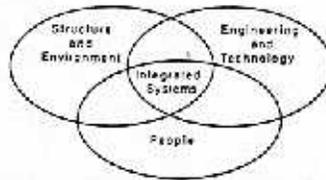




MANPRINT BULLETIN



Vol. II No. 3

"Remember the Soldier"

September/October 1987



GEN Thurman Says TRADOC Is Serious About MANPRINT

Have no doubt that U.S. Army Training and Doctrine Command (TRADOC) is serious about influencing system development by seeing to soldier performance issues in execution of TRADOC missions. GEN Maxwell R. Thurman hosted a MANPRINT seminar for the TRADOC principal staff on September 4, 1987 to underscore his personal commitment to improving total system performance through the MANPRINT Program.

GEN Thurman chaired the seminar which consisted of a MANPRINT overview followed by a detailed review of human performance issues in the nondevelopmental item (NDI) procurement of the Line-of-Sight Forward (Heavy) component of the Forward Area Air Defense System. BG Donald M. Lionetti, Assistant Commandant of the U.S. Army Air Defense School, and BG William J. Fiorentino, Program Executive Officer for the Forward Area Air Defense Program, led a discussion during a cross-walk of the required operational capability (ROC), test plan, request for proposal (RFP), and source selection process--the central theme being to assess how well soldier performance was addressed and the contribution to total system effectiveness.

GEN Thurman conducted the seminar as the lead to a modified MANPRINT training program which will include a participative training approach, integrating commanders and staff of TRADOC schools and centers and commodity commands of the U.S. Army

(Continued on page 2)



Inside . . .

Page

LHX MANPRINT - "The Next Step-Forward" by CPT Wayne A. Sauer	2
"MANPRINT is Alive and Well"	3
MANPRINT and the DOD Human Factors Engineering Technical Group by CPT Donald R. Loose	4
Integrating Ergonomics Into Military Systems by Foreign Countries	5
Army Officer Awarded MANPRINT Fellowship	7

MANPRINT PIONEER ASSIGNED TO DOD AGENCY

Lieutenant Colonel William O. (Bill) Blackwood, formerly of the Army's MANPRINT Research and Studies Directorate, was recently tapped for a high-level DOD assignment. On October 1, 1987, Colonel Blackwood joined the Office of the Deputy Assistant Secretary of Defense for Programs and Resources/Strategic Planning.

(Continued on page 2)

Thurman
(Continued from page 1)

Materiel Command (AMC). Dubbed the "T" course by the MANPRINT Program Division, Soldier Support Center-National Capitol Region (responsible for MANPRINT training), the course will be formed by combining the MANPRINT GO/SES seminar and the one-week mid-managers' course.

The September 4 seminar ensures that the TRADOC staff is fully aware of the MANPRINT program prior to export of the "T" course to schools and commodity commands. A pilot "T" course will be conducted at Fort Belvoir, VA during the week of November 2-6, 1987. The Engineer School and AMC's Troop Support Command will serve as joint hosts for this initial offering. Eleven sessions are programmed for the remainder of Fiscal Year 88. The three-week staff officers' course remains unchanged.

MANPRINT Pioneer
(Continued from page 1)

Bill Blackwood was instrumental in making MANPRINT a reality. In 1984, GEN Thurman, then the Army's Vice Chief of Staff, directed that human performance and reliability considerations be integrated into the materiel acquisition process (MAP). Bill Blackwood was selected by the DCSPER of the Army to help plan, organize and implement the MANPRINT program. Since its inception, Bill has paved the way for Army-wide institutionalization of MANPRINT. His unflinching efforts led to the establishment of sound MANPRINT policies, new and improved methods of integrating human performance into the MAP, and the development of successful MANPRINT training courses. Bill has done an outstanding service for the Army, and we in the MANPRINT community applaud his success.

