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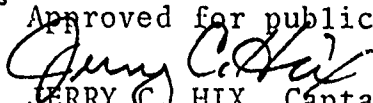
Air Force Institute of Technology  
Wright-Patterson Air Force Base, Ohio

January 1974

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Block 20.

This document presents a series of brief abstracts of the Master Theses written by the Class of 74A at the School of Systems and Logistics. The topics vary from "A STUDY OF THE METHODS BY WHICH THE UNITED STATES AIR FORCE CAN PROVIDE PROFESSIONAL MILITARY EDUCATION FOR SENIOR FOREIGN OFFICERS" to "A SIMULATION STUDY OF THE ECONOMIC IMPACT OF DSAR 4140.52 ON SLOW MOVING INVENTORY ITEMS AT THE DEFENSE ELECTRONICS SUPPLY CENTER." The master theses are generally concerned with topics of interest to the Logistics Manager. Although the specific problem area addressed may be highly specialized, the mode of attack emphasizes a strong research orientation to provide maximum support for any desired conclusions or recommendations.

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AU-AFIT-SL-2-74

GRADUATE MANAGEMENT PROGRAM

ABSTRACTS OF THESES

CLASS 74A

A School of Systems and Logistics AU-AFIT-SL Technical Report

Air University

Air Force Institute of Technology

Wright-Patterson AFB, Ohio

By

Department of Research and  
Communicative Studies

January 1974

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FOREWORD

This book contains abstracts of theses submitted to the Graduate Faculty of the School of Systems and Logistics. The theses represented by the abstracts contained in this booklet were submitted by the students of Graduate Logistics Class 74A in partial fulfillment of the requirements for the degree of Master of Science in Logistics Management. These abstracts are distributed to apprise Headquarters USAF, Major Air Commands, and other interested DOD agencies of the results of the student logistics research projects. Thesis Abstracts' Table of Contents is annotated with an A or B classification.

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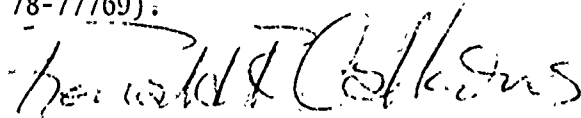
  
RONALD R. CALKINS, Lt Colonel, USAF  
Head, Department of Research and  
Communicative Studies  
School of Systems and Logistics

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January 1974

SLSR 3-74A

A STUDY OF THE METHODS BY WHICH THE UNITED STATES  
AIR FORCE CAN PROVIDE PROFESSIONAL MILITARY  
EDUCATION FOR SENIOR FOREIGN OFFICERS

Leslie Bunn, Wing Commander, RAAF  
Richard J. Steppic, Captain, USAF

The Nixon doctrine and the changing emphasis of military assistance have created a need for an increased professional military education program for foreign officers so that their countries may assume a greater portion of their own defense burdens with less advice and assistance from the United States.

The study identifies methods that can be used by the United States Air Force to provide professional military education for senior officers from allied, friendly and nonaligned nations. Extensive interviews conducted with senior officials currently involved in professional military education provide the primary source of data.

The study concludes that five methods are available to provide an increased program, and that the most feasible method is to establish a separate college for senior foreign officers co-located with the other USAF professional colleges and schools at Maxwell AFB, Alabama. 199 pp.

January 1974

SLSR 4-74A

A COMPARATIVE ANALYSIS OF THE RELATIONSHIPS OF TOTAL  
DISTRIBUTION COSTS BETWEEN AIRLIFT AND SEALIFT

Lionel A. Boudreaux, Captain, USAF  
Thomas J. Cooper, Lieutenant, USAF

Airlift and sealift are provided for the Department of Defense (DoD) by the Military Airlift Command (MAC) and the Military Sealift Command (MSC) respectively. Transportation services are paid for by the user through separate industrial funds. A comparison of the costing criteria used by each agency to establish tariffs, showing the relationship to user requirements, provides a foundation for measuring true DoD transportation costs. In order to make recommendations which would strengthen the compatibility of the tariff structures, we made a comparative analysis of the costing criteria presently used. The primary recommendations are:

- (1) Separate and exclude the training costs resulting from maintaining the strategic mobility policy.
- (2) Include the costs incurred at ocean terminals.
- (3) Exclude the cost of MSC project ships.
- (4) Include the pay of both civilians and military employees.
- (5) Continue the use of the industrial fund concept.

105 pp.

