ARMY
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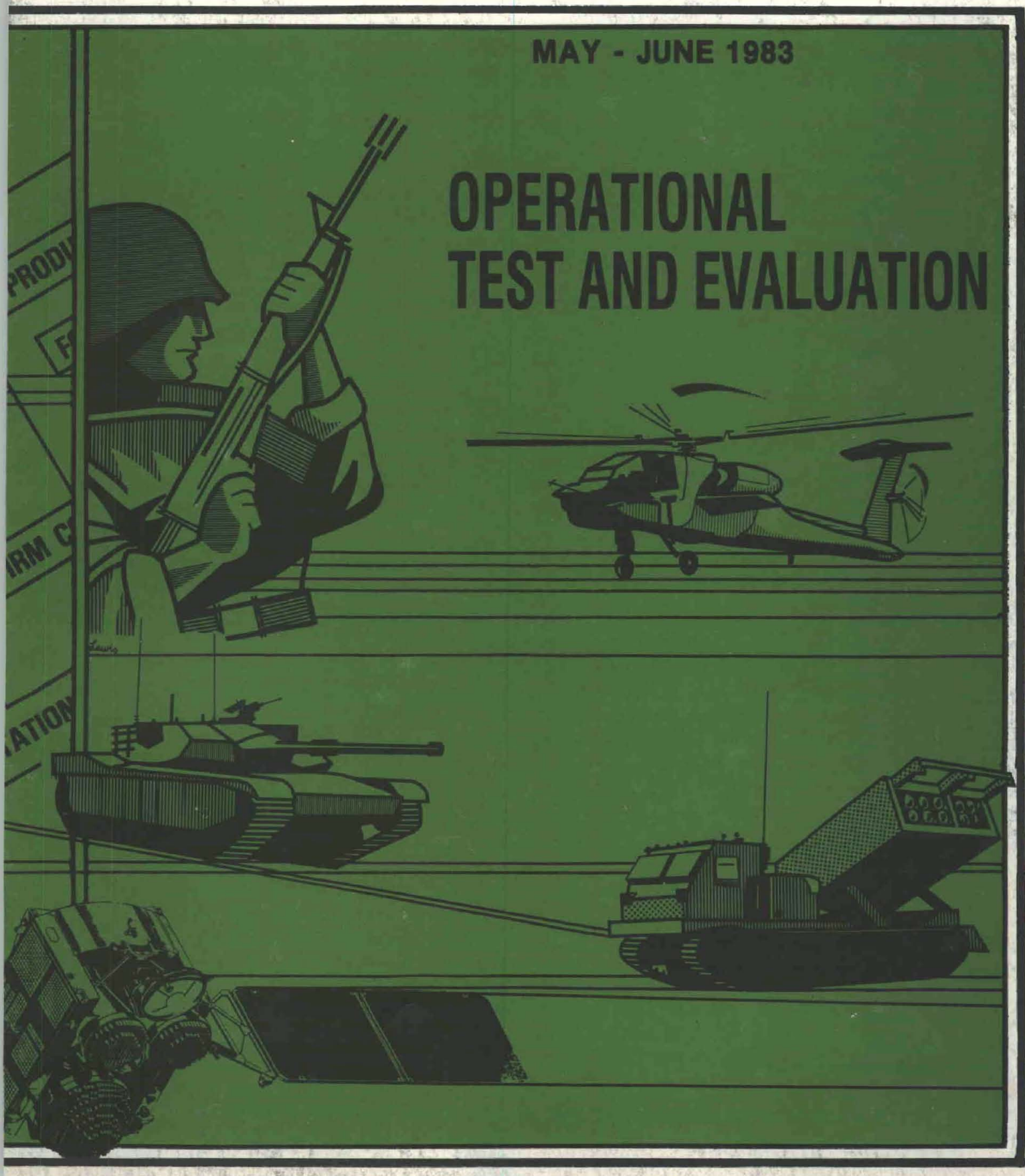
MAY - JUNE 1983

OPERATIONAL TEST AND EVALUATION



R,D&A ARMY

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ABOUT THE COVER

Shown on the front and back covers is a conceptual sampling of materiel acquisition systems and processes associated with the mission of the U.S. Army's Operational Test and Evaluation Agency, and other organizations involved in the operational testing process.

FEATURES

DEPARTMENTS

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Purpose: To improve informal communication among all segments of the Army scientific community and other government R,D&A agencies; to further understanding of Army R,D&A progress, problem areas and program planning, to stimulate more closely integrated and coordinated effort among Army R,D&A activities; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF STAFF
WASHINGTON, D.C. 20310

18 MAR 1983

This issue examines operational test and evaluation, a function crucial to the Army's modernization efforts.

The systems we field must be the best that we can give our soldiers, and the combined soldier-system must also give us the best possible return on our investment.

As we acquire new, sophisticated capabilities, senior officials must make decisions throughout the development of these systems. Operational testing and evaluation ensures that we make the right choices.

Responsive evaluations demand dedicated professionals and efficient testing organizations. What you are asked to do is seldom an easy task, but it is an absolute necessity. I encourage you to continue building on your record of excellence -- Challenge the obvious, test the innovative, and accept nothing at face value. Our troops deserve the BEST -- help ensure they receive it.

Most sincerely,

JOHN A. WICKHAM, JR.
General, United States Army
Vice Chief of Staff

Thoughts on Operational Testing

By MG Robert L. Kirwan

Commander, U.S. Army Operational Test and Evaluation Agency

In a few weeks I will end 35 years of service in the Army. During those 35 years I have had the opportunity to serve in many challenging and interesting assignments. No assignment, however, has been quite so gratifying as my last five years as an operational tester. During this time I have seen operational testing assume an increasingly important role in the acquisition of new systems for our soldiers.

I am proud of the contributions that operational testing has made and the professionalism that has been displayed in planning and executing it. The years ahead, I suspect, will be just as challenging for the acquisition community; and I remain confident that operational test and evaluation will continue to play a prominent role. Let me now leave you with some thoughts about how operational test and evaluation fits into the aquisition process.

One of the most frequent questions I have been asked in my travels around the acquisition community is "Do we really need operational testing?" This question is answered for me every day when I visit an operational test site and observe a soldier, in sub freezing temperatures, trying to adjust a tiny knob on a calibrating device at night, or hear an NCO with a high school education explaining to a confused group of soldiers how a complex communication device is supposed to be installed, or see a group of soldiers sitting idly beside the road during a maneuver exercise because they don't have enough parts to repair their vehicles.

Yes, we do need operational testing. We need it because only the soldier and his environment can place the demands upon a system that will be present after it is fielded. Performance and suitability in the operational environment is, after all, the ultimate goal of any military development program. Who is better equipped to judge this performance and suitability than the soldier?

I do not mean to say that operational testing is more important than development testing. On the contrary, development testing is also essential to the acquisition process. Development and operational testing, however, address different criteria and environments. They therefore complement each other, both contributing to the acquisition process.

Another issue I often hear debated is the role of the operational evaluator in the decision process. I can best address this role by stating what it is not. The evaluator's role is not to "Pass" or "Fail" the system. On the contrary, the evaluator's role is to work hand in hand with the materiel and combat developers to identify shortcomings and insure that corrective measures provide the required performance.

Only the decision maker can pass or fail a system, because only he can decide what weight and importance is to be given to the system's capabilities and shortcomings. The operational tester and evaluator assist the decision maker by providing an unbiased observation of the system's performance in the operational environment. This information, along with information concerning system cost, urgency of need, and other parameters, allows the decision maker to select an appropriate course of action. This is the way it is, and the way it has to be.

My last thought concerns responsibilities for the operational testing process. Operational testing is a process which requires cooperative efforts of the entire Army community. The decision maker, the materiel developer, the combat developer, the operational tester, and the field commands must all work together if this process is to be meaningful.

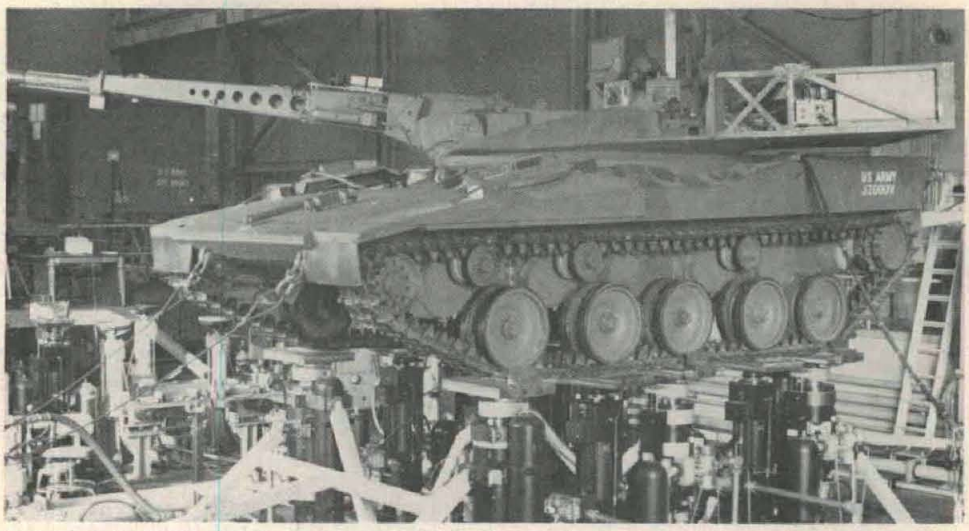
The decision maker must decide early in the process what information he needs from operational testing and must stand by this decision. The materiel developer must provide adquate systems for test; systems that include mature prototypes, appropriate maintenance items, and sufficient spares. After testing is complete, he must take appropriate, timely action to insure that findings from operational testing are addressed.

The combat developer must develop doctrinal, training, and employment concepts that are well formulated, proven in the field, and finalized before test design and planning begins. The operational test is not a time to experiment with alternatives to these concepts, and the operational tester must design and execute the test using a minimum of resources. He must remain objective in his observations, and fair and impartial about what he reports.

Lastly, our field commands, both overseas and in the United States, must be willing to sacrifice the time, personnel, and equipment to conduct meaningful testing. Operational testing must be everyone's business if we are to benefit from it. Cooperation is sometimes lacking, but I am confident we can find solutions to our differences. We must work together toward this goal.

I hope some of the thoughts I have shared with you will make the road ahead for operational testing less rocky. As we negotiate that road, I ask that you remember the words of former Chief of Staff GEN Creighton Abrams, who said: "No requirement is so urgent we produce unsatisfactory equipment to fill it."

Mobile Protected Gun System Tests



The High Survivability Test Vehicle-Light is shown on the Motion Base Simulator in support of the MPGS Tests.

The Mobile Protected Gun System (MPGS) has been given tough goals to meet. For example, it must be C-130 transportable, kill the best Russian tanks, compensate for lighter armor protection with greater lethality, and be cheaper than the M1. Fire control and stabilization systems comprise the largest cost reduction and technical payoff potential of the MPGS.

Currently, tests are being conducted at the U.S. Army Tank-Automotive Command, Warren, MI, to evaluate these subsytems effects on system performance. A huge shaker table called the Motion Base Simulator (MBS) is used to evaluate the ability of the tank to point the gun at a target based on varied terrain inputs to the tank track.

The Motion Base Simulator is made up of hydraulic activators at each tank roadwheel position and a hybrid computer is used to control inputs to the activators. Analog inputs such as vertical heave, pitch or roll can be used for simple frequency response analysis. Digitized real world terrains can also be used.

Terrains up to 3.3-inch root means square are currently available for simulation. Once the terrain has been input to the tank tracks, the vehicle responds as if going cross-country. The gun stabilization system can be evaluated using gyro signals, and the complete fire control/stablization subsystems can be evaluated using instrumentation automatic video contrast trackers.

The video gunner's sight picture as well as an over-the-gun tube video image are measured by instrumentation video trackers to determine pointing performance of both the sight and the gun. In this manner, total gun pointing inaccuracies from terrain input to gun pointing output can be evaluated on the Motion Base Simulator.

A Pulse Code Modulation telemetry link is used between the tank and an instrumentation van to record data during testing. One hundred and twenty-eight channels of data are recorded including tracking position error, gyro, accelerometer, strain gage, pressure, and fire control status during each test. Test duration is normally 10-30 seconds; enough time to perform at least one cycle of the specified terrain.

Original purpose of these tests was to combine transducers and computers from the stabilization and fire control system. Modeling of the stabilization system and the use of various stabilization system control algorithms was added later to the test design. Three different control algorithms are included in the evaluation. Once the tests were under way, additional uses were found, such as:

- Precision Aim Technique; a method to fire the gun only when the muzzle end of the gun is in proper position, is also being evaluated. BRL is performing these tests as a piggy-back effort.

- A finite element model of the hull is being performed by the Jet Propulsion Lab. By using suspension inputs, the Jet Lab hopes to refine the vehicle structure necessary to handle actual terrain inputs and thereby minimize vehicle weight.

- The data base for loadings throughout the vehicle is being expanded to permit shaking subcomponents separately, such as the turret and establishment of a vehicle system error budget really lists total error contribution from suspension input through the vehicle response to the gun pointing performance output.

- A software program has been incorporated on-board the test vehicle readjusts gain and bias based on current friction within the system. This will be useable during combat operation to adjust for any deterioration or replacement part irregularities.

The Motion Base Simulator Testing provides a means of detailed analysis with repeatable disturbances. With this tool, TACOM is developing the MPGS system to be more lethal while firing-on-the-move and at the same time, more cost effective.

The preceding article was authored by Mr. Steven E. Sparklin, senior project engineer, PM, Mobile Protected Gun System.

An Introduction to Army Operational Test and Evaluation

By MAJ John R. Hamilton

Last year marked the 10th anniversary of independent operational test and evaluation for the Army. During the past decade, operational test and evaluation has provided the Army with a significant opportunity to improve the combat effectiveness and suitability of new systems. By testing prototype systems with the soldier in a realistic operational environment, the Army has realized unexpected insights which have significantly enhanced the design of both hardware and software, and provided the critical feedback needed in the formulation of tactical, training, and support concepts. Operational test and evaluation has been particularly beneficial during the development of high technology systems, and as the Army's need for such systems increases in the future, so will the importance of operational test and evaluation. The discussion that follows provides an overview of operational test and evaluation concepts and procedures and an introduction to the Army agency responsible for its management, the Operational Test and Evaluation Agency (OTEA).

What is operational test and evaluation? It is a process during which a system's effectiveness and suitability are estimated while the system is operated in a realistic environment by typical operators, crews, or units.

Effectiveness, as addressed during operational testing, is a measure of how well the system performs its intended mission and how vulnerable it is to enemy action. Suitability, on the other hand, is a measure of the burden that a system imposes upon the using unit as manifested in maintenance, support, and training needs.

Operational testing differs from development testing in that development testing addresses the issue of whether the system meets its design requirements; while operational testing assumes that it does, and addresses the issue of whether the system is operationally useful to the soldier.

Findings of development and operational testing may be similiar for some issues, but in most cases they differ significantly because of differences in test environment. Thus, it is not uncommon for the development tester to find that an engine can be repaired in 30 minutes inside a maintenance facility while the operational tester finds that a minimum of two hours is required during field operations where weather and a lack of readily available parts and tools hinder repairs.

Because development and operational testing are significantly different, they complement each other in their contribution to the acquisition process. Operational test and evaluation is a required step in the acquisition process which generally follows or parallels development testing. Figure 1 shows the operational testing required during the acquisition of major systems.

OPERATIONAL TEST & EVALUATION DURING THE MATERIEL ACQUISITION PROCESS

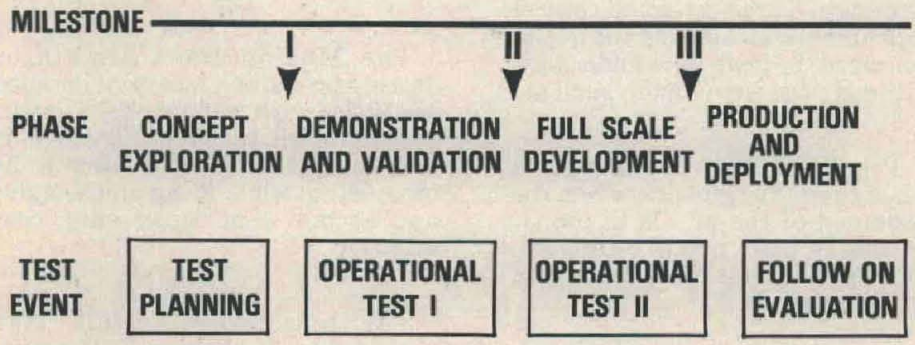


Figure 1

During the demonstration and validation phase, Operational Test I is conducted on brassboard configurations, experimental prototypes, or advanced development prototypes to provide an indication of the military utility of the concept and to provide data on competing prototypes to support the decisions to enter full-scale development.

OT I is conducted at crew or operator level and normally includes a side by side comparison of the competing prototypes and the fielded system being replaced. In addition to providing a measure of the utility of the prototypes, OT I provides an early indication of operational problems and an estimate of the adequacy of concepts for employment, support, training, organization, doctrine, and tactics.

The next required operational testing is Operational Test II, which is conducted during the full-scale development phase. It is the most demanding operational test performed on a system and is an essential source of information for the Milestone III production decision.

The goal of OT II is to estimate the military utility, operational effectiveness, operational suitability, and logistical supportability of a total materiel system to include associated test and diagnostic equipment, training devices, manuals, and other ancillary items.

OT II is designed to demonstrate reliability, availability and maintainability performance in keeping with the system's maturity at the end of engineering development; operational performance commensurate with established criteria; and the adequacy of the training, tactical, doctrinal, and logistical concepts as they relate to overall system effectiveness and suitability.

OT II consists of controlled field exercises and special subtests using troop units equipped with mature prototype systems and ancillary items. Representative segments of higher echelon support elements also participate. As with OT I, OT II includes side by side comparison with units equipped with the new system conducting common exercises alongside units equipped with the existing system.

If a system is successful during full-scale development and is approved for production, no further operational testing may be needed. For most systems, however, a Follow-On Evaluation (FOE) is required to address issues which have not been adequately satisfied during previous testing or verify that required corrections have been made.

A typical follow-on might validate system reliability after final preproduction modifications have been applied or assess the appropriateness of changes incorporated into the logistical concept in response to deficiencies noted during OT II.

In any event, the FOE will be conducted by a troop unit in a realistic environment. To preclude disruption of the fielding schedule, these evaluations are normally conducted using the Initial Operational Capability unit and are within the scope of training exercises normally conducted by that unit.

