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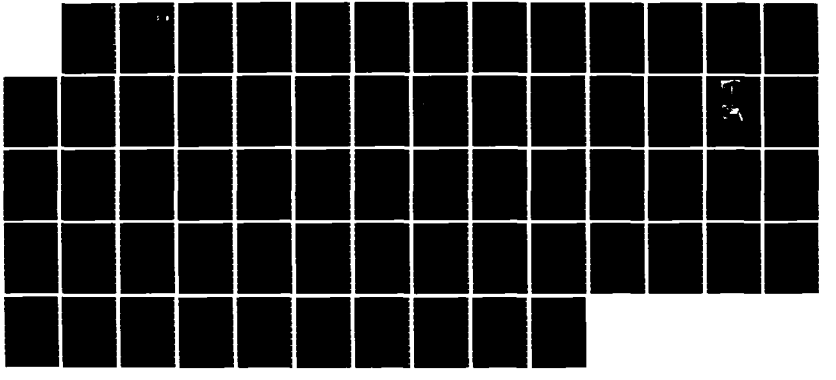

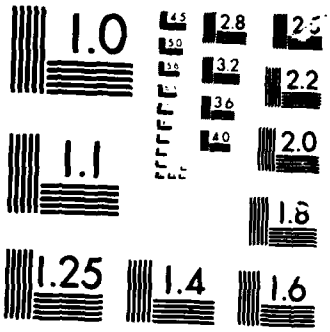

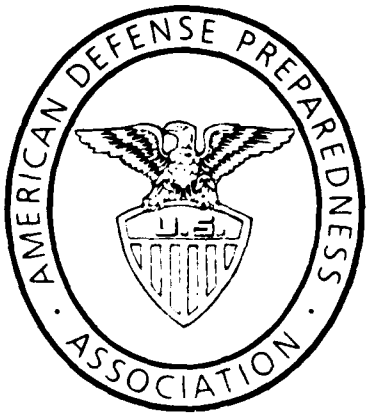

PROCEEDINGS

ELECTRONIC TEST EQUIPMENT SYMPOSIUM

NOVEMBER 13-14, 1980
ARLINGTON, VIRGINIA

AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

NATIONAL HEADQUARTERS: ROSSLYN CENTER
SUITE 900, ARLINGTON, VA 22209

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ELECTRONIC TEST EQUIPMENT SYMPOSIUM

SPONSORED BY

ELECTRONIC TEST EQUIPMENT DIVISION

at the
Sheraton National Hotel
Arlington, Virginia
13-14 November 1980

AMERICAN DEFENSE
PREPAREDNESS ASSOCIATION

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DoD REQUIREMENTS FOR COMMERCIAL ELECTRONIC TEST EQUIPMENT

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Area Code 202-697-4197

Commercial electronic test equipment (ETE) are essential to the maintenance and readiness of our complex weapons systems. They are central to one of the major problems facing our operational forces. We have developed sophisticated weapon systems and trained our armed forces to operate and maintain them. However, shortages of both people and spares have resulted in low levels of force readiness. The rapid growth in weapons technology when coupled with a larger turnover rate in military personnel makes maintenance and repair of our equipment in the field extremely difficult. The shortage of qualified operating and maintenance personnel creates a challenge that can best be met by the application of technology to defense needs. We need ETE to help us maintain an adequate national defense posture.

The annual DoD expenditures for automatic test equipment (ATE) alone exceeds 3 billion dollars. This vast expenditure is primarily due to the fact that present ATE is developed virtually as a unique item for each specialized need. Furthermore, automatic test equipment have had maintainability problems, poor fault duplication and incorrect fault diagnosis record. However, with all these problems, the potential savings in life cycle cost of weapon systems could be enormous if even a small percentage saving is achieved in these programs, making ATE among the highest in potential return on investment within DoD programs.

In the overview, I will highlight DoD requirements for ETE, address selected challenges to the industry to meet these requirements and discuss some of the DoD technological initiatives in ATE.

I. DoD Requirements

One of DoD's main challenges regarding defense preparedness is the operational readiness of our weapon systems. One of the keys to this kind of readiness is the supportability of these weapons systems. The more it costs to support our weapon systems the fewer dollars we will have to buy new ones or to improve the ones we have. ETE, and in particular, ATE is key to providing effective weapon system support.

Our challenge, then, is to provide effective weapon system support at the lowest life cycle cost. In order to meet this challenge we must improve our management of ATE, reduce the cost of acquiring, using, and supporting ATE, and reduce the proliferation of ATE.

The greatest opportunity for Life Cycle Cost savings is in the area of testability. Testability must be designed into the weapon system at all levels of maintenance during the conceptual phase. The more testable the Unit Under Test (UUT) is, the less costly the test equipment need be. This is particularly true of the test programs (computer programs). Another factor for reducing costs is competition in the marketplace. Industry will be encouraged to compete for the development of future ATE systems.

The most recent thrust in trying to reduce the cost of automatic test systems made for both industry and the government has been an emphasis on the use of commercial instrumentation. However, the integrated logistic support issues involving the use of commercial ETE have been largely overlooked. The challenge to industry is to come up with maintenance plans that will allow industry to support commercial instrumentation for the government and guarantee support.

Reducing proliferation will require increased standardization of ATE with the government owning the standards. This means that industry needs to build modules, both hardware and software, to standard interfaces. The commonality of modules from test station to test station helps to reduce training and support problems.

DoD has made ATLAS the standard for Test Programs. This is one way of reducing proliferation. Fewer support tools will be required because there will be only one language to support. Using ATLAS will have the very positive effect of universal acceptability. We encourage your participation with the IEEE ATLAS committee in improving this standard language.

II. Industrial Challenges - Now let me address selected challenges to the industry.

1. Interim Contractors Support: The objective is to provide initial contractor support for new systems with an effective transition to optimal Service support. The challenge to industry is to devise a method of providing initial support to the Services for new systems, to prepare the system for smooth transition at the optimal time, and to provide proper documentation, supply support, training, and configuration management so that the system can be readily assimilated into a standard Service system support context.

2. Logistics Support of Commercial Test Equipment: The objective is to provide the capability of acquiring and supporting test equipment, especially commercial test equipment, that can be procured by DoD to meet testing requirements while maintaining the attributes desirable for military systems (commonality, supportability, standard sparing, documentation, training, field deployments). The challenge to industry is to assist in resolving the non-compatibility problems, provide assistance in problem identification, and provide recommendations for policy, guidance, tools, and procedures to rectify the known problems. Simultaneously, the interests of prime weapon suppliers with dedicated testers and specialized broad based test equipment manufacturers must be balanced to provide industry incentives and user efficiencies/cost savings.

3. System Acquisition with Warranty Incentives: The objective is to reduce high failure rates and high maintenance costs leading to excessive system life cycle costs by use of contracting incentives. The challenge to both industry and government is to develop contracting techniques that can provide warranty incentives for weapons and test systems. The contracts should provide a fair profit, provide acquisition savings for government, and reduce total life cycle costs by optimizing the reliability, availability, and maintainability mixes to a maximum benefit.

4. Family of Testers: The objective is to reduce proliferation of testers in government use so that benefits of standardization and larger buys may result. The challenge to industry in establishing a "Family" is to ensure that while the legal and competitive aspects of test equipment selection are maintained, the criteria developed is meaningful and cost-effective for the government user. The real challenge is the reduction of proliferation and the establishment of effective logistic support.

5. Manual Test Equipment: The objective is to provide the capability for the acquisition, management, and support of electronic test equipment through standardization and reduction of proliferation. The challenge in managing, acquiring and supporting the Service Test Equipment is to provide equipment with the multiple/broad measurement capabilities in order to reduce the proliferation of manual electronic test equipment.

III. Technology Programs

Now let me address the exploratory development and advanced technology programs in ATE within DoD and provide you with the funding profile of these programs.

1. Army. The Army's ATE technology program is focussed on a new family of forward area automatic test support system. The forward area ATSS is composed of two major subsystems - Simplified Test Equipment - Expandable and Direct Support ATSS. The first subsystem is a portable modular and reconfigurable automatic test set intended for use by organizational combat vehicle maintenance personnel. The second subsystem is a family of compatible, rugged and reconfigurable automatic test sets intended primarily for unit, direct support and intermediate level maintenance personnel supporting all electronics based systems of Army materiel.

The Army has also a modernization program in the test measurement diagnostic equipment (TMDE). The problem is the state of materiel readiness of Amry electronic end systems in the field is compromised by less than optimal availability and effectiveness of Army TMDE. This problem is caused by the high degree of obsolescence and proliferation evident in the present TMDE inventory. The solution is to modernize and reduce the TMDE inventory with off-the-shelf electronics test equipment available from the commercial market and cut the types of TMDE in the inventory by a factor of ten.

2. Navy. The Navy's program is addressing the aircraft carrier central ATE shop needs. The requirement within the Navy is to provide command with a controlled electronic means to rapidly, continuously and accurately determine and evaluate total ship system readiness to perform mission functions. The ORMS program objectives are (1) to provide a total ship system real time status and performance monitoring capability, (2) exploit other applications of on-line monitoring, (3) identify and develop new capabilities for monitoring/assessing operational readiness as part of the total ship system and (4) implementation of ORMS on selected ships. Development is underway of laboratory demonstration model of ships ATE/operational readiness monitoring system (ORMS) concepts, blending real/simulated monitoring techniques to be demonstrated to the fleet. A test bed facility will be developed for evaluation of one-line distributed monitoring approaches including interfaces, fault detection, and data handling.

