CONFERENCE THEME

DR. H. H. WOLFF
Technical Director, Naval Training Device Center and
Conference General Chairman

Military training is as old as organized society. For many centuries, it was conducted in the real environment using real military hardware. Gradually, however, mainly in the first quarter of this century simulation was introduced. For example, special exercise ammunition was developed and the new weapons platform, the tank, was simulated.

The years between the two world wars and especially World War II itself brought a basic change in military training. It was in that period that our Navy started to replace training in the real environment by training in a simulated environment, by means of training devices, and training device technology and training methodology started to develop into a science and a technique.

We, here at the Naval Training Device Center, had, last year, the pleasure of commemorating the 30th year of the Navy's Training Device involvement, and the 25th Anniversary of the establishment of the first specialized Training Materiel Command.

The increase in complexity of modern warfare, especially multiplatform warfare, and the resultant need for training in simulated multiplatform settings resulted in the need for a vast variety of training programs to train for the many different skills needed in modern warfare. Naturally, this large variety of training problems caused a large variety of training activities to get involved in different aspects of the Navy's training needs and resulted in a fragmentation of the Navy's training program. It became more and more obvious that a coordination and unification of all these various training programs was mandatory if the Navy wanted to achieve the highest quality of training. This demand has led the Chief of Naval Operations to reorganize the Navy's training efforts by placing all training other than that assigned to the Fleet Commanders and the Chief, Bureau of Medicine and Surgery, under the newly established Office of Chief of Naval Training.

This reorganization will make it possible not only to provide an all encompassing and more effective unified training program for all of the Navy's present and future warfare situations, but will also achieve through cross-fertilization between different training areas a vastly improved training program and thereby an improvement in the professional capabilities of all Navy personnel.

Those of you who have been associated with military training, since the establishment of this organization, or even have been associated earlier with the initial phases of synthetic training, when RADM (then CDR) Luis de Florez became the first deskholder for training material in the Navy, know that training material has come a long way since the days of the 610 H Street NE Washington garage.

Starting with simple straight forward technology, we have reached today a point when even the most advanced technology available does no longer satisfy the needs of the Navy's training activities.

Operational equipment is getting increasingly complex. Its operation requires more and higher skill. And, consequently training devices call for higher and higher sophistication.

As most of you know, the Naval Training Device Center, and the training device industry have — during the last decade — made vigorous attacks on the state-of-the-art in training device technology, especially in the areas of visual environment simulation and in radar and sonar training simulation.

In spite of many achievements of the past, many areas of training device technology, especially systems for flight and ship control training, for sonar and radar for team and for task force training, to name a few, call for further advances, if we want to achieve training that is cost-effective as compared to training in the real environment, if we want to achieve the training goals in the shortest amount of time, and if we want to achieve these goals with equipment that minimizes the cradle to grave overall cost, and that minimizes the human resources needed for its operation and its maintenance.

The problems that existed six years ago made us aware of the fact that a closer cooperation between NAVTRADEVCEN and industry was needed. They have led to the first NAVTRADEVCEN/Industry Conference, which Captain Jack Sloatman, who was at that time our Commanding Officer, personally vivaciously promoted.

We open today the Fifth NAVTRADEVCEN/Industry Conference under the Command of Captain Frank Featherston, who was the driving force for having this Anniversary Conference here in Walt Disney World. As you may know, conferences of this type; especially, in today's financial environment —require high-level approval which can be obtained only if the Command is wholeheartedly promoting it, and all of us at NAVTRADEVCEN are very happy that Captain Featherston could convince our parent Command of the importance of our NAVTRADEVCEN/Industry Conferences for a continued progress in the support of the Navy's training program.

Looking back over the years that have passed since our first conference we find that many advances have been made during this time span.