January 1974

SLSR 5-74A

A SIMULATION OF A MEDICAL CENTER  
PHARMACY INVENTORY SYSTEM

James F. Bloss, Captain, USAF  
Michael L. Moccia, Captain, USAF  
Michael J. Rowland, Captain, USAF

This thesis involves the construction of a computer simulation model of the Pharmacy inventory system at the Wright-Patterson Air Force Base Medical Center. Of special interest in the thesis is the use of two special-purpose FORTRAN computer programs, use of the GASP II simulation program, and use of the SIMFIT II curve-fitting program.

The thesis follows several steps in construction of the computer simulation. First, the in-being inventory system is examined and a computer simulation is formulated which models the subject system; formulation involves accumulation and useful arrangement of the raw data necessary to perform the simulation. Second, sensitivity analyses of the inventory system are performed using the constructed model. Finally, the thesis team interprets the analyses and makes recommendations to Pharmacy management, providing alternatives to current operating methods and procedures. 159 pp.



January 1974

SLSR 6-74A

AIR FORCE MANPOWER REQUIREMENTS DETERMINATION:  
AN ANALYSIS OF WORKER NONAVAILABILITY

Ernest H. Simms, Captain, USAF  
Frank C. Watson, Captain, USAF

The purpose of this thesis was to assess the use of constant nonavailable time estimates in the determination of Air Force manpower standards. Analysis of data from several sources revealed significant differences in the amount of time personnel in the various pay grades (military and civilian) were available for primary duty. The effect upon manpower standards caused by the use of erroneous availability estimates is simulated through the application of various estimates to a work center. The authors conclude that current methods of estimating worker availability are inadequate and recommend incorporation of availability estimates in work sampling studies. 130 pp.

January 1974

SLSR 7-74A

MOTIVATIONAL DIMENSIONS THAT MAY BE  
INFLUENTIAL IN OPTIMIZING JOB PERFORMANCE  
OF AIR FORCE OFFICERS

Thomas M. Cochran, Captain, USAF  
Allison G. Sconyers, Captain, USAF

Department of Defense officials and Air Force leaders, in particular, have encouraged the use of motivational techniques to increase job performance of personnel. This study was conducted to identify key motivational dimensions which would motivate Air Force officers toward improved job performance.

To accomplish this objective, Herzberg's motivator and hygiene factors were selected to specify the dimensions. Additionally, Vroom's expectancy theory was applied to determine the force or strength of each dimension through means of a multiplicative process using the level of importance and the respective amount of effort expended. The model was then applied to the following dimensions: achievement, recognition, responsibility, Air Force policy, work itself, interpersonal relations, incentives, advancement, supervision, and working conditions.

Data was obtained by means of a questionnaire administered to 117 Air Force officers enrolled in the School of Systems and Logistics.

With respect to importance and effort, there was only a slight difference in the values assigned the dimensions by the respondents, whereas, thru application of the model, the strength or force of achievement, work itself, advancement, and supervision was significantly greater than that of the remainder. Apparently for the first time, a multiplicative model combining both importance and effort and using Herzberg's factors for dimensions resulted in a marked difference among the dimensions, whereas the results obtained from the two parts taken by themselves rendered no significant differences.

Practical recommendations were offered for each dimension which could enable supervisory personnel at all working levels to increase the performance of their subordinates thru motivation. 105 pp.

January 1974

SLSR 8-74A

A COMPUTER SIMULATION OF A  
BASE TELECOMMUNICATION  
CENTER

William E. Glacemann, Captain, USAF  
Robert J. Robinson, Captain, USAF

The purpose of this study was to examine the use of computer simulation as an analytical aid in the management of a Base Telecommunications Center.

First, we discuss the communications system in general and then the Base Telecommunications Center in specifics. The management areas in which a computer simulation might be helpful are discussed.

Then, the nature of the populations of the variables and the problems used to define the boundaries of the system being modeled are presented and examined. The message processing times are used as a significant measure of performance in a Telecommunication Center.

The simulation output is compared to the output of the WPAFB Base Telecommunications Center and the differences are discussed. The simulation output is examined to determine its usefulness in determining the effect of different types of equipment, shift schedules, and system changes. The possibility of using a simulation to determine minimum requirements in terms of personnel and equipment was examined.

It is concluded that the cutting and proofreading functions should be redefined in order to provide a more realistic, and hence, a more valid model. Computer simulation can be used as an aid in the management of a Base Telecommunications Center. 228 pp.

January 1974

SLSR 9-74A

SUGGESTED METHODS FOR IMPLEMENTATION OF LIFE CYCLE  
COSTING TECHNIQUES IN THE PROCUREMENT OF AIR FORCE  
GENERAL PURPOSE COMMERCIAL VEHICLES

Ernst R. Karsten, Captain, USAF  
Larry T. McDaniel, Captain, USAF

The Problem and Its Importance

With decreasing Department of Defense budgets it is becoming more important to cut procurement cost and at the same time receive more for the money spent. One procurement method with this capability is Life Cycle Costing (LCC). Since vast sums of Air Force money are being spent each year on commercial vehicles, the LCC procurement method could become a viable alternative in their acquisition. This thesis is a study on two LCC techniques which could be applied in this acquisition. These methods are: Total Life Costing and Guaranteed Maintenance.

Methodology Used in the Study

The primary efforts in compiling this thesis were spent in researching all methods of LCC. Sources used in gathering this information were limited primarily to four areas: (1) Commercial advertisement; (2) Commercial publications, i. e. magazines, books, etc.; (3) Interviews with government employees; (4) Government and Government associated publications. These sources were reviewed with particular emphasis placed on finding and developing LCC methods and techniques which would be most applicable to the procurement of commercial vehicles.

Conclusions

Total Life Costing could be used to procure commercial vehicles with the help of present computer systems. However, a modification to present vehicle maintenance and operating costs data would have to be made. This LCC method might or might not save the Air Force money, but would insure the Air Force of buying quality vehicles at lowest prices.

77 pp.

January 1974

SLSR 10-74A

AN ATTITUDINAL ANALYSIS OF  
AIR FORCE RACE RELATIONS TRAINING

Charles J. Breitzke, Jr., Captain, USAF  
Michael T. Ferrara, Captain, USAF

The training which is the subject of this thesis is the 18-hour course of instruction which is required, on an annual basis, for all Air Force military personnel. An attitude questionnaire, composed by the authors, was used to determine racial attitude indices of subjects who had just completed the training and of a control group who had not been exposed to the course.

In the analysis of the results, only Blacks and Whites were compared in attitudinal tendencies, and the only other division which was considered was that between commissioned officers and enlisted personnel. Overall results of the study indicated a slightly positive difference in racial attitude on the part of the persons who attended the training. 78 pp.

January 1974

SECRET-74A

FLEXTIME: A MODIFIED WORK FORCE SCHEDULING TECHNIQUE  
FOR SELECTED HEADQUARTERS AIR FORCE LOGISTICS COMMAND  
ORGANIZATIONS

Reed T. Kimzey, Major, USAF  
Samuel M. O. Prince, Captain, USAF

In today's budget constrained defense environment, the military services are having to compete more than ever before with the private labor market for qualified personnel. Managers are seeking better ways to improve efficiency, productivity, and job satisfaction in the belief that job satisfaction enhances the motivation to produce. We believed that the type of work schedule that employees are expected to work is directly related to job satisfaction. This thesis discusses the advantages and disadvantages of one work force scheduling technique--flextime.

We found a large number of studies concerning work schedules that were directed toward private industry. We were interested in determining if a flextime schedule could be put into effect in a governmental organization such as Headquarters AFIC. Our study objectives were to determine the feasibility, desirability, and specific advantages and disadvantages of putting flextime into effect in selected AFIC organizations. To satisfy our objectives, we obtained sample data from three sources; an opinion survey for AFIC employees, a structured interview procedure for AFIC managers, and authoritative AFIC leave absence records. From these data, we were able to provide statistical and subjective answers to our research questions.

The study concluded that flextime would be desirable in terms of socio-economic, behavioral, attitudinal, productivity, and job satisfaction factors. Our sample of Headquarters AFIC personnel believed that flextime would create many meaningful advantages to the work environment. However, it is not feasible to put flextime into effect at this time because of the legal restrictions of Title 5, U. S. Code, and negotiated union agreements. Also, other barriers exist such as managerial resistance and energy crisis considerations. We discuss these factors in detail in the thesis. 124 pp.

January 1974

SLSR 12-74A

FACTORS AFFECTING THE MILITARY  
COMMUTER'S CHOICE OF TRAVEL MODE

Robert E. Bryan, Captain, USAF  
Robert E. Chapman, Captain, USAF

Several major problems in modern society have developed from increased use of the automobile for work commuting. This thesis develops these major problems--traffic congestion, air pollution, and energy consumption--along with the rise in importance of the automobile and the decline of mass transit systems of all forms. A solution to these major problems is presented in the form of bus mass transit.

A research questionnaire was given to residents of Wright-Patterson AFB military housing who had access to a free military bus line usable for work commuting. Respondents provided limited biographical data used to answer a research question concerning whether users and non-users differed with respect to certain selected variables: military rank, age, number of automobiles in the family, working status of the spouse, work reporting time, automobile driving time, walking time from parking place to place of work, and total trip time by automobile. Results indicated significant differences with respect to: number of automobiles in the family, working status of spouse, walking time from parking place to place of work, and total trip time by automobile.

Additionally, it was hypothesized that military users and non-users ranked service first, comfort second, and free fare last in their ordering of factors affecting the decision to use or not use the base bus for work commuting. Testing of the hypothesis validated this order for non-users but indicated a different order for users--service and free fare evenly divided, then comfort. 111 pp.

January 1974

SISR 13-74A

G-200 BEARING: AN ANALYSIS CONCERNING THE  
RELIABILITY OF AN INEXPENSIVE PART AND  
ITS EFFECT ON DEPOT LEVEL REPAIR COST

by

John W. Burt, Lieutenant Colonel, USAF  
Robert T. Benbow, Lieutenant, USN

Little management attention has been paid to inexpensive parts critical to the operation of defense weapons systems that incur large maintenance costs. This Costly Replacement of Inexpensive Parts (CRIP) concept was analyzed in one instance; the G-200 gyroscope bearing of the LN-12 platform.

Statistical testing supported the first research hypothesis that a significant difference existed between the failure rates of competing bearing vendors during the G-200 gyroscope depot level repair process. The second research hypothesis that a difference existed between the failure rates of competing bearing vendors during field operations could not be supported. The third research hypothesis was tested by using a mathematical cost model to simulate the total depot variable costs involved in repairing gyroscopes returned because of defective bearings. Using historical data furnished by the depot as inputs to the model, costs were developed which supported the third hypothesis that there was a difference in the cost incurred between two competing bearing vendors that was out of proportion to the initial procurement cost of the bearing itself.

The CRIP concept was supported in the case of the G-200 bearings. These precision instrument bearings did in fact represent an inexpensive part (\$38 each) that was critical to the effectiveness of an aircraft's inertial guidance system and generated high replacement costs when failures occurred. 96 pp.



January 1974

SLSR 14-74A

INTERDICTION OF A CAPACITATED  
LOGISTICS NETWORK

James F. Beaumaster, Major, USAF  
David P. Robinson, Major, USAF

In a tactical war environment, the commander of friendly forces faces a major problem in determining the most effective use of available aircraft sorties. Aircraft can be launched in different roles, such as air superiority, air interdiction, and close air support. The different roles compete for available aircraft resources so that complete satisfaction is rarely attained for each type role. The commander needs a method to determine potential results of sortie application in each of the air roles. The objective of this thesis is to provide a method for determining potential results in one of the air roles, air interdiction of a capacitated logistics network. In an effort to measure interdiction effectiveness, a network model is developed to provide air interdiction planners with an analytical method for reducing enemy supply thrupt. The network model represents the tonnage capacity of a ground transportation network; the assignment of interdiction attacks against network targets; and the changes in thrupt tonnage, network routes, and thrupt costs which result from these interdiction attacks. The model answers two general questions about air interdiction effectiveness: 1) whether or not a capacitated transportation network can be interdicted to reduce flow capacity below enemy supply requirements; and 2) whether or not available interdiction aircraft have a satisfactory probability of attack success. The model is converted to a computer language, FORTRAN, for rapid processing of model variables. A user's guide is included in Appendix A which explains how to input model variables into a remote computer terminal. 159 pp.

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SLSR 15-74A

MOTIVATION OF MAINTENANCE PERSONNEL TO  
WORK PARTICULAR SHIFTS

Robert D. LaRue, Captain, USAF  
Gary D. Metzinger, Captain, USAF

The problem addressed by the authors in this research was to identify and evaluate the importance of selected factors of the employees and their environment which might motivate them to work non-day shift schedules in Air Material Area (AMA) Aircraft Maintenance functions of the Air Force Logistics Command. Four general factor areas were considered: selected individual characteristics, hygiene, motivational and off-the-job aspects. A mailed questionnaire was developed to measure the perceived importance of selected factors with respect to shift preference. Data was gathered from a sample of 204 employees randomly selected from the Aircraft Divisions of the five AMA's. The results of the research indicated three sub-factors that were significantly different across shift preference groups. These sub-factors were age, grade classification and salary. The other 13 sub-factors were not supported as being different across shift preference groups. The implications of these results reinforce the intuitive conclusion that shift preference is largely tempered by differential pay considerations. 96 pp.

