MANPRINT BULLETIN

Vol. II No. 4 "Remember the Soldier" November/December 1987

Health Hazard Assessment: How the System Works

by LTC Bruce C. Leibrecht

Editor's Note: This is the second in a series of articles on the Army Medical Department's role in the MANPRINT Program. The first article in this series, which appeared in the June 1987 issue, presented an overview of the Army's Health Hazard Assessment (HHA) program .

Army Medical Department (AMEDD) organizations provide HHA support, as directed by AR 40-10. Three components of the AMEDD, the Office of The Surgeon General (OTSG), the US Army Health Services Command (HSC), and the US Army Medical Research and Development Command (MRDC), exercise major roles in implementing this program.

OTSG establishes HHA policy and provides central coordination of the HHA Program. The latter is accomplished by the Health Hazard Assessment Coordinator, who works in the Preventative and Military Medicine Consultants Division of OTSG's Professional Services Directorate. HSC, as the operational health services provider for the Army, gives direct HHA support. Within HSC, the Academy of Health Sciences (AHS) reviews and provides medical input to requirements documents, while the Army Environmental Hygiene Agency (AEHA) performs the HHAs and provides input to safety documents and Human Factors Engineering Analyses (HFEAs). Finally, MRDC conducts biomedical research in support of HHA requirements and assists in conducting HHAs.

The Health Hazard Assessment Report (HHAR) is

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INSIDE. . .

ARMY MANPOWER COST SYSTEM (AMCOS)

By David K. Horne, Ph.D.
US Army Research Institute

The Army Research Institute, under the sponsorship of the Deputy Comptroller of the Army, is developing life-cycle cost, budget, and economic models known as the Army Manpower Cost System (AMCOS). These models accurately estimate manpower costs for active Army, Army Reserve,

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the primary mechanism for fulfilling the HHA, which is required for each materiel system, component, item, and product improvement (including nondevelopmental items). Defined by AR 40-10, the HHAR provides a standard structure for assessing systems-generated threats to the health of crewmembers, maintainers, trainers, and other troops. The system involved in generating the HHAR is represented in Figure 1.

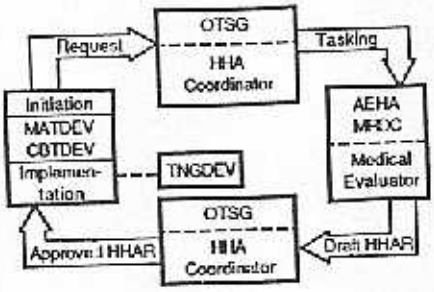

Figure 1

The materiel developer (MATDEV) must submit a written request for the HHAR through command channels to OTSG; the combat developer (CBTDEV) may also ask for one, usually in conjunction with user testing. Included is a description of the system and its intended use, and any test results related to health hazard issues.

A key waystation in the request's channel to OTSG is AMC Headquarters or the TRADOC Surgeon's Office; AMC's HHA Officer and TRADOC's Health Standards Officer each reviews and tracks their respective HHA activities. The request is forwarded to OTSG, where the HHA Coordinator designates an independent medical evaluator (normally AEHA, but occasionally MRDC) to prepare a draft HHAR. This report is developed by reviewing the system description, doctrinal information, test and evaluation data, health standards, and other available information. (A future article will explain this preparation process.) The findings are submitted to OTSG for review, final coordination, and approval, and then forwarded through channels to the requesting developer. The HHAR may also be incorporated into the HFEA and/or the Safety Assessment Report (SAR).

The most important part of the HHA process is the resolution of identified health hazard problems; this follow-through by the developer yields the real payoff to the Army. The MATDEV incorporates health hazard issues and concerns into milestone decision documents, while the CBTDEV provides the user position on the acceptability of health risks. In implementing the HHAR's recommendations, the MATDEV takes action to eliminate, reduce, or control health risks before the system is fielded. If health protection criteria are compromised in the materiel acquisition decision process, the MATDEV must formally document the risks accepted. Procedures adopted to control health risks must be incorporated into technical and training publications and materials by the combat, materiel, and training developers.

A different system applies for obtaining medical input to, and review of, requirements documents. The CBTDEV or MATDEV, as appropriate, submits draft system requirements documents to the AHS for official review and input. The Academy's Combat Developments Directorate identifies potential health hazards and applicable health standards, prepares comments, and returns them to the requesting developer. In practice, unofficial input or advice may be obtained from AEHA or MRD.