LHX MANPRINT - "The Next Step Forward"

by CPT Wayne A. Sauer
U.S. Army Aviation Center

Anticipating the LHX Defense Acquisition Board's approval to proceed from milestone one (completion of the Concept Exploration Phase) to the Demonstration Validation Phase (DEVAL), the LHX MANPRINT strategy will remain within the guidelines of AR 602-2, and ensures the LHX MANPRINT Program is efficient and effective. This new strategy redirects the MANPRINT efforts towards qualifying and quantifying the MANPRINT issues/concerns section of the System MANPRINT Management Plan. The current LHX issues/concerns are stated in generic and general descriptive terms that allow the community of subject matter experts to best express their MANPRINT guidelines without adversely impacting on design flexibility and innovative engineering alternatives.

As the program progresses towards source selection for down select, it is critical that the

MANPRINT issues/concerns are resolved and quantifiable MANPRINT evaluation criteria are established. The United States Army Aviation Center has developed a methodology that will allow the MANPRINT issues/concerns identified in the LHX System MANPRINT Management Plan (SMMP) to be modified into statements conducive to resolution through accepted evaluation practices.

The methodology discussed below consists of two sections. The first section is the essential elements of analysis. Each issue/concern in TAB D of the SMMP will be rewritten into specific and well defined statements that will require timely resolution during the LHX acquisition process. The second section to the MANPRINT methodology is the identification and timely sequencing of the measures of effectiveness (MOE) required for each essential element of analysis resolution. MOE associated with each essential element of analysis may be based on a range of evaluation techniques. It is critical for the subject matter experts (SMEs) of the LHX MANPRINT Joint Working Group (JWG) to recommend the required Army and contractor evaluation techniques. The required measures of effectiveness can include reviews and analyses by SMEs, testing, measurement using simulation, surrogate systems, engineering prototypes/mock-ups, or questionnaire data. Any established standards or requirements associated with an essential element of analysis

(Continued on page 3)

LHX MANPRINT

(Continued from page 2)

should be included along with the corresponding measure of effectiveness. To facilitate a consistent MANPRINT program throughout the development of LHX, multiple measures of analysis should be identified for each successive program milestone until total resolution of each essential element of analysis.

To further illustrate the EEA/MOE methodology the following example is provided: In the current LHX SMMP, issue 2 is stated as, "Are the LHX manpower requirements equal to or less than the manpower requirements needed to support the predecessor systems?" This issue restated in the essential element of analysis format would appear as, "What are the manpower requirements (operator, maintainer, and supporter) for the LHX equipped attack helicopter company as compared with a similar company equipped with predecessor systems (AH-1, OH-58, and UH-1H)?"



The second, and perhaps the most critical, portion of the methodology is the measures of effectiveness section. For issue 2, the following are examples of MOEs:

MOE 2.1.1 How many direct maintainers, by military occupational specialty (MOS), are required for an attack helicopter company?

1. For the LHX
2. For predecessor systems (AH-1, OH-58, UH-1H)

Data Sources:

HARDMAN Projections - Concept Phase
Contractor Logistics Support Analysis Report
(LSAR) - full-scale development (FSD)/
DEMVAL
Reliability, availability, and maintainability
(RAM) data - GCT/UTE/IOTE

MOE 2.1.2 How many operator personnel, by MOS, are required in an attack helicopter company?

1. For the LHX
2. For predecessor systems (AH-1, OH-58, UH-1H)

Data Sources:

Contractor Logistics Support Analysis Report
(LSAR) - full-scale development (FSD)/
DEMVAL
Force Development Tests and Experimentation
(FDTE)

As the above example illustrates, the EEA/MOE approach quantifies the MANPRINT issues and concerns into very specific statements and directly relates data sources that will lead to its resolution. The methodology will also disclose potential government and/or contractor data voids. With timely action and the dedication of the subject matter experts of the LHX MANPRINT JWG, these data voids will be filled. The final, and perhaps most important, benefit of this methodology is that the MANPRINT goals, constraints, issues and concerns are presented to industry (our MANPRINT partners) in a clear, organized manner. Industry can, then, task organize and commit assets to answer those critical MANPRINT concerns and continue to build a system that optimizes the performance of man and machine. For additional information contact: CPT Sauer, USAAVNC (ATZQ-CDM-R), Fort Rucker, AL 36362-5000. Telephone (205) 255-5310 or AV 558-5310.

★★★★

"MANPRINT Is Alive And Well"

During an interview with members of Army Times Magazine, General Maxwell R. Thurman, Commander of the U.S. Army Training and Doctrine Command, had this to say about MANPRINT:

Q: "How is the MANPRINT (Manpower and Personnel Integration) program coming along?"

A: "MANPRINT is alive and well, and as a matter of fact in one week we will spend one day here at TRADOC on MANPRINT. I am going to lead the session. The purpose of that is to make sure that I have my principal staff officers here, who are busy writing requirements documents and reviewing contractor proposals from the Army Materiel Command, understand how to interject MANPRINT statements into requests for proposals.

(Continued on page 4)

Alive and Well

(Continued from page 3)

So we are going to run a one-day, nine-hour seminar. We will bring in a project manager, one of our school commandants, and we will take a given system and we will work our way through the documents to see how they are displayed and if they are adequate, or not adequate. The purpose is to use it as a teaching vehicle.

We want to export that ... and we have a five-day course working that gives the nuts and bolts of MANPRINT. It's absolutely essential. The fact of the matter is that industry can be challenged to do things better than maybe now. But that means we must enter into a dialogue with industry. MANPRINT is one of the things you have to think about when you look at something as unsophisticated as a hand-held antitank munition, or as sophisticated as the LHX."

Army Times, September 14, 1987, by Larry Carney and Jim Tice. Reprinted with permission of the Times Journal Company, Springfield, VA 22159.

MANPRINT And The DOD Human Factors Engineering Technical Group

by CPT Donald R. Loose
Air Force Acquisition Logistics Center

The Department of Defense Human Factors Engineering Technical Group (DOD/HFE/TG) is a triservice military organization which brings together military psychologists and engineers working in human factor related disciplines to share their experiences and expertise. The DOD/HFE/TG is, thus, the ideal organization to keep abreast of human factors engineering, biomedical engineering, manpower, personnel, and training disciplines on a triservice level.

Traditionally, the DOD/HFE/TG has been organized around technical specialties—for example, user-computer interface design, human operator modeling, human workload assessment, or human performance during sustained operations. However, participation is now increasing from the acquisition community and more "macro-human-factors" issues,

as Dr. Harold Booher of the Headquarters Department of Army, MANPRINT Research and Studies Directorate calls them, are being addressed.

Two DOD/HFE/TG subgroups should be of particular interest to the MANPRINT community. The Logistics in Human Factors Subgroup (LOGROUP) is concerned with disciplines which overlap human factors engineering and integrated logistics support; in particular, design for maintainability and maintenance, manpower, personnel, and training. The new Human Factors in Acquisition Committee (ACQCOMM) is concerned with all aspects of contracting for human factors engineering as part of the weapon system acquisition process (WSAP).

A meeting of the full DOD/HFE/TG is scheduled for November 16-19, 1987 in Oxnard, California. The meeting, which will be hosted by the Pacific Missile Test Center, will feature a presentation about the new Air Force "model manpower, personnel, and training" program at Wright-Patterson Air Force Base. Both the LOGROUP and ACQCOMM will meet on November 16. The LOGROUP will conduct a seminar on the Maintenance Manpower/Human Engineering Interface, and the ACQCOMM will discuss common areas of concern about human factors. For more information, contact Ms. Louida D. Murray, (303) 979-7441.



Graphic copied from Engineering Data Compendium, Kenneth R. Buff and Janet E. Lincoln, eds.

Integrating Ergonomics Into Military Systems by Foreign Countries

Taking the human into consideration when designing military equipment and determining the use of personnel has become a high priority in the defense planning of many countries. Manpower and Personnel Integration (MANPRINT) is one of the major efforts by the U.S. Army to subject all new systems under development to ergonomic standards in order to optimize the man-machine interface from the beginning of the life-cycle process. Emphasis that other countries place on human factors and the integration of ergonomics into the military follows:

NATO COUNTRIES

Belgium has a small but strong military force. Although ergonomics currently seems to be a young discipline, some agencies such as Labo Tele, an acoustics laboratory that performs noise and blast studies for the military, and the Psychological Research Section, an organization that performs selection studies and research, indicate that human factors play a growing role.

Although Canada does not produce major weapon systems, it is able to meet most of its other defense needs. In the Canadian military establishment, human engineering usually means only that ergonomists may offer advice concerning the weapon systems, procured by the military; this advice may or may not be followed. The Defense and Civil Institute of Environmental Medicine (DCIEM) is the lead agency for military human factors research and testing and for studying human engineering, personnel, and medical issues of the soldier. The Canadian Forces Personnel Applied Research Unit performs behavioral science research and assists in the recruitment and selection process.

France has the third largest defense industry in the world and exports almost half of the armaments produced by this industry. Ergonomics is accorded a high status among the French, with many agencies either specializing in ergonomics or using the assistance of ergonomics experts in designing and producing military products. Many agencies can be identified as providing ergonomics



input, but no one organization can be singled out as the agency responsible for the overall management of human engineering. Among the most important agencies concerned with ergonomics are the Ergonomics Group, Land Army Technical Section (STAT); Group 9, Ergonomics Division of the Research Service, Directorate of Research, Studies and Techniques (DRET); and the Research Center of the Armed Forces Health Services (CRSSA).

Italy is undergoing an extensive modernization program and seeks eventually to produce all its own military equipment. Even though the Italian Army does not devote resources to ergonomics research NATO standards are followed with regards to design guidelines. Vehicles designed to FIAT seem to be very well engineered so far as ergonomics are concerned.

The Netherlands buys most of its military equipment from other countries, so their ergonomics input is restricted largely to evaluating foreign systems and designing work spaces. Agencies that perform ergonomics research and application include the Institute for Perception TNO and the National Aerospace Laboratory. The former appears to be the major contributor to military ergonomic issues.

Turkey is also largely dependent on other countries for most of its defense materiel. Its long-term goal, however, is to modernize its forces and produce more equipment nationally. Ergonomics may play a part in this modernization process, although direct evidence of ergonomics involvement in the military is currently not available. The field of ergonomics is young but growing, with the National Productivity Centre and the Building Research Centre leading the way by offering training courses and conducting anthropometric studies.

The United Kingdom has a well-established defense force and produces most of its own equipment. Ergonomics research is performed by the military, private industry, and universities in support of the defense effort. The key Army agency for ergonomics is the Army Personnel Research Establishment, which is concerned with optimizing soldier performance by a variety of means. GEC-Marconi, perhaps the largest UK defense contractor, ensures that human factors are considered when designing new equipment. Attached to some universities are

(Continued on page 6)

Integrating Ergonomics (Continued from page 5)

research laboratories that publish international journals on ergonomics issues, these journals reach a wide audience in many countries.

In West Germany, which has a well-developed modern defense force, ergonomists are consulted whenever a new military system is being designed. Even though advice from these ergonomists is not always followed, West Germany's stated goal is to involve them in all stages of the research, development, and acquisition process. The coordinating office for all military ergonomics is the Psychological Service (P II 4). This office places ergonomists and psychologists in various organizations throughout the Ministry of Defense to provide advice and perform research. Some agencies supported by P II 4 are the Federal Office for Military Technology and Procurement, AT II 4 (BMB); Eckenforde, Trier, Meppen, and Lichtenau Proving Grounds; and the Research Institute for Human Engineering (FAT).



OTHER EUROPEAN COUNTRIES

Austria has a very small defense force, and it buys almost all its major military equipment from other countries. Austria depends on troop tests to determine whether a particular system is satisfactorily operable and easily maintained, but no specific criteria for selection or rejection are specified. One agency, the Military Psychological Service, performs psychological tests to select and place military recruits and officer candidates, but no other agency that studies ergonomics has yet been identified.

Finland, which has declared itself a neutral country, buys military equipment from the USSR, Sweden, Britain, France, and the United States. No agency in Finland has yet been identified that performs human engineering on military equipment, although the Finnish National Institute of Occupational Health and the Military Psychology Office in Helsinki perform psychological and physiological research for military projects.

Sweden has a large defense industry and makes a few purchases from the United States.

Ergonomics, a well-established field in Sweden, is given significant attention by the military. This importance is demonstrated by the existence of the Human Studies Division, National Defense Research Institute (FOA). The Human Studies Division's mission is to study and improve human performance in a combat environment. Many consulting groups also lend support to the military on occasion. Aero-medical research for the Air Force and Navy is performed by several universities.

A self-declared neutral country, Switzerland has a small-arms industry that produces most of its military equipment, although it does buy materiel from other countries when needed. There is not identifiable military human engineering organization in Switzerland, but the Swiss Federal Institute of Technology has published some guides that are intended to assist designers in developing new military equipment.

Yugoslavia has its own defense industry but purchases most major weapon-related materiel from USSR. Ergonomics is a growing field, and ergonomists are eager to share with and learn from both Eastern and Western neighbors. The Military Academy may be the agency that performs all human factors work for the Yugoslav People's Army. Its research is geared toward the well-being of the soldier, to include ergonomics, nutrition, clothing, and personal equipment. The Institute of Occupational Medicine and Radiological Protection performs prototype testing on nuclear, biological, or chemical protective equipment.

FAR EASTERN COUNTRIES

Australia produces many defense items indigenously but buys most major systems from other countries. Ergonomists are most likely involved in the procurement process during prepurchase trials. The major Australian research facilities are the Aeronautical Research Laboratories, the Royal Australian Air Force Institute of Aviation Medicine, the 1 Psychology Research Unit, and the 1 Psychology Unit. The last two organizations are Army units that perform primarily manpower research.

China has the largest standing Army in the world, but many setbacks (e.g., the Cultural Revolution in the 1960s and 1970s) hindered its scientific

(Continued on page 7)

Integrating Ergonomics

(Continued from page 6)

and technical growth. As the Chinese attempt to modernize their defense forces, ergonomists are gradually being integrated into that process. The Air Force and Navy seem to be ahead of the Army in ergonomic research, and their key organizations include the Laboratory of Aviation Environmental Physiology, the Air Force Fourth Institute, the Navy Medical Research Institute, and the Institute of Space Medico-Engineering. The Army seems to be tackling ergonomics from a manpower and training viewpoint at present.

India is currently attempting to modernize its military forces, although it still is dependent on the USSR for much of its military equipment. The Defense Institute of Physiology and Allied Sciences is the only identifiable organization that performs ergonomics research from a medical point of view. Because ergonomics is still young discipline in India, it is probable that there is no other military research currently underway.

Japan is almost self-sufficient in military materiel and is gradually modernizing its equipment. Military ergonomics research is performed by the Technical Research and Development Institute (TRDI) and the JASDF Aeromedical Laboratory. The Japanese have requested assistance from the United States about ergonomics issues such as noise and blast problems.

New Zealand has a very small defense force. Major equipment is purchased primarily from Britain and the United States. Two defense agencies



perform human performance research: the Defense Environmental Medicine Unit, which concentrates on Air Force personnel issues, and the Defense Psychology Unit, which provides all psychological services needed by the military.

South Korea has the sixth largest armed forces in the world and is trying to produce more combat systems indigenously, but it is currently heavily dependent on the United States for most defense equipment.

For additional information contact: HQDA (DAPE-MR), MANPRINT Research and Studies Directorate, Washington, D.C. 20310-0300; telephone AV 225-9213 COMM (202) 695-9213.

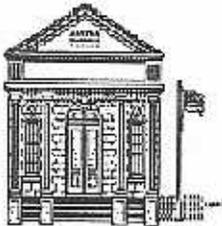


Army Officer Awarded MANPRINT Fellowship

Lieutenant Colonel Glen Hewitt was recently awarded a one-year fellowship to participate in a study project to support the Army's MANPRINT program. The study, "Managing the Introduction of New Technology for Weapon and Support Systems," is sponsored by the MANPRINT Research and Studies Directorate in cooperation with the Rand/Arroyo Center, Santa Monica, California.

Approved by the Arroyo Center Policy Committee in 1986, the study is designed to assist the Army in furthering the aims of its MANPRINT program. Hewitt will be working closely with other Army officers and the Rand researchers to develop improved methodologies for accomplishing effective trade-offs during the design of Army equipment. He will explore methods that the Army can use to successfully integrate the MANPRINT domains into the design trade-off process. Improved methodologies for integrating MANPRINT and the trade-off process will better enable the Army to apply the latest technologies to weapon developments.

After completing his fellowship, Hewitt will return to the Pentagon where he will be assigned to the Army's MANPRINT Research and Studies Directorate.



Schedule of MANPRINT Courses for FY88

MANPRINT Staff Officer Courses*

19 Oct - 6 Nov 87	4 - 22 Apr 88
30 Nov - 18 Dec 87	2 - 20 May 88
25 Jan - 12 Feb 88	6 - 24 Jun 88
7 - 25 Mar 88	11 - 29 Jul 88
	8 - 26 Aug 88

Schedule of one-week MANPRINT Managers courses and one-day GO/SES seminars will be announced later.

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

Meetings of Interest

12-14 October

Association United States Army Meeting. Washington, D.C.

19-23 October

Human Factors Society Annual Meeting. New York City, NY.
Contact: Human Factors Society, P.O. Box 1369, Santa Monica, CA 90406. Telephone: (213) 394-1811.

30 November - 2 December

9th Interservice/Industry Training Systems Conference (IITSC). Washington, D.C. Sponsored by the American Defense Preparedness Association. Contact: American Defense Preparedness Association, Rosslyn Center, Suite 900, 1700 N. Moore Street, Arlington, VA 22209-1942, Attn: TMAS. Telephone (703) 522-1820

8-12 August 1988

IEEE 1988 International Conference on Systems, Man & Cybernetics. Beijing and Shenyang, China. Contact: A. Terry Bahill, Systems and Industrial Engineering, University of Arizona, Tucson, AZ 85721. Telephone (602) 621-6561.

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) 325-3707.

HUMAN FACTORS ENGINEERING STANDARDS AND APPLICATIONS - Human Engineering Laboratory - MICOM Detachment, ATTN: SLCHE-MI, Redstone Arsenal, AL 35898-7290. AV 745-2048. COMM (205) 876-2048.

GENERAL INFORMATION (MANPRINT BULLETIN, POINTS OF CONTACT LIST, ETC.) - Automation Research Systems, Ltd., ATTN: MANPRINT PM, 4480 King Street, Alexandria, VA 22302. (703) 620-9000.

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Ms. Karen Green, Editor

Harold R. Booher

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 the 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. Proposed articles, comments, or suggestions should be mailed to MANPRINT Bulletin, Attn: HQDA (DAPE-MR), Washington, DC 20310-0300. Telephone: Commercial (202) 695-9213 or Autavan: 225-9213.