OPERATIONAL TEST AND EVALUATION PROCESS

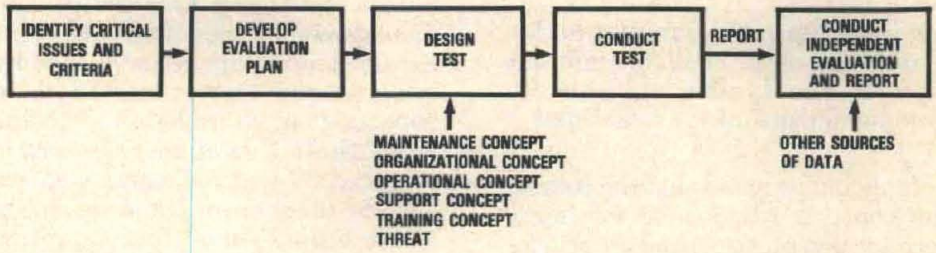


Figure 2

Who accomplishes Army operational test and evaluation? Prior to 1972 both development testing and operational testing in the Army were accomplished by a DARCOM agency, the Test and Evaluation Command (TECOM). To provide a degree of independence between the two testing functions, TECOM Test Boards, located at the various TRADOC schools and centers conducted the "service test" while TECOM proving grounds accomplished "engineering testing."

This organizational structure was found to be inappropriate when a Blue Ribbon Defense Panel reviewed testing procedures within the Services in 1970. The Panel concluded that operational test and evaluation contributed substantially to the decision process and that "it was not in the interest of unbiased and objective operational test and evaluation to have those who perform it report through the Developer ..."

The Panel therefore recommended in its report to the President that a separate operational test and evaluation agency be organized in each Service, independent from both the developer and user, reporting its results directly to the Service chief. OTEA was subsequently organized under the Office of the Chief of Staff of the Army and assigned responsibility for all user testing.

User testing is a generic term which includes operational testing, joint service testing, and force development test and experimentation. OTEA accomplishes its management responsibilities by conducting or monitoring all operational testing, acting as the Army point of contact for joint service testing, and coordinating resources for force development test and experimentation.

To take advantage of all available testing resources, the Army organized the TECOM Test Boards under TRADOC with the mission of conducting operational testing and evaluation of selected nonmajor systems and force development test and experimentation. In addition, The Surgeon General, Corps of Engineers, and Army Communications Command were given responsibility for operational testing of medical equipment, construction items, and communications systems above Corps level. Readers interested in the testing activities of these organizations should refer to related articles in this magazine.

Having discussed when and by whom operational testing is conducted, it is now appropriate to discuss how it is accomplished. Figure 2 provides a flow diagram of the test planning process. This process attempts to sequentially answer the following questions:

- What unknowns does the decision maker need answered about this system (issues)?

- What level of performance does the user require of this system (criteria)?

- What data are needed to answer the issues (evaluation plan)?

• How can this data be best obtained during testing (test design)?

• What are the capabilities of the system (test and reporting)?

• Based upon the observed performance and other available information, is the system suitable for fielding (independent evaluation)?

It should be noted that the combat developer is responsible for initial formulation of issues and criteria for approval by the acquisition decision maker, while the other steps of the test planning process may be accomplished by different organizations, task forces, or even a single individual depending upon the complexity and importance of the system. In all cases, however, every effort is made to insure the system receives an impartial and unbiased evaluation.

Throughout the operational test process there is a continuous need to identify and schedule resources for testing. The operational tester is dependent upon FORSCOM, TRADOC, and others to provide the data collectors, controllers, firing ranges, maneuver areas, and ancillary equipment needed for testing.

The resourcing process is accomplished through the Test Schedule and Review Committee (TSARC), a general officer body which semi-annually reviews and recommends priorities for test resources. Approved resource requirements are published in the Five Year Test Program (FYTP), a tasking document which identifies all user test resources for the current year, budget year, and three subsequent years. A discussion of test resourcing, which focuses upon the support provided by troop units and major commands, follows this article.

OTEA is organized so that functional divisions develop the independent evaluation plan and test design plan; conduct the test in the field and write the test report; and finally prepare and present the independent evaluation.

A Science and Technology Division supports this process by providing expertise in the areas of instrumentation, data processing, methodology, human factors, reliability, and systems analysis.

Test resourcing, test policy, and management of nonmajor and joint Service testing are accomplished by a Plans and Operations Division which also provides liaison with the Army Staff. Overall management is provided by test managers who are system function oriented generally along branch lines for: Infantry; Armor; Field Artillery; Air Defense Artillery; Command, Control, Communications and Intelligence; Nuclear, Biological and Chemical, Aviation, and Joint Test. These test managers, all of whom are experienced officers in the rank of Colonel, are responsible for providing detailed management to each test in their functional areas.

To facilitate coordination, OTEA establishes a system task force for each test. This system task force is chaired by the appropriate test manager and is composed of representatives from each of the divisions responsible for preparation of the documents of the operational test and evaluation process. The system task force concept provides centralized management and enhances communications during test planning and execution.

OTEA annually conducts some 12-15 major tests and manages more than 70 nonmajor and joint service tests. With its small staff of 242 military and civilian personnel, it can not support even one major test from its own resources. The agency, therefore, requires outside augmentation.

The test director is responsible for overall execution of the test and is normally a senior field grade officer who is stationed at the installation where the test is to be conducted. OTEA provides a deputy director for Operational Testing to daily manage the test and a small support cell to provide expertise in data collection, test control, and other technical test functions.

The combat developer and trainer, usually TRADOC, provides a deputy director for Combat Developments and Training who is responsible for evaluating all training and insuring that the system is tested in accordance with appropriate operational concepts.

When augmented with data collectors, data managers, controllers, and support personnel, a test directorate for a major system may involve over 100 military and civilian personnel. On a typical day, OTEA can expect to have from 3-5 test directorates in the field with an average test requiring from four to six months to accomplish. Those tests which OTEA is scheduled to conduct during FY83 are displayed in the centerfold of this magazine.

OTEA is a small agency with a big mission. Created specifically by direction of the Department of Defense, OTEA's function is to insure that user testing is effectively planned, conducted, and evaluated with emphasis on adequacy, quality, and credibility. In short, OTEA's job is to help the materiel and combat developer provide the soldier with the best equipment possible; equipment that is both operationally ready and combat effective.

MAJ JOHN R. HAMILTON is a policy officer for the U.S. Army Operational Test and Evaluation Agency. He is a 1969 graduate of the U.S. Military Academy, holds an MS degree in systems management, and has attended the Defense Systems Management College.

Resources: The Key to Meaningful Testing

By MAJ John R. Hamilton

If there is a single factor which determines the success of operational testing it is resources. Without soldiers, firing ranges, instrumentation, fuel, ammunition, funding in adequate quantities, even the best planned and executed test will not be meaningful.

Resources determine not only which questions the tester will be able to answer, but also how well he will be able to answer them. Resources, therefore, must be a concern to everyone involved with the acquisition of a system. The degree to which these resources will be required depends upon the number of issues to be addressed and the confidence desired in the results.

It is incumbent upon the acquisition decision maker, therefore, to only request information that will be critical to his decision. The operational tester in turn must design his test to require only the minimum resources needed to provide adequate and credible information to the decision maker.

Who provides these test resources? Funding for all testing resources is provided under various Department of the Army appropriations. DARCOM program managers provide the test items with associated spare parts and support items, while DARCOM commodity commands provide the required ammunition.

The operational tester provides a limited number of test management personnel and selected items of test instrumentation. All other resources, including the soldiers that will participate in the test, test support personnel, firing ranges, maneuver areas, fuel, and support equipment, are provided primarily by FORSCOM or TRADOC.

This approach to test resourcing is necessary for two reasons. First, player participation in operational testing is limited to soldiers with the skills and experience necessary to operate the system after it is fielded. FORSCOM and TRADOC are both ideally suited to provide these soldiers.

Secondly, the types and quantity of resources needed for testing vary significantly from one system to another. For example, testing of an M1 tank requires large numbers of personnel skilled in armor tactics and a large maneuver area. Testing of a Patriot missile, on the other hand, requires a comparatively smaller number of air defense qualified personnel and a firing range with an extensive down range safety area.

It would not be appropriate, given this wide range of resources, to provide the operational test community with full time resources to meet all testing requirements. Instead, these resources are more efficiently borrowed from FORSCOM or TRADOC for the limited periods required.

Since FORSCOM and TRADOC units must still accomplish their training mission, resources for testing, such as soldiers, range, and support equipment, must be scheduled early to minimize disruption. The scheduling process begins as soon as the need for an operational test has been determined, ideally 3-5 years before the start of the test.

The operational tester develops an estimate of test resource requirements based upon a preliminary list of issues and criteria; and draft concepts for system support, doctrine, training, and operations. Based upon this estimate, an outline test plan is prepared which provides a detailed description of each resource, designates the time and place it is to be provided, and identifies an organization, normally FORSCOM or TRADOC, to provide the resource.

After informal coordination with the appropriate organizations, the outline test plan is submitted to a general officer body, the Test Schedule and Review Committee (TSARC) for approval or resolution of resource shortfalls.

Resource Support of FISTV OT II

Supporting Organization	Major Resources Provided
Forces Command	Maneuver Area (200 sq km), Impact Area, 155 MM Battery (TOE), Tank Plt, Scout Plt, Mortar Plt, BN Task Force Command and Control Elements with Armored Vehicles, Cobra Fire Team W/AH-1G Cobras, FIST Parties, Selected Player and Support Personnel
Training and Doctrine Command	Test Directorate Personnel, Support Vehicles, Support Items, Player Personnel, Instrumentation
Materiel Development and Readiness Command	FIST V Prototypes, KY 57 Vinsons, Digitat Message Devices, Support Equipment, Spare Parts
Operational Test and Evaluation Agency	Test Management Personnel, Support Items, Instrumentation
Department of the Army	$1.22 Million RDTE

Upon approval, outline test plans are added to the Five Year Test Program. This is a resource tasking document for those tests scheduled during the current and budget years, and a planning document for those scheduled for the three out years. Since test issues and system support concepts sometimes change, all outline test plans are reviewed semiannually. If necessary, resource requirements are revised and the outline test plan is resubmitted for TSARC approval. The current Five Year Test Program includes more than 340 approved outline test plans.

Operational testing of a major new system requires a wide range of resources and necessitates the cooperative support of the entire Army community. The recent Operational Test II for the Fire Support Team Vehicle is an excellent example of this cooperation. This test was conducted at Fort Sill, OK, from September through December 1982, and included maneuver by the command and control elements of a combined arms task force supported by indirect fires. Table 1 shows organizations which supported this test. Information from this operational test will significantly contribute to the final design of the new vehicle and the formulation of tactics and training to support it.

Although the costs in personnel, dollars, and equipment sometimes seem high, providing adequate resources for operational testing is one of the best investments that the Army can make.

The time and effort sacrificed by a small contingency of Army elements in operationally testing a developmental system, results in improvements which save thousands of soldier manhours and millions of dollars after the system is fielded. No sacrifice in the Army today could mean more to the Army of the future.

A biographical sketch of MAJ John Hamilton — the author of the preceding article — appears on page 6 of this magazine.

Moore, Oblinger Chosen for Key DARCOM Assignments

Shortly before this issue of the *Army RD&A Magazine* went to press, it was announced that **MG Robert L. Moore**, commander of the U.S. Army Missile Command since 1980, will receive his third star and succeed **LTG Robert J. Lunn** as DARCOM deputy commander for Research, Development and Acquisition. LTG Lunn has been nominated by the President to be placed on the retirement list following more than 33 years of active military service.

It was announced also that **MG Orlando E. Gonzales**, DARCOM director of Development, Engineering, and Acquisition since September 1981, has been selected to assume new duties as commander of the U.S. Army Aviation R&D Command, St. Louis, MO.

MG John B. Oblinger, deputy chief of staff for Combat Developments, HQ U.S. Army Training and Doctrine Command since July 1982, will succeed MG Gonzales. Prior to his TRADOC assignment, MG Oblinger had served as commander of the U.S. Army Air Defense Center and Fort Bliss and Commandant of the U.S. Army Air Defense School.

Reporting dates for the preceding personnel have not been announced.

From The Proponency Desk...

MATERIEL ACQUISITION MANAGEMENT PROGRAM (MAM) UPDATE.

MAM is scheduled for implementation in the June-July 1983 time frame ... Development on the MAM basic course is progressing ... Target date for the first basic course session at the Army Logistics Management Center, Fort Lee, VA is October 1983.

PROGRAM MANAGEMENT COURSE (PMC) GRADUATES UPDATE.

The Defense Systems Management College (DSMC) at Fort Belvoir, VA is interested in keeping up with the career progression of the graduates of the Program Management Course (PMC). If you are a PMC graduate and have been recently promoted or selected for promotion, been selected for further military or civilian schooling or training, or been reassigned, you should notify the college. Submissions should include your PMC class number and be forwarded to: Inside DSMC, Publications Directorate, DSMC, Fort Belvoir, VA 22060.

NOTES FROM THE SC 51 PROPONENCY DESK.

A revision to Chapter 51 (Research, Development and Acquisition Management), DA Pamphlet 600-3 (Officer Professional Development and Utilization) has been submitted to HQ, USAMILPERCEN for staffing. Continue reading this column for news of the final change number and effective date.

REMINDER! Officers who know that their records will be going before a DA Selection Board should take steps to ensure their records are in order. Review your Officer Record Brief (ORB) **carefully**. If there is an erroneous entry or if an entry has not been posted, contact your local personnel officer. Have you reviewed your Official Military Personnel File (OMPF) and is it up-to-date? Is your photograph current? Remember, your records represent YOU!

Per request of the SC 51 Proponency Office at HQ DARCOM, the Career Management Officers at HQ USAMILPERCEN are currently reviewing the records of all OPMD SC 51 (R&D) designated officers. The purpose of this intensive record screen is to identify those lieutenant colonels and colonels considered not qualified to serve in senior R&D positions due to no R&D assignment or training experience. Officers so identified will be officially notified by USAMILPERCEN in writing of their removal from the R&D Specialty and offered a designation in a specialty which will better fit their experience and training.

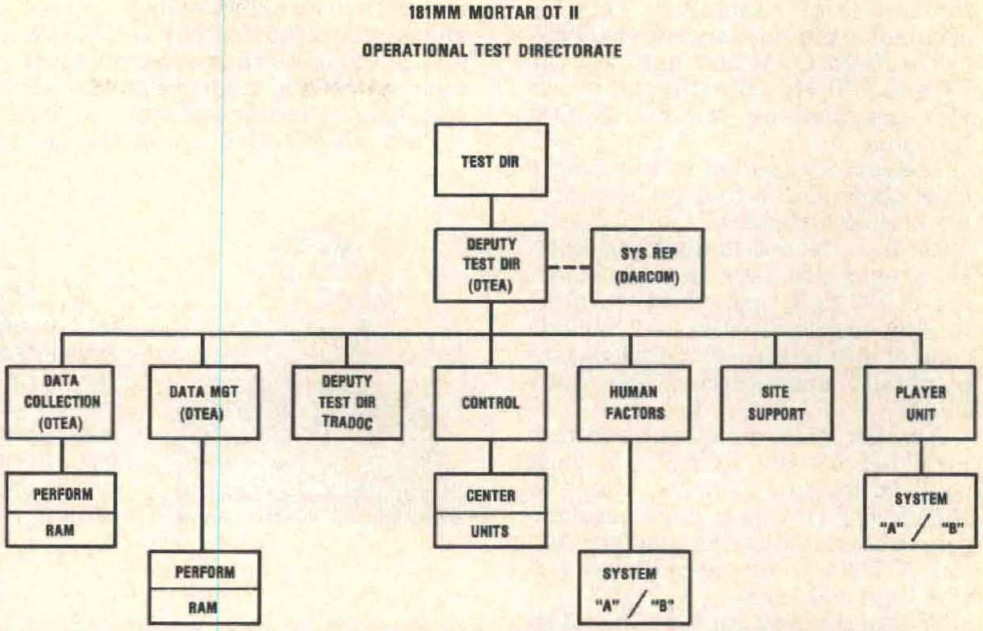
Good news! The position of Commander, Kwajalein Missile Range in the Marshall Islands, has recently been added to the DA Centralized Command Selection List as a SC 51 command. This brings to five the number of colonel level positions to be selected for fill by a centralized DA Selection Board. The other positions are: MERADCOM, Fort Belvoir, VA ... Natick R&D Lab, Natick, MA ... Yuma Proving Ground, Yuma, AZ ... and Harry Diamond Lab, Adelphi, MD.

Operational Testing — *Organizing for Success*

By MAJ William W. Ryan Jr.

Is there really a key to guarantee success for the operational tester? The answer to this question lies within the organizational structure for implementing operational testing in the U.S. Army today. After the test has been carefully planned and resources obtained, the success or failure of the test rests on the test directorate. This test directorate encompasses representatives from the operational tester (OTEA), the combat developer (TRADOC), the materiel developer (DARCOM), and the FORSCOM designated host unit.

This article will examine how these representatives are formed into an effective test directorate team which will achieve a successful operational test and use as a model for discussion the organization of the recently completed Improved I81mm Mortar Operational Test II (I81mm OT II).



Organizational breakdown of the I81mm Mortar Operational Test Directorate

The assignment of personnel to the I81mm OT II Test Directorate began about six months prior to the Fort Polk, LA, test start date, and during this time an operational test team was designated at OTEA and tasked to conduct the test. The OTEA-filled positions on this team were the deputy test director for operational testing, the chief data manager, and the chief data collector.

Designing and implementing the detailed test plan so that all operational test issues defined in the system's requirements document are answered is the job of the deputy director for operational testing. Criteria for selection of the deputy director is based upon the officer's familiarity with the type system undergoing test. This normally results in an infantry officer being assigned the deputy director position for an infantry system test, as was the case in the I81mm OT II.

It is the deputy director's task to organize the test directorate in such a manner that will insure the accomplishment of the assigned test objectives within the time and funds allocated. He must make allowances for effective communication and feedback among the various positions so that an accurate and factual test report, depicting the test conduct, can be produced at the conclusion of operational testing.

The chief data collector is responsible for development of all forms necessary to gather the test data. To accomplish this, he must acquire a thorough understanding of what data are required and, with the help of the Science and Technology Division in OTEA, break down each requirement into an understandable and simple collection form.

Development of a simplistic collection form is absolutely critical since all other data collection personnel will come from the FORSCOM host unit which normally does not have prior testing experience. The chief data collector also completes test report paragraphs addressing performance and reliability, availability, and maintainability. In the case of the I81mm OT II, the number of personnel assigned to this section was approximately 20 soldiers from FORSCOM.

The chief data manager's responsibilities are to validate, enter and format performance and RAM data into an OTEA-developed data base. He must provide a near realtime validated data base for evaluation if a sound procurement decision on the test system is to be reached.