3. Air Force. The Air Force program is focussed on Avionics and the approach is to define modular automatic test equipment which can be reconfigured to test the various avionic equipment in the inventory. The overall objectives of MATE are to (1) reduce life cycle costs of weapon system support and automatic test equipment, (2) reduce proliferation of ATE, (3) improve operational utility and test efficiency, (4) improve ATE management and (5) improve ATE procurement practices. The reduction in life cycle costs of weapons system support is achieved in part by the use of a standard DoD test language, tradeoffs between manual, BIT, and ATE, procurement of modules through competitive purchase and use of commercial equipment where possible. The reduction in proliferation of ATE is accomplished in part by establishing architecture for qualified test modules, developing standard interfaces and requiring all new weapon and electronic programs to use the developed MATE.

The technology funding profile in ATE is as follows:

	FY 80	FY 81	FY 82	FY 83
Army	1.4	10.2	13.9	9.3
Navy	3.5	1.9	2.7	2.0
Air Force	5.3	13.9	20.2	31.5
Total	10.2	26.0	36.8	42.8

It is quite evident that the exploratory development and advanced technology funding in ATE is growing rapidly. The Navy's technology base program is considerably smaller than the Army and Air Force programs, however considerable effort is being devoted within DoD to revitalize the Navy's ATE effort.

In summary, I have provided you with future DoD requirements, selected challenges to the industry and highlights of DoD technological programs. We challenge industry to help DoD reduce the high cost of ETE, and in particularly ATE and its support so we can afford new weapons systems and improve our current inventory.

PRESENTATION BY GEORGE S. OSTROWSKI, EXECUTIVE VICE PRESIDENT,
DON SOWLE ASSOCIATES, INC., AT THE ADPA COMMERCIAL TEST
EQUIPMENT SYMPOSIUM
13-14 NOVEMBER 1980

My assigned subject is a status report on the Recommendations of the "Fluke Committee" and "what needs to be done." The Fluke Committee was a Defense Science Board (DSB) task force with a charter to "examine the greater use by the Department of Defense of privately developed, commercially available off-the-shelf electronic test equipment, including modifications thereof, with the goal of achieving economy and reliability benefits for the several armed services and to recommend policies and procedures which will maximize these benefits." Mr. John Fluke, president of the Fluke Manufacturing Co., was chairman of the task force. Composition of the task force is outlined on this chart. (See View Graph 1.)

In addition to the Fluke Committee, a follow-on effort was sponsored by the Radio Technical Commission for Aeronautics (RTCA) with General Cheney as chairman, after Mr. Fluke got it started. Mr. Cheney is now with Sanders & Associates. I'll briefly cover the RTCA task force recommendations, since General Cheney won't be here today.

Each of you has a copy of the Executive Summary of the DSB Task Force. My viewgraphs are from this report, in small type, so you may want to use your copy so you can read the recommendations better. The following comments are based on input from the Army, Navy, and Air Force, by recommendation number:

1. The elements of this recommendation are effectively implemented in DoDD 5000.39, 17 January 1980. The second part of the recommendation is implemented by DoDD 5000.37, a DoD manual being developed by Don Sowle Associates, Inc., to provide guidelines for "Acquisition and Distribution of Commercial Products (ADCoP)."

2. The need for benefitting from "lessons learned" is a part of the Joint Logistics Commanders Plan by subtask.

3. Achieved by DoD Commercial Product Policy.

4. Achieved in 1976.

5. The Commercial Product Policy has forced a mil. spec. review. Navy says they rely primarily on commercial test equipment.

6. OSD chartered an industry/joint services project on automated test equipment in 1977, and the report with recommendations is being distributed.

7. The August 1978 revision to DoD Manual 4120.3-M effectively implements this recommendation.

8. Mixed reception by military services, since it complicates central management and standardization. GSA changes in handling the schedule program has also detracted from their usefulness. This program needs better implementation. I believe that DoD as major user should manage it.

9. Mixed reception by military services. Air Force indicates that they have implemented the concept in AFR 800-11.

10. DAR 2-202.4 has been amended as recommended to make it easier for the military services to use bid samples.

11. No defined action apart from recommendations 8, 9, and 10.

12/13. Each military service has its own policy on proliferation control and standardization under guidelines of DoDD 4120.20 and DoDM 4120.3.

14. Each military service has developed its own policies on warranties. The new DoDM 5000.37 will provide some new guidelines.

15/16. No action considered necessary by the military services.

17. Implemented in DoDD 5000.39.

18. All services concur and have various plans and actions under way.

19. Action by Joint Logistics Commanders is dependent on their priorities. Services concur but there does not seem to be any known definitive action.

20. Air Force has the ORTEM program and the Navy has budgeted $2 million for FY 82. Army is developing a 5-year economic analysis plan on their inventories.

21. Efforts to develop a joint spec. have been unsuccessful.

22. Services are not in agreement on this recommendation, due to differences in mission requirements.

23. Services generally agree but action is indeterminable.

24. No change.

25. No action. Administrative cost of buying by alternative procedures has never been considered of importance by the Government.

26, 27, 28. Completed. RTCA and ADPA are follow-on efforts.

Recommendations made by the RTCA Committee generally cover the same issues as those outlined in the Fluke Task Force report, but they are more detailed and specific regarding implementation. They are outlined in Document No. RTCA/DO-171 issued by the Radio Technical Commission for Aeronautics (RTCA), January, 1980, titled "Recommendations on Policies and Procedures for Off-The-Shelf Electronic Test Equipment--Acquisition and Support." The topics covered are:

-- Bid samples.
-- Warranty shortfalls.
-- New technology E&E maintenance equipment.
-- " " " " documentation.
-- " " " " training.
-- " " " " spares.
-- GSA repair service credits.
-- Wasteful cost of obsolescence.

With respect to the second part of my assignment, WHAT NEEDS TO BE DONE, we should first review WHAT HAS BEEN DONE. Major actions by the DoD and OFPP over the last five years to take better advantage of products sold in the commercial marketplace include the following:

- CCAP and CISP were DoD pilot programs to help identify and resolve problems with procurement and distribution procedures in buying off-the-shelf.

- OFPP Policy was issued in May 1976, and DoDD 5000.37 extended the policy to DoD activities, to the effect that "the Government will purchase commercial, off-the-shelf products when such products will adequately serve the Government's requirements," and "the Government will utilize commercial distribution channels in supplying commercial products to its users."

- FAR Parts 10 and 11 (Federal Acquisition Regulations) have been drafted to replace the DAR and FPR with respect to commercial products, and

- OFPP Pamphlet #2 has been issued to explain the concept and process proposed by OFPP to implement the policy.

- DoD Manual 5000.37 has been drafted to extend the OFPP concept and process to DoD activities. This manual is expected to be issued within a few months. It is being developed by Don Sowle Associates, Inc.

The DoD Manual (see View Graph 2) is entitled "Acquisition and Distribution of Commercial Products." It will encompass all end items and related services. It will outline and clarify Federal policy especially with respect to the term "commercial market acceptability" that was included in the original policy.

The acquisition cycle emphasizes users' needs and requires analysis of the commercial marketplace on how best to meet those needs. Market research and analysis extends to distribution systems and business practices as well as to the products. Acquisition strategy is then designed to make the best use of the commercial marketplace including the contracting approach and product description to use. A separate section will address users' needs at overseas locations.

Application requirements when buying Major Commercial Systems, Commercial Components of Major Systems, Repairable Equipment, and Consumables, are outlined in separate chapters. The proposed contracting approach is based on the DAR and FPR, but provision is made to give cost emphasis over price in competitive negotiation when appropriate (see View Graph 3). The objective is to provide more specific guidelines on "Lowest Ultimate Overall Cost" than currently exist in the DAR. The results of analysis of users' needs and the commercial marketplace should provide justification to structure the solicitation on a lowest Government cost basis when the circumstances warrant this contracting approach. The marketplace analysis will also provide the justification for a sole source negotiation when appropriate.

Now for WHAT NEEDS TO BE DONE (see View Graph 4). These statements summarize the areas that need to be addressed if the Government will ever have an acquisition system that is responsive to users' needs, is fair to suppliers, and is effective and economical for the taxpayer.

- The Armed Services Procurement Act and the Federal Property and Administrative Services Act only authorize competitive negotiation under specific exceptions to formal advertising. None of these exceptions provides for saving taxpayers money. The exception that comes closest to this objective is when "it is impracticable to obtain competition" (by formal advertising), and this one is further restricted by the DAR and FPR to when it is "impossible" to prepare a suitable specification.

- Costs of the acquisition process and of ownership are not used effectively, so bid price is generally the controlling factor for award. We need better visibility of these costs and guidelines for their use in competitive negotiation.

- The term "lowest ultimate overall cost" is used in the DAR as a negotiation objective but it is overshadowed by "price competition" in the procedures. Separation of these two objectives would be helpful.

- Finally, the Government reporting system needs revision to identify competition in product value separate from "price" or "technical" competition.

This concludes my presentation. I'll be pleased to answer any questions.

ELECTRONIC TEST EQUIPMENT TASK FORCE

John M. Fluke, *Task Force Chairman*	John Fluke Manufacturing Co., Inc.
Rudolph J. Sgro, *Executive Secretary*	Office, Assistant Secretary of Defense (I&L)
John C. Beckett, *Procurement Group Chairman*	Hewlett-Packard Company
Robert A. Kudlich, *Logistics Group Chairman*	Raytheon Company
F. Ralph Shirak, *Requirements Group Chairman*	RCA, Government and Commercial Systems
MGEN James W. Stansberry	Office, Assistant Secretary of Defense (I&L)
BGEN Robert A. Cheney	Army Electronics Command
RADM E. B. Fowler	Naval Electronic Systems Command
MGEN William R. Nelson	Headquarters, U.S. Air Force
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Eugene Fallon	General Radio Company
Herman J. Hicks	Collins Radio Group
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Joseph F. Keithley	Keithley Instruments, Inc.
Louis G. Washburn	John Fluke Manufacturing Co., Inc.
William R. Weir	Weston Instruments, Inc.
RADM Raymond J. Schneider (Ret.)	Consultant
Technical Support Contractor	Don Sowle Associates, Inc.