January 1974

SLSR 17-74A

AN ECONOMIC ANALYSIS OF THE RELEVANT COSTS  
IN AIR FORCE BUILDING REPLACEMENT

Melville M. Andrews, Jr., Captain, USAF  
Jack L. Joines, Captain, USAF

This thesis describes and analyzes the relevant costs in an Air Force building replacement consideration and illustrates, through the use of economic analysis, the effects of the described relevant costs on the replacement decision. A regression analysis is accomplished to illustrate a method of predicting building maintenance expenditures. Building deterioration, obsolescence, and effectiveness are discussed in terms of their effects on maintenance costs and the performance of the assigned function. An economic analysis of a hypothetical replacement consideration illustrates the sensitivity of the replacement decision to inclusion of the costs of obsolescence and reduced functional performance. Deferred maintenance is assessed in terms of its effect on functional performance. The authors conclude that the attendant costs of deterioration, obsolescence, and facility ineffectiveness are essential to a creditable facility replacement decision. 92 pp.

January 1974

SLSR 18-74A

AN ANALYSIS OF THE RELATIONSHIP  
BETWEEN SELECTED FACTORS AND CONCERN FOR PRIVACY  
AS EXPRESSED BY OCCUPANTS OF AIR FORCE MILITARY FAMILY HOUSING

Constantin Costen, Jr., Lieutenant Colonel, USAF  
John W. Hocking, Major, USA

The Problem and Its Importance

A perplexing problem confronting military family housing planners is to determine how to best accommodate occupant's needs and desires within the monetary and space constraints imposed. Research conducted in the area of Environmental Psychology indicates that important relationships exist between man's behavior and the degree of privacy he is accorded. The neglect of privacy considerations in Air Force housing design is considered to be an underlying cause for dissatisfaction among occupants.

Methodology Used in the Study

Results of the Air Force's portion of the DoD Housing Opinion Survey (1972) were stored on magnetic disc and a computer assisted analysis was made of 18,981 questionnaires. Based on the 14 listed factors an occupant considered to be most and second most important, he was placed in one of three categories indicating his concern for privacy. Concern for privacy and level of satisfaction were measured against various factors including category and type of quarters.

Conclusions

Privacy considerations are important to military family housing occupants. The 1972 DoD Survey failed to adequately address the factor of privacy as an influence on occupant opinion. A multi-disciplined approach is necessary to relate the factors concerning environmental psychology to house planning and construction in order to provide more livable communities for the occupants of military family housing. 155 pp.

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SLSR 19-74A

HIERARCHICAL MODEL OF OBJECTIVES AND PERFORMANCE  
INDICATORS FOR THE BASE CIVIL ENGINEER

Palmer G. Arnold, Captain, USAF  
David F. Fink, Captain, USAF

The United States Government has approximately seventeen billion dollars invested in hundreds of facilities located at numerous Air Force bases throughout the world. The operation and maintenance of these facilities is the responsibility of the Civil Engineering organization. Currently the base level Civil Engineering organization uses a management system based on objectives and performance indicators conceived by higher Headquarters. Many believe that the current system's objectives are not the true objectives for the Base Civil Engineering organization and that the current system provides more information than can be used effectively. The purpose of this research effort was: (1) to determine the primary organizational objectives, (2) to determine secondary organizational objectives, (3) to determine what performance indicators or "Need to Know" information is required by the Base Civil Engineer to monitor progress toward these objectives, and (4) to determine how often these performance indicators need to be reviewed. Literature was reviewed, interviews were conducted, and two questionnaires were distributed to a sample of Civil Engineering managers. All of the data gathered was analyzed and used to develop a hierarchical model of objectives and performance indicators. This model was proposed as representative of the BCE's true objectives and was suggested as a method of reducing the information provided to the BCE. 195 pp.

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SLSR 20-74A

THE EFFECT OF INTERRUPTIONS ON THE  
PRODUCTIVITY OF CIVIL ENGINEERING  
PLANNING TECHNICIANS

Dennis F. Hlad, Captain, USAF  
Paul D. Vetter, Captain, USAF

In Civil Engineering Planning Shops there is presently a significant discrepancy between the amount of time originally programmed for planned work orders and the time that is actually spent in the performance of planned work. This discrepancy has been attributed to the low productivity ratio of the planning technicians (P-Ts).

