

# MANPRINT Quarterly

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## THE ARMY SAFETY CENTER AND HUMAN FACTORS

*Reprinted with permission from the USA Safety Center USASC  
Communique (March 1993).*

Accidents during wartime have exacted a greater toll on Army resources than enemy action in every war except Korea. Fiscal year 1992 was the Army's safest year on record, yet accidents cost 237 soldiers' lives, over 4,500 military personnel injuries, and more than \$208 million.

About 80 percent of these accidents were caused by "human error." MG Dave Robinson, Chief, Aviation Branch and Commanding General, United States Army Aviation Center, Fort Rucker, AL, described the significance of this problem well by saying that every mission we execute is a fight against two enemies—human error and the declared enemy.

This evidence, in conjunction with the increased demands of limited budgets and a leaner Army, challenges us to improve "human-system integration" (HSI). Improved HSI will allow us to reduce human factors hazards that cause accidents, take lives, destroy warfighting systems, and diminish our warfighting capability.

The Army safety mission is to protect the force and enhance warfighting capability through a systematic and progressive process of hazard identification and risk management.

This includes providing commanders mission-oriented policies, procedures, standards, and proactive accident prevention programs that integrate safety and risk management into doctrine, training, material acquisition, sustainment, and combat.

The Army Safety Center's plan to accomplish this mission is Army Safety 2000. This is a customer-focused effort to motivate processes which result in high-quality, value-added products that

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# BATTLE LABS ASSIST IN ENHANCING CBRS

Richard Dodson and MAJ Robert Stump

*Reprinted, with permission, from the Logistics Technology Bulletin (Vol. 2, No. 1, March 1993; pages 1 and 3).*

The Army, as well as contractors, are in an environment radically changed by recent world events. It's not "business as usual." TRADOC (US Army Training and Doctrine Command) is making major changes in its battlefield requirements generation process.

In the past TRADOC identified battlefield requirements through the Concepts Based Requirements System (CBRS). The roots of CBRS are in the 1973 reorganization of the Continental Army Command under "Operation Steadfast." Then the Army purchased weapons systems and adapted doctrine, training, and force design to those systems. TRADOC changed its approach in 1981. TRADOC identified needs based on warfighting concepts, and sought doctrinal, training and organizational solutions in addition to materiel solutions and thus created the CBRS.

CBRS, an unconstrained, threat-based process intensive system, served admirably as TRADOC and the Army's combat developments program during the Cold War period. However, the 24 month CBRS process is not responsive in today's dynamic environment. A change in National Military Strategy (NMS), which requires a force projection Army, and decreasing resource prompted TRADOC to evolve to an Enhanced CBRS (ECBRS). In ECBRS the Branch Chiefs and PropONENTS will provide common sense analysis; linking Doctrine, Training, Leader development, Organization, Materiel and Science and Technology (DTLOMS&T) requirements that focus on the soldier. Required capabilities (solutions), based on Battlefield Return on Investment (BROI) as determined by a Warfighting Lens Analysis (WFLA) will be codified in the Army Modernization Plan (AMP).



The AMP translates long-range goals into mid-term and near-term objectives for Doctrine, Training, Leader development, Organization, Materiel, and Soldier (DTLOMS). The AMP identifies objectives by functional areas that will help the Army maintain the technological edge on the next battlefield. TRADOC has established six Battle Labs (at Forts Monroe, Lee, Benning, Leavenworth, Sill, and Knox) to help in this effort by working high profile, critical issues. A major function of the Battle Lab process is to facilitate horizontal integration among competing requirements. The Battle Labs are developing a Battlefield Dynamics Master Plan to identify required capabilities and to integrate and prioritize them within Battlefield Dynamics. The Battlefield Dynamics are Lethality & Survivability, Depth & Simultaneous Attack, Mounted Battle, Dismounted Battle, Battlefield Command & Control, and Combat Service Support.



The TRADOC Battle Labs provide an environment in which to explore new technologies and ideas. Further, in the Battle Lab environment, combat and materiel developers and industry can team up to tailor the materiel acquisition process using concurrent engineering. Battle Labs must think and work from an integrated perspective so they link with each other the technology base, industry, DOD, and institutions and installations that deal with advanced technology. Ultimately, the Battle Lab process interfaces with the Planning, Programming, Budgeting, and Execution System (PPBES) to align funding for high payoff solutions.

The PPBES interfaces with requirements through the acquisition Life Cycle Management Model (LCMM) at a Milestone I and then later more directly at the submission of the Program

Objectives Memorandum. The Materiel Developer (MD) takes control of the program at a Program Decision Review (PDR) once the combat developer identifies the need. The MD takes the program through the materiel acquisition process to develop and acquire the solution and synchronize its delivery to the field.

