NASA

Management
A Bibliography for NASA Managers

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MANAGEMENT

A BIBLIOGRAPHY FOR NASA MANAGERS

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FOREWORD

Management gathers together references to pertinent documents — reports, journal articles, books — that will assist the NASA manager to be more productive. Items are selected and grouped according to their usefulness to the manager *as manager*. A methodology or approach applied to one technical area may be worthwhile for a manager in a different technical field.

Individual sections can be quickly browsed. Indexes will lead quickly to specific subjects or items.

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A Bibliography for NASA Managers

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HUMAN FACTORS AND PERSONNEL ISSUES

Includes Organizational Behavior, Employee Relations, Employee Attitudes and Morale, Personnel Management, Personnel Development, Personnel Selection, Performance Appraisal, Training and Education, Computer Literacy, Human Factors Engineering, Ergonomics, Human-Machine Interactions.

A85-13587#
TRAINING AND DEVELOPMENT OF ENGINEERS AT THE AIR FORCE FLIGHT TEST CENTER - AN OVERVIEW
R. E. HART (USAF, Flight Test Center, Edwards AFB, CA) AIAA, AHS, ASEE, *Aircraft Design Systems and Operations Meeting*, San Diego, CA, Oct. 31-Nov. 2, 1984. 6 p
(AIAA PAPER 84-2528)

Training and development of engineers is a major undertaking for the 6520 Test Group at the Air Force Flight Test Center Guidance and policy regarding training is provided in the Master Training Plan. The plan evolved as a result of some training and development deficiencies within the organization. This paper comments on means for identifying training deficiencies and discusses changes made to improve training and development of engineers at the Flight Test Center. The paper also briefly addresses such related items as why training is needed, assessing training needs, and preventing obsolescence. Author

A85-17232#
SIMULATORS/TRAINING DEVICES FOR COMMUTER AIRLINES
R. L. COLLIE (Regional Airline Association, Washington, DC) (Royal Aeronautical Society and Canadian Aeronautics and Space Institute, Spring Convention, London, England, May 9, 10, 1984) Canadian Aeronautics and Space Journal (ISSN 0008-2821), vol 30, Sept. 1984, p. 263-268

The reasons for developing economical simulators for training pilots for flying regional aircraft are delineated, along with standards the simulators must meet. The current cost of simulators is $5-8 million, too much for regional airlines to pay, while at the same time the pilots must learn during actual flights, an expensive school in which to gain all proficiency skills. The rapid expansion of regional services and numbers of passengers carried in the period 1972-1982 has placed a heavy burden of in-flight training on existing, operational aircraft. It is suggested that a motion-equipped, non-visual simulator can be built for $0.75 million. The device would furnish line-oriented flight training and cockpit resource management skills. Detailed requirements for Levels I-III simulators which would meet FAA standards have been defined and can be tailored to any specific aircraft. The equipment specifications and performance test, tolerance and characteristics at each level are outlined. M.S.K.

A85-17781
QUALITY CIRCLES - SQUARE DEAL FOR PRODUCTIVITY
B. HUNT (General Dynamics Corp., Pomona, CA) Engineering Management International (ISSN 0167-5419), vol 2, July 1984, p. 271-278 refs

It is pointed out that the United States productivity growth is at an all time low, trailing several industrial nations, particularly Japan. Fullmer (1981) has stated that a failure to tap the tremendous amount of personal energy available in the U.S has contributed to a declining position. He claims that only 10 percent of the individual potential is used. The investigation of avenues related to an optimization of human creative effort is an important aspect of the productivity formula. One avenue, 'quality circles', has already been used successfully in Japan The present investigation is concerned with questions regarding a successful application of this concept in the U.S., taking into account a study conducted by an American aerospace company The study included a six-month pilot program. It was found that 'quality circles' are an effective means to productivity improvement which taps that other 90 percent of human potential which, according to Fullmer, is still available. G.R.

A85-18720
NEW SYSTEM FOR THE SELECTION OF AIR TRAFFIC CONTROL PERSONNEL [NEUES AUSWAHLSYSTEM FUER FLUGSICHERUNGSPERSONAL]
K. STEININGER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmedizin, Hamburg, West Germany) DFVLR-Nachrichten (ISSN 0011-4901), vol. 43, Nov. 1984, p 35-37. In German.

Air traffic control operations in West Germany are very demanding on account of the great air traffic density in this country. It is, therefore, vital that the personnel of the air traffic control organization is well qualified for their work. The selection of suitable applicants represents an essential precondition for the successful development of personnel qualified for the performance of the air traffic control operations. Education and training leading to the position of a fully responsible air traffic controller requires a time of five years Certain difficulties have arisen in connection with the current selection system, and a fundamental revision of this system is necessary A description is given of the approaches developed by the DFVLR for such a revision, taking into account the great differences in performance shown even in the case of people of the same age group, education, and orientation with respect to interests. Attention is given to the criteria which are considered in the selection process. G.R.

A85-21560#
DISPLAYS, DEJA VU
R. B. HUNTOON (Rockwell International Corp , Collins Government Avionics Div., Cedar Rapids, IA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 77-84. refs

This paper is intended to briefly review the development and status of avionics and human engineering with particular emphasis on human engineering recommendations and requirements as applied to current display technology. Existing and near term cockpit management systems are used to illustrate potential areas for human factors specialists, and some suggestions, indicated by recent cockpit display research, are offered. Author

A85-21565#
UNITED AIRLINES' COCKPIT RESOURCE MANAGEMENT TRAINING
D. L. JACKSON (United Air Lines, Inc., Denver, CO) IN Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 131-137. refs

This paper describes a unique pilot training program which focuses on five elements of synergistic cockpit crew teamwork. The five elements are: inquiry, advocacy, conflict resolution, critique and decision making. The Managerial Grid provides a theoretical basis for crew self-assessment of performance effectiveness on each of the five elements. The primary goal of this training program is to improve aviation safety. The data indicate a positive acceptance of the program by flight crewmembers and a positive effect upon their performance during annual proficiency checks Plans for future data collection on United Airlines and recommendations for industry-wide data collection are discussed Author

A85-21579#
PILOT JUDGMENT TRAINING - PAST, PRESENT AND FUTURE
G S LIVACK (General Aviation Manufacturers Association, Washington, DC) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 353-362.

Until very recently, conventional flight training was not concerned directly with proper judgment, because it appeared that 'judgment' could neither be taught, measured, or modified. However, in recent years, developments related to improved accident investigation technology have led to a growing realization of the significance of pilot judgment errors A description is given of recent pilot judgment related projects, taking into account a U.S. Air Force program designed to teach judgment to the pilot, pilot judgment training activities initiated by a U.S airline, judgment research efforts undertaken by the Federal Aviation Agency, and the development of a student pilot judgment training program for use in Canada. A proposed future, multifaceted, pilot judgment training program is also discussed. G.R.

A85-21581
THE MYERS-BRIGGS TYPE INDICATOR AS A TOOL TO IDENTIFY FLIGHT STUDENT'S LEARNING STYLES
A. C POWERS (AOPA - Air Safety Foundation, Bethesda, MD) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings Columbus, OH, Ohio State University, 1984, p. 385-391.

A test to identify the personality types of flight students has been developed. The test is based on Jung's (1923) theory of types and can be used to characterize the way an individual perceives his environment or judges events and actions. It is shown that an awareness of personality types during flight training makes it possible to modify training approaches to meet the specific needs of each student. The benefits of a more individual approach to flight training include greater retention of information and faster learning rates A complete list of the different personality types is given in a table I.H

A85-21588#
THE FUNCTIONAL AGE PROFILE - AN OBJECTIVE DECISION CRITERION FOR THE ASSESSMENT OF PILOT PERFORMANCE CAPACITIES AND CAPABILITIES
R. J. BRAUNE and C. D. WICKENS (Illinois, University, Champaign, IL) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 437-444 refs
(Contract N00204-82-C-0113)

A85-21589#
AUTOMATED PERFORMANCE MEASUREMENT FOR NAVAL AVIATION - APARTS, A LANDING SIGNAL OFFICER TRAINING AID
C A. BRICTSON (Dunlap and Associates West, Inc , La Jolla, CA) IN: Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p. 445-448 Navy-sponsored research.

Development of the Automated Performance Assessment and Remedial Training System (APARTS) is described. APARTS is an automated training aid designed to assist the Landing Signal Officer (LSO) in training pilots during the acquisition of carrier landing skills APARTS is based on general principles of learning and provides graphic displays of pilot landing technique problems for LSO evaluation and pilot feedback. APARTS also integrates Field Carrier Landing Practice (FCLP), conducted in the aircraft, with Night Carrier Landing Trainer (NCLT) instruction. Landing technique problems are identified and fed back to the pilot as a basis for remedial instruction in the NCLT trainer. APARTS is designed to process, store and graphically display pilot landing performance data, including the type, frequency and location of problems. Application of APARTS data has improved initial carrier landing performance, reduced cost and provided normative data for training evaluation The evolution of the program to its present operational status is an example of how automated performance measurement can be applied to Naval aviation Author

A85-21602#
THE USAF PILOT SELECTION AND CLASSIFICATION RESEARCH PROGRAM
J. E KANTOR (USAF, Human Resources Laboratory, Brooks AFB, TX) IN. Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p 547-552.

A battery of experimental tests to select combat pilot trainees for the US Air Force is described. The tests are given in a stand-alone format on computer and provided measures of behavior previously not available through traditional testing formats. Among the psychological parameters evaluated by tests are: psychomotor abilities; cognitive abilities; attitudinal characteristics; and personality traits Some preliminary results of the tests are considered, within the context of a discussion concerning the usefulness of psychomotor testing, in general. I.H.

A85-23276
SOME PERSPECTIVES ON THE STUDY AND IMPROVEMENT OF THE COGNITIVE-CREATIVE ACTIVITY OF AN INDIVIDUAL AND A GROUP [O NEKOTORYKH PERSPEKTIVAKH IZUCHENIIA I SOVERSHENSTVOVANIIA POZNAVATEL'NO-TVORCHESKOI DEIATEL'NOSTI LICHNOSTI I GRUPPY]
I. S. ZAMALETDINOV and R. B BOGDASHEVSKII (Tsentr Podgotovki Kosmonavtov, USSR) Psikhologicheskii Zhurnal, vol. 5, Sept.-Oct. 1984, p. 13-24. In Russian. refs

The available psychological literature concerned with the origins and characteristics of creative processes is reviewed Attention is given to the results of experimental investigations of the cognitive and creative abilities of human operators in a variety of environments. Some practical applications of the experimental results in the fields of personnel selection and operator training are discussed. I.H.

A85-23278
INTERPERSONAL ACTIVITY IN CONDITIONS OF GROUP LEARNING [MEZHLICHNOSTNAIA AKTIVNOST' V USLOVIIAKH GRUPPOVOGO OBUCHENIIA]
R. S. NEMOV (Akademiia Pedagogicheskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Obshchei i Pedagogicheskoi Psikhologii, Moscow, USSR) and K. A. KHVOSTOV (Akademiia Pedagogicheskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Trudovogo Obucheniia i Professional'noi Orientatsii, Moscow, USSR) Psikhologicheskii Zhurnal, vol. 5, Nov.-Dec 1984, p. 39-47. In Russian. refs

A85-23279
SOME PRINCIPLES FOR THE CONSTRUCTION OF AN ADAPTIVE TRAINING SYSTEM [NEKOTORYE PRINTSIPY POSTROENIIA ADAPTIVNOI SISTEMY PODGOTOVKI]
L. P. GRIMAK, V. M. VASILETS, and V F. ZHERNAVKOV Psikhologicheskii Zhurnal, vol 5, Nov.-Dec 1984, p 62-68. In Russian. refs

The role of computer models in aircraft mechanic training exercises is discussed. Attention is given to some of the benefits of computer-assisted mechanical instruction, including an increase in the time available for hands-on instruction, and a more logical organization of the lesson plan. In preliminary experiments with a prototype computer training system, it was found that the computer's selections with respect to exercise complexity and lesson sequence were in substantial agreement with the selections of a number of professional aircraft mechanic trainers. I.H.

A85-23283
THE PRINCIPLES OF EXPERIMENTAL SETUP IN MODELS OF COMPLEX HUMAN OPERATOR ACTIVITIES [PRINTSIPY POSTANOVKI EKSPERIMENTOV PRI RAZRABOTKE MODELEI SLOZHNYKH DEISTVII CHELOVEKA-OPERATORA]
G. M ZARAKOVSKII, S. L. RYSAKOVA, and K. A. CHERNOV Psikhologicheskii Zhurnal, vol. 5, Nov.-Dec. 1984, p 93-105. In Russian. refs

A85-23285
INTERRELATIONSHIP BETWEEN LEARNING AND DEVELOPMENT IN THE PROCESS OF MASTERING AN OCCUPATIONAL ACTIVITY [VZAIMOSVIAZ' OBUCHENIIA I RAZVITIIA V PROTSESSE OSVOENIIA PROFESSIONAL'NOI DEIATEL'NOSTI]
V. L SHKALIKOV and V. D SHADRIKOV (Iaroslavskii Gosudarstvennyi Pedagogicheskii Institut, Yaroslavl, USSR) Psikhologicheskii Zhurnal, vol. 5, Sept.-Oct. 1984, p 94-103. In Russian. refs

A85-25986
T-45 TRAINING SYSTEM - CONCEPT AND ACQUISITION STRATEGY
W. J. CATLETT (U S Navy, Washington, DC) and R G GROWER (McDonnell Douglas Corp., St. Louis, MO) Society of Automotive Engineers, Aerospace Congress and Exposition, Long Beach, CA, Oct. 15-18, 1984. 7 p.
(SAE PAPER 841588)

An account is given of the U.S Navy's Full Scale Development program for the T-45 trainer aircraft, which attempts to work with the manufacturer within the Navy's schedule, priority, and affordability constraints. Acquisition of the T-45 is unique in being a closed loop system which has to demonstrate pilot production and cost-to-train advantages. In addition, program management has striven to encompass hardware, software, and 'courseware' from the Navy's curriculum guidelines O C

A85-28024
BASIC PRINCIPLES OF THE DEVELOPMENT AND EXECUTION OF A SYSTEM FOR THE PSYCHOLOGICAL SELECTION OF MILITARY PERSONNEL [OSNOVNYE PRINTSIPY RAZRABOTKI SISTEMY PROFESSIONAL'NOGO PSIKHOLOGICHESKOGO OTBORA VOENNOSLUZHASHCHIKH I EGO PROVEDENIIA]
V. A. BODROV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Sept 1984, p. 41-43. In Russian

A85-29863
SIMULATORS FOR TRAINING AIRCRAFT MAINTENANCE PERSONNEL [VYCVIKOVE TRENAZERY PRO TECHNICKY PERSONAL V UDRZBE LETADEL]
J. TUMA (Ceskoslovenske Aerolinie, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no. 6, 1984, p. 345-349. In Czech. refs

Finding more efficient ways of training the ground support personnel becomes increasingly important as the requirements for the qualifications of such personnel become more stringent The qualification of aircraft maintenance specialists directly affects the cost effectiveness of aircraft maintenance and flight safety. The use of simulators in training aircraft maintenance technicians is discussed, and the principal characteristics of such simulators are examined. V.L.

A85-29865
POSSIBLE APPLICATIONS OF SIMULATORS IN VARIOUS AREAS [VALIDITA UZITI TRENAZERU V RUZNYCH OBORECH]
J. STIKAR and J HOSKOVEC (Karcova Univerzita, Prague, Czechoslovakia) Zpravodaj VZLU (ISSN 0044-5355), no 6, 1984, p. 357-360. In Czech

The possibilities afforded by simulators for improving the efficiency of training in various areas are discussed, and various types of systems for simulating simple and complex skills are examined. It is noted that the use of simulators is particularly effective in areas where acquiring the necessary skills during actual operation is too dangerous, expensive, or difficult Methods for evaluating the efficiency of simulators and assessing the acquired skills are presented. V.L.

A85-39368
HUMAN FACTORS IN AVIATION. I
E. EDWARDS Aerospace (UK) (ISSN 0305-0831), vol 12, June-July 1985, p 13-17

The ergonomic factors influencing the design of cockpit instruments, control devices and accommodations are discussed, on the basis of data accumulated in the fields of perceptual psychology, anthropometry, and cognitive psychology The design of cockpit displays is noted to call for careful attention to the relevant human perceptual processes, irrespective of the technical problems associated with the instrument's production Attention must also be given to cockpit temperature control and especially to cockpit lighting O C

A85-39623#
GRADUATE EDUCATION IN PROPULSION
B H. GOETHERT (Tennessee, University, Tullahoma, TN) AIAA, SAE, ASME, and ASEE, Joint Propulsion Conference, 21st, Monterey, CA, July 8-10, 1985 6 p
(AIAA PAPER 85-1147)

The main elements of M S -programs in propulsion are discussed in relationship to undergraduate and Ph.D.-programs. Consideration is given to the role of the faculty which is required to have good engineering experience and close contact with outside industry, and to graduate student participation in research, accomplished by close cooperation within professor-student teams. The advantages of bringing engineers and scientists from the outside into the university programs by appointing them to the faculty as adjunct professors and of teaching engineering by taped lectures or lecturing by telephone are examined The demand for special short courses of usually one week, as exemplified in specific short courses in aeropropulsion, is also discussed. M D

A85-40554#
AV-8B HARRIER II TRAINING CAPABILITIES
R. J. MUFFLER (McDonnell Aircraft Co , St. Louis, MO) IN Flight Simulation Technologies Conference, St. Louis, MO, July 22-24, 1985, Technical Papers New York, AIAA, 1985, p 11-15.
(AIAA PAPER 85-1734)

An evaluation is made of the training facilities that have been developed for U.S. marine pilots' transition to AV-8B harrier II operation These are designated the Operational Flight Trainer (OFT) and Weapons Tactics Trainer (WTT) OFT is specifically concerned with the development of pilot skills associated with V/STOL, WTT has the complementary role of refining pilots' air-to-ground and air-to-air weapons delivery skills, especially those which involve low altitude navigation and target penetration Attention is presently given to the OFT and WTT simulators' imagery display pilot fields-of-view. O.C

A85-43183#
WHY WRESTLE WITH JELLYFISH?
R. J BOYLE (Honeywell, Inc , Minneapolis, MN) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality. Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 51-54.

Based on experience with stimulating organizational change, it is suggested that executives should make sure they are devoting their attention to the right things - culture, quality and management systems. Eight pitfalls that accompany dealing with change are noted, and eight corollary lessons are offered. Author

A85-43193#
RENEWING LARGE ORGANIZATIONS
L. W. LEHR (3M Co , St. Paul, MN) IN White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p 113-117.

Strategies for promoting innovation and flexibility in large established organizations are discussed from a management point of view, with examples from business and government. Topics examined include the key role of individual innovators in initiating and carrying through new products or procedures, the need for management sponsors for new ideas, the establishment of reward structures which permit innovators to continue their activity (with higher pay and prestige but without becoming supervisors or managers), job security in the case of an unsuccessful innovation, identification of customer needs as the source of innovation, techniques for maintaining close communication with customers, the innovative design of the NASA SPAS-01 space platform, and creativity as a fundamental human drive T.K

A85-43198#
ENCOURAGING AND MAINTAINING AN INNOVATIVE WORK CLIMATE
H E. EDMONDSON (Hewlett-Packard Co., Palo Alto, CA) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality; Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 145-148

Strategies for promoting innovation in large corporate or governmental organizations are discussed. The primary emphasis is on defining the role of innovation in fulfilling the overall corporate mission, selecting and motivating innovators, and establishing work environments and reward structures which encourage innovation. T.K.

A85-43200#
LABOR-MANAGEMENT COOPERATIVE PROGRAMS
J. R. STEPP (U.S. Department of Labor, Washington, DC) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 157-160.

A85-44244
PSYCHOLOGICAL TECHNIQUES FOR THE SELECTION AND INITIAL TRAINING OF MILITARY AIR TRAFFIC CONTROLLERS [METHODES D'APPROCHE PSYCHOLOGIQUE DE LA SELECTION ET DE LA FORMATION INITIALE DU CONTROLEUR AERIEN MILITAIRE]
J.-J. HOFFMANN and G. VERON (Service de Santedes Armees, Saint-Cyr-l'Ecole, France) Medecine Aeronautique et Spatiale, vol. 24, 2nd Quarter, 1985, p. 130-134. In French. refs

An 18 month psychological study was carried out on 120 probationary students at the French military air traffic controller (ATC) school. Results of a pre-school battery of tests were compared with the results of entrance tests for the school. It was hypothesized that ATCs must minimize logical thought in utilizing the high technology tools at their disposal, and must have a good capacity for spatial conception and for verbal communications. The candidates were given tests dealing with accident avoidance in space Written tests were also given to establish the levels of nervousness, extroversion and introversion, anxiety, hysteria, obsessiveness, neuroses, paranoia, schizophrenia, and psychosomatic illnesses. The results, when correlated (or negatively correlated) with the entrance tests scores, indicated that the psychological profile tests will be a valid aid in determining the motivational levels of candidates for ATC training. M.S.K.

A85-44624
AGE AND SPACE FLIGHT
S. R. MOHLER (Wright State University, Dayton, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 56, July 1985, p. 714-717. refs

Criteria for space flight crew and passenger selection should be based on the following three considerations: (1) freedom from impairing disease, (2) ability to perform mission requirements and (3) motivation to undertake the mission Chronologic age of itself is not a valid criterion. Forecast life expectancy and vitality relative to mission duration are valid criteria and can be applied on an individual basis using modern assessment techniques. The good health and vitality characterizing the upper ages of today's population widens the opportunity to utilize increasingly broad fields of experience and skills in future space flights, further enhancing the odds for total mission accomplishment. Author

A85-45094
ANALYTICAL MODELS OF PERFORMANCE OF PROCEDURES
P. J STICHA (Human Resources Research Organization, Alexandria, VA) IN: NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984 Volume 2 . New York, IEEE, 1984, p. 841-848 refs
(Contract MDA903-81-C-0517)

Models that represent the performance of procedural tasks are described, concentrating on different ways sequencing may be represented. Three network simulation techniques are discussed, the Siegel-Wolf model, which predicts the performance of individuals affected by stress, the Human Operator Simulator, which makes extensive use of psychological micromodels, and the System Analysis of Integrated Network of Tasks (SAINT) The techniques are compared for flexibility, validity, generality, and pragmatic considerations Production systems for representing procedural control are discussed and compared to network simulations in terms of how they represent control and approach cognitive modeling Of the network simulations, SAINT is preferred for flexibility and generality, while the other simulations are advantageous in situations for which the task domain is restricted. Network models are more suited to requirements of procedural tasks than production systems, which are data driven. C D.

A85-45122
TRAINING TASK HIERARCHY DEVELOPMENT
R. CLAPP (Boeing Military Airplane Co., Wichita, KS) IN: NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 1072-1075. refs

Special emphasis should be directed in flight simulation training programs to those tasks that are especially hazardous to crew or aircraft in actual flying, and are characterized by contingency or emergency events in flight procedures. Attention is presently given to a Training Task Hierarchy which has been developed to cover the range of possible simulator training tasks, listing those that are fully, partly, or not at all adequately simulable Fully simulable emergency and malfunction situations encompass engine radio communication and electrical system failures, icy or wet runways, and the appearance of unfriendly aircraft. O.C.

A85-46148
AN ANALYSIS OF ERGONOMIC SYSTEMS [ANALIZ ERGOTEKHNICHESKIKH SISTEM]
G. V. DRUZHININ Moscow, Energoatomizdat, 1984, 160 p In Russian. refs

The book is concerned with the application of the concepts of human factors engineering to the design and development of automated systems. Attention is given to the biological and psychological characteristics of human operators, method of describing the structure of individual work processes, and operational characteristics of technical equipment The discussion also covers various methods for describing schedules of operations, probabilistic modeling of work processes, and assessment of the confidence level of information in ergonomic systems V.L.

A85-48752
HUMAN-SYSTEM PERFORMANCE MEASUREMENT IN TRAINING SIMULATORS
D VREULS and R. W OBERMAYER (Vreuls Research Corp., Thousand Oaks, CA) Human Factors (ISSN 0018-7208), vol. 27, June 1985, p. 241-250. refs

Present deficiencies in human performance measurement techniques for training simulators are discussed Automated performance measurement is controlled by algorithms in real-time, recording performance data wherever feasible. The systems cannot assess hidden knowledge, only overt actions, thereby missing any indication of complex decision-making processes. The practice of measuring whatever is measurable is a default technique employed in the absence of a satisfactory human performance theory. Furthermore, no extensive validation programs have been carried out to prove that the data is a basis for predicting future performance. Finally, there is a lack of quantitative criteria for evaluating performance changes. It is recommended that quantitative operational performance standards be established and that AI systems be developed for measuring performance and providing immediate feedback, using performance data from experts at tasks as reference points. M S K.

N85-10648# Denver Research Inst, Colo.
FACTORS CRITICAL TO THE IMPLEMENTATION OF SELF-PACED INSTRUCTION: A BACKGROUND REVIEW Final Technical Paper May - Dec. 1982
S. M. BACK and B. L. MCCOMBS Aug. 1984 61 p
(Contract F33615-81-C-0007)
(AD-A145143; AFHRL-TP-84-24) Avail: NTIS HC A04/MF A01 CSCL 05I

In a previous effort the literature pertaining to self-paced instruction was initially collected and reviewed to support a study of factors associated with the successful utilization of self-paced instruction in Air Force technical training. The purpose of this technical paper is to provide a more in-depth analysis of the literature relevant to the findings of that study. In general, the analysis of the literature revealed a high level consensus among military and civilian reports with respect to factors associated with successful implementation of self-paced instruction. GRA

N85-11426*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)
A REPORT ON THE TRAINING COURSE AT FORTALEZA (CEARA) [RELATORIO DO CURSO DE TREINAMENTO DE FORTALEZA (CEARA)]
M. P. BARBOSA, Principal Investigator Dec 1983 28 p In PORTUGUESE; ENGLISH summary Sponsored by NASA ERTS
(E85-10013; NASA-CR-168570, NAS 1.26:168570; INPE-2989-RPE/453) Avail: NTIS HC A03/MF A01 CSCL 05B

The activities of the on the job training course Applications of the Remote Sensing Data, with Emphasis on LANDSAT Images, to Study the Natural Resources are described. M.A.C

N85-11597# Office of Naval Research, Arlington, Va.
OVERVIEW OF TRAINING AND AIDING
H HALFF *In* Denver Research Inst. Artificial Intelligence in Maintenance p 67-81 Jun. 1984
(AD-P003917) Avail: NTIS HC A22/MF A01 CSCL 05A

This article discusses the role that people play in maintaining systems and about psychological research which addresses that role. GRA

N85-12302# Denver Research Inst., Colo Social Systems Research and Evaluation Div.
TRAINING CAPABILITIES TEST OF ELECTRONICS EQUIPMENT MAINTENANCE TRAINER (EEMT): FINDINGS AND CONCLUSIONS Final Technical Report, Sep. 1981 - Feb. 1984
L. F CICCHINELLI, R. A. KELLER, and K R. HARMON Orlando, Fla. Naval Training Equipment Center Jul. 1984 125 p
(Contract N61339-81-C-0126)
(AD-A146075; TAEG-TR-158) Avail: NTIS HC A06/MF A01 CSCL 05I

The objective of the study was to design and conduct a Training Capabilities Test (TCT) of the Electronic Equipment Maintenance Trainer (EEMT) within the Primary Power portion of the AN/SPS-10 radar training course at ET A School, Naval Training Center, Great Lakes. The TCT consisted of a series of studies which examined the training effectiveness, operational suitability, and life cycle cost of the EEMT as it supports the training system. Author (GRA)

N85-14558*# Army Aviation Center, Fort Rucker, Ala
DETERMINING TRAINING DEVICE REQUIREMENTS IN ARMY AVIATION SYSTEMS
M L POUMADE *In* NASA. Ames Research Center 20th Ann. Conf., on Manual Control, Vol. 2 p 273-282 Sep. 1984 refs
Avail: NTIS HC A18/MF A01 CSCL 05H

A decision making methodology which applies the systems approach to the training problem is discussed. Training is viewed as a total system instead of a collection of individual devices and unrelated techniques The core of the methodology is the use of optimization techniques such as the transportation algorithm and multiobjective goal programming with training task and training device specific data. The role of computers, especially automated data bases and computer simulation models, in the development of training programs is also discussed. The approach can provide significant training enhancement and cost savings over the more traditional, intuitive form of training development and device requirements process. While given from an aviation perspective, the methodology is equally applicable to other training development efforts. E.A.K.

N85-16475# Human Resources Research Organization, Alexandria, Va
HUMAN FACTORS AND TRAINING RESEARCH IN MILITARY ORGANIZATIONS AND SYSTEMS Final Report
A L. KUBALA Army Research Inst. for Behavioral and Social Sciences Oct. 1984 13 p
(Contract MDA903-79-C-0191; DA PROJ. 2Q2-62717-A-765; DA PROJ 2Q2-62731-A-792)
(AD-A146832, HUMRRO-FR-MTRD(TX)-80-9; ARI-RN-84-124)
Avail: NTIS HC A02/MF A01 CSCL 05I

This report summarizes the resulting five research projects conducted between March 1979 and February 1980. Separate, more detailed reports describing the work in each of the five areas are being published concurrently. These reports are: 'Preliminary Development of the Commander's Unit Analysis Profile: A Leadership Tool for the Small Military Unit; The Impact of Adopting Physical Fitness Standards on Army Personnel Assignment. A Preliminary Study; Testing and Training Methods for Skill Qualification Testing; Reading Ability and Other Correlates of the SQT Written Component; Development of a Basic Training Program in Combat Vehicle Identification, and Improvement of Training Realism for Tactical Units: Opposing Force (OPFOR) Program. GRA

N85-17542# Electronic Systems Div., Hanscom AFB, Mass
TRAINING GUIDE FOR SCIENTIFIC AND ENGINEERING TRAINEES 1984
Jun. 1984 24 p
(AD-A147963; ESD-TR-84-184) Avail NTIS HC A02/MF A01 CSCL 05I

This Training Guide is to provide a unique opportunity to selected graduate engineers, mathematicians, and computer scientists to acquire applicable knowledge and experience in technical management with the guidance of the Electronic Systems Division Scientific and Engineering Career Panel It is to provide trainees with an effective and meaningful entry into a technical management career. GRA

N85-18013*# Piedmont Aviation, Inc., Winston-Salem, N C
MANAGEMENT TRAINING FOR COCKPIT CREWS AT PIEDMONT FLIGHT
J C. SIFFORD *In* NASA. Ames Research Center Flight Training Technol. for Regional/Commuter Airline Operations p 79-101 Dec. 1984
Avail: NTIS HC A12/MF A01 CSCL 05I

A brief history of Piedmont Airlines' flight operations is presented A captain-management seminar conducted regularly by Piedmont is discussed. Piedmont's approach to cockpit resource management (CRM) is reviewed, and the relationship of CRM training to other aspects of flight training is addressed Future leadership research plans and CRM training is considered along with critical training issues. R.S.F

N85-18017*# Air Midwest, Inc., Wichita, Kans.
COMMUNICATIONS SKILLS FOR CRM TRAINING
M. SHEARER *In* NASA. Ames Research Center Flight Training Technol. for Regional/Commuter Airline Operations p 143-146 Dec. 1984
Avail: NTIS HC A12/MF A01 CSCL 05I

A pilot training program in communication skills, listening, conflict solving, and task orientation, for a small but growing commuter airline is discussed The interactions between pilots and management, and communication among crew members are examined Methods for improvement of cockpit behavior management personnel relations are investigated. E A.K.

N85-18025*# Scenic Air Lines, Inc., Las Vegas, Nev
LOW COST TRAINING AIDS AND DEVICES
J LAWVER and A LEE *In* NASA Ames Research Center Flight Training Technol. for Regional/Commuter Airline Operations p 221-228 Dec. 1984
Avail: NTIS HC A12/MF A01 CSCL 05I

The need for advanced flight simulators for two engine aircraft is discussed Cost effectiveness is a major requirement. Other training aids available for increased effectiveness are recommended Training aids include. (1) audio-visual slides, (2) information transfer, (3) programmed instruction, and (4) interactive training systems B W.

N85-18026*# Air Midwest, Inc., Wichita, Kans.
PILOT EDUCATION AND SAFETY AWARENESS PROGRAMS
M SHEARER and W D. REYNARD *In* NASA Ames Research Center Flight Training Technol for Regional/Commuter Airline Operations p 229-239 Dec 1984
Avail: NTIS HC A12/MF A01 CSCL 01C

Guidelines necessary for the implementation of safety awareness programs for commuter airlines are discussed A safety office can be viewed as fulfilling either an education and training function or a quality assurance function. Issues such as management structure, motivation, and cost limitations are discussed B.W

N85-18027*# Air Wisconsin, Inc., Appleton.
INITIATIVE USES OF AIRCRAFT FOR FLIGHT TRAINING
M. SELE and M BAETGE *In* NASA. Ames Research Center Flight Training Technol. for Regional/Commuter Airline Operations p 241-247 Dec 1984
Avail. NTIS HC A12/MF A01 CSCL 01C

The use of the aircraft rather than a flight simulator as a training device is investigated. Particular attention is paid to the application of LOFT concepts to the aircraft in its home environment B W.

N85-18028*# Command Airways, Wappingers Falls, N.Y
INNOVATIVE APPROACHES TO RECURRENT TRAINING
H NOON and M. MURPHY *In* NASA. Ames Research Center Flight Training Technol. for Regional/Commuter Airline Operations p 249-263 Dec 1984
Avail: NTIS HC A12/MF A01 CSCL 05I

Innovative approaches to recurrent training for regional airline aircrews are explored. Guidelines for recurrent training programs which include in corporation of cockpit resource management are discussed B W.

N85-18561# Joint Publications Research Service, Arlington, Va
ROLE OF ENGINEERING PSYCHOLOGY
A SAVAYAN *In its* USSR Rept. Life Sci. Biomed. and Behavioral Sci. (JPRS-UBB-85-002) p 26-30 23 Jan. 1985 Transl. into ENGLISH from Trud (Moscow), 18 Sep. 1984 p 3
Avail. NTIS HC A09/MF A01

Human factors engineering in the working force is discussed. The psychological effects of automation and robotics are analyzed The contribution of human factors to work accidents and lost work hours is outlined. Psychological fitness of equipment operators for the appropriate jobs is outlined. E.A.K.

N85-19620# Joint Publications Research Service, Arlington, Va.
STUDY OF COGNITIVE STYLES OF STUDENTS IN AUTOMATED TEACHING SYSTEM Abstract Only
T A BRUTSENTSOVA *In its* USSR Rept Life Sci Biomed. and Behavioral Sci. (JPRS-UBB-85-011) p 19-20 26 Feb. 1985 Transl into ENGLISH from Vopr. Psikhologii (Moscow), no. 4, Jul. - Aug. 1984 p 70-76
Avail NTIS HC A05/MF A01

Computer-assisted experiments revealed cognitive styles in students which must be considered during development of computer-assisted teaching systems and showed the possibility of using computer-based teaching systems in psychological study of aspects of teaching Subjects included 12 8th grade students and 7 Moscow State University students using 3 variants of the BASIC language Two cognitive styles were noted. Subjects with cognitive style A acted impulsively without preliminary analysis of the situation, used trial and error and guess work and did not worry about mistakes, while those with cognitive style B were very cautious, analyzed carefully in order to avoid errors, checked their answers carefully, made few errors but were greatly bothered by them The experiments showed the advisability of using computer-assisted teaching methods in teaching students with individual differences. A brief account of the history of the study of this problem is presented. Author

N85-19640*# Federation of American Societies for Experimental Biology, Bethesda, Md Life Sciences Research Office.
RESEARCH OPPORTUNITIES IN HUMAN BEHAVIOR AND PERFORMANCE
J. M. CHRISTENSEN, ed. and J M TALBOT, ed. Jan. 1985 77 p refs
(Contract NASW-3924)
(NASA-CR-175473, NAS 1.26 175473) Avail: NTIS HC A05/MF A01 CSCL 05I

Extant information on the subject of psychological aspects of manned space flight are reviewed; NASA's psychology research program is examined; significant gaps in knowledge are identified; and suggestions are offered for future research program planning. Issues of human behavior and performance related to the United States space station, to the space shuttle program, and to both

near and long term problems of a generic nature in applicable disciplines of psychology are considered. Topics covered include: (1) human performance requirements for a 90 day mission, (2) human perceptual, cognitive, and motor capabilities and limitations in space; (3) crew composition, individual competencies, crew competencies, selection criteria, and special training, (4) environmental factors influencing behavior; (5) psychosocial aspects of multiperson space crews in long term missions; (6) career determinants in NASA; (7) investigational methodology and equipment; and (8) psychological support A.R H.

N85-19874# Brigham Young Univ., Provo, Utah Dept. of Civil Engineering
STRATEGIC MANAGEMENT FOR ORGANIZATIONAL EFFECTIVENESS. THE EFFECT OF HUMAN RESOURCE PLANNING ON RETENTION AND RELATED ISSUES, VOLUME 1 Final Report
L. S. OPPENHEIM, S. D. HYMAN, and C. T KYDD Dec 1984 137 p
(Contract N00014-82-C-0803)
(AD-A149398; ONR-FR-1-VOL-1) Avail: NTIS HC A07/MF A01 CSCL 05A

This study assessed the match between strategic direction, human resource policies and the perceptions of those policies held by middle managers in five successful organizations Human resource practices related to retention -- job movement, organizational signals, and incentives -- were the focus of three separate studies The results indicated that the strategic considerations of these organizations were well served by their human resource practices although the configuration of policies and practices differed. The research also indicated that these effective organizations exhibited greater flexibility in interpreting policy and enforcing boundaries in areas in which they needed information to innovate and adapt GRA

N85-19875# Brigham Young Univ., Provo, Utah Dept. of Civil Engineering.
STRATEGIC MANAGEMENT FOR ORGANIZATIONAL EFFECTIVENESS. THE EFFECT OF HUMAN RESOURCE PLANNING ON RETENTION AND RELATED ISSUES, VOLUME 2 Final Report
L. S OPPENHEIM, S. D. HYMAN, and C T KYDD Dec 1984 123 p
(Contract N00014-82-C-0803)
(AD-A149399, ONR-FR-1-VOL-2) Avail NTIS HC A06/MF A01 CSCL 05A

This study assessed the match between strategic direction, human resource policies and the perceptions of those policies held by middle managers in five successful organizations. Human resource practices related to retention -- job movement, organizational signals, and incentives -- were the focus of three separate studies. Results from the studies were combined with information from formal documents and interviews to form the basis for comparative case studies Approximately 100 managers at each of the six sites contributed to these results. Key findings were: (1) a model of job movement which took expectations into account was a good predictor of the way in which a manager and his boss divided tasks, (2) the rate of movement from one job to the next was more rapid in organizations where jobs were clearly and narrowly defined than when jobs evolved and expanded over time; (3) signals from the organization which were public, positive and relevant to a manager's goals increased the likelihood of his remaining with the organization, (4) managers were more likely to see themselves as resource constrained if goal setting and resource allocation were decided at different levels in the organization, (5) informal incentives were more salient to middle managers than most formal incentives. GRA

N85-19876# Brigham Young Univ, Provo, Utah. Dept of Civil Engineering
STRATEGIC MANAGEMENT FOR ORGANIZATIONAL EFFECTIVENESS. THE EFFECT OF HUMAN RESOURCE PLANNING ON RETENTION AND RELATED ISSUES, VOLUME 3 Final Report
L. S. OPPENHEIM, S. D. HYMAN, and C T KYDD Dec. 1984 78 p
(Contract N00014-82-C-0803)
(AD-A149400, ONR-FR-1-VOL-3) Avail NTIS HC A05/MF A01 CSCL 05A

This research evaluated the match between strategic direction, human resource policies and the perceptions of those policies held by middle managers in five successful organizations. Human resource practices related to retention -- job movement, organizational signals, and incentives -- were the focal points of three separate studies Results from the studies were combined with data from formal documents and interviews to form the basis for comparative case studies The key research findings were (1) a model of job movement which took expectations into account was a good predictor of the way in which a manager and his boss divided tasks, (2) the rate of movement from one job to the next was faster in organizations where jobs were clearly and narrowly defined than when jobs evolved and expanded over time, (3) signals from the organization which were public, positive and related to a manager's goals increased the likelihood of his remaining with the organization; (4) managers were more prone to see themselves as resource constrained if goal setting and resource allocation were decided at different levels in the organization; (5) informal incentives were more salient to middle managers than most formal incentives GRA

N85-19877# Brigham Young Univ, Provo, Utah Dept of Civil Engineering.
STRATEGIC MANAGEMENT FOR ORGANIZATIONAL EFFECTIVENESS. THE EFFECT OF HUMAN RESOURCE PLANNING ON RETENTION AND RELATED ISSUES: METHODOLOGICAL APPENDIX Final Report
L S. OPPENHEIM, S. D HYMAN, and C T. KYDD Dec. 1984 139 p
(Contract N00014-82-C-0803)
(AD-A149401, ONR-FR-1-APP) Avail: NTIS HC A07/MF A01 CSCL 05A

This research studied the relationship between strategic direction, human resource policies and the perceptions of those policies held by middle managers in five successful organizations. Human resource practices dealing with retention -- job movement, organizational signals, and incentives -- were the focus of three different studies. Information from the studies were combined with information from formal documents and interviews to form the basis for comparative case studies The main reseach findings were: (1) a model of job movement which took expectations into consideration was a good predictor of the way in which a manager and his boss divided tasks, (2) the rate of movement from one job to the next was more rapid in organizations where jobs were clearly and narrowly defined than when jobs evolved and expanded over time; (3) signals from the organization were public, positive and relevant organization; (4) managers were more likely to envision themselves as resource constrained if goal setting and resource allocation were decided at different levels in the organization; (5) informal incentives were more salient to middle managers than most formal incentives GRA

N85-21978# Advanced Research Resources Organization, Bethesda, Md.
TEAM DIMENSIONS: THEIR IDENTITY, THEIR MEASUREMENT AND THEIR RELATIONSHIPS Final Research Note
V. F NIEVA, E. A. FLEISHMAN, and A. RIECK Jan. 1985 101 p
(Contract DAHC19-78-C-0001)
(AD-A149662; ARI-RN-85-12) Avail NTIS HC A06/MF A01 CSCL 05J

This report represents the initial phase of a programmatic effort aimed at answering basic questions about the nature of team performance and the factors affecting it. An extensive literature review on the relationships between various team or group characteristics and collective performance was conducted, and a summary of propositions derived from this literature is presented. In addition, a new conceptualization of team performance is proposed, and a provisional taxonomy of team performance dimensions consistent with this conceptualization is presented GRA

N85-23693# Joint Publications Research Service, Arlington, Va.
IMPROVEMENTS IN PERSONNEL NEEDED FOR BETTER FLIGHT SAFETY
Y. KOLESNIKOV *In its* USSR Rept.: Transportation (JPRS-UTR-85-005) p 17-20 25 Mar. 1985 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 24 Jan. 1985 p 2
Avail: NTIS HC A05/MF A01

Flight safety is that generalized indicator in accordance with which the level of professional skill is evaluated along with the quality of training of flight controller, and engineering and technical personnel. The status of organized operation and discipline in flight subunits, in the traffic services, and in the technical maintenance services of air maintenance bases is also evaluated. The ground services and the effectiveness of organizational and political education work in a collective is reviewed Author

N85-24732# Michigan Univ., Ann Arbor.
THE ACQUISITION OF PROCEDURES FROM TEXT. A PRODUCTION-SYSTEM ANALYSIS OF TRANSFER OF TRAINING
D. E. KIERAS and S. BOVAIR 29 Jan 1985 40 p
(Contract N00014-84-K-0731)
(AD-A151029; TR-85; ONR-TR-16) Avail: NTIS HC A03/MF A01 CSCL 05I

The current theory of cognitive skill describes knowledge of procedures in terms of a production rule representation which is constructed on the basis of an initial declarative (propositional) representation. In these terms, learning a procedure from written instructions consists of converting the propositional content of the written material into production rules. This process was studied in a transfer of training experiment. Subjects learned from step-to-step instructions a series of related procedures for operating a simple device, with the major manipulation being the order of learning the procedures. Very strong transfer effects were obtained, which could be predicted very well by a simple model of transfer. Individual production rules can be transferred, or re-used in the representation of a procedure if they appeared in a previously learned procedure, meaning that learning time is mostly a function of the number of completely new production rules that must be acquired. Examination of the time required to read individual instruction steps suggests, however, that this transfer mechanism involves processes acting on declarative propositional representatives of the production rules. This means that the transfer process is more similar to comprehension processes rather than conventional practice mechanisms, or Anderson's (1982) learning principles.
Author (GRA)

N85-26147 British Aerospace Dynamics Group, Bristol (England). Human Factors Dept.
HUMAN FACTORS DEPARTMENT 1981 PUBLICATIONS
J. L. EVANS Jan. 1982 26 p refs
(BAE-BT-12685) Avail Issuing Activity

About 90 papers covering human factors of remotely controlled systems; gun aiming; sight performance modeling; man computer interaction; target acquisition; and vision modeling are listed.
Author (ESA)

N85-26200# Naval Postgraduate School, Monterey, Calif
A LEARNING STRATEGY APPROACH FOR TEACHING NOVICE COMPUTER PROGRAMMERS M.S. Thesis
D D BEGLEY Sep. 1984 85 p
(AD-A151523) Avail: NTIS HC A05/MF A01 CSCL 09B

The purpose of this thesis is to investigate various learning strategies and present some suggested applications for the teaching of computer programming to Marine Corps entry-level programmers. These learning strategies are used to develop a cognitively designed structure for the teaching of the software engineering process. This structure was designed so that programmers could have readily available in their thinking process modern software engineering goals and principles that ultimately affect the quality of software. Also suggested at a lower level of the overall structure is a syntax and semantics organizer This particular framework serves as an advance organizer for which specific programming language features could be introduced. This structure can act as an organizing mechanism for the introduction of various, useful programming chunks that would start the novice programmer on his quest to becoming an expert. Author (GRA)

N85-27028# Ballistic Research Labs., Aberdeen Proving Ground, Md.
A REVIEW OF SAFETY PRACTICES AND SAFETY TRAINING FOR THE EXPLOSIVES FIELD
J. HERSHKOWITZ Feb. 1985 125 p
(Contract DA PROJ. 1L1-61102-AH-43, DA PROJ 1L1-62618-AH-80)
(AD-A152295; AD-F300588, BRL-TR-2635) Avail. NTIS HC A06/MF A01 CSCL 13L

Various safety practices and the content of selected training programs emphasized at several major installations involved with explosives and explosive devices are reported herein. The report is divided into independent sections, each of which addresses a commonly encountered facet of explosives safety. Supplemented by a safety file consisting of regulations, references, documents, videotapes, and cassettes (all listed in an appendix) and suggestions for presentation and demonstrations (also included as an appendix), the report can be used as the basis for a modular training course. It is being used in this mode by the Ballistic Research Laboratory (BRL) in the production of a video training tape which, ultimately, will be made available to those working in the field of explosives. Although the report provides the reader with a comprehensive view of many of the safety practices currently in use at representative installations, it is not an endorsement of any of the safety practices described nor does it supersede existing safety regulations at any installation In all cases, the safety regulations at the individual installations continue in effect until formally altered. GRA

N85-27223 Welding Inst , Cambridge (England).
WELDER TRAINING/WELDER TESTING
30 Jan. 1985 13 p Transl into ENGLISH from ZIS-Mitt. (West Germany), no. 11, 1980 p 1214-1220
(BLL-WI-TRANS-683-(9312.57)) Avail British Library Lending Div., Boston Spa, England

There are various areas of weakness in the conventional training of arc welders, which negatively influence the overall result in such a manner that the course time is exceeded, a number of trainees fail to achieve the course objective and the level which is attained is all in all not entirely satisfactory. Based on the recognition of these shortcomings, investigations were carried out into teaching trainees arc welding, with a view to eliminating the

existing areas of weakness, to raise the educational effectiveness of the lessons, to make the training more rational and effective and to achieve an improvement in the overall quality. Particular importance is given to the use of television techniques in this training. E.R.

N85-28550# RAND Corp., Santa Monica, Calif.
INDIVIDUAL CHARACTERISTICS AND UNIT PERFORMANCE: A REVIEW OF RESEARCH AND METHODS Interim Report
J P KAHAN, N. WEBB, R. J. SHAVELSON, and R. M. STOLZENBERG Feb. 1985 124 p
(Contract MDA903-83-C-0047)
(AD-A153145; RAND/R-3194-MIL) Avail. NTIS HC A06/MF A01 CSCL 05J

This study is an initial effort to understand how characteristics of individuals influence the effectiveness and efficiency with which the military units to which they belong perform their missions. It was undertaken as a systematic review of existing knowledge about the relationship between individual characteristics and group performance. It identified five general catagories of predictors of group performance: (1) individual characteristics (general ability, task proficiency, and personality characteristics); (2) leadership; (3) group structural composition, or the mix of individual characteristics, (4) group processes (cohesiveness, attraction); and (5) training techniques (feedback vs. individual performance). Among its conclusions, the study finds that the relationship between ability and performance depends on the nature of the task, and that feedback, both on level of the individual members' performance and on the level of unit performance, is very important GRA

N85-28556# Bundesanstalt fuer Flugsicherung, Frankfurt am Main (West Germany).
GUIDELINES OF THE FEDERAL MINISTER OF TRANSPORTATION FOR THE FORMATION AND EXAMINATION OF AIRLINE PERSONNEL, PART 4 [RICHTLINIEN DES BUNDESMINISTERS FUER VERKEHR FUER DIE AUSBILDUNG UND PRUEFUNG DES LUFTFAHRTPERSONALS, HEFT 4]
Oct. 1984 165 p In GERMAN
Avail: NTIS HC A08/MF A01

The methods and extent of the formation and examination of airline personnel are outlined. Pilots' theoretical and practical instruction, extension or renewal of a type rating, tolerances to be respected during the flight, and certificate for instruction and examinations, are discussed. Theoretical and practical instruction *and examination of instrument rating and long range rating are* presented. Author (ESA)

N85-28558# *Deutsche Forschungs- und Versuchsanstalt fuer* Luft- und Raumfahrt, Hamburg (West Germany). Abt. Flugphysiologie und -psychologie.
CONSTRUCTION OF A JOB-ORIENTED TEST FOR THE SELECTION OF AIR TRAFFIC CONTROLLERS Thesis - Hamburg Univ.
T. SPOHRER Oct. 1984 46 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-921)
(DFVLR-FB-84-51; ISSN-0171-1342) Avail NTIS HC A03/MF A01; DFVLR, Cologne DM 17.50

The Approach Control Test (ACT) simulating air traffic control operations is a paper-pencil group test consisting in controlling the collision-free landing of two to three aircraft over check points in the Approach Control area The test requires the use of a test map representing the approach control area, a tape or cassette recorder and a blackboard for occasional explanations. The test results prove the validity of the ACT used as a part of the psychological selection program for air traffic controllers. Author (ESA)

N85-28559*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HAND CONTROLLERS FOR TELEOPERATION. A STATE-OF-THE-ART TECHNOLOGY SURVEY AND EVALUATION
T L. BROOKS and A. K. BEJCZY 1 Mar. 1985 94 p refs
(Contract NAS7-918)
(NASA-CR-175890, JPL-PUB-85-11; NAS 1.26:175890) Avail NTIS HC A05/MF A01 CSCL 05H

Hand controller technology for teleoperation is surveyed in three major catagories. (1) hand grip design, (2) control input devices, and (3) control strategies In the first category, 14 hand grip designs are reviewed and evaluated in light of human factor considerations. In the second, 12 hand controller input devices are evaluated in terms of task performance, configuration and force feedback, controller/slave correspondence, operating volume, operator workload, human limitations, cross coupling, singularities, anthropomorphic characteristics, physical complexity, control/display interference, accuracy, technological base, cost, and reliability. In the third catagory, control strategies, commonly called control modes, are surveyed and evaluated. The report contains a bibliography with 189 select references on hand controller technology. Author

N85-29562*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.
SOME IDEAS AND QUESTIONS REGARDING SPACE STATION DESIGN FOR HUMAN USE
S. SKOLNICK *In its* Proc. of the Seminar on Space Station Human Productivity 9 p Mar 1985
Avail: NTIS HC A99/MF E03 CSCL 05H

Design concepts for interior utility of space station crew areas are offered Planning of a living environment that maintains elements of humanity is stressed. G.L.C

N85-29567*# McDonnell Aircraft Co., St. Louis, Mo.
CUSTOMER AND MISSION INFLUENCE ON SPACE STATION ARCHITECTURE
F. C RUNGE *In* NASA. Ames Research Center Proc of the Seminar on Space Station Human Productivity 17 p Mar 1985
Avail: NTIS HC A99/MF E03 CSCL 05H

Overall Space Station architecture is presented in schematic outlines and plans. How the customer and mission needs influence this design is studied. The uses, occupants, activities, interfaces, utilities, locomotion, environments, and technological costs are all factors which influence the architecture User and system functions are profiled, interfaces are characterized and functions are grouped. These lead to packaging of functions into modules and the design of system and user accommodations. E R.

N85-29568*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION FOR HUMAN FACTORS RESEARCH. A CENTRAL QUESTION: FIDELITY
D. NAGEL *In its* Proc. of the Seminar on Space Station Human Productivity 4 p Mar. 1985
Avail: NTIS HC A99/MF E03 CSCL 05H

Generalized outlines are presented for simulation in human factors research. Recent trends in aeronautical simulation are given. Some criteria for effective training devices are also given. Full system/full mission simulation in aviation and in space human factors research is presented. E R.

N85-30628# *Applied Science Associates, Inc., Valencia, Pa.*
MAINTENANCE TRAINING SIMULATORS PRIME ITEM DEVELOPMENT SPECIFICATION. MODEL SPECIFICATION AND HANDBOOK Final Technical Report, Sep. 1983 - Sep. 1984
R. J HRITZ, G R. PURIFOY, JR , and J. A FITZPATRICK Brooks AFB, Tex. Air Force Human Resources Lab. Apr. 1985 456 p
(Contract F33615-78-C-0019)
(AD-A154108; AFHRL-TP-84-44) Avail NTIS HC A20/MF A01 CSCL 05I

This document contains a model specification for maintenance training equipment. An accompanying handbook gives instructions on tailoring the specification for a particular application. The specification allows both training and engineering functional requirements to be stated and is designed to facilitate the inclusion of information related to instructional systems development. The specification provides a standard format while avoiding over-specification of requirements or restriction of contractor engineering decisions. The handbook assists the specification preparer in determining appropriate requirements and gives reasons for these requirements The value appropriate for particular parameters, source documents, and lessons learned in previous acquisition. GRA

N85-32768# American Coll. Testing Program, Iowa city, Iowa Test Development Div.
MODELS FOR MULTIDIMENSIONAL TESTS AND HIERARCHICALLY STRUCTURED TRAINING MATERIALS Final Report, 1 Sep. 1981 - 28 Feb. 1985
M D. RECKASE May 1985 32 p
(Contract N00014-81-K-0817; RR0-4204)
(AD-A155231, RR-85-1-ONR) Avail NTIS HC A03/MF A01 CSCL 14B

Work on item response theory was extended to include two areas that had not been extensively researched previously They include models for test items that require more than one ability for a correct response and models for the interaction between modules of instruction that have a hierarchical relationship. For both of these types of models, estimation procedures were developed for model parameters and extensive work was done to determine the appropriate interpretation of the parameter values. This report is a summary of work performed on these modules over a three year period. GRA

N85-35821 George Washington Univ , Washington, D.C
DATA PROCESSING PROFESSIONALS AND DP APPLICATION USERS' PERCEPTIONS AND EXPECTATIONS OF OPERATIONAL ROLES OF PERSONS WORKING IN A DP/APPLICATION USER INTERFACE GROUP Ed.D Thesis
M K. WOLF 1985 148 p
Avail: Univ. Microfilms Order No. DA8506771

The purpose of this study is to determine the perceptions and role expectations of data processing professionals (DPP) and data processing application users (DPAU) working in a data processing/application user interface (DPAU)/application user interface (DPAU) group in an organization From two mailings sent to each of the two subpopulations, a total of 349 computer processable questionnaires were received from 213 DPPs and 136 DPAUs. A Likert type scale is used to obtain four grouped responses for each of the 16 technical questions The four responses corresponds with four points of view related to what DPPs and DPAUs are doing or should be doing in their daily work It is found that DPAUs have a very low level of perceived competency and a low level of job expectancy and that DPPs have a low level of perceived competency and a high/medium high level of job expected competency. Competency training for DPPs and DPAUs should be developed and required in order to create more effective and efficient DPAU groups in organizations. Dissert. Abstr.

02

MANAGEMENT THEORY AND TECHNIQUES

Includes Management Overviews and Methods, Decision Theory and Decision Making, Leadership, Organizational Structure and Analysis, Systems Approaches, Operations Research, *Mathematical/Statistical Techniques, Modelling, Problem Solving,* Management Planning.

A85-12647
AN ENGINEER'S GUIDE TO BOOKS ON STATISTICS AND DATA ANALYSIS
G. J HAHN (General Electric Co.; Union College, Schenectady, NY) and W. Q. MEEKER, JR. (Iowa State University of Science and Technology, Ames, IA) Journal of Quality Technology (ISSN 0022-4065), vol. 16, Oct 1984, p. 196-218 refs

An annotated bibliography of statistics and data-analysis texts of use to engineers is presented General texts on applied statistics (of varying degrees of mathematical sophistication) are listed; introductions to mathematical statistics are assessed; and works on such specific application areas as error analysis, experimental design, multivariate analysis, probability distributions, product-life analysis, regression analysis, reliability analysis, statistical computing, statistical graphics, quality control, sampling methods, and time-series analysis are characterized. Consideration is given to special methods, including decision and risk analysis population selection, sample-size determination, sequential analysis, and simultaneous inference T.K.

A85-17777
THE ROLE OF COMPANY BOARDS IN DESIGN LEADERSHIP
A TOPALIAN (Alto Design Management, London, England) Engineering Management International (ISSN 0167-5419), vol 2, March 1984, p. 75-86 refs

Difficulties regarding the establishment of design leadership are partly related to an acute worldwide shortage of design specialists with qualifications required to provide such leadership. For this reason, in the foreseeable future, industry will have to find design leaders among managers who have no design training. Problems arise because to the majority of managers design remains unfamiliar territory. Attention is given to different perceptions of design in industry, the characteristics of design activities, the sequence of stages through which design projects progress, aspects of design project management, corporate design management, design 'management' and design 'responsibility', the 'ultimate' responsibility for design, 'visible' and 'invisible' leadership, design responsibility and company boards, and a checklist of board responsibilities for design G R

A85-21540* National Aeronautics and Space Administration. *Langley Research Center, Hampton, Va.*
REPORT-READING PATTERNS OF TECHNICAL MANAGERS AND NONMANAGERS
T E PINELLI, V. M. CORDLE (NASA, Langley Research Center, Hampton, VA), M GLASSMAN (Old Dominion University, Norfolk, VA), and R. F VONDRAN, JR. (Catholic University of America, Washington, DC) Technical Communication (ISSN 0049-3155), vol 31, 3rd Quarter, 1984, p 20-24 refs

A survey to determine the review and reading processes used by technical managers and nonmanagers indicates that the summary, abstract, conclusion, title page, and introduction are the components used most frequently by both groups to decide whether to read a NASA technical report. In the review process, significantly more managers than nonmanagers use the summary and conclusion, whereas significantly more nonmanagers use the abstract and title page The most common sequence of review consists of the title page, abstract, and summary, in that order, for both groups. In the reading process, the conclusion, results and discussion, and summary are the components read by the highest percentage of both groups Author

A85-26785
SUPPORT PROGRAM PLANNING - MANAGING TO GET IT SUPPORTED
R. A. NAVARRO (McDonnell Aircraft Co., St. Louis, MO) IN. AUTOTESTCON '83, Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p 61-64.

Major avionics development programs impose significant management and schedule burdens on the Automatic Test Euipment (ATE) community. The success of an avionic system is directly proportional to the success of its ATE support Successful, on-time ATE support requires that the contractor create and employ a management process which is usable and responsive to the manager's needs, which provides visibility into the development process, and which assists the manager in the selection of alternate courses of action. McDonnell Aircraft Company (MCAIR) has developed such a Management System for use in MCAIR's management of ATE development efforts associated with the F-15 Multistaged Improvement Program (MSIP) Author

A85-26786
MANAGEMENT TECHNIQUES IN MEETING REQUIREMENTS FOR INTEGRATING TECHNICAL PUBLICATIONS AND TRAINING INTO ATE STATIONS
R. L. MANGANELLI (Harris Corp., Government Support Systems Div., Syosset, NY) IN. AUTOTESTCON '83; Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p 69-74.

A85-26847
INTERCOMPANY TECHNOLOGY TASK FORCES PROMOTE COOPERATION AT LOCKHEED
R. L. HEIMBOLD (Lockheed Space Operations Co., Titusville, FL) Lockheed Horizons, Feb. 1985, p 2-14

Attention is given to the features of a large aerospace corporation's 'technical task force' system, in which 13 such groups, each composed of five to 15 members from sister companies, meet several times a year in order to exchange technologies and computer programs, coordinate research plans, and arrange interchanges with universities and government agencies An evaluation is made of the impact of these task forces in the fields of advanced metallic materials, communications research, composite materials, electronic warfare, computational aerodynamics, control systems, corrosion control, human factors engineering, nondestructive evaluation, and signal processing O.C.

A85-29402
MULTILEVEL MONITORING SYSTEM FOR A CENTRAL RESEARCH AND DEVELOPMENT AGENCY
P. S. NAGPAUL (National Institute of Science, New Delhi, India) and D. K BHATNAGAR (Council of Scientific and Industrial Research, India) Engineering Management International (ISSN 0167-5419), vol. 3, Feb. 1985, p. 101-112. refs

The conceptual framework and salient features of a multilevel, recently developed monitoring system are described. The design takes into account the organizational structure, R&D project characteristics, and information requirements for decision making at various levels, and incorporates environmental dynamics. A practical method for tracking environmental changes is suggested. The choice of parameters, structure of the monitoring system, information flow, filtering, and aggregation are discussed C.D.

A85-32129
OVERCOMING PROJECT PLANNING AND TIMELINESS PROBLEMS TO MAKE LANDSAT USEFUL FOR TIMELY CROP AREA ESTIMATES
R DOBBINS, R RYERSON, and J LEBLANC-COOKE (Statistics Canada, Agriculture Statistics Div., Ottawa, Canada) IN Canadian Symposium on Remote Sensing, 8th, and Association Quebecoise de Teledetection, Congress, 4th, Montreal, Canada, May 3-6, 1983, Proceedings . Sainte-Foy, Quebec, Canada, Association Quebecoise de Teledetection, 1984, p 485-494 refs

A85-33649
STRATEGIC PLANNING FOR INVESTMENT IN R&D USING DECISION ANALYSIS AND MATHEMATICAL PROGRAMMING
G. R. MADEY (Goodyear Aerospace Corp., Akron, OH) and B. V. DEAN (Case Western Reserve University, Cleveland, OH) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-32, May 1985, p 84-90 refs

This paper investigates the strategic planning and investments associated with research and development (R&D) project selection and budgeting within a division of an aerospace firm A model is described that is used in an R&D planning environment where considerable risks result from technological, economic, governmental, and market factors. Several forms of a multi-attribute utility (MAU) objective function are maximized using mathematical programming techniques. Approximate methods, including compromise programming and goal programming, are evaluated and yield results that are reasonably close to and require less computation than more exact methods. Solutions are used to recommend to management an R&D portfolio that maximizes expected utility for the division Author

A85-33650
RELIABILITY OF COMMUNICATION FLOW IN R&D ORGANIZATIONS
P. SULLO, W. A. WALLACE (Rensselaer Polytechnic Institute, Troy, NY), and T TRISCARI, JR (USAF, Institute of Technology, Wright-Patterson AFB, OH) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol EM-32, May 1985, p 91-97. refs
(Contract NSF 78-16414)

Much attention has been given to the communication process in R&D organizations since the concept of a technological gatekeeper was proposed. By viewing the R&D organization as an information processing and generating system, the role communication network structure plays in determining R&D performance can be isolated and studied. Findings from empirical research are reviewed, providing a framework in which to examine and assess the communication patterns present in an R&D organization. A methodology is presented to evaluate the effectiveness of an organizational communication network with particular reference to project management. The proposed method permits the assessment of contemplated management actions intended to improve organizational communication Author

A85-37163
INTEGRATED MANAGEMENT
O. A SOLI (Pan American World Airways, Inc., Cocoa Beach, FL) IN New opportunities in space, Proceedings of the Twenty-first Space Congress, Cocoa Beach, FL, April 24-26, 1984 . Cape Canaveral, FL, Canaveral Council of Technical Societies, 1984, p. 4-82 to 4-91.

Management techniques for obtaining the best results from employees are discussed. Key concerns of the professional manager, including change, competition, commitment, and creativity, are summarized. Managerial planning is discussed, including predetermining objectives, forecasting outcomes, programming steps of action, and scheduling a time sequence of actions. The manager's organizational responsibility is addressed, including identifying and grouping the work, delegating responsibility, creating conditions for cooperative work, and choosing people for positions. Managerial leadership responsibilities are considered, including communication,

motivation, and decision-making. Finally, the managerial tasks involved in maintaining a steady course are examined, including the budgeting, reporting, evaluating, and correcting the work done and the results attained. C D.

A85-38415
USER AND R&D SPECIALIST EVALUATION OF DECISION-SUPPORT SYSTEMS
L. ADELMAN, P. E LEHNER (PAR Technology Corp., McLean, VA), and F. W. ROOK (Science Applications International Corp., Albuquerque, NM) IEEE Transactions on Systems, Man, and Cybernetics (ISSN 0018-9472), vol. SMC-15, May-June 1985, p. 334-342. refs
(Contract F30602-81-C-0263; F30602-83-C-0154)

There exists little empirical research regarding how users and specialists evaluate the ability of decision-support system (DSS) prototypes. To obtain such information one must develop a measurement instrument that can be used to evaluate different prototypes and thereby collect data regarding what factors different user and specialist groups generally consider most/least important when making utility judgments. A standardized questionnaire recently used by substantive experts (i.e., potential users) and technical representatives (i.e., R&D specialists) to evaluate five DSS prototypes for U.S. Air Force tactical decisionmaking is described. Reliability and validity measures obtained after analyzing the evaluation participants' responses indicate that the questionnaire was an acceptable instrument for measuring people's subjective assessment of DSS prototypes. In addition, there was support for the theoretical position that people use themselves (i.e., their knowledge, skills, needs, etc.) as a reference point when evaluating the potential utility of DSS prototypes. These results represent an initial step toward developing an empirical knowledge base for understanding the different perspectives of DSS users and developers. Author

A85-41319* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIMRAND METHODOLOGY - SIMULATION OF RESEARCH AND DEVELOPMENT PROJECTS
R. F. MILES, JR. (California Institute of Technology, Jet Propulsion Laboratory, Pasadena) Large Scale Systems (ISSN 0167-420X), vol. 7, 1984, p. 59-67. refs
(Contract NASA TASK RE-152; DE-AI01-76ET-20356)

In research and development projects, a commonly occurring management decision is concerned with the optimum allocation of resources to achieve the project goals. Because of resource constraints, management has to make a decision regarding the set of proposed systems or tasks which should be undertaken SIMRAND (Simulation of Research and Development Projects) is a methodology which was developed for aiding management in this decision. Attention is given to a problem description, aspects of model formulation, the reduction phase of the model solution, the simulation phase, and the evaluation phase. The implementation of the considered approach is illustrated with the aid of an example which involves a simplified network of the type used to determine the price of silicon solar cells. G.R.

A85-42587
THE MULTIPLE FUNCTIONS OF FORMAL AIDS TO DECISION MAKING IN PUBLIC AGENCIES
J. D. ROESSNER (Georgia Institute of Technology, Atlanta) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol EM-32, Aug. 1985, p. 124-128 refs

This article examines how the value to a decision maker of formal, quantitative decision aids changes as the setting shifts from the program level to senior executives and, ultimately, to external groups to which the decision maker is accountable. Examples drawn from the use of research and development project selection models in the U.S. Department of Energy are used to illustrate the various meanings that 'use' of such models can have in a public agency, and how a public agency's accountability to OMB and the Congress affects the ways its program managers use formal project selection models. The article concludes with a discussion of how changes in the administration in power and differences in the technical competence among agency oversight groups might affect the use of formal decision aids Author

A85-43177#
MANAGEMENT PHILOSOPHIES ASSOCIATED WITH LEADING A SUCCESSFUL ORGANIZATION
M. T. STAMPER (Boeing Co., Seattle, WA) IN. White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality· Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p 11-15.

The productivity accomplishments of the U.S. aerospace industry are reviewed, and strategies to further improve productivity are suggested, from the perspective of the president of a large aerospace corporation. Consideration is given to the critical part played by employees on all levels in initiating and implementing improvements; the role of the federal government in promoting international trade and intranational competition, financing R&D efforts, and limiting taxation and regulation; the need to consider environmental, social, and human values in developing management goals; the value of balanced news reporting on aerospace-productivity issues rather than solely negative coverage of waste, mismanagement, and overcharges, thus instilling public trust and support; and the potential benefits of cooperation among military, industry, government, news media, and the general public. T.K.

A85-43184#
JAPANESE MANAGEMENT IN U.S.
R. A. KRAFT (Matsushita Industrial Co., Franklin Park, IL) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 55-57.

Japanese management practices and their application to increase the productivity and product quality of U.S. firms are discussed by the head of a Japanese electronics-manufacturing operation in the U.S. Techniques examined include focus on product rather than short-term gains, acceptance and support of long-term plans, emphasis on cooperation rather than confrontation with all personnel, attention to detail without inundation in details (which are best analyzed by lower-level employees), willingness to study and learn from all available sources, and adoption of a clearly defined consistent corporate philosophy. T.K.

A85-43185#
ARE INCENTIVES RIGHT FOR U.S. WHITE COLLAR ORGANIZATIONS?
F. B. WALLACE (General Motors Corp., Allison Gas Turbine Div., Indianapolis, IN) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 58, 59.

In response to the workshop's objective - to explore challenges and problems which may impede white collar productivity - attention is directed to the effectiveness of white collar efforts and the creative results which they achieve. Tendencies in our current management systems may place undesired incentives of short- vs long-term emphasis on strategies and investments, or may stifle risk taking, creativity, and entrepreneurship These management practices are discussed, as are avenues for continuing the progress currently being made in U.S. organizations. Author

A85-43186#
QUALITY IN PRACTICE AT IBM
J. B. JACKSON (IBM Corp., Purchase, NY) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality. Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 63-70.

The paper discusses the excellence values of IBM and how they were made operational through quality improvement for the decade of the '80s. First, consideration is given to the importance of underlying beliefs of a corporation that brings out the great energies and talents of its people. The most important single factor in corporate success is the faithful adherence to those beliefs Quality as a productivity driver is examined. The five concepts that IBM uses as a basis for its quality improvement are discussed. Tools and techniques for the removal of 'defects' from nonproduct processes, e.g., accounting, inventory control, distribution, order entry, etc., are reviewed. Specific attention is given to the 'job process' and to complex cross functional processes that every large organization has and must manage in a defect-free manner if it is to be competitive Author

A85-43197#
MAKING THE 'Z' CONCEPT WORK
C W. JOINER, JR. (Mead Corp., Mead Imaging Div., Dayton, OH) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality; Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 137-141.

Techniques for implementing the Theory Z management strategy of Ouchi (1984) in large organizations are discussed using examples from the author's recent private-sector experience. The basic principles of Theory Z are briefly reviewed, and their realization is linked to common-sense leadership (based on belief in people and commitment to excellence); team management; and establishment of long-term corporate goals and strategy, strong personnel systems, and participative structures. It is argued that national policy should be changed to promote stable ownership of firms (penalizing gross financial manipulation), stable workforce patterns, intracorporate training and education, long-term government contracts with suppliers, and industry cooperation in developing and applying new technologies. T.K

A85-43205#
THE DANA STYLE - PARTICIPATION BUILDS THE CLIMATE FOR PRODUCTIVITY
C. H. HIRSCH (Dana Corp., Toledo, OH) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 192-196.

The management strategies developed at Dana corporation to maintain and increase productivity are reviewed. The measures discussed include employee stock-purchase plans, quality circles, productivity-gain sharing, continuous communication, and a minimal five-level management structure (indirect/direct ratio = 0.75) involving strict regionalization and ad hoc structures to solve superregional problems. The emphasis on the initiative of individual employees or small groups is shown to have produced significant productivity increases at large, medium-sized, and small manufacturing plants. T K

A85-45079
SOFTWARE CONTINGENCY PLANNING
M W. EVANS (Integrated Computer Engineering, Mountain View, CA) IN: NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 744-751.

This paper describes how in a project situation, a software manager can anticipate and avoid the crises which can impact productivity and ultimate project success. The paper describes how, through planning, the manager can anticipate the crises thereby predefining alternatives and options in the event of their occurrence. The paper provides a sample project crises matrix which is a tool a manager may use to project and summarize the potential software development problem areas. Author

A85-45157#
JOINT SERVICE ACQUISITION MANAGEMENT INITIATIVES
P. S. BABEL (USAF, Wright-Patterson AFB, OH) IN NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 1332-1335. refs

A Software Acquisition Working Group has been formed by the U S. Army, Navy, and Air Force, under the Department of Defense's 'Software Technology for Adaptable and Reliable Systems' (STARS) program, to identify and define near-term software acquisition improvements that will be applied in all three services. These improvements will be based on advanced acquisition practices for mission-critical (embedded) software. All mission-critical software will be designed and developed in Ada. The acquisition management initiatives under consideration are guidelines for proposal of software tools, principles of software acquisition, software development capability/capacity reviews, software acquisition education, software baseline estimation, software development incentives, software engineering design verification methodologies, a request for proposal checklists, a system test software baseline initiation, and integrated software acquisition management tools. O.C.

A85-47678
A RESEARCH PARADIGM FOR MULTI-HUMAN DECISION MAKING
D. L KLEINMAN, D. SERFATY, and P B. LUH (Connecticut, University, Storrs) IN· 1984 American Control Conference, San Diego, CA, June 6-8, 1984, Proceedings. Volume 1 New York, IEEE, 1984, p. 6-11

A novel experimental paradigm, motivated by Naval tactical Command Control and Communication (C3) problems, is proposed that can be used to examine the general problem of how a team of humans 'solve' problems of distributed resource management under uncertainty in a multi-task environment. Via the paradigm, different organizational and informative structures, and different assignment of responsibility among the team members can be examined. The paradigm is highly amenable to analytic modeling, making it an excellent candidate for a research tool with which to develop normative-descriptive theories of team decision making. Author

A85-47795
EFFECTS OF REDUNDANCY MANAGEMENT ON RELIABILITY MODELLING
R. H. LUPPOLD, E. GAI (Charles Stark Draper Laboratory, Inc., Cambridge, MA), and B K. WALKER (MIT, Cambridge, MA) IN: 1984 American Control Conference, San Diego, CA, June 6-8, 1984, Proceedings. Volume 3 . New York, IEEE, 1984, p. 1763-1770. refs

Two methods are investigated for incorporating the effects of fault detection and isolation (FDI) decision errors and redundancy management (RM) policy into reliability models for a simple one component - dual redundant system The two methods are combinatorial analysis and Markov chain modelling It is shown that the existence of time-ordered event sequences resulting from the interaction of the FDI decision errors with the RM policy considerably complicates the combinatorial model. An error analysis illustrates the inaccuracy in the system's predicted reliability which results for a combinatorial model when the time-ordered event sequences are ignored. The Markov modelling technique is shown to accurately account for these effects. Author

N85-11675# Massachusetts Inst. of Tech , Cambridge Lab for Information and Decision Systems.
A MATHEMATICAL THEORY OF COMMAND AND CONTROL STRUCTURES Final Report, 1 Jul. 1983 - 30 Jun. 1984
A. H. LEVIS 30 Aug. 1984 77 p
(Contract AF-AFOSR-0229-80)
(AD-A145608; LIDS-FR-1393; AFOSR-84-0830TR) Avail: NTIS HC A05/MF A01 CSCL 12A

The elements of a mathematical theory for the analysis and design of organizations are presented. The focus of the research has been on information processing and decisionmakers organizations supported by Command Control and Communications(C3) systems. The mathematical framework used in modeling the individual decisionmakers, as well as the organization, is that of n-dimensional information theory. Petri Net representation of the organizational structure is used to model the interactions between organization members as well as their interactions with the C3 system. Comparison and evaluation of alternative organizational forms is accomplished by considering organizational performance, individual workload and the sets of satisfying decision strategies. A brief description of research on distributed estimation and on information storage and flow in C3 systems is also included. GRA

N85-11896# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
DECISION SUPPORT SYSTEM (DSS): A SURVEY
H. W. ITTMANN Jun 1983 34 p refs
(NRIMS-TWISK-317) Avail NTIS HC A03/MF A01

A survey of Decision Support Systems defines the concept and relates it to other fields. A frame work of the typical functions and components of such a system are presented. Practical applications are discussed for illustrative purposes Author

N85-11906# Naval Ship Research and Development Center, Bethesda, Md. Computation Mathematics/Logistics Dept.
A MANAGEMENT WORKSTATION CONCEPT
S. BERKOWITZ Jul 1984 35 p
(AD-A145617, DTNSRDC/CMLD-84-17) Avail: NTIS HC A03/MF A01 CSCL 05B

The David Taylor Naval Ship R&D Center is designing an automated, paperless environment for logistics functional managers at HQ, Naval Supply System Command This paper asserts that technology is currently available to radically change the way that the logistics or financial manager deals with his business environment. The change would affect both quantitative and qualitative aspects of his work environment In principle, the manager could summon up large volumes of data with a touch of a finger and gain analytical insight by interacting with and interpreting graphics displays He could instantaneously communicate his newly-found perceptions and decisions through voice and hand-drawn sketches to a select, remote audience without benefit of keyboard and paper. As a practical matter, however, the separate technologies that would accommodate such office power still need to be integrated at a marketable price. Moreover, keyboard and paper may be preferable modes of entry for some managers Until continuous speech and unconstrained hand-lettered recognition become practical realities for large vocabularies, mundane activities such as editing (formatting, composition, publication, distribution) may best be left to a support staff. GRA

N85-12772# Air Command and Staff Coll., Maxwell AFB, Ala.
MATRIX ORGANIZATIONS: OVERCOMING THE DISADVANTAGES
H. E. BERG Apr. 1984 44 p
(AD-A145318; ACSC-84-0225) Avail: NTIS HC A03/MF A01 CSCL 05A

This paper is a background on the matrix management organizational structure. The author identifies typical disadvantages of the matrix organization with the focus on project and functional managers, functional experts, and project teams. Various techniques to counteract these disadvantages are examined and evaluated for potential application in matrix organizations. GRA

N85-12791# International City Management Association, Washington, D.C.
DESIGN OF A SCIENTIFIC INFORMATION COLLATION AND DISSEMINATION SYSTEM, VOLUMES 1 THRU 3 Final Technical Report
G. J. HOETMER, A. C. PAUL, and N. CARSON 28 Jun. 1984 203 p
(Contract EMW-C-0877)
(AD-A146002) Avail NTIS HC A10/MF A01 CSCL 05B

The purpose of this study is to: (1) determine the scientific and technological information needs of the emergency management community, and (2) explore the options available to the Federal Emergency Management Agency to coordinate or develop a mechanism to provide this information. GRA

N85-16474# Massachusetts Inst. of Tech., Cambridge.
INTERACTION OF HUMAN COGNITIVE MODELS AND COMPUTER BASED MODELS IN SUPERVISORY CONTROL
T B. SHERIDAN Mar 1984 38 p
(Contract N00014-83-K-0193)
(AD-A142547) Avail NTIS HCA03/MFA01 CSCL 05H

This report summarizes the first year's effort of a three year research systems and how the operators of such systems apparently represent and utilize such knowledge. The first section of the report discusses the relationship of computer based supervisory control to computer based decision aiding (expert systems) by identifying component variables and functions and building up block diagrams. The second section deals quantitatively with internal models, knowledge, and calibration, both with respect to expectations of the existence of identifiable states of the world and with respect to the overlap of meanings of terms (mental) or linguistic encodings, fuzzy variables) The third section discusses mental models and their importance in three kinds of activities supervisors must do in complex systems (1) discovering how things work; (2) determining what is wanted out of the set of alternatives states of the attributes; (3) encoding and manipulating fuzzy concepts; (4) combining evidence and confidence; (5) deciding what to do. The fourth section of the report deals with the human use of computer based models in automatic control and in decision aiding. It reports on three sets of experiments underway or completed. GRA

N85-16665*# National Aeronautics and Space Administration, Washington, D.C.
THE MANAGEMENT OF RESEARCH INSTITUTIONS: A LOOK AT GOVERNMENT LABORATORIES
H MARK and A LEVINE 1984 311 p refs
(NASA-SP-481; NAS 1.21.481) Avail. NTIS MF A01; SOD HC $9.00 as SN-033-000-00937-2 CSCL 05A

Technology development; project management; employment patterns; research productivity; legal status of support services; functions of senior executives; the role of the sponsoring agency; research diversification; obstacles to technical innovation, organizational structures; and personnel management are addressed B.G.

N85-16668# Logistics Management Inst., Washington, D. C
LIFE CYCLE COST MANAGEMENT MASTER PLAN FOR THE DEFENSE COMMUNICATIONS AGENCY Final Report, Nov. 1982 - Feb. 1984
J. S. DOMIN and F L. ADLER Apr. 1984 47 p
(Contract MDA903-81-C-0166)
(AD-A146876; LMI-DC301-B) Avail: NTIS HC A03/MF A01 CSCL 05A

The Defense Communications Agency (DCA) has evolved from functioning simply as primary manager and operator of the Defense Communications System to providing command, control, and communications (C3) mission analysis, long-term planning, and systems engineering and integration support at the National, Office of Secretary of Defense, Joint Chiefs of Staff, and Unified and

Specified Command levels To accommodate its enhanced role, DCA has identified a need to upgrade its life cycle cost (LCC) estimating and analysis capabilities consistent with new DoD acquisition policy in an environment of rapidly changing C3 technology and deregulation of the communications industry. DCA tasked LMI to prepare a master plan for developing LCC capabilities, including advanced-system cost estimating, independent cost estimating, LCC quality assurance, comparative economic analysis, acquisition management analysis, program cost, tracking, special studies, and funding requirements forecasting for planning, programming, and budgeting GRA

N85-17544# Perceptronics, Inc , Woodland Hills, Calif
COMPATIBILITY EFFECTS AND PREFERENCE REVERSALS
A. TVERSKY and P. SLOVIC 21 Aug 1984 110 p
(Contract N00014-82-C-0643)
(AD-A148399, PFTR-1127-84-8) Avail NTIS HC A06/MF A01 CSCL 05J

Recent studies of decision making show that people's preferences among risky and riskless prospects often depend on the manner in which the options are described or framed Much as changes in vantage point alter the apparent size of objects, different representations of a given decision problem induce predictable changes in preferences. These findings violate the *normative principle of invariance, which states that the preference* order between prospects should not depend on the manner in which they are described. This study investigates the effect of elicitation method on preferences among simple gambles Three strategically equivalent elicitation procedures, choice, pricing, and attractiveness rating, produced reversals of preference when the same pairs of gambles were evaluated under different procedures These results are attributed to the compatibility effect, a tendency to weight more heavily those aspects of the stimulus that are most easily mapped into the response. This phenomenon is described by a differential weighting model in which the effect of the elicitation procedure on the relative weighting of the stimulus attributes is expressed by a bias parameter b Implications of these and related findings for the theory and the practice of decision making are discussed. GRA

N85-17736# Massachusetts Inst of Tech , Cambridge.
AUTONOMY IN THE INDUSTRIAL R AND D LAB Interim Technical Report
L. BAILYN Oct 1984 47 p
(Contract N00014-80-C-0905, NR PROJ. 170-911)
(AD-A148075; TR-30-ONR) Avail: NTIS HC A03/MF A01 CSCL 05A

This paper distinguishes between strategic autonomy (the freedom to set one's own research agenda) and operational autonomy (the freedom, once a problem has been set, to attack it by means determined by oneself, within given resource *constraints) The paper argues, and presents preliminary* corroborating data, that the optimal position for the start of careers in the R&D lab is to be low on strategic but high on operational autonomy Most labs, however, seem to espouse a philosophy of strategic autonomy. This confusion between strategic and operational autonomy creates dilemmas and contradictions in the technical career areas. GRA

N85-17738# Research Inst of National Defence, Stockholm (Sweden).
DECISION MAKING IN STRESSFUL CONDITIONS: A MODEL BASED ON THE COPING PERSPECTIVE
G. LARSSON and B. STARRIN Aug 1984 32 p refs
(FOA-C-55064-H3; ISSN-0347-7665) Avail: NTIS HC A03/MF A01

A model of decision making in stressful conditions was developed by elaborating the Janis-Mann model to make it fit the more general stress and coping theory. The importance of the goal hierarchy of the decision maker, at all levels of awareness, is brought into a fuller consideration The kinds of emotions elicited by different kinds of cognitive appraisals during different stages of the decision making process are specified. The role of emotion-focused coping in taking care of these emotions is emphasized The interdependence of problem and emotion-focused coping is elaborated and specific combinations are related to different coping patterns in decision making Methodological suggestions for empirical studies of the model are offered.
Author (ESA)

N85-18193# University City Science Center, Philadelphia, Pa
MANUFACTURING COSTS, EQUIPMENT NEEDS AND TECHNOLOGICAL OPPORTUNITIES AMONG SMALL AND MEDIUM-SIZE MANUFACTURERS
F W KIRSCH May 1984 8 p
(Contract DE-FC01-83CE-40654)
(DE85-000479; DOE/CE-40654/T1) Avail NTIS HC A02/MF A01

During a series of 54 performance evaluation interviews conducted during March and April, 1984, 15 plant representatives were chosen for a further confidential interview about their plants' overall manufacturing costs, their equipment needs, and the opportunities they envision for research, development, and technology transfer Manufacturers' response are summarized to a series of questions designed to elicit useful information about the factors that contribute most to their plants' manufacturing costs; *the manufacturers' preferred approaches to increasing their plants'* profitability, perceived management needs for new equipment, its availability, and barriers to purchasing it; plant management's attitude toward the potential for research and development (R and D) to improve product quality, and the same persons' estimates of whether the R and D will be done within five years (if needed) and by whom. In addition to summarizing that information, an analysis of the patterns which these responses reveal and observations about the priorities which they indicate are described. DOE

N85-19694# Naval Postgraduate School, Monterey, Calif Dept of Administration Sciences
A DECISION MODEL FOR SELECTION OF MICROCOMPUTERS AND OPERATING SYSTEMS M.S. Thesis
K. G. HIGHFILL Jun 1984 76 p
(AD-A149076) Avail NTIS HC A05/MF A01 CSCL 09B

A framework for the construction of an economic analysis model is suggested for the selection of microcomputer hardware and operating systems. The model is suggested in order to guide prospective Navy microcomputer systems The model is designed such that common spreadsheet software programs can be utilized to manipulate the model and store data on available systems. In addition, comparisons are made of current popular microcomputer systems and operating systems, in order to provide a frame or reference for the use of the model GRA

N85-19881# Texas A&M Univ , College Station Dept. of Management
A PROPOSED INTEGRATION AMONG ORGANIZATIONAL INFORMATION REQUIREMENTS, MEDIA RICHNESS AND STRUCTURAL DESIGN
R. L. DAFT and R. LENGEL Nov. 1984 64 p
(Contract N00014-83-C-0025)
(AD-A149317; TR-ONR-DG-10) Avail NTIS HC A04/MF A01 CSCL 05B

This paper argues that information processing in organizations is influenced by two forces--equivocality and uncertainty. Equivocality is reduced through the use of rich media and the enactment of a shared interpretation among managers (Weick, 1979). Uncertainty is reduced by acquiring and processing additional data (Galbraith, 1973, Tushman and Nadler, 1978). Elements of organization structure vary in their capacity to reduce equivocality versus uncertainty Models are proposed that link structural characteristics to the level of equivocality and uncertainty that arise from organizational technology, interdepartmental relationships, and the environment. GRA

N85-20690*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOFTWARE MANAGEMENT ISSUES
In its Space Sta. of Software Issues p 6-16 Feb. 1985
Avail: NTIS HC A04/MF A01 CSCL 09B

Issues related to the development of a software management plan are discussed with reference to contract requirements, NASA control, integration and testing, governmetn staffing, and the role of the Space Station Software Working Group The major issues include software management planning, independent verification and validation, and quality assurance and configuration management Essential considerations for each of these topics are outlined and recommendations are given. M.G

N85-22248# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Human Factors.
RESEARCH AND MODELING OF SUPERVISORY CONTROL BEHAVIOR, REPORT OF A WORKSHOP
T. B. SHERIDAN and R. T HENNESSY 1984 81 p Workshop held in Sarasota, Fla, Feb. 1983
(Contract N00014-81-C-0017)
(AD-A149621) Avail: NTIS HC A05/MF A01 CSCL 05A

This report of a workshop on Supervisory Control was compiled under the Review of the National Research Council. Supervisory control is the human activity involved in initiating, monitoring, and adjusting processes in systems that are otherwise automatically controlled. The two-day workshop covered three major themes (1) concepts and characteristics of supervisory control systems, (2) the choice of appropriate research vehicles, and (3) the interchange between researchers and designers Summary conclusions are: (1) it is useful to characterize the emergency class of human-supervised, computer-controlled systems by strict as well as broader definitions; (2) no single or simple model of supervisory control is appropriate at this time; (3) experimenting with supervisory control systems is difficult for various reasons; (4) experienced subjects are essential for research; (5) supervisory control systems can never be completely closed, since the human supervisor must have the capability to set subgoals; and (6) better guidance from researchers is needed for designers and operators, in the form of principles and checklists. Various articles cover the analysis of supervisory control systems and behavior, mental models, matching mental models of operators and designers and models of human performance. Failure modes are also discussed GRA

N85-22249# Purdue Univ., West Lafayette, Ind. Dept. of Statistics.
A STATISTICAL APPROACH TO VENDOR SELECTION
S. S. GUPTA and G C. MCDONALD (General Motors Research Lab., Warren, Mich.) Sep. 1984 30 p
(Contract N00014-75-C-0455; N00014-84-C-0167)
(AD-A149781; TR-83-44) Avail: NTIS HC A03/MF A01 CSCL 12A

A common problem that arises in practice is the comparison of several Bernoulli processes (or populations) with unknown parameters p sub I, ... p sub k, respectively, where the p sub i's denote the success probabilities. A particular realization of this problem is the critical issue of vendor selection. Deming (1982) notes the importance of vendor selection in a company's efforts to achieve high quality and productivity. In his 14 points, Demin's point 4 suggests the reduction of the number of suppliers to a subset of vendors who can furnish statistical evidence of dependable quality. Vendor selection involves a consideration of many aspects - cost, service, reliability, and quality. Pettit (1984) described the approach that 3M Corporation uses in the evaluation of prospective suppliers. It consists of evaluating potential vendors in four areas quality, price, performance, and facility capabilities. While quality is explicitly considered in this approach, it is not evaluated in a statistical sense It is the intent of this article to indicate how statistics can be utilized as one objective evaluation tool in this decision setting. Author (GRA)

N85-24736*# Hilton (Conrad N.) Coll. of Hotel and Restaurant Management, Houston, Tex
FOOD SERVICE MANAGEMENT
C. L RAPPOLE and S. A. LOUVIER (Houston Univ.) *In* NASA. Lyndon B. Johnson Space Center Food Serv. and Nutr for the Space Shuttle p 16-19 Apr 1985
Avail NTIS HC A05/MF A01 CSCL 06H

A study to design a food service system using current technology to serve a small scale Space Station was conducted. The psychological, sociological and nutritional factors affecting feeding in microgravity conditions was investigated. The logistics of the food service system was defined E R.

N85-24876# Naval Postgraduate School, Monterey, Calif.
SOME APPLICATIONS OF FUZZY SETS AND THE ANALYTICAL HIERARCHY PROCESS TO DECISION MAKING M.S. Thesis
A. C ROSAS Sep. 1984 74 p
(AD-A150720) Avail: NTIS HC A04/MF A01 CSCL 12B

This thesis examines the use of fuzzy set theory and the analytic hierarchy process in decision making. It begins by reviewing the insight of psychologists, social scientists and computer scientists to the decision making process The Operations Research-Systems Analysis approach is discussed followed by a presentation of the basis of fuzzy set theory and the analytic hierarchy process. Two applications of these methods are presented. The first uses fuzzy sets and a little of the analytic hierarchy process to solve an hypothetical decision problem for the commanding officer of a naval task force. The second applies the latter technique and estimated data to the problem of choosing the best alternative to provide quality air service to Mexico City. Author (GRA)

N85-25283# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio School of Engineering.
A DECISION SUPPORT METHODOLOGY FOR SPACE TECHNOLOGY ADVOCACY M.S. Thesis
P. H. RENSEMA and R. W. CHAPMAN Dec 1984 393 p
(AD-A151895, AFIT/GSO/OS/84D-3) Avail. NTIS HC A17/MF A01 CSCL 05A

In this thesis a decision support methodology for space technology advocacy was developed. Decision models inadequately address the risk and uncertainty inherent in R&D A decision support methodology was developed that would assist the Air Force space technology advocate to determine the strategic and technical utility of space technology issues. Model criteria were developed that could be used in a worth assessment of space technology issues. Using these criteria the decision maker can focus on the strategic appreciation of the technology issues and their relative worth to military space strategy and doctrine and military space technology A description was presented of the information requirements and the analytical tool (the Analytic Hierarchy Process) which could be used by the decision maker, with the appropriate user interface, to apply the criteria in a worth assessment of space technology issues. The results of testing the validity, adequacy, and suitability of the proposed methodology are presented. The criteria was applied to sets of space technology issues within the context of the Analytical Hierarchy process. Results indicate that the proposed methodology provides a firm foundation for development of a microcomputer-based decision support system. Included is an extensive bibliography of mathematical models pertaining to R&D project selection GRA

N85-26190# Ninham Shand, Inc. (South Africa).
MANAGEMENT COMMUNICATION AND FINANCIAL MODELING
H N P. PELLS *In* South African Inst of Civil Engineering Symp. on Computers in Civil Eng., 1983 10 p 1983 refs
Avail: NTIS HC A10/MF A01

The basis of modern management is effective communication Recent developments in the field of data communication by the South African Post Office, the establishment of a South African Library Network and the development of program writing financial modeling systems have all improved communication and thence

the effectiveness of management These developments are reviewed. Author

N85-26439* National Aeronautics and Space Administration, Washington, D.C.
MANAGEMENT: A BIBLIOGRAPHY FOR NASA MANAGERS
Mar. 1985 183 p
(NASA-SP-7500(19); NAS 1.21:7500(19)) Avail NTIS HC A08 CSCL 05A

This bibliography lists 706 reports, articles, and other documents introduced into the NASA scientific and technical information system in 1984 Entries, which include abstracts, are arranged in the following categories human factors and personnel issues; management theory and techniques, industrial management and manufacturing; robotics and expert systems; computers and information management; research and development; economics, costs, and markets; logistics and operations management, reliability and quality control, and legality, legislation, and policy Subject, personal author, corporate source, contract number, report number, and accession number indexes are included A R.H.

N85-27743# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PERSONAL COMPUTER AIDED DECISION ANALYSIS M.S. Thesis
G. R. WHITE 14 Dec. 1984 273 p
(AD-A151911; AFIT/GSO/OS/84D-8) Avail. NTIS HC A12/MF A01 CSCL 09B

The increasing complexity of today's business and military decisions demand informed decision making at all levels of management. Such decision making must be fully supported by timely and accurate analysis. Computers are well-suited for such analysis. Unfortunately, the large mainframe computers are not flexible or responsive enough for use by most managers in a timely manner The growing popularity, presence, and capability of microcomputers represents a new opportunity for operations research. These small, low-cost machines can provide much of the computer support needed for decision making by managers and analysts provided that the necessary software tools are developed. This thesis was undertaken to provide a user-oriented decision analysis tool which exploits the advantages of personal computers. Of the many useful quantitative techniques available, the weighting and constraint techniques of multi-objective decision analysis were selected and implemented. GRA

N85-27746# Texas A&M Univ., College Station Coll. of Business Administration.
MANAGEMENT CONTROL SYSTEMS AND INTERDEPENDENCIES: AN EMPIRICAL STUDY
N. B. MACINTOSH and R L. DAFT Mar. 1985 33 p
(Contract N00014-83-C-0025)
(AD-A152280; TR-ONR-DG-13) Avail: NTIS HC A03/MF A01 CSCL 05A

Two themes in behavioral accounting research suggest that management accounting system characteristics are related to characteristics of the larger organization and that the management accounting system is one element in a control system package The research reported here investigates the relationship between departmental interdependencies and the design and use of three management control systems - the operating budget, periodic statistical reports, and standard operating policies and procedures. The findings support the idea that interdependency between departments influences the emphasis placed on specific management control systems Standard operating procedures are an important control device when interdependence is moderate. When interdependence between departments is high, the role of all three control systems diminish. The findings support the themes that accounting based systems are one device in the organizational control package and that control systems are employed differently according to organizational characteristics. Author (GRA)

N85-27812 European Space Agency. European Space Operations Center, Darmstadt (West Germany).
HELIOS PROJECT SUPPORT
K JEFTMAN *In* DFVLR Ten Years of Helios p 189-192 1984 In ENGLISH and GERMAN
Avail: Issuing Activity

The way in which the Jet Propulsion Laboratory supported the Helios project is described. The preparation procedures for operations are explained The tracking coverage during the flight operations is described. The spacecraft performance exceeded expectations. Author (ESA)

N85-28392# Lawrence Livermore National Lab , Calif.
INTEGRATING QUALITY ASSURANCE AND RESEARCH AND DEVELOPMENT
J. J DRONKERS 15 Feb 1985 5 p refs Presented at the 16th ASQC Ann. Calif. Quality Week Conf , San Jose, Calif., 22 Mar. 1985
(Contract W-7405-ENG-48)
(DE85-007974; UCRL-92210; CONF-8503107-1) Avail: NTIS HC A02/MF A01

Quality assurance programs cannot be transferred from one organization to another without attention to existing cultures and traditions. Introduction of quality assurance programs constitutes a significant change and represents a significant impact on the organizational structure and operational mode. Quality assurance professionals are change agents, but do not know how to be effective ones. Quality assurance as a body of knowledge and experience can only become accepted when its practitioners become familiar with their role as change agents. DOE

N85-28616# Brigham Young Univ., Provo, Utah Computer Aided Mfg Lab
MANUFACTURING INFORMATION SYSTEM Final Report, 1 Jul. 1982 - 31 Oct. 1984
D. K. ALLEN, P. R. SMITH, and M J. SMART 26 Dec 1984 258 p
(Contract AF-AFOSR-0253-82)
(AD-A152715; AFOSR-85-0275TR) Avail: NTIS HC A12/MF A01 CSCL 13H

This is the final report of a project to develop prototype miniature laboratory apparatus to be used in conducting a series of experiments and investigations relating to a Manufacturing Information System. The size and cost of manufacturing equipment has made it extremely difficult to perform a realistic modeling and simulation of the manufacturing process in university research laboratories Likewise the size and cost factors, coupled with many uncontrolled variables of the production situation has even made it difficult to perform adequate manufacturing research in the industrial setting. The difficulty of developing Integrated Manufacturing Systems is well documented by the large amount of funding and effort being spent by industry and government. It was the purpose for research funded under this grant to continue the development of miniature prototype equipment for use in an integrated CAD/CAM Laboratory The equipment developed under this grant and from previous work is capable of actually performing production operations (e.g , drilling, milling, turning, punching, etc.) on metallic and non-metallic workpieces. It is now expected that the prototype equipment developed or otherwise acquired under this grant will now provide the basis for extensive research on Manufacturing Information Systems, Common Database Development, CIM Application Program Development, Local Area Networking, and Knowledge-based CAD/CAM Training utilizing Interactive Videodisc Delivery Systems. GRA

N85-28637# Technische Hogeschool, Delft (Netherlands) Dept. of Mathematics and Informatics.
THE INTERFACE WITH DECISION MAKERS IN INTERACTIVE MULTIOBJECTIVE LINEAR PROGRAMMING
M KOK 1984 40 p refs
(REPT-84-38) Avail: NTIS HC A03/MF A01

The mathematical formulation of interactive multiobjective linear programming methods is investigated, showing that they are all

based on weighting, constraint, or reference point scalarization Interactive methods in each class of scalarization are presented and illustrated with a numerical example. The type and amount of information given by decision makers in the interactive methods are discussed It is shown that in many applications, weighting methods do not fully recognize that the ability of a decision maker to oversee a large number of stimuli is limited. Author (ESA)

N85-28852# Minnesota Univ., Minneapolis Strategic Management Research Center
CENTRAL PROBLEMS IN THE MANAGEMENT OF INNOVATION Interim Technical Report
A H. VANDEVAN Dec. 1984 65 p
(Contract N00014-84-K-0016)
(AD-A152598; SMRC-DP-21; TR-7-ONR) Avail. NTIS HC A04/MF A01 CSCL 05A

Innovation is defined as the development and implementation of new ideas by people who over time engage in transactions with others within an institutional order This simple and seemingly innocuous definition has major implications for managing innovation This definition focuses on four basic factors (new ideas, people, transactions, and institutional context). An understanding of how these factors are related lead to four basic problems confronting most general managers· (1) A human problem of managing attention, (2) A process problem in managing new ideas into good currency, (3) A structural problem of managing part-whole relationships, and (4) A strategic problem of institutional leadership. Appreciating these problems and their consequences provides a first step in developing a practical theory on the management of innovation. GRA

N85-28854# Minnesota Univ , Minneapolis. Strategic Management Research Center
THE CONCEPT OF FIT IN CONTINGENCY THEORY Interim Technical Report
A. H. VANDEVAN and R DRAZIN Nov. 1984 66 p
(Contract N00014-84-K-0016)
(AD-A152603; SMRC-DP-19; TR-5-ONR) Avail· NTIS HC A04/MF A01 CSCL 05A

Contingency theories dominate scholarly studies of organization behavior, design, performance, planning and management strategy. While they vary widely in subject matter, they have the common proposition that an organizational outcome is the consequency of a fit or match between two or more factors. Fit is the key concept in this proposition, and the core problem common to contingency theories is not defining this term clearly. This paper examines three ways to define and test this concept of fit: Selection, Interaction, and Systems approaches. A critical discussion of these approaches will clarify much of the current confusion in the literature on contingency theories, and suggest ways that future theorizing and research can become more systematic and constructive GRA

N85-28870# Technische Hogeschool, Delft (Netherlands). Dept of Mathematics and Informatics.
MULTICRITERIA DECISION ANALYSIS AS AN AID TO STRATEGIC PLANNING OF ENERGY RESEARCH AND DEVELOPMENT
F. A LOOTSMA, J. MEISNER (Shell Research BV, Amsterdam), and F. SCHELLEMANS (Energy Research Council, Hague) 1984 53 p refs
(REPT-84-02) Avail: NTIS HC A04/MF A01

The use of multicriteria decision analysis as an aid for an advisory council to select areas of interest for government-financed Energy R&D subject to a budget constraint is described A way of comparing the anticipated impact of energy R&D in different technological areas based on the opinions of the council members given a number of judgment criteria is outlined Maximizing the overall impact of an R&D program for a given level of expenditure is explained. It is shown how the decision model can be used as a discussion model highlighting the points of agreement and disagreement among council members Author (ESA)

N85-29835# Naval Postgraduate School, Monterey, Calif.
OVERHEAD MANAGEMENT GUIDE FOR AEROSPACE PROCUREMENTS M.S. Thesis
D D. DIETZE and K F. WALTER Dec 1984 129 p
(AD-A153626) Avail: NTIS HC A07/MF A01 CSCL 14A

This thesis focuses on the management emphasis concerning overhead cost control. Senior personnel within the Naval Air Systems Command (NAVAIR) review a multitude of cost information. Due to the nature and complexity of these costs, it is extremely difficult to analyze and interpret cost data and, more specifically, to use these data as a basis for the management of cost control. This study will focus on overhead costs, their impact on total costs, and an analysis of management indicators deemed most useful in controlling overhead costs Findings of the study included· administrative indicators, variance analysis, base forecasting, comparison of dollar amounts, comparison of ratios and a new tool called Overhead Cost Analysis package GRA

N85-30704# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
GUIDE ON WORKLOAD FORECASTING Final Report
H LETMANYI Mar 1985 71 p
(PB85-177632; NBS/SP-500/123; LC-85-600504) Avail NTIS HC A04/MF A01; SOD HC $3.00 as 003-003-02634-4 CSCL 09B

A guide was compiled to provide ADP managers and technical personnel with useful quantitative techniques for forecasting future workload requirements It additionally provides a step by step approach to the forecasting process. Readers can then, in a timely manner, provide the computing resources needed to perform the user's workload at required service levels throughout the life cycle of an ADP system. These techniques are described so that readers with little or no training in statistics should find them useful. However, this guide does not intend to give an exhaustive treatment of the techniques. Author (GRA)

N85-30966# Logistics Management Inst., Bethesda, Md.
PRODUCIBILITY ENGINEERING AND PLANNING (PEP): PROGRAM MANAGEMENT GUIDELINES Final Report, Nov. 1983 - Dec. 1984
F. L ADLER, D. G ALDUCIN, D. V. GLASS, and R A. GUNKEL Jan 1985 44 p
(Contract MDA903-81-C-0166)
(AD-A153730; LMI-RE403) Avail· NTIS HC A03/MF A01 CSCL 05A

Weapon systems and equipment are not always designed for economical fabrication, assembly, inspection, and testing with available production techniques. As a result, deliveries are often late and costs exceed expectations. Production suffers because producibility is not considered early enough during design and because production planning during development is inadequate. We propose guidelines that will provide managers of weapons system programs with a practical approach to developing, executing and funding individual PEP programs. To get the most out of PEP, we recommend that the program manager focus on producibility at the very start of the program and conduct a PEP program that balances design and producibility and incorporates demonstrations of advanced manufacturing processes. During full-scale development, he should carryout out a PEP program that designs and demonstrates production tooling, facilities, and manufacturing methods. We found that when requirements and funding are sound, such as in the F-16 and Air-Launched Cruise Missile programs, a good PEP program can smooth transition from development to production. GRA

N85-32769# Texas A&M Univ., College Station. Dept. of Management

SYMBOLIC AND INTERACTIONAL PERSPECTIVES ON LEADERSHIP: AN INTEGRATIVE FRAMEWORK

R. W. GRIFFIN, K. D. SKIVINGTON, and G. MOORHEAD May 1985 52 p

(Contract N00014-83-C-0025)

(AD-A155247; TR-ONR-DG-15) Avail NTIS HC A04/MF A01 CSCL 05J

This paper presents the development of a Symbolic Interactional Leadership model. The model integrates three emergent streams of thought, symbolic action, reciprocal interactions, and interactional psychology, into a fresh approach which offers considerable advancement over simple, unidirectional, bivariate, static models Implications for future theory and research are discussed. This model, while not yet a fully articulated theory, does represent a significant advancement over simple unidirectional, bivariate, static models While likely to be subject to further refinement and development, the SIL model, then, may provide a useful framework for organizing existing theory and serving as a blueprint for future research. GRA

N85-35313# International Association of Fire Chiefs, Washington, D.C.

FIRE SERVICE EMERGENCY MANAGEMENT HANDBOOK Final Report, Apr. 1983 - Jan. 1985

Jan. 1985 287 p

(Contract EMW-C-0743)

(AD-A155780) Avail NTIS HC A13/MF A01 CSCL 13L

This planning guide was prepared for the Federal Emergency Management Agency by the International Association of Fire Chiefs as part of an effort to update and improve emergency management information available to the fire service Intended as a primary source for fire chiefs, fire executives, and planners, it incorporates the following main topic areas: instruction for the use of the handbook, description of the emergency management process; and checklists for specific hazards. The volume includes a self evaluation form for determining community risk, concepts of emergency management, and specific steps in community risk reduction in the four phases of emergency management process. Sample forms, tables, and letters of agreement are also included. GRA

N85-35498# Air Command and Staff Coll., Maxwell AFB, Ala

A GUIDE FOR NEW ENVIRONMENTAL COORDINATORS

J F KARASEK Apr 1985 49 p

(AD-A156327, ACSC-85-1405) Avail: NTIS HC A03/MF A01 CSCL 05A

This guide provides introductory information about the environmental coordinator's role in the implementation of pollution abatement policy, programs, and requirements. It was written for new environmental coordinators The guide doesn't replace any document, nor is it a substitute for more detailed information It identifies requirements, programs, agencies, and sources of information necessary for the environmental coordinator to perform his/her duties. GRA

03

INDUSTRIAL MANAGEMENT AND MANUFACTURING

Includes Industrial Management, Engineering Management, Design Engineering, Production Management, Construction, Aerospace/Aircraft Industries, Manufacturing.

A85-11245

AIRCRAFT MAINTENANCE [TEKHNICHESKAIA EKSPLAUATATSIIA SAMOLETOV]

N V. ANIKIN and IU. V NAZAROV Moscow, Izdatel'stvo Transport, 1984, 200 p In Russian.

The organization of the aviation engineering service, the general rules of aircraft maintenance, and specific technical servicing procedures are discussed. Attention is given to various types of maintenance, maintenance-related documentation, the maintenance of piping, filters, control systems, airframe, chassis, and hydraulic systems and maintenance procedures under different climatic conditions. Other topics discussed include tools, fixtures, and ground equipment, the structure of an airfield, and take-off preparation. The examples used in the discussion concern An-24 and Tu-154, two of the most popular types of aircraft V.L.

A85-13921

STRATEGIC MANAGEMENT OF INDUSTRIAL TECHNOLOGY - A REVIEW OF THE ISSUES

P. H. BIRNBAUM (Indiana University, Bloomington, IN) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-31, Nov 1984, p 186-191 refs

The English language literature concerning the relationship between strategic management and technological development in U.S. industrial organizations is reviewed. Although still largely normative, there is consistent focus on life cycle approaches and a growing body of empirical evidence which lends support to the argument that more successful firms use technology appropriate to different stages in the product life cycle Author

A85-17776

ENGINEERING MANAGEMENT PROGRAMS AS AIDS IN MOVING FROM TECHNICAL SPECIALTY TO TECHNICAL MANAGEMENT

D F KOCAOGLU (Pittsburgh, University, Pittsburgh, PA) Engineering Management International (ISSN 0167-5419), vol. 2, Jan. 1984, p 33-47 refs

A85-17780

ARE DECISION SUPPORT SYSTEMS APPLICABLE TO ENGINEERING MANAGEMENT?

E. J HANSS (Mallinckrodt, Inc, St Louis, MO) Engineering Management International (ISSN 0167-5419), vol. 2, July 1984, p. 243-250. refs

The challenges of the 'information age' are confronting corporate engineering managers and they must determine if decision support systems (DSS) can be applied and in what manner Managerial concerns of financial responsibilities, technical responsibilities, competitive pressures, together with the availability of computer technology, have led to DSS The use of these systems in the planning, technology, financial and personnel activities of an engineering department are presented. Development of the DSS will be by conscious decision or by default. The changing roles of a corporate engineering department and the challenges of the next decade justify using DSS Author

A85-19181
WORK FLOW IN MANUFACTURING SYSTEMS
B. G. DALE (University of Manchester Institute of Science and Technology, Manchester, England) Engineering Management International (ISSN 0167-5419), vol. 3, Nov. 1984, p 3-13 refs

This paper analyses the material flow system created by functional and group technology manufacturing systems. The results of a survey are discussed which measures the effectiveness of the way in which work flows through the respective systems and tentative reasons are advanced for the throughput efficiency of some group technology systems not coming up to expectation The paper also discusses the contribution which group technology can make to flexible manufacturing systems. Author

A85-21298#
MANAGING PROJECTS FOR HIGH PERFORMANCE
H SHEPARD (Portsmouth Consulting Group, Stamford, CT) and J. GONZALEZ (Bell Northern Research, Ltd, Ottawa, Canada) American Society of Mechanical Engineers, Annual Energy Sources Technology Conference and Exhibit, 7th, New Orleans, LA, Feb 11-17, 1984 5 p.
(ASME PAPER 84-MGT-8)

The effectiveness of organizations developed to handle particular projects was assessed through interviews with managers of twenty different efforts. The projects covered energy, aerospace and chemical endeavors Team management solving problems in an ongoing manner was found preferable to vertical management structures. Communication among the managers is therefore a critical need, as are clearly defined goals, role clarity, teamwork values, flexibility in response to need and a team commitment to success. Rewards and recognition assure teamwork when combined with open dealings with shortfalls A clear, consistent management philosophy must be articulated at the outset and must account for interim goals and a gradual introduction of the operational organization as the project progresses. Blurring the distinctions between contract and project personnel is recommended, as are celebrations of milestones. Finally, emphasis is laid on factors such as open communications, dealing with whatever problems arise as they are perceived, and maintaining a matrix consciousness of the entire system. M S.K

A85-25117
A METHODOLOGY FOR ORGANIZING PERFORMANCE REQUIREMENTS FOR COMPLEX DYNAMICAL SYSTEMS
H. L MALCHOW and S. R. CROOPNICK (Charles Stark Draper Laboratory, Inc, Cambridge, MA) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-32, Feb 1985, p. 10-15. refs

Management of the development of complex dynamical systems includes the tasks of establishing system performance requirements. These requirements are typically obtained from a nonsystematic process, which often results in premature constraining of system design. This paper describes an orderly methodology for establishing performance requirements for complex systems The methodology uses a 'top-down' approach Connections between the system high level mission requirements and the lower level functional performance requirements are made in a series of steps. The steps include identification of system activities, identification of activity-derived state vector elements, definition of state maintenance functions, and identification of functional components. Author

A85-25118
R&D PROJECT TERMINATION IN HIGH-TECH INDUSTRIES
J. A. RAELIN (Boston College, Chestnut, MA) and R. BALACHANDRA (Northeastern University, Boston, MA) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-32, Feb. 1985, p 16-23 refs
(Contract NSF PRA-81-0558)

Based upon extensive data on 51 R&D projects in high-tech companies, a discriminant analysis produced 16 factors which discriminated very well the decision to continue or terminate a project in the development phase. The most important discriminating variables were virtually strategic parameters of the high-technology research environment. Specifically, high rates of product turnover, high market share, and small size were found to lead to continuations, whereas infancy stage product life cycle and innovative versus aligned research strategy led to terminations A number of controllable behavioral properties were also critical to project continuation, among them project management effectiveness, management support, worker commitment, and project leader championship during the projects later stages. In constrast to high-tech firms, 'non-high-tech'project's were found to have greater potential where product turnover was low and projects had limited focused end uses offering sizable profit margins. Author

A85-35100
QUALITY CHARACTERISTIC FEEDBACK CONTROL
G. TAGUCHI (Academy of Quality, Japan) International QC Forum (ISSN 1471-521TX), vol. 2, Feb 1985, p. 9-27. Translation.

Every manufacturing plant has a system to control the conditions of its working process by checking the characteristic value of its product. In this paper, the design of a quality control system by means of feedback control is explained. It is assumed that the mean square drift is proportional to production volume and that the cost of measuring the characteristic value is B yen and that of adjusting the cost is C yen. Measuring errors and time lag are also considered. C.D.

A85-35799
MACHINE VISION: THE EYES OF AUTOMATION - A MANAGER'S PRACTICAL GUIDE
J HOLLINGUM Kempston, Beds., England/Berlin, IFS (Publications), Ltd /Springer-Verlag, 1984, 119 p. refs

The applications of machine vision to robot manufacturing and product inspection are discussed. The image processing and analysis procedures of machine vision systems are described, and detailed case studies of several companies' experience with machine vision systems are presented. Among the machine vision applications discussed are: break-stem rivet inspection, car body type identification; machine loading inspection, and the alignment of automobile windshields. A detailed bibliography is provided, as well as a list of the major organizations and companies which are active in the development of machine vision systems for industrial applications I.H

A85-39076* Naples Univ. (Italy).
SPACELAB TO SPACE STATION; PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON SPACELAB 1 - RESULTS, IMPLICATIONS AND PERSPECTIVES, NAPLES AND CAPRI, ITALY, JUNE 11-16, 1984
L. G NAPOLITANO, ED. (Napoli, Universita, Naples, Italy) Symposium sponsored by the Universita di Napoli, Aeritalia S.p A., ESA, and NASA Earth-Oriented Applications of Space Technology (ISSN 0277-4488), vol. 5, no. 1-2, 1985, 169 p. For individual items see A85-39077 to A85-39096.

Consideration is given to the scientific objectives of the Spacelab program, a review of data obtained during the STS-9/Spacelab 1 mission on board the Shuttle, and the coordination of future Spacelab research among participating European nations. Among the specific fields of study covered by Spacelab 1 were space plasma physics, materials and fluid sciences and technology, astronomy and solar physics, and atmospheric physics and earth observations. Consideration is also given to the legal aspects of space manufacturing activities, the role of private industry in space-based manufacturing ventures, plant production and breeding in space, and the development of remote sensing systems for use in a microgravity environment. I.H.

A85-43189#
NEW TECHNOLOGY IMPLICATIONS ON THE WORK FORCE
F. W. GARRY (General Electric Co., Fairfield, CT) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 New York, AIAA, 1985, p. 87-90.

The introduction of automation and advanced technology into manufacturing plants is discussed from a management perspective, drawing on recent experience at GE. The gradual nature of technological change is considered; the role of international competition in forcing productivity increases and product improvements is indicated; case histories illustrating successful and unsuccessful implementation of productivity-raising measures and/or new technology in existing plants are presented; and strategies for managers are proposed. Recommendations offered include clear definition of actual needs, preliminary analysis of the organizational environment, selection of implementation teams, realistic implementation planning, training and informing workers well in advance, and close cooperation with technology suppliers. T.K

N85-10002# Aeronautical Systems Div., Wright-Patterson AFB, Ohio. Directorate of Support Systems Engineering.
AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS: ESCAPE, RESCUE AND SURVIVAL, TEST FACILITIES AND TEST EQUIPMENT AND TRAINING-SIMULATION EQUIPMENT Annual Report, Jan. 1983 - Jan. 1984
D. C. KITTINGER Apr. 1984 68 p
(AD-A145059; ASD/(ENE)-TR-84-5003; ASD-TR-84-5006) Avail: NTIS HC A04/MF A01 CSCL 01C

This report is part of a compilation of formalized Technology Needs (TNs) covering Support Systems as identified in the Aeronautical Systems Division. They are based on development/operational experience, systems studies, and new concepts -- all related to future system applications Their presentation is to serve a threefold purpose (1) guidance for technology programs, (2) prove developmental potential, and (3) engineering data/requirements essential for technology use in systems. The identified needs delineate progress desired in performance, control, design flexibility, safety and cost. GRA

N85-10218# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
MODELLING THE DEMAND FOR CONSTRUCTION
H. R. WEISTROFFER Jul. 1983 21 p refs Submitted for publication
(CSIR-TWISK-322) Avail: NTIS HC A02/MF A01

A system dynamics approach to modelling the demand for construction in South Africa is described. The model presented is intended as a first step in an iterative process of modelling construction demand, and as such is deliberately kept small Results obtained through the model using historical data indicate that the relations included in the model are indeed relevant The accuracy of the model is discussed and suggestions for further developing the model are made. R J F.

N85-11910# Cologne Univ. (West Germany). Betriebswirtschaftliches Institut fuer Organisation und Automation
BUSINESS PLANNING FOR INFORMATION SERVICES UNDER SPECIAL CONSIDERATION OF GERMAN MANAGEMENT INFORMATION SYSTEMS Final Report, Jun. 1978
N. SZYPERSKI, L. BERENS, K. HOERING, W. STEINBRECHER, and M. WOLFF Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983 161 p refs In GERMAN, ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-ID-83-007, ISSN-0170-8996) Avail: NTIS HC A08/MF A01, Fachinformationszentrum, Karlsruhe, West Germany DM 33

Data base services, information brokers, management information systems, publishers and information consultants are examined In order to assist these planning activities decision support systems were developed Methods for industrial management development planning; computer aided planning model; data logging, and analysis of pilot systems are described Author (ESA)

N85-13684# Centre National d'Etudes Spatiales, Toulouse (France). Direction des Affaires Internationales et Industrielles.
VALUE ANALYSIS [L'ANALYSE DE LA VALEUR]
C PETITDEMANGE Jan. 1984 110 p refs In FRENCH; ENGLISH summary
(CNES-NT-110) Avail NTIS HC A06/MF A01

Industrial competitiveness is analyzed to establish value analysis techniques as a fundamental tool Product development, user requirements, and cost analysis are discussed Organization necessary for the implementation of value analysis in the industrial environment is detailed Author (ESA)

N85-16691# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio
ORGANIZATIONS AND INFORMATION PROCESSING: A FIELD STUDY OF RESEARCH AND DEVELOPMENT UNITS WITHIN THE UNITED STATES AIR FORCE SYSTEMS COMMAND Ph.D. Thesis
T. TRISCARI, JR. Aug 1984 349 p
(AD-A147381; AFIT/CI/NR-84-68D) Avail. NTIS HC A15/MF A01 CSCL 05A

This study conceptualizes the Research and Development (R&D) organizational unit as an information processing system which, to be most effective, must respond to the changing information requirements encountered in proceeding from a research orientation (information generation and expansion) to a product or system development emphasis (information application). To contend with and reduce the level of uncertainty, a unit must process information from various sources for its problem solving or decision making activities. This approach suggests that those units matching their information processing capabilities to the information processing requirements should be effective. The intent of this research is to investigate the information processing model of organizational design within an R&D setting. Specifically, the research will examine if perceived information requirements differ between research units and development units. GRA

N85-18079*# National Academy of Sciences - National Research Council, Washington, D C. Ad Hoc Committee on Space Station Engineering and Technology Development
SPACE STATION ENGINEERING AND TECHNOLOGY DEVELOPMENT
1985 86 p
(Contract NASW-3455)
(NASA-CR-174383, NAS 1.26 174383) Avail. NTIS HC A05/MF A01 CSCL 22B

Historical background, costs, organizational assignments, technology development, user requirements, mission evolution, systems analyses and design, systems engineering and integration, contracting, and policies of the space station are discussed. B G.

N85-21414*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Engineering and Technical Systems.
COMPUTER INTEGRATION OF ENGINEERING DESIGN AND PRODUCTION: A NATIONAL OPPORTUNITY Final Report
Oct 1984 73 p
(Contract NASW-3811)
(NASA-CR-175483; NAS 1.26:175483; PB85-128429) Avail: NTIS HC A04/MF A01 CSCL 13H

The National Aeronautics and Space Administration (NASA), as a purchaser of a variety of manufactured products, including complex space vehicles and systems, clearly has a stake in the advantages of computer-integrated manufacturing (CIM). Two major NASA objectives are to launch a Manned Space Station by 1992 with a budget of $8 billion, and to be a leader in the development and application of productivity-enhancing technology At the request

of NASA, a National Research Council committee visited five companies that have been leaders in using CIM. Based on these case studies, technical, organizational, and financial issues that influence computer integration are described, guidelines for its implementation in industry are offered, and the use of CIM to manage the space station program is recommended. GRA

N85-21989# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.
THE MAN-MACHINE INTERFACE Interim Report
R. U. AYRES Dec 1984 31 p
(AD-A149971; CMU-RI-TR-84-26) Avail: NTIS HC A03/MF A01 CSCL 05H

Our basic objective was to define a composite measure of human capabilities that could also be used to measure the skill requirements of various manufacturing tasks. In the course of our research, however, we have come to the conclusion that most human workers (at least in the semiskilled categories) are not employed for their manual skills, or dexterity, but for a different purpose. Although our basic objective remains unchanged, our research focus has shifted to the emerging competition between human workers as machine process controllers in certain highly engineered environments, and the use of sensor-based, computerized systems for the same purpose. Author (GRA)

N85-24309# ESCOM, Cleveland (South Africa)
STATUS OF THE U.K. N.D.T. INDUSTRY TODAY
E. A. LLOYD *In its* Mini-Seminar on Non-Destructive Testing 8 p Oct. 1983
Avail: NTIS HC A07/MF A01

Government interest in the advancement of nondestructive testing methods is discussed. The problem of manufacturing costs was investigated and it was found that these could most effectively be minimized by the provision of abundant, cheap and secure supplies of energy. Exploitation of North Sea oil reserves, the expansion of the Nuclear Power Program, and measures to increase the availability of existing power plant within the Electrical Industry, were all proposed as means of reducing dependence on expensive and increasingly unreliable imported energy. The reliability of pressurized equipment is seen as a principal problem area in nearly every activity associated with a secure energy supply. Representations and recommendations are made for the rationalization and expansion of the domestic NDT industry. E.A.K

N85-25824# Whessoe Ltd., Darlington (England)
THE DEVELOPMENT AND IMPLEMENTATION OF ADVANCED WELDING TECHNOLOGY
W. P. CARTER *In* Welding Inst. Welding Technol. Japan p 1-3 1904
Avail: Issuing Activity

The principal reasons for adopting more advanced techniques must be identified and the possible limitations on the adoption of mechanized/automated systems must also be considered for specific applications. Three aspects of welding technology examined include the organization of development activities when considering new technology implementation, the importance of material quality developments in achieving success, and technology for welding tunnel lining closing seams, helical pipes to large tubes, and overhead tubes to plate joints. A.R.H.

N85-25835# Babcock Power Ltd., London (England).
WELDING TECHNIQUES IN PRESSURE PART TECHNOLOGY
J. C. LOCHHEAD *In* Welding Inst. Welding Technol., Japan p 119-129 1984
Avail: Issuing Activity

Japanese pressure part welding technology appears to have invested heavily in high rate deposition techniques. These include multiwire electroslag and submerged arc processes and numerous variations on the narrow gap principle. The Japanese success in the introduction of new technologies is a combination of four main factors, which are as follows: (1) market incentive; (2) Attitude, (3) NDE requirements; and (4) Financial Considerations. These factors can be related to their historical and cultural background. E.A.K.

N85-26184# Hill Kaplan Scott, Inc. (South Africa).
COMPUTERS AND THE CONSULTING ENGINEER
A. D. TUFF *In* South African Inst. of Civil Engineering Symp. on Computers in Civil Eng., 1983 15 p 1983
Avail: NTIS HC A10/MF A01

The implementation of computers within the total consulting engineering environment from administration through to project management is discussed. The advantages to be had by creating an integrated system and describes the various areas of application are outlined. Current design software is discussed and the means for its needed improvement are suggested. Author

N85-27121# Naval Postgraduate School, Monterey, Calif.
AN ANALYSIS OF DATA DICTIONARIES AND THEIR ROLE IN INFORMATION RESOURCE MANAGEMENT M.S. Thesis
S. L. LANDIN and R. L. OWENS Sep 1984 109 p
(AD-A152134) Avail: NTIS HC A06/MF A01 CSCL 05B

The goal of efficient management of an organization's information resource can be accomplished through the implementation and use of a data dictionary. This thesis defines the structure and functions of a data dictionary and analyzes the attempt of the National Bureau of Standards to promulgate a standard software specification for use in the evaluation and selection of data dictionaries in the federal government. Criteria for the ideal data dictionary are developed based on the role a dictionary can play in information resource management and are then used to evaluate four commercial data dictionary packages. Finally, some ideas concerning possible applications for data dictionary technology are presented. GRA

N85-27821# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany)
ACTIVITIES IN AEROSPACE Annual Report, 1983 [KONZERN-GESCHAEFTSBEREICH 1983]
Jun. 1984 45 p In GERMAN Original contains color illustrations
Avail: NTIS HC A03/MF A01

Research concerning helicopters and aircraft, astronautics, transport and passenger aircraft, and military techniques is summarized. Author (ESA)

N85-28189# Joint Publications Research Service, Arlington, Va.
APPLICATIONS OF ROBOTS IN MACHINE TOOL INDUSTRY REVIEWED
N. TYURIN *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-84-014) p 46-49 31 Jul. 1984 Transl. into ENGLISH from Sov. Rossiya (Moscow), 28 Apr. 1984 p 1
Avail: NTIS HC A04

Progress in the development of the application of robots in the machine tool industry is reported. The implementation of major comprehensive programs will raise the production to a new level. Robot technology and the development of its major resource is emphasized. E.A.K.

N85-32785# Joint Publications Research Service, Arlington, Va.
QUALITY ANALYSIS
P. KYJOVSKY *In its* East Europe Rept. Sci. and Technol. Selections on CSSR JPRS-ESA-84-017 p 17-20 31 May 1984 Transl. into ENGLISH from Sdelovaci Technika (Prague), no. 11, 1983 p 401-402
Avail: NTIS HC A05/MF A01

Quality analysis and quality engineering are one of the means for intensifying the national economy that have an impact not only on the sphere of products, but also on the management and evaluation of entire production organisms in defining their economic and social utility. Quality analysis as such is a system oriented complex of methods, the ultimate objective of which is searching for and proposing improved or even basically new solutions relevant to the function of the analyzed object in order to improve its effectiveness. Examples of improvements in such products as

switches, soldering apparatus, and transformers are discussed
R J.F.

N85-35410# Applied Concepts Corp , Woodstock, Va.
INVESTMENT JUSTIFICATION OF ROBOTIC TECHNOLOGY IN AEROSPACE MANUFACTURING. USER'S MANUAL Final Report, 21 Feb. - 28 Sep. 1984
J. A. SIMPSON Oct. 1984 80 p
(Contract F33615-83-C-5080)
(AD-A156193; BRMC-83-5080-3) Avail. NTIS HC A05/MF A01 CSCL 05C

A computer program summary of the results of a three phased research program entitled Investment Justification of Robotic Technology in Aerospace Manufacturing, whose objective was to develop a computerized economic analysis methodology appropriate for investment justification of robotics and flexible manufacturing systems (FMS) in aerospace manufacturing is presented. A microcomputer-based economic justification methodology was developed, called the Robotics Investment Decision Model (RIDM) In Phase 1 a nation-wide survey was performed of robotics investment analysis methodologies used or proposed by government, industry, and academia. The survey included discussions with financial, engineering, and management personnel at eight major U.S. aerospace corporations, to determine their needs and constraints, and how a model might best be designed. Phase 2 was the model development phase. The model was written as a Lotus 1-2-3 template, and is called the Robotics Investment Decision Model. Phase 3 was a review and field test of the model, RIDM was demonstrated to several USAF organizations, and was assessed by a major U.S aerospace manufacturer. Internal testing continued, improving RIDM through several format changes, one minor technical change, and adding a few new features The model is now ready for release to the aerospace industry. GRA

04

ROBOTICS AND EXPERT SYSTEMS

Includes Artificial Intelligence, Robots and Robotics, Automatic Control and Cybernetics, Expert Systems, Automation Applications, Computer-Aided Design (CAD), Computer-Aided Manufacturing.

A85-13599
A QUANTITATIVE EVALUATION OF HUMAN ACTIVITY IN MAN-MACHINE SYSTEMS [KOLICHESTVENNAIA OTSENKA DEIATEL'NOSTI CHELOVEKA V SISTEMAKH CHELOVEK-TEKHNIKA]
G P SHIBANOV Moscow, Izdatel'stvo Mashinostroenie, 1983, 264 p. In Russian. refs

Problems related to the analytical representation of the characteristics of man as an element of the man-machine system are examined with a view to developing an approach to the quantitative evaluation of human activity. Based on a systems approach, several mathematical models describing various aspects of human activity in man-machine systems are proposed The basic principles of the evaluation of the efficiency of the human operator in man-machine systems are formulated and evaluation algorithms are presented V.L.

A85-16093*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
COOPERATIVE CONTROL - THE INTERFACE CHALLENGE FOR MEN AND AUTOMATED MACHINES
W W HANKINS, III and N E. ORLANDO (NASA, Langley Research Center, Automation Technology Branch, Hampton, VA) American Society of Mechanical Engineers, International Computers in Engineering Conference and Exhibit, Las Vegas, NV, Aug 12-16, 1984, Paper 9 p. refs

The research issues associated with the increasing autonomy and independence of machines and their evolving relationships to human beings are explored The research, conducted by Langley Research Center (LaRC), will produce a new social work order in which the complementary attributes of robots and human beings, which include robots' greater strength and precision and humans' greater physical and intellectual dexterity, are necessary for systems of cooperation Attention is given to the tools for performing the research, including the Intelligent Systems Research Laboratory (ISRL) and industrial manipulators, as well as to the research approaches taken by the Automation Technology Branch (ATB) of LaRC to achieve high automation levels. The ATB is focusing on artificial intelligence research through DAISIE, a system which tends to organize its environment into hierarchical controller/planner abstractions M.D.

A85-17817#
MODEL-BASED REASONING IN EXPERT SYSTEMS - AN APPLICATION TO ENROUTE AIR TRAFFIC CONTROL
S. E. CROSS (USAF, Institute of Technology, Wright-Patterson AFB, OH) IN Digital Avionics Systems Conference, 6th, Baltimore, MD, December 3-6, 1984, Proceedings New York, American Institute of Aeronautics and Astronautics, 1984, p 95-101. USAF-sponsored research; U S. Department of Transportation. refs
(Contract DOT-FA79WA-4360)
(AIAA PAPER 84-2619)

The explanation capabilities (EC) of expert systems, the extent of computer understanding, and the artificial intelligence ability to reason about disparate knowledge are discussed in the context of air traffic control (ATC). EC is essential for humans to understand and interact with the results of computer reasoning Questions of 'how' and 'why' certain actions are recommended can be satisfied by a display of the appropriate part of the computational process used to arrive at a conclusion, abstracted and expressed in a form amenable to the context of the question and intelligible to humans The knowledge base may be solutions to the aircraft equations of motion It may be necessary for representations to be multi-leveled to reply successively until satisfying the questioner's level of sophistication in understanding, e.g., physics For ATC problems such as collision avoidance, the system must take into account operational aspects like other flight routes and flight economy Several examples are provided of means by which an expert system could search for an answer and be able to explain it. M.S.K

A85-20400#
SYNERGY IN SPACE - MAN-ROBOT COOPERATION
S WALTERS Mechanical Engineering (ISSN 0025-6501), vol 107, Jan. 1985, p. 26-37

The forecast of U S. national space strategy for the next 25 years and beyond, as announced by President Reagan in October, 1983, is concerned with the permanent occupation of space by man. In connection with plans for the implementation of such an occupation, NASA has considered the concept of a 'flotilla' with a manned base in the center, a utility core, a modular laboratory, and an orbital service station The presence of man and machines, in particular computer-linked machines, is to provide possibilities for the continuous exploitation of space. Studies have identified automation, robotics, and machine intelligence systems (ARAMIS) as an important contributor to the productivity of orbital factories. Attention is given to aspects of 'telepresence', plans for 1995 and beyond, the orbital maneuvering vehicle (OMV), OMV applications, the support of materials-processing platforms,

telepresence technology, a stereo-optic vision system, manipulator arms, end-effectors, communications, and long-term plans and goals. G.R.

A85-21569#
MESSAGE - AN EXPERT SYSTEM FOR AIRCRAFT CREW WORKLOAD ASSESSMENT
G. A. BOY and C. TESSIER (ONERA, Centre d'Etudes et de Recherches de Toulouse, Toulouse, France) IN Symposium on Aviation Psychology, 2nd, Columbus, OH, April 25-28, 1983, Proceedings . Columbus, OH, Ohio State University, 1984, p 207-222. refs

A system of Crew and Aircraft Subsystems Models for the Management of Aircraft Equipment (CASMMAE) is presented. The system is based on the results of human pilot modelling experiments carried out at ONERA since 1981. Individual interactive models of human performance in the operation of heavy transport aircraft are incorporated into the system, in order to simulate the data acquisition, planning, and execution processes which form the basis of pilot decision making Some preliminary results from experimental simulations with the system are discussed CASMMAE is written in PASCAL to facilitate the definition of structured data and file management An example of a recovery strategy tree used by the system is provided I.H.

A85-23195#
SPECIFYING AND COST ESTIMATING
G K. SWEET (United Space Boosters, Inc., Huntsville, Al) University of Alabama in Huntsville and University of Alabama in Birmingham, Annual Robotics Conference, 4th, University of Alabama, Huntsville, AL, Apr. 26, 1984, Paper. 27 p.

The successful purchase and installation of an industrial robot requires a suitable planning and implementation procedure The entire process involves four general steps, related to planning, applications engineering, installation, and intergration. Planning, the first step, is to lead to a decision regarding the employment of a robot. In typical manufacturing operations, it appears to be indicated to conduct both a cost study and an audit of manufacturing operations. Attention is given to the selection of a group of individuals to carry out the implementation program, the importance of an active participation of management, the definition of objectives, the identification of robot application candidates, a review of robot equipment, the conduction of an economic analysis, categories of cost savings, details of cost analysis, initial application, initial application requirements, robot selection, training, and human relations G.R.

A85-23196#
PRODUCIBILITY ENGINEERING FOR ROBOTIC MANUFACTURING
J. H. DONNELLY (U.S. Army, Production Engineering Div., Redstone Arsenal, AL) University of Alabama in Huntsville and University of Alabama in Birmingham, Annual Robotics Conference, 4th, University of Alabama, Huntsville, AL, Apr. 26, 1984, Paper. 23 p. refs

Producibility engineering is concerned with the development of a close relationship between product design and the processes proposed for its manufacture. Such a relationship is important for the selection of low-cost manufacturing processes. The present investigation has the objective to provide a producibility philosophy, a proven step-by-step methodology, and a management control procedure to ensure success in any manufacturing environment including a robotic one. It is pointed out that design for product producibility must be introduced early and intensively managed to achieve results. Producibility engineering considerations are discussed, taking into account design flexibility, proprietary components and processes, standardization, tolerances, materials, components, physical shape, test and inspection, uncluttered design, and manufacturing economy. Attention is also given to the importance of an identification of cost targets, manufacturing rates, and manufacturing locations G.R.

A85-23197*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SYSTEM-LEVEL APPROACH TO AUTOMATION RESEARCH
F. W. HARRISON and N E ORLANDO (NASA, Langley Research Center, Flight Dynamics and Control Div., Hampton, VA) University of Alabama in Huntsville and University of Alabama in Birmingham, Annual Robotics Conference, 4th, University of Alabama, Huntsville, AL, Apr. 26, 1984, Paper. 17 p. refs

Automation is the application of self-regulating mechanical and electronic devices to processes that can be accomplished with the human organs of perception, decision, and actuation. The successful application of automation to a system process should reduce man/system interaction and the perceived complexity of the system, or should increase affordability, productivity, quality control, and safety. The expense, time constraints, and risk factors associated with extravehicular activities have led the Automation Technology Branch (ATB), as part of the NASA Automation Research and Technology Program, to investigate the use of robots and teleoperators as automation aids in the context of space operations. The ATB program addresses three major areas: (1) basic research in autonomous operations, (2) human factors research on man-machine interfaces with remote systems, and (3) the integration and analysis of automated systems This paper reviews the current ATB research in the area of robotics and teleoperators. Author

A85-23198#
HUMAN FACTORS IN ROBOTICS
H. M. PARSONS (Essex Corp., Alexandria, VA; Lehigh University, Bethlehem, PA) University of Alabama in Huntsville and University of Alabama in Birmingham, Annual Robotics Conference, 4th, University of Alabama, Huntsville, AL, Apr. 26, 1984, Paper. 23 p refs

The present investigation is concerned with possible contributions of human factors engineering to robotics. Engelberger (1974) applied the term 'symbiosis' to robotics to indicate that humans were and would be working jointly with robots. Aspects of such a 'symbiosis' are discussed, and a description of human factors engineering techniques is presented, taking into account interface design, workplace layout, ambient conditions, safety, procedures and manuals, installation and testing, skill and training requirements, and job design. It is pointed out that in terms of visible events, human factors engineering has been involved in robotics for no more than five years. Developments occurring in connection with such an involvement are discussed. G.R.

A85-24035
CERTAIN PROBLEMS IN THE AUTOMATED ASSESSMENT OF THE OPERATING EFFICIENCY OF MAN-MACHINE SYSTEMS [NEKOTORYE VOPROSY AVTOMATIZATSII OTSENKI EFFEKTIVNOSTI FUNKTSIONIROVANIIA SISTEM 'CHELOVEK-TEKHNIKA']
A. A. BEZBOGOV (Rizhskoe Vysshee Voennoe Aviatsionnoe Inzhenernoe Uchilishche, Riga, Latvian SSR) Kibernetika i Vychislitel'naia Tekhnika (ISSN 0454-9910), no. 61, 1984, p. 63-67. In Russian. refs

A generalized description is given of a man-machine system (MMS), its constituent parts (the human operator and the machine part), and their interactions. The problem of assessing the operating efficiency of MMSs is formulated, and the concept of objective assessment is defined. A classification of assessments of MMS operation is proposed, and structures of automated systems for the assessment of MMSs are presented. B.J.

A85-30351#
ACTIVE CONTROL OF MECHANICAL SYSTEMS - THE STATE-OF-THE-ART FOR ROBOTIC MANIPULATORS
S. DUBOWSKY (MIT, Cambridge, MA) IN: Structures, Structural Dynamics, and Materials Conference, 26th, Orlando, FL, April 15-17, 1985, Technical Papers. Part 2 . New York, American Institute of Aeronautics and Astronautics, 1985, p 258-261.
(AIAA PAPER 85-0683)

Active control is an important factor in developing future high performance intelligent mechanical systems. Robotic manipulators are an example of such systems which have received much attention recently. This paper briefly reviews the current state-of-the-art capabilities and limitations of the control systems for these devices It also discusses the areas which must be addressed if robotic manipulators are to achieve truly high levels of performance in the future. Author

A85-31792
DEVELOPMENTS IN DECISION SUPPORT SYSTEMS
R. H. BONCZEK, C. W. HOSAPPLE, and A. B. WHINSTON (Purdue University, West Lafayette, IN) IN: Advances in computers. Volume 23 Orlando, FL, Academic Press, Inc., 1984, p. 141-175. refs
(Contract NSF IST-81-08519; NSF ECS-81-16135)

A 'Decision Support System' (DSS) is a computerized system which utilizes knowledge about a particular application area to help decision makers working in that area solve ill-structured problems. Ill-structured problems exist in applications related to financial planning, medical diagnosis, operations management, and market planning The concept and the activities of decision making are discussed. The information-processing system which makes a decision may be human (individual or group), machine, or a system having both human and machine participation. The latter type of decision-making system is of primary interest in the DSS field. The machine-based portion of the decision-making system constitutes typically a decision support for the human portion A DSS must possess at least one of the seven decision-making abilities and must exercise that ability in some stage of a decision process. Attention is given to the tools for building a DSS, the essential components of a DSS, trends in the DSS field, and future research directions G.R.

A85-37566
EVALUATION OF THE EFFICIENCY OF OPERATOR WORK IN MAN-MACHINE SYSTEMS [OTSENKA EFFEKTIVNOSTI RABOTY OPERATORA V SISTEMAKH 'CHELOVEK-MASHINA']
E. V BORISOV Radiotekhnika (ISSN 0033-8486), April 1985, p. 91, 92. In Russian

A method for determining the efficiency of operator work in man-machine systems is proposed in which the necessary input data are specified in the form of fuzzy sets. This makes it possible to formalize the subjective representation of the researcher concerning the characteristics of the system and the operator, especially at the system design stage. B J.

A85-42892*# Jet Propulsion Lab , California Inst of Tech., Pasadena.
TOWARD THE FULLY CAPABLE AI SPACE MISSION PLANNER
S. GRENANDER (California Institute of Technology, Jet Propulsion Laboratory, Pasadena) Aerospace America (ISSN 0740-722X), vol. 23, Aug. 1985, p. 44-46.

The necessity of expending numerous ground-side manhours to write extremely concise command codes for deep-space probes in-flight, which carry limited on-board processing capabilities, is encouraging the development of AI modules to perform the same task. An experimental automated sequence planner, Deviser, has proven successful enough, when used on a mainframe computer, to continue with the next generation of the concept, PLAN-IT, an expert scheduler for spacecraft observation targets. The new system will provide the ground-based user with interactive graphic displays for choosing targets and generates an expected time-line. An updated Deviser, using the new modules, will be tested after the Voyager Uranus encounter, and PLAN-IT will be employed to formulate Spacelab activity schedules M.S K

A85-45087
TIMM - THE INTELLIGENT MACHINE MODEL
D. W COOPER (General Research Corp , Santa Barbara, CA) IN NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 New York, IEEE, 1984, p. 802-807. refs

The rationale behind TIMM (The Intelligent Machine Model), a domain independent expert system building tool, is discussed, and a description of TIMM's functions is given TIMM helps the expert describe both the problem domain and the set of possible solutions. It leads the expert through test cases, asking only about specific, real problems. TIMM generalizes the expert's knowledge, eventually attaining a sufficient degree of expertise to perform as well as the expert in the problem domain. Current deficiencies in TIMM and several in-house applications are described C D.

A85-45902*# TRW, Inc., Redondo Beach, Calif.
THE ROLE OF ROBOTICS IN SPACE SYSTEM OPERATIONS
H F. MEISSINGER and V A. SPECTOR (TRW, Inc , Space and Technology Group, Redondo Beach, CA) IN: Guidance, Navigation and Control Conference, Snowmass, CO, August 19-21, 1985, Technical Papers New York, AIAA, 1985, p. 223-236. refs
(Contract NAS8-35031)
(AIAA PAPER 85-1879),

The role of automation and robotics in support of man's activities in space is discussed, with emphasis given to satellite servicing functions on board the NASA Space Station (SS) or at remote locations. Consideration is given to four satellite servicing mission scenarios, including: low-earth-orbit (LEO) servicing of satellite in situ or on the Space Station following orbital transfer by means of an Orbital Maneuvering Vehicle (OMV); in situ servicing of a free-flying coorbiting materials processing platform; repair/refurbishment of Space Station payloads of substations, an in situ servicing of geostationary satellites by means of an Orbital Transfer Vehicle (OTV) The potential applications of three different automation technologies are examined, including: teleoperation; robotics, and artificial intelligence Consideration is also given to the potential applications of the Space Station data system in support of servicing activities A list of the more common terms of automation technology is provided. I H.

A85-47677
THE MODELING OF HUMAN COGNITIVE DECISION PROCESSES IN THE INTELLIGENT MACHINE MODEL (TIMM)
R. E. PARKER and S. J. KISELEWICH (General Research Artificial Intelligence Laboratory, Santa Barbara, CA) IN 1984 American Control Conference, San Diego, CA, June 6-8, 1984, Proceedings. Volume 1 . New York, IEEE, 1984, p. 1-5. refs

The Intelligent Machine Model (TIMM) is a software package that enables a user to build an 'expert system' - that is, a system which is capable of providing expert advice in some well-defined domain of expertise. To accomplish this, TIMM attempts to represent some of the analog character of the real world domain, in addition to a standard rule base. This extra information defines a metric over the rule base. This metric allows TIMM to model some distinctly human capabilities. TIMM is able to reach decisions for new, uncertain, and incompletely defined situations. TIMM is able to examine its own rule base and suggest new rules that seem appropriate for the domain. These are important capabilities for real world expert systems Author

A85-49098
ARTIFICIAL INTELLIGENCE - A NEW DIMENSION IN EW
T. H. GREER (Litton Applied Technology, Sunnyvale, CA) Defense Electronics (ISSN 0278-3479), vol. 17, Sept. 1985, p. 190, 191, 193 (8 ff.).

The concept of artificial intelligence (AI) is examined from the standpoint of the application of AI techniques to electronic warfare. The general design of a knowledge-based system and its components are then discussed, with attention given to the

production pair, inferencing, the inference engine, search strategies, and knowledge representation. It is pointed out that applying AI techniques to threat warning systems will produce a more comprehensive, higher-level, contextual assessment of the current and projected threat situation. This assessment will contain more information and need less interpretation by the pilot than the mere categorization and display of the instantaneous signal environment. V.L

A85-49563
EXPERT SYSTEMS IN SOFTWARE MAINTAINABILITY
C. A. DYER (Digital Equipment Corp., Nashua, NH) IN. Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p 295-299.

The development of an expert system for planning for software maintainability is described. The factors which need to be considered in order to optimize the cost of maintaining software are given. Maintainability planning, which is a set of decisions about the level of support available for a product, and expert systems, which match inputs to rules stored in the system, are discussed An example which explains the functioning of the expert system is provided. An expert system utilizes human judgment, however, the system is not capable of drawing inferences or formulating new rules I F.

N85-10372# *LTV Aerospace Corp., Dallas, Tex. Aero Products Div.*
ICAM (INTEGRATED COMPUTER AIDED MANUFACTURING) CONCEPTUAL DESIGN FOR COMPUTER-INTEGRATED MANUFACTURING. VOLUME 4, PART 6: TASK D. QUALITY ASSURANCE/QUALITY CONTROL/TECHNICAL REQUIREMENT/TASKS, QUALITY ASSURANCE MODELING AND ANALYSIS, QUALITY ASSURANCE PROGRAM MANAGEMENT STANDARD RECOMMENDATIONS (ISP) Final Technical Report, 1 Oct. 1981 - 29 Jun. 1984
R. H. WETTACH, B. R. SHEPHERD, and W. D. VINSON Wright-Patterson AFB, Ohio AFWAL 29 Jun 1984 304 p
(Contract F33615-81-C-5119)
(AD-A144891; REPT-2-20150/4R-2-VOL-4-PT-6; ISP110513000-VOL-4-PT-6; AFWAL-TR-84-4020-VOL-4-6) Avail: NTIS HC A14/MF A01 CSCL 14D

This document, Vol. IV, Part 6, of the Final Technical Report contains the Quality Assurance Program Management Standard Recommendations (ISP). This document presents recommendations for a new DoD Quality Assurance Standard and two alternative considerations for improving existing standards Background rationale and other supporting material, including analysis approach and survey results are presented.
Author (GRA)

N85-11347# *Applied Concepts Corp , Woodstock, Va*
ROBOTICS INVESTMENT DECISION MODEL USER'S MANUAL Report, 21 Feb. - 2 May 1982
J. A. SIMPSON 4 May 1984 88 p
(Contract F33615-83-C-5080)
(AD-A145467, BRMC-83-5080-2) Avail: NTIS HC A05/MF A01 CSCL 09B

This report describes how to use the Robotics Investment Decision Model (RIDM) RIDM is a computerized model for assessing the economic attractiveness of investments in robotics and/or flexible manufacturing systems. It is written as a template for Lotus 1-2-3, a popular microcomputer-based electronic spreadsheet program. RIDM models the nominal and discounted cash flows generated by the investment as compared to the existing method of manufacture, and provides the internal rate of return and net present value of the investment, both before and after taxes. Author (GRA)

N85-11594# Rome Air Development Center, Griffiss AFB, N.Y.
ARTIFICIAL INTELLIGENCE APPLICATIONS TO MAINTENANCE
A. COPPOLA *In Denver Research Inst. Artificial Intelligence in* Maintenance p 23-44 Jun 1984
(AD-P003914) Avail NTIS HC A22/MF A01 CSCL 05A

The maintenance of modern military systems employs a variety of automation. Built-In-Test provides on-line fault detection and some isolation, Automatic Test Equipment is indispensable at intermediate and depot repair stations, and automated maintenance aids and trainers abound These developments were designed to speed maintenance and to compensate for declining skill levels in the maintenance force. They are currently far from satisfactory. Modern maintenance is characterized by excessive false alarms and unnecessary removals at all levels of maintenance. The results of these deficiencies are long maintenance times, resources wasted in unnecessary for inefficient maintenance actions, and systems out of action which need not be. Correcting these problems would therefore provide both an economic advantage and a force multiplier. To create quantum improvements in maintenance will require the application of radical changes to the technology One possibility is the application of Artificial Intelligence (AI) techniques to maintenance. AI is beginning to see application to practical problems in many disciplines, and hence is potentially capable of relatively rapid implementation into military systems At present, DoD efforts in applying AI to maintenance are small and exploratory. The task of the Artificial Intelligence Applications committee was to examine the opportunities for applying AI to maintenance, assess the costs, risks, and development time required, and provide recommendations to the DoD for action GRA

N85-11595# Navy Center for Applied Research in Artificial Intelligence, Washington, D C
ON APPLYING AI (ARTIFICIAL INTELLIGENCE) TO MAINTENANCE AND TROUBLESHOOTING
K DEJONG *In* Denver Research Inst Artificial Intelligence in Maintenance p 45-54 Jun 1984
(AD-P003915) Avail: NTIS HC A22/MF A01 CSCL 05A

This article describes artificial intelligence applications to maintenance and troubleshooting in the Navy GRA

N85-11605# Stanford Univ , Calif.
GUIDON
W. J. CLANCEY *In* Denver Research Inst Artificial Intelligence in Maintenance p 181-188 Jun 1984
(AD-P003925) Avail: NTIS HC A22/MF A01 CSCL 09B

GUIDON is an intelligent computer-aided instructional program for teaching diagnosis, such as medical diagnosis. The program is general Without reprogramming, the program can discuss with a student any diagnostic problem that it can solve on its own. Moreover, by substituting problem solving knowledge from other domains, the program can immediately discuss problems in those domains. This power derives from the use of Artificial Intelligence methods for representing both subject material and knowledge about how to teach. These are represented independently, so the teaching knowledge is general. There are teaching rules and procedures for: determining what the student knows, responding to his partial solution, providing hints, and opportunistically interrupting to test his understanding. Experience with GUIDON reveals the importance of separating out casual and strategic knowledge in order to explain diagnostic rules and to teach a reasoning approach These lessons are now guiding the development of new representations for teaching. Author (GRA)

N85-11606# Bolt, Beranek, and Newman, Inc., Cambridge, Mass
DESIGNING AN EXPERT SYSTEM FOR TRAINING AUTOMOTIVE ELECTRICAL TROUBLESHOOTING
W. FEURZEIG and J FREDERIKSEN *In* Denver Research Inst. Artificial Intelligence in Maintenance p 189-192 Jun. 1984
(AD-P003926) Avail. NTIS HC A22/MF A01 CSCL 05A

Two key issues in the design and development of expert systems for maintenance training are the choice of an appropriate

expert model and the function of the expert in instruction We are confronting these issues in instructional research involving the design of an expert instructional system for automotive electrical troubleshooting In studying expert troubleshooters and in examining troubleshooting procedures used in the military, we have encountered three distinctly different types of expertise. Each of these requires different forms of knowledge and produces qualitatively different troubleshooting behaviors. One kind of expert has established a large repertoire of symptom-fault associations through extensive experience in troubleshooting. Another kind of mechanic utilizes fixed troubleshooting procedures from shop manuals and various maintenance aids. A third kind of expert does extensive inferencing in attempting to diagnose faults.
GRA

N85-11609# Arizona Univ., Tucson Dept. of Psychology
THE PSYCHOLOGY OF TECHNICAL DEVICES AND TECHNICAL DISCOURSE
D. E KIERAS *In* Denver Research Inst. Artificial Intelligence in Maintenance p 227-255 Jun. 1984
(Contract N00014-81-C-0699; N00014-83-K-0224)
(AD-P003929) Avail: NTIS HC A22/MF A01 CSCL 06D

This paper is concerned with some issues in cognitive psychology that are relevant to the general question of what artificial intelligence techniques can do toward the solution of problems concerning equipment training and maintenance Three topics will be discussed. The first is the nature of expertise in electronics, which is not very well understood. The second topic is the relation between instructions and expertise The third topic is technical documentation GRA

N85-11614# Army Research Inst for the Behavioral and Social Sciences, Alexandria, Va
ARTIFICIAL INTELLIGENCE CONTRIBUTIONS TO TRAINING AND MAINTENANCE
J. PSOTKA *In* Denver Research Inst Artificial Intelligence in Maintenance p 305-315 Jun. 1984
(AD-P003934) Avail NTIS HC A22/MF A01 CSCL 06D

Artificial intelligence is rapidly becoming a practical and useful technology for training and maintenance. This paper provides an introduction to its uses in maintenance training, drawing on current research funded by the Army After a description of this work, a call is made to fund more exploratory research, expand the base of competent professionals in the field, and begin the complicated process of evaluating this new technology in order to diagnose its failings and hasten its development Author (GRA)

N85-12792# Johns Hopkins Univ., Silver Spring, Md.
PSYCHOLOGICAL ISSUES IN THE DESIGN OF EXPERT SYSTEMS
B W. HAMILL Jul. 1984 23 p
(Contract N00024-83-C-5301)
(AD-A146081, TR-ZEY-84-01) Avail: NTIS HC A02/MF A01 CSCL 05B

Recent advances in the artificial intelligence technology of knowledge-based expert systems have captivated the imaginations of designers, sponsors, and suppliers of computer-based systems in government and industry as well as researchers in university and non-profit laboratories where the technology originated An expert system is essentially a way to capture the knowledge and expertise of a subject-matter expert and transfer it to a computer program in hopes of creating an intelligent computer system that will emulate the problem-solving and decision-making performance of the expert. Such systems are being built to serve as intelligent advisors and decision aids in a wide variety of application areas. We discuss conceptual issues underlying expert system design, with references to current psychological and artificial intelligence literature, and urge consideration of these issues before undertaking development of expert systems. Author-assigned Keywords include Knowledge-based systems; Knowledge acquisition; Knowledge representation; Mental models; and Decision aids. GRA

N85-13688# Committee on Science and Technology (U. S. House).
MANUFACTURING SCIENCES AND ROBOTICS RESEARCH AND DEVELOPMENT ACT OF 1984
1984 18 p Rept. to accompany S 1286 presented by the Comm. on Sci. and Technol., 98th Congr., 2nd Sess , 25 Sep. 1984
(H-REPT-98-1078; GPO-31-006) Avail: US Capitol, House Document Room

Computer aided design; automated materials handling, processing, and assembly; automatic testing; machine adaptive learning, integrated manufacturing systems, machine and process control strategies; automated sensing machines; new metallurgical technology, practices and activities to implement improved manufacturing methods are considered. B.G.

N85-14596 University of Southwestern Louisiana, Lafayette.
KNOWLEDGE-BASED COMMUNICATION AND MANAGEMENT SUPPORT IN A SYSTEM DEVELOPMENT ENVIRONMENT
B. I KEDZIERSKI 1983 228 p
Avail Univ Microfilms Order No DA8416778

The identification of project management and communication support as an important domain of an effective software development environment, and the application of speech act theory to that domain is considered. A framework, or paradigm, was designed for such an environment using a knowledge based, program synthesis approach from artificial intelligence. A pilot communication and management support environment (CMS) was implemented. Studies of system/user interaction helped form the theory that people, while interacting with a computer system, perform communication or management acts, such as questioning, informing, requesting, critiquing, or planning. An act taxonomy was created and the structure and relationships among some of these acts were formally represented. A representation of time as hierarchical periods was also created. Protocols were developed for project activity and formally represented as rules that refer to the project model and acts. Dissert Abstr

N85-15176# Joint Publications Research Service, Arlington, Va.
NEW CONCEