training missiles for initial qualification and seven annually thereafter. It is apparent that the annual cost of training all SHERIDAN gunners world-wide would be astronomical.

In an effort to reduce this cost, the Armor School is studying the feasibility of reducing the number of required missile firings without degrading combat readiness. Initial indications are that less than seven missiles may be adequate, but a specific number has not been determined. This potential reduction is made possible largely due to the high effectiveness of the CONDUCT OF FIRE TRAINER which permits all SHERIDAN crew members to maintain proficiency in gunnery throughout the year.

Here is another device that demonstrates significant advantages over the operational equipment. This is one of a series of multipurpose TURBINE ENGINE TRAINERS used at the Transportation School at Fort Eustis, Virginia, in training officer and enlisted aviation maintenance personnel. These engine simulators are used to teach correct starting and operating procedures, to demonstrate incorrect procedures, and to teach trouble-shooting procedures and malfunction recognition. (Figure 3.)

The alternative to these devices is use of operational engines. One instructor is required for each four students when operational engines

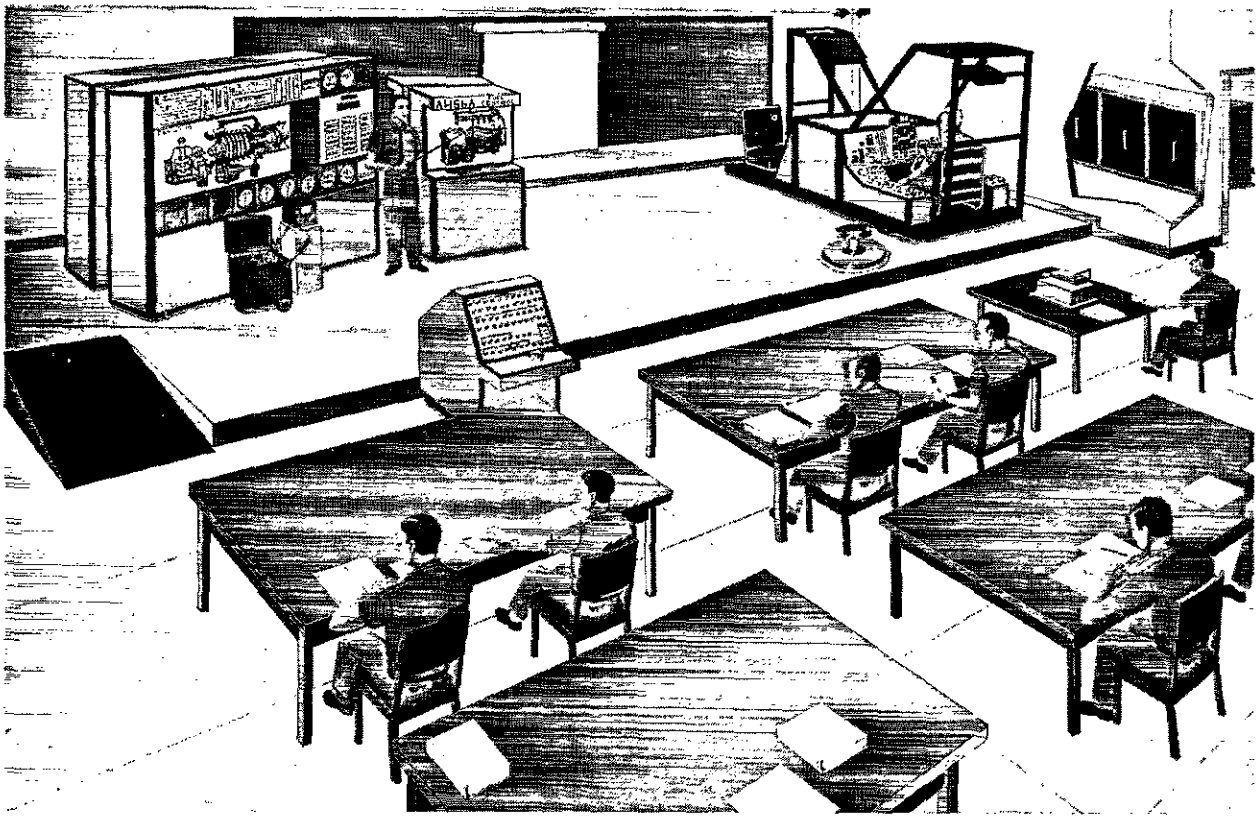

Figure 3. Artist's Concept of a Multi-Purpose Turbine Engine Trainer

are used. Faulty performance by a student could destroy or damage an engine or result in a serious accident.

