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CONTRACT NO: DAMD17-90-C-0061

TITLE: PROGRAM AND MANAGEMENT SUPPORT FOR THE OFFICE
OF MILITARY PERFORMANCE ASSESSMENT TECHNOLOGY

PRINCIPAL INVESTIGATOR: Marvin Fitts

CONTRACTING ORGANIZATION: Morgan Management Systems, Inc.
5401 White Mane
Columbia, Maryland 21045

REPORT DATE: April 3, 1992

TYPE OF REPORT: Annual Report

PREPARED FOR: U.S. Army Medical Research and
Development Command, Fort Detrick
Frederick, Maryland 21702-5012

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13. ABSTRACT (Maximum 200 words) Although 10-Net LAN version 4.2 software was acquired to upgrade the OMPAT Field Office LAN and increase network functionality and speed, plans for installing the network upgrade were held in abeyance until beta testing of version 4.2 was completed. Prior to completion of 4.2 beta testing, 10-Net's 4.2 software fixes became available in Version 5.0. Installation of 10-Net version 5.0 10-Net and reconfiguration of the existing network nodes and software were completed during the second quarter of FY 92.				
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FOREWORD

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1. Contract No.: DAMD17-90-C-0061 and Modification Nos. P00001, P00002, P00003, P10004, and P20005
2. Contractor: Morgan Management Systems, Inc.
12075B Tech Road
Silver Spring, Maryland 20904

Principal Investigator: Marvin L. Fitts
Telephone No.: 301-236-5400
3. Date of the Report: 3 April 1992
4. Reporting period: 1 April 1991 - 31 March 1992
5. Project Title: Program and Management Support for the Office of Military Performance Assessment Technology (OMPAT).
6. Current staff with percent of effort of each on project:

Three Morgan Management Systems' positions are assigned full-time (100%) to this contract, and two positions are part-time. Hours and percent of effort for each position for this reporting period are listed below:

POSITION	FY92 2nd QTR	MAN HOURS CUMM 92	CUMM	% of EFFORT
PROJECT DIRECTOR	72	144	613	14.5
PROJECT MANAGER	496	971	3816	100.0
SYSTEMS MANAGER	426	886	3783.5	85.9
SEC/ADMIN ASST	449	886	3364	90.5
SECRETARY	75	150	414.95	15.1
TOTAL	1518	3006	11991.45	

7. Comments on administrative and logistical matters during the year:

a. Local Area Network (LAN): Although 10-Net LAN version 4.2 software was acquired to upgrade the OMPAT Field Office LAN and increase network functionality and speed, plans for installing the network upgrade were held in abeyance until beta testing of version 4.2 was completed. Prior to completion of

version 4.2 beta testing, 10-Net's 4.2 software fixes became available in Version 5.0. Installation of 10-Net version 5.0 10-Net and reconfiguration of the existing network nodes and software were completed during the second quarter of FY92.

b. Contract Modification P20005 dated 31 October 1991 increased contract funding \$350,000 for Fiscal Year 1992.

c. In response to a WRAIR requirement, plans were developed for modifying the contract to (1) extend the NCO Career History Project and (2) provide resources for the Operation Desert Shield Family Health and Performance Survey. While the proposed modification received program approval, the Small Business Administration disapproved the proposal on the basis that the proposed worked expanded the scope of work of the current contract.

d. Hardware/Software Acquisitions during the year are listed below:

Apr - Jun 91

Software:

- Adobe Plus
- ATM for Windows
- Upgrade-MS DOS 5.0
- Objectvision V1.0
- PC Paintbrush Upgrade
- Paradox Ver 3.5
- PerFORM PRO

Jul - Sep 91

Software:

- HiJaak 2.02
- Turbo C++
- DCA 10-Net Local Area Network Software Upgrade
- Database Toolkit for Windows
- Graphics Toolkit

Oct - Dec 91

Hardware:

- Soundblaster Sound Board
- Amplification Speakers for the Sound Board
- HP Deskjet 500C Color Printer
- IBM 6' Shielded Cable

Software :

- WordPerfect for Windows 5.1
- Objectvision 2.0
- American Electronic Dictionary
- Adobe Type Manager 2.0

Jan - Mar 92

Hardware:

- Teflon Network Cabling
- 200 Watt Power Supply

Software:

- Harvard Graphics for Windows
- Word for Windows 2.0
- Patriquin Utilities
- MathCad Windows Upgrade 3.0
- Advanced Math Application Pack, Mathsoft
- Ghost, Vermont
- 10 Net Version 5.0
- Hyperwriter
- Info Select
- Corel Draw 2.01 Upgrade
- World of Objectvision
- Video w/diskettes
- Norton PC Anywhere/LAN
- Quattro Pro 4.0

8. Summary of approximate Principal Investigator expenditures on the contract to date:

EXPENSE	BUDGET	2NDQTR EXPEND	CONTRACT CUMM	PROJECTED CUMM	VARIANCE CUMM/PROJ
DIRECT LABOR	\$346,876	\$33,582	\$251,715	\$258,998	-0.028
FRINGE BENEFITS	100,594	9,739	72,997	75,109	-0.028
DIRECT COSTS	216,376	13,598	187,537	183,807	0.020
SUBCONTRACT	12,000	0	16,500	12,000	0.375
OVERHEAD	324,406	27,321	253,800	254,359	-0.002
FEE	77,539	6,571	59,970	60,185	-0.004
TOTAL	\$1,077,792	\$90,810	\$842,521	\$844,459	-0.002

9. Progress during the year:

a. Administrative Support of Program Management.

(1) Operation of OMPAT Office. Established OMPAT administrative support procedures operated effectively throughout the year. Correspondence and reports control, the OMPAT Bulletin Board System, and the FAX operation are continuous functions for which effective procedures were developed, implemented, and refined.

(2) Telecommunications: During the year, the OMPAT Bulletin Board was reconfigured and subboards were renamed to

more accurately reflect on-line communication requirements. Out dated subboard names were changed to newer, more relevant names, as follows:

OLD

Main Board
Administration
Beta Test
Horizon Technology
New User

NEW

Main Board
Testing Applications
Synthetic Work Methods
Network Modeling

The New User subboard was taken off-line; new members must now call the OMPAT Field Office to register for BBS membership.

Utilization of the OMPAT BBS is currently recorded with monthly reports generated by the system. Records include a Call Log Report, File Log Report, and statistical reports on usage by BBS node, baud rate and hour of day. The following data will be reported quarterly:

Number of registered users:	252
Number of calls:	1827
Average duration of calls:	9.36 min.

(3) Local Area Network (LAN): Version 5.0 of 10-Net LAN software was installed on the OMPAT LAN during the second quarter FY92. Prior to network software installation, each node's hard drive was reconfigured and optimized, and individual disks were created for booting the LAN or DOS. Boot disks were attached to LAN nodes with a plastic diskette sleeve and velcro. A separate Read-Only copy of each nodes' boot disk is maintained by the LAN Administrator to facilitate recreation of boot disks in the case of disk failure or disappearance. A network configuration manual is currently being written.

Back-up software, running under MicroSoft Windows, was installed on the OMPAT Network. The software facilitates programming after-hours backup, so the OMPAT Bulletin Board System (BBS) can be stored on tape during the night. Night-time back-ups will avoid slowed service or down time during the regular work day.

Due to intermittent network failure, a cabling company was employed to examine the network cables for shorts or poor connections, and it was discovered the network's cabling was defective. Two machine connections were broken, several cables were damaged, and many cable connectors were in need of repair. New cable and connectors were installed where necessary, and the unexplained processor failures have ended.

Originally, a second fileserver was to be configured to mirror the existing fileserver and ease workload and increase storage

space, but the second fileserver was diverted and became a node for the OMPAT Bulletin Board System due to increased usage of the BBS.

b. Administrative Support of PIMS

(1) Data and Text Entry: Upon arrival in the OMPAT Field Office, technical, quarterly, annual, and final reports continue to be scanned and entered in the PIMS database. During the year, efforts were focused on entering JWGD3/OMPAT quarterly, annual, and final reports, and developing key-word jump files for the Hynet database. Over four hundred technical documents were scanned, edited, and entered into the PIMS Administrative database during the contract year. The Administrative section of PIMS holds reports from Joint Working Group on Drug Dependent Degradation of Military Performance (JWGD3 MILPERF) and OMPAT efforts.

NOTE: Quarterly systems status report: Data related to the PIMS database, the Technology Transfer database, and the OMPAT Product Archive are contained in the consolidated PIMS Quarterly Status Report, Appendix A.

(2) Literature Searches: During the year, the following literature searches were performed using BRS Colleague Information Management Service for Health Care Professionals:

- Speech
- Speech Patterns
- Speech and Timing
- Speech and Rhythm

The Speech searches produced 468 hits, and the Director, OMPAT ordered nine reprinted articles.

- Bootstrapping
- Diphenhydramine and Bioassays
- Diphenhydramine and Sedatives
- Diphenhydramine and Pharmacokinetics

From the Bootstrapping and Diphenhydramine references compiled in this search, a bibliography was developed and placed on the OMPAT BBS for download.

c. Administration of Contract, MIPR and Command Operating Budget (COB) Program Elements.

(1) Program funding documentation, initiated and developed for the FY92 OMPAT program, required adjustments due to service wide reductions in R&D funds. Recommendations on OMPAT program projects and contracts under the direction of the Director, OMPAT, were submitted to USAMRDC, SGRD-PLC for review.

Five program projects could not be funded. Three of those projects were recommended for no cost extensions, and two were discontinued. Required reports on active projects will continue to be monitored. Communication with principal investigators and participating laboratories continues through the medias of voice, FAX, and the OMPAT BBS.

(2) Procedures for completing Records of Environmental Consideration (REC) and obtaining Certification of Environmental Considerations from participating laboratories were developed and implemented, and REC's were processed for five OMPAT program projects.

(3) Contract, MIPR and COB program element deliverables continued to be monitored, and reporting requirements are being reinforced. A Reports Summary listing quarterly, annual, and final reports due from participating laboratories was published for each quarter. Reports received are listed in Appendix A and continue to be logged, reproduced distributed, and archived in appropriate project files and PIMS.

d. Management of OMPAT Meetings: The OMPAT Field Office Staff provided administrative support as required, including meeting and travel arrangements, audio/visual equipment, etc., for the following meetings during the year:

29 Jan 92	Synthetic Task Authoring System Group Meeting. San Antonio, TX. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR; LTC D. Penetar, USAMRDC; Ms. J. Marshall-Mies, Horizon Technology; Mr. F. Gray, Horizon Technology; Dr. D. Eddy, Systems Research Lab; Dr. J. Campbell, Systems Research Lab; Dr. S. Schiflett SUSOPS, Brooks AFB.
28 - 29 Jan 92	Site Visit Brooks Air Force Base, Sustained Operations Branch, Crew Technology Division. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR; and LTC D. Penetar, USAMRDC
13 Nov 91	OMPAT Review and Analysis, U.S. Army Medical Research and Development Command, Ft Detrick, Frederick, MD.
18 Oct 91	Synthetic Task Authoring System Group Meeting. OMPAT Field Office, Silver Spring, MD. Dr. F. Hegge, WRAIR; MAJ R. Kehlet, DNA; Ms. J. Marshall-Mies, HTI; Mr. F. Gray, HTI.
01 Oct 91	OMPAT Program Briefing, OMPAT Field Office, Silver Spring, MD. Dr. F. Hegge, WRAIR; COL F. Manning, WRAIR; LTC D. Penetar, USAMRDC.

12 Aug 91 Dr. F. Hegge, WRAIR and Dr. J. Woods, Krug Life Sci. Human Performance Assessment.

09 Aug 91 Synthetic Task Authoring System Group Meeting. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR/NHRC; Dr. S. Moise, NTI; Mr. J. Campbell, NTI; F. Gray, HTI; Dr. S. Schiflett, USAFSAM.

07 Aug 91 ANAM Synthetic Working Group Meeting. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR/NHRC; Dr. D. Thorne, WRAIR; Dr. Bob Schlegel Univ. of Oklahoma; Ms. K. Winter, NCTS; Dr. S. Moise, ERGOTECH; Dr. R. O'Donnell, NTI.

06 Aug 91 OMPAT Technical Advisory Group Meeting, Calverton, MD.

05 Jun 91 Modelling Issues Meeting. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR; Mr. B. Perez, SAIC; and Mr. J. Peters, SAIC.

04 Jun 91 Horizon Technology and Defense Nuclear Agency: In-Process Review. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR; Ms. J. Marshall-Mies, HTI; Mr. F. Gray, HTI; MAJ R. Kehlet, DNA; and Mr. R. Young, DNA.

05 Apr 91 OMPAT BBS AND ANAM Issues Meeting. Dr. F. Hegge, WRAIR; LCDR Reeves, OMPAT; Mr. S. Lacour, NAMRL; and Ms. K. Winter, NCTS.

01 Apr 91 OMPAT Program Planning. Dr. F. Hegge, WRAIR; Dr. T. Elsmore, WRAIR; and COL F. Manning, WRAIR.

In addition, the OMPAT Field Office Staff provided administrative support for the OMPAT section of the 1991 Bioscience Review. Support included design and fabrication of the title board for the AGARD/STRES Battery poster, and assembly and construction of the body of the poster. Provided support for the OMPAT Deputy Director in Presentation Poster Board fabrication. Made arrangements for the Director and Deputy Director's travel and accommodations at the Bioscience Review. The 1991 Bioscience Review was held at Aberdeen Proving Grounds, MD. on 7-8 August 1991.

OMPAT Field Office Staff provided support in the development of material for the OMPAT Review and Analysis R&A on November 13, 1991, at the U.S. Army Medical Research and Development Command, and the DNA OMPAT In-Process Review at the Hyatt Arlington, Arlington, VA on 3, 4, and 5 December, 1991. Assistance was

provided with the printing and reproduction of overhead graphics for the R&A and for the Director and Deputy Director's travel.

e. NCO Career History Project. Modification P00003 provided resources to support this project for abstracting, data analysis, and editing of NCO histories to describe the state of morale and discipline in the Army following Vietnam. The project was completed as of 30 September 1991. The following summarizes activities for the project:

Project Overview: This project involved abstracting, data analysis, and editing of 20 NCO career histories, totaling approximately 6,000 single-spaced pages of career history narrative. The project was modified over the course of the contract to allow for all available data to be utilized. Thus, the final project involved 20 histories, rather than the 6 or 7 originally contracted. The project involved two major efforts prior to the evaluation and implementation of the computer sorts: (1) preparing the data for sorting (the editing and abstracting processes); and (2) mastering the sort and retrieval software routines. Linspar Associates was responsible for locating, converting, cleaning, abstracting, and editing the manuscripts. COL Ingraham mastered the sort and retrieval software routines, and accomplished the majority of the data analysis (the computer sorts).

Preparing data for sorting/analysis (editing and abstracting). As of 30 September 1991, all 20 transcriptions had been located, converted into the common code environment, cleaned, and delivered to COL Ingraham. Of the 20 transcripts located and converted into the common code environment, 16 transcripts were also cleaned to break the extremely long paragraphs created by the transcription process. This pass could not be assigned a computer routine and had to be done manually. The remaining four transcripts had the paragraph breaks accomplished as part of the overall transcription cleaning.

Development, evaluation, and implementation of the computer sort routines.

Testing of the three sort and retrieval programs developed under this project was completed. COL Ingraham has evaluated the primary software. In addition, this effort developed a text outline procedure using the sort software to link the sorts to the outline. This feature of the software allows the operator to "fill-in" the substance of the outline as the computer hits are generated. This process has provided a rudimentary outline and time line for completion of a manuscript.

10. Brief Statement of plans for the next quarter.

a. Administrative Support of Program Management: Continue to perform office management tasks and refining procedures for

the telecommunications systems and the LAN. A network configuration manual with a system wiring diagram will be completed. Continue to provide administrative and travel support for the Director and Deputy Director. Known travel requirements include TDY travel and per diem requests for the Director to participate as a member of the U.S. Historically Black Colleges and Universities Source Selection Evaluation Board (SSEB) at the Army Research Office, Research Triangle, North Carolina and a TDY request for the Deputy Director to attend the Defense Nuclear Agency Radiation Risk Assessment Program Meeting in LaJolla, CA.

b. Administration of Contract, MIPR and COB Program Elements: Continue monitoring contract and MIPR project deliverables and the processing of funding documents for program projects and contracts. Develop FY93 budget and funding levels based on USAMRDC directions and prepare funding documents based on approved funding levels.

c. Administrative Support of PIMS: Continue to scan, edit, and enter technical documentation into PIMS. Investigate new methods for archiving, databasing, and using hypertext software to modernize and upgrade data transfer procedures.

d. Administrative Support of OMPAT Meetings: Continue to provide administrative support and audio/visual equipment for OMPAT meeting, as required.



Prepared by: M. L. FITTS, PROJECT MANAGER
C. L. KRESSLEIN, SYSTEMS MANAGER
C. A. DEW, ADMINISTRATIVE ASSISTANT

PERFORMANCE INFORMATION MANAGEMENT SYSTEM (PIMS)

Fiscal Year 1992
Second Quarter Report
1 January 1992 - 31 March 1992

A. PIMS CENTRAL REPOSITORY

TEXT SCANNING AND DATA ENTRY:

Reports and documentation submitted to the OMPAT Field Office continue to be scanned, edited, and transferred to the PIMS on a routine basis. During the year, over four hundred technical, final, annual and quarterly reports were scanned, edited, and entered into the PIMS Administrative Database.

B. TECHNOLOGY TRANSFER DATABASE

DISTRIBUTION IN RESPONSE TO QUERIES:

TECHNOLOGY DESCRIPTION	# DISTRIBUTED
AGARD/STRES Battery and Documentation 1991	10
Complex Cognitive Assessment Battery Documentation	3
Deuster, P. A., "Acute Antihistamine Ingestion Does Not Affect Muscle Strength and Endurance," USUHS	1
Deuster, P. A., "Exercise Testing and Physical Activity Appraisal," Annual Report, USUHS	1
Schrot, J., "Development and Evaluation of a Human Performance Assessment Battery," Final Report. NMRI	1
Dimsdale, J., Berry, C., et al., "A Quantitative Technique for Characterizing Tasks in Psychophysiology Studies," 1990	5
Englund, C.E., et al., "Unified Tri-Service Cognitive Performance Assessment Battery (UTC-PAB): I. Design and Specification of the Battery," (87-10).	3
Henningfield, J., "NIDA Intramural Program for Level I and II Screening of Pretreatment Drugs," Final Report. NIDA/ARC	1
Hegge, F. W., Bioscience Review Paper Submitted for the Proceedings entitled, "Performance Assessment and Risk Analysis," OMPAT, WRAIR	9

Hegge, F. W., OMPAT Presentation Slides Prepared for the
HIV Symposium, WRAIR:

"Modelling Real-World Performance: Performance Risk Analysis"	7
"Contributions of the U.S. Army to Psychological Technology and Methodology"	1
"The Role of Performance Assessment in Risk Evaluation"	3
"Real-World Performance"	3
Hegge, F. W., The Performance Assessment System: OMPAT	1
Gawron, V. et al., "Evaluation of Algorithms for Combining Independent Data Sets in a Human Performance Expert System."	1
Gawron, V., and Schiflett, S.G., et al., "The Effect of Pyridostigmine Bromide on Inflight Aircrew Performance," USAF TR-87-24.	2
Linnet, K., and Brandt, E., "Assessing Diagnostic Tests Once an Optimal Cutoff Point Has Been Selected," 1986.	5
MicroSAINT 3.2 Diskettes and Documentation on Disk	1
Mode, C., "Mathematical and Statistical Strategies for Biomarker Research of Aging," 1988.	5
Molina, E., "Continued Performance Assessment Methodology (PAM) Research (VORPET)," Annual Report, NAMRL	1
Montgomery, L.C., Kyle, S.B., et al., "Performance Physiology Assessment Battery (PPAB)," 89-10.	1
Montgomery, L. C., et al., "Performance Physiology Assessment Battery for Chemical Warfare Treatment/Pretreatment Drugs," USUHS TR-89-1.	2
Perez, W.A., et al., "Unified Tri-Service Performance Assessment Battery: Review and Methodology."	2
Reeves, D.L., et al., "Unified Tri-Service Cognitive Performance Assessment Battery (UTC-PAB): II. Software and Hardware Specifications," (SR89-1).	3
Schiflett, S. G., "Antihistamine Drugs and Performance on C3 Tasks," Final Report #87MM7505. USAFSAM	1
Schlegel, R. and Gilliland, K., "Evaluation of the Criterion Task Set - Part I Appendices A and B - Univariate Summary (U)."	2

Schlegel, R. and Gilliland, K., "(U) Evaluation of the Criterion Task Set - Part I CTS Performance and SWAT Date-Baseline Conditions."	2
Terfenadine (Seldane) Reference List, 1987	1
Systems Research Laboratory, "Comparative Effects of Antihistamines on Aircrews Under Sustained Operations."	1
Tharion, W. and McMenemy, D., "Effect of Two Different Antihistamines on Central Nervous System Function," View Graphs for OMPAT TAG Meeting from USARIEM	1
Walter Reed Performance Assessment Battery and Documentation	7
Wasserman, S., and Bockenholt, U., "Bootstrapping: Applications to Psychophysiology," 1989.	5

C. OMPAT PRODUCT ARCHIVE

OMPAT Program and other reports and reprints listed below are routinely received, reproduced, and distributed to OMPAT program participants.

Bolin, S., Nicholson, N., and E. Smootz, "Two Howitzer Crew Drill Models," Army Research Institute 90-13 Note, February 1990.

Brett, B. and L. Allender, "Performance Assessment Capability Feasibility Study," Army Research Institute 90-127 Note, Sept 1990.

Deuster, P.A., "PPAB Norm Development (PPABNORM)," Quarterly and Annual Reports # 90MM0531

Deuster, P.A., "Exercise Testing and Physical Activity Appraisal," Final Report # 90MM0531.

Dolatshahi, F., Kaul, D., Woolson, W., "Technical and User's Manual Fortran Edition Version 6 of ATR 6," SAIC Report #DNA-TR-91-165, February 1992.

Elsmore, T., "A Comparison of Polygraphic and Actigraphic Monitoring of Sleep using a 5-Channel Programmable-Sensitivity Actigraph," Quarterly and Annual Reports #91MM1505.

Englund C.E., "MicroSAINT Modeling of Individual and Team Sonar Performance During Shipboard Operations," Interim Report #90MM0527, December 21, 1990.

Fitts, M.L., MMS, "Program and Management Support for the Office & of Military Performance Assessment Technology," Quarterly and Annual Reports, #90C0061.

French, J., "MicroSAINT Model of Fatigue Assessment," Quarterly and Annual Reports, #90MM0504.

Herning, R., "NPPAB Norms in Non-Drug Using Males," Quarterly and Annual Reports, #90PP0807.

Hodgdon, J., "Predicted Body Temperature and Dehydration Responses to Microclimate Cooling Protocol," Technical Report, #90MM0527.

Holcombe, F., NBDL, "MicroSAINT Models of the Close-In Weapon System (CIWS): Sensitive and Conformal Mapping of Performance Data," Quarterly and Annual Reports, #90MM0526.

Marshall-Mies, J., "Risk Assessment Tools for Human Performance Assessment and Performance Decrement Prediction in Multiple Threat Environments," Quarterly Reports, Horizon Technology, DNA Contract #001-01-90-C-0118.

Molina, E., "Refinement and Implementation of the JWGD3 MILPERF-NAMRL Multidisciplinary Performance Test Battery (NMPTB)," Final Report.

Molina, E., "Continued Performance Assessment Methodology (PAM Research VORPET)," Final Report, #90MM0528.

Morrison, T., Webb, L., and Wildzunas, R., "The Effects of Fatigue on 41-Ft Utility-Boat Crewmembers," Naval Biodynamics Lab, May 1991.

Schiflett, S., "Antihistamine Drugs and Performance on C3 Tasks," Final Report, #87MM7505. February 1992.

Stanny, R., "Modeling for Human Performance Assessment," Final Report, #90MM0523.

Stanny, R., "MicroSAINT Applications : Documentation of JWGD3 MILPERF Performance Assessment System," Final Report, #90MM0523.

US Army Research Institute of Environmental Medicine, "Effects of High Terrestrial Altitude on Military Performance," Report #T2-92, December 1991.

Williams, D. and J.A. Hodgdon, "A MicroSAINT Model of Physiological Changes During Marching," Quarterly and Annual Reports, #90MM0527.

Williams, D., "MicroSAINT Modeling of Load Carriage and Sonar Performance during Land and Shipboard Operations," Quarterly and Annual Reports, #90MM0527.

Winter, K., "Development of the OMPAT Neuropsychological/ Psychomotor Performance Evaluation and OMPAT Data and Timing Support Programs," Quarterly and Annual Reports, #91MM1504.

OTHER PAPERS, BOOKS AND TECHNICAL REPORTS RECEIVED

Allen, R.W., Stein, A., and Miller, J., "Performance Testing as a Determinant of Fitness-for-Duty," 1990.

Anno, G., Dore, M. and Gamach, G., "An Assessment of Selected Crew Models as a Test Bed for Risk Assessment Tools," Pacific-Sierra Research Corporation, June 1991.

Anno, G., et al., DNA Technical Report "Biological Effects of Protracted Exposure to Ionizing Radiation: Review, Analysis, and Model Development," Pacific-Sierra Research Corporation Contract No. DNA 001-86-C-0307 and DNA 001-87-C-0104. November 1991.

Bradley, E., The Jackknife, the Bootstrap and other Resampling Plans, Society for Industrial and Applied Mathematics, 1982.

Caldwell, J.A., Carter, D.J., Stephens, R.L., Stone, L.W., Delrie, D.M., Pearson, J.Y., and R.R. Simmons, "Effects of the Chemical Defense Antidote Atropine Sulfate on Helicopter Pilot Performance: An In-Flight Study," USAARL, June 1991

Chubb, G., White Paper: "Tools Integration for Manned Systems Modeling,"

Chubb, G., Draft: "Systems Analysis Of Integrated Networks of Tasks (SAINT)."

Chubb, G., "A Comparison of Anxiety and Frustration Impacts on Performance in Manned Systems," 1982.

Cooper, Merri-Ann, Schemmer, F., Fleishman E., Levin, K., Harding, F., and J. McNelis, "Task Analysis of Navy and Marine Corps Occupations: A Taxonomic Basis for Evaluating CW Antidote/Pretreatment Drug," Final Report for the Advanced Research Resources Organization, July 1987.

Crowley, J., "Aeromedical Hazards of High Terrestrial Elevation: Effect of Altitude, Mountain Sickness, and Oxygen," Unpublished paper.

Deem, J., Manning, W., Knack, J. and J. Matesich, "The Automatic Extraction of Pitch Perturbation using Microcomputers: Some Methodological Considerations," Journal of Speech and Hearing Research, Vol 32, 689-697, September 1989

Deuster, P.A., "Battle Fatigue Identification, Management and Prevention Training," 1991.

Dimsdale, J. and C. Berry, et al., "A Quantitative Technique for Characterizing Tasks in Psychophysiology Studies," Psychosomatic Medicine, Vol 52, pg 435-44, 1990.

Eckerman, D., "An Overview of Animal Cognition," 1991.

Eckerman, D., "Developing a MetaAnalytic Database to Assess Performance Incapacitation."

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