During the I81mm OT II, there were two automated data processing remote terminals at the test site with a direct telephone link to the Automated Data Processing Center accessed by OTEA. This section consisted of two locally hired civilian terminal operators as well as performance and RAM data reducers/verifiers from the FORSCOM host unit. In support of the test report preparation, the section provides all performance and RAM data displays required by chief data collector.

The first individual designated from outside OTEA to serve on the test directorate is the test director. This individual serves as the FORSCOM host unit point of coordination for resources, personnel and facilities necessary to conduct the operational test. Because of the complex and sensitive nature of this position, the commander, 2d Brigade, 5th Infantry Division (Mech), Fort Polk, LA was selected for the I81mm OT II. The deputy test director for training and doctrine is another operational test directorate position provided by the test community. This individual is selected by the combat developer from the TRADOC center having the most involvement with the particular test system.

Relative to the I81mm OT II, the deputy test director for training and doctrine came from the Infantry Center at Fort Benning, GA. He is responsible for certifying that all training received by maintenance and player participants conforms to the training procedures to be implemented when the tested system is issued Army-wide.

The deputy test director also assists in development of the various test scenarios by insuring that the tested system's tactical and doctrinal employment considerations are incorporated into the test. Additionally, he provides input to the test report paragraphs addressing "Training, Doctrine, Tactics, Logistics, and Transportability." In

operational testing, all test events are executed under the direction of a centralized control element headed by the chief controller. This individual is provided by either OTEA or the FORSCOM host unit. For the I81mm OT II, the chief controller was provided by the FORSCOM host unit.

The major criterion in selecting a chief controller is that he possess a working knowledge of a similar type system to the one undergoing tests. He should also have an understanding of S-3 field operations since his control responsibilities will include control groups at each participating player unit and a tactical operations center.

Another test directorate section provided by the FORSCOM host unit is human factors. For the I81mm OT II, this section was comprised of one officer as the chief and four NCOs who served as human factors data collectors.

Within this section, all human factors data requirements are gathered to include player pre, mid, and post-test interviews with Delphi procedures used to obtain a ranking of the test player answers to questionnaires to assess the man/machine interface. Since human factors questionnaires are not easily formatted for automated data processing, it often requires a manual reduction effort by this section in order to input the data into the test report.

The smallest test directorate section is that of site support. The officer and NCO who made up this section during the I81mm OT II were aided by a local civilian hire clerk/typist. This section is tasked with all property accountability within the test directorate which includes all office buildings, test facilities, office furnishings and rental equipment in addition to any DARCOM tested items. Additionally, all funds provided by OTEA to the host installation for the conduct of the test are managed by the site support section.

The final FORSCOM host unit participants in the test are the test players. This group will remain under the operational control of the test directorate from the time training commences through the completion of the post-test human factor questionnaires.

Three mortar platoons from 3d Battalion, 11th Infantry at Fort Polk were the player units for I81mm OT II. These units deployed in a realistic operational environment and conducted exercises as outlined in the test scenarios.

Throughout the operational test, a DARCOM representative is always available to the test directorate in an assistance capacity. His main objective is to insure the timely arrival of all test items provided by DARCOM and to expedite the procurement of repair parts which are unique to the test system during testing.

Through effective use of the personnel resources assigned to an operational test directorate, a credible and accurate evaluation of a test system can be accomplished. As the I81mm OT II example shows, the integration of OTEA/DARCOM/TRADOC/FORSCOM elements into one test organization is truly "organizing for success."

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DARCOM Announces MSC Realignments

The U.S. Army Materiel Development and Readiness Command has announced the intent to establish three new commands by merging six existing commands.

- A U.S. Army Aviation Systems Command (AVSCOM) will be created by consolidating the U.S. Army Aviation Research and Development Command (AVRADCOM) and the aviation elements of the U.S. Army Troop Support and Aviation Materiel Readiness Command (TSARCOM).
- A U.S. Army Troop Support Command (TROSCOM) will be created by consolidating the troop support elements of TSARCOM, the U.S. Army Mobility Equipment Research and Development Command (MERADCOM), and the U.S. Army Natick Research and Development Laboratories (NLABS). MERADCOM and NLABS will become part of TROSCOM without geographic relocation.
- A U.S. Army Armament, Munitions and Chemical Command (AMCCOM) will be created by merging, in place, the U.S. Army Armament Research and Development Command (ARRADCOM) and the U.S. Army Armament Materiel Readiness Command (ARRCOM).

AVRADCOM and TSARCOM Headquarters are presently located in St. Louis, MO; MERADCOM is located at Fort Belvoir, VA; and NLABS is in Natick, MA. ARRADCOM is located at Dover, NJ, Aberdeen Proving Ground, MD and Watervliet, NY. ARRCOM is located at Rock Island, IL.

The newly designated commands of AVSCOM and TROSCOM will be located in St. Louis while AMCCOM will be headquartered at Rock Island.

Total employment is expected to remain at the current level for each geographic location involved and there will be no resultant physical relocation of people. Implementation will be carefully planned and time phased to minimize disruption. The effective date of the reorganization will be established as part of the planning process.

AVSCOM will serve as a single manager for research, development, acquisition and support of Army aviation systems. TROSCOM will perform the same role for Army troop support equipment. AMCCOM will assume total management responsibility for armament, ammunition, and chemical materiel logistics and readiness support now assigned to ARRCOM and ARRADCOM.

These reorganizations are designed to strengthen and simplify DARCOM's management structure in support of U.S. Army forces without increasing resource requirements.

The Army and Joint Testing

MAJ John D. Claxton

Each year vital questions relating to joint tactical procedures, force structures, and interservice operating relationships are addressed in joint test conducted by a multiservice joint test organization. The joint tests management process, involving all the services, addresses the issues and resources of test concepts recommended for evaluation by a joint test.

The Army participates in test planning and resource support of only those joint tests of interest to the Army. This management process has evolved from an early identification of the need for joint service testing.

The Blue Ribbon Defense Panel of 1970 suggested the initial evaluation concept. This report identified a need for conducting productive joint tests of technical and tactical concepts, force structure and systems interoperability issues requiring involvement of more than one service.

Department of Defense Directive 5000.3 requires the services to participate in or monitor the Joint Test and Evaluation definition and test design efforts, and coordinate the results of these before the commitment of resources. This directive provides the basis for Army involvement in joint testing and further tasks management of this program to the Office of the Under Secretary of Defense for Research and Engineering.

Subsequently, the responsibility for initiation and management of the Joint Test and Evaluation Program is delegated to the Director, Defense Test and Evaluation (DDTE). This staff element provides management of the nomination procedure, funding, interservice coordination, and technical assistance by contract support agents such as the Institute for Defense Analysis and MITRE Corp.

The DDTE primary management tool is a Five Year Test Plan containing a list of Joint Test and Evaluation nominations which are updated annually and considered for approval.

The annual nomination process begins each spring when the Director, Defense Test and Evaluation requests nominations. Any major Army command, agency, or individual may submit nominations through channels to the Army staff where they are reviewed and forwarded.

The Army staff manages this process with the Joint Test and Evaluation Review Council which is chaired by an Army operations action officer. This council brings together the Army staff, OTEA and major command representatives to review nominations, discuss the impact and utility for the Army, and establish Army positions as nominations work their way through the process.

Nominations received by the Director, Defense Test and Evaluation Staff start the initial process with a planning committee review. The committee looks at test objectives, feasibility and develops a prioritized listing of the nominations. All service positions are considered, and a draft Five Year Test Plan is forwarded to the Senior Advisory Council.

The Senior Advisory Council, consisting of general and flag officers, evaluates the nominations for a scope of the test, feasibility, resource requirements, funding, and validation of priorities. Lead and participating services are identified and fiscal year start dates assigned to each nomination accepted for the Five Year Test Plan.

Each step in the nomination process includes a progressively more comprehensive and detailed refinement of resource and funding estimates. Four nominations currently within this cycle, and their nominating agencies, are; Joint Chemical Warfare (JCS), Air-to-Air Missile Combat Evaluation (OUSDRE), Joint Assault of Deep Targets (USA), and Target Engagement Using Laser Designators (USA).

Once a joint test is approved and chartered, the lead service nominates a joint test director and each participating service appoints a deputy test director. The Director, Defense Test and Evaluation approves the nominated joint test director and then a joint test directorate structure is developed and staffed with personnel from the participating services. While the joint test staff develops the test design, each service publishes its resource support requirements.

Army OTEA interfaces with the joint test director and the Army deputy to develop the Army resource and funding requirements for the Outline Test Plan. The joint test director is advised of the equipment and personnel which the Army can provide and Army funding support is budgeted through OTEA based on the support listed in an Outline Test Plan.

The Joint Test Branch of OTEA coordinates through major command headquarters to insure test support resources are provided on schedule. Upon completion of testing, the joint test directorate writes the final test report which is used to develop the Army independent evaluation report. This Army evaluation provides the basis for changes to Army tactics and doctrine.

The joint test process is in a constant state of review by the Senior Advisory Council. Recent revisions require periodic Senior Advisory Council inprocess reviews of joint tests to evaluate their progress and determine the utility of continuing test development.

Those joint tests not adequately advancing towards a useful product are considered for termination. The trend in test design is being shifted away from massive field tests requiring months of field time for service personnel and equipment.

Recent test design approaches rely more on technical analysis using computer simulations with selective data validation through limited field test excursions. Another consideration is the greater participation of readiness or central command staff planners in the test design effort. This will identify additional benefits by using selected readiness exercises to provide field forces for validation of computer data. Increasing costs of fielding test forces may dictate the avoidance of single purpose field testing.

Future field trials may require more data from joint tests combined with readiness exercises or selected developmental systems of the services in various stages of the acquisition cycle. The Army Lighter Than Air Cushion Vehicle (LACV-30) is currently scheduled for testing in

conjunction with Joint Logistics Over The Shore (JLOTS) II, Phase I.

The Navy plans to test the Auxiliary Crane Ship and the Maritime Administration Sealift Container during the last phase of JLOTS II. The C3 Countermeasure field test can provide an appropriate environment for testing U.S. conceptual EW/CM equipment. Sharing of field test resources will result in significant reductions in testing budgets and more efficient use of Army personnel and equipment.

The implementation of the 1970 Blue Ribbon Defense Panel recommendations promugated by DOD Directive 5000.3 provides the basis for Army involvement in the joint testing nomination process. Each joint test nominated is reviewed extensively and then managed by one of the services to answer questions which all services agree are important but impossible for one service to resolve alone.

With OSD guidance, the joint field test effort may become the test bed for many future tests, resulting in real world cost reductions and allowing commanders more time for training, while still producing valuable, informative test data.

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TECOM's IME Program Reduces Materiel Development Costs

Years before the current debate on defense spending began, the U.S. Army's International Materiel Evaluation Program (IMEP) was seeking cost savings approaches in the materiel acquisition process.

IMEP identifies and evaluates systems already in use by America's NATO allies for possible adoption by the U.S. Army. By purchasing existing non-major items, the Army reduces research and development time and money.

The program is the Army element of the Department of Defense Foreign Weapons Evaluation Program, and is managed by the U.S. Army Test and Evaluation Command (TECOM) at Aberdeen Proving Ground, MD.

The Army has purchased six items through the IMEP since the program was established in 1977. These items are a light antitank weapon from Norway; a nuclear, biological and chemical contamination marking set and a 10-ton truck from Germany; a small unit support vehicle from Sweden; and, a ribbon bridge erection boat and tracer training ammunition from the United Kingdom.

In addition to decreasing development and purchase costs, the program's objectives are to improve performance of U.S. systems by integrating allied technologies, to reduce time needed to field items, to further standardization of materiel among NATO forces, and to improve interoperability of weapons, ammunition and other hardware.

Three steps, or phases, are involved in the acceptance of foreign materiel into the Army inventory, according to Mr. Fred F. Schaub, chief of the International Materiel Evaluation Division. Phase I begins when somebody brings an item to the attention of the IMEP.

"Most of our input comes from liaison offices and sales representatives," Schaub said, "but literally anybody can suggest a system for consideration."

Once the item has been identified, IMEP goes to the Training and Doctrine Command (TRADOC) to determine if there is a requirement for that item. If there is a requirement, IMEP conducts a search for additional candidates.

A Phase I evaluation determines the potential of one or more items. If there is potential, and if DA "gives its blessing," Schaub said, IMEP secures Department of Defense funding and begins Phase II, evaluation of the foreign items.

The first step in this phase is to acquire the system under consideration. "We can either borrow, lease or purchase the item, whichever is the most advantageous," Schaub said.

Once the IMEP has obtained the required number of items, the program tasks a division of TECOM and the appropriate TRADOC element to do the testing and evaluation. From this point, the item is handled exactly as if it were a piece of American equipment, Schaub said.

Once Phase II is completed, the Army may decide to accept the item and acquire it through direct purchase or co-production with the foreign country, reject the item, or acquire additional data through Phase III testing.

Through the Phase I screening process, IMEP tries to identify only those systems with a reasonable potential for success. If the item does not fully meet U.S. Army needs, Schaub said, IMEP may recommend that the item be accepted and then product improved.

"When we find faults, we let the foreign manuafacturer know," Schaub said. "Often we influence them to make changes in their system." A major cost saver in the program is that IMEP relies heavily on foreign-produced data.

"Most foreign countries follow U.S. testing standards with modifications for their own environment," he said. "Additional environmental and safety tests are usually required, but we are still able to use a significant amount of foreign test data."

Currently under consideration in the IMEP is an inflatable Hawk missile decoy developed by Germany. The decoy has been tested at TECOM's Electronic Proving Ground at Fort Huachuca, AZ, and White Sands Missile Range, NM. The inflatable Hawk is undergoing durability testing at Aberdeen Proving Ground.

Currently the IMEP has seven Phase I and 25 Phase II evaluations in progress.

TRADOC's Guidelines and Philosophy on Operational Testing

By MG Benjamin E. Doty
Deputy Chief of Staff, Test and Evaluation, TRADOC

The position of deputy chief of staff for Test and Evaluation is a fairly new position within the Army's Training and Doctrine Command, established in December 1980, to provide emphasis and independence to the test and evaluation mission. Management of the Army's 10 user test activities has provided balanced support to TRADOC's role as the Army's doctrine, combat and training developer.

Physically located at Fort Hood, TX, the position is dual-hatted because it includes reponsibilities as the commander of the TRADOC Combined Arms Test Activity. There are two principal assistants, an assistant for Operations and an assistant for Resources and Policy. The former is also the commander of TRADOC's Combat Developments Experimentation Command at Fort Ord, CA; the latter is located at HQ TRADOC, Fort Monroe, VA, and provides interface with the headquarters staff and outside commands and agencies.

A key part of TRADOC's test and evaluation realignment was the formation of the Test Independent Evaluation Directorate at the Combined Arms Center, Fort Leavenworth, KS. This directorate is providing operational evaluation clearly independent from system proponents and, being at the Combined Arms Center, has the added advantages of having an established analytical capability and the perspective of how systems function and interrelate on the battlefield. The synergism from these advantages significantly enhance the center's evaluation capability.

Since the formation, there have been a variety of thrusts which we have undertaken. These have been directed at the improvement of quality of user T&E, utilization of T&E resources and of how user T&E supports the various missions of TRADOC and the Army.

TRADOC Instrumentation

TRADOC is the Army's major developer, acquirer, operator and maintainer of user test instrumentation. Realistic user testing is relatively new compared to the types of tests conducted in laboratories and proving grounds.

In the infancy of user testing as we now know it, there were intense efforts to develop methods of measuring and recording data and to simulate battle conditions. Some were successful. Some were not. Some efforts were duplicative. Over the last several years we have developed a well integrated instrumentation development and acquisition program that will replace first generation user instrumentation.

Devices being developed will permit measurements under simulated battlefield conditions with minimal or no interference with test participants; provide realistic, yet safe simulation of battlefield conditions to include the threat; be cheaper to operate and maintain and more reliable and accurate; and be movable to the optimum test site.

Instrumentation and simulation must keep pace or, hopefully, lead weapon system development. The program is expensive in spite of the preceding advantages. We therefore have established a variety of backbone programs to provide the maximum standardization among our test activities. We also have established an automated inventory to maximize utilization by all TRADOC test agencies and minimize procurement of instrumentation.

Responsive and Early Testing

User test and evaluation has historically been reactive, heavily hardware oriented and late in the acquisition process. Within TRADOC there is a major effort and emphasis on early testing and validation of doctrinal, training, force structure and weapon concepts; operational testing conducted early during the acquisition cycle; test issues well focused on key operational and user aspects of the system; and feedback to decision makers in a timely fashion.

The framework for these improvements has existed for sometime, but not always well used. TRADOC has therefore established procedures to insure that key tests are not arbitrarily waived and that the critical issues important to the decision makers are identified earlier to the tester. This procedure is accomplished through the TRADOC Materiel Evaluation Committee. The committee involves key elements of TRADOC headquarters staff and the integrating centers and interacts directly with both the TRADOC deputy commander for combined Arms and the TRADOC commander.

To provide earlier evaluation of new concepts, we have taken a futuristic approach to test planning. We are now structuring a test master plan which covers the doctrinal, force structure, training and materiel issues that have been highlighted through the Mission Area Analysis process that TRADOC utilizes.

Test advisory groups are being established to plan and design the individual force development test and experimentation, concept evaluation and operational tests which result. Through these advisory groups, we will be able to update our long-range planning as Mission Area Analyses are updated to reflect the transition of the Airland Battle 2000 from concept to Army doctrine.

Improved Methodology

In spite of perceived increases in defense spending, this is truly an era of scarce resources. The scope of the Army's modernization effort requires that we constantly devise new methods to obtain needed test results with fewer people, less dollars and less impact on the active Army's personnel and equipment.

We are already rescoping tests to reduce the amount of dedicated test operations. Instead we are, where possible, depending upon observations of active units and their use of equipment rather than scheduling massive exercises.

We are also investigating new methods of expanding our data collection on logistics supportability, without increasing the scope of tests. Included are better use of developmental data and collection of data after systems are fielded.

TRADOC's Testing Goal

The goal of our testing is to provide the decision maker with the information necessary to make a decision. Overall, our philosophy is to conduct reliable and affordable tests; insure that tests occur early to minimize surprises late in the development process; and to scope tests so that the decision maker has the minimal information necessary to answer his issues at a comfortable level of risk. This translates into testing which is tailored to the key issues and is timely. Too much information has little utility and answers too late have none.

Our testing can take many forms. While operational testing is usually tightly controlled, we must be prepared to revert to a test-fix-test to provide quick answers during hardware development. Users of our evaluations may be doctrinal developers and trainers as well as members of the materiel acquisition community. These non-materiel consumers increase in importance as the Army determines how to transition from the Airland Battle doctrine to the Airland Battle 2000 concept.