Several factors can adversely affect the performance of P-Ts. The most significant factor, however, appears to be outside interruptions (personal and telephone interruptions). The problem with interruptions is that each time a person stops or lets his attention turn to something else, time is wasted getting started again.

The purpose of this thesis was to evaluate the effects of interruptions on P-T productivity and quality. This was accomplished through an experimental field study conducted within the CE Planning Section of Wright-Patterson Air Force Base Civil Engineering Squadron. The experimental design employed the principle of matched pairs and used interruptions as the "treatment" variable.

The results of this study indicate that interruptions have a significant effect on the productivity of P-Ts. The study also gave strong reason to believe that interruptions have an adverse effect on work quality. 67 pp.

January 1974

SLSR 21-74A

A COST-BENEFIT ANALYSIS OF COMPETITIVE VERSUS  
SOLE-SOURCE PROCUREMENT OF AIRCRAFT  
REPLENISHMENT SPARE PARTS

Alan E. Olson, Major, USAF  
James A. Cunningham, Captain, USAF  
Donald J. Wilkins, Captain, USAF

The objective of this research was to determine the effect of competition on the cost of aircraft replenishment spare parts.

A conceptual model was presented which depicts the relationships between the various cost factors and the identifiable benefits of competition. It indicates that the net savings (loss) accompanying a shift from sole-source to competitive procurement is a function of gross savings (loss) in procurement dollars, procurement data costs, administrative costs, quality costs, and reliability costs.

As a result of this research the authors reached the following conclusions: the most likely estimate of the savings realized by the Air Force through the solicitation of competition is 10.85 to 17.5 per cent, depending on the order quantity; procurement data costs do not significantly detract from these savings; administrative costs may be a negative or a positive factor, depending on the particular circumstances of the procurement; and, the net effect of competition could be highly sensitive to quality and reliability costs. 120 pp.

January 1974

SLSR 23-74A

THE IMPACT ON AVIONIC LOGISTIC SUPPORT  
COSTS OF FALSE MAINTENANCE ACTIONS

George W. Pickard, Major, USAF  
Quintin L. Waterman, Major, USAF

The objectives of this research were (1) to describe, quantitatively, the impact of remove, test OK occurrences on base level logistic support costs and (2) to derive a model to predict these occurrences in terms of information available prior to system acquisition. Such a model will increase the accuracy of predicted logistic support costs for new or proposed systems.

Limiting the scope of the research effort to base level, avionic, line replaceable unit maintenance, the authors selected a sample of 100 units from four aircraft currently in the AF inventory. The analysis reveals that test OK occurrences represent thirty percent of the suspected failures which are removed from the aircraft for repair. Twenty three percent of the manhours consumed to base level avionic maintenance were involved with a test OK unit.

Further analysis shows a strong correlation between the test OK rate and the actual failure rate of line replaceable units. A regression analysis derives an equation which explains sixty percent of the variation for the sample.

Recognizing that remove, test OK occurrences are a human problem the authors recommend a specific effort to reduce these occurrences and to predict even more accurately the remove, test OK rate of new or proposed systems. 86 pp.



January 1974

SLSR 24-74A

AN ANALYSIS OF THE 66XX AFSC  
WITHIN AFLC

William R. Drake, GS-12, USAF  
Michael F. Loughman, Jr., Captain, USAF

This thesis discussed the Logistics Plans and Programs Officer (Air Force Specialty Code 66XX) within the Air Force Logistics Command (AFLC). A brief history of the specialty code was presented, and a model of AFLC's current Logistics Plans and Programs Officer was developed in terms of education, experience, and skills. Data obtained from a survey of 214 AFLC 66XX officers was presented and comparisons were made with the current model. In addition, a future model was developed which projects the education, experience, and skill requirements for AFLC 66XX officers in the post 1980 time period. Comparisons of the survey data and the future model indicated areas where deficiencies existed. Finally, recommendations were proposed that could ensure that the education, experience, and skills of the logistics officer are compatible with AFLC's requirements in the 1980's. 123 pp.

January 1974

SLSR 25-74A

JOB ENRICHMENT: POSSIBLE CRITERIA  
FOR APPLICATION IN AIR FORCE  
ORGANIZATIONS

Richard L. Clarke, Captain, USAF  
Peter T. Pesenti, Captain, USAF

The basic problem addressed by this thesis was the identification of specific criteria for determining the applicability of a job enrichment program in a specific career area. In identifying criteria those intrinsic and extrinsic aspects of a job, which act as determiners of job satisfaction/dissatisfaction, were identified.