HHA activities, similar to those in other MANPRINT domains, are integrated throughout all phases of a system's development and acquisition cycle. During the program initiation phase, the CBTDEV incorporates health hazard considerations and criteria into the requirements document (Operational and Organizational Plan, Justification for Major System New Start) based on input from AHS and other AMEDD elements. Responsibilities and tasks needed to control potential health hazards are identified in the System MANPRINT Management Plan (SMMP).

In the concept exploration phase, the CBTDEV and MATDEV ensure that HHA requirements are included in program management documents, particularly the Test and Evaluation Master Plan (TEMP), the Integrated Logistics Support Plan (ILSP), and the Acquisition Plan (AP). They also request an HHAR from OTSG, submitting for evaluation available health hazards-related test and evaluation data. Responsible organizations obtain medical input to the HFEA, SAR, Safety and Health Data Sheets, and the System Safety Program Plan (SSPP). OTSG, AEHA, and MRDC provide health hazard consultation as required.

During demonstration and validation, the formal requirements document (Required Operational

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Capability, Training Device Requirement) specifically addresses health hazard considerations peculiar to the system. The CBTDEV, MATDEV, and independent evaluator collect health hazard data which form the basis for an updated HHAR, which in turn provides input to the updated HFEA, safety documents, TEMP, SMMP, and SSPP. The MATDEV takes action to control health hazards, and AMEDD elements continue to furnish health hazard consultation, including direct test support if required.

In the full-scale development phase, testers collect data to address unresolved health hazard issues. To determine the system's status in terms of health risks, the MATDEV obtains an updated HHAR from OTSG. The results of this evaluation are incorporated into the updated HFEA, the SMMP, and safety documents. Contract specifications are developed and refined to ensure compliance with health hazard requirements. The MATDEV takes action to correct or control remaining health risks, and documents management decisions that accept risk associated with significant hazards.

As the system enters production and deployment, health hazard control procedures adopted as a result of HHAR recommendations are incorporated into technical publications and training materials. Production testing documents system conformance with HHA-related contract specifications. Testers collect required data on unresolved health hazard issues during post-production testing (e.g., Follow-on Operational Test and Evaluation) and submits them to the AMEDD for review. The MATDEV ensures that Engineering Change Proposals receive proper review for health hazard implications, and decisions resolving remaining health hazard issues are documented and implemented.

MATDEVs, CBTDEVs, training developers, testers, independent evaluators, logistics support developers, users, and others can obtain a variety of HHA services as shown below:

SERVICE	PROVIDER	SUPPORT ORGS
CONSULTATION	OTSG, AHS, AEHA, MRDC	–
REQUIREMENTS DOC REVIEW	AHS	AEHA, MRDC
PROGRAM DOC REVIEW	OTSG	AEHA, MRDC
WORKING GROUP REP	OTSG	AEHA, MRDC
SAFETY RELEASE APPROVAL	OTSG	MRDC, AEHA
HUMAN VOLUNTEER APPROVAL	OTSG	MRDC
DATA COLLECTION/ANALYSIS	OTSG	MRDC, AEHA
HHAR	OTSG	AEHA, MRDC
SPECIAL STUDIES	OTSG	MRDC, AEHA

The MANPRINT Points of Contact List published by ODCSPER is a good source for obtaining most of the HHA services shown above. The points of contact for AMC and MRDC are listed below.

AMC: Commander
US Army Materiel Command
ATTN: AMCSG
5001 Eisenhower Avenue
Alexandria, VA 22333-0001
AV 284-4750/9470
(202)274-4750/9470

MRDC: Commander
US Army Medical Research and Development Command
ATTN: SGRD-PLC
Fort Detrick
Frederick, MD 21701-5012
AV 343-7301
(301) 663-7301

For additional information, contact LTC Leibrecht, U.S. Army Aeromedical Research Laboratory, P.O. Box 577, Ft. Rucker, AL, AV: 588-6800 or Com(205)255-6800.

AMCOS (Continued from page 1)

Army National Guard, and civilian personnel. The active enlisted and officer life-cycle cost models have been completed; the reserve and civilian models are currently under development. Systems Research and Applications (SRA) Corporation is conducting the entire effort with the assistance of Systems Analytics Group (SAG) Corporation.

LTG Max W. Noah, Comptroller of the Army, praises AMCOS for allowing the Army "to highlight the importance of the person—military or civilian—in the operation of the Army." He further states that "we have not been able to include that in our deliberations over budgets in the past. These models give us a better predictive capability to estimate what we need to do with our personnel policy and operations in the future, and emphasizes our ability to be better informed for decisions, and for budgets."