Today's Army needs timely solutions to the changing threat and advancing technology. One method of making the process more timely is by rigorously tailoring our acquisition process.

Non-developmental items, technology insertions, modifications to existing equipment, and Advanced Technology Demonstrations offer many opportunities for Battle Lab applications. Developmental programs require more time to ensure that the concepts and technologies are sound and available for production. However, if the MD is using proven solutions, the emphasis is on the

integration of the components. This can save time. It will allow the Battle Labs to function not only as a forum in which to design systems in less time, but also may permit the CD and MD to satisfy many of the LCMM requirements before the first PDR.



The ECBRS, Battle Labs, and the type of solution chosen are critical to fielding capabilities. With the new way of doing business, TRADOC will have a marked effect upon how long it takes the Army to field a system or whether or not the Army should field it at all.

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## MANPRINT SUPPORT CONTRACT

by Gordon Goodwin (TRAC-LEE) and Ron Lafond (AEPCO)

The Manpower, Personnel, and Training (MPT) Division of TRAC-LEE has the mission to support TRADOC Headquarters and all TRADOC Centers, Schools, Activities, and Installations with analytical studies, services and products in the areas of MPT. TRAC-LEE performs its mission in part through a Manpower and Personnel Integration (MANPRINT) contract with Advanced Engineering and Planning Corporation (AEPCO), the prime contractor, and Dynamics Research Corporation (DRC), the subcontractor. This MANPRINT support contract has been in use since August of 1990 and is anticipated to be viable for at least another two years. ATRC-LP represents the contracting officer in the administration of this contract in order to provide the Army with timely and accurate MPT support. The types of MANPRINT studies that may be performed using this contract vehicle include: 1) MPT inputs to Cost and Operational Effectiveness Analyses (COEAs); 2) Hardware versus Manpower (HARDMAN) analytical studies; and 3) Other MANPRINT Analyses (OMAs). In recent efforts, MPT analysis has been conducted to support COEAs in the Army Regulation 5-5 Study Program. For example,

AEPCO/DRC has conducted an MPT analysis for the US Army Air Defense Artillery School's Corps Surface-to-Air Missile (SAM) system in conjunction with the Corps SAM COEA Study Plan. Manpower and training resources were determined for the base case and four major alternatives for use in the Milestone I Decision Review. Additionally, AEPCO is currently performing a similar MPT analysis for the US Army Field Artillery Schools' Advanced Field Artillery System (AFAS)/Future Armored Resupply Vehicle (FARV). The manpower and training resource requirements from this analysis will eventually feed the AFAS/FARV COEA for the base case and six alternatives for the Milestone I Decision Review.

Non-TRADOC agencies such as Army Materiel Command Commodity Commands may also use this contract vehicle provided the Statement of Work meets the intent of the MANPRINT philosophy and relates to TRADOC's mission area.

*For more information on the use of this contract contact: TRAC-LEE, ATTN: ATRC-LP (Dr. Gordon Goodwin), Fort Lee, VA 23081-6140, DSN 539-1821/1820; DSN Fax 539 1456; COM (804) 765-1821/1820; COM Fax (804) 765-1456.*

# OCS TOOLS - A NEW MANPRINT TECHNIQUE

by Ronald L. Munden

There is a "new kid on the block" in the Test and Evaluation data collection, data reduction, and analysis area--the Observation Coding System Tools (OCS Tools). It has demonstrated the ability to save both time and money during collection, reduction, and analysis of MANPRINT related audio/video data. This article provides information on the innovative and successful application of this technology in support of one operational test.