View Graph 1

VIEW GRAPH 2

DRAFT DoDM 5000.37

ACQUISITION AND DISTRIBUTION OF COMMERCIAL PRODUCTS

SCOPE - END ITEMS AND RELATED SERVICES

POLICY

ACQUISITION CYCLE

- USERS NEEDS
- MARKET RESEARCH AND ANALYSIS
- ACQUISITION STRATEGY
- CONTRACTING
- OVERSEAS REQUIREMENTS

MAJOR COMMERCIAL SYSTEMS

COMMERCIAL COMPONENTS OF MAJOR SYSTEMS

LESS THAN MAJOR SYSTEMS (EQUIPMENT)

CONSUMABLES

VIEW GRAPH 3

CONTRACTING APPROACH

FORMAL ADVERTISING

COMPETITIVE NEGOTIATION

-- LOWEST PRICE

-- LOWEST ULTIMATE OVERALL COST

SOLE SOURCE NEGOTIATION

VIEW GRAPH 4

WHAT NEEDS TO BE DONE

- PROCUREMENT STATUTES SHOULD PROVIDE FOR COMPETITIVE NEGOTIATION TO ACHIEVE LOWEST ULTIMATE OVERALL COST

- COST OF THE ACQUISITION PROCESS AND COST OF OWNERSHIP NEED TO BE RECOGNIZED ALONG WITH PRICE IN ACQUISITION STRATEGY

- LOWEST ULTIMATE OVERALL COST TO THE GOVERNMENT NEEDS TO BE CLARIFIED IN PROCUREMENT DIRECTIVES AS A COMPETITIVE NEGOTIATION OBJECTIVE SEPARATE FROM PRICE COMPETITION

- COMPETITION IN PRODUCT VALUE AS PART OF COST TO THE GOVERNMENT NEEDS TO BE IDENTIFIED IN PROCUREMENT REPORTING

MAINTENANCE AND SUPPORT OF COMMERCIAL TEST EQUIPMENT

Captain Louis K. von Perbandt

The Navy, perhaps more than any of the other services, has looked to the commercial world to provide the General Purpose Electronic Test Equipment (GPETE) needed to support the fleet's electronic systems. We were an early supporter of the Fluke Committee's thrust toward greater utilization of commercially available instrumentation. The potential benefits to the services by such expanded utilization have been eloquently expressed in the reports of the Fluke Committee, and elsewhere, and need not be repeated here.

There was a time in the not too distant past, when the Navy was forced to write military specifications around the general purpose equipment it needed in order to achieve the product reliability necessary for operation within military environments. However, with the advent of solid-state technology, new generations of lightweight, more reliable commercial instrumentation appeared and the necessity to develop military performance specifications for GPETE was going the way of the vacuum tube -- out of our thinking. By the time the Fluke Committee was formed, the Navy was firmly committed to satisfying its needs for GPETE by use of commercial off-the-shelf equipment wherever feasible.

The distance the Navy has progressed in the area can best be illustrated from Slide 1.

This slide shows the mix of military specification items vs commercial items and relates figures from the Navy's first comprehensive preferred equipment document for GPETE -- MIL-STD-1364EC (circa 1971) as compared to projections for the next issue of MIL-STD-1364. The absolute numbers are not necessarily significant since the applicability of MIL-STD-1364 has evolved somewhat since 1971 -- that is, some equipment categories which were controlled in 1971 were dropped by 1980 and vice versa. What is significant is the change in the relative mix of military vs commercial since 1971. In 1971 about 60% of the Navy's GPETE needs were satisfied by commercial off-the-shelf products; in 1980 it's more like 95%. These are, of course, raw figures and do not take into account the absolute dollars associated with each particular line item.

We regard this trend as good for the Navy and good for the test equipment industry, but there have been some bumps along this road. That is, not all commercial suppliers were as diligent as others in supplying equipments of sound design and uniform reliability. A tool was needed to assure that the equipment the Navy was buying was being built to specific quality standards

which could be called out in the applicable purchase document. The tool developed was MIL-T-28800, the General Specification for Electronic Test Equipment. This specification was developed through a combined industry/government effort -- no doubt worked on by many people in this room today. The Navy considers this the backbone of its GPETE acquisitions and is cited in virtually all GPETE procurements. It is an essential ingredient in assuring that the Navy is getting the quality it needs in the products it acquires for the fleet. It is our goal that all GPETE will be tested to MIL-T-28800 Type III, Class 5, Style E (at a minimum) prior to listing in MIL-STD-1364.

This trend toward satisfying the Navy's GPETE needs by way of the commercial market has surfaced other problems peripheral to the acquisition of new equipment. When the bulk of our requirements were being satisfied through the utilization of military performance specifications, it was a comparatively easy task to control equipment configuration and provide the necessary spare parts, provisioning and other logistics concerns. In the desire to take greater advantage of the commercial market, the Navy perhaps, did not fully consider these concerns relative to adequate maintainability and support for its equipment. As a consequence, new equipments did enter Navy service without the type of logistics package that we know we need for proper support. We asked ourselves some hard questions:

1. How do you provision for equipment purchased through the GSA/FSS?

2. Can we take better advantage of some manufacturers' world wide service facilities?

3. What level of repair can maintain the equipment and where should we stock repair parts? Should we stock repair parts at all?

4. What special equipment and training is needed to maintain the equipment?

These are just a few of the logistic concerns -- in too many cases, products have entered the fleet without their adequate consideration. This is now being turned around. All Navy preferred commercial instruments will now have "tailored" maintenance plans developed which address logistics support and consider the service capacity of individual suppliers. Slides 2A and 2B illustrate integrated logistics support tailoring considerations. Some of the new commercial products with wide Navy application are shown on slides 3A and 3B.

Another recent example which more fully addressed logistics concerns was the Navy acquisition of a replacement for the AN/SQM-5 Sonar Noise Recorder.

The AN/SQM-5 had a number of problem areas. It lacked adequate sensitivity, dynamic range, and band width. Moreover, it was electromechanical and never supported with spare parts. The Navy went through a long search and solicitation process for a replacement and achieved negative results. We solicited bids from 47 domestic suppliers without a single positive response.

Our search for a replacement expanded to include Europe, and ultimately we awarded a contract to Safare-Crouzet of Nice, France, who proposed a modification of certain of their existing commercial instruments. This contract resulted in the delivery to the Navy of the Safare-Crouzet Model DEBB-1 Sonar Noise Recorder, (Slides 4 and 5).

This all solid state advanced sonar noise recorder fully meets Navy requirements and is now in wide service throughout the fleet. All 123 equipments were delivered on schedule, the performance and reliability has been outstanding, and the fleet is requesting more equipments of this type. Being a foreign procurement has required the Navy to pay particular attention to concerns of maintainability and support. To assure that the Navy users are completely understanding of the operation and maintenance of the unit, the contractor was requested to assist in the preparation of video orientation tapes which fully describe the equipment's operation and methods for trouble-shooting and repair.

Calibration has been completely built-in and the unit is one of the few in Navy service which carries the label "No Calibration Required."

Due to the complexity of the equipment, major repairs must be accomplished at the depot level and the Mare Island Naval Shipyard has been chosen for this purpose. Minor repairs can be accomplished at lower levels utilizing a spare parts kit provided with each delivered unit. Major spare parts have been contracted for but have not yet been delivered.

The Mare Island depot is currently developing the capability to repair and maintain the DEBB-1. In the interim, the Navy has contracted with Safare-Crouzet for the repair of any failed unit. Under the terms of this contract, failed units are delivered to the Naval Research Laboratory for transshipment to Safare Crouzet who will make the repairs and expedite return again via the Naval Research Laboratory. The Navy is fully confident that by making maximum utilization of the manufacturer's maintainability and support capability, the Navy's interests will best be served.

For the future, (see slide 6) I see the Navy taking greater advantage of the worldwide service capabilities of many of our suppliers -- both for parts support and maintenance. We also will shortly be introducing into the fleet, test equipment with built-in diagnostic capability. In addition, the Navy is pursuing a vigorous leasing program to satisfy some of our urgent, short term needs and as an ownership alternative to minimize the burden of in-house logistics support.

We have underway a shipboard leasing evaluation program and many deployed ships now have leased test equipment onboard. We also hope to further minimize our logistics costs by thrusting further into standardization through DAR provision 3-213 and within the limitations and authority provided the Department of the Navy.

Captain Louis K. von Perbandt
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Logistics Directorate
Naval Electronic Systems Command
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NAVY TRENDS IN PREFERRED TEST INSTRUMENTATION

- MIL STD 1364 "STANDARD GENERAL PURPOSE ELECTRONIC TEST EQUIPMENT (GPETE)"

	1971 MIL STD 1364(EC)	1980 MIL STD 1364F
• TOTAL ITEMS LISTED:	260	253
• MIL SPEC ITEMS:	103	13
• COMMERCIAL O. T. S. ITEMS:	157	240

SLIDE 1

GPETE ILS "TAILORING"

- CONSIDERATIONS
  - ILSP AVAILABILITY
  - CALIBRATION MAINTENANCE REQUIREMENTS SUMMARY
  - MAINTENANCE PLAN
  - TRAINING
    - COURSE
    - VIDEO TAPES
  - TECHNICAL MANUALS
    - OPERATOR
    - MAINTENANCE
  - MAINTENANCE REQUIREMENT CARDS (MRC'S)
  - CALIBRATION PROCEDURES

SLIDE 2A

CONSIDERATIONS (CONT.)

- ENGINEERING DRAWINGS
- REQUIRED SUPPORT EQUIPMENT AND CAL STANDARDS
- PROVISIONING AND REPAIR
  - NAVY
  - CONTRACTOR SUPPORT
- FUNDS FOR ILS CONSIDERATIONS IDENTIFIED PRIOR TO HARDWARE PROCUREMENT
- EVENTUALLY ALL PREFERRED GPETE WILL HAVE TAILORED ILS PACKAGES

SLIDE 2B

NEWLY INTRODUCED COMMERCIAL GPETE WITH WIDE NAVY APPLICATION

- HEWLETT-PACKARD 8640B SIGNAL GENERATOR
  - 500 kHz TO 1 GHz
  - BUILT-IN FREQUENCY COUNTER
- SANDERS 5440C NOISE FIGURE TEST SET
  - 1 MHz TO 18 GHz, 26.5 GHz, 40 GHz
  - SMALL; LIGHTWEIGHT
- TEKTRONIX 492 SPECTRUM ANALYZER
  - 50 kHz TO 40 GHz
  - PORTABLE, RUGGED CONSTRUCTION

SLIDE 3A

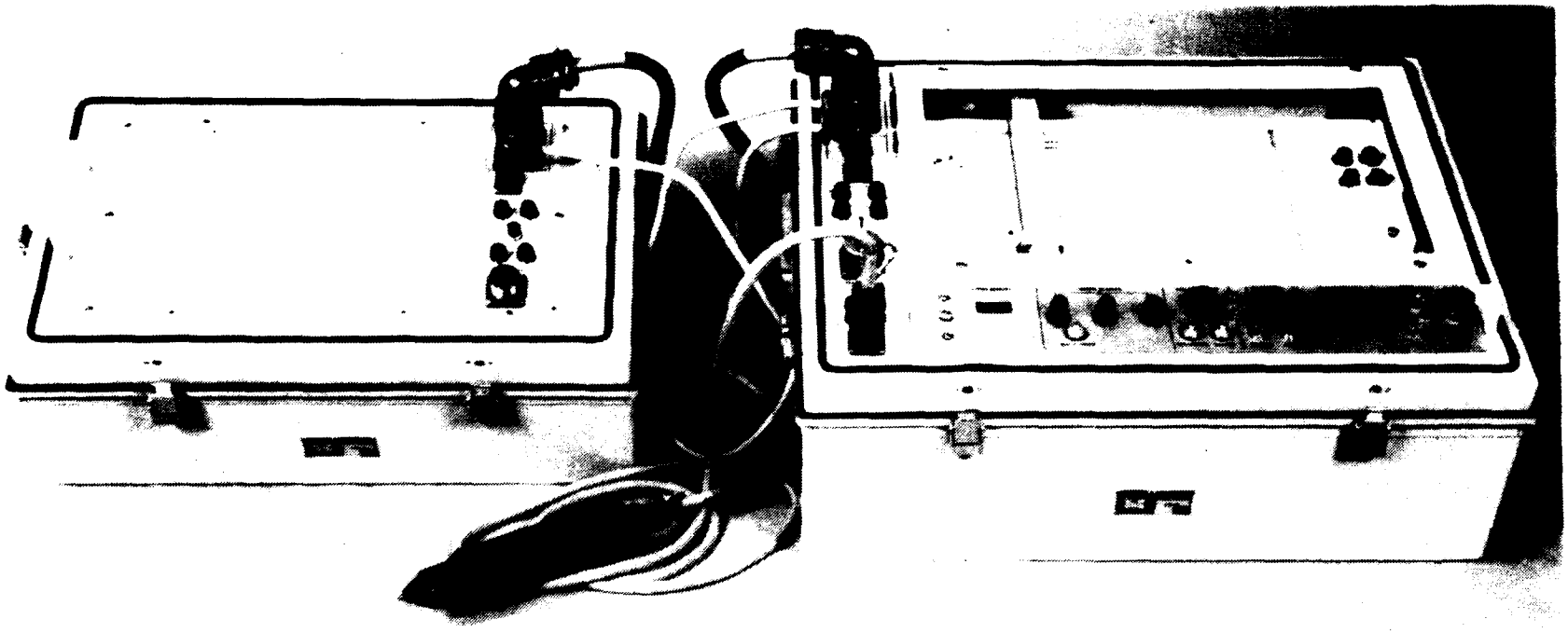
NEW GPETE (CONT.)

- WAVETEK 3000-200 SIGNAL GENERATOR
  - 1 MHz TO 520 MHz
  - BUILT-IN FM DEVIATION METER
  - LOW COST, GENERAL PURPOSE USE

- SYSTRON-DONNER 1626-01 MICROWAVE SIGNAL GENERATOR
  - 100 MHz TO 26 GHz
  - +5 dBm OUTPUT
  - BUILT-IN POWER METER

SLIDE 3B

SAFARE - CROUZET



DEBB-1 SONAR NOISE RECORDER

CLISE 4

SAFARE - CROUZET DEBB-1

- FEATURES
  - 1 MICROVOLT TO 1 VOLT SENSITIVITY
  - 120 dB DYNAMIC RANGE
  - 150 Hz TO 30 kHz BANDWIDTH
  - BUILT-IN CALIBRATION (NO CAL LABEL)
  - RECORDS TRUE RMS VALUE OF DETECTED NOISE
  - OPERATES IN DRIVEN OR DRIVE MODES
  - EXCELLENT RELIABILITY AND CONTRACTOR SUPPORT

SLIDE 5

TRENDS IN NAVY GPETE

- GREATER USE OF COMMERCIAL SERVICE/SUPPORT
- EXPANDED LEASING PROGRAM
- BUILT-IN DIAGNOSTIC CAPABILITY
- EXPANDED CALIBRATION INTERVALS
- INCREASED MTBF
- SMALLER, LIGHTER, SIMPLER OPERATION
- MIL-T-28800 TYPE III, CLASS 5 CONFORMANCE

SLIDE 6

The following remarks were presented to the ADPA Commercial Electronic Test Equipment Symposium on 13 Nov 80 by:

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Good Afternoon. I'm Jim Lincoln from the San Antonio Air Logistics Center. If you haven't already guessed it, the San Antonio Air Logistics Center is located in San Antonio, Texas at Kelly Air Force Base.

For those of you who may not be familiar with the SA-ALC, I have a few charts to provide you a very brief discussion in some areas that may be of interest to you.

The SA-ALC is a part of the Air Force Logistics Command. At SA-ALC, we have technical, engineering and overall logistics management responsibility for a number of major systems and equipment. Some of the more significant items or areas are the C-5 Aircraft System, Aircraft Life Support Systems, Special or Nuclear Weapons and overall Air Force Fuels Management responsibility.

Another of our major support responsibilities is Electronic Test Equipment which is classified into one of these three groups.

Very few of our Automatic Test Equipment system requirements can be satisfied by commercial equipment. However, as you are aware, these systems now use many commercial instruments.

The Electrical - Electronic Measuring and Test Equipment is Federal Stock Class 6625. Our requirements for this class of equipment are satisfied almost entirely through procurement of commercial items.

The last group of equipment is Federal Stock Class 4920 and because of its specialized applications we are able to use very few commercial items in this area.

Our major direct commercial activity is in the Electrical-Electronic Measuring and Test Equipment or FSC 6625 area.

The current inventory of FSC 6625 equipment end items which we support is approximately $654M at purchase cost. This inventory consists of 7,321 different basic types.

Our annual budget for new and/or replacement end items runs for $60 to 70M and 80 to 90% of our purchases are of commercial equipment.

The two primary tools we have used in achieving a high acquisition rate for commercial ETE are purchase descriptions and bid samples. Although some of

our purchase descriptions may be rather detailed, they do not contain many of the formal MIL-SPEC requirements.

The use of bid samples permits any vendor having an item which may meet the purchase description to submit a sample for evaluation.

As many of you are aware, we have a new program within the DOD to promote acquisition of commercial equipment. This program is the acquisition and distribution of commercial product or ADCoP Program. While our 80% + success rate makes us view this new program a bit skeptically, insofar-as ETE is concerned, we are taking steps, as prescribed by our headquarters, to implement the program.

We have responsibility for approximately 600 formal specifications at SA-ALC for items in the FSC's identified in the ADCoP Program. All of these specifications must eventually be reviewed to determine if they can be converted to commercial item descriptions. Initially we are reviewing those specs which are overage relative to their normal periodic review requirement. We have 78 specs in this condition for 1980. So far, we have cancelled 29 of these specs, recommended establishment of six commercial item descriptions and retained 28, primarily due to critical weapon system requirements. The remaining 15 are still in the review process.

Next we will accomplish the same review for any other spec which may be in a revision process for other reasons.

We will repeat this process annually until all of our specs have been reviewed under the ADCoP Program criteria.

Another relatively recent program, within the Air Force, is development of the Standard Designated Items List and Preferred Items List. These lists are intended to provide descriptions of standard and preferred items which can be used by project offices and contractors in selecting support equipment for new systems. All Federal Stock Classes of equipment and mission items are considered for these lists.

The initial screening at SA-ALC revealed that we had over 19,000 items that were potential candidates for these lists. Each of these items must be individually evaluated before a final decision can be made.

With availability of initial manpower allocations, we began screening items in August of this year.

As of late October, we have reviewed over 800 items and recommended 188 for inclusion in the Standard or Preferred Lists.

MIL-HDBK-300 serves a purpose very similar to the SIL/PIL Lists, but only for equipment items. The data which will be provided in the SIL/PIL Lists is essentially identical to that required for MIL-HDBK-300. Accordingly, those of you who may use MIL-HDBK-300 will be glad to know that each equipment item we develop for SIL/PIL Lists is also being submitted for entry into MIL-HDBK-300.

