

# **ITEA**

## **NEWSLETTER**

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**Manuscripts.** Submission of unsolicited articles or news items of interest to the T&E community is welcomed and encouraged. Articles should be typed, double spaced. A brief biography and a small black and white glossy photograph of article authors are desired. Only original (or quality reproduction) art and black and white photographic prints can be accepted. All submissions are subject to approval and editing by the ITEA Editorial Board. Mail submissions to Mr. B. S. Granum, 9508 Seddon Court, Bethesda, MD 20817. Tel. (703) 379-5404.

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## THE IDENTITY OF T&amp;E

**Matthew T. Reynolds**  
**Director, Test & Evaluation Office**  
**Naval Sea Systems Command**

The editorials in the initial issue of the ITEA Newsletter have necessarily dealt with the growth and expansion of ITEA. For the first editorial that departs from that practice, we will focus some thought on the identity of T&E.

When the Department of Defense instituted the "try before buy" procurement policies in the early 1970's, T&E became very formalized. The requirements for the approval of test plans and distribution of test reports increased substantially. There was predictable concern among many system developers that the policies might portend a further erosion of their authority and control. Over the following decade, as the implementing procedures were defined, refined and became institutionalized, most of the early fear dissipated. After several years, one could frequently find phrases such as "T&E community" liberally sprinkled in correspondence and literature. The very idea that people involved in T&E in different organizations would have anything substantive in common, much less have any allegiance to a "community," would have bordered on the heretical to many people not too long ago. But today, there is even a T&E "Association," and an "International" one at that!

T&E has come a long way, but we must not forget its humble beginnings. ITEA has proven, and will continue to prove, that there is much interest in and many benefits to sharing the thoughts, ideas and the experience among all involved in T&E; the policy makers, the government and industry program managers, public and private engineering or-

ganizations, and equipment suppliers involved in both defense and non-defense related industries. But, we must never make T&E an end unto itself. T&E is a subset of engineering. Regardless of who conducts the tests, makes the evaluations, and how T&E results are used for program approval or budgeting decisions, T&E must be structured to take its input from and give its output to engineering. It must be tailored to the technical issues of the particular engineering endeavor it is supporting whether it be an R&D experiment, an operational test, a first article test or even an in-service maintenance test. Our customers, the Defense establishment and the public, cannot afford T&E programs that are fully standardized, stand-alone and are planned to prove everything. T&E must be judiciously planned and conscientiously adjusted through the course of the program to ensure it is efficient and cost effective. It must be planned and integrated at every stage of assembly and at every level of engineering. It must be a thread (albeit an identifiable and traceable one) in the fiber of the build-test-fix-retest weave.

The foregoing should not be interpreted to discourage independence in T&E. Some testing can be better conducted and the results better evaluated by someone not closely associated with the system development. Nevertheless, T&E should be planned so it integrally supports the engineering process. The engineering must be tested, but the testing must also be engineered.

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## PRESIDENT'S CORNER

Carl Cooper  
Vice President

ITEA growth, activities, and scheduled events continue to expand at an impressive rate. We welcome the Channel Islands Chapter, formed at Point Mugu, California in October 1981, as the fourth chapter of our society and the first one on the West Coast. Plans are underway to establish chapters in the Dallas/Fort Worth and the Los Angeles areas in the near future. The founding of each new chapter has been dependent on one or two enthusiastic, motivated individuals getting the ball rolling in their local area with the coaching and support of the National Headquarters. We need individual catalysts in other geographic areas, such as Albuquerque, Eglin, Las Vegas/China Lake, Boston, Aberdeen, et al. If you, the reader, are ready and willing to take on the organizational task in your area, and to reap the satisfaction of furthering the ITEA goals and objectives, please take a few minutes to call or write Dr. "Matt."

Matt deserves our joint admiration and appreciation for the past two years of devoted effort to ITEA. In particular, Matt has allowed ITEA to consume much of his energies and waking hours over the past 15 months following his retirement from the Naval Air Test Center, Patuxent River. He has refused monetary remuneration for his efforts, which quite truthfully flies in the face of today's economic realities. I look forward to the day when ITEA has reached the critical mass that will allow it to hire a professional staff to relieve Matt of many of the burdensome tasks he now accomplishes singlehandedly.

In November 1981, I attended the First Flight Testing Conference at Las Vegas, Nevada. The conference was an unqualified success, with over 560 attendees. ITEA was one of six professional associations co-sponsoring the conference. In reality, ITEA was riding the coattails of the American Institute of Aeronautics and Astronautics (AIAA), the principal sponsor and administrator of the conference. Unquestionably our association benefitted from the generous exposure which AIAA and the conference graciously provided. Having thus co-sponsored a national conference, ITEA is better prepared to sponsor a major T&E conference in 1982.

The tempo of chapter activities has quickened in the past quarter. Each of the three East Coast chapters had held at least one local special event in 1981, the latest being a workshop at the Defense Systems Management College sponsored by the George Washington Chapter on November 21, 1981. Thus, the primary mission of ITEA to enhance the understanding and professionalism of T&E through effective education is being accomplished.

My thanks to Matt for allowing me this opportunity to report to the membership on the healthy status of our association.

## TEST PLANNING, CONDUCT AND ANALYSIS

Lee M. Hand #C213RM  
McLean, Virginia

Editor's Note: The following article, which provides a few general guidelines for developmental test planning, conduct and analysis, has been extracted with minor editorial changes from the T&E Handbook of the Naval Electronic Systems Command. Our thanks for permission to edit and print to Mr. W. J. Riegger, NAVELEX T&E Coordinator.

### General

Developmental T&E must, of course, determine the degree to which contract specifications have been met. But that is not enough. There are two questions which must be addressed in developmental testing: (1) does the equipment meet spec's and (2) does the equipment do what it is supposed to do? We may not always obtain clear answers to the second question, particularly in early tests of complex subsystems, but we must keep the question in mind.

The specifications in the early design stages of complex equipment may well be based on experience and engineering judgment, but that does not guarantee the specifications will give the performance desired. If we concentrate on testing for conformance to specification and lose sight of performance, we could find ourselves downstream with a piece of gear that meets spec's beautifully, but won't do the thing it's supposed to do; we've fallen into Pitfall Number 1.

In a black and white world, developmental tests would be conducted under

completely controlled conditions and operational testing would be free-play. However, in the real world, rarely is either of these fully obtainable. Remember that a valid test is a repeatable test and you must control conditions as necessary to obtain repeatable results. If you can't obtain repeatable results, you don't know what results you have. If test results indicate that the equipment meets spec's, but you can't get the same results in a retest, you don't know whether, in fact, the equipment does meet spec's or external influences produced the results.

How much testing should you do? This is one of the tougher questions and there is no simple answer. The Fleet, who is your ultimate customer, may hold two separate perceptions of you simultaneously. While you're testing and retesting, the sailor in the Fleet, who, in his view, desperately needs the piece of gear, thinks of you as Nero, fiddling while Rome burns. The same individual, seeing himself on the firing line doing his duty for God and Country, receives a piece of gear that doesn't work as advertised, and he thinks of you as another Washington bumbler who keeps sending him pieces of junk. You will find yourself under conflicting pressures: (1) to get on with the program, get the equipment developed and deployed and (2) to ensure, through rigorous tests, that the equipment, when deployed, will work.

How much testing is enough is a judgmental call. You must weigh the various factors that are involved in making this determination. Primary factors are test results to date, technological innovation involved and urgency of the requirement. The more testing you do, the more confidence you have that you

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will deploy a good piece of gear. The less testing you do, the greater the risk that you'll deploy equipment that won't work as well as it should. The happy medium is hard to find. Those who make decisions and those who make recommendations follow the same procedures; they weigh all the factors involved, consider the alternatives and, on the basis of best judgment, identify the preferred solution.

### Test Planning

Testing costs both time and dollars and it can be very expensive. Anything that is expensive can be wasteful unless utilized properly. Program decisions depend heavily upon test results. Note the word, "results." The number and duration of tests, the test procedures and the test environment: these and other test parameters are important, but their importance is primarily in assessing the validity and the confidence level of the results. In writing or reviewing a test plan, don't get so involved with the trees that you lose sight of the forest. Don't get wrapped up in detailed procedures and events, yet. The first, critical step in test planning is to identify clearly the questions that must be answered and, therefore, the results that the test should produce. Your program documents should identify critical issues. There are extensive questions to be answered at each milestone decision point. You must clearly identify these issues and questions if you're going to structure a test that will provide the answers. Otherwise, you're groping your way through the trees towards Pitfall Number 2: test completed, masses of data in hand, and unanswered questions.

If you have the impression that end-to-beginning, or backwards, test planning is suggested, you are 100 percent correct. If you have clearly in mind the questions and issues the testing must address, then you're in a position to make realistic assessments of the data you'll need and how you'll treat the data in order to produce test results that answer the ques-

tions and resolve the issues. Raw data will frequently require data reduction and the application of analytic or statistical techniques. We want to produce results that are clear and meaningful in ordinary language or form. We also want to handle sufficient data to provide a realistic confidence level that the results do, in fact, reflect equipment performance.

We're dealing, basically, with three interrelated questions: (1) how many raw data points do we need, (2) how are we going to reduce the raw data and (3) what analytic methodology will we apply? Determining the answers to these questions is an iterative process. Good answers to these questions are important. They help us avoid Pitfall Number 2, having masses of data and unanswered questions; they also permit efficient test planning. Ideally, we'll test enough to collect the data we need and no more. In real life, we'll probably throw in a modest safety pad to ensure having sufficient data, but we'll avoid the expensive collection of masses of unnecessary or marginally useful data.

Now, with a handle on the raw data we need, we can take another step backwards and determine how we'll collect the data. The nature and quantity of the data points lead us rather naturally to the most reasonable collection means. We want hard copy of some nature. Collection means vary in capacity, cost and quality and range from high speed, multichannel magnetic tape to a stubby pencil. Quality, in this context, means resolution. Required test results, test/detection equipment and the recording medium should all be consistent. If test results are meaningful only to terms of 0.5 volt, it's wasteful to measure and record to a millivolt. On the other hand, it should be obvious that if fine-grain resolution is required in the results, measurement and recording means must both provide it.

Our next backward step is to determine data collection points and recording times. We may require data from a given

point only during portions of the test or during selected subtests. We may need continuous data. We can make this determination based on the results we're looking for. Data collection points are a more subtle problem. If, for example, we are measuring field strength, there are an infinite number of data collection points. The results we're testing for help us determine the distances to take measurements and help us define whether discrete relative bearing measurements will suffice. Depending on the results we need, we may take measurements on 18 or 36 relative bearings, or we may need continuous measurements for the full 360 degrees.

In determining data collection points, watch out for Pitfall Number 3: test/recording equipment or procedures contaminating test results. Measuring the parameters of an electronic circuit is fairly straightforward. Be careful that you don't become complacent. You can tap into a data collection point, in a physical as well as an electrical sense, and introduce undesired and unknown influences on the equipment's performance.