In this environment the test and evaluation community must maintain the perspective of being both a service organization for its consumers as well as their "consumer advocate".

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APG's Support Division Tests Tomorrow's Weapons Today

A small group of soldiers at Aberdeen Proving Ground, MD, is playing a key role in the decision-making process regarding what kinds of weapons, vehicles and equipment will make their way into future Army inventories.

These soldiers, about 200 of them, are testing tomorrow's Army inventory today under field conditions . . . long before these items make their way into the field. In most cases, the testing is tougher and more demanding than anything the soldier will encounter on the battlefield.

Soldiers who conduct this testing are assigned to the Military Support Division (MSD) of the Materiel Testing Directorate (MTD), APG's largest test organization.

"We give the Army a chance to see if its soldiers can operate and maintain new weapons systems, and to get any bugs out of the system before it goes into operational testing in a unit," explained MAJ James Vickrey, chief of the MSD. "The average soldier is hard on a piece of equipment because he doesn't have the experience to operate it. Generally, if a test vehicle or weapon can withstand handling by MSD soldiers, more than likely it will hold up in the field."

Vickrey added that the MSD soldiers get as much experience as possible with a piece of equipment. They are trained in all aspects of operating and maintaining. Soldiers in the Maintenance Support Branch perform all maintenance tasks and soldiers in the Field Support Branch perform all operator tasks.

"One problem we have with maintenance involving new test equipment is that soldiers may not have any training on that particular piece of equipment," Vickrey said. "The Army does not have a Military Occupation Specialty (MOS) for equipment that isn't yet a part of its weapons systems. The soldiers have to rely on the contractor's manuals to learn how to maintain and how to operate the equipment.

"For instance, our soldiers are expected to test the Reverse Osmosis Water Purification Unit," Vickrey added. "There is no MOS in the Army for operating it, nor are there manuals that explain it. All we have is the contractor's manual. I have soldiers with five different MOSs working on it."

MSD has 29 different MOSs or soldier's job types, that include construction equipment repairman, M1 tank system mechanics, infantrymen, combat engineers, and field artillerymen. Regardless of their job specialty, all the soldiers play an important role in supporting MTD's test mission.

When new equipment comes in for testing, there are three phases of the Soldier Operator Maintenance Test and Evaluation program performed by the Military Support Division.

First, the human factors engineering aspects of the equipment are considered to see if the equipment and the human are compatible and if the equipment is safe to operate. Then the maintenance crew completes an initial inspection of the equipment to make sure the equipment is complete, useable and fully functional.

The Field Support Branch soldiers will then follow the test director's test plan. Normally this involves driving a vehicle many miles over a combination of cross-country and level courses and performing any test firing that may be required.

"The soldiers provide MTD's data collectors with all the necessary information they need for evaluating the test vehicle," Vickrey said. "Every time a test vehicle is on the road, the operator logs all performance data, too."

The soldiers sometime save the government a considerable amount of money. Vickrey stated that MSD gets involved in some projects where a test vehicle or weapon can't perform its intended purpose. The project is stopped early, saving the Army a significant amount of money.

Army Long Range RDA Planning

By Dr. Jay R. Sculley, Assistant Secretary of the Army (RDA)

Form, function and direction of the Army's long range planning process was the subject of an Army Science Board address by Assistant Secretary of the Army (RDA), Dr. Jay R. Sculley. An abbreviated version of that presentation follows:

Planning is a fundamental, and integral part of any but the most simple management task, and the planning aspect of management tends to emerge and become highly visible when management has to contend with a rapidly changing environment.

Though the changes that have caused the present emphasis on planning have taken place during the past two decades, their cumulative impact on the Army has been enormous. These changes have occurred in the threat, in technology and in the economy.

During the late 1960's and early 1970's, the conflict in Southeast Asia diverted our nation's attention and resources, and the Soviets exploited this opportunity to continue the most massive modernization effort ever undertaken in peacetime. The Army mission, therefore, is to counter this threat and assist in deterring war worldwide.

The above situation has resulted in a change in strategic direction which is reflected in our research, development and acquisition efforts — namely, in added funding for RDA. We need to understand, however, that this added funding will not make us well — increased funds merely allow us to develop and produce planned for weapons at planned for quantities. The changing economy, however, does not allow us to do all that needs doing.

Our special problem then is one of balancing our investment among readiness, modernization and sustainability between both light and heavy forces. While I don't think we should try to match the Soviets gun for gun, I do believe that for this great nation to be "out qualitied" is unthinkable — yet that is where we are today. We can close that quality gap in the 1980's by leveraging off America's technology.

Our challenge for the 1980's is to procure enough equipment to equip and modernize our forces and to plan and execute an R&D effort that will preclude our falling behind again. Fundamental to this challenge is our technique for managing the tradeoffs between requirements and resources. The keystone is, I believe, effective long range planning.

Long range planning as it relates to research, development and acquisition is best understood by an outline of what it is to accomplish. Its primary focus is to stabilize the RDA process — with the emphasis on process.

Let me now describe what has been accomplished during the past three to four years to achieve these objectives. As a result of initiatives begun by DARCOM's GEN Keith, while he was the DCSRDA, the first edition of the DA Long Range RDA Plan was published in the summer of 1981. The final draft of the DARCOM Long Range RDA Plan was also published in May of 1981.

In order to further emphasize the significance of 1981 for Army planning, the DA Chief of Staff Regulation 11-15, entitled the Army Long Range Planning System, was published in May 1981. Responsibility for its implementation lies with ODCSOPS. It describes three sequential iterative processes consisting of estimates of the future, Army future needs, and plans to meet future needs. Plans in the latter phase include the DA Long Range RDA Plan, the DARCOM Long Range RDA Plan, and TRADOC's Airland Battle and Battlefield Development Plan.

Responsibility for long range RDA planning under CSR 11-15 has been delegated to ODCSRDA.

It should be stressed that the long range RDA planning process involves a large number of people representing a host of organizations, and that the success of this process depends to a large degree on the partnership between the combat developer (TRADOC) and the materiel developer (DARCOM). The relationship between the TRADOC schools and the centers, and the DARCOM laboratories is highly important.

This partnership is reflected in the combined efforts of these two groups in support of the TRADOC mission area analyses and individual DARCOM major subordinate command RDA plans. Initial impetus for the long range RDA process is, however, the concept based requirements strategy of TRADOC.

Unlike previous approaches, this strategy attempts to make materiel developments responsive to "how to fight" concepts rather than vice versa. Currently, the conceptual focus of this strategy is mid-term and leads to an airland battle doctrine on which the present mission area analyses are based.

I should mention that a fundamental tenant of ODCSOPS is that to stabilize the RDA Program, the Army Staff, TRADOC and DARCOM must work from a single set of priorities for all RDA acitivities. For example, system developments and acquisition are prioritized in the DA Long Range RDA Plan. Additionally, the tech base is prioritized in the DARCOM Long Range RDA Plan for Science and Technology. TRADOC provides the basic input for both parts of this RDA prioritization.

The DARCOM Long Range RDA Plan consists of two parts. The first, known as the Science and Technology Plan, is devoted to the tech base. It was published for the first time with an Army prioritization of its tech products in March 1982.

The second part of the DARCOM Plan is the development and acquisition portion which should be published in final form for the first time in the summer of 1983. This volume will provide baseline schedule information for systems included in the DA Long Range RDA Plan and will show how the technology base supports specific system acquisitions planned for the next 20 years.

By addressing different parts of the RDA process and by including different levels of detail, the DA Long Range RDA Plan and the DARCOM Plan actually compliment each other. The DARCOM Development and Acquisition Plan couples technology, development and acquisition, and thereby provides critical timing information required for affordability studies. The DARCOM Plan will also define advanced systems concepts for possible inclusion in future cycles of the DA Long Range RDA Plan.

Since successful long range RDA planning is not easy, it will be necessary to achieve several difficult tasks. For example, major objectives of the plan must be clearly tied to user requirements. Also, actions in the programming and budgeting area must be made after analysis of impact on the plan. Finally, management cannot allow capricious deviations from the plan.

In summary, I want to emphasize that the process and the people involved in long range RDA planning are really the heart of the matter. The plans themselves are the sign posts that focus our efforts and provide the necessary visible record of planning.

ASA (RD&A) Dr. Sculley Terms Acquis

Q. *Army RDA Magazine* interviewed you when you first came aboard as the Assistant Secretary for Research, Development and Acquisition. During that interview you stated that the Army's primary area for improvement was that of cost and management discipline. Could you comment on the progress that has been made?

A. We have been doing many things to accomplish our goal of producing the required equipment in an efficient and economical manner. It is not business as usual in the Army. I personally have made cost and management control my number one priority and have focused my staff's efforts on implementing several specific initiatives. We have made significant progress, but still have a long way to go.

We have implemented an effective management control system, completed the transition to production on most major systems, and have clearly defined our future hardware strategy and technology thrusts through our long range planning process.

Q. During the last three years there have been many efforts aimed at improving the acquisition process. What were the major efforts and what were the most significant results?

A. The efforts of General Vessey, when he was the Vice Chief of Staff, were aimed at improving our costing capability and better tying the acquisition process into the overall Planning, Programming and Budgeting process. The Secretary of the Army's Cost Discipline Advisory Committee recommended an additional 40 actions. Their major thrust was aimed at better handling of the transition to production phase of the acquisition process.

The Acquisition Steering Group, which included representatives from DARCOM and TRADOC as well as the Army Staff, identified 15 initiatives aimed at shortening the acquisition process that are now being implemented.

Of course, the umbrella for all of this has been the Defense Acquisition Improvement Program or Carlucci Initiatives that outlined 32 objectives for the overall improvement of the acquisition process. As you are aware, Secretary Thayer has recently supported these objectives and has identified some for his special emphasis.

From an overall management standpoint, one of the most important results of all of these initiatives is a continuous real time update to the Army leadership on the cost, technical, and schedule performance of our major programs. This involves a joint on-going effort involving the Secretariat, the Army Staff and DARCOM to work with the program managers in identifying and solving potential problems early. This system has allowed us to shift from a reactive to an active mode and has all but eliminated unpleasant surprises.

Closely aligned with this is DARCOM's new Program Management Control System. This system specifically outlines the program's acquisition plan, requirements, costs and operating objectives in an integrated management plan that must be approved by DARCOM Headquarters and the Department of the Army. Once the plan is finalized, all changes must be approved at the headquarters level.

We have expanded our anlaysis of Selected Acquisition Reports. The Under Secretary, the Vice Chief of Staff and other senior managers now conduct quarterly reviews of the Army Staff's SAR analysis. We have established Risk Review Teams to independently examine all aspects of a program prior to an Army System's Acquisition Review Council decision. The goal of these teams is to make sure we have considered all aspects of a program from a cost standpoint.

We have also linked the Planning, Programming, and Budgeting System to the systems decision milestones so that tradeoffs must be made at the time of the decision if recommended costs exceed programmed costs. This results in an Army program that is always in balance. It also forces us to better understand the cost implication of our decisions. Nothing is free. We now update our baseline cost estimates annually and conduct independent cost estimates on major systems. Previously, estimates were conducted at milestone reviews which could be 3-5 years apart.

"To achieve a balance between our current modernization efforts and the emerging threat, we are focusing our research and development efforts on key leverage technologies. This strategy will minimize the cost of developing future systems while taking full advantage of our scientific strengths."

We are taking advantage of the cost savings potential of multiyear procurement where it is appropriate. The Blackhawk and ALQ-136 contracts were awarded in 1982. We are now evaluating the Multiple Launch Rocket System, CH-47, T700 Engines and several other programs in an effort to reduce costs through this type of contracting.

Q. Are your management and cost control initiatives directed primarily at the new weapon systems in production?

A. While the major new weapon platforms are the most publicized part of our modernization program, it is important to recognize that they represent only about 43 percent of our total procurement budget or approximately 12 percent of the Army's total budget. For example, our 1984 procurement budget is made up of the following mix: 43 percent is for weapon platforms such as MLRS, Patriot and DIVAD; 6 percent is for modifications to existing platforms and product improvements such as the

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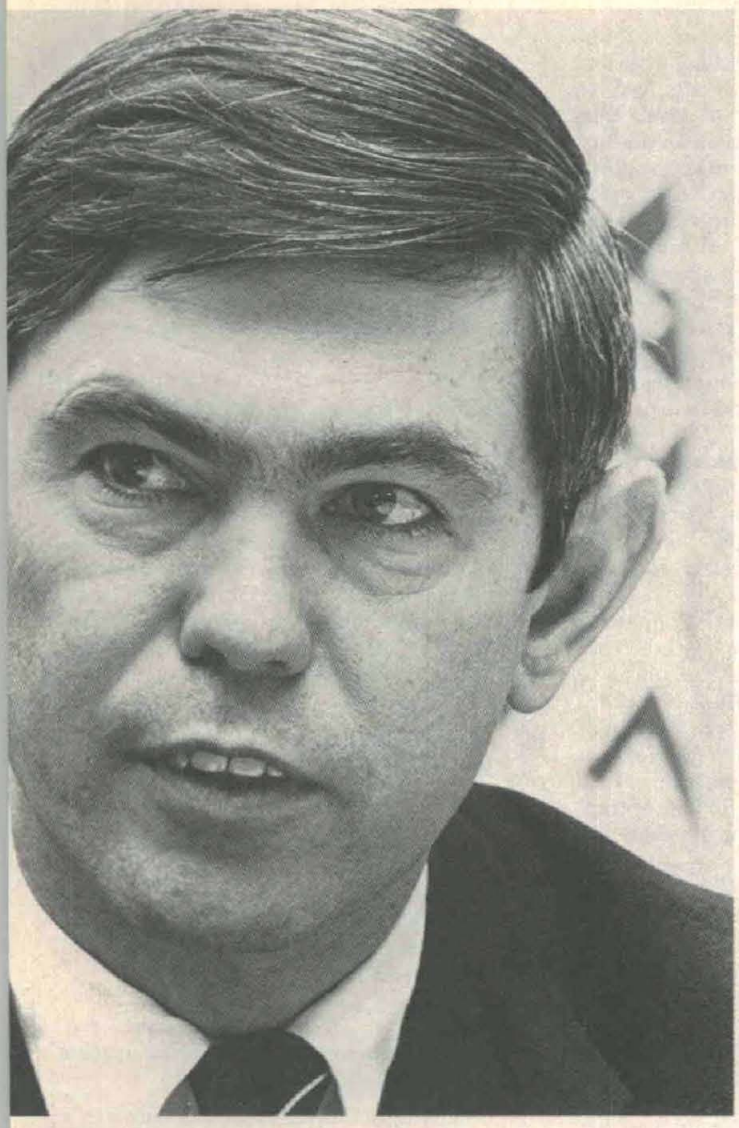

CH-47D program; 12 percent is devoted to initial spares, support equipment and facilities such as that for avionics, missiles and production base support; 12 percent is for the support vehicles and equipment such as the High Mobility Multipurpose Wheeled Vehicle (HMMWV), 5-ton trucks, cranes, generators, and fork lifts; 14 percent goes to communications and electronic equipment such as SINCGARS and Joint Crisis Management Capability (JCMC); and finally 12 percent is for ammunition.

These other investments are necessary to maintain the infrastructure and supportability of both the new weapon systems we are deploying and the existing force. For example, we must invest approximately $270 million per year just to maintain the 15 year average age of the 2½-ton trucks in our inventory. Another example is our ammunition production lines which require an investment of $2 billion per year just to keep them at minimum production rates.

Q. What are you doing to address the affordability of future systems?

A. To achieve a balance between our current modernization efforts and the emerging threat, we are focusing our research and development efforts on key leverage technologies. This strategy will minimize the cost of developing future systems while taking full advantage of our scientific strengths.

We have identified five functional thrusts which will form the nucleus of future systems. These are Very Intelligent Surveillance and Target Acquisition devices; Distributed Command, Control, Communications and Intelligence; Self-Contained Munitions, Soldier-Machine Interface, and Bio-Technology.

These new thrusts are based on technologies that will yield hardware that will lower acquisition costs, require less power, and be smaller and lighter. These improvements will give us equipment in the field that is more deployable and easier to operate and maintain. This will result in a need for fewer people and reduced costs. By making use of these technologies we will minimize the so-called "bow wave" of operating and support costs as we modernize the Army.

In our fiscal year 1984 budget request, we have allocated 328 million dollars to these new thrusts, which represents 28 percent of our technology base funds.

Q. How do you plan to effectively manage the costs of implementing these new technologies?

A. We plan to control the configuration management decisions at the headquarters level and will use pre-planned product improvements of existing systems wherever possible. This will allow us to extend the useful life of existing systems, reduce the laboratory-to-deployment time and minimize the probability of technological surprise.

Perhaps the best example of our efforts at blending the research and development and procurement process is the high technology test bed program. The objective is to reduce the amount of strategic lift required for a division while retaining combat power approaching that of a heavy armored division.

There have been many allegations that our efforts at accelerating the implementation of high technology in weapons systems and cost management control are mutually exclusive objectives. In reality, they are complementary and, in many cases, dependent on each other.

Q. What are your objectives for the coming year for the acquisition process?

A. We are now initiating agressive management actions to reduce unit costs. Our objective is to reduce the net cost of major weapon systems through specific actions. We are going to insist that acquisition strategies link the contractor's future profits to his past cost performance. Further, there should be no award fee or other rewards for attaining the basic contract requirements.

Competition must be used throughout the subcontractor-vendor supply chain on the basis of total costs to the Army over the expected life of the program. We are starting to implement innovative ideas to reduce the indirect costs of manufacturing, engineering and administration.

Strong emphasis is being placed on capital investments and elimination of non-essential performance requirements, specifications or other functional cost drivers. At the program manager level, these cost reduction elements must be included in annual operating plans and included in contracting actions. Contracts must be managed at target, not ceiling. Although many problems remain to be solved, our continued efforts will enable us to identify and correct them.

I believe that we have substantially improved the acquisition and management process. In my opinion, achieving our goal is not a 100-yard dash or even a 5-mile run but, rather, an endless marathon in which we must be continuously innovative, progressive and persistent to stay ahead. The cornerstone of this philosophy is discipline — personal, organizational and managerial.

TRADOC Testing Activities and Facilities

By Donald G. Reich

Involvement of the Training and Doctrine Command (TRADOC) in Army user testing is not widely known, but this involvement started in 1975 following a recommendation by the 1974 Army Materiel Acquisition Review Committee as a way to improve development of Army materiel requirements. But even those aware that TRADOC conducts most operational tests of non-major systems do not usually know the full scope of its test and evaluation role.

For example, TRADOC is responsible for operation of 10 Army user test activities; conduct of OT for most non-major systems; conduct of Army Force Development Test and Experimentation; conduct of Concept Evaluation Programs (CEP); definition of issues, criteria, organization, doctrine, tactics and test scenarios for all OT; Army evaluation of joint tests; and last, but far from least, support of OTEA operational tests.

Non-Major Operational Tests

There are normally several hundred non-major operational tests in various stages of planning, conduct or evaluation. These can be relatively simple items such as plastic training cartridges or a water testing kit, or they may be very complex items such as the Decentralized Automated Service Support System computer system or multistation airborne or ground electronic and optical systems. Test methods for each of these are tailored to the equipment, but are similar to those employed with major systems. However, with many non-major systems, lower prototype costs make a more complete test possible before a production decision.

The acquisition process for major and non-major systems is identical. Both are required to undergo an OT I during the validation phase and an OT II during full-scale development. In the past, OT I for most non-major systems was waived under the assumption that there was much lower design risk on low cost items. We have learned, however, that earlier user experience can be just as important on non-major systems as on the more complex tanks, fighting vehicles and helicopters.

The OT I is now, therefore, less frequently waived. Compelling evidence, in the form of data from other sources, is now required to insure that user testing is not needed to validate the design.

Conduct of OT I does not mean more testing and more testing time. Experience gained during OT I can usually be used to reduce the scope of subsequent OT II. Of course, a driver of OT II scope and duration is the time required to satisfactorily demonstrate that reliability, availability and maintainability and integrated logistical supportability requirements have been met.

Normal policy is to test three systems for a period of at least 1.5 times the minimum acceptable value specified for mean time between failure and measure for reliability. This is occasionally compromised for systems with extremely stringent requirements, such as electronics, which could extend test periods for years.

It is important to remember that operational testing is always tailored to the issues to be answered and the decision risk level that is acceptable.

Hopefully, materiel is ready for type classification at the end of OT II. Problems encountered during OT II may be addressed in later testing. If production is approved, additional testing might be done in a Follow-on Evaluation (FOE) after production is initiated. It is not unusual to purposely defer issues not critical to fielding to a planned FOE. Conduct of an OT III is also an option, but one seldom exercised or needed.

Concept Evaluation

An important reason for the 1975 assignment of the Army user test activities to TRADOC was to provide the capability to conduct concept evaluation of new materiel ideas. Concept evaluations are much more flexible and shorter than operational tests. Their specific purpose is to provide an experimental base for a requirement before entering the formal acquisition process.

Tests can be conducted with commercially available materiel, items from other services or a surrogate for a postulated capability. The latter approach is being used more frequently, particularly with computer dependent systems. Examples of past successes from this program are hand-held calculators for fire direction centers and the helicopter mast mounted sight. Major current efforts include automated interactive systems for a corps tactical operating center and a division level intelligence, surveillance, and target acquisition system.

Discarding a bad idea before formal and expensive development can also be a major success of the concept evaluation program. This, too, occurs. An example is a short-range laser communications device which worked well on a parade ground, but would not function in the underbrush typical of field conditions.

Force Development Test and Experimentation

A variety of non-materiel tests are conducted as Force Development Test and Experimentation (FDTE). Such tests provide a basis for trying out new doctrine, tactics and organizations, and while not tests of new hardware, they are often the results of new or planned equipment. In these cases, they are conducted to determine the best way to use or support the new equipment.

FDTE is usually conducted as simulated battles frequently using lasar devices to simulate engagements between friendly and aggressor forces. When conducted in this manner, computers are used to determine engagement outcome in real or near real time. This is referred to as real time casualty assessment. Real time recording of position location as well as engagement outcome permits detailed post test analysis of these simulated battles.

TRADOC Test Activities

The 10 TRADOC test activities are scattered from coast to coast. They vary in size from more than 1,000 personnel to less than 100. These are the only activities dedicated to Army user testing. Activities of each test board are described briefly below.

Combat Developments Experimentation Command (CDEC)

While CDEC is discussed in detail in a separate article in this issue, its uniqueness is worth emphasizing. The size of Fort Hunter Liggett Military Reservation, where CDEC tests, is such that full instrumentation of this area is possible without undue conflict with 7th Infantry Division training. This large instrumented range, coupled with organic troops and equipment, provides the capability to conduct precise combat experiments, and major operational tests.

Recent examples of major OT conducted by CDEC for OTEA are the OT II of the Apache Helicopter and the OT I of the High Mobility Multipurpose Wheeled Vehicle. As TRADOC's largest test activity, CDEC is the user test equivalent to the developer's White Sands Missile Range.

TRADOC Combined Arms Test Activity (TCATA)

Like CDEC, TCATA is unique among the TRADOC test activities. Its exis-

tence at Fort Hood with III Corps has enhanced TCATA's ability to conduct OT of major weapons systems, and to execute large force-on-force FDTE. Recent TCATA tests have been conducted in Europe, Korea, and Forts Carson, Riley, Lewis, Ord and Bragg.

The scope of TCATA testing has significantly expanded since its origin in 1969 as Project Mobile Army Sensor System Test Evaluation and Review (Project MASSTER) with responsibility for evaluating surveillance, target acquisition and night observation (STANO) materiel and doctrine destined for immediate use in Vietnam.

MASSTER was transferred to the newly established TRADOC in 1974, and was reorganized as TCATA in 1976. Over the years its testing role expanded to include combined arms, command and control, intelligence integration, combat support and combat service support.

TCATA is now engaged in the full range of TRADOC testing activities — operational tests of major weapons systems, FDTE to resolve doctrinal and training issues; and concept evaluations of new materiel. TCATA frequently supports operational tests of major weapons systems for OTEA.

TCATA supported the M1 Abrams Tank OT III, a battalion-size test in the first organization equipped with the Abrams Tank for OTEA and is now scheduled to support the OT II of the improved Abrams Tank, the XM1E1 with 120mm gun.

TCATA recently completed a month-long evaluation of the proposed combat field feeding system in which two mechanized infantry batallions at Fort Hood conducted field training, while the soldiers were fed using prototype tactical field kitchen equipment together with the new T-ration and Meal-Ready-To-Eat ration as well as the standard B-ration.

The Weapons Crew Training Test (WCTT) is an FDTE of longer duration involving more units. WCTT addresses the potential saving of substituting simulators and other devices for some of the standard training ammunition allowance.

WCTT will run for about 18 months and involves tank battalions at Fort Carson and Fort Hood, and infantry battalions at Fort Ord and Fort Hood. TCATA is also responsible for the world wide evaluation of the New Army Manning System which will establish cohesion in Army units.

Highly instrumented force-on-force tests using position location, through sight video and laser engagement devices is also within TCATA's capability. The recent Armor Combat Operations Model Support (ARCOMS) test used these capabilities as well as specially developed scanning lasers to measure the existence of line of sight between combatants.

To support extensive testing of battlefield automation and intelligence integration, TCATA has developed a tactical simulator designed to provide battlefield realism for testing of those systems. In response to commander's essential elements of information and tasking, the simulator's computer-generated intelligence reports simulate products from combat intelligence collectors operating against a potential opposing force and scenario. The simulator is directed toward division, corps, and echelons above corps systems evaluation and training with emphasis on joint and combined interfaces.

TRADOC Test Boards

The other TRADOC test activities are test boards. Some of those eight test activities are among the oldest Army test activities long predating TRADOC and the current Army organization, acquisition strategy and test methodology. For years, the test board system has represented the primary means by which the Army has validated user acceptance of new materiel.

Seven of the eight test boards are at a TRADOC center/school, and collocated with major combat and training developers. This provides a close tie for the conduct of concept evaluation of new materiel and training device ideas. The balance, and major portion of their efforts, is dedicated to operational testing of new equipment.

U.S. Army Airborne Board

The one board not located at a TRADOC center/school is the U.S. Army Airborne Board, Fort Bragg, NC. The Airborne Board's main effort is to test airdrop and air delivery systems as well as the ability of Army equipment to be transported and delivered by these systems.

The Airborne Board's mission has been expanded to inlcude items for transportation, quartermaster and special operations. Examples of equipment falling in these categories are the LACV-30, scuba equipment and small boats.

U.S. Army Air Defense Board

The U.S. Army Air Defense Board, Fort Bliss, TX, is naturally enough, involved in the testing of air defense weapons and related systems. Major systems tested for OTEA have included the Patriot and Stinger-POST missile systems, and the SGT York gun system. The Board has also been involved in testing elements of an Air Defense Artillery Battalion of the High Technology Light Division (HTLD) at Fort Lewis, WA.

Much of the Board's non-major test effort for TRADOC involves improvement to existing systems. A recent example is testing of the Forward Looking Infrared Modification to the Chaparral missile system.

U.S. Army Armor and Engineer Board

The U.S. Army Armor and Engineer Board at Fort Knox, KY, is our largest test board. This is because it is, in essence, a dual board. The engineer portion of the organization works closely with the Engineer School on concept evaluations and operational tests of engineer materiel. Recent systems tested are SLUFAE mine clearing system, combat service support boat and clear lane marking system used to mark mine fields.

Armor systems tested vary from specialized pieces of armor crew equipment to support of OT for major systems such as the M1 Tanks and M3 Cavalry Fighting Vehicle. Also evaluated was the 4-year Armor Combat Vehicle Technology Program, which originated at the Defense Advance Research Projects Agency and was passed to the Army and Marine Corps as a joint program with UK participation. To support the test beds, the High Mobility/Agility Vehicle (HIMAG) and the High Survivability Test Vehicle — Light (HSTV-L), a complex instrumented test facility was developed to measure weapon and crew performance. The same facility will be used for future test bed developments and product improvements on the M1 series tanks.

U.S. Army Aviation Board

The U.S. Army Aviation Board is located at Fort Rucker, AL. Formed in 1975, it is collocated with the Aviation Development Test Activity (ADTA) under the command of the Test and Evaluation Command. This greatly enhances the ability to share test prototypes during development and operational testing as well as joint use of test data. A major portion of the Board's effort has also been devoted to testing simulators. Flight simulators for the Cobra, Black Hawk and CH-47 have undergone operational testing. Planning is now underway for an accelerated test program for the Apache simulator.

U.S. Army Communications — Electronics Board

The Communications-Electronics Board at Fort Gordon, GA, is TRADOC's newest and smallest test organization. It was formed in 1978 with a relocation of C-E testing from the Airborne Board at Fort Bragg. OT has been conducted by this C-E Board on radios, test sets, antennas and sattelite communication systems, and concept evaluations have included commercial communication devices as well as experiments with fiber optics and the millimeter wavelength radio.

The Board has also been heavily involved with the FDTE of the signal battalion supporting the High Technology Light Division (HTLD). This Board also operates the Army Data Distribution System/Packet Radio test bed. This detachment at Ft. Bragg is experimenting with the XVIII Corps on new communications technology as well as determining what the information requirements are for Corps.

U.S. Army Field Artillery Board

The Field Artillery Board, Fort Sill, OK, the oldest of the Army test boards, was established in 1902. Testing has included field artillery cannon and missile systems, support radar systems and employment concepts such as those associated with the Field Artillery Fire Support Team (FIST). This Board is also responsible for the operational testing of Tacfire equipment and associated software.

U.S. Army Infantry Board

Located at Fort Benning, GA, the Infantry Board is responsible for testing more types of items than any of the other user test activities. All types of infantry weapons are tested such as rifles, machine guns, mortars and antitank weapons.

Clothing and personal equipment are also tested. This includes not only garments and boots but also chemical protective equipment such as masks and overgarments. Smoke generators, decontamination equipment, chemical agent alarms and infantry night vision devices add to the list of things tested.

The Infantry Board is also involved in major systems testing such as that done on the Bradley Fighting Vehicle. The Board is now conducting tests on the Light Armor Vehicle, a joint Marine/Army program, to evaluate the Army's unique modifications of this system.

U.S. Army Intelligence and Security Board

The Intelligence and Security Board (INSB) was formed as a result of the Intelligence Organization and Stationing Study reassignment of functions formally under the Army Security Agency. At that time the existing ASA Test and Evaluation Center at Fort Huachuca was restructured. The portion responsible for developmental testing was incorporated into TECOM's Electronic Proving Ground, while the portion responsible for user testing was formed into a TRADOC test board.

The period, since its formation, has been one of intensive operational testing of new intelligence and electronic warfare (IEW) systems. Recently the board also completed a large force development test on special IEW related electronic mission aircraft and aircraft survivability equipment. This test permitted the assemblages of this new equipment for the first time in a realistic environment.

Tactics, interfaces and performance were evaluated. Potential new equipment approaches were also integrated into this test.

TRADOC Evaluations

TRADOC evaluations are the responsiblity of the Test Independent Evaluation Directorate at the Combined Arms Center, Fort Leavenworth, KS. This organization is responsible for either developing evaluation plans and reports or approving those submitted by TRADOC combat developers. For systems evaluated by OTEA, this organization participates, with the combat developer, in development of issues and criteria for the OTEA evaluation, as well as review of proposed test waivers for operational tests. The Evaluation Directorate performs similar functions for Force Development Test and Experimentation and for Joint Testing. For the latter, it is responsible for developing Army nominees for joint tests and for providing and Army evaluation of the results of these tests.

Test Management

TRADOC testing is under the control of the Deputy Chief of Staff for Test and Evaluation, and it is his job to develop plans and programs to include funding for operating the test activities and to pay for testing.

Development, acquisition, operation and maintenance of test instrumentation and threat simulators is another area of his responsibilities. Requirements are developed by the individual test activities and harmonized into a TRADOC Test Instrumentation Master Plan. These programs form the backbone of the Army's user testing capability supporting OTEA as well as TRADOC tests.

A major instrumentation program is the development of the Mobile Automated Field Instrumentation System (MAFIS). MAFIS will greatly increase portability of force-on-force instrumentation. Use of the Global Position System for position location will eliminate the need for the extensive surveyed tower networks of current systems.

Summary

TRADOC's test mission then extends from hardware intensive operational tests, to tests completely unrelated to equipment, such as the field evaluation of the Army's New Manning System by TCATA; from small items such as belt buckles to tanks and helicopters; from platoon size tests to battalion against battalion; from test activities of less than 100 people to one of more than a 1,000. All 10 user test activities and the various user tests play a key role in how the Army fights and the equipment it uses.

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CDEC's Unique Capabilities

By Dr. Marion Bryson

During the more than 25 years of its existence, the mission of the Army's Combat Developments Experimentation Command (CDEC) has changed very little. Its main purpose remains to experiment with Army materiel, organization, tactics, and doctrine under reasonably realistic simulated combat conditions.

While CDEC is headquartered at Fort Ord, CA, most of its experiments are conducted at the CDEC Field Laboratory, Fort Hunter Liggett, CA, about 85 miles to the south.

CDEC is equipped, manned, and instrumented to conduct many types of experiments, all emphasizing soldier participation in an operational setting. An experiment may consist of 10 players, each attempting to detect tactically deployed targets. The distribution of the times to detect are then used in the construction of computer models of combat.

An experiment may consist of measuring the performance of competing hardware systems or the performance of a single hardware system of comparison against established standards. Experiments such as this are done in cooperation with the Operational Test and Evaluation Agency (OTEA). However, CDEC is especially equipped to perform experiments involving simulated combat in which there is two-sided free play.

Three special characteristers make CDEC uniquely qualified to do this type of experimentation. First, CDEC has access to an isolated test range upon which it can experiment without the influence of a surrounding civilian community. This isolation is particularly valuable when the experiments include the use of electronics, lasers, or low flying aircraft.

Second, CDEC has its own dedicated troop support. The approximately 800 enlisted personnel serve as players, controllers, data collectorts, technicians, engineers, and test and logistics support personnel. For most large experiments, however, CDEC must borrow additional player and support personnel from other units.

Sophisticated, state-of-the-art instrumentation is the third characteristic of CDEC, the heart of which is the computer complex. This complex collects data from the field, processes it, stores it, and sends data to the field as needed. It also drives a video display of the events occurring in the experiments in real-time.

For communication, CDEC uses the Range Measuring System. This system, through several fixed transmission stations, measures the distance of each player from known locations and reports their distances to the computer. The computer, in turn, computes the three dimensional coordinates of the position of the player. The measuring system is also used as the communication system over which information is passed from the battlefield to the computer and back.

During a CDEC field trail, blue smoke shows that a tank has been "killed."

For engagement simulation, CDEC uses a low power, eye-safe laser to simulate the firing of a weapon and sensors located on the target to detect the incident laser energy, simulating a hit. In addition to the computer, the Range Measuring System and the engagement simulators, CDEC has the usual array of cameras, voice recorders, signature simulators, micro-processors, etc.

Let us briefly go through an engagement sequence. Let us say a platoon of blue tanks, supported by an attack helicopter team, is defending against a company of attacking red tanks with their supporting air defense. A blue ground player detects the attacking force which is still out of range of his weapon but within range of the Hellfire aboard a supporting helicopter. He radios the helicopter team for support. The attack helicopter unmasks, detects the target, designates the target with his laser, and fires. At this point, the computer takes over.

The computer has been tracking each of the players so it knows the location of both the helicopter and its target. When the laser on the helicopter is activated with a coded beam unique to that player, the computer is automatically notified. If the laser is properly aimed, the sensors on the target detect the laser energy and report that to the computer along with the code of the laser beam. The computer now knows who fired, who was the target, their locations, whether the target is moving, and the aspect and exposure of the target by which sensors were illuminated.

Based on this information, the computer determines the probability that the target would have been killed in such an engagement. Using this probability and a random number, a determination is made as to whether the target is declared a casualty. If so, the target is so notified and is removed from the battle.

CDEC, with its capability to simulate the battlefield of the year 2000, is on the forefront of research into new concepts of the land battle.

DR. MARION R. BRYSON is the director of the Army Combat Developments Experimentation Command. He received his PhD in statistics from Iowa State University, has published numerous papers on the development of field methodology and analysis of test data, and is a former president of the Military Operations Research Society.

User Testing of Medical Equipment

By CPT William M. Nichols

"We need a new field dental X-ray machine. Who can we depend on in the Army to make an impartial test of this X-ray machine? We need a new defibrillator for a station hospital emergency room, but who makes them? What are the costs of the various brands and models?

"Is there an organization in the Army that conducts objective, unbiased user tests and is a repository of information on all medical equipment and systems?" You bet there is, and it is as close as your phone and has been around for quite some time. The organization has a new name, but is in the same business — user testing of medical equipment and answering medical equipment inquiries — EIs.

On 1 October 1982, the Army's Directorate of Medical Equipment Test and Evaluation became the United States Army Medical Department Board (USAMEDDBD), located at Fort Sam, Houston, TX, as part of the Academy of Health Sciences. While the name changed, this organization continues to perform the same mission and provide the same service it has since 1964. That mission is the management of user tests of medical and designated nonmedical equipment having application to the Army Medical Department health care delivery system.