AMCOS is a user-friendly, PC-based family of manpower cost models that works best with an AT-style machine; however, it will run on any IBM-compatible PC with at least a ten megabyte hard disk. The program is menu-driven, so it can be used with limited knowledge of the system. Experienced

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AMCOS (Continued from page 3)

users can modify the cost elements for specialized applications.

To implement the system, users provide manpower requirements (by grade and number of years in the life-cycle of the system) for each MOS in the unit of interest. Standard requirement codes (SRCs) can also be used as input. The user can specify inflation and discount rates and also has the flexibility of changing particular cost elements as the need arises. The model generates the manpower costs for the life-cycle of the system by budget appropriation category and year for each MOS as well as for the entire system.

There are a number of applications for the precise manpower cost data AMCOS provides. These include:

Manpower cost estimates of new weapons systems. After the annual or life-cycle manpower requirements have been determined, AMCOS can be used to generate the manpower costs.

Systems manpower cost trade-off analyses. The costs of various manpower-system configurations can be estimated so that the most cost-effective mix of manpower and hardware may be determined.

Personnel policy analyses. Explicit modeling allows rapid estimation of the cost implications of personnel policy changes (such as tour length, reenlistment bonuses, the proportion of high quality recruits in an MOS, component mix, etc.).

Budget impacts resulting from policy changes. The timing and magnitude of costs must be estimated for budget consideration.

Cost data from a variety of sources are processed through a number of policy modules to obtain cost elements by major budget appropriation category for each MOS. The policy modules currently in AMCOS include: military compensation, enlisted recruiting, officer acquisition, training, permanent change of station, retired pay accrual, selective reenlistment bonus, special pays, medical support, other benefits, and the new GI bill. These cost elements are then used as an input to the cost estimating routine. The cost elements may also be accessed directly as a separate cost data base for viewing or for modification in the cost estimation. The cost data base is generated by data from the underlying data base that is processed through the policy modules. The costs are then generated for specific MOS's or units by the cost estimation routines.

An AMCOS graphics module can be used to display both discounted and nondiscounted costs over time for any system being costed. Options include bar charts that represent total cost over time by year, and bar and pie charts showing costs by appropriation category.

The life-cycle models have been used in a number of applications to date. For example, the Army Cost and Economic Analysis Center (CEAC) has used AMCOS to generate the manpower costs for several configurations of the Armored Family of Vehicles.

For more information, contact David K. Horne, Ph.D. (COR), US Army Research Institute, (202) 274-5610, or Donald E. Rose, Jr. (Project Manager), Systems Research and Applications Corporation, (703) 558-7826.

First MANPRINT Senior Training Course Taught at Fort Belvoir

by Cooper Wright

A pilot MANPRINT Senior Training Course (MSTC) was conducted at Fort Belvoir, VA during the week of November 2-6, 1987. Guidance for the course was provided by GEN Maxwell R. Thurman during the MANPRINT In-Process Review (IPR) held at TRADOC headquarters on 4 September, 1987.

The MSTC is designed to bring the commanders and staff of TRADOC schools and centers together with those of the AMC commodity commands for discussion of MANPRINT policies and procedures. Through lectures, briefings, and practical exercises, participants learn the techniques used to integrate MANPRINT considerations into all phases of the materiel acquisition process.

The first day's session was opened by MG William H. Reno, CG, US Army Engineer Center and MG Henry G. Skeen, CG, US Army Troop Support Command; their staff representatives then briefed attendees on the implications of MANPRINT in the Commercial Generator Sets and Assemblages (CGSA) program. During the next four days, participants received instruction in MANPRINT roles and responsibilities, the System MANPRINT Management Plan (SMMP), requirement and procurement

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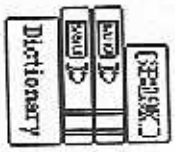
MSTC (Continued from page 4)

documents, and key acquisition activities. Actual CGSA program documents were used during the instruction.

MG Reno closed the course by emphasizing MANPRINT's vital role in the materiel acquisition process, and the payoff it yields in terms of operations and support costs over time. He then challenged the course participants to make MANPRINT more than just another bureaucracy, so that it may favorably impact upon the army of the future.

The next MSTC will be hosted by the US Army Missile Command, Redstone Arsenal, AL, during the week of January 11-15, 1988. MANPRINT players from the US Army Air Defense Center will attend as the supported TRADOC representatives.

