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W. Steven Demmy

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**STUDIES OF SCHEDULING AND RESOURCE ALLOCATION TECHNIQUES  
FOR REPARABLE ITEM INVENTORY SYSTEMS**

March 20, 1980

AFOSR-76-3011-141

Dr. I. N. Shimi  
Air Force Office of Scientific Research  
AFOSR/NM  
Building 410  
Bolling AFB, D. C. 20332

Subject: Final Scientific Report for  
AFOSR Grant 76-3011

Dear Dr. Shimi:

This communication marks the completion of our research efforts for "Studies of Scheduling and Resource Allocation Techniques for Reparable Item Inventory Systems" funded by AFOSR Grant 76-3011. Since beginning these efforts, we have conducted a number of investigations to develop and evaluate improved procedures for the planning and control of Air Force reparable item inventories. These studies have ranged from the development and testing of large-scale optimization techniques for depot repair planning to the development and evaluation of multi-location inventory system distribution rules. The complete results of our efforts are documented in a series of thirty-two Working Papers. In several cases, these results were also presented at national meetings of technical societies or published in appropriate journals. A list of the working papers and publications funded by this grant is attached.

I have hand-carried copies of all of these papers to the Management Science Office (AFLC/XRS) at Headquarters, Air Force Logistics Command, and I have previously sent you copies of several of the papers which appear to be of general Air Force interest. In addition, I plan to send you copies of working papers completed since January, 1979 as soon as I get the copies back from Printing Services. If you would like copies of any other reports, please let me know.

We at Wright State sincerely appreciate the opportunity to work with AFOSR in the development and evaluation of improved logistics management techniques, and we hope to work with you again in the near future. I personally am very grateful for the advice and assistance that you have provided me in the past few years, and I hope we will meet again soon.

Sincerely yours,

*Steve*

W. Steven Demmy  
Associate Professor  
Department of Management

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Technical Reports and Publications  
Supported by AFOSR Grant 76-3011

- Demmy, W. Steven, and Andrew W. Lai, Multi-Item Scheduling with Reflection Programming, Working Paper 76-3011-1, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, 5 pp. Published in Conference Proceedings: The Problems of Disaggregation in Manufacturing and Service Organizations, The Ohio State University, Columbus, Ohio, March 1977. This paper was also published in the book Disaggregation: Problems in Manufacturing and Service Organizations, Martin Nijhoff Publishing Company, Boston, 1979, pp. 185-195.
- Demmy, W. Steven and James L. Minch, A FORTRAN Code for Fulkerson's Out-of-Kilter Algorithm, Working Paper 76-3011-2, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, February 1977, 16 pp.
- Demmy, W. Steven, Algorithms for Computing Repair Schedules in Probabilistic Environments, Working Paper 76-3011-3, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, April 1977, 26 pp.
- Demmy, W. Steven, Multi-Item Scheduling in Repairable Item Inventory Systems with Reflection Programming, Working Paper 76-3011-4, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, April 1977, 33 pp. Presented at the Joint National Meeting of Operations Research Society of America and The Institute of Management Science, San Francisco, Ca., May 1977, 33 pp.
- Demmy, W. Steven, GGUB: A FORTRAN Code for Generalized Upper Bounding (GUB) Linear Programming Problems, Working Paper 76-3011-5, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, May 1977, 33 pp.
- Demmy, W. Steven, EWAGNR: A FORTRAN Code for the Support Level Algorithm, Working Paper 76-3011-6, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, 39 pp.
- Demmy, W. Steven, Studies of Scheduling and Resource Allocation Techniques for Repairable Item Inventory Systems: A Progress Report and a Proposal for Additional Research, Working Paper 76-3011-7, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, March 1977, 18 pp.
- Demmy, W. Steven, Multi-Item Scheduling in Inventory/Repair Systems with Reflection Programming: An Overview, Working Paper 76-3011-9, Department of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, October 1977. Published in Proceedings of the 1977 Chicago Meeting of the American Institute for Decision Sciences, October 1977, p. 598.