An adjunct to this mission is a requirement to respond to equipment inquiries from the Army, worldwide, on commercial medical equipment and nonmedical equipment having medical application.

The organizational elements undertaking this process are the Test Division and a Test Support Division under the Office of the President of the Medical Board, with the Test Support Division supporting the Test Division in dealing with scheduling and policy matters and managing user tests and conducting EIs.

Requests for user tests come from the combat developer, after he has identified and the Surgeon General has approved an equipment requirement. The materiel developer will then attempt to furnish an item or system that can potentially satisfy the need.

When questions as to the feasibility or workability of the identified equipment or system require answers that can only be assessed by actual equipment users, the Medical Board is directed to conduct a user test. Such a test is usually an operational one, and is designed to provide factual data to evaluate several or all of the following: suitability, utility, desirability, reliability, availability, maintainability, trainability, and safety of the proposed item or system.

Once identified, the equipment/system is assigned a project team, usually a project officer/NCO and assistant. An Outline Test Plan, which is both a scheduling and tasking document, is prepared. This plan is reviewed and approved by the General Officer Test Schedule and Review Committee.

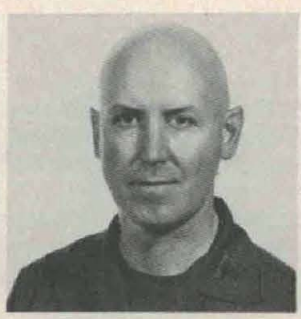
Once approved, the project team authors a test plan and subsequently manages the user test, employing a FORSCOM medical unit of the type that would use the equipment or system if approved for purchase. A project team member is always present at the test site in the field, managing the test. Once the test is completed, the project team returns to the Medical Department Board at Fort Sam, Houston, TX, and prepares a test report, normally within 60 days of test completion.

This objective report is published and distributed to agencies that have a direct concern with the equipment/system, and is one of the key documents used in the DA decision-making process, to either buy, reject or modify the equipment/system. Modification may require further testing, but not necessarily user testing. If further user testing is required, the Board will conduct it.

The key to this small unit's success is probably due to many factors, but certainly among these would have to be its organic personnel and its access to all the professional expertise within the Medical Department, to include the assignment of a Health Services Command professional consultant to each project team.

The Board president and his staff are officers, NCOs, and DA civilians with a strong technical and writing background, coupled with extensive TOE/field unit experience. This field experience is especially important. It is this background that enables the project teams to write plans and manage tests, which produce facts to assess the ability of the item to support the soldier in the field under combat conditions.

As military weaponry continues to grow more lethal and expensive, the medical equipment used in health care of the soldier concurrently has grown more sophisticated and costly. With its new organizational structure, this unique health care equipment test unit, the U.S. Army Medical Department Board, will continue to provide its vital service in support of the Army medical mission, "To conserve the fighting strength".



CPT WILLIAM M. NICHOLS is a project officer in the Test Branch of the U.S. Army Medical Department Board. He holds a BS degree in journalism from the University of Maryland and an MBA from Webster University.

The Army Communications Command's Role in Operational Testing

The critical communications arm of the Army worldwide, the U.S. Army Communications Command, functions at the leading edge of telecommunications technology. From satellite earth terminals, fiber optics and advanced digital radio systems to state-of-the-art voice and data networks, the Command's systems are required to meet the most demanding communications needs of command, control and intelligence.

The need for totally available and responsive systems is obvious. Compounding this need is the fact that these systems are often located in remote areas with increased requirements for high reliability and ease of maintenance.

Much of the Command's equipment is low-density, fixed-base equipment of commercial or modified commercial design acquired as nondevelopmental items. Because there is normally no research and development involved with this equipment, an operational test is critical.

The operational test cycle begins at the Command's headquarters, Fort Huachuca, AZ. This major Army command is the combat developer and operational test manager for Army communications at all echelons above corps, the Army part of the Defense Communications System, and all Army air traffic control. In addition, the Command engineers, installs, operates, and maintains the more than 1,400 communications and Army air traffic control facilities in 13 countries throughout the free world.

All new commercial, nondevelopmental Communications-Electronics materiel proposed for introduction into the Command's inventory receives close scrutiny as to performance, reliability, supportability, and maintainability. Those items which pass the examination, based on commercial experience, are generally excluded from operational testing. The remainder, as well as all developmental items, are included in the DA Five Year Test Program.

The operational tester for the Army Communications Command is the Test and Evaluation Directorate of the U.S. Army Communications-Electronics Engineering Installation Agency (USACEEIA). This organization translates the Outline Test Plans and Independent Evaluation Plans of the Command into Test Design and Detailed Test Plans, executes the test, and prepares the test report.

Because of tri-service responsibilities in the Defense Communications System, a typical test organization for that System's new equipment would be such that the Test and Evaluation Directorate of the Agency would provide the test director and evaluators for human factors, safety, reliability, availability and maintainability; HQ, U.S. Army Communications Command would provide training and logistics evaluators; a deputy or associate test director would come from the Air Force or Navy and player personnel or units would be provided by one or more of the Armed Services.

Although it appears to be a complex coordination problem, in practice it works quite smoothly due to the excellent working relationships which have been established over the years.

The major operational test effort in the recent past has been applied to the Defense Satellite Communications System. This global communications network via geostationary satellites is in the process of evolving into a pure digital system.

Because of the strategic importance of the communications traffic on the system, a near constant operational test has been performed as the various new digital subsystems have replaced the old analog boxes. Subsystems tested include the heavy ground terminal AN/FSC-78, medium ground terminal AN/GSC-39 (Figure 1), digital modems and mutliplexers as well as the spread spectrum multiple access equipment and transportable JCS contingency terminals used for DCS restoral any place in the world.

Army aviators will find the air traffic control system considerably improved due to testing which has been conducted on the Non-Directional Beacons, Terminal VHF Omni Range Equipment, and improved Ground Controlled approach radars (Figure 2). Test planning is currently underway for the new Air Traffic Control Communications Console, an automated system, which will be deployed in the towers at Army airfields worldwide by the Army Communications Command.

The various materiel developers and acquirers involved in the Command's systems provide the state-of-the-art materiel, system support packages, logistical support for the tests, and factory training for the test teams. In return, the operational tests provide valuable insights as to how their systems perform when operated and maintained by military personnel in an operational environment. This feedback leads to design changes to further improve the effectiveness of all the Army's communication systems.

The preceding article was authored by several personnel at the U.S. Army Communications Command, Fort Huachuca, AZ.

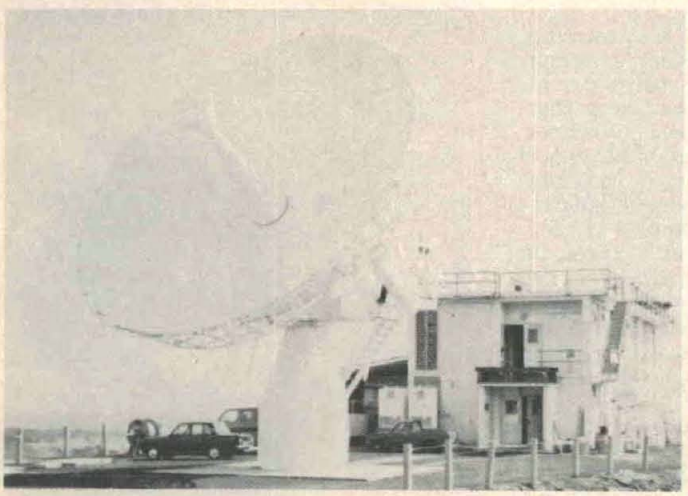


Figure 1. AN/GSC-39

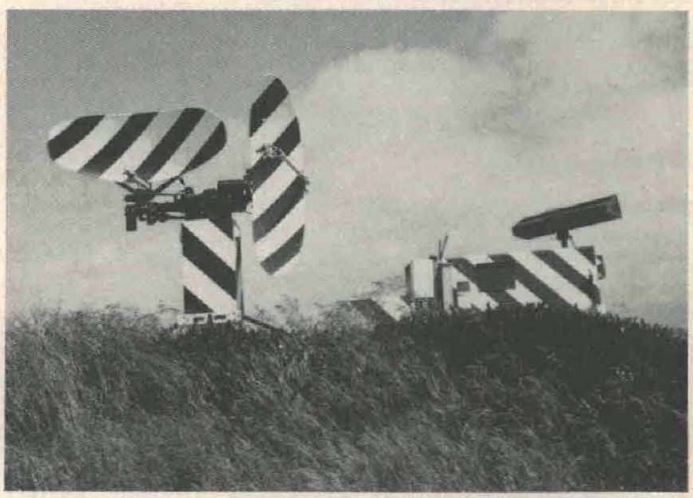


Figure 2. AN/FPN-40

The Armored Combat Earthmover

By Christine Richard

The Army's new M9 Armored Combat Earthmover (ACE) can dig as fast as the most efficient bulldozer, travel 30 MPH cross-country, is air transportable, amphibious, and able to withstand artillery fragmentation fire while on the front line. The ACE is scheduled to go into initial production this summer.

Capable of performing a full range of earthmoving operations, the vehicle has .30 cal. armor piercing protection, about equivalent to the M113 APC, to allow these tasks to be performed while under enemy fire.

Two M9s will be fielded to each engineer platoon in divisional engineer battalions to enhance their ability to perform vital support missions, such as constructing antitank ditches, building combat trails and reducing or knocking down earthen obstacles, and digging in infantry, artillery and armor.

What makes the M9 unusual, explained CPT Thomas J. Galli, assistant M9 project officer at the Tank-Automotive Command in Warren, MI, is a unique, controllable hydropneumatic suspension system that permits it to perform a variety of tasks ... dozing, grading, scraping, hauling and dumping.

For a machine to be an effective bulldozer it must have two essential characteristics — weight and a stiff suspension. The stiff suspension allows the machine to be a stable platform that offers resistance to the downward thrust of the blade, and the weight allows the machine to gain traction while pushing earth.

To gain this weight and traction, the M9 operator raises the blade approximately 18 inches, moves the suspension system control lever to the unsprung position, then tilts the machine forward using the hydropneumatic suspension. He selfloads the machine bowl with about eight cubic yards of earth to gain roughly 20,000 pounds of weight, lowers the blade, and is ready for dozing.

The degree of blade penetration is controlled by hydraulically raising and lowering the suspension system. When earthworking operations are completed, the M9 operator dumps the earth ballast and shifts to the sprung mode to absorb shock for high-speed cross-country travel.

U.S. combat engineers currently rely on the D7 dozer, 2½ cubic yard scoop loader, loader-backhoe, and road grader for their earthworking operations. All of these pieces of equipment are essentially slow-moving civilian construction items that lack the armor protection to survive and the cross-country capability to operate effectively in the forward battlefield area.

The D7 dozer, for example, is used for riverbank preparation, but the task is often delayed due to the time needed to load the D7 onto a 25-ton low-bed semi-trailer, transport it to the site with an M916 20-ton truck tractor, and unload it.

Even after the dozer arrives, the machine and operator are highly vulnerable. So, when enemy fire begins, the operator and machine probably will not survive and the essential task of providing maneuver unit mobility would remain incomplete. However, with the M9 ACE, the engineers will have a machine with the needed speed to keep up with the maneuver units and the armor protection so both the operator and machine can survive to continue the assigned tasks while under fire.

To keep pace with a fast-moving mechanized infantry, artillery or armor unit, the M9 can travel cross-country at 30-MPH — a speed twice as fast as that of the scoop loader's and nearly 10 times greater than the dozer's maximum speed of 3½-MPH. Additionally, it can ford streams and swim at a speed of 3-MPH. By comparison, the new Bradley M2/M3 Fighting Vehicle swims at a speed of 4½-MPH, and the M113 swims about 3-MPH.

The M9 can be modified to be transported by the Air Force's C-130 aircraft by removing a steel plate and the intake and exhaust grilles. This takes one man about 1¾-hours to do and when the M9 hits the ground, it is capable of functioning with those components removed.

With so many benefits to offer, the M9 is an ideal vehicle to have on the battlefield. Much of the difficulty experienced with the early prototype M9's was due to fabrication and quality problems, as well as a lack of funding support. It was hard to attract Congressional attention to a vehicle that wasn't going to have sophisticated armament or electronic systems. It was looked on as just a bulldozer and they didn't understand why it was needed.

Even with its many points, this versatile earthmover still has some time to go before it will augment the construction equipment in the Army's vehicle fleet. Current plans are to go into a multi-year procurement from FY84-88. Completion of this production run will provide the Army approximately 1,400 vehicles.

CHRISTINE RICHARD is a DARCOM intern in the information and editorial career field. Assigned as a technical publications writer (engineering) at TACOM's R&D Center, Warren, MI, she holds a bachelor's degree in journalism from Oakland University, Rochester, MI.

A New Way to Melt Explosives

By LTC Edward G. Haggett III

Almost everything people do has an element of risk. Frequently, that risk involves injury or perhaps even death. This factor was an overriding consideration in the improvement of the method of melting explosives described in this article. Unlike many earlier improvements which are quite simple, this improvement is a distinct and totally new way of accomplishing the risky business of melting explosives more safely. For the person who developed it, it represents the ultimate success in improving operations with a new application of technology.

Anyone familiar with military munitions appreciates the progress made over the years in improving their effectiveness. This improvement has been necessary so that the military might better cope with the increasingly sophisticated technology of our enemies. However, despite this improvement, one thing has remained constant — most munitions still use explosives to do the job. Explosives are designed to do one thing — explode with sufficient force to do what is necessary to defeat the target.

When an explosive is received from the manufacturing plant, it is usually boxed in a granular or flaked form. Two methods are typically used to load it into the round of ammunition: It can be pressed in, using a hydraulic or mechanical press; or it can be melted and then simply poured in and left to solidify. Both methods present some degree of hazard.

This article will cover a process which reduces the hazard associated with only the melt/pour operation. It will look briefly at the current process and then present a detailed look at the new process in order to show what significant technical changes were made and how the tremendous reduction in safety hazard was achieved.

Until recently, explosives usually have been melted in a large kettle heated by a separate steam jacket, much like the double boiler used in a kitchen. In a molten state, explosives are only slightly more sensitive; however, a degree of risk is induced by the stirring of the explosives, a process which is necessary to maintain a uniform mixture.

This risk, however small, becomes a significant hazard because of the large quantity of explosives involved, frequently several thousand pounds in a kettle. This hazard is further compounded because several kettles are usually located in one "melt" building along with a few operators. This large quantity of explosives and multiple kettles are required because the melting process takes a long time, and thousands of pounds are used every hour or so.

The initial approach to reducing the safety hazard was to reduce either the amount of explosive being melted at one time or the number of people exposed to it. However, an optimal system would rapidly melt small amounts of explosive to keep up with the demand and at the same time have the fewest operators on hand. This challenge was met by an inventive engineer named Mr. Joe Sirls.

Sirls is a facility development engineer with Martin Marietta Aluminum Sales, Inc., operating contractor of the Milan Army Ammunition Plant in Milan, TN. Thoroughly familiar with the explosive melting process, Sirls knew from experience that a heated container surface would not be suitable to melt an explosive quickly because too little of the explosive would be in contact with the surface, and explosives themselves do not conduct heat very well.

The procedure Sirls chose was to expose the explosive directly to steam, which had sufficient heat to melt it but also left the knotty problem of removing the resulting moisture from the molten explosive so it could then be loaded, or poured, into munitions.

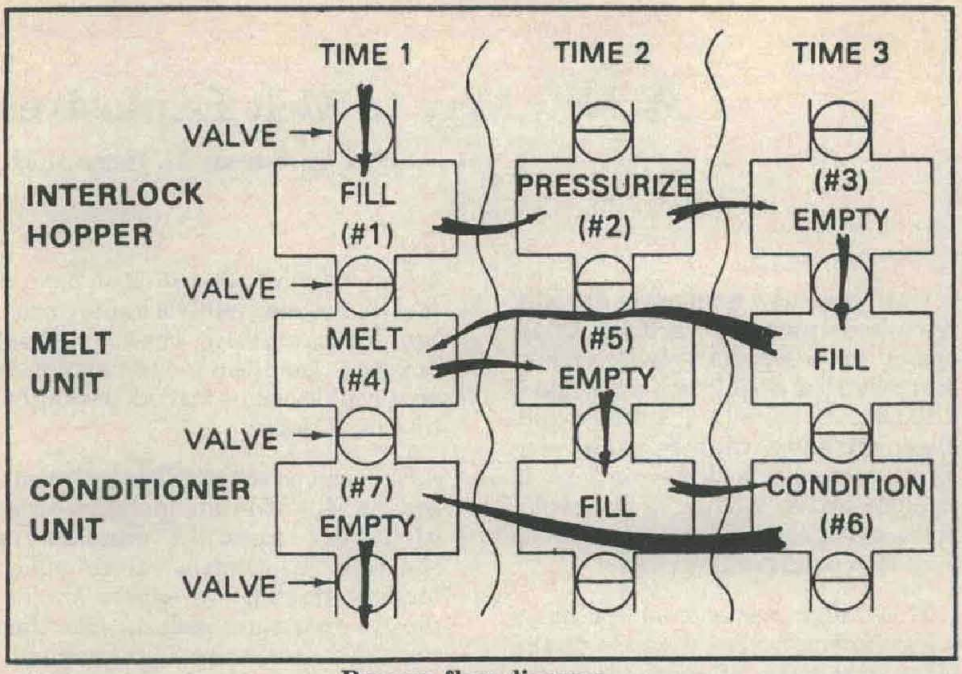
Sirls solved the problem by inventing the Milan Minute Melter, a series of interconnected containers separated by control valves, which made it possible to expose the explosive to steam, melt it, and then remove the moisture. This seemingly simple approach permitted the amount of explosive being melted at any one time to be reduced to about 180 pounds, taking less than two minutes to process. This was a far cry from the normal process involving thousands of pounds of explosive and a melting time of about an hour.

Three basic components of the Milan Minute Melter are the Interlock Hopper, the Melt Unit, and the Conditioner Unit.

The Interlock Hopper permits the flaked or granualar explosive to be added at normal atmospheric pressure and then be introduced into the Melt Unit by pressurizing the hopper with air to match the 15 pounds per square inch guage (PSIG) pressure of saturated steam in the Melt Unit and opening a specially designed valve between the units.

The Melt Unit exposes this explosive directly to the steam, where it melts in about 20 seconds. After the melting is completed, the explosive is then transferred to the Conditioner Unit to have the moisture removed. This removal is accomplished by the creation of a vacuum (approximately 25 inches of mercury) in the conditioner and then the application of heat to boil off, or vaporize, the moisture.