Survey data were obtained using the Job Description Index (JDI) which measured job satisfaction on five job dimensions: work, supervision, pay, promotions, and co-workers. The JDI was administered to a random sample of 625 item managers at the five Air Force Logistics Command Air Materiel Areas.

Analysis of data revealed that twenty-six percent of the item managers surveyed were dissatisfied with their job. The most dissatisfying job dimensions were promotions, followed by the work itself. From these results the authors concluded that a job enrichment program may be of possible benefit in selected organizations.

In summary, the authors have developed a methodology for assessing worker attitude prior to the application of a motivational technique. The key element of the methodology is the empirically-based determination of the source or sources of job dissatisfaction. Once the source is isolated, the specific treatment can be applied.  
111 pp.

January 1974

SLSR 26-74A

## HISTORY AND EVALUATION OF THE AIR FORCE DEPOT LEVEL EOQ INVENTORY MODEL

James T. Coile, Captain, USAF  
Dennis D. Dickens, Captain, USAF

The Air Force depot level inventory model has passed through several stages of development since the economic order quantity (EOQ) concept was implemented in 1957. This paper chronicles EOQ development at the depot level and provides an insight into current and projected models used in the management of expendable items.

Depot level management of expendable items has followed a modified EOQ concept which can be described in four stages: (1) no economic ordering concept, (2) a range concept designed to approximate the benefits of the EOQ method, (3) arbitrary adjustment of the Wilson EOQ cost factors, and (4) using the Wilson EOQ formula with determined cost factors.

All past EOQ models and those to be used in the Advanced Logistics System (ALS) rely on the Wilson EOQ formula. The assumptions of the models have not changed over the years, but assumptions used to determine the cost factors have varied. A brief sensitivity analysis to compare the effects of incorrect demand or cost factors on both the current and ALS model is presented.

The authors believe that several changes can be made to correct inadequacies in using historical price information and the determination of future price data. Suggestions for calculating the obsolescence factor and "quantitative" requirements are presented. More emphasis on research into low-demand, high cost, item management is also recommended.  
156 pp.

January 1974

SLSR 27-74A

A STUDY INTO THE FEASIBILITY  
OF INCORPORATING THE AECF INTO  
THE AFROTC PROGRAM

Philip D. Joulilian, Captain, USAF  
Harrington L. Wilmoth, Captain, USAF

This thesis discusses the desirability/feasibility of incorporating the Airman Education and Commissioning Program (AECF) into the Air Force Reserve Officer Training Corps (AFROTC) program. As background, a brief history of the AECF and AFROTC is presented.

The thesis discusses the cost factors associated with the present commissioning procedures and provides an analysis of what might be expected under a combined program. An analysis of AECF personnel reaction to a joint program is also provided. Lastly, the thesis discusses the legal implications of any proposed program merger. 94 pp.

January 1974

SLSR 28-74A

A STUDY OF PEACETIME MULTISHIFT OPERATIONS  
WITHIN AIR FORCE LOGISTICS COMMAND

Jean M. LaFleur, Jr., GS-12, Dept. of AF  
Susano Masconro, GS-09, Dept. of AF

The objective of this study was to look at multi-shift operations in the aircraft maintenance facilities within the Air Force Logistics Command with a view towards reducing the amount of shift differential paid.

Literature was examined for information about the provisions of law and Labor-Management agreements that would restrain Management's decisions to change hours of shift work and to determine the effects of shift work on productivity. Supervisors at Ogden Air Materiel Area, Ogden, Utah, were interviewed to determine the nature of constraints requiring the use of multishift activity.

It was found that, while hours of work are a management prerogative, decisions to change hours of work based on cost avoidance criteria have been successfully contested in some cases, by the labor unions. There was a lack of agreement among the various authors about the effect of shift work on productivity. Recommendations for management actions were to: refrain from overcommitting the aircraft maintenance facilities beyond a one-shift-per-day, forty-hour week; refrain from imposing arbitrary flowtime deadlines on all levels of maintenance activities; make aircraft maintenance line supervisors accountable for all direct support personnel held over beyond the day shift; and, encourage informal discussions between the aircraft maintenance line and direct support supervisors to find ways to reduce the use of stand-by personnel on swing and midnight shifts. 95 pp.

January 1974

SLSR-29-74A

A DESCRIPTION OF EXPECTED FAILURE RATES  
OF NEWLY ACQUIRED COMPONENTS PRIOR  
TO STEADY STATE

Richard F. Erickson, Captain, USAF  
Donald H. Hammond, Captain, USAF

A study of the effects on the population failure rate of component failures during the period of transition to steady state is presented. Comparisons between the simulated failure rates and the system failure rate predicted under the present Air Force assumption of an underlying Poisson process are accomplished for various MTBF's and parameters of the Weibull distribution. The decreasing hazard, constant hazard, and increasing hazard functions are studied and presented.

This study was performed as a simulation of the transition period using the GASP II package developed by Pritsker and Kiviat. Such a simulation package greatly simplifies the required programs necessary to be written. The computer program used in this study is included as part of this paper.

The results of the study indicate there are significant differences between the present Air Force methods of predicting failure rates and the simulated failure rate distribution during the transition period. Plots of the simulated results compared to the present Air Force methods indicate these differences could reach 100% of the Air Force estimated failure rate when the Weibull shape parameter is greater than 3 and the components MTBF exceeds 1000 hours.

The study indicates that component failure rates, which can be described by a Weibull density function, will result in oscillations about the present Air Force computed rate at steady state. 141 pp.

January 1974

SLSR 30-74A

AN ANALYTICAL APPROACH TO OPTIMIZING AIRFRAME  
PRODUCTION COSTS AS A FUNCTION OF PRODUCTION RATE

Peter F. Fazio, Captain, USAF  
Stephen H. Russell, Captain, USAF

This thesis evaluates all airframe cost elements in terms of their sensitivity to production rate and provides an analytical methodology by which the optimal production rate can be determined.

Several fundamental concepts which pertain to airframe cost and schedule analysis are introduced and reviewed. These include flow time accelerations generated by the learning curve, the impact of duplicate stations on the rate of learning, and capacity constraints on rate of output.

The analysis of individual airframe cost elements explains what each element of cost represents, how it is estimated and what effect rate of production has on its magnitude.

The authors introduce an original production scheduling methodology which provides the analytical framework for relating cost elements to plant production rate options.

The authors conclude that the correct decision variables for the production rate and cost problem are "peak production rate," "number of final assembly areas," and "number of work shifts," and that the optimal production schedule is determined by an iterative costing sequence which incorporates all possible decision variable values. 161 pp.

January 1974

SI:SR 31-74A

AN ANALYSIS OF THE EFFECT OF REPLACING  
INDIVIDUAL TOOL KITS WITH  
COMPOSITE TOOL KITS

William A. Vincent, WS-19, USAF

This thesis analyzes the effect of replacing individual tool kits with composite tool kits. Specifically addressed is the effect of the CTK on tool inventory, the cost of tool control, and tool caused F O D, the acceptability of the CTK, and what correlated benefits and liabilities can be expected from the implementation of the CTK concept.

The populations sampled were those USAF maintenance activities that have implemented the CTK and similar USAF maintenance activities using the individual tool kit.

The data indicated there is a reduction in tool inventories under the CTK concept, but the costs of tool control are not reduced. The data further indicated the ITK was more acceptable than the CTK to maintenance personnel and the liabilities associated with the implementation of the CTK may outweigh the benefits. The data relating to F O D was inconclusive. 95 pp.



January 1974

SLSR 32-74A

A SIMULATION STUDY OF THE ECONOMIC IMPACT  
OF DSAR 4140.52 ON SLOW MOVING INVENTORY  
ITEMS AT THE DEFENSE ELECTRONICS  
SUPPLY CENTER

Ramon E. Mendez, Lcdr., USN  
James J. Ramsey, GS-11, USN

The objective of this thesis was to study the economic impact of the policy and criteria contained in Defense Supply Agency Regulation (DSAR) 4140.52 on slow moving inventory items at Defense Electronics Supply Center (DESC). It was decided that the subject could best be studied using a computer simulation model.

The model was designed using information and data obtained from DESC. It simulates the management of slow moving items under policies used at DESC prior to FY 1972 and under current policies prescribed by DSAR 4140.52. The model duplicates as close as possible the decisions and procedures used under each of these two policies. After the model was developed and validated it was used to study slow moving items and to develop estimated management costs for each of the two policies mentioned.

The final results of the simulation indicate that the current policies prescribed by DSAR 4140.52 generate higher management costs than the old DESC policies when applied to DESC slow moving inventory items. The results also indicate additional areas of study for which the model developed for this thesis could be used. These areas for further study include the specific criteria contained in DSAR 4140.52 for the assignment and reassignment of Supply Status Codes. 143 pp.

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