Stepping another pace to the rear, we can now determine the necessary test procedures. Knowing the data required and where and when we need to collect them, we can formulate a scenario, or sequence of events, that will produce data at those points when needed. We can also determine, based on data needs, the number of replications we need for each subtest. This scenario also helps us identify test elements or subtests that can be combined to improve test efficiency. Data collected at one point may provide results applicable to several other tests or subtests. We might also identify data needs that can be met by piggybacking on another test.

Procedures, in a simplistic sense, boil down to the what, when, where and how. In developing step-by-step test procedures, we also identify who. Some

procedures must run in sequence; others can be run simultaneously. People are a major expense in any test, so we want to make best use of this resource. By careful planning, we can reduce the number of people to the minimum; we can also keep most of the folks usefully employed most of the time during the tests.

A mental walk-through, a deliberate step-by-step examination of each sequence in the test scenario also enables us to identify, one at a time, the pieces of ancillary gear and special test equipment that we'll need. This mental walk-through also gives us a clear idea of how the test articles, test and recording equipment and ancillary gear all fit together. This provides us the information needed for the final, giant step backward to site selection and test setup. With an image of how everything fits and operates together, the design of the test setup is simple and straightforward. With the entire test in focus, we can identify site requirements including physical parameters and required support facilities. Selection then becomes a simple matter of identifying (and scheduling) the most convenient site which meets all requirements.

If the backward planning process we have just described addresses a fairly complex system and test, we have probably developed back-to-front test outlines for the overall test and for a series of subtests as well. If the test article is fairly simple and the tests we have envisioned are straightforward, we may have a rather sketchy, though sufficient, test outline. In any case, we have the essentials in hand and can now either write or review a detailed test plan in a systematic manner.

The sequence of backward planning steps which we have outlined is summarized as follows:

- Identify questions to be answered or critical issues to be ad-

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- dressed/resolved.
- Derive the test results needed to answer/resolve the questions and issues.
- Determine the raw data required and the data reduction and analytic methodology to be used in producing the required results.
- Identify data collection points and collection/test and recording means.
- Determine resolution required; identify testing/recording quality (resolution).
- Identify necessary procedures: what, when, where and how (test scenario).
- Determine personnel requirements; how many people at what points doing what things.
- Mentally walk through the test. Identify how test articles, test and recording equipment and ancillary gear fit together.
- Design the test setup and make a site selection.
- Write/review the test plan.

If you're reviewing a test plan, don't be hesitant about asking questions. If there's anything in the plan that isn't clear to you, sit down with the author and ask questions. There are very few stupid questions. If you don't clearly understand a procedure described in the test plan, how do you know the person performing that procedure during the test will know what he is supposed to do? Don't be embarrassed about asking questions. If you don't understand something in the test plan, there's a strong possibility that the author didn't write it well or didn't fully understand it himself.

A final note on test planning: avoid doing a half-gainer into Pitfall Number 4; undue optimism. Undue optimism, particularly with respect to test scheduling, can create a lot of problems. Allow sufficient time. Anticipate, particularly in tests early in the development cycle,

that testing will identify problems. Such problems frequently mean delay. If you're lucky, the delay may be short. You may isolate the problem, locate the fault and perform a fix on the spot. If so, you can resume testing. The time to find and fix the fault could take several days which would require a suspension of the test. In any case, the fix may invalidate portions of the testing completed, which would require some amount of retesting. Some retesting may be needed just to revalidate earlier test results. Don't plan on failure, but don't schedule on a "nothing-can-go-wrong basis" either. Remember Murphy's Law.

### Test Conduct

If you have a good, detailed test plan, you have a nice leg up on conducting the test. Except for the very simplest of tests, you're looking for answers to a number of questions. Frequently, there will be several people involved in the test and each may be looking for answers to his specific questions. A good test plan is a good guide, but when you hit the first glitch, someone's got to decide, on the spot, what's to be done. The glitch and the possible solutions may be extremely simple, but unless lines of authority and responsibility are clearly drawn, you can have a real mess. The issue is, "Who is in charge?" Committees are just fine, unless a decision is required. We've not planned on success (Pitfall Number 4), so we anticipate a few glitches during the test. When one occurs, we have a departure from the test plan. There may be several reasonable alternatives as to the next course of action. The important thing is that someone, clearly identified beforehand, has the authority to make the decision and we all get on with the program. We don't need a tsar, but the worst decision possible, in many cases, is no decision at all.

Many tests will involve more than one activity or headquarters. Tests can be multiagency and even multinational.

The principle is the same. Regardless of the number of participants, straphangers or agencies involved, any time a test involves more than one participant there should be clear understanding and agreement before hand reflecting lines of authority and responsibility. In the worst-case situation, things could go to h— in a handbasket and the prudent decision would be to terminate, fall back and regroup. Someone (not a committee) needs to make that decision.

In a less dramatic sense, many fixes to minor glitches will require go-no-go decisions. Two experts on the scene may propose different fixes to a problem. Both may be reasonable. Somebody's got to say yea or nay and also assess the requirement to retest. That same somebody's got to ensure that fixes are documented. You need technical experts on the scene, particularly in early tests, to resolve glitches and make minor fixes. The problem you have is that there are very indistinct lines between debugging, tweaking and modifying. Pitfall Number 5 is stepping over the modification line without any documentation. The difference between fine tuning a variable component and redressing a few wires may not be readily apparent, but unless the redressing is documented, you can wind up downstream with the next developmental or production model and encounter baffling problems. Why? The drawings don't reflect the redressing that was done during the test. Production of the current model, based on original drawings, has "unfixed" something that was "corrected" a long time ago.

How do you avoid this sort of problem? Talk things over beforehand with everybody involved in the test. Make sure everyone knows and understands who's going to do what to whom and when. Be sure every person knows who has the authority to approve changes in the test plan and in the equipment and who has the responsibility for documenting these changes. Changes will be necessary, but

they must be controlled and documented. A loosely-run test, with lots of adjustments, tweaking and changing can lead you right down the garden path. After exhaustive tests, you can find yourself sitting on a mountain of data with no more idea of equipment performance than you had when you started.

Plan on changes; then document them. Also plan to revalidate available results that could reflect the changes. Judgment decisions? Of course. That's the name of the game. Remember, we don't live in a black and white world, so don't expect black and white test results. Plan your tests and ensure they're controlled so you know what the results mean. Your evaluation can then be a judgment, rather than a guess.

### Test Results Analysis

Analysis, in its simplest terms, is the reduction of raw information which may be in rather indigestible form into a form or language that is more meaningful. Quite commonly, this meaningful form will be in statistical terms, such as probabilities or percentages. The performance of a radar, for example, might be expressed as the probability of its acquiring a target of given size and dimension, at a given range, under specified conditions. Further examples would be the common measures for reliability, which is Mean Time Between Failures (MTBF), and for maintainability, Mean Time to Repair (MTTR).

If we were testing for these suitability characteristics in the technical evaluations, we would, of course, use standard statistical techniques to derive these specific means. Analyzing a variety of technical characteristics may not be quite so straightforward. Once again, your judgment becomes a significant determinant. We discussed test analysis results as the culmination of the test and as the beginning of our back-to-front test planning. If you have gone through the itera-

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tive process discussed (mentally or on paper) and have weighed questions to be answered (raw data needed, data reduction and analytic methodology) you already have, or should have, identified the statistical/analytical techniques that will translate your test result data into more familiar and meaningful terms.

Watch out for Pitfall Number 6, one of the most dangerous pitfalls we'll discuss. It's dangerous because it can be camouflaged so easily. Voluminous charts, graphs and endless tables can be used to clearly demonstrate the authenticity of a bunch of nonsense. We know that figures never lie; but liars figure. We also know that a skillful statistician, given sufficient data, can probably "prove" that the earth is flat. Remember Joe Schmook, who sat on a hot stove with his bare feet on a block of ice? His "comfortable average temperature" prevented neither the burns nor frostbite.

Apply two tests to both the methodology and the results. First, do the results make sense? Are they consistent with the physical world as you understand it? Do the data used apply to the parameters in question? If the results are not consistent with common sense and known physical laws, there may be an error in the application or treatment of the data. On the other hand, of course, you may be on the verge of a scientific breakthrough and the winning of a Nobel Prize. You need to take a careful look to determine which is the case. The second test is just as important, though a bit more subtle. Do your statistics obscure more than they reveal? Joe Schmook's "comfortable average temperature," though accurate, was not only meaningless, but obscured the fact that his feet were freezing and his buttocks burning.

Be leery of concrete results derived from limited data. Test results have two values: one is what the result itself tells you about the equipment performance; the other is the confidence level you can

assign to the result. Time and other resource constraints may limit the testing you can do. If testing is limited, you may obtain good results, but at a low confidence level. If decisions must be made on the test results available, so be it. Provide the results, but be sure the confidence level is clearly identified. If program urgency dictates proceeding at the risk involved, fine. Just ensure that those risks are identified so no one in the decision chain gets blind sided.

Let's consider a final pitfall (Pitfall Number 7). We call this one seven because it's "betting on luck." A prudent test sequence is test, find a fault, fix it and retest. Omitting the last event in this sequence is dancing around the edge of the pitfall. If one of your expert advisors assures you, with 100 percent confidence, that the fault has been identified and repaired, pretend you're from Missouri. Ask him to "show you." If it was a quick and simple fix, you should be able to confirm it with a quick and simple test. If that quick and simple test reveals that something has been fixed that wasn't broken, but you still have a fault, you've saved yourself considerable embarrassment downstream.

Let's review briefly the seven deadly sins...make that the seven deadly Pitfalls (PF) in developmental test planning, conduct and analysis.

PF 1. Ignore performance (operational) testing. Result: equipment meets spec's but doesn't do what it's supposed to.

PF 2. Write/review a test plan without a clear focus on questions to be answered. Result: tests are complete with masses of data and unanswered questions.

PF 3. Inject unknowns with testing/recording gear and pro-

cedures. Result: test results are contaminated and of unknown validity. You don't know what results you have, if any.

PF 4. Be unduly optimistic. Result: glitches occur, time and other resources are exhausted and tests are incomplete.

PF 5. Perform or permit undocumented modifications. Result: following models "unfix" corrections already made.

PF 6. Manipulate data. Result: data prove the earth is flat, or the results obscure more than they reveal.

PF 7. Bet on luck, ignore retesting after a "simple" fix. Result: you fixed something that wasn't broken. The "fixed" fault will show up again later.