Upcoming courses are listed on page 8. For more information, contact Cooper Wright at (703) 820-9000.



BOOK REVIEW

by Kent Myers, Ph.D.

The Human Factor

Richard Rubinstein, Harry M. Hersh, Henry F. Ledgard, ed., The Human Factor: Designing Computer Systems for People, Digital Press (12A Esquire Road, Billerica, MA 01862), 1984. 249 pp., $30.00. Includes glossary, bibliography, index, teaching exercises, and audio taped discussion with the authors.

Authors Rubinstein and Hersh apply human factors concepts to computer systems design. The Human Factor is an easily understood treatment of human-oriented design, yet it also achieves some depth when discussing cognitive issues. The core of the book is devoted to defining practical guidelines for prototype development. Task analysis, the design development process, language, human interface styles, and testing systems are among the topics covered. Guidelines include:

Develop a use model for the system. Designers must understand how the system will fit into the user's current problem solving practice.

Choose a good external myth to influence the way in which users think about the system. Programmers may think in terms of files, records, and system calls, but the user should be given an appropriate analogy to guide his use of the system. The "filing cabinet myth" encourages the user to move information around as if it were in paper files, allowing him to keep track of information using familiar procedures.

Use human conversation as a model for dialogues. Interpersonal communication, particularly behavior during conversation, is a "rich source of guidance" when designing human interfaces.

Do documentation as part of the design. Serious documentation is as crucial to the system as the software. Done early in the design process, it will reveal many flaws while there is still opportunity for inexpensive repair.

Design the errors in the system. A design is faulty if it fails to identify and accommodate the human errors that are likely to occur. A human-oriented design will ensure that fewer machine or man-made errors occur, and will alllow for an easier recovery when they do.

Respond to people in real time. The user has expectations of response time from computers. Delay and variation disrupts interaction, causing confusion and "stuttering."

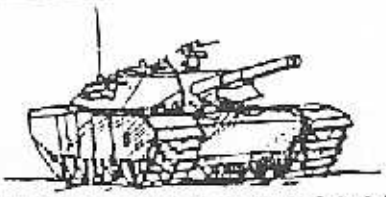
Use the user's representation of data. Data categories and presentation formats should accommodate the user through natural, flexible, and consistent representations.

You build it, you test it. Simple and inexpensive evaluations, performed by designers at an early stage, can eliminate potentially costly mistakes, and ensure that goals and requirements are met. It is essential to have the users test the prototypes.

The authors conclude by stating that users must be "allowed to develop in their own worlds, and not solely in that of the systems designer."

Notice

- For **general information** regarding the MANPRINT Bulletin or Points of Contact List, contact: Automation Research Systems, Ltd., ATTN: MANPRINT PM, 4480 King St., Alexandria, VA 22302. Telephone: (703) 820-9000.
- **Changes of address** should be directed to Ms. Kristy Underwood at the above ARS address. Please enclose your old mailing label with update.



Can MANPRINT and "Fightability" be Tested?

by LTC Joe Bishop

Editor's Note: The Logistics Development Branch of the Office of the Program Manager, M1A1 Tank, requested an article on how the test community checks for MANPRINT and "fightability" of a new weapon system (specifically referring to the M1A1 Block II Improvement Program). The Operational Test and Evaluation Agency (OTEA) position is that MANPRINT and "fightability" are complex concepts that cannot be tested directly. This article expands on this notion from an OT&E perspective.

OTEA views MANPRINT as a subset of Materiel Aquisition Process (MAP) management procedures, and not as a system characteristic; therefore, it is not directly testable. The MANPRINT process ensures that combat and materiel developers generate the human resource and performance considerations to impact upon the design and selection of a new system, enabling it to meet the user's needs. The T&E community evaluates the program's impact on a system similar to the way it evaluates the outcome of any other facet of engineering design—by assessing the system's technical and operational performance, using required characteristics as a benchmark.

OT&E measures total system performance against the user's needs. Testing is done in as realistic an operational setting as can be devised, with all components of the system present, including the soldiers who will operate, maintain and support the equipment in combat. Such testing ensures that soldier task performance is not the weak link in total system performance. If system performance is unsatisfactory, or may become so under the stress of combat, the human component is analyzed as a potential factor. If determined to be a significant contributing cause, design solutions are identified by evaluating the impact of all elements of the total system (i.e., hardware, software, manpower and organization, personnel, training, and task procedures) on soldier task performance.