In our first conference, I talked to you about our concern over the extensive cost and time spent for the reliability test of one-of-a-kind training devices and proposed new approaches to cope with this problem. Several of our reliability people have attacked this problem since then as most of you know with considerable success. For, whereas five years ago we required a test time of approximately 250 hours, with a possibility of running up to close to 500 hours, today we can often satisfy our reliability conscience in a 40-hour test. Five years ago we tested under an unrealistic continuous operation. Today, we go through a realistic operational cycle, and have begun to operate the equipment under test in accordance with a realistic lesson plan such that the test corresponds as much as possible to the actual usage. Five years ago we did not distinguish failures as to their criticality in the training program. Today, we assign weights to failures and provide thereby a much better basis for a meaningful reliability acceptance test.

In the 1967 conference we discussed the importance of the value engineering program. With the cooperation of the industry, we have achieved considerable annual savings for the Government and thereby the taxpayer. During the last fiscal year, for example, $659,000 were saved under this program.

In the 1967 conference I mentioned to you also the need for automatic failure indicator systems. Unfortunately, I cannot report here any significant progress. This is, therefore, a call for investigations into how to take advantage of the state-of-the-art in automatic failure indicators, and automatic testing, and for a possible promotion of the state-of-the-art where it is needed, certainly good fields for industry's Independent R&D Program.

Finally, I had asked, in our 1967 conference, to pay more attention to the instructor and trainee problem in the development of training devices, rather than to be satisfied simply with the simulation of operational equipment.

I renewed this request in our 1968 conference, asking especially to strive for an improvement in the student to instructor ratio. Industry has responded to this need.

For, we have meanwhile procured and are presently under new procurements for training devices in which the instructor is enabled to handle several students simultaneously, both through an automatic adaptation of the difficulty of the training task to the trainee's performance and through the use of cathode ray tubes for on-call displays of instruments and performance parameters. You will find these concepts increasingly called out in the specifications for future flight trainers and others.

In the 1968 conference, in addition to the repeated request for automatic failure indicators, I asked for self-healing systems. This again should be a good problem for industry's independent R&D Program, especially for companies that are also involved in the space program.

In our 1969 conference we talked about a diversity of problems, problems in training psychology, trainer technology and trainer procurement, many of which are still unresolved; especially the automatic evaluation of student performance, adaptation steps in adaptive systems, physiological factors in training (a very broad field), the various areas of visual simulation, such as computer-generated displays, for example radar displays, as well as many others, still pose problems.

For several years we have tried to reduce training device cost, maintenance cost, spare parts inventory and maintenance skill requirements by an aggressive standardization program. I would like to take this opportunity to acknowledge the contributions that our industry has made to this effort, especially through the sub-committee on training device component/equipment standardization of the National Security Industrial Association.

As a result of our standardization effort the number of waivers for non-standard parts has tremendously decreased, offeror's standardization efforts are evaluated as to their compliance with standardization plans such as the MIL-T-23991 specification, the NAVAIR Avionics preferred standard test equipment list and others.

Very shortly a cockpit procedures trainer procurement will be used to evaluate the applicability of the Navy's standard hardware program to training devices, and in the next fiscal year we intend to specify the use of SHP (Standard Hardware Program) modules for a major training device, just to mention a few of our plans to promote standardization.

Let me turn now to a few problems that have not yet been brought to the forefront.

The need to replace more actual flight time by training device time has resulted in a demand for flight trainers of more encompassing simulation features, trainers that provide both motion and visual environment simulation. Since a motion platform can provide only a limited motion simulation; namely, an acceleration and a deceleration onset, a wash-out has to be provided. As a consequence of this, any motion platform position may represent different operational platform (for example aircraft) positions, each of which demands a different visual presentation of the visual environment. The difference in the limitations of motion simulation and visual simulation prevent a perfect solution for the linkage between motion and visual display. We will have to be satisfied with a deficiency minimization. Though some experiments have been conducted in this field much more knowledge is required about the motion inputs that different vehicles provide to the human sensory system and for which we have to provide motion simulation. A multidisciplinary R&D effort is needed here before we have the technology well enough in hand to avoid negative training and satisfy the user.