With the engine simulators, only three instructors are required for 60 students. The principal instructor can safely introduce up to 40 malfunctions to which the student in the cockpit must respond appropriately. If the student allows one of these malfunctions to get out of control, the only penalty is the lighting of a "goof" signal on the main panel.

These engine simulators have proved extremely effective. They are used 16 hours every day in training the 12,000 students programmed for this instruction during the current fiscal year. The Transportation School estimates considerable annual savings through the use of these simulators as opposed to operational engines, assuming an hour-for-hour substitution.

Gentlemen, these are just three examples of why we are so optimistic about the potential for increased use of training devices in the Army. There are many others we could cite. This is the approach all of us involved with training device requirements must use in selling higher echelons on the need for funds to develop additional trainers. In our opinion, investment now in

cost-effective trainers is good management and mandatory if we are to achieve better mission accomplishment with reduced resources in the years ahead. While development and procurement costs may seem high in some cases, these costs generally are only a small fraction of the savings that will be realized during the useful life of a trainer.

Next, I will discuss our estimate of the Army trainer development potential as we see it now.

In recent years we have been spending more for AVIATION trainers than any other category. We expect this will continue.

The Army has high priority requirements for a new ADVANCED AERIAL FIRE SUPPORT AIRCRAFT, a UTILITY TACTICAL AIRCRAFT SYSTEM (UTTAS), and a HEAVY LIFT HELICOPTER. Appropriate trainers will be required.

We foresee additional requirements for aviation training devices in the following categories: Fixed-Wing and Rotary-Wing Flight Simulators, Helicopter Gunnery Trainers, Gunnery Scoring Systems, Avionics Simulators, and Maintenance Trainers.

The potential for trainers in support of new weapon systems and their associated vehicles is high.

We have been deeply involved for years in trainers for Armor. It appears that this will continue.

While the MAIN BATTLE TANK-70 (MBT-70) program is under review at present, it seems certain that some version of the tank will be approved for further development and eventual production. At present, action on requirements for six trainers for the MBT-70 is being held in abeyance pending a decision on the tank program.

There are three other new programs in the Armor field that will require trainers. These are the ARMORED RECONNAISSANCE SCOUT VEHICLE (ARSV), the MECHANIZED INFANTRY COMBAT VEHICLE (MICV), and the VEHICLE RAPID FIRE WEAPON SYSTEM—an automatic weapon between 20 and 30 millimeters in caliber that will be mounted on both vehicles.

In the Air Defense field, the SAM-D Missile System has significant trainer potential. CHAPARRAL and VULCAN Mount Simulators for use with the REDEYE Moving Target Simulator also are required.

There is a requirement for a new 155 millimeter, self-propelled howitzer for which supporting trainers probably will be needed.

In the area of ELECTRONICS, the increased use of computers throughout the Army in command and control as well as administrative applications undoubtedly will generate requirements for supporting trainers.

The Army's effort to improve combat capabilities during conditions of reduced visibility will result in the establishment of new training device requirements. A requirement for a Combat Surveillance Radar Trainer has been forwarded for approval.

Army training device requirements cover a broad spectrum and vary from simple to highly complex. Those that do not logically belong in the first three categories fall into the miscellaneous group. For example, there is high interest in improving our small arms marksmanship training. Undoubtedly this will result in requirements for new targets and range systems. We are still seeking a satisfactory tank target and scoring system. We also foresee a requirement for a tank-versus-tank tactics training system. A Laser Tank Gunnery Trainer is needed urgently.

Gentlemen, this gives you a general idea of what the Army's trainer requirements are likely to be in the next few years. I've said it before and I'll say it again ----- a reduction in defense spending actually dictates the need for greater use of training devices from the cost standpoint alone. However, we can also achieve increased effectiveness, efficiency, flexibility, and safety in our training programs at the same time. With all these potential benefits, what are we waiting for?

My colleagues and I will continue to stress these points at every opportunity in an effort to assure expansion of our training device program at the earliest practicable time.

In closing, I want to emphasize some other points that are becoming increasingly important to the Army.

We must strive for simplicity and avoid the tendency to introduce unnecessary sophistication. We must stick to state-of-the-art technology in high priority development projects.

Above all, I want to stress the importance of reliability and maintainability. Both must be designed into trainers. We must remember that our trainers serve only one purpose ---- training soldiers. If they do not perform reliably over long periods and cannot be restored to service quickly and easily by soldiers in the field, they do not meet our objective of providing the Army the best possible trainers and will not be accepted.

All U.S. Army Participation Group personnel look forward to working with those of you in industry much more in the future. We are certain that, working together, we can help the Army accomplish its training mission better with reduced resources.