**The Test Report**

Your test planning should have identified individual or agency responsibilities for all phases of the test, including the documentation. The test report is the document which gets the visibility. Its summarization of T&E results will be used by the decision makers in determining the program's direction. The report should be finished without delay but must be complete and accurate. A literary masterpiece is neither required nor desired. A good report is one that clearly, but concisely, spells out what tests were conducted, what their objectives were, how they were done, what they measured and the results. If your test planning and conduct were done well and the report is clear and concise, any reader or reviewer should be able to determine quickly and easily what the results are. He should be

able to determine immediately, without digging through volumes of data, how well the tests answered the questions to be addressed, how well the equipment performed and where the program should go, with respect to this test, in terms of further development and test.

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Lee Hand, Senior Engineer at Tracor's Electronics Systems Division, is primarily engaged in technical and engineering support for the test and evaluation of electronic systems and equipment. A former Army Aviator, Lee has participated in the development, test, and fielding of varied avionics systems and in the design and fielding of current meteorological satellite systems. He is one of several authors of the NAVEXLEX T&E Handbook, from which this article was extracted.

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**MEMBERSHIP CERTIFICATES**

The Association is obtaining deluxe membership certificates for Charter, Founder, Honorary, and Corporate Members. The certificates are 11 x 14 inches (standard picture frame size) with colored logo, gold corporate seal and the member's name.

Members' names will be entered as first, middle initial, and last name per ITEA records. Corporate certificates will bear the name of the corporation. Titles and professional grades which are subject to change will not be entered. Distribution is planned for January 1982: direct mailing to individual members at large and through chapter presidents to chapter members.

Reminder: Charter Membership is available only to the closing of the 1982 International Symposium.

## TONOPAH TEST RANGE SUPPORTS NAVY CRUISE MISSILE TEST SERIES

In recent tests of the Navy's Tomahawk cruise missile, performance has been remarkably successful - and so has the performance of Sandians and instrumentation systems at Tonopah Test Range where the tests terminated at a dry lake bed target area on the Range.

"Elated" is the way Ron Bentley, TTR supervisor of Division 1172, describes the Navy's reaction to test data supplied by the Range. "The cruise missile tests stretch the capabilities of our instrumentation to its fullest," Ron says, "but the systems are performing without a glitch."

The cruise missile tests start beneath the sea in the nuclear submarine Guitarro submerged off the coast of Pt. Mugu, Calif. The Tomahawk is fired out the forward torpedo tube of the sub and carried aloft by a rocket booster. At about 150-ft. altitude, the rocket drops away, the jet engine fires, tiny wings emerge from the torpedo-shaped missile and a 500-mile zig-zag journey starts across California, over the Sierras and into the dry desert terrain of Nevada. The flight is primarily over government-controlled land away from population centers. The flight of the Tomahawk is at low altitude, making it virtually impossible to detect on radar.

The missile streaks onto the Range at approximately 550 mph, its small turbofan engine remarkably quiet. It comes in at treetop level, and as it approaches the house-size target, it drops even lower. It hits right on target, an awesome performance of the missile and its guidance system.

As the missile approaches the Range, it transmits a signal from an on-board beacon which is picked up by the

radars at TTR. Once locked onto the missile, the radar systems' position data are transmitted into the central computer at TTR and automatically relayed to the cinetheodolite, telescopic and tracking cameras. Each camera station has its own minicomputer which processes the radar location data to automatically position, track and focus the optical instrumentation. Data for the missile guidance telemetry link is also processed in real-time by the TTR computers and this is used as an additional target location aid by the Range instrumentation systems.

A long-lensed TV camera, integrated into the radar system, is also focused on the incoming missile to provide a CRT image on screens in the Operations Center at TTR.

Simultaneously, the position of the target is displayed by a graphics system incorporating maps of the TTR area. As the missile comes closer to the target, the scale of the maps changes to take over closer looks at the flight course and target. The position and progress of the missile is plotted as a bright line on the screen.

One of the requirements of the cruise missile tests was tracking the missile as well as a chase plane following above and behind the missile. The plane was instrumented to take over control of the missile if it deviated from its programmed flight path. The chase plane had to maintain its position so that a narrow "cone," the space where the control electronics would function, could be precisely positioned during the critical moments before the missile hit its target. This information was continuously visible on the TTR graphics display.

Another requirement for the cruise

missile tests was additional displays in real-time of 100 data channels from instruments on board the missile which monitored internal functions - engine and exhaust temperatures, electronic component performance, etc. These data were organized and displayed by TTR's computer in digital form on TV screens and chart printers set up in the operations building where Navy and contractor people, responsible for the various components, could monitor individualized system performance data.

All of the electronic data from the tests were recorded and processed on site for "quick look" analysis immediately following the tests. Film and cinetheodolite data were processed by Gary West's Test Data Reduction Division 1522 in Albuquerque and were delivered within a couple of days.

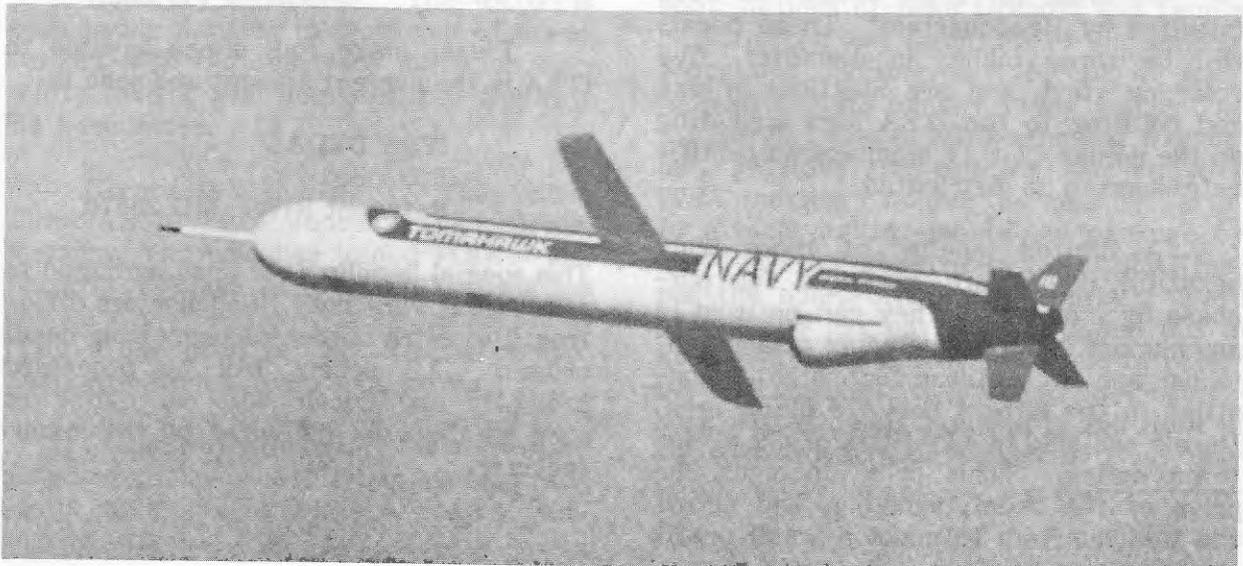
The test on July 17 marked the first time that a Tomahawk was launched from undersea by submarine to hit a land target. It was successful on the first try. The missile carried a simulated conventional HE warhead.

Several versions of the Tomahawk exist - one that is launched from the

ground, one from a surface ship and another from an aircraft. They carry a conventional HE warhead or a nuclear warhead. Sandia and Los Alamos developed the nuclear warhead for the Tomahawk. The nuclear package is considerably smaller than the HE warhead, and extends the range of the cruise missile to more than 1000 miles.

Additional tests of the Navy's submarine-launched Tomahawk are planned to take place at TTR before the end of the year. These tests will take the missile from development to operational status.

"TTR is designed for this kind of high performance testing," Sam Moore, manager of TTR Department 1170, says. "Our Range modernization program has brought TTR's instrumentation systems to the edge of available technology. We can match the sophistication of the most advanced weapon systems, and provide performance data in depth, plus offering flexible scheduling and extensive support services." (Sandia National Laboratories, "LAB NEWS," Vol. 33, No. 19, September 18, 1981)



## EDITOR'S NOTES

This issue reflects the desired trend toward broader membership. The Editorial is written by Mr. Matt Reynolds, an ITEA member and Director of the Naval Sea Systems Command T&E Office; Mr. Carlton Cooper, our vice-president, has written the President's Corner column; and the lead feature article is by our associate editor, Mr. Lee Hand.

Other new ITEA contributors include are Colonel Mullin, whose article, "Security and Software Test and Evaluation," is in the personal viewpoint column. Mr. Erling D. Tranby contributed a news article on our newest chapter, The Channel Island Chapter. Terry Myron and Ron Ace contributed interesting material on the Tidewater and the George Washington Chapters, respectively. Al Ebeltoft submitted the article on the Southern Maryland Chapter.

We must accelerate this trend of broadened contributions by ITEA mem-

bers; particularly manuscripts for feature articles. ITEA needs this increased membership contributions to reach the level of professionalism appropriate for and expected by a professional society. Although quality original articles are the most desirable, if you don't have time to do an original article, submit an appropriately edited manuscript on thoughts you may have originated for some other publication. I am sure there are many of you, like Lee Hand, who have written for, or made presentations to, a limited audience on subjects appropriate for ITEA publication. The ITEA Newsletter is an excellent vehicle to further expose your ideas, or advertise events or capabilities to a distinguished audience. Take advantage of this opportunity.

All submissions for the ITEA Newsletter should be sent to: Mr. Brad Granum, 9508 Seddon Court, Bethesda, MD 20817

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## ITEA DECALS

An order for ITEA decals has been initiated by Headquarters. These decals will be three inches in diameter, five color on vinyl, and are identical in size and coloring to the ITEA logo appearing on the deluxe 11 x 14 membership certificates soon to be distributed.

A limited number of these truly beautiful decals are available for purchase by members. They can be used in any number of ways, including attachment to luggage or briefcase for instant recognition in the airport baggage claim area. Decals are sold in quantities of six (6) for three dollars. This price includes the price of the decal, handling, and allows the Headquarters to make a small profit

for the general operating fund.

Please make your check payable to ITEA in the correct amount and send to:

ITEA DECAL  
P.O. Box 203  
Patuxent River, MD 20670

This special handling has been arranged to relieve our very busy Headquarters office from the extra burden of processing decal orders. All orders will be processed promptly and decals will be mailed as soon as they are delivered by the manufacturer.

## ASSOCIATION AND CHAPTER NEWS

**Membership:** Further growth has occurred! ITEA now has approximately 250 members throughout the U.S. and Canada. Additional members expand existing chapters with concentrations being the foundation for establishing new chapters.

**Chapters:** As suggested in the July 1981 issue, a new chapter has now been formed on the West Coast and is known as the Channel Islands Chapter. See article herein.

Chapters are assigned geographical areas that approximate a one-hour driving radius. All members in these areas are considered members of that chapter but are, of course, free to attend any chapter or international meeting. Such assignment simplifies computer records and administration.

Inquiries have been received about forming chapters around Eglin AFB, Phoenix, Dallas/Fort Worth, Anaheim and others. We need action to form these chapters.