- Demmy, W. Steven, Transients in M/G/∞ Models of Recoverable Item Inventory Systems, Working Paper 76-3011-10, Department of Administrative Sciences and Finance, Wright State University, January 1978, 22 pp. Presented at Ninth Annual Conference on Modeling and Simulation, University of Pittsburgh, Pittsburgh, Pa., April 1978, 5 pp. This paper was also published in Modeling and Simulation, Vol. 9, Part IV, Instrument Society of America, 400 Stanwix Street, Pittsburgh, Pa., 15222, April 1978, pp 1279-1284.
- Demmy, W. Steven, A Limiting Form of the Negative Binomial Probability Distribution, Working Paper 76-3011-11, Department of Administrative Sciences and Finance, Wright State University, January 1978, 5 pp.
- Demmy, W. Steven, Some Tables and Curves of Negative Binomial Probabilities and Depot Delay Factors for AFLC Recoverable Items, Working Paper 76-3011-12, Department of Administrative Sciences and Finance, Wright State University, January 1978, 55 pp.
- Demmy, W. Steven, A Tchebycheff Inequality for Optimum Reorder Levels in Stationary EOQ Inventory Systems, Working Paper 76-3011-13, Department of Administrative Sciences and Finance, Wright State University, January 1978, 12 pp.
- Demmy, W. Steven, A General Procedure for Depot Repair Planning, Working Paper 76-3011-14, Department of Administrative Sciences and Finance, Wright State University, January 1978, 32 pp.
- Demmy, W. Steven, On the METRIC Distribution Algorithm, Working Paper 76-3011-16, Department of Administrative Sciences and Finance, Wright State University, May 1978, 9 pp. Published in Modeling and Simulation, Vol. 10, 1979. W. G. Vogt and M. H. Mickle (editors), Instrument Society of America, 400 Stanwix Street, Pittsburgh, Pa.
- Demmy, W. Steven, RSIM -- The Repair System Simulator, Working Paper 76-3011-17, Department of Administrative Sciences and Finance, Wright State University, April 1978, 32 pp.
- Demmy, W. Steven, Studies of Scheduling and Resource Allocation Techniques in Repairable Item Inventory Systems: A Progress Report and a Proposal for Additional Research, Working Paper 76-3011-18, Department of Administrative Sciences and Finance, Wright State University, February, 1978, 27 pp.
- Demmy, W. Steven and R. M. Genet, On the Benefit-to-Cost Ratio of Base-Level Stocking Decisions for Low Demand Items, Working Paper 76-3011-19, Department of Administrative Sciences and Finance, Wright State University, April 1978, 20 pp.
- Demmy, W. Steven, Russel M. Genet, Thomas D. Meitzler, and Capt. R. E. Miles, Optimizing Tomorrow's Spares Procurement Through Increasing Availability of Today's Aircraft, Working Paper 76-3011-20, Dept. of Administrative Science and Finance, Wright State University, Dayton, Ohio 45432, June 1978, 5 pp. Published in Proceedings of the Seventh Annual DOD Symposium on Acquisition Research, Hersey, Pa. April 1978.

- Genet, R. M., W. S. Demmy, T. D. Meitzler, T. R. Edison, and D. J. Coleman, Identifying and Evaluating R & M Investments for Fielded Military Equipment, Working Paper 76-3011-21, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 4 pp. Published in 1979 Proceedings of the Annual Maintainability and Reliability Symposium, January 1979, pp. 243-247.
- Barlow, Mark A. and W. Steven Demmy, Source Listings and Variable Definitions for METRIC: A Fortran Code for Implementing Sherbrooke's METRIC Algorithm, Working Note 78-3011-22, Dept. of Administrative Science and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 18 pp.
- Tamavimok, Ted W., and W. Steven Demmy, A Fortran Program for Deterministic Material Requirements Planning, Working Paper 76-3011-23, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, January 1979, 27 pp.
- Barlow, Mark A. and W. Steven Demmy, METSIM: A Model for Simulating Two Echelon, Multi-Item Inventory/Repair Systems, Working Paper 76-3011-24, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, March 1979, 55 pp.
- Demmy, W. Steven, Maj. Donald F. Pederson, and Henry Triwash, A Study of the Predictive Accuracy of Flying Hour and Sortie Models for Estimating Remove and Replace Actions for C-130E Aircraft, Working Paper 76-3011-25, Dept. of Administrative Science and Finance, Wright State University, Dayton, Ohio 45435, February 1979, 22 pp.
- Barlow, Mark A. and W. Steven Demmy, Fortran Source Programs for Metsim: A Model for Simulation Two Echelon, Multi-Item Inventory/Repair Systems, Working Paper 76-3011-26, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, February, 1979, 79 pp.
- Demmy, W. Steven, and Victor J. Presutti, Multi-Echelon Inventory Theory in the Air Force Logistics Command, Working Paper 76-3011-27, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, May, 1979, 36 pp. Presented at Conference on Multi-Level Inventory Systems, Purdue University, 24-25 May 1979. This paper will be published in the book Multi-Level Production Inventory Systems: Theory and Practices, Leroy B. Schwarz (editor), TIMS Studies in Management Sciences, 1980.
- Nahmias, Steven and W. Steven Demmy, Support Levels in Inventory Management Systems, Working Note 76-3011-28, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45432. Presented at the New Orleans Joint National Meeting of ORSA/TIMS, April 1979.
- Demmy, W. Steven, An Analytical Sensitivity Analysis of the METRIC Flush-Out Phenomena, Working Paper 76-3011-29, Dept. of Administrative Sciences and Finance, Wright State University, Dayton, Ohio 45435, May, 1979, 38 pp. Published in 1980 Proceedings of Northeastern Meeting of American Institute of Decision Sciences (AIDS), Dayton, Ohio, April 1980, 4 pp.

Demmy, W. Steven, and Mark A. Barlow, CALPLOT: A Fortran Code for the IBM 1627 Plotter, Working Note 76-3011-30, Dept. of Management, Wright State University, Dayton, Ohio 45435, August 1979, 20 pp.

Demmy, W. Steven, A Simulation Study of the METRIC Flush-Out Phenomenon and a Comparison with Current Air Force Distribution Policy, Working Paper 76-3011-31, Dept. of Management, Wright State University, Dayton, Ohio 45435, Jan. 1980, 39 pp.

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