In addition, we plan to use our manpower, which has been allocated for this purpose, to provide for long term maintenance and updating of these documents.

In closing, I would like to provide a few words regarding our preferences at SA-ALC in providing support for the commercial electronic test equipment that we procure.

We have no hesitancy in using acceptable commercial manuals. Obviously, the term "Acceptable" is vague. Basically, we're looking for manuals which provide the required information in a useable and easily understood manner. To date, we've had very little difficulty in accepting almost all manuals offered.

For most of our procurements, we must assure that we can provide for worldwide support under all conditions. Accordingly, we normally require spare parts provisioning. However, when possible, we will provision with less than full formal MIL-SPEC documentation. In fact we can, and frequently do, provision from the manuals.

Once we have decided to buy spare parts, we need to know when changes are made which may necessitate procurement of different spare parts. The formal means for transmittal of the data necessary to amend our provisioning is the Design Change Notice or DCN. However, since DCN's are seldom available to us in the commercial environments, we frequently accomplish our changes through use of any available documentation which gives us the equivalent information. For example, with a little help from the contractor we can use changes to the commercial manuals.

Maintenance of our commercial equipment by air Force personnel is required to assure worldwide support under all conditions. We must assure, to the extent practical, that we can support the various War-Time scenarios that can be expected.

These remarks are applicable to the majority of our large procurements. We do make some limited buys for limited applications where spares provisioning and full air force maintenance capability is not required.

The overall message here is that we are flexible in our approach to commercial electronic test equipment and are more than willing to use equipment and processes available in the commercial marketplace, when such use enables us to meet our commitments in support of the combat forces.

I believe our success in this area is demonstrated by the fact, as I said earlier, over 80% of our procurements in this area are satisfied by commercial equipment.

SLIDE 1

ADPA SYMPOSIUM

SAN ANTONIO AIR LOGISTICS CENTER

(SA-ALC)

SLIDE 2

AIR FORCE LOGISTICS COMMAND (AFLC)

TECHNICAL, ENGINEERING, LOGISTICS MANAGEMENT RESPONSIBILITY

C-5, LIFE SUPPORT SYSTEMS, SPECIAL WEAPONS, AF FUELS MGT

ELECTRONIC TEST EQUIPMENT

AUTOMATIC TEST EQUIPMENT

ELECTRICAL-ELECTRONIC MEASURING & TEST EQUIPMENT

AIRCRAFT MAINT. & REPAIR SHOP SPECIALIZED EQUIPMENT

SLIDE 3

ELECTRICAL-ELECTRONIC

MEASURING & TEST EQUIPMENT

INVENTORY
-$654M
-7,321 TYPES

ANNUAL BUDGET

- $60 - 70M

80-90% COMMERICAL

SLIDE 4

ACQUISITION OF COMMERICAL ETE

PRIMARY TOOLS

PURCHASE DESCRIPTIONS

BID SAMPLES

ADCoP

600 SPECIFICATIONS

78 OVERAGE 1980

29 CANCELLED

6 CID

28 RETAIN

SLIDE 5

STANDARD ITEMS/PREFERRED ITEMS LIST

- INITIAL REQUIREMENT - 19,843 ITEMS
- STARTED AUGUST 1980
- AS OF 27 OCT 1980
  -- 824 ITEMS REVIEWED
  -- 188 ACCEPTED SIL/PIL

MIL-HDBK-300 INPUTS

SLIDE 6

COMMERCIAL ETE SUPPORT

- ACCEPTABLE COMMERICAL MANUALS
- SPARE PARTS PROVISIONING
- DCN OR EQUIVALENT
- MAINTENANCE BY AIR FORCE

TRENDS IN INSTRUMENTATION

William E. Terry

Future developments in electronic instruments are driven by several factors. Manufacturers are always interested in expanding their business and increase the size of their catalogs. While there are sometimes fads in instrumentation the trends are basically driven by more fundamental long term developments of technology and application needs.

Fundamental technologies, particularly component technologies, affect both the need and availability of newer and better tools. Advanced components that make better products and systems available demand better instruments. These same components make it possible for instrument manufacturers to keep up with this evolution with better tools. Fundamentally instruments are directly linked to the applications in the growing electronic world whether it's an automobile, satellite, military system, game, airplane, appliance, etc. These applications demand better tools in the design, manufacture and maintenance of products with an increasing electronic content. Trends are driven by this interaction of application demand and technology supply.

Some of the common threads in the future of instruments include the following:

Technology will force the needs for better tools in more complicated applications. The microprocessor, starting with the 8 bit version has crept into most instruments. Many of them use 16 bit microprocessors now with 32 bit microprocessors in the next 5 years. This component has done much to "tame" and improve the use of instruments. These microprocessor based instruments will deliver better accuracy and better answers for the operator not just more data.

There are going to be more opportunities to interconnect instruments and computers in systems. We've come from a history of very crude binary coded decimal interfaces up to sophisticated "smarter" systems such as the IEEE 488 standard. There are probably 400 or more instruments available using this interconnection with many controllers. These systems have brought about great benefits of more complete testing and the faster development and integration of systems that can be operated by people with a minimal amount of training.

The range of different instrument types will grow. While there will always be a large base of very basic tools, there will be more and more specialized types for logic testing, communications testing, etc. Beside a spread in product types there will continue to be a spread in price with the emphasis on more value per dollar (or mark, yen, etc.). This is apparent at the low end and hopefully the same benefits in very expensive complex measuring products and systems will occur. The manufacturers that will succeed are those that will continue to deliver more value in terms of performance and reliability per dollar of cost.

Let me try to cover the broad range of instrumentation by concentrating on a few areas starting first with:

RF and Microwave Instruments

The microprocessor has led a large impact in these products along with other basic technologies such as gas FET's, hybrids, YIG mixers, etc. These products by their nature needed a certain amount of taming and automation. Their applications are driven by the more crowded frequency spectrum with more services being offered as well as the need for secured communications per unit of band width.

There is more and more interest in higher frequency products above 40GHz. While some basic components exist there is still a need that will be filled in the next 5 years for basic products such as signal analyzers, network analyzers, stable sources, fast switching sources and accessories in the areas above 40GHz.

Much of the information to be transmitted in RF and Microwave systems is either digital by nature or becomes digital prior to transmission. Needs will grow for sophisticated modulation and demodulation instruments to measure the true characteristics of these systems.

Fast switching sources are needed for spread spectrum applications. Demands will grow for faster switching speeds over broad frequency ranges.

There will continue to be trends of integrating microwave and RF instruments across application areas. By that I mean abilities to transfer techniques, software, etc. between R&D labs, production floors and field service applications. Field or depot system maintenance applications will grow for products that can be made relatively portable.

Now a second closely linked area is:

Communication Test Equipment

This is a somewhat specialized outgrowth of many of the RF and Microwave instruments and includes historic instruments such as selective level measuring sets, microwave link analyzers as well as cable maintenance equipment such as fault locators and pair identifiers.

Tremendous expansion of communications applications particularly digital has seen the need today and will see even more needs in the future for dedicated products. These include portable systems testers with the trend being to perform more of the test in a single product. This is a difficult area for most test equipment manufacturers since the applications are specialized and it means getting out in the marketplace and learning more about the true nature of the problem. Also the users of these products are not necessarily as well trained as development engineers so it means relatively smart products that are unambiguous in the results they deliver.

Fiber optic instrumentation is a slow but sure growth area with the needs in the next 5 years being for very basic products that generate signals, analyze signals as well as some sort of a product that can be used for field troubleshooting and maintenance.

The third area is a new one over the last 5 years and is probably one of the ones that will undergo much change in the next 5 years. This is the area of:

Digital or Logic System Testing

This area is driven by the application of the ubiquitous digital IC and its many forms as a computer. It wasn't too many years ago that the major solution to this problem was a 4 channel oscilloscope and instead of looking at 4, 8, 16 or more timing diagrams on the face of the CRT a better product was invented called the Logic Analyzer. Today we have sophisticated products that can be used to determine the timing or state of logic systems. They will get faster with deeper memories and wider words as well as getting friendlier as the systems needs grow. There are large future needs, many of them unfulfilled today, of taking these same sorts of ideas and making them more applicable in field maintenance situations. Techniques exist such as signature analysis, that can be built into the product in the R&D phase and then found very helpful to troubleshoot the product either in manufacturing or in the field service arena. Signature analysis plus the general purpose oscilloscope plus probably future unknown more specialized instruments will be the combination of ideas needed to install and maintain complex digital systems in the field.

The next area is a broad one and somewhat difficult to define but I'll call it:

ATE/Data Acquisition/Board Testers/Circuit Testers/Module Testers

The term ATE is many times applied to rather large complete test systems of either PC boards, modules or whole products many of them of a complex military-aerospace nature. The existance of the IEEE 488 interface and a broad range of instruments and controllers have made it possible for users to customize (hardware and software) and assemble these systems to meet a given need. The trend is for manufacturers to add value in hardware and standardized software and give the customer the opportunity to mix and match among these products to meet a specific need. Fundamental operating software (operating system, language, diagnostics) come from the manufacturers, users design applications software in "friendly" high level languages.

In the area of printed circuit board test of both analog and digital boards, the trends continue to follow the nature of the problem moving today from a mixed analog-digital content to more and more of a digital environment. Functional testing through simulation is becoming much more difficult as the density of the boards increases. There is a definite trend toward incircuit testing that is causing designers to reevaluate their techniques for design, emphasizing more testability, partitioning, and the availability of test points on the board. Today it is very easy to design a totally untestable printed circuit board assembly. With VLSI a few years ahead of us this takes on even more importance.

The area of data acquisitions systems has seen much change again via the IEEE 488 interface and a great number of front end card cages, scanners, A to D's and D to A's available, easily assembled into ATE systems. There will be even more choices in the next few years including more capable and less expensive controllers.

The ATE area overall has seen much change and progress in the last few years. Today there are many capable, reliable, commercial instruments that the users can easily tailor specifically to an application. In the complex module-military system tester area the trend is somewhat less clear but definitely toward commercial instruments-controllers with a need for cleverness in system testability rather than brute force multi-rack approaches.

The next area is what I call General Purpose Instruments.

If instruments can be thought of as tools, these are the tools at the bottom of the tool box. They include frequency counters, oscilloscopes, volt meters, pulse and sinewave sources, waveform, distortion and signal analyzers, LCR meters, power supplies, standards, and recorders.

All of these products will continue to evolve toward both less expensive and more capable versions. With the frequency counter today we can put most of the functions of the 100 MHz counter on a single chip and within 3 to 5 years we will probably do the same thing at 1 Ghz. Better measurements in the presence of noise and modulation as well as more rugged, portable, reliable products will be a continuing trend. As a derivative from the counter we are seeing the emergence of a new class of product that uses basic analog to digital conversion techniques and with the information in digital form can perform a great deal of analysis. This product, called the high speed A to D or waveform analyzer, is now available in about 20 different products; a typical one being an 8 bit, 10 Mhz single channel system. In this area there is a need and trend to write new specifications and come to an agreement among manufacturers on how to specify these products so that the users can understand their application. The applications in the near future will be in laboratory situations but probably moving toward production and in the field in the future.

Oscilloscopes are still the most universal piece of test equipment and ones that have evolved significantly over the last 10 years. The push for more bandwidth seems to be subsiding and the emphasis seems to be on cost, value and reliability particularly around the mid-frequency range. I suppose it is not surprising that with these kinds of trends -- cost, value and reliability -- we are seeing some of our first significant Japanese and European competition in the US market for oscilloscopes.

There is also a need for a totally automated oscilloscope that can be controlled by a computer and has available the waveform output information for computer or visual analysis. This product in many ways is the missing link in automated test systems.

Both sine and pulse sources continue to evolve toward more performance with less distortion but also with more versatility. Pulse generators can generate wider, deeper words and are much easier to set up. Instead of a panel of pushbuttons or toggle switches the instruments have CRT's, with menus, built into the product or can be externally controlled from a computer. The arbitrary waveform generator or product that generates a waveform of a specified customer shape,

will probably evolve from its relatively simple form today. There will be a new demand for the very fast pulse generator particularly for communication and fiber optic applications.

Analyzers in their broadest form will continue to evolve to smarter and smarter instruments. This product will really stress the computational power of the microprocessor through a whole variety of signal averaging, fourier transforming, noise reduction and analysis techniques. The trend will be toward not just a smarter product that is easier to use but one that gives more insight and analysis into the problem of interest including vibration testing and probably machinery efficiency.

LCR meters and standards will continue to evolve somewhat slowly at least in their basic techniques but will still benefit from more automation which will make them more stable and more accurate over a longer period of time. LCR meters and these basic products are finding new areas of application today and in the future in semiconductor processing and in-process measurement.

Power supplies are taking advantage of newer and faster switching speed technologies to give us more power per dollar per cubic cenimeter per kilogram. Faster switchers will make this even better as long as we can manage the containment of the RFI.

Recorders are smarter today and will be better yet with multi-color outputs, character and symbol generation; all to give us a more complete picture of a better measurement.

There are a couple of special areas that I'd like to mention including application of instruments in education. This is particularly related to teaching about microprocessors and digital systems and while basic instruments fill much of the need, special educational instrument products are going to be needed to help with the problem of the supply and demand for engineers and technical people.

INTO THE FUTURE

The trends in the next 3-5 years are fairly easy to predict given a view of the current products in development in our laboratories and the trends of the last few years. Beyond 5 years there are a lot of exciting things that could happen beyond the obvious trends of speed, accuracy and value tied to an application.

As instruments get more capable and more complex they must get friendlier. Today we can make an instrument talk back to the operator in a simple set of audio instructions. Trying to discover something meaningful to say is more difficult than the technology to do it. Either through audible means or through CRT menus instruments will be friendlier and easier to use. The instruction manual will be stored in the product and the instrument will coach you through an ordered series of steps to arrive at the correct results. The product may even remember you by name so when you type in your name, it has an idea of your state of expertise in making a measurement, and the places you went wrong last time, so it can coach you better on this particular occasion. Certainly the instrument will be smart enough that instead of just saying "error number 53", it will give you a complete description of what you did wrong and what you need to do in order to make the measurement correctly.

Instruments will get more communicative as they are tied more and more into networked measuring systems. There will be probably more interconnection or busing schemes beyond IEEE 488. This standard fits many applications but applications requiring higher speed, longer distance or perhaps shorter distance, lower data rates will see a careful expansion of the standard interconnect systems. Instruments will have just as much say and interest in local networks as computers. Remote testing will move from today's specialized applications, such as surveillance in the telephone systems, into an everyday occurrence perhaps for general purpose computer systems continuously monitored, online from the standpoint of measurement and maintainability considerations.

Instruments will definitely have to get more reliable. Manufacturers must fight the linear relationship between complexity and unreliability. Large scale integrated circuitry gives us a chance to make that happen. Self test is a reality today. Today's instrument at turn on does a self test and flashes a light that it is ready to make a measurement. Self diagnostics are coming of age so that in the case of substandard performance, the instrument can alert the operator to problems, perhaps down to the component level. What needs to be done to bring it up to specifications, self healing or self repairing is a possibility. Perhaps the instrument of the future will flash a specification status of its capability. As the instrument changes over time, perhaps it will be able to make measurements at degraded performance levels prior to a complete overhaul.

While much the glamour of electronics technology is focused on the basic component development such as the 64K RAM and on the very sophisticated systems that result such as a cruise missile or home computer; instrument makers and users have an exciting future ahead of them also. The steady, careful development of these basic tools plus the usual open communication-sense of partnership between users and manufacturers plus a healthy attitude that the status quo is never really good enough, should make the future a very exciting one for all of us.

Bill Terry
1/6/81

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Group 66, electronic test equipment, is an example of why we have a multiple award schedule. It's a category of specialized scientific lab equipment, highly sophisticated users and a wide variety of uses. Selection of proper test equipment is like getting three pilots to agree at a cockpit mockup.

Sales of test equipment to Federal agencies total an estimated $400 million a year. I have a real problem in the yearly addition of this inventory. What is the average unit cost? Who are the customers? Are these accountable and repairable items? Why do we buy so much? Having managed a lab myself, I find a "new toy syndrome" which must be avoided. We must steer away from the old philosophy of "never use old! Always order new."

We need the cooperation of the industry in working out as many standardizations as possible to allow use of presently owned equipment. We need to mutually recognize that much test equipment is applicable to new systems. If industry will cooperate in making it applicable, we will share some of the savings.

The requiring agencies also must look to real needs. Some government labs are full of uncalibrated test equipment because somebody wanted a new one. The economic realities today require that we get maximum use of all equipment.

Our research to date indicates some test equipment meets two important criteria for establishing a multiple award schedule. Can we standardize and purchase the product using a single award? In some cases it does not seem so at this point, given the wide range of jobs performed by government labs. Are there significant variances in features and prices? Yes, in some cases, no doubt in response to these widely varying product needs. An important exception is the general purpose oscilloscopes for which we have developed commercial item descriptions, and there will be others.

We'll compare Group 66 with copy paper (which we've standardized and competed in definite quantity procurement) after we take a look at the history of the multiple award schedule, what's wrong with this particular buying system and what the General Services Administration is doing about the problems.

The Federal Property and Administrative Services Act of 1949, which created GSA, places tremendous responsibility on the Administrator of General Services. It's my responsibility to decide how to buy. I could wipe out all multiple award schedules with the stroke of a pen if I so desired. That's not my desire, nor has it ever been. My only interest is getting the best deal for the government so that all of us have a smaller tax bill. That's what the Hoover Commission had in mind when it made the study that led to the creation of GSA.

The Hoover Commission envisioned one agency bringing economical and efficient administrative services to the executive branch. Professional procurement specialists could free agencies to do their own thing. Volume buying would produce savings.

GSA's reason for existence was pretty well lost through the years. Growth of the multiple award schedule was part of that overall degeneration of the agency's purpose and effectiveness. These schedules were designed as basic order agreements for new product development, and for products with significant variation in features and prices. Through the years we drifted into a posture of letting the schedules become the major buying system.

I'm trying to bring GSA back to its original mission. The multiple award system has a small place in this mission, and certainly not the same role it enjoyed until recently.

Before I came to GSA little action had been taken on the basic problems. Only a few cosmetic efforts had been made, efforts such as removal of party favors, snow mobiles and other items from the schedules. No overall approach had been formulated.

The overall management approach, which I developed, is two-fold: one, improving procurement using the remaining multiple schedules; two, building a strong, competitive system that has as its foundation the use of commercial item descriptions, the utilization of commercial distribution channels, the emphasis on requirements buying and the use of life-cycle cost analyses.

This approach combines needs-oriented property management with market research. Agencies must justify requirements on the basis of need. Real need is weighed against surplus and rehabilitated property before we go out and buy. Market research is thorough. Its focus is "know your customer" and "know your commercial market" -- the distribution channels, availability of products, product lines and suppliers. Its final component is an acquisition strategy.

These solutions follow the philosophy I set out at my confirmation hearing June 21, 1979. That is, the multiple award system has been used in too many cases that are inappropriate. Too many products are on schedules with the result that user agencies were totally confused. I said I would urge a substantial reduction in the number of items on multiple schedules and work hard to improve contracting procedures for those items remaining on schedules. That didn't mean destroy the whole system. It meant review each item and work out a market strategy that will get the best deal for the government.

That is the framework in which GSA has proceeded the past year and a half. We have been criticized for moving too slowly. I accept responsibility for the deliberate method of procedure.

The most publicized critique by the General Accounting Office in 1979 largely focused on the same points I enumerated in my confirmation testimony. These criticisms were justified. Macy's and Gimbel's couldn't have competed with the fine array of "nice to haves" carried on the schedules.

We are proceeding with our plan for reviewing the multiple award schedules, doing away with those not needed and improving the process on those we keep. There is as much gold to be mined in cleaning up existing schedules as there is in doing away with many of them. And that's a lot!

Our improvement efforts are in areas of upgrading contracting procedures, developing a schedules management information system, getting better item identification, and allowing fewer product additions.

We are exploring ways to get off the benchmark system and maybe utilize the most favored customer as a negotiation technique.

Careful consideration is being given to where the maximum order limitation level is set on each item. The higher the maximum order level, the lower the cost. The lower the maximum order level, the more paperwork but you get a much better deal. A good, well-managed, professional procurement system weighs these tradeoffs.

In designing a schedules management information system we are trying to answer questions such as: What are the top selling schedules? Who/what are the top sales contractors? What is the total schedule purchase volume, large and small business? Total award volume, large and small? What are the top selling models, by agency?

Better item identification will enable us to get weak sellers off the multiple award schedules, and to get some of the bigger ones off the multiple award schedules and onto advertised.

Fewer product additions will be allowed because agencies simply can't handle the paperwork. I would like to see two amendments: one in the first 90 days, one in the second 90 days.

Except for special circumstances, the best supply system uses commercial item descriptions, competes and utilizes the commercial distribution systems. It encourages maximum competition, operates on requirements buying and utilizes life-cycle cost analyses.

We've used this method in buying copy paper and typewriters. Commercial item descriptions are ready for procurement of calculators, overhead projectors, dictating equipment, microfische readers, and general purpose oscilloscopes.

The joint committee on printing developed new standards for copy paper. We went through a test procurement and published a schedule, using a commercial item description. The result was four successful bidders who are using their own distribution systems. We saved $2 million on a six-month contract.

We can effect savings by aggregating requirements and getting phased delivery. If agencies get over 800 cartons, the maximum order level, we go for definite quantity, direct delivery. In one case we saved $75,000 on a $1.3 million procurement. We need to get agencies to routinely furnish us requirements to take advantage of this method.

My first obligation is to provide cost-effective services. If industry, particularly the test equipment industry, will team up with me to accomplish this objective, we will work out a mutually beneficial arrangement.

I cannot destroy an entire supply system without having something to put in its place. I can streamline the system and improve it. To that end, each of the 113 multiple award schedules will face the question: "can we buy this product competitively?" In some cases, already, the answer has been "yes", and we are moving in that direction. Equally as important, in other cases the answer will be "no", and we will work hard to cleanup these schedules. Or if the quantities are small, we will let agencies buy and GSA will oversight. All facets of the effort are important, and all will be accomplished.

Statement of Richard N. Bullock at American Defense Preparedness Assocation meeting, November 14, 1980.

The GSA multiple award schedule is an acceptable and equitable method for the acquisition by the Federal Government of small quantities of electronic test equipment. The ten or more years of negotiation between both parties have provided the best and basic elements of a good contract-equity for both parties. The basic benefits that accrue to the contractor are two: The first and greatest of these savings is the freedom from having to evaluate item-by-item a series of "original" specification items which have been rewritten by a government technical person to describe an instrument. Second, the terms and conditions and inspection and shipping procedures are spelled out and the quotations to the government can be handled by general office personnel rather than requiring contract specialists in each office. As an example, at Fluke anything that cannot be quoted on our standard quotation form using standard discounts cannot be quoted in the field. They must be handled at our Home Office. They are processed through the Contracts Administration Department to assure ourselves that the product and terms we offer and the stated requirements of the government are consistent.

An additional advantage to the contractor is the advantage of time. An advantage of the GSA supply system appears on both sides of the ledger. It is an advantage to the contractor to know within a brief period of time whether a commitment he has made (quotation) is going to be required or not. The typical time to know whether we are the successful quoter on a GSA request for quote is 1-3 weeks where the time for an RFP is typically 6 or more months.

The equities on behalf of the GSA customer are also multiple.

It has been my general experience that the equipment is required by the user at the time he writes the requisition. By the time his requirement goes through the total processing routine, it typically will be delivered as much as two years after the origination of the requirement. Besides the timely delivery of GSA orders, the government is spared the administrative costs of (1) the technical group in writing a detailed set of salient and required characteristics; and (2) the administrative groups are saved the time of analyzing terms, conditions, pricing data, etc. of multiple vendors over and over again. By maintaining the maximum order limitation (MOL) at the $100,000 limit -- the present GSA limit -- the user maintains the ability to go sole source on those procurements which are over $100,000 and request costing data. For dollar values in excess of $100,000 or large numbers of units, the option remains to write a set of salient characteristics and allow the forces of the competitive marketplace to work their will.

There is an additional comment I would like to make on the use of GAS Multiple Award Schedules to supply the electronic test equipment needs of the military. We should remember there are two military procurement systems - the "big" military and the "small" military. The "big" military is the logistic center that support our operational forces. The "small" military are the laboratory and R & D Centers, such as the Army's Ballistic Research Laboratory or the Naval Research Laboratory. The present GSA system is ideally suited to "small" military procurement needs. It fits the "big" military for specific requirements.

Further, the possibility that in certain instances equipment has been procured, using GSA, where its justification is questionable is an issue for the purchaser, not GSA or the supplier. The supplier has to assume that the equipment he is asked to quote on is needed to fulfill a real need. Any problem that exists in that area is one that must be corrected by the requesting service, not GSA and not the supplier.

From our point of view the system works. Let's not kill it.

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Remarks of Daniel S. Wilson
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Before the Fall Meeting of the
Electronic Test Division
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It is my pleasure to participate with this panel to examine the subject: "Specifications, Standards, and Product Descriptions" -- as a product of the development of an acquisition strategy. The subject is not self standing. It is a part of the whole generic procurement process where there is dependence on interdisciplinary actions and where there is reliance on:

- The initiative and judgment of qualified people who are accountable for their performance;

- Effective competition as a predominant means of obtaining the most value for federal expenditures; and

- Simplicity in procurement procedures so that all business -- large, small, minority -- can fully participate.

The theme of the generic procurement process is one in which the government specifies what is needed, not how it is to be accomplished! A doctrine of fairness and equity in the government's exercise of its sovereign powers which is intended to allow competitive solutions to flow from the marketplace. Instead of excessive direction, it is preferable that there be a process where judgment is exercised based on front-end analysis, where requirements are expressed in functional terms which, if necessary, may be tailored to fit needs and where accountability of the Federal procurement professional is mandated.

This capsules the direction being sought in implementing OFPP's policy on the Acquisition and Distribution of Commercial Products (ADCOP) -- the development of routines which stress major efforts in identifying and considering user needs; market research and analysis; and the selection of acquisition strategies -- all of which will lead to more intelligent purchasing, distribution, and support decisions -- to assure user satisfaction. These basics are appropriate to all types of commodities--including electronic test equipment, purchased off-the-shelf.

The procurement process cannot function effectively in isolation. It depends on front-end analysis -- in the light of customer needs, market conditions and practices must be known even before product descriptions are developed, if viable commercial alternatives are not to be excluded.

Results of the marketplace analysis must be used in establishing acquisition strategies including method of distribution decisions. These strategies lead to the contracting approach that best capitalizes on effective competition and the support systems prevailing in the marketplace. How? The various Government personnel who work in the procurement process (requirements, acquisition, inventory management, and distribution) function as a team, and generally, where warranted, under a commodity manager -- an interdisciplinary approach to commodity management.

With this base in mind to emphasize that product descriptions are not expected to be developed in a vacuum, let us lead in with comments by the panel whom I have the pleasure to introduce, after which we will defer to your questions.

Panel

- Duane Bowens, Government Accounts Manager, Tektronix, Inc., Beaverton, Oregon.

- Roger Daniero, Assistant Commissioner for Contract Management, FSS, GSA.

- Robert Willett, Manager of Test and Measuring Equipment, Collins Air Transport Division (Rockwell International), Cedar Rapids, Iowa.

- Jeffrey Allen, Defense Materiel Specifications and Standards Office, Office of the Deputy Under Secretary of Defense for Research and Engineering.

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AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

ELECTRONIC TEST EQUIPMENT DIVISION

SYMPOSIUM ON COMMERCIAL ELECTRONIC

TEST EQUIPMENT

PANEL: Robert B. Willett

Specifications, standards, and product descriptions for Electronic Test Equipment Presentation manuscript by B. Willett, Collins Air Transport Avionics Division of Rockwell International Product Management, Manager Test Equipment.

Like other commodities (items bought and sold), test equipment has a specific mission. Very basically, its task is to produce, modify, or measure electrical quantities (phenomenon that can't be seen) technically described by parameter, range, and accuracy. However, test equipment is unlike most other commodities as its role is to either directly or indirectly setup, test, and evaluate (judge) other electrical products. How well it actually does that job is a key but partial measure of its total life cycle figure of merit. Some of the other elements of the total picture are:

a) How long it will perform within documented specifications - without recalibration;

b) How long it will perform - without repair and recalibration;

c) How long it takes to repair;

d) How long it takes to re-calibrate;

e) How long it takes to verify its calibration; and the

f) Quality of documentation and continuing dynamic support.