Developmental Testing (DT) and Technical Test and Evaluation (TT&E) take a slightly different approach. TT&E ensures that a system meets applicable industry standards and contract specifications, but is also concerned with performance, particularly that of subsystems under specified conditions. TT&E uses soldier task performance as a guide to determine which specific system characteristics will be tested, just as in OT&E. The tests performed depend not only upon the system's specific hardware and software features, but also upon the role soldiers are expected to play in operation, maintenance, and support.

The "fightability" of a system is a global concept which must be broken down into elements of system performance for it to be tested directly. What it means depends upon the purpose and intentions of the combat developer, as well as the specific hardware and software options the materiel and combat developers have selected to achieve the user's system performance requirements. What is built into the system in response to those requirements are those technological compromises the developers jointly decide will improve its "fightability". "Fightability improvements" to the M1A1 tank, for example, are operationally defined by the combat and materiel developers in terms of the intended operation and use of those improvements. The consequences of those improvements are broken down further by the combat developer in terms of system performance issues and criteria, and the task procedures which integrate system operation, maintenance, and support with doctrine, tactics, and means of employment.

OT&E tests system performance against operational issues and criteria. "Fightability" would be evaluated by assessing the change or improvement in system performance attributable to those hardware and software options selected to implement the concept of "improved fightability." It has meaning only in terms of the actual technical changes made to the equipment, the procedural changes made for its operation, and the purposes for which those changes were made.

In regard to testing for "fightability improvements" to the Abrams tank under the Block II program, an operational definition of "fightability" must be pursued with the combat developer. In addition, a description

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Fightability (Continued from page 6)

of the MANPRINT goals and constraints that would influence Block II design must be solicited. These answers should form the basis for the issues to be addressed, and the performance to be measured in both user and technical testing. Indeed, the answer to the operational definition of "fightability" may actually take the form of M1A1 Block II operational issues and criteria.

Questions on the above should be addressed to LTC Bishop or MAJ(P) Kaminski, CSTE-TS-M, AV 289-2487 or Com (202)756-2487.

NATO-SPONSORED WORKSHOP

NATO is sponsoring a Workshop on "Applications of Human Performance Models to System Design: A Technology Demonstration Workshop" to be held 10 -13 May 1988 in Orlando, FL. The workshop will emphasize applications rather than theory and will consist of technical papers, technology demonstrations, and structured discussions. Attendance will be limited to 100. The NATO Research Study Group will invite attendees on the basis of their background to ensure a representative mix of industry, government, and university interests. For more information, refer to 'Meetings of Interest' on page 8.

Can MANPRINT Help Solve a Safety Dilemma?

by Robert Runyard
System Safety/Human Factors Engineer
Ford Aerospace and Communications Corporation

When a soldier notes a significant difference between an item in a technical manual (TM) and its real-life counterpart, his or her confidence in the TM may be lessened. When the contradiction involves safety specifications, the consequences may be far more serious.

Problems arise when one set of standards is used for labeling a condition in the equipment (commercial and developed items are usually consistent with American National Standards Institute [ANSI] standard Z35), and another set for labeling the same condition in the TM (as in Military Handbook 63038-1). Note the differences in meanings of some major terms:

DANGER
ANSI Z35: "...immediate and grave danger or peril, a hazard capable of producing irreversible damage or injury, and prohibitions against harmful activity."
MIL-HDBK: (DANGER is not a specified warning term.)

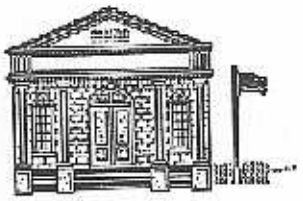
WARNING
ANSI Z35: (WARNING is not a specified signal term.)
MIL-HDBK: "Conditions, practices, or procedures which must be observed to avoid personal injury, loss of life, (or) long-term health hazard."

CAUTION
ANSI Z35: "...potential danger or hazard, or a hazard capable of resulting in severe but not irreversible injury or damage."
MIL-HDBK: "Conditions, practices, or procedures which must be observed to avoid damage to equipment (or) destruction of equipment."

Colors associated with specific warnings differ as well:
ANSI Z35: "DANGER" appears in white on a red oval. "CAUTION" appears in yellow on a black background.
MIL-HDBK: "Red conventionally symbolizes dangerous conditions. . .Orange conventionally indicates when caution is to be exercised."

Such inconsistencies provide opportunities for unnecessary and potentially costly errors in human performance. User acceptance is also a factor; reference to manuals is hindered when information cannot be trusted. Specifications in technical manuals must be uniform with labeling of the hardware. This is a safety-oriented issue which, having contributed to soldier training and performance problems in the past, should have been addressed long ago.

Can anyone in the MANPRINT world help to make this happen?



Schedule of MANPRINT Courses for FY88

MANPRINT Senior Training Courses

11-15 Jan 88 (Redstone)	25-29 Apr 88 (Rock Island)
22-26 Feb 88 (Bliss)	23-27 May 88 (TACOM)
28 Mar - 1 Apr 88 (Sill)	27 Jun - 1 Jul 88 (Knox)

MANPRINT Staff Officer Training Courses*

25 Jan - 12 Feb 88	11 - 29 Jul 88
7 - 25 Mar 88	8 - 26 Aug 88
4 - 22 Apr 88	12-30 Sep 88
2 - 20 May 88	19 Oct - 6 Nov 88
6 - 24 Jun 88	30 Nov - 18 Dec 88

*All courses will be held at the Casey Building, Humphrey's Engineer Support Activity Complex, Ft. Belvoir, VA.

MANPRINT INFORMATION

POLICY-MANPRINT, Research and Studies Directorate, HQDA (DAPE-MR). Washington, DC 20310-0300. AV 225-9213, COMM (202) 695-9213.

MANPRINT TRAINING - Soldier Support Center-National Capital Region, ATTN: ATNC-NM, Alexandria, VA 22332-0400. AV 221-3707, COMM (703) 325-3706.

PROCUREMENT & ACQUISITION - US Army Material Command, ATTN: AMCDE-PQ, Alexandria, VA 22333-0001. AV 284-5696, COMM (202) 274-5696.

HUMAN FACTORS ENGINEERING STANDARDS AND APPLICATIONS - Human Engineering Laboratory - MICOM Detachment, ATTN: SLCHE-MI, Redstone Arsenal, AL 35898-7290. AV 746-2048, COMM (205) 876-2048.

MANPOWER, PERSONNEL AND TRAINING RESEARCH - Army Research Institute, ATTN: PERI-SM, Alexandria, VA 22333-5600. AV 284-9420, COMM (202) 274-9420.

28-30 January 1988

Test Technology Symposium. Johns Hopkins University, Laurel, MD. DOD personnel only. Contact: Science and Technology Corp., Meetings Division, ATTN: TTS, 101 Research Dr., Hampton, VA 23666-1340. Telephone: (804) 865-0332.

11 February 1988

MANPRINT Methodology Workshop. Alexandria, VA. To provide TRADOC Action Officers MANPRINT analysis methods. For more information contact: Mr. J. Dykhuis. Telephone: AV 221-2074 or (202) 325-2074.

3-5 May 1988

Manpower, Personnel, Training, and Safety Conference. Orlando, FL. Contact: National Security Industrial Assn., 1015 15th St., NW, Ste. 901, Washington, D.C. 20005. Telephone: (202) 393-3620.

10-13 May 1988

Applications of Human Performance Models to System Design: A Technology Demonstration Workshop. Orlando, FL. NATO sponsored. Contact: Dr. Michael H. Strub, US Army Research Institute-Fort Bliss Field Unit, PO Box 6057, Ft. Bliss, TX 79906-0057.

GENERAL INFORMATION

- Proposed articles, comments, and suggestions are welcomed, and should be mailed to: MANPRINT Bulletin, ATTN: HQDA (DAPE-MR), Washington, D.C. 20310-0300. Telephone: AV 225-9213, COMM (202) 695-9213.

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Director, MANPRINT, Research and Studies

The MANPRINT Bulletin is an official bulletin of the Office of the Deputy Chief of Staff for Personnel (ODCSPER), Department of the Army. The Manpower and Personnel Integration (MANPRINT) program (AR 602-2) is a comprehensive management and technical initiative to enhance human performance and reliability during weapons system and equipment design, development, and production. MANPRINT encompasses the six domains of manpower, personnel, training, human factors engineering, system safety, and health hazard assessment. The focus of MANPRINT is to integrate technology, people, and force structure to meet mission objectives under all environmental conditions at the lowest possible life-cycle cost. Information contained in this bulletin covers policies, procedures, and other items of interest concerning the MANPRINT Program. Statements and opinions expressed are not necessarily those of the Department of the Army. This bulletin is published monthly under contract by Automation Research Systems, Ltd., 4480 King Street, Suite 500, Alexandria , Virginia 22302, for MANPRINT, Research and Studies Directorate, Office of the Deputy Chief of Staff for Personnel under the provisions of AR 310-2 as a functional bulletin.