The dry, but still molten, explosive is then forced by air pressure into a conventional pouring unit ready to fill munitions.



Process flow diagram

Although only three separate major components are involved (plus an assortment of valves), it is really a seven-step operation sequenced as follows: the Interlock Hopper is filled with explosive; the hopper is pressurized; the explosive in the hopper is emptied into the Melt Unit; the explosive in the Melt Unit is melted with saturated steam; the molten explosive and condensate (moisture) is forced by steam pressure into the Conditioner Unit, which is under vacuum; the explosive in the conditioner is heated while still under vacuum to boil off (vaporize) the moisture; and the conditioned explosive, now free of moisture, is forced from the Conditioner Unit by air pressure.

These are the seven steps involved in the operation, but because of the unique design of the system, the three major units (the Interlock Hopper, the Melt Unit, and the Conditioner Unit) may be in use concurrently. For example, while explosive is being loaded into the Interlock Hopper, an earlier batch could already be melted and an even earlier batch could be conditioning.

The various steps of the process, however, each take different lengths of time to complete. Since several batches are processed at different steps concurrently and the conditioning step is a lengthy one, there was a need for a second conditioner to permit optimum operation. With two conditioners, while one is busy, explosive can be transferred into the other end and conditioning begun.

While it is difficult to show all the possible combinations of steps which could occur at the same time, it is possible to take several "time snapshots" to illustrate what steps might be occurring as a batch of explosive goes through its seven processing steps.

The process flow diagram above shows the three major units and those control valves which isolate them from adjacent functions. Each "time snapshot" represents the same piece of equipment at some different moment in its operating cycle.

Each step of the operation is labeled and numbered, in parentheses, in the sequence in which that batch will undergo processing. The valves which make all this possible are indicated by a circle with a vertical arrow, if open, or a horizontal bar, if closed.

Each of these steps occurs automatically by control of the valves, heat, vacuum, and air pressure. The valves separate each operation to permit different operating pressures and to control movement of the explosive through the system. Heat is used to melt and, in conjunction with the vacuum, dry the explosive. The Melt Unit and Conditioner Unit have inner rotating drums to agitate the explosive during these steps. Compressed air, steam, and/or vacuum move the explosive from one operation to another.

Safety is even further enhanced because operating personnel are not required to be present for the operations. In addition, the explosive hazard is reduced by the separation of the Melt Unit, with its 180 pounds of explosive, and each of the Conditioner Units, containing like amounts, with heavily reinforced concrete barricade walls and specially designed explosive transfer lines to prevent propogation between units.

Simple? Existing technology? The answer to both questions is yes. However, the process involves a new application of that technology, and one with a real payoff in safety. While it is still possible to have an explosion, the relatively small amount of explosive (180 lbs) and absence of personnel in the immediate area will prevent a major catastrophe.

This method is a lot safer than exposing a hundred or so people, along a 2000-foot ammunition production line, to the destruction from an accidental explosion involving 10 to 20 thousand pounds of explosive.

LTC EDWARD G. HAGGETT III, former commander of the Milan Army Ammunition Plant, is currently on the faculty of the Armed Forces Staff College. He holds a BS degree in civil engineering from the University of Maine, and is a graduate of the Army Command and General Staff College.

DARCOM Comptroller Reviews Cost Guidance

Major issues facing the cost anlaysis community and personal guidance for dealing with these issues highlighted a recent letter from DARCOM Comptroller BG James F. McCall to HQ DARCOM personnel, DARCOM major subordinate commands, all PM offices, and the Army Logistics Management Center. A condensation of that letter follows:

Attempts to improve the weapon systems acquisition process have had a direct impact on the cost analysis community, and the number of annually required major Baseline Cost Estimate (BCEs) has increased from an average of 17 to 40.

Concurrently, the annual requirement for independent estimates has jumped from 10 to 30. We are attempting to make the BCE a multipurpose document which serves the program, budget, and contracting communities.

The Baseline Cost Estimate is the basic estimate prepared by the proponent for a system and it is usually prepared by a PM in accordance with AR 11-18 and related pamphlets. The PM may seek cost estimating assistance or advice from the Cost Analysis Offices located at the DARCOM major subordinate commands, or he may seek contractual assistance.

There is no predisposition at this headquarters as to study contractor produced estimates with proper government involvement. Each estimate will be graded on individual merit. The BCE serves as a primary source of cost data for Army decision making and financial management, including planning, programing and budgeting, and contracting and program control.

The Independent Cost Estimate (ICE) satisfies the requirement of the Army System Acquisition Review Council and the OSD Cost Analysis Improvement Group for an independent, second opinion of program costs. Previously, independent estimates of the BCE were sometimes prepared at various levels such as the major subordinate command, HQ DARCOM, and HQ DA.

A new DA/DARCOM initiative establishes joint DA/DARCOM teams to perform the ICE for major programs. This approach brings together the best talent of the Army's cost analysis activities for a single, more efficient estimate.

The independent estimate should concentrate on the major cost drivers and produce a separate estimate to validate or refute the BCE. Additionally, the ICE should not be prepared in the detail of the BCE. Melding the BCE and the ICE together into the best command estimate makes good sense and should continue. However, the independent estimate must be briefed by the joint DA/DARCOM team chairman to the Army System Acquisition Review Council and the Cost Analysis Improvement Group.

Strict adherence to the current guidance often produces a large, cumbersome cost document, and the process suffers from conflicting pressures. First, the estimate is providing greater levels of detail for the Program Objective Memorandum, budget, and contracting during the preaward phase. Concurrently, there is pressure to reduce paperwork and speed the turnaround time.

We endorse simplification of the process through review and tailoring the guidance for each BCE/ICE as outlined in the HQ DA, Army Comptroller message of 3 November 1982. For example, special emphasis should be placed on production and initial spares and repair parts of the investment phase.

Other simplification techniques for testing and/or refinement include: Improve the clarity and content of the Executive Summary, which should be a stand alone document stating assumptions, methodology, and conclusions of the cost estimate; Automate data management; and Streamline documentation in the Basic Cost Estimate formally submitted.

I also want to underscore the requirement to give special treatment to the technological risks associated with the early years of production of a new weapon system. In response to the Carlucci Initiatives, the Army has extended the concept originally applied to R&D funding known as Total Risk Assessing Cost Estimate (TRACE). The new application to production is referred to as TRACE-P.

The TRACE-P concept is defined as the amount of additional funds required at the 0.5 probability level (i.e. 50/50 chance) to accomodate expected technical program risks during the first 3 years of significant quantity production.

TRACE-P will be included in the investment portion of the BCE and briefed to HQ DA as an additive amount over the most likely point estimate for the production of the system. The best methodology we could develop at DARCOM is contained in the DARCOM Letter of Instruction, dated 6 October 1982, subject, TRACE-P.

We encourage improvements and research on ways of estimating production risk. Experienced technical and cost analysis personnel must work together to provide the highest level of analytical expertise and professional judgement in order to maintain the integrity of TRACE-P.

Finally, I would like to discuss the relationship of the BCE to the contract price estimate. The procurement policy letter issued by the director of Procurement and Production of 20 October 1982 established the requirement to perform a reconciliation between the preaward cost estimate and the proposed contract award price for weapon system procurements.

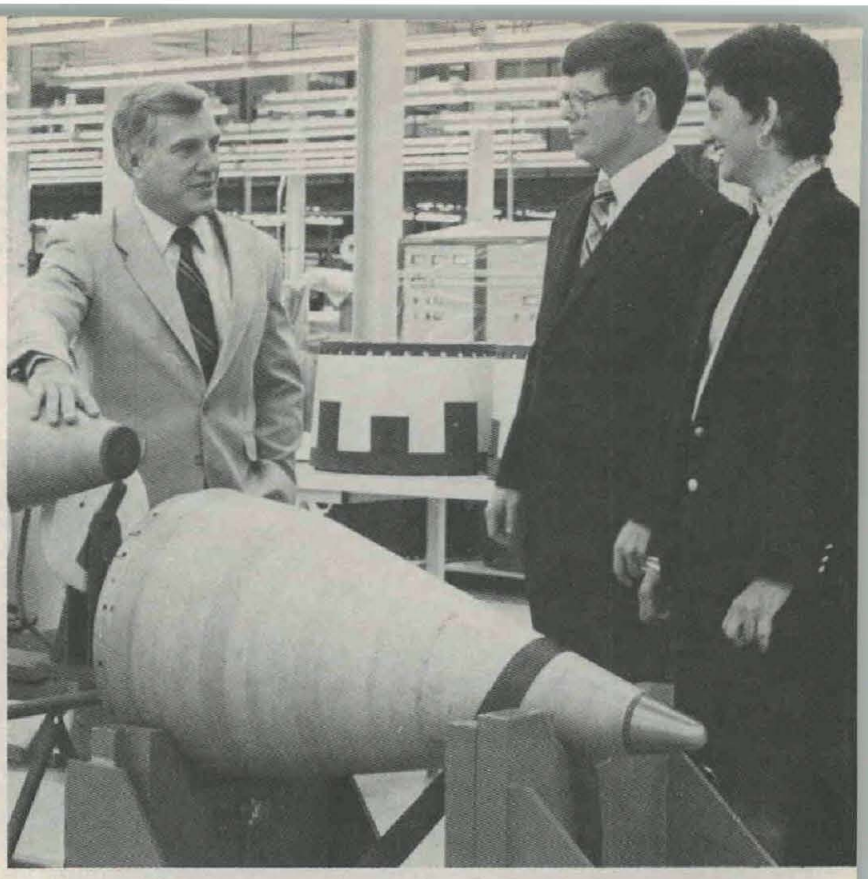
Relative to major systems at key decision points, the preaward cost estimate is to be reflected in the contract portion of applicable cost cells of the PM's BCE. Cost analysts assigned, or on contract to the PM, are responsible for producing estimates of contract cost in sufficient detail and stratification that it can be used as a preaward estimate.

Contracting officers and their representatives are responsible for making their requirements known during the formulation stages of the BCE and participating in the development of the cost estimate in order to lend their expertise to the cost estimating process.

Contracting officers must assist, coordinate and accept the contract cost estimate portion of the BCE as their baseline for comparison of the negotiated contract price. The objective is a positive linkage between the Army estimated price for contractural effort and the final negotiated price.

The preceding concepts and guidance are central to the strengthening of major system cost estimates in the materiel acquisition process. DARCOM needs to assure that our cost estimates represent the best product the Army can provide with available resources. We especially do not want to miss opportunities afforded by Army initiatives to enhance cost analysis. I solicit your support to make these things happen.

Training With Industry At Martin Marietta



Bob Ammerman (far left) and Cecilia Demetree discuss some Martin Marietta plant procedures with training with industry participant/author CPT David C. Dickson.

By CPT David C. Dickson

Martin Marietta Orlando Aerospace (OA) is one of the many large defense contractors in the U.S. that supports the Army's Training With Industry Program. While Martin is primarily an Army contractor, it additionally has contracts with the Air Force and with the Navy, and noteworthy systems the company has contributed are the Copperhead Guided Projectile, the Pershing I and II missile systems, the Patriot missile, TADS/PNVS for the Apache helicopter, Hellfire, Lantirn, and the Navy's Vertical Launching System.

From the president of Martin Marietta, Mr. Walter Lowrie, down through the various levels of management, it is obvious that the entire organization is extremely customer oriented — their goal being to give their customers weapons systems that will successfully combat the enemy threat, within schedule and proposed costs.

Management realizes that to accomplish such tasks it must have counterparts on their customer's side who are both familiar and sensitive to the needs of the defense industry. This philosophy has allowed for the growth and success of the Training With Industry program at Martin Marietta Orlando Aerospace.

Martin initiated its Training With Industry Program in 1975, and since then, the concept has been nurtured into firm annual commitments with the Army to train officers in the SC97 and SC51 career fields. Training military officers, commonly referred to as "the Customers", has become an accepted way of life at Martin and is widely accepted as necessary for industry as well as the military.

Company personnel are very open with the Army's trainee students and insure that the officer understands the rationale and specifics of each item under discussion. During academic year 1982/83, the Army contingent includes one officer assigned in Research and Development (SC51) and one officer in Procurement (SC97A Procurement or 97C Production).

The Martin TWI coordinator, Cecilia Demetree, believes that given adequate guidance by management personnel, each assigned officer should author his own training plan. The management at Martin Marietta has very definite ideas on which areas should be studied, but the philosophy that part of the officer's learning process is designing his own training plan really makes one analyze his training objectives very carefully. Therefore, when an officer reports for duty at Martin, he should have a reasonable idea of which disciplines he needs to intensively study.

Being able to personally tailor a training plan gave me the opportunity to learn in the areas I needed for professional growth as well as for my sequential military assignment as a production officer.

Our Martin Marietta Orlando "Big Brother", Bob Ammerman, director, Subcontracts, Missile Systems Division, firmly believes that the subcontracts area is an excellent training ground. Bob, a former career Army officer, has served as a program manager in both the Army and at Martin, so he is very familiar with what a Training With Industry student needs to learn during his tour.

Bob points out that in today's defense contractor world, great amounts of dollars are subcontracted to vendors for fabricated components integral to our modern weapons systems.

Typically, 25-45 percent of a primer contractor's costs can be attributed to subcontracted items or subsystems. Many lessons can be learned by dealing with the myriad of subcontractors under contract to the prime; requirement planning, production scheduling, "get well" plans quality procedures, — the list is endless.

As a result, the trainee officers have been assigned to the Missile Systems Division (MSD) Subcontract Directorate, and I am one of those officers that has been assigned to this

workforce. Specifically, I am a member of the Missile Systems Division Subcontractor Evaluation Team.

The Evaluation Team is a modified "Should Cost" group that continually evaluates subcontractors supporting five separate Martin missile programs. The team is comprised of senior functional experts from the areas of finance, configuration & data management, manufacturing engineering, industrial engineering, contracts, material procurement/purchasing, production control, and quality assurance.

The concept is to send the Evaluation Team to a subcontractor's facility to personally observe the hardware fabrication and the management systems in action. Separate evaluations are performed in each of the various areas and then a comprehensive report is published addressing each discipline plus upper management "one-liners".

In addition to the "Should Cost" mission, this team performs evaluations of subcontractor bids, contract earned value analyses, trouble-shoots subcontractor manufacturing problems, and provides independent management consultant services.

This is the second year an Army trainee officer has been included as a member of the team. Each member takes extreme care in explaining the necessary steps to accomplish his part of the evaluation. Before the team visits a subcontractor's facility, the team chief will pick the discipline that I will work for that trip.

The opportunity has been given to me to participate in each discipline — and in the course of my one year tour, I will have been involved with all the disciplines at least once.

Normally, I attempt to work the area that is expected to be the most involved and difficult portion of the evaluation. This accomplishes two things: first, it insures that I am where the real action is and second, it helps the Evaluation Team in getting additional manpower into the trouble spots.

A typical evaluation might proceed like this: After an initial in-briefing with the subcontractor's management, each individual on the Evaluation Team spends adequate time with their counterpart so that the subcontractor's methods can be totally understood. The evaluation is then performed with meticulous detail.

Nightly meetings insure information exchanges and quite often guide the effort due to new developments. The evaluation itself may take anywhere from one week to over a month, depending on the complexity of the hardware and processes. An exit briefing to the subcontractor's management is presented giving the very important findings and recommendations. A published report then follows.

My initial trip with the Evaluation Team (Lear Siegler, Inc.) was designed to be an outside consultant evaluation of Lear's program leading to the fabrication of several Patriot launcher assemblies. My assignment was to assist the Martin material evaluator.

We initially spent some time with Lear's director of Materiel and his managers so we could understand their overall materiel system. Reviewing the production requirements planning, to include scrap rates, normal production allowances, and the perfection bill of materials, led us directly into the purchasing department.

The "cost driver" materials (20 percent of the materials constitute 80 percent of the cost) were studied to insure the correct quantity and type of materials were purchased from qualified vendors in a competitive market.

Our next stop was to view the material flow from the incoming material quality inspection into the warehouse. Our final tasks were to look at the warehousing procedures, how Lear forms their production line kits, issue short procedures, and material issues to the production floor. By this time, I was innundated with details; but the evaluation was complete. After the exit briefing and report were finished, we were on to our next assignment.

Singer/Kearfott Division in Wayne, New Jersey was scheduled to have an earned value analysis performed. Such an analysis is completely different than the consultant work done at Lear. Singer's production plan for Pershing II inertial measurement system was explained to the Evaluation team members by their individual cost account managers.

Each work breakdown structure element had to be totally understood through its description, sequence, and budget allocation. It was then a matter of comparison of actuals to budgets and reviewing recovery plans for any deviations from cost, schedule, or performance. Since I was again assigned to the Material area, at least the language and concepts were becoming familiar.

The last two evaluations with my involvement have both had the same purpose; evaluate the tooling and test equipment production rates for two Pershing II subcontractors. Hercules Inc. in Salt Lake City UT, manufactures first and second stage rocket motors, and Goodyear Aerospace Corp. in Akron, OH manufactures radar units and correlators. The concept was to insure that both Hercules and Goodyear were capable of producing their respective commodities in the required rate for the first and second production contracts. This required a thorough examination of tooling lists and purposes, tooling certification plans and schedules, and test equipment capabilities with rates. This time, I was assigned to the manufacturing/industrial engineer and the quality assurance manager. The complexity of producing a weapons system is finally taking a realistic form.

The Evaluation Team concept has proven to be very effective for Martin in managing the costs, schedules and performance of its subcontractors. It has offered me a tremendous opportunity to learn not only how Martin Marietta produces weapons systems, but how many other defense contractors operate as well.

Being a member of the Evaluation Team is rather like having several Training With Industry tours concurrently. The amount of experience and knowledge gained would be difficult to parallel in most other military assignments. Training With Industry at Martin is certainly professionally rewarding.

It is imperative for those military officers who deal with the defense industry to be knowledgeable and sensitive to the needs of industry. This is the corollary to the widely recognized need for industry to be ever sensitive to the requirements of the Department of Defense.

We must work as a team in order to produce our modern and complex weapons systems. If we know each others constraints and capabilities, we will have a much better potential for efficiently producing military hardware. My limited experience has shown that industry is both willing and capable of providing this type of cross-training to our military officers.

For those SC97 procurement officers that envision working in the materiel acquisition arena or even as future PMs, a Training With Industry assignment will provide an avenue of professional development growth, not available through the military schools system or civilian education. Training With Industry and Martin Marietta is a team dedicated to providing education through experience.

CPT DAVID C. DICKSON will assume an assignment as a production officer with the Aviation R&D Command following completion of the Defense Systems Management College Program Manager's Course. He holds a bachelor's degree in industrial engineering from Youngstown State University and an MBA from Florida Institute of Technology.

From The Field...

Armament R&D Command

Qualification testing begins on M1E1. Six M1E1 tanks will begin prototype qualification testing in June at Aberdeen Proving Ground, MD, according to a recent announcement from the APG Public Affairs Office.

The M1E1, which is currently under full-scale engineering development, differs from the M1 version because it features a 120mm gun instead of the standard 105mm gun and the M1E1 includes a nuclear, biological, and chemical protection capability. Prime contractor for the M1E1 is General Dynamics.

"Half of the tanks to be tested at APG will be devoted to automotive, weapons and fire control systems testing," said Mr. Todd Wagner, chief of the Prototype Systems Section in APG's Materiel Testing Directorate. "The other three tanks will be undergoing reliability, availability, maintainability and durability testing.

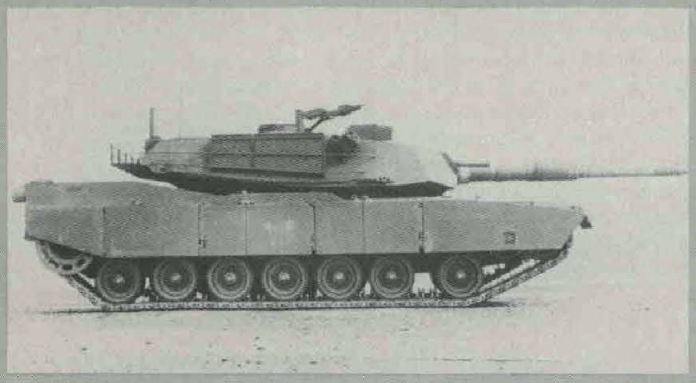
"We will be looking at things such as how far the tanks will go before breaking down, what type of maintenance they will need, and if the skill levels identified for a specific maintenance task are adequate," he added.

The tanks are scheduled to log approximately 4,000 miles each and shoot some 800 rounds each. Testing is expected to be completed next year and the prototype tanks will undergo more ammunition, interchangeability, environment, and armor testing here and at other Test and Evaluation Command installations.

The automotive performance and slope capability levels of the M1 and M1E1 are essentially the same. The E1's maximum speed is 41.5 mph and the M1's is 44 mph. The difference in the speeds is due to the additional weight of the E1 and the changes made in its final drive ratios, according to Wagner.

The outside appearance is the same but the E1's armor was improved in certain selected areas to provide greater protection. With some minor variations, the fire control, electrical, suspension and communications systems are essentially the same.

The E1 will use the same AVCO Lycoming AGT-1500 turbine engine and Detroit Diesel Allison transmission that is in the M1. Other features such as the smoke grenade and engine smoke capability will also be the same. The production date for the first M1E1 is September of 1985. (APG PAO Rel.)



The M1E1 tank with 120mm gun.

Aviation R&D Command

Modernized Chinook arrives at 101st Airborne Division. The Army Aviation Research and Development Command, St. Louis, MO, has delivered the first modernized Chinook helicopter to units of the 101st Airborne Division at Fort Campbell, KY.

The Chinook program "has demonstrated to the public that a defense weapon system can be fielded on cost, on schedule and perform better than the original design requirements," said MG Story C. Stevens, AVRADCOM commander, during the ceremony commemorating the delivery.

The Chinook is the Army's medium-lift helicopter used to ferry troops, artillery pieces or general supplies over the battlefield. Under the "D" modernization program, AVRADCOM has contracted with the Boeing Vertol Co. to incorporate new engines, advanced flight controls and avionics, composite rotor blades, night vision equipment and additional cargo hooks into the older "B" and "C" model aircraft, increasing their speed, lift capacity and operability.

The Army is estimated to have saved more than $1 billion in development costs alone by retrofitting the older helicopters instead of designing and building new ones. MG Stevens also noted that increased funding for support items has made its impact felt.

"I am proud to say that we are delivering a helicopter for the first time that has 100 percent of its support being delivered with it," he said. "The tools, manuals, test equipment, ground support equipment and trained personnel are all here at Fort Campbell."

AVRADCOM hopes to eventually deliver 48 of the modernized Chinooks to the 101st, part of the total of 436 older helicopters which will undergo retrofitting. The first Chinooks were delivered to two companies of the 159th Aviation Battalion, the only battalion-sized Army outfit equipped exclusively with Chinooks. (PAO Rel.)

Electronics R&D Command

Additional AN/TRQ-32 (VI) systems purchased. The U.S. Army Electronics R&D Command's Signals Warfare Laboratory will reportedly purchase 32 additional AN/TRQ-32 (VI) radio receiving set systems at a cost of $11.2 million. The purchase was made under terms of a contract awarded to Magnavox Government and Industrial Electronics Co. in June 1982 calling for the initial delivery of 20 shelter-mounted radio receivers.

The AN/TRQ-32 set is a mobile, multi-station, ground-based direction finding and intercept system that supports the Army in the tactical environment. An improved version that Magnavox will produce is equipped with a pneumatically operated, quick-erect antenna mast. (PAO Rel.)

Mobility Equipment R&D Command

Groundwater source detection methods studied. The U.S. Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, is directing a joint study with the Colorado School of Mines and the Army's Waterways Experiment Station to evaluate various surface deployed geophysical methods for detecting groundwater sources.

Results of a recent literature review indicated that using electrical and seismic methods in an integrated fashion was the most viable way to undertake groundwater exploration.

After preliminary studies, researchers designed a brassboard prototype system using commercially available equipment built by Geotronics Corp. of Austin, TX, and Geometrics of Sunnyvale, CA. This system, which used a combination of seismic refraction and DC resistivity to locate groundwater, was tested at White Sands Missile Range, NM, and Fort Carson, CO.

In operation, engineer units will use available information about an area to select sites where groundwater detection equipment will be set up. (A unit like the prototype system tested at White Sands and Fort Carson can cover about one-two square kilometer/8-hour day/3-man team and take reasonably accurate measurements down to depths of about 600-800 feet. As the depth of investigation increases, the resolution of the system decreases.

By analyzing differences in electrical resistance and the refraction of sound waves passing through the ground, they can then pinpoint the most promising well drilling sites.

The study group, under the direction of the Army's Engineer School, will now review the data collected at White Sands and Fort Carson and report its findings at a decision review meeting to be held later this year. (PAO Rel.)

Elastomer water tanks. The Army's Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, has awarded $279,000 to Goodyear Aerospace Corporation's Engineered Fabrics Division in Rockmart, GA, for the production of 36 20,000-gallon water storage tanks. These water storage tanks, made of elastomeric materials, will be used by the Marine Corps as part of its field water supply system.

The 36 water storage tanks are the first option on a $1,651,650 contract awarded last September. That calls for the production of 231 water storage tanks with an option to purchase 254 more. Thus far, 94 water storage tanks have been delivered to the Army. The remainder of the initial production quantity is scheduled to be delivered by October.

Delivery of the Marine Corps' water storage tanks under this contract option is scheduled to begin in October and be completed in late November. (PAO Rel.)

These 20,000-gallon tanks will become part of a field water supply system for the Army and Marines.

Pipeline Outfit, Petroleum. A commercially-developed pipeline system adapted for military use by the U.S. Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, is expected to improve bulk fuel delivery in the field. Called POP—for Pipeline Outfit, Petroleum—the system will permit construction of 18 miles of pipeline in one day to carry large bulk quantities of fuel from beach entry to forward corps areas.

The system consists of a mechanical pipe joint, a hydraulic pipe joining press carried on a side-boom tractor, and a tapered interference pipe coupling collar. In operation, the system joins and seals 6- or 8-inch pipe in less than one minute.

The military version uses aluminum in place of steel in the structural frame of the hydraulic press to reduce weight and improve transportability. The substitution does not affect system effectiveness.

The military pipeline system has completed force development test and evaluation by troops of the 240th Quartermaster Battalion, Fort Lee, VA, and the 515th Engineer Pipeline Company from Fort Leonard Wood, MO. The tests, conducted by the Armor Engineer Board, were held at Fort Pickett, VA, and involved construction and use of two miles of pipeline under simulated tactical conditions. (PAO Rel.)

Missile Command

Multipurpose automatic test equipment. The U.S. Army Missile Command has announced receipt of its first multipurpose automatic test equipment. This is part of the Army's effort to end the proliferation of test equipment through a single standard policy. The Army decided in 1980 that it had too many specialized devices to test electronic units.

"It is a highly sophisticated piece of multi-purpose automatic test equipment," according to Jewell House who works in the Automatic Test Equipment Section of the Maintenance Engineering Directorate, MICOM Logistics Center. The new machine will be used to develop test program sets for shipping to Army depots and other general support activities in the field.

The "software" or computer discs developed at MICOM can be used by those activities with similar machines to test electronic units. "We can make a wider variety of test programs to be utilized on the same machines whether it be a depot or whether it be in the field," House says. The goal is to end the proliferation of "system-peculiar" test equipment.

The new million dollar machine, manufactured by RCA, can test everything from printed circuit cards and electronic assemblies to the so-called "black-box" line replaceable units. It uses Army standard Atlas computer programming language, and stands about 74 inches high, 12 feet long and 26 inches deep.

"Every missile system has thousands of electronic components. From time to time, we have failures in components. The 410 (machine) is used to automatically fault-isolate the failure in those electric components," House says.

"How does the machine do it? There is a diagnostic test program set developed for each electronic unit under test," he adds. "This test program set consists of a computer program, an interface adapter and other essential documentation."

In other words, Army activities use these test program sets to assist them in maintaining their missile systems. They fix or replace those units the machine identifies as faulty.

"We're going to participate in developing diagnostic test program sets for the TOW weapon system that mounts on the Bradley Fighting Vehicle," says House. After that effort, the section will be responsible for any updates and changes for test program sets as well as assist in developing test programs for "present and future MICOM-managed systems."

The new equipment is the 53rd of approximately 100 such machines under purchase Armywide, according to House. It was accepted in a ceremony featuring MICOM officials and representatives from RCA of Burlington, MA. (PAO Rel.)

Corps of Engineers

The Solar Energy System Economic Feasibility Program (SOLFEAS), developed by the U.S. Army Construction Engineering Research Laboratory, Champaign, IL, and the Fort Worth Engineer District, is now in use by the Sacramento, Kansas City and New York Districts.

SOLFEAS is an interactive, user-friendly program for evaluating the economic feasibility of active solar energy systems in the early concept design stage, greatly reducing the effort for evaluation which must be performed for new design.

The program was used by the Sacramento District to do an analysis of solar energy for family housing at Dugway Proving Ground, UT. The SOLFEAS analysis took approximately 30 minutes and agreed with a previous manual analysis within five percent. The manual analysis had taken upwards of three weeks to perform. (CERL PAO Rel.)

Awards...

BRL Receives DA Award for Excellence

The U.S. Army Armament R&D Command's Ballistic Research Laboratory (BRL) has won the Department of Army's "Award For Excellence" for the seventh time since 1974.

The Army's annual award for laboratory excellence is based on the degree that each Army R&D facility fulfills its potential relative to mission assignments.

BRL, previously honored for excellence in 1974, 75, 77, 78, 79 and 1981, was again cited in fiscal year 1982, for outstanding accomplishments in areas of ballistic research and improvements to Army weapons systems.

The Army presented three 1982 awards for laboratory excellence as a runner-up to the annual Lab-Of-The-Year Award, bestowed this year to the U.S. Army Medical Research Institute For Infectious Diseases at Fort Detrick, MD.

Another ARRADCOM research and development facility at Aberdeen Proving Ground, the Chemical Systems Laboratory, received the 1982 Department of Army "Award for Most Improved Laboratory".

FSTC Awards Cite Civilian/Military Achievements

FSTC award recipients (L to R) Mary B. Scott, Norman G. Taylor, Ann H. Jacobs.

Civilian and military achievements in scientific and technical intelligence, leadership, and administrative and technical support were recognized recently during the first annual U.S. Army Foreign Science and Technology Center's Commander's Awards ceremony.

FSTC Commander COL J.R. Tedeschi termed the awards "the highest local form of recognition for FSTC employees." Each of the 17 nominees for the awards received cash stipends and a certificate of achievement. The winner in each category also received a plaque.

The Scientific and Technology Intelligence Achievement Award, which is based on any S&T intelligence process such as analytical approach, results, and dissemination, was presented to *Mr. Norman G. Taylor.* He was cited for accomplishments associated with foreign helicopter systems. Other nominees in this category were *Dr. Stephen L. Carter, Mr. Thomas C. D'Isepo, Mr. William A. Gooch,* and *Mr. Richard L. Torian.*

The Leadership Award, which recognizes an individual for either technical or group achievements, was presented to *Mrs. Mary B. Scott* for her accomplishments related to automatic data processing. *Mr. David B. Hardin, MAJ John R. Williamson,* and *MAJ Emil L. Havach* were also nominated for this award.

The Administrative and Technical Support Award, designed to recognize the service and support role of FSTC employees, was received by *Mrs. Ann H. Jacoby.* She was cited for establishing, monitoring, revising, and controlling FSTC's publication production schedule. Other nominees were *Mr. James M. Butler, Ms. Alice G. Gutshall, Mrs. Charlotte D. Hogue, Mr. Charles G. Langham, Mr. Ronald J. Ligon, Mrs. Iris C. Morelli,* and *Mr. David B. Wilson.*

Conferences & Symposia...

OTEA Will Sponsor 22nd AOR Symposium

The 22nd Annual Operations Research Symposium (AORSXXII) will be held 4-5 October 1983 at the U.S. Army Logistics Management Center, Fort Lee, VA. About 200 Army, academic, and industrial leaders are expected to participate in the event which will be sponsored by the U.S. Army Operational Test and Evaluation Agency.

This year's symposium theme will be "Integration of Modeling and Simulation with Testing to Efficiently Resource the Acquisition Process." This theme was selected to encourage presentation of ideas to enhance the application of available resources in the procurement cycle.

For the 10th consecutive year, the U.S. Army Quartermaster Center and Fort Lee, commanded by MG Harry L. Dukes, Jr., and the U.S. Army Logistics Management Center, commanded by COL Billy C. Holland, will host the conference. Attendance will be limited to invited participants and observers.

Papers which reflect thoughts on methodology, application of current or informative techniques, problem areas, and conceptual techniques to improve the acquisition process will be solicited by letter.

Additional symposium information may be obtained from: Commander, U.S. Army Operational Test and Evaluation Agency, ATTN: CSTE—STD (AORS), 5600 Columbia Pike, Falls Church, VA 22041, or commercial phone (202) 756-2416/2446, or Autovon 289-2416/2446.

Career Programs...

ALMC Offers Operations Research MS Degree

The Florida Institute of Technology (FIT), in conjunction with the U.S. Army Logisitics Management Center (ALMC), has recently initiated a master of science degree program in operations research at ALMC, Fort Lee, VA.

Officers who desire to pursue the degree must first complete the 12-week Operations Research Systems Analysis Military Applications Course I (ORSA MAC I) at ALMC for which they receive six graduate quarter credit hours with FIT. The remaining 42 credits are completed over the course of one year for a total time at Fort Lee of 15 months.

FIT has a resident PhD/ORSA director for the program and carefully screens and selects instructors who are both academically and professionally qualified in operations research. Classes are scheduled during the day or evening with the ALMC Library and computer facility available for student studies.

The degree program is a cooperative program requiring student officers to pay tuition costs. However, VA educational benefits can be used for tuition.

For information on the program, contact Mr. William Creed, Resident Director, ALMC, FIT Office, Fort Lee, VA, 23801; AUTOVON 687-2722 or Mr. Jose Antunes, ORSA Committee, ALMC, ATTN: DRXMC-LS-S, Fort Lee, VA 23801, AUTOVON 687-2386. Interested officers with degrees in science, engineering or mathematics are encouraged to discuss the program with their respective professional branches at MILPERCEN.

DSMC Initiates Contractor Extension Course

The Defense Systems Management College Fort Belvoir, VA, has developed and is making available an extension version of its popular Contractor Performance Measurement (CPM) Course. The CPM extension course, designed to provide students with an understanding of the way progress is evaluated in a defense aquisition program, is open to military officers and equivalent-grade civilians.

A do-it-yourself version of the CPM resident course, the CPM extension course is presented in 11 easy-to-read, informal modules that allow the student to proceed at his or her own pace. Students who successfully complete the course will be awarded a Defense Systems Management College Certificate of Completion.

There is no fee for military or government civilian personnel, however, there is a $50 fee for industrial and part-time government personnel. For more information contact the Registrar, CPM Extension Course, Defense Systems Management College, Fort Belvoir, VA 22060.

OPERATIONAL TESTING FY 83 (OCT 82 - SEP 83)

Major Operational Test Sites and Equipment

HMMWV

HIGH MOBILITY MULTIPLE - PURPOSE WHEEL VEHICLE

FT HUNTER LIGGETT, CA

DSCS

DEFENSE SATELLITE COMMUNICATIONS SYSTEM

SUNNYVALE, CA

SINGLE CHANNEL GROUND AND AIRBORNE RADIO SUBSYSTEM

SINCGARS

FT RILEY, KS

PATRIOT AIR DEFENSE MISSILE SYSTEM

PATRIOT

FT BLISS, TX, & WSMR, NM

MULTIPLE LAUNCH ROCKET SYSTEM

MLRS

FT BLISS, TX

SST

SINGLE SUBSCRIBER TERMINAL

SDNRIU

SECURE DIGITAL NET RADIO INTERFACE UNIT

FT HUACHUCA, AZ

ULCS/ULMS

UNIT LEVEL CIRCUIT/ MESSAGE SWITCH

ANDVT

ADVANCED NARROW BAND DIGITAL VOICE TERMINAL

DIVISION AIR DEFENSE GUN SYSTEM

SERGEANT YORK

FT BLISS, TX

I 81

IMPROVED 81mm MORTAR

ABERDEEN, MD

BRADLEY FIGHTING VEHICLE SYSTEM

BFV

FT HOOD, TX

AN/TTC-39

AUTOMATIC COMMUNICATIONS CENTRAL OFFICE

FT HOOD, TX

AN/TYC-39

AUTOMATIC COMMUNICATIONS MESSAGE SWITCH

TAC JAM

TACTICAL COMMUNICATIONS JAMMING SYSTEM AN/MLQ-34

FT STEWART, GA

SCOTT

SINGLE CHANNEL OBJECTIVE TACTICAL TERMINAL

LEXINGTON, MA

LIGHT ARMORED VEHICLE

LAV

FT BENNING, GA

FIRE SUPPORT TEAM VEHICLE

FISTV

FT SILL, OK

PERSHING II

P II

FT SILL, OK

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