Maintenance training was for many years a simple device problem. Operational equipment was cut apart and provided the hardware needed by the instructor for his lecture. With increasing complexity of operational equipment to be maintained, maintenance training cannot be effectively undertaken any more by using operational hardware. Very little effort has been directed towards increasing the training effectiveness in this area by better maintenance training devices. A few new approaches are reflected in the new generalized sonar maintenance trainers which we procured for the school in Memphis. The Chief of Naval Training, and the Chief of Naval Technical Training are looking at us and at the trainer industry to provide the means for vastly improved maintenance training material.

All of us know that in spite of the many advances that have been made we are still behind the demands of the users. These demands have increased in sophistication faster than the state-of-the-art progressed. This holds true as much for training methodology as it does for hardware, especially for totally integrated multiunit task force systems.

Today's operational systems offer such a tremendous versatility of utilization that only extremely well-trained personnel are able to fully utilize the system capability. This means that the training programs have to be very carefully developed and standardized to assure the use of the most effective training methodology.

In future larger procurements—especially of weapons systems trainers—you will find, therefore, increasingly that a detailed course outline and a training syllabus are mandatory deliverable items.

Let me take up another subject which we should vigorously attack.

We have about 550 million dollars worth of training devices in the Navy inventory and it has been estimated that we have in the training program close to two billion dollars worth of operational equipment that has been set aside for training purposes. Assuming that this operational equipment will have to be replaced over a 10-year span, about 200 million dollars will be spent annually for such equipment. You can analyze for yourself how much of this equipment could be replaced by training devices that are more training effective

and far less costly, and how much the training device market could broaden and how much taxpayer's money could be saved if all of us would take steps to build-up this area more aggressively.

As you can readily see, much has been achieved in the last 25 years, much more is ahead of us, only part of which I could outline to you. But based on these past achievements, both within NAVTRADEVCEN and in Industry, we feel that our first 25 years in the training device business form an excellent springboard for the future.

As you know, NAVTRADEVCEN is a multiservice activity for we not only serve the Navy, but also the Army through the U.S. Army Training Device Agency under Colonel Mierswa, and the Marine Corps, that through Colonel John Terry, the Marine Corps Liaison Officer, is rapidly increasing its training device involvement. Finally, we often have the privilege to assist the Air Force in meeting its training device requirements.

I am very happy to welcome all our friends from the Navy, the Army, the Marine Corps, and the Air Force, and last, but not least, from our industry.

WHAT'S HAPPENING IN TODAY'S ARMY

General Ralph E. Haines, Jr.
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I'm happy to be here on the Silver Anniversary of the Naval Training Device Center and gratified that this conference offers the opportunity for the services and industry to focus attention on the past 25 years of training simulation as a springboard for the future.

In acknowledging the 25th Anniversary of the Naval Training Device Center, I am pleased to note that this has been a cooperative effort with the Army participating for the last 21 years. The Army is appreciative for the excellent support that has been provided our training during this time. You are to be commended for your fine work.

My purpose here today is to tell you "What's Happening in Today's Army"—with particular reference to the innovations in the Army's training programs, and later in my discussion pass on to you information concerning the Modern Volunteer Army Program.

First, I would like to say that the Continental Army Command (CONARC), with its 13 training centers, at which newly recruited or drafted soldiers receive their initial training, and the 24 Army Schools, which train and educate officers and enlisted men to various levels of skill or knowledge, has

the largest training responsibility of any U.S. Command world-wide. At the end of FY 71, there were nearly 367,000 individuals trained in Basic Combat Training (BCT), 291,000 in Advanced Individual Training (AIT), and 271,000 in the service schools, for a total of 928,000. So you can see CONARC's mission as the Army trainer is sizeable. CONARC is responsible for determining training aids and device requirements, and operating the CONUS training aid center system. The Training Centers and Army Schools, which constitute the "training base", and the major users of training devices, today faces a dichotomy of effort deriving from the necessity to reorient our training toward requirements in other parts of the world, and yet continue to provide maximum support to Vietnam. The country is psychologically in a post-war period even though we are still heavily involved in a shooting war. Our training dollars have been decreased by budget constraints, with no reduction in mission, to maintain a high-level of combat readiness. As a result, a great deal of command emphasis from the Chief of Staff of the Army, down through major commands, is being exerted to make maximum use of training devices in lieu of the actual weapon or item of equipment where effective training can be accomplished, and cost savings accrued.