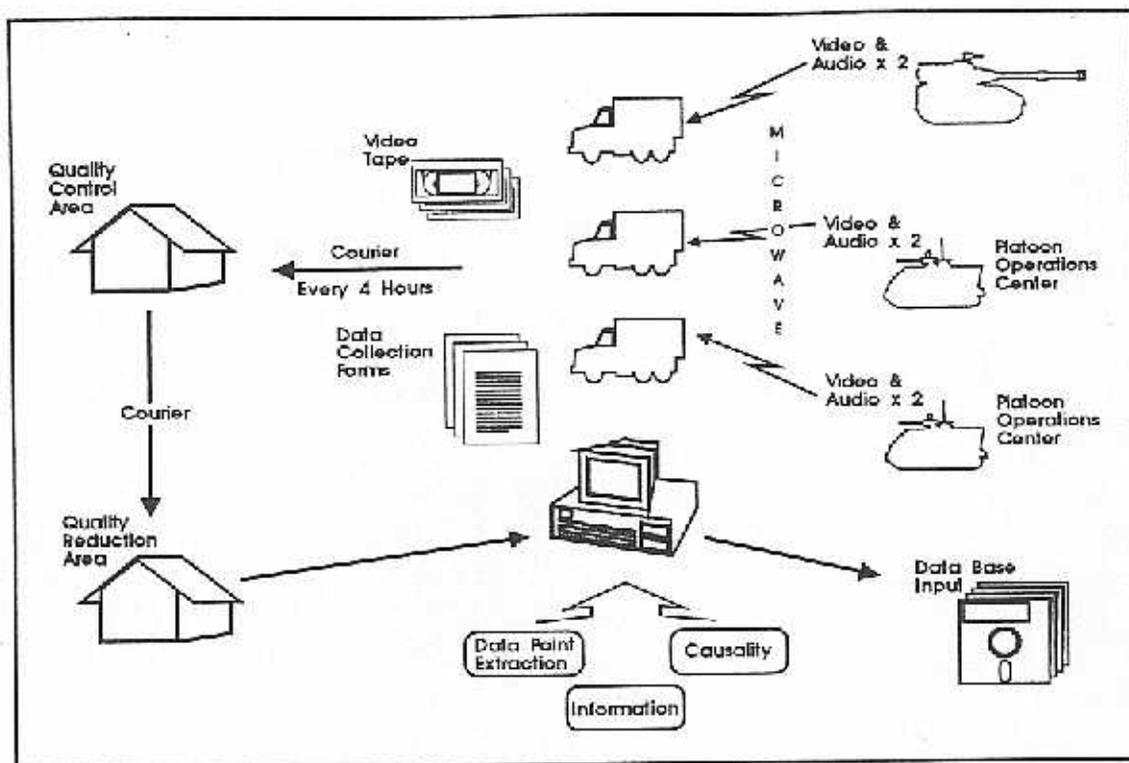
During the M109A6 Paladin howitzer Follow-On Test and Evaluation (FOTE) in November 1992 at Ft. Sill, Oklahoma, Atlantic Research Corporation (ARC), as part of a Joint Venture team with Planning Research Corporation (PRC), supported the Army's Operational Test and Evaluation Command (OPTEC) by providing MANPRINT evaluation. In previous Paladin tests, audio/video data source reduction had been one of the slower, costlier, and more difficult types of data reduction. Since the evaluation and analysis of the performance measures associated with the MANPRINT domains heavily depends on audio/video medium for quantitative data, these obstacles caused a number of difficulties in test execution flexibility and data authentication and validation. The acquisition of OCS Tools by the Test and Experimentation Command (TEXCOM) and its operation by ARC analysts in support of the Operational Evaluation Command (OEC) evaluators changed this condition dramatically. As an additional benefit, OCS Tools supported other Paladin areas of analyses including RAM, Performance, and Logistics.

OCS Tools combines the latest in computer technology with high speed automated video editing and unique data extraction/analysis techniques. It consists of computers, video monitors, video recorders, time code generators and new software programs. It is used in conjunction with other manually collected information to provide a complete picture of test events. OCS Tools was used by the ARC MANPRINT evaluators to reduce audio/video data received from the field test sites

into coded data base sets that included the following information: crew performance measures, fire mission times, mission types and crew tasks which related to the six MANPRINT domains. These OCS Tools data base sets were compatible with the Paladin test relational data base that included data from other instrumentation sources supporting the evaluation.

Each Paladin howitzer was instrumented by TEXCOM with two cameras: one focused on the Automated Fire Control System (AFCS) computer screen and the other provided a "fisheye" overview of the howitzer's crew compartment. Each camera had an associated audio channel -- the radio link to the Platoon Operations Center (POC) for the AFCS and an "open mike" in the crew compartment for the "fisheye." These audio/video signals were microwaved back to a HMMWV where MANPRINT data collectors watched the TV monitors for test incident identification and also controlled the video recorders and time code generators. The POC and the Battalion's Tactical Operations Center (TOC) were also instrumented with video cameras and microphones. All data collectors had received Paladin training and could identify when an artillery fire mission was not being conducted properly.