**Regions:** Action pending as needs arise to form proposed regions as outlined in the July '81 Newsletter.

**Honorary Members:** The BOD is considering limiting to 5 percent of membership with ten Honorary Members currently invited and accepted per the July '81 Newsletter.

**Corporate Members:** The BDM Corporation, 7915 Jones Branch Drive, McLean, Virginia, has joined ITEA. Mr. Earle C. Williams is President. BDM has and continues to be a strong supporter of ITEA. See item in this Newsletter for Corporate Membership application.

**Computerized Mailing List:** New arrangements have been completed for the roster of members and the general pur-

pose mailing list. It provides mailing labels and general or specialized mailing lists/labels. Future arrangements will include a profile of all members. This is a service that has been and will continue to be available to all chapters. The roster is proprietary to ITEA and only provided as mailing labels to others such as the AIAA to announce related symposia to members. The general mailing list of over 1,000 names is now being revised.

**Officers:** Mr. W. L. Spurgeon has resigned as Secretary in order to devote more time to the preparation of updated by-laws and the Southern Maryland Chapter of which he is Vice President. Bill has made numerous contributions.

The President has resigned as Treasurer to spread the workload. Mr. Carl C. Smith, Jr., of Peak, Marwick, Mitchell and Company, has been elected Secretary-Treasurer. Carl has been of great help.

**Newsletter:** This publication has been oriented to be a combination of a Newsletter and a journal. The purpose is to provide a gradual build-up in articles leading to the publication of a separate journal of T&E while keeping members informed of ITEA activities. The skillful contributions of Brad Granum and family perform the key functions of acquisition, processing, editing, and layout of each newsletter into camera-ready copy. The St. Mary's Press of McGregor and Werner, Inc. provides the printing service with ITEA members holding a "mailing party" to attach mailing labels and package by ZIP codes for delivery to the Post Office per the non-profit mailing permit. Paid advertising has not been obtained but is needed to help defray the costs of printing and mailing. It is hoped that members will or have included a line item in the 1982 advertising budget of their parent organization.

## ASSOCIATION AND CHAPTER NEWS

**By-Laws:** The committee has completed several drafts leading to a final draft that will possibly be distributed to the BOD for review along with the minutes of the last BOD meeting on 7 October 1981.

**Senior Advisory Board:** Dick Cross has completed a documented chapter for the SAB and Lieutenant General Howard W. Leaf, USAF, the Inspector General HQ USAF/IG, has accepted membership in the SAB. General Leaf is an Honorary Member whom we are proud to have as an active participant.

**International Committee:** CDR Terry Myron, organizer of the Tidewater Chapter, has been appointed Chairman. Terry reports to SHAPE HQ in January 1982, and will then be active in a variety of C<sup>3</sup> programs as well as ITEA.

**Meetings, Symposia & Seminars:** A number have been held by chapters and more are planned as listed herein. The enthusiasm to exchange knowledge exceeds all ITEA HQ plans and can only be accomplished by strong support that ITEA members have given. Frank Smith and Walt Finkelstein are actively proceeding with revised plans and actions for the International Symposia and Seminar. See announcement herein.

**ITEA Decals:** Available for distribution and needed by all members. Procure from ITEA DECALS; Box 203; Patuxent River, MD 20670. Printing and distribution cost is only \$3 for 6 decals.

**Membership Certificates:** In printing process. Now to be 9" x 12" and deluxe. Plan on framing for your office. As you will see this is a major process leading to distribution in January 1982.

**Dues:** The administrative time and cost for billing is a major workload for volunteers. Please use the membership

application form herein and voluntarily submit your 1982 dues and donations. All tax deductible. BE SURE TO INCLUDE YOUR MEMBERSHIP NUMBER ON THE FORM. This income is used to defray routine operating costs complementing the voluntary services and materials provided by members and friends.

**Taxes:** The IRS has ruled ITEA as a non-profit corporation. However, it is still necessary to file an annual federal return as well as other quarterly returns even though ITEA does not have employees. More about this in forthcoming ITEA publications. Chapters need to be prepared to submit by 31 January 1982 an annual financial statement for integration into the Headquarters report. Maryland sales tax exemption is in process along with a modification of the ITEA Articles of Incorporation to specifically include all purposes such as education.

**Standard Operating Procedures:** A family of SOPs are under development. These cover headquarters functions, chapter operations, finances, standing committees and a variety of activities. They will be developed for approval by the Executive Committee consistent with ITEA BOD policies, the Corporate Charter, legal requirements and general policies. SOPs will be provided to all concerned parties after approval by proper authority.

**Membership Roster:** Rosters in the Newsletter are extremely useful but a consolidated roster is needed. It is hoped to publish one as soon as a computerized listing is available so membership can be listed as follows: alphabetically, organizational grade, membership grade, chapter, etc.

**BOD Meeting:** The 7 October 1981 meeting was held at Information Spectrum, Inc., Washington, D.C. from 1400 to 1900 hours. The meeting accomplished its

(continued on page 18)

MEMBERS: RESUBMIT WITH ANNUAL DUES/DONATION AND UPDATED INFORMATION ONLY.  
NEW MEMBERS: COMPLETE IN ENTIRETY

(Print or Type)

THIS FORM MAY BE REPRODUCED AS REQUIRED

INTERNATIONAL TEST AND EVALUATION ASSOCIATION (ITEA) MEMBERSHIP APPLICATION  
AND RECORD FORM

I. NAME: \_\_\_\_\_  
Last First Middle Initial or Name

II. TITLE: Mr. Mrs. Miss Ms. Dr. (Circle One) Other \_\_\_\_\_

III. RESIDENCE ADDRESS IV. OFFICE ADDRESS:

Street/Court/Place/Etc. Title  
P.O. Box/Apt. No./Other Organization/Mail Stop or Code  
City/State/County/Zip City/State/County/Zip  
Area Code/Telephone Number Area Code/Telephone Number

V. PREFERRED ITEA MAILING ADDRESS: Residence \_\_\_ Office \_\_\_

VI. BRIEF BIOGRAPHY: (For ITEA Analyses of Membership Interests in Meetings and Publications)

Born: \_\_\_\_\_  
Place Date

Citizenship: \_\_\_\_\_

Academics: \_\_\_\_\_  
Highest Degree Institution Major Fields

Technical Specialties: \_\_\_\_\_

T&E Specialties: \_\_\_\_\_

Other Specialties: \_\_\_\_\_  
(i.e.,ilities/operations/manufacturing/prog. development/management)

Special Awards: \_\_\_\_\_

Biographical Listings In: \_\_\_\_\_

Membership in Other Professional Societies: \_\_\_\_\_

VII. SPECIAL T&E INTERESTS: (discuss)

VIII. VOLUNTARY DONATION (\$5 to \$75): \_\_\_\_\_  
Designate Amount

IX. SPONSOR(S): \_\_\_\_\_  
(Not required for Charter Members (deadline, Last Day 1982 Annual Symposium))

X. ANNUAL DUES: \$25 all membership classes except \$15 for active duty military and \$10 for students except active duty military

Signature Date

NOTE A: Enclose check payable to ITEA for dues plus donation to cover dues for calendar year (Tax Deductible).

NOTE B: Mail to ITEA, P.O. Box 603, Lexington Park, Maryland 20653

(ITEA Purposes Only)  
\*\*\*\*\*

ITEA Approved by: \_\_\_\_\_ ITEA Recorded by: \_\_\_\_\_

ITEA Record of Payment: \_\_\_\_\_

Membership Card Issued by: \_\_\_\_\_ Number: \_\_\_\_\_

MEMBERSHIP SURVEY--PLEASE CHECK ALL BOXES THAT APPLY

I. TECHNICAL SPECIALTIES

- Engineering
- Electrical
- Electronic
- Mechanical
- Aeronautical
- Astronautical
- Propulsion
- Industrial
- Human Factors
- Computer Systems
- Hardware
- Software
- Systems
- IV&V
- Simulation
- Ops. Research/Systems Analysis
- Systems Design
- Flight Test Engineer
- Test Pilot
- Ships & Ship Systems
- Undersea Warfare
- Electronic Warfare
- Unmanned Vehicles
- Aviation
  - Flight Ops.
  - Vertical Flight
  - Avionics
- Sensor Systems
- Medicine
- Mission Systems
- Test Facilities
- Measures of Effectiveness
- Signal Processing

II. OTHER SPECIALTIES

- Policy
- Procedures
- Planning
- Test Development
- Budget/Controllershship
- Systems Acquisition
- Program Management
- Mgt. Info. Systems
- Manufacturing
- Marketing
- Data Base Management
- Organizational Development
- Education
- Consultant
- Training
- \_\_\_\_\_
- \_\_\_\_\_

III. I CAN HELP WITH:

- Symposium
  - Publication Committee
  - Publicity Committee
  - Membership Committee
  - International Committee
  - Starting Local Chapter
  - Contributing to Newsletter
  - Speaking at a Meeting
  - \_\_\_\_\_
  - \_\_\_\_\_
- Details \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

IV. COMMENTS:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

V. HERE ARE SOME ITEA MEMBERSHIP PROSPECTS. PLEASE SEND THEM A NEWSLETTER AND A MEMBERSHIP APPLICATION FORM.

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

YOU MAY/MAY NOT (CIRCLE ONE) TELL THEM I RECOMMENDED THEM TO ITEA.

## CORPORATE MEMBERSHIP IN ITEA

Industrial corporations, non-profit institutions and governmental agencies are all striving for increased productivity and reduced costs. Key elements are the educational training and motivation of employees. Corporate membership in ITEA can contribute in several ways.

ITEA has planned a number of symposia that facilitate the exchange of technical information and offer an opportunity to widen the range of contacts in the professional T&E world. The opportunity to participate in these symposia not only contributes to an employee's sense of professional pride and helps keep him updated in his profession, but also provides exposure for the company and enhances its image.

Corporate membership in ITEA offers employees an excellent opportunity to publish in official ITEA publications where their professional views and expertise will be recognized by leaders in the T&E field. This recognition and professional growth of the employee will both be of benefit to the corporation.

Demonstrate your corporate support by subscribing to a \$300 per year Corporate Membership in ITEA that will enhance your RDT&E approach, quality assurance, and employee rewards. Complete the application form in the name of the corporation at a \$300 annual membership fee and receive corporate recognition in all ITEA International Publications.

Corporate membership will also provide the following benefits:

- Inclusion on mailing list for distribution of all ITEA headquarters general publications to designated corporate officer or library, as requested
- Invitations to attend and participate in all ITEA member functions, both national and area chapters
- Reduced registration fees for two attendees at annual international symposia
- Discounts on advertising in ITEA publications (25%)
- Special rates on space for advertising/exhibit booths at conventions, meetings, technical symposia, and educational forums
- Two individual memberships in ITEA to be selected by corporate member with no additional dues
- The two selected individual members will have all rights and privileges including the right to vote and to hold office.

## ITEA NEWSLETTER ADVERTISING ARRANGEMENTS

**Circulation:** 3000 copies printed and distributed by mail and hand delivery; current computerized mailing list of approximately 1000. Over 200 members receive five copies each for distribution to key T&E associates. Published quarterly in 8½" x 11" format. Distribution primarily domestic.

**Policies:** Limited advertising to ten pages or 20 percent of total pages per issue. Technical data, products, services, employment and educational advertising preferred. Copy subject to approval of publisher. Advertising prices based upon restricted space available in publication and to cover ITEA costs. Advertising not mixed with editorial articles unless required.

**Copy:** Advertising material must be provided in black and white, camera-ready format approximately the size purchased to ensure satisfactory print and image sizes. Standard 8" x 10" glossy black and white photographs or original art layouts acceptable when advertiser assumes responsibility for satisfactory camera reduction to size specified.

**Deadline:** Receipt at least by the fifteenth of the publication months of January, April, July and October.

**Prices:** \$300 per full page per issue or \$200/page for three issues.

\$175 per ½ page per issue or \$150/½ page for three issues.

\$100 per ¼ page per issue or \$85/¼ page for three issues.

\$25 per 2" x 3½" business card per issue or \$20 for three issues.

**Payment:** Payment by check required at time of submission of material for publication in specified issues. Publisher reserves the right to refund or publish on first-come basis within (plus or minus) one issue of desired issue(s). Costs are based upon Newsletter publication and distribution costs to a non-profit corporation.

**Exceptions:** Publisher reserves the right to change prices and policies to meet unforeseen or changed market situations.

**General:** Increased T&E contracting requires additional exposure for capabilities of contractors and sub-contractors. Your professional T&E technical/educational society (ITEA) can assist on a cost-of-publication basis. Newsletter costs cannot be fully supported by member dues and donations.

**Mail to:** ITEA; P. O. Box 603, Lexington Park, Maryland 20653

## NEW MEMBERS

16 Jul 81 to 21 Oct 81

**Belk, Reece G. Jr.** (C 308 RM), 7501 Evans Ford Road, Clifton, VA 22024, (703) 750-0500; Director, JWK International Corporation Management, Technology & Training, 7617 Little River Turnpike, Annandale, VA 22003, (703) 830-8757

**Bergondy, Paul J.** (C 288 RM), CDR, USN, Head, EW T&E Section COMOPTEVFOR, Norfolk, VA 23511, (804) 444-5021; 4925 Admiration Drive, Virginia Beach, VA 23460, (804) 495-1960

**Biasotti, Albert F.** (C 299 RM), 7411 Colton Lane, Manassas, VA 22110, (703) 361-3302; Director, Product Assurance Division, Night Vision & Electro Optics Lab, Fort Belvoir, VA 22060, (703) 664-6895

**Brainin, Samuel M.** (C 310 RM), 33 Meadowcrest Road, Sherman Oaks, CA 91403; Branch Head, PMTC, 3152 Point Mugu, CA 93042

**Brehm, Joyce A.** (C 320 RM), Science Applications, Inc., 16 Koger Executive Center, Suite 101, Norfolk, VA 23502; 5914 Beechwalk Drive, Virginia Beach, VA 23464

**Cashman, David M.** (C 317 RM), CDR, USN, COMOPTEVFOR, Code 71, Norfolk, VA 23511; 613 Mossycup Drive, Virginia Beach, VA 23462

**Galvin, Timothy J.** (C 297 RM), 1021 Dorset Drive, Waldorf, MD 20601, (301) 645-5344; Engineer, VEDA, Inc., #2 Three Notch Road, Lexington Park, MD 20653, (301) 862-2100

**Hannah, William P.** (C 293 RM), 9373 Willow Oak Road, Salinas, CA 93907, (408) 633-5701; Senior Scientist, ORI, Inc., 1340 Munras Avenue, Suite 311A, Monterey, CA 93940, (408) 646-8994

**Hay, Walter P.** (C 289 RM), 54 Wintergreen Drive, Quaker Hill, CT 06375, (203) 442-1276; U.S. Naval Underwater Systems Center, New London, CT 06320

**Hausenflech, Charles H.** (C 319 RM), COL, USAF, Vice Commander, HQ AFTEC, Kirtland AFB, NM 87117; 2225 Stockton Loop, SE, Kirtland AFB, NM 87118

**Lenahan, Ruth S.** (C 322 RM), VEDA, Inc., 1317 Del Norte Road, Camarillo, CA 93010; 5491 E. Holly Ridge Drive, Camarillo, CA 93010

**McMicken, Steven M.** (C 298 RM), 1206 Aldridge Drive, S.E., Huntsville, AL 35803, (205) 882-2877; WYLE Laboratories, 7800 Governor's Drive, Huntsville, AL 35807, (205) 837-4411 (Ext. 523)

**Moats, Wilton B.** (C 301 RM), COL, USAF, Assistant DSC/Test & Evaluation, HQ Air Force Test & Evaluation Center, Kirtland AFB, NM 87117, (505) 844-9706; 6925 Vivian Drive, NE, Albuquerque, NM 87109

**Moore, James K.** (C 303 RM), 2610-202 Colony Pines Drive, Virginia Beach, VA 23452, (804) 340-4557; Senior Test & Evaluation Analyst, 16 Koger Executive Center, Suite 101, Norfolk, VA 23502, (804) 461-1372

**Moore, William R.** (C 304 RM), 5107 Whitecap Street, Oxnard, CA 93030, (805) 985-7973; Senior Engineer, VEDA, Inc., 1317 Del Norte Road, Camarillo, CA 93010, (805) 485-6535

**Moseley, Leo O.** (C 318 RM), 5209 Fairfield Blvd, Virginia Beach, VA 23464; BDM Staff Member, OPTEVFOR/BDM, Norfolk, VA 23511

**Moulton, Joseph R.** (C 287 RM), President, E-OIR Measurements Association, P.O. Box 3348, College Station, Fredericksburg, VA 22401, (703) 371-6664

**Moyer, Janette M.** (C 311 RM), Manager, Information Systems, Tracor, Inc., 5201 Leesburg Pike, Falls Church, VA 22041, (703) 379-5463; 7130 Backlick Road, Springfield, VA 22150

**Norris, William H.** (C 305 RM), 1121 Sagebrush Trail, Albuquerque, NM 87123, (505) 292-0471; Technical Director, Test & Evaluation, BDM Corporation, Y10, Albuquerque, NM 87106, (505) 848-5649

**Norton, Henry J.** (C 316 RM), Head, Missile Systems Software, Code 1221, PMTC, Point Mugu, CA 93042; 3081 Lee Place, Oxnard, CA 93033

**Ozment, Oliver J. Jr.** (C 294 RM), 22317 Davenrick Street, Salinas, CA 93908, (408) 646-8994; Manager, Test & Evaluation Support Office, ORI, Inc., 1340 Munras Avenue, Suite 311A, Monterey, CA 93940, (408) 484-9280

**Purdey, Louis A.** (C 290 RM), Resource Consultants, Inc., 8200 Greensboro Drive, Suite 600, McLean, VA 22102, (703) 893-6120; 123 Hodges Cove Road, Grafton, VA 23692, (804) 898-7771

**Roach, Charles A.** (C 321 RM), CDR, USN, COMOPTEVFOR, Code 50E, Norfolk, VA 23464; 5084 Janet Court, Virginia Beach, VA 23464

**Radko, Anatole** (C 295 RM), 4259 E. Cartegena Way, Las Vegas, NV 89121, (702) 451-9186; Senior Engineer, VEDA, Inc., 3100 W. Sahara, Suite 207, Las Vegas, NV 89102, (702) 871-6211

**Rapp, Donald H.** (C 312 RM), Chief, Test and Evaluation Section, U.S. Geological Survey, Hydrologic Instrumentation Facility, Bldg 2101, MS-44H, NSTL Station, MS, 39529; Rt 1, Box 337, Carriere, MS, 39426

**Reynolds, Luther W.** (C 309 RM), Technical Director, Tracor ESD, Chesapeake Division, 825D Greenbriar Circle, Chesapeake, VA 23320; 2872 Salem Road, Virginia Beach, VA 23456

**Sanders, Patricia A.** (C 283 RM), 12341 Los Arboles N.E., Albuquerque, NM 87112, (505) 292-3545; Space Systems Analyst, HQ AFTEC/OAS, Kirtland AFB, NM 87117, (505) 844-2981

**Saputo, Anthony V.** (C 292 RM), CDR, USA, OTEA, 5600 Columbia Pike, Falls Church, VA 22041, (202) 756-1516 (AV 289); 7022 Bradwood Court, Springfield, VA 22151, (703) 295-0916

**Sargis, Robert A.** (C 285 RM), 6418 The Parkway, Alexandria, VA 22310; Informatics, Inc., 7926 Jones Branch Drive, Suite 272, McLean, VA 22102

**Saxey, Edward II** (C 291 RM), 100 Camarillo Drive, Camarillo, CA 93010; T&E Program Manager, VEDA, Inc., 1317 Del Norte Road, Camarillo, CA 93010

**Sherer, Wayne S.** (C 313 RM), CDR, ARRADCOM, Attn: DRDAR-TSE-IA, Dover, NJ 07801; 151 Route 206, Bldg 23 Apt 4, Flanders, NJ 07836

**Sikora, James J.** (C 306 RM), 2508 Madre NE, Albuquerque, NM 87112, (505) 292-3610; BDM Corporation, 1801 Randolph SE, Albuquerque, NM 87106, (505) 848-5000

**Sither, Charles R.** (C 300 RM), 3365 Huntington Place, Marina, CA 93933, (408) 384-9681; ORI, Inc., 1340 Munras Avenue, Suite 311A, Monterey, CA 93940, (408) 646-8995

**Stanford-Nance, Janette M.** (C 286 RM), 670 Masefield Circle, Virginia Beach, VA 23452, (804) 340-5371; CNA Representative, Code 01, c/o Staff COMOPTVEFOR, Norfolk, VA 23511, (804) 444-5058

**Stevenson, Donald M.** (C 284 RM), 505 Carlisle Drive, Alexandria, VA 22301, (703) 548-7150; SEMCOR, Inc., 2341 Jefferson Davis Hwy, Arlington, VA 22202

**Wadsworth, Jesse L.** (C 302 RM), 11551 N. Oakcrest Avenue, Ojai, CA 93023; Project Engineer, Pacific Missile Test Center, Code 1233, Point Mugu, CA 93042, (805) 982-8504

**Watson, Carroll E.** (C 315 RM), Project Engineer, Code 1233, Point Mugu, CA 93042; 1213 Nordman Drive, Camarillo, CA 93010

**Wiles, Richard I.** (C 296 RM), 500 Woodland Court, NW, Vienna, VA 22180, (703) 938-6379; Program Director, ORI, Inc., Land Warfare Programs Office, 1400 Spring Street, Silver Spring, MD 20910, (301) 588-6180 (Ext. 5967)

**Wilhoit, Max E.** (C 314 RM), 330 E Elfin Green, Port Hueneme, CA 93041; Task Manager/Electronics Engineer, Range Management Office, Code 3022-1, Point Mugu, CA 93042

**Zeleny, Donald J.** (C 307 RM), 121 North Linden Drive, Ventura, CA 93004, (805) 647-0605; AMRAAM Project Engineering Manager, Code 0133.1, PACMISTESTCEN, Point Mugu, CA 93042, (805) 987-7063

## PERSONAL VIEWPOINT

### SECURITY AND SOFTWARE TEST AND EVALUATION

Planning and requirements for the test and evaluation of a proposed defense system must be developed as early as possible in the life cycle of the proposed system, preferably concurrently with the requirements definition phase for the system. This would increase the likelihood of having a family of pragmatic and reproducible tests prior to testing and especially prior to acceptance or rejection of the system. In addition, it will reduce the likelihood of conducting sham tests wherein the alternative of failure is not seriously present. Actually, the situation is somewhat more complex since we field systems in clusters, but tend to test them one-at-a-time due to prohibitive costs for many multiple-tests.

For embedded systems and automated C<sup>3</sup> systems, we suggest planning for the T&E of high cost and sensitive items (e.g., test planning for security subsystems or for software) must receive high priority for earliest consideration in the life cycle. The costs of correcting faulty

systems security or software rises dramatically as we proceed through the life-cycle phases. We cannot afford to have planning or execution of T&E for security or software as mere add-on items worked into the development cycle somewhere (late).

Finally, I suggest that certain embedded systems, C<sup>3</sup> systems, and automated logistics systems must even receive T&E after they are deployed; i.e., throughout their operational use. This will reduce the likelihood of automated sabotage from the unauthorized manipulation of the software of the embedded systems once they are deployed. Further, the post-deployment software and security testing will reduce the likelihood of automated pilferage from the unauthorized use of automated logistics systems.

COL Albert A. Mullin, USAR  
506 Seaborn Drive  
Huntsville, AL 35806

## ASSOCIATION AND CHAPTER NEWS

(continued from page 14)

objectives and received an outstanding report from Frank Smith on the International Symposium along with many other items. Travel and other crises complicates attendance by all volunteer members but ITEA moves forward as decisions are made. A full report is available in the minutes by Bill Spurgeon and Carl Smith, in transition as Secretary. The BOD leadership is a group for which ITEA is appreciative of the many ideas and decisions that are consummated. The present nine members provide the key to the future and is a key role for ITEA.

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### SOUTHERN MARYLAND

**President:** Allen Ebeltoft  
**Vice President:** Bill Spurgeon  
**Secretary:** Frank Healy  
**Treasurer:** Tom Ramey  
**Membership Chairman:** Walter Beverly, III  
**Southern Maryland Chapter:**  
P.O. Box 203, Patuxent River, MD  
20670

Southern Maryland Chapter member Carl Smith was elected to the ITEA National Board on November 4, 1981. He was additionally elected as National Secretary/Treasurer. Congratulations to Carl.

The proceedings of the chapter sponsored symposium held this summer have been compiled and are ready for mailing. Those attendees that requested specific topics have received them or will receive them shortly. The long delay was caused by an inability to get copies from all the speakers. A lesson learned for symposium planners - have your speakers submit one reproducible copy of their text prior to or at the symposium.

The chapter is planning meetings for January, February and March. The exact dates, format and subjects will be announced when available. At least one of the meetings will be a luncheon that will be free to chapter members. The speakers and topics are being selected at this time and will be announced later.

I would like to encourage all eligible potential members in Southern Maryland who read this ITEA Newsletter to fill out the application and join us. If someone has already used the application, contact Walt Beverly at 863-3301 for assistance. There are more than fifty potential members out there that have received copies of the Newsletter and haven't responded. Get your applications in and lets make the Southern Maryland Chapter the largest as well as the first.

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### GEORGE WASHINGTON

**President:** Ed Connor  
**Vice President:** Frank Smith  
**Secretary:** LTCOL Bill Smith, USAF  
**Treasurer:** MAJ Ron Keyes, USAF  
**George Washington Chapter:**  
c/o E. D. Connor  
Corvus Systems, Inc.  
8150 Leesburg Pike, Suite 406  
Vienna, VA 22180

The George Washington Chapter held a dinner meeting Thursday, August 20th, at the Fort Meyer Officers' Club. Approximately 35 members and their guests enjoyed a pleasant social hour and dinner.

The highlight of the evening was a very informative and interesting presentation by the guest speaker, Mr. Charles K. Watt, Deputy Director, Test and Eval-

uation Strategies, Naval and C<sup>3</sup>I Systems, Office of the Under Secretary of Defense for Research and Engineering. He presented an overview of T&E from a DOD point of view and related T&E to commercial business and the consumer marketplace.

An October monthly meeting, held at the Arlington Hall Station Officers' Club, was primarily a planning session for the T&E Workshop which the Chapter is sponsored at the Defense Systems Management College, Fort Belvoir, on November 20 and 21. Registration and a reception were held the evening of the 20th and the workshop itself was held on the 21st. The featured speaker was BGEN Eugene Fox, USA, Deputy Director, Test and Evaluation, Tactical Air and Land Warfare Systems, Office of the Under Secretary of Defense for Research and Engineering.

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**TIDEWATER**

**President:** Terry Myron  
**Vice President:** Jim Duff  
**Secretary:** Dick Kasten  
**Treasurer:** Ed Sierra  
**Tidewater Chapter:**  
 P.O. Box 13181  
 Chesapeake, VA 23325

On November 17, 1981, the Tidewater Chapter of ITEA held its regular Executive Board meeting. It was reported that since its inception four months earlier the membership has grown to 33.

Meetings are most frequently held on the second Tuesday of each month at one of the area military officers' clubs. Each meeting includes a short social hour, followed by lunch and a special speaker on

unique T&E programs.

Jim Duff will assume the office of Chapter President in January when CDR Terry Myron transfers to his new duties with the NATO staff in Belgium. Norm Anderson will fill the vice president's position and continue his role as Chapter Symposium Chairman.

The November 10, 1981, monthly luncheon was held at the Naval Amphibious Base, Little Creek, Officer's Club. Walter Golman from the Center for Naval Analysis was the featured speaker and he gave a talk on visual aids, "Don't Let Your Slides Flip You: A Painless Guide to Visuals that Really Aid."

Beginning with the January 5, 1982 chapter meeting a unique short course "Statistics for the Practical Man" will start. The course will continue each Tuesday from 6:30-8:30 pm, for a series of ten two-hour sessions, at Automation Industries, Vitro Laboratories Division in Chesapeake, Virginia. The purpose of the course is to acquaint the student with statistical techniques in the following subjects: frequency distributions, measures of central tendency/dispersion, confidence levels/intervals, probability, hypotheses testing, analysis of variance, and regression. The instructor will be Jim Duff, Senior Analyst, Headquarters, Operational Test & Evaluation Force, Norfolk, Virginia.

A T&E Symposium "Testing Today's Technology," is scheduled for February 8-10, 1983, at the Sheraton Hotel in Virginia Beach, Virginia, sponsored by the Tidewater Chapter. The symposium objectives are to:

- Provide an educational forum for exchange of T&E ideas and information
- Improve professional standards and status of the T&E community

## ASSOCIATION AND CHAPTER NEWS

- Stimulate creative new T&E approaches

- Present a one day tutorial concerning operational T&E in the U.S. Navy.

The theme for the symposium is the broad areas of testing today's technology and the chapter is soliciting papers concerning T&E approaches and methods for testing items from every-day articles to exotic high technology equipment. Some subjects which the chapter plans to address in this and future symposia are:

- Testing to the new high reliability standards

- Testing survivability and vulnerability

- Testing undersea systems
- Testing for consumer protection

- Realistic operational testing of software

- Testing of electronic systems in realistic interference/jamming environments

- "Why can't you deliver what I ordered?"

- Testing Very High Speed Integrated Circuits (VHSIC)

- Marketing research and civilian T&E

- "How can we test that satellite?"

- Trends in automatic test equipment

- Methods of testing large scale military tactics

- Testing strategic systems

- Testing training devices

- Testing alternative energy devices.

For additional information and abstract/paper requirements contact Norman Anderson, Program Chairman, at (804) 424-2431.

## CHANNEL ISLANDS

**President:** Erl Tranby

**Vice President:** Don Zeleny

**Secretary:** Doug McAvoy

**Treasurer:** Sam Brainin

**Channel Islands Chapter:**

Code 6000

Naval Ship Weapons Systems Engineering Station

Port Hueneme, CA 93043

On October 20th, 1981, a chapter organizational meeting was held at the Point Mugu, California, Officers' Club with ITEA members from the Pacific Missile Test Center (PMTTC), Naval Ship Weapons Systems Engineering Station (NSWSES), and local contractors. The name Channel Islands was selected as representative of the geographic area stretching from Point Mugu to Vandenberg AFB in California. The officers listed above were elected during this initial meeting.

Since the chapter was formed with the minimal number required it was decided a membership drive should be the first order of business. A membership committee was formed with Harry Norton (Chairman), Bud Wasgatt, Max Wilhoit, and Bill Moore. The committee was given a goal of doubling membership by 15 January 1982 and tripling membership by the time of the 1982 ITEA Symposium when charter memberships will cease. The chapter officers will also constitute an Executive Committee with responsibilities for planning, publicity and establishment of chapter by-laws. Those interested in joining the chapter should contact Henry Norton, telephone (805) 982-8311.

The chapter held a regular luncheon meeting on November 17, 1981 at the Point Mugu Officers' Club. Approximately 20 members and guests reviewed ITEA opportunities and discussed test and

## Channel Islands Chapter Initial Meeting



(Left to right: Dr. Sam Brainin (Treas.), Carroll Watson, Noel Van Slyke, Bill Moore, Jesse Wadsworth, Dinaha DeMoss, Henry Norton, Don Zeleny (Vice Pres.), Doug McAvoy (Sec.), Erl Tranby (Pres.), Bud Wasgatt, and Max Wilhoit.

evaluation with RADM Fred Baughman (ITEA Honorary Member), Commander, Pacific Missile Test Center (PMTC), Point Mugu, California.

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### RANGE COMMANDERS' COUNCIL

The officers who command the Nation's major test ranges gathered at the Pacific Missile Test Center, Point Mugu, CA on 28 and 29 October. Hosted by RADM Fred H. Baughman, Commander, PMTC, this was the 56th meeting of the Range Commanders' Council since its formation in August 1951. Two admirals (RADM Baughman and RADM Wissler, COMNATC), five general officers, four colonels and two captains headlined the two-day sessions. RADM I. W. Linder, USN (Ret.), Director, Defense Test and Evaluation, attended as the guest of the Council.

"The results of these meetings are long-lasting, providing time-saving and cost-effective changes in the operation of our ranges," Baughman said. "Getting together gives us a chance to talk about

common problems and have a face-to-face exchange of ideas. We are often able to solve small problems before they grow too large to solve. We learn from each other's mistakes and benefit from each other's experience."

The scope of activity of the council is to resolve common problems, discuss common range matters in an organized forum, exchange information and, thereby, minimize duplication, coordinate major or special procurement actions, develop operational test procedures and standards for present and future range use, encourage the interchange of excess technical systems and equipment and conduct joint investigations pertaining to research, design, and development procurement testing.

**ITEA MEETINGS**

**The Annual ITEA Technical/  
Educational Symposium**

This symposium will be held in the Washington, D.C. area in June 1982. The 1981 symposium was rescheduled for June 1982 due to meeting schedule conflicts and to provide longer lead-time. The Symposium Committee is working on arrangement details and the program of speakers. Members interested in serving on the Symposium Committee are invited to contact Franklyn P. Smith at (703) 281-6561 and offer their specialized services for the subcommittees listed below.

The ITEA Board of Directors elected Franklyn P. Smith, Vice President of the George Washington ITEA Chapter, to assume the duties of Associate Chairman for the National Symposium. He will be responsible for the direction and development of the three-day event. The initial steps in forming the essential subcommittees are underway. The subcommittee chairpersons will form an operating committee which will recommend the theme for the Symposium to the National Association's Board of Directors. Many questions will be resolved over the next few months by the operating committee on the exact location, dates, program outline, registration, publicity, principal guests and speakers, classification of technical presentations, and accommodations.

The subcommittees currently being formed are:

- Registration
- Finance
- Secretariat
- Publicity
- Exploitation
- Program

- Reception
- Entertainment
- Security

This is our first national symposium and it will be held at the seat of the national government. The officials in government, other associations and their membership, and our friends from other countries will be watching how well we do. Our future rests on our professional approach.

**CALL FOR PAPERS  
First Annual International Test and  
Evaluation Association Symposium -  
June 1982**

The purpose of the symposium is to explore those technologies which will have significant impact on test and evaluation in the 1990-1999 time frame. The major technical subjects include:

- Test and Evaluation Management Policy
- Test and Evaluation Technology/Methodology
- Test and Evaluation Ranges/Facilities

Among the specific topics that may be addressed are:

- T&E Management/Policy  
Developmental T&E (DT&E)  
and Operational T&E (OT&E)  
Project and Organization T&E  
Management  
T&E Policy and Role in Acquisition  
Acquisition Management  
Joint T&E Programs  
Logistics T&E  
T&E Planning

Cost-effective T&E

- T&E Technology/Methodology  
Simulation vs Hardware T&E  
T&E of Systems (EW, C<sup>3</sup>, etc.)  
Avionics T&E  
Software Integration  
Automatic Test Facilities  
Man-machine Interface  
Integration with Training  
Independent Verification and  
Validation of Computer Systems  
T&E Design and Analysis  
T&E process and procedure  
Reliability and Maintainability  
(R&M)  
Weapon System Environmental  
Testing  
System Testing  
Measure of Effectiveness  
Missile Testing  
Safety T&E  
Subsystem T&E
- T&E Ranges/Facilities  
Range Instrumentation  
Test Facilities  
Test Ranges  
Aircraft, Ships Instrumentation  
Depot Rework T&E  
Range Data Reduction and Analysis

ITEA members or other interested parties wishing to participate in the technical program should submit, as soon as possible, their abstracts of no more than 500 words. These abstracts should be typed single-space on 8½ x 11 inch paper using only one side. The principal contributor's name, address and telephone number should appear on the head of the first page. A brief biographical sketch of the contributor(s) should also be attached to each abstract submitted. Please forward two copies of all materials.

Material to be presented at the ITEA Symposium should not have been presented previously at other major sym-

posia or conferences or published in either technical or trade journals. All abstracts or ideas, as well as final papers, must be submitted in English. No submitted papers and materials will be returned. Authors will be notified of the acceptance or rejection of their papers. Please send your papers to:

ITEA  
PO Box 84  
Vienna, VA 22180

Speakers representing the military services, Office of the Secretary of Defense and major defense contractors are invited to address topics of vital importance to personnel involved in test and evaluation.

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**MAILING LIST**

The entire mailing list has been reviewed and updated to include all 250 members and 1,000 non-members that have made requests or been recommended -- all according to ITEA records, including requests for address changes.

Members are requested to submit their 1982 dues not later than January 1982. Use the application form (abbreviated) and INCLUDE MEMBERSHIP NUMBERS THEREON.

NON-MEMBERS WILL BE DELETED FROM THE MAILING LIST AFTER SEVERAL ISSUES UNLESS THEY SUBMIT DUES AND A MEMBERSHIP APPLICATION.

This approach is used to maximize distribution of information and advertising to be fair to members whose dues currently finance the Newsletter.

## COMMITTEE REPORTS

### ITEA Professional Group Committee

The ITEA Professional Group Committee, under the chairmanship of Dr. E. Weber (Web) Ivy, is chartered to provide ITEA with professional identity, technical credibility and recognized leadership in the field of T&E. This is a big undertaking and will require the full support and active participation by all ITEA members.

As in most professional societies, ITEA will encompass a wide variety of disciplines and areas of interest, ranging from the more technical, engineering subjects (test design, test instrumentation, data reduction, etc.) to those in the management science and policy-making areas (PPBS, DSARC, etc.). An important goal of the Professional Group Committee will be to help establish ITEA, at the international level, as an authoritative, highly respected, professional organization (similar to AIEE, AIIE, etc.) capable of representing the best, state-of-the-art ideas and technical expertise throughout the world in the rapidly expanding T&E community.

Initially, as proposed and approved by the ITEA Board of Directors, the Professional Group Committee will be organized into sub-committees, representing three general areas of interest. These are: (1) T&E Management/Policy, (2) T&E Technology/Methodology, and (3) T&E Ranges/Facilities. While the majority of ITEA membership will represent activities within DOD and federal government organizations, it is envisioned (and hoped) that the Professional Group Committee will also include participation from ITEA members representing the more commercial and private industry sectors of T&E. This will encourage interesting dialog and exchange of ideas for future symposiums, panel discussions and T&E papers. It should also permit ITEA to capitalize on the wealth of experience and knowledge contained within these groups.

Mr. Alan Blanksfield has recently accepted the chairmanship of the T&E Technology/Methodology sub-committee. Al is extremely well qualified to assist in the development of the more technical areas of interest within ITEA, having served both as a consultant (DDR&E, IDA, others) and with private companies (KETRON, FALCON RESEARCH and DEV. CALSPAN, others) in high priority T&E programs of national interest. Chairmanship of the other two sub-committees (T&E Management Policy and T&E Ranges/Facilities) are unfilled. The manning and firming up these sub-committees within the Professional Group Committee is of highest importance in getting ITEA off to a good start and in supporting the first ITEA Symposium planned for 1982.

All members are encouraged to furnish any ideas for professional growth and to volunteer for active participation and leadership in the Professional Group Committee by contacting Dr. E. W. Ivy, ITEA Professional Group Committee Chairman, 6653 Midhill Place, Falls Church, VA, 22043, (703) 281-4582 or evenings/weekends (703) 241-0913

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### 1982 MEMBERSHIP DUES

MEMBERS ARE REQUESTED TO VOLUNTARILY SUBMIT 1982 DUES BY DECEMBER 31, 1981 FOR TAX DEDUCTION, BUT NOT LATER THAN JANUARY 31, 1982. Compliance will save voluntary labor and service costs for billing. Members delinquent in paying dues will be carried for one year before being dropped from the mailing list. It has been proposed that an "initiation" fee be established and require repayment after a lapse of one year. Over 90 percent of members automatically renew without billing.

## PERSONALITY

**Alfred D. Starbird**  
**Lt. General, USA, Retired**

Alfred D. Starbird has had a distinguished career of service to the nation spanning more than 45 years. Born in Fort Sill, Oklahoma, April 28, 1912, he graduated from the United States Military Academy in 1933 with a BS degree and was commissioned a second lieutenant in the Corps of Engineers. In 1937, he acquired a masters degree in civil engineering from Princeton University. Prior to World War II, General Starbird served on various engineering assignments and served as an instructor at the United States Military Academy.

In 1942, General Starbird was assigned to the War Department General Staff. During landings and early operations he served on temporary duty as an operations officer with the First Division staff in North Africa and with the Fifth Corps in Normandy. From January through June 1945, he commanded an Engineer Combat Group in the Third Army, returning to the War Department General Staff subsequent to the armistice in Europe.

Following World War II, General Starbird served in various assignments in the Pacific, Continental United States, and in Europe. While in the Pacific, he served on the first atomic weapons test force at Eniwetok Atoll in 1949. In Europe, he was the Secretary of Supreme Headquarters, Allied Powers, Europe (SHAPE). After two years in the Office of the Chief of Engineers (May 1953 to June 1955), General Starbird was named Director of Military Application of the Atomic Energy Commission and served from July 1955 to January 1961. Called from his assignment as Division Engineer, North Pacific Engineer Division, General

Starbird organized the Joint Task Force EIGHT and commanded it during the planning, preparation, and execution of Operation DOMINIC, the 1961 nuclear test series.

The task force was created from scratch when the USSR broke the nuclear test moratorium. The force was organized and deployed to the Pacific in less than four months to conduct scientific observations of the last U.S. atmospheric nuclear weapon test series. More than 20,000 military and scientific personnel were involved, along with 100 specially equipped aircraft and 30 major ships.

General Starbird assumed duty as Director, Defense Communication Agency, in October 1962, and additional duty in September 1966 as Director of the Defense Communications Planning Group. On November 15, 1967 he was transferred to become the SENTINEL (later SAFE-GUARD) Antibalistic Missile System Manager. He retired from active military duty on March 31, 1971.

His retirement was short lived. Recognition of deficiencies in the test and evaluation of major weapons systems led to the reorganization of the Office of the Director, Defense Research and Engineering and the appointment of General Starbird, by the Secretary of Defense in June 1971, as the first Deputy Director, Test and Evaluation, Defense Research and Engineering. With a small staff of senior experts, General Starbird established defense level T&E policies, oversight and coordination; corrected deficiencies in initial test plans, monitored progress against planned milestones and provided an evaluation of test results to the Assistant

## WHO'S WHO IN T&E

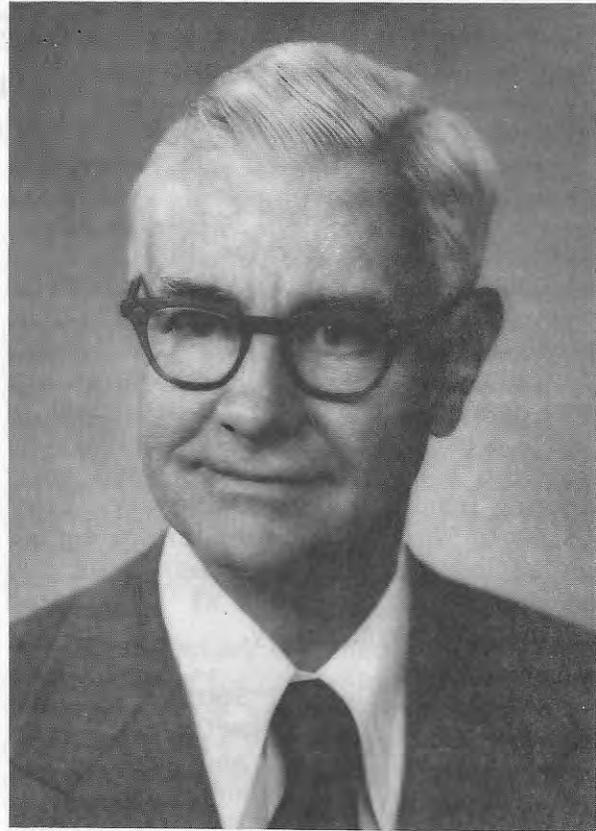
Secretaries or to the Secretary of Defense, as appropriate.

Current defense T&E policies and procedures stem largely from those established in the early 70s by General Starbird. Many consider General Starbird to be the progenitor of Defense level T&E.

In May 1975, the President appointed General Starbird as Assistant Administrator for National Security in the Energy Research and Development Administration (ERDA). As Assistant Administrator, he was responsible for directing and developing policy for the agency's nuclear weapons, international security, safeguards and security, laser fusion, and classification programs. With the formation of the Department of Energy in October 1977, and integration therein of ERDA, the President appointed General Starbird as Acting Assistant Secretary for Defense Programs, a responsibility held until his resignation on December 31, 1977.

General Starbird's military decorations include the Distinguished Service Medal (with 3 Oak Leaf Clusters), Legion of Merit, Bronze Star Medal (with Oak Leaf Cluster) and the Commendation Ribbon. Other awards include the AEC Citation and Gold Medal for Commendatory Service to the AEC, the Secretary of Defense Meritorious Service Award and the Energy Research and Development Administration Accomplishment Citation.

General Starbird is a member of the Society of Military Engineers, the National Academy of Engineering and the Armed Forces Communications and Electronics Association. Although currently retired from full-time service, he continues as an on-call consultant to the Departments of Defense and Energy.



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### New Scientific Advisor At Army OTEA

Dr. Philip C. Dickinson was recently appointed Scientific Advisor to the U.S. Army Operational Test and Evaluation Agency in Falls Church, Virginia. He advises MGEN Robert L. Kirwan, Commander of the agency, and replaces Mr. Walter W. Hollis, who has been appointed Deputy Under Secretary of the Army for Operations Research. Dr. Dickinson was previously Chief Scientist for development projects and for the Mobile Army Sensor Systems Test and Evaluation Review (MASSTER) organization at Fort Hood, Texas.

**TESTS COMPLETED ON HAVE  
SLED I PROGRAM**  
Norton AFB, Calif.

Tests have been completed at BMO (Ballistic Missile Office) on the Have Sled I Sounding Rocket Sled Program.

The Have Sled program consisted of three rocket launches from the University of Alaska's Poker Flat Research Range located north of Fairbanks. The tests were conducted by BMO's Advanced Ballistic Reentry Systems Program Office (ABRES) for the Army's Ballistic Missile Defense Advanced Technology Center.

**First Alaska Launch**

Although Have Sled I was the first ABRES program launched from Alaska, it was just another in a long series of sounding rocket programs conducted by ABRES from numerous launch facilities throughout the U.S. and Western Pacific Islands.

Since September 1966, sounding rockets of various sizes have been launched for ABRES programs in support of the Air Force, Army, and Navy ICBM research and development programs.

ABRES is tasked with testing and developing new or improved reentry technology and strategy for the ICBMs. The testing phase includes full-scale test flights aboard decommissioned Minuteman I ICBMs. The ABRES sounding rocket program provides a relatively inexpensive yet flexible means for testing concepts and hardware for verifying laboratory measurements as well as flight qualifying hardware prior to ICBM test flights.

**Boosters Vary**

Many types of boosters have been used singly or in combinations of up to four stages. The current booster is a two stage system.

The first stage is the old surplus Army Sergeant rocket motor modified to accommodate larger fins in the rear, and an adapter on the nose to accommodate the second stage and payload. The second stage is manufactured by Space Data Corporation in Tempe, Ariz. and is called Hydac.

The Sergeant-Hydac booster system can put a 300 pound payload to an altitude of 350 miles with more than 10 minutes of free space flight time.

The ABRES sounding rocket payloads have typically been designs of possible penetration aids for SAC's operational ICBM fleet.

**Other Uses**

Other sounding rockets have been used to characterize the atmosphere along the flight immediately before or after ICBM test flights.

A third type of program has been conducted to test the capabilities of ground sensors against a possible enemy attack.

The ABRES program is managed by Capt. Jim Ahmann. He is responsible for managing the Space Data Corporation contract, integrating the payloads with the booster, interfacing with rocket ranges, and performing the role of mission director during launch operations.

During a launch operation Captain Ahmann supervises and coordinates the activities of all contractors and range support personnel. (Air Force Systems Command "Newsreview," Sept. 11, 1981.)

## FEATURED FACILITY

### GENERAL MOTORS TECHNICAL CENTER

The heart of GM's corporate-wide scientific and technical resources, and the origin for much of the innovative technology being applied today through the corporation, is the General Motors Technical Center and associated test facilities. Headed by Mr. Alex C. Main, more than 6,000 scientists, engineers, designers, and skilled technical support personnel generate new technical knowledge on products and processes of commercial interest to GM; conduct research on technical, environmental, and societal issues impacting the Corporation; establish a solid technical and scientific base for future GM products, processes, and operations; and provide support to GM Divisions with technical solutions to product, production, and environmental problems.

The initial announcement that launched the General Motors Technical Center dates back more than 35 years. At that time, most of the staff groups that would be occupying the Technical Center site were already part of the General Motors organization. The GM Research Laboratories, for example, came into being in 1920. However, in the early post-World War II era the various groups were scattered throughout the Detroit area.

The GM Technical Center was created to bring GM's scientific, engineering, and design expertise into a central location, providing better communications, not only within staffs but between staffs, and rendering a research and development environment apart from production line pressures.

The purpose of basic goals of the Technical Center are the same today as when it opened 25 years ago; to assure continued technological progress in research, engineering manufacturing pro-

cesses, and automotive design. Its activities, however, have expanded dramatically to match the environment in which GM conducts its business. Today, the Technical Center's activities are focused not only on consumer wants and needs, but also on meeting the challenges imposed by energy and environmental concerns, materials scarcity, and government requirements and standards.

Five staff operations are housed at the Center: research laboratories, engineering, design, manufacturing development and environmental activities. Although these staffs bend their efforts in various direction, e.g., research, engineering, manufacturing, and automotive design, there is a singleness of purpose which binds all these staffs together, automotive progress through scientific and technological accomplishment.

Research Laboratories. The GM Research Laboratories conducts broad research programs in a wide range of areas important to the Corporation - for example, materials, combustion, alternative power plants, computer science, and engineering mechanics. A strong environmental science program has been a major contributor to the auto industry's understanding and control of atmospheric pollution. Typical of the work done at the General Motors Research Laboratories is the development of process technology related to electronic circuit devices made with high resolution lithography. The goal is to provide Very Large Scale Integrated Circuits (VLSI) with improved reliability at lower cost.

Engineering Staff. The GM Engineering Staff concentrates its efforts on the study and development of new automotive product ideas and engineering techniques; coordinates and administers corporate ve-

## FEATURED FACILITY

hicle programs; develops corporate engineering standards, test procedures, and design practices; coordinates GM's parts number control and uniform parts classification system; and is the center for GM's metric conversion program. It also has responsibility for the Corporation's Project Centers, an organizational technique which mobilizes GM staff and divisional engineering resources into a coordinated effort for vehicle design and development. In addition, the staff's New Devices Section investigates about 6,000 ideas and inventions submitted annually from within GM and outside sources.

Other important areas of responsibility include Proving Ground operations, which creates environments for vehicle testing that attempts to approximate the real world outside, yet permit accurate measurement, comparison and evaluation of test results; highly specialized facilities which were developed in response to the complexity of vehicle testing and need to conform with increasingly complex United States and foreign vehicle regulations and include a Vehicle Emissions Laboratory, Noise and Vibration Laboratory, Safety Research and Development Laboratory, and an Electromagnetic Compatibility Laboratory; and an Aerodynamics Laboratory, or wind tunnel, used in evaluating and improving the aerodynamic qualities of all GM vehicles and can simulate a range of wind speeds from those encountered by full-size vehicles during typical highway travel, or 150 mph for scale models.

Design Staff. The design staff is responsible for the appearance of GM products worldwide. This responsibility is carried out in design studios, where a vehicle's concept is developed through the stages of idea sketches, full-size engineering drawings, three-dimensional seating bucks, and eventually full-size clay and fiberglass models. Individual interior and exterior design studios are allocated to

each GM car division and are supported by body development and engineering groups. Wood, plastics, metal, paint, and soft-trim fabrication shops provide model construction capability. Various overseas design operations also are coordinated at design staff. The non-automotive work of design staff includes graphics, office interiors, and technical exhibits and displays.

Manufacturing Development. The responsibilities of manufacturing development, a section of the GM Manufacturing Staff, include improving the efficiency, productivity, and reliability of the Corporation's worldwide manufacturing processes and techniques. Typical of a manufacturing development project is the PUMA (Programmable Universal Machine for Assembly) robot, which installs light bulbs in the back of an instrument panel cluster case. PUMA was conceived by manufacturing development in response to the need for a relatively small and inexpensive unit capable of handling the simple assembly of small, lightweight automotive components. Manufacturing development, in addition to its own exploratory engineering projects, also provides technical assistance to other staffs as well as divisional manufacturing engineering groups throughout the world.

Environmental Activities Staff. This staff is the Corporation's "interface" with various federal and state regulatory agencies. Environmental Activities coordinates and assures GM's compliance with the many complex automotive safety standards and the many regulations involving such environmental areas as automotive emissions, vehicle and industrial noise, industrial air and water pollution control, and hazardous waste disposal.

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General Motors Technical Center, which marked its 25th anniversary in May, 1981, is a complex of 42 buildings located on a 330-acre site in Warren, Michigan.

**INTERNATIONAL TEST & EVALUATION ASSOCIATION (ITEA)**  
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Falls Church, VA 22041

Computerized Mailing limitations prevent inclusion of complete titles/rank of addressees.