Our primary aim must be the effective discharge of our responsibilities for the defense of our country. By that, I mean that we train in the skills that relate directly to military duties and employ all means provided by science and industry toward the accomplishment of this training.

Our training programs are under continuous review, revision, and refinement. We place high priority on keeping them current and attuned to changing needs. The objective is to assure that these programs remain vigorous and challenging for our young soldiers.

At our 13 U.S. Army Training Centers, each inductee entering the Army receives an eight-week Basic Training Course covering the military fundamentals that all trainees must have. Upon completion of basic training, about 70% of the trainees remain in the Training Center System for eight or more additional weeks, and receive Advanced Individual Training or AIT in one of the 69 military skills taught in that system. Another 20% of the basic training graduates proceed to Army Schools for AIT in one of approximately 178 skill-producing courses, the longest of which takes a full year to complete. The remaining 10% of basic training graduates go directly to units to complete their skill qualification by on-the-job apprentice-type training, or to a duty position for which they are already qualified by reason of their civilian education or experience.

We are making changes in AIT with increasing emphasis on hands-on training and performance testing.

The content and nature of Army education and training is, I contend, scientific, because it applies "expert knowledge and technical skill" in its theory and in its practice. But, we also attempt to apply scientific methods in the accomplishment of this training. The Army's interest in training technology stems from the need to improve training, and produce a more skilled soldier in less time and at a lower cost. Several years ago, we decided that the base process upon which our training must be developed is the systems approach. After thorough study and preparation, we established a five-year program through which all courses at our Army Schools and Training Centers will be systems engineered.

In this process, the first and most important step is job analysis, which identifies the on-the-job performance requirements in terms of individual tasks and characteristics of various duty positions. During job analysis, our schools conduct interviews with job incumbents and use the output of the military occupational data bank, which is a computerized repository of detailed job and task data collected from questionnaires administered on an Army-wide basis. These data indicate job frequency and help determine what training is required. In the second step of systems engineering, essential tasks are selected for training and then are evaluated to determine whether they should be taught in a formal course of instruction or accomplished by on-the-job training. In succeeding steps, tasks are converted into training objectives and training materials to include training aids and device requirements and tests are prepared. Quality control is the last step of the process. Test results are analyzed and feedback information is obtained by observation and reports from commanders and course graduates. By these means, courses are continually evaluated and updated.

The systems engineering approach to training is fundamental to insuring that course content and training methods develop soldiers who can perform successfully on the job. The systems approach is also the vehicle for capitalizing upon the advantages of other training innovations, as it guarantees that all of them receive full consideration in course design and development.

As a matter of information, CONARC uses programmed instruction throughout the Army School system. This is a self-paced method of teaching through the use of specially prepared texts which provide instant feedback to the student and thus assures progress at his individual rate. Our analysis of programmed instruction has shown that most students, who have difficulty learning from a classroom instructor, are better able to absorb and retain knowledge through texts.

A natural extension of the use of programmed texts in particular segments of instruction is their use in completely self-paced courses. Our Helicopter Instrument Flight Course has been completely converted to self-paced instruction by allowing students to progress at their own rate instead of in lock step. An average savings of two weeks in training time was achieved; additionally the dollar savings accrued were sufficient to amortize the total contract cost by the end of the first year of operation.

Presently, the Army has a number of training programs that utilize computer-supported instruction. Based on our experience, we have found that the computer can be a most valuable tool in both the active instructional process as well as in the administration and management areas. CONARC exercises a progressive development policy, which encourages investigation, into discrete applications of the computer in support of training functions.

A final example of our educational innovations is our extensive use of Educational Television, or ETV. Closed circuit educational television is used at all 24 of our Army Schools and 10 of our Training Centers, with taped material ranging from basic training subjects to complex military problems.

We derive many advantages from use of television. We realize significant savings in equipment and manpower costs by taping live performances for repetitive instruction. Other benefits include the ability to standardize instruction and to preserve noteworthy presentations otherwise available to only a few students on a one-time basis.

In addition to producing instructional tapes for television viewing, our television production facilities support the Army-wide training film program. TV tapes are converted to 16mm film for Army-wide distribution. These are but a few highlights of the many changes taking place in the Training Centers and Service School training programs in today's Army.

Now turning for a moment to future developments in the area of training simulation. In the past, the Army has made considerable use of training aids and devices in the Missile, Armor, Infantry, Artillery, and Aviation fields. However, we have scarcely touched on simulation for the Combined Arms Tactical Training Programs. The shrinking land area available for large scale maneuvers, the requirement to improve training effectiveness, and reduce training cost, requires us to look to simulation to solve our most critical tactical training problems. In this respect we have initiated a requirement to develop a Combined Arms Tactical Training Simulator (CATTS). The purpose of the CATTS will be to simulate a variety of combat situations for the training of future commanders and staff officers. The primary requirement is to realistically approximate the placement of a commander and his staff in either of two simulated combat options, a ground command post environment for conduct of tactical ground operations, or a command and control helicopter environment for conduct of airmobile tactical operations. We are looking forward to the simulator as the long-range solution to one of our many training problems. As many of you know, our most prestigious trainer to date is the Synthetic Flight Trainer System now undergoing test at Ft. Rucker. This, the Army's most ambitious and costly trainer development program represents a move from the horse and buggy days and into the space age for instrument flight training. We believe that the future cost savings potential will be very significant not only in flying hours saved, but in better trained aviators.

While any review of the total training devices and training aids picture reveals that many requirements are initiated by the people at the local Training Centers and Schools, I am aware that many are developed by industry or the laboratory, and I am well aware of the part you play in the initiation and development of our requirements. We must always be on the alert for new innovations, new developments, and most of all, new ideas on how to improve the training of our modern Army.

This leads me to another major innovation that is taking place today—that of the Modern Volunteer Army. The Chief of Staff has directed the Army to move without delay to build a more professional Army with a zero draft and to achieve this by 1 July 1973. The program was kicked off officially by General Westmoreland at his Commanders' Conference, 30 November 1970.

The Modern Volunteer Army Program consists, in general terms, of three categories of actions or initiatives, with purposes described as—

Strengthening Professionalism
Improving Attractiveness of Army Life
Enhancing Public Respect for the Soldier.

Inherent in this combination of categories is the will to promote the most effective and efficient means of mission performance; to improve the life-style and living conditions of the soldier and his family, and to enhance the respect of the soldier for himself and in the eyes of the American public. Through accomplishments in each of these areas we are striving to attain the goal of a better Army and eliminate reliance on the draft.

The Modern Volunteer Army (MVA) Program began last November when several high impact actions, such as elimination of reveille, more liberal pass policies, and a shorter work-week were adopted Army-wide. Numerous actions designed to enhance training, improve living and working conditions, and eliminate the non-essential, so that we may get on with the necessary aspects of duties, have since been implemented. Within the context of each of these actions, I want to emphasize that we seek first to build a highly professional, disciplined Army capable of survival and victory on the battlefield.

As an integral part of the MVA Program, test experiments, under the title of Project VOLAR (VOLAR being the acronymn for Volunteer Army), are being conducted at selected Army installations. The purpose of these experiments is to test and determine those improvements or changes which, when implemented Army-wide, will enhance the military posture and increase enlistments and re-enlistments. Four CONARC installations took part in the Project VOLAR experiments during FY 71. During FY 72 we are expanding these experiments and a total of 13 Army Posts, within the Continental United States, will be participating.

To achieve our goal of a highly professional volunteer force in FY 73, we must increase enlistments and reenlistments significantly. To assist in accomplishing this, the attractiveness of the service must be increased together with a decided improvement in the Army's combat capabilities.

I am sure that you have seen reports in the local papers of many of the specific measures we are taking in these areas. We have solicited ideas from a broad spectrum of Army personnel and are currently in a testing period, trying out ideas, which we consider have merit. These tests are at selected locations and conducted under carefully controlled conditions. Changes are always difficult, particularly in a stable institution such as the Army, and especially when they impinge upon proven methods. But times are changing; and we must be responsive to social change, without compromising basic values, if we hope to remain in contact with and communicate to the soldiers.

In our efforts to improve the life-style of the soldier and to remove service irritants, we will not impair the ability of the Army to perform its mission. We, in the Continental Army Command, are mindful of our responsibilities and intend to improve the Army's professionalism within the context of the Modern Volunteer Army. This will call for all the talent and judgment at our command.

Regardless of changes we make within the Army, however, we cannot hope to achieve our goals unless we receive support from the Executive Branch of the Government, members of Congress, the news media, and civic, business, and educational leaders.

The goal of acquiring a completely volunteer force is yet to be proven. Certainly we will leave no stone unturned in attaining that goal.

It is important that we keep draft legislation in existence until we can demonstrate conclusively that a Volunteer Army is both feasible and effective in the discharge of its assigned responsibilities. We will, in fact, have a continuing although lessening need for the draft for several years to come. If we are able to shift to a Volunteer Force, we must do it without creating a gap between the Army and the people which we serve. In our zeal to see

those laws enacted, that will provide us with the inducements needed to attract sufficient members of qualified men and women, we must not create a mental climate in which the average citizen feels that he can, in effect, buy his way out of any obligation to defend his nation.

We, in the Army, are faced today with the activism of the "now" generation. I recognize that the local draft board is only one of many institutions to which the youth of today cannot relate easily. Many are skeptical of the values of our society and cynical because of inconsistencies found between stated beliefs and actions which appear to belie those beliefs. One of the lessons learned during research, conducted on the fall of the Roman Empire, is that "a society that loses interest in its Army and distains military service will pay for its mistake sooner or later." I feel that the MVA Program will do much to prevent this conditon from developing in this country.

The Vietnam War weighs heavily on most of us. However, my current responsibilities do not encompass that area and I would prefer to leave to the writers of history the rights or wrongs of our involvement there. I must observe, however, that I find it difficult to accept the thesis of some which, through a strange transposition of fact, has made the aggressor the aggrieved. I do have a feeling of compassion for the young men and women, who return from Vietnam, every day in the year. They merit a far better reception than they are getting from the people of this country. Our most pressing job in CONARC today is to rebuild the dignity, pride, and motivation of the post-Vietnam Army. Again, we will need all the talent and judgment we can muster. After every war there has been a tendency toward a drop in morale, esprit, and prestige for the man in uniform. We must work to overcome this tendency because of its deleterious effect on both the man in uniform and the public. The dedication of the soldier and the confidence of people in him are principal ingredients of our national strength. The nation will be the loser, if over the longer term, the dignity and pride of the soldier are not retained.

I have attempted to outline for you some of the aspects of our education and training requirements and to point out the way the Army is moving today. With shrinking resources and maneuver areas, the Army is placing greater reliance on training aids and devices than at any time heretofore. We cannot be satisfied with our present methods of training. We must constantly search for better, more effective and less expensive solutions to our training problems.

SESSION I

Tuesday, 15 February 1972

Chairman: Dr. James J. Regan
Head, Human Factors Laboratory
Naval Training Device Center