The video tapes were collected every four hours, delivered to the test data management center, logged in, and delivered to the OCS Tools operators. Each tape was accompanied by the data collector's notes, comments, and observations. As the OCS Tools operators watched and listened to the tapes, they coded them with predetermined data points while simultaneously creating an associated data disc. These operators, who also received Paladin training, coded any anomalies they saw or that had been observed by the data collectors. The data sets produced were then compiled into predetermined blocks of time and provided to the compatible test relational data base. Because of the processes used and the quality control measures instituted by ARC



MANPRINT analysts, authentication and validation of this audio/video generated data base was completed as the data base was being produced rather than having to wait for the MANPRINT Data Validation Team (DVT) to meet. The TEXCOM and OEC team members mutually agreed that because of the quality and form of the video reduced data, it was to be treated as validated data. In fact, for the Paladin FOTE test, the six-person MANPRINT DVT was eliminated, resulting in both cost and time savings in test support.

Timeliness was a key factor in using OCS Tools. Authenticated data was available within 18 hours of event occurrence. In addition, whenever a fire mission failure occurred, an investigation could be initiated and the cause determined quickly. MANPRINT analysts could rapidly move through many hours of video data to investigate incidents by letting the computer software drive the VCRs and by associating the appropriated data disc and video tape information. Safety, Health Hazard, and Human Factors Engineering incidents could be replayed many times. In fact, ARC has consolidated many of these incidents into a single tape

to be used for future Paladin training. The coded data points permitted a detailed examination of each segment of the fire mission and were particularly valuable to the Performance and RAM analysts for verification of their timed events. Also, the OEC Logistics evaluation team for this FOTE verified or collected their "rounds fired" data from the OCS Tools video data.

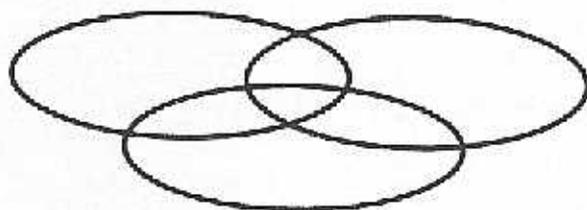
OCS Tools has proven to be a valuable addition to the MANPRINT analysis tool kit. Now, audio/video data reduction need not be the "laggard" in test operations. As a MANPRINT analysis technique, OCS Tools can not only provide a neat chronological data base but also the capability to support investigation of issues and performance causality at the same time. MANPRINT analysts now have a system that can be used to develop a data base for all of the domains that quickly and efficiently produces objective and visually reviewable results for evaluation.

*Ron Munden is a Senior Program Analyst with Atlantic Research Corporation's (ARC) Test and Evaluation Operations Center, Defense Systems Division. His office is in Lawton, OK.*

## THE 1993 MANPRINT PRACTITIONERS' FORUM

*The Future Vision of MANPRINT* was the theme of this year's MANPRINT Practitioners Forum held on 15-16 June in Springfield, Virginia. The forum, with nearly 170 practitioners in attendance, took place against the backdrop of a changing and uncertain environment within and surrounding the MANPRINT community.

Presenters at the forum reflected this turbulent climate in their contrasting opinions. Setting the stage in his keynote address, Dr. Robin Keese of the Army Research Laboratory, Human Research & Engineering Directorate (HRED), spoke of evolutionary developments in and prospects for the MANPRINT program. While pointing out strengths in the program, Dr. Keese also emphasized the need for effective MANPRINT tools, confidence in the program, and showing how MANPRINT effects the bottom line.



In a similar tone, some speakers, including Jim Dyser of HQ Information Systems Command and LTC Gary Bratt of the Office of the Surgeon General, focused on challenges and the need for improvement. These individuals, along with others, believed that participation and enthusiasm in the MANPRINT program require bolstering. Their point was clear: We cannot interest others if we are not interested ourselves.

But obstacles and problems were only one side. Other presentations highlighted MANPRINT success stories. For instance, Frank Gassens (Garrett Engine Division of Allied Signal Aerospace Company) presentation on the T800 engine, Ron Mundens (Atlantic Research Corporation) Observation Coding System (OCS) Tools, and Mike Kelleys (Armor Center) Combined Arms Training Strategy (CATS) demonstrated the positive influences of MANPRINT.

Further illustrating the success of MANPRINT, CDR Adrian Nance of the British Ministry of

Defence spoke enthusiastically of Britain's continued commitment to the MANPRINT philosophy, and to the Ministry's high level support for the future of the program.

Another positive note was presented by Al Sciarretta of the National Academy of Sciences. He spoke of MANPRINT's future concerning soldier survivability—MANPRINT's newest domain—and of MANPRINT's role in strategic technologies for the Army of the 21st century. Additionally, MAJ Richard Ward, (Fielding Officer, All Source Analysis System [ASAS]), discussed how MANPRINT has been effectively applied to tactical automated information systems development.

In addition to formal presentations, participants were free to ask questions and comment after each speaker. And later, during an open forum panel discussion, individuals were allowed to elaborate further on topics of interest. This interaction provided insight into many of the concerns still confronting MANPRINT practitioners, such as the role of MANPRINT in Automated Information Systems (AIS); the status of AR602-2 *Manpower and Personnel Integration (MANPRINT) in the Materiel Acquisition Process* and the *MANPRINT Users Source Guide (How to Manual)*; the need for additional MANPRINT educational opportunities; and the practicality and availability of MANPRINT tools.

While all questions were not answered and all problems not resolved, most attendees walked away feeling the forum was instructive and productive, and looked forward to further activity within the MANPRINT program.

*Note: Any suggestions for next year's forum will be appreciated. Please submit your ideas by filling in the Reader Response form at the end of this bulletin (mail and fax info is on the form).*

## Training

### MANPRINT Action Officers Courses

Class	Dates	Location
94-001	18 Oct - 28 Oct 1993	TEXCOM, Ft. Hood, TX
94-501	15 Nov - 19 Nov 1993	Motorola, Scottsdale, AZ
94-002	6 Dec - 16 Dec 1993	JFK Warfare Center, Ft. Bragg
94-003	3 Jan - 13 Jan 1994	Natick, MA
94-004	7 Feb - 17 Feb 1994	Ft. Belvoir, VA
94-005	7 Mar - 17 Mar 1994	QM School, Ft. Lee, VA
94-006	11 Apr - 21 Apr 1994	FA School, Ft. Sill, OK
94-007	16 May - 26 May 1994	CECOM, Ft. Monmouth, NJ
94-008	20 Jun - 30 Jun 1994	TBD
94-009	25 Jul - 4 Aug 1994	TBD
94-010	15 Aug - 25 Aug 1994	TACOM, Ft. Warren, MI
94-011	19 Sep - 29 Sep 1994	ADA School, Ft. Bliss, TX

*The purpose of the MANPRINT Action Officers Course (MAOC) is for officers, warrant officers, non-commissioned officers, and civilian personnel. You will leave this nine-day course better able to perform duties as action officers responsible for integrating MANPRINT considerations into the acquisition process for army materiel and automated information systems. An Officer Skill 6S is awarded to Captains, Majors, and Lieutenant Colonels, upon successful completion of the course.*

*The MANPRINT for Managers Course (MPMC) is designed to provide training to mid-level managers in Army organizations with MANPRINT missions and functions in order to facilitate the accomplishment of MANPRINT program goals. The course provides highly interactive instruction on MANPRINT and its background, philosophy, purpose and domains in two days.*

### MANPRINT for Managers Courses

Class	Dates	Location
94-001	5 Oct - 28 Oct 1993	CECOM, Ft. Monmouth, NJ
94-002	28 Oct - 16 Oct 1993	TEXCOM, Ft. Hood, TX
94-003	16 Dec - 13 Dec 1994	JFK Warfare Center, Ft. Bragg
94-004	13 Jan - 17 Jan 1994	Natick, MA
94-005	17 Feb - 17 Feb 1994	Ft. Belvoir, VA
94-006	17 Mar - 21 Mar 1994	QM School, Ft. Lee, VA
94-007	21 Apr - 26 Apr 1994	FA School, Ft. Sill, OK
94-008	26 Apr - 30 Apr 1994	ADA School, Ft. Bliss, TX
94-009	4 Aug - 4 Aug 1994	TBD
94-010	25 Aug - 25 Aug 1994	TACOM, Ft. Warren, MI

*The MANPRINT for Senior Leaders Seminar is a one hour seminar designed to give general officers and Senior Executive Service personnel an overview of MANPRINT. The Senior Leaders Seminar will be available upon request.*

For more information about these courses, or to enroll in one, contact:

Enrollment procedures: Ft. Lee, VA, DSN 589-4057 or COM (804) 765-4057

Information and other assistance: Ms. Dianne Leuker or Mr. Jan Dykhuis, DSN 221-3706/2098, COM (703) 325-3706-2098

Are you attending these meetings, conferences, and seminars? I would love to hear your comments and insights. Please submit a letter to the editor, an article, or any information you might want to contribute. All articles, comments, and suggestions are always welcomed. Please submit to: **MANPRINT Quarterly**, HQDA (DAPE-MR), Washington, DC 20310-0300, USA; AV 225-9213, COM (703) 695-9213, FAX (703) 695-3195,

Susan Culkin Freeman, Editor