The aforementioned technical performance element is the basic factor of the measure of the adequacy or acceptability of test equipment. In other words, will it do what it's supposed to do? What does one use as the reference for establishing the intended performance criteria of test equipment, or of the question, what is it supposed to do? Here is where words such as specifications, standards, and product description enter the picture. And, those words like test equipment itself, infer different meanings to different people and organizations. (For instance, some people think that MIL-T-28800 is a test equipment performance document when in reality it is a shopping list to characterize the environmental provisions to be applied to the commercial technical performance parameters.) At Collins, commercial general purpose test equipment is purchased against the manufacturer's prior interpreted functional and performance specifications (qualified to intended environment variations) as contained in the manufacturers instruction manual for that particular model. Preliminary, tentative, or final technical data sheets are

typically abridged versions of the manuals specification used for advertising purposes. Some test equipment manufacturer's do a better job than others in documentation areas. One has to be cautious as omissions of parameters, characteristics, or qualifiers thereof may be extremely important and would only be detected by a very metrology or test equipment knowledgeable person or organization.

The next step is, how does or how should one measure the actual technical performance or acceptability of test equipment with reference to the defined performance criteria of the specifications contained in the manufacturer's manual? Unlike many other commodities, the technical performance of test equipment cannot be evaluated or accessed by our senses such as looks, feel, smell, fit, sound, color, etc. One cannot see or hear a basic electrical quantity like volts, amps, impedance, percent amplitude modulation, or other derived parameters (like the avionics VOR radial parameter), let alone quantify it traceable to national standards as regulations require. So how can its performance to specifications be evaluated? Some functional parameters can be accessed by observing operation with the unit-under-test in a user lab or facility, but the technical performance parameters can only be measured by comparison to a known quantity or capability. In other words, compared to a known and more accurate measurement standard or system of measurement standards. This is most commonly known as calibration in most commercial and government metrology laboratories.

My point is that the interpretation of test equipment technical performance specifications and evaluation of actual test equipment performance against those documented specifications is best done by a central organization with special technical attributes. That organization must be tasked with the responsibility of understanding test equipment specifications and be knowledgeable in the science of measurements. They must have the necessary facilities, measurement standards equipment, knowledgeable personnel, known measurement capability, and a performance history documentation and control accounting system to accumulate actual test equipment performance data as well as management information. They naturally must be capable of interfacing directly with the test equipment manufacturers and user agencies to validate, understand, and document test requirements. They should be a strong contributor in evaluation of the total performance package described earlier and must be influencial in the decision and implementation processes from planning to operational stages involving manual and automatic test equipment.

The evaluation and establishment of a test equipments performance and capabilities is an important process. The general prerequisite to that however, the activity of deriving, identifying, interpreting, evaluating, validating, and finally documenting the UUT test requirements and test equipment Minimum-Use-Specifications is equally if not more important and probably has the most potential for improvement, as it is fundamental to the whole measurement process. The integrity of the identified technical needs are as important as the integrity of the technical capabilities of existing or new test equipment. The builder of the bridge between

between the product design engineering discipline and the measurement and test equipment discipline will have accomplished the most to establish the factual firm foundation for the whole follow-on test function in support of that UUT for many years to follow with attendant efficiencies and effectiveness derived.

In summary, in typical order of occurrence, the areas of opportunity are:

1. Derivation and validation of a) UUT Test Requirements & b) Requirements of Test Equipment Resources thru Minimum-Use-Specifications Techniques.
2. Evaluate and purchase general purpose test equipment against documented functional and performance specifications contained in the manufacturers instruction manual.

   Protect your interest by having a central metrology and test equipment organization with necessary technical attributes necessary evaluate test equipment and attendant documentation and support with proper responsibilities and influence. Having 1) validated the UUT test requirements and test equipment requirements thru Minimum-Use-Specifications and 2) validated the functional and performance capability, etc. of representative types of test equipment, the match between requirements to capabilities and purchase activities can occur with confidence.

My final point is that solutions are basic and technical. Activate and implement the already available metrology and calibration organizations that are available in DoD, US Army-Redstone Metcal Engineering Center, US Air Force-Newark Metcal Engineering Center, and US Navy-Pomona Metcal Engineering Center. If workload and other reasons indicate that evaluation must be done by a commercial lab, be sure that it is a technically capable high integrity measurements lab, not one more involved with component, environmental, or research activities (UL, OSHA, etc). Also, utilize the existing metrology data banks at those Metcal Centers for control accounting as well as performance history data and information for manual and auto test systems.

Be smart; find out what test equipment you have, how much it is utilized; knowing its capabilities and having validated new requirements and quantity needs, redeploy existing where needed; if have to buy new, have it evaluated before procuring by an organization with a laboratory that has the technical attribute known measurement abilities, not an avionics or weapons maintenance shop or group that has some miscellaneous test equipment or no lab at all. Lastly, assign responsibilities and accountability to those organizations that can best make the right decisions with the appropriate information.

Questions -

SYMPOSIUM ON
COMMERCIAL ELECTRONIC TEST EQUIPMENT
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REQUIREMENTS DEVELOPMENT PANEL
PRESENTATION BY
MR. RICHARD E. PRIBYL, US ARMY CERCOM

CERCOM, the Communications - Electronics Materiel Readiness Command, manages the preponderance of the Army's manual electronic test equipment, or TMDE (Test, Measurement, and Diagnostic Equipment) as we call it, and this presentation was offered from that perspective.

The basic need driving the Army's TMDE requirements is to provide adequate support equipment for Army weapon systems to permit timely and effective maintenance, diagnosis and repair and assure the required operational readiness for the weapon systems.

When the realities of Integrated Logistics Support (ILS) costs (e.g. inventory management, provisioning, technical documentation, training, etc.) are considered over the entire program, a constraint to minimize proliferation of different models and configurations must be imposed to attempt to minimize these logistical costs. Hence, another objective of our management of Army TMDE is to provide the best minimum ensemble of equipments which fully satisfies system test requirements.

Let's examine the origin of TMDE requirements. These really are generated in four ways:

(1) Requirements which identify TMDE required for support of new weapon systems.

(2) A change in maintenance concept/procedures for fielded weapon systems identifies new TMDE requirements.

(3) The asset posture for fielded TMDE identifies need to "buy more."

(4) Obsolescence of field TMDE is very apparent when, for example, parts are no longer obtainable, and hence, there is a requirement for replacement of the TMDE.

An examination of the process of determining TMDE requirements at the micro level for a particular weapon system would be of value. This is usually done by the weapon system contractor and provided to the government ILS manager. For CERCOM, the GSERD or Ground Support Equipment Recommendation Data (DI-S-6176) is used for this purpose. This provides a sequence of alternatives for the contractor to use in his selection of TMDE. In short, it directs him to utilize the following alternatives: the Army Preferred Items List, the Army TMDE Register, other Services' Standard TMDE, Commercial TMDE, and lastly, the development of TMDE. This selection is reviewed by the government and later identified in a Maintenance Allocation Chart (MAC) utilized by field personnel.

Changes in maintenance concept and procedure will usually translate immediately to a revision to the MAC.

Another mechanism which triggers TMDE requirements is the asset posture for fielded TMDE. In short, requisitions on backorder or the knowledge of an increase in authorizations will drive a requirement to buy additional TMDE. In general, we will use the existing technical data package, but of course, we may not obtain the same make and model as previously procured. We want to keep up with the state-of-the-art and buy a modern piece of equipment, but we are not always able to do so.

The Army has a well defined process for materiel acquisition and introduction of new materiel into the Army inventory. Included in this process are procedures and regulations for the type classification of Army materiel. The type classification process is designed to identify materiel which meet standards of mission acceptability and supportability, and which are then identified as STANDARD, as well as identify materiel which is no longer fully satisfactory (CONTINGENCY), or no longer required or acceptable (OBSOLETE).

Generally, a minimum of two years of processing is required by regulation to type classify an item, and type classification is a required prerequisite for procurement action. Once an item is type classified STANDARD, the procurement activity may rebuy it as required based upon the approved technical data package. If we want to change the technical characteristics of what we're buying, we're back to square one and must type classify a new item.

Now let's look at our source; hopefully, it is the off-the-shelf commercial electronic test equipment industry. The industry is always advancing the performance of their products and introducing new products -- I guess it's called maintaining the competitive edge.

Similarly, the performance envelope of the Army's TMDE needs is growing. Considering that our objective is to minimize the required ensemble of TMDE for present and future needs, we know intuitively that we should incorporate much of the increased performance in our present TMDE procurements to keep pace with the industry "STANDARD" TMDE.

However, if there is an increase in performance or change in functional characteristics, or if the new item is proposed to replace more than one equipment in the present inventory, the program is considered a new requirement and we're back to square one of the type classification process.

In summary, our system places some constraints upon us which can and do prevent us from moving toward procurement of the best choice of TMDE models. The industry sees this in a couple of ways. For one thing, you may see a technical data package which contains the "same old specification", when the commercial market has advanced well past the performance reflected in it. Secondly, when you show up to provide a demonstration of a new product or model, and get around to the business of our requirements - you may get a shoe shuffle from us.

This is not a reflection of a lack of interest or concern by a bureaucratic management structure. It is, I believe, a systemic problem which we within the Army are attempting to turn around. Our processing system for commercial TMDE cannot fit into a system designed for the standardization of Army developed materiel, unless we make great sacrifices in terms of quality and responsiveness. The alternative that we hope to pursue is to tailor our acquisition strategy and procedures to permit the acquisition of the best selection of commercial TMDE for the minimum cost with greater flexibility than is afforded by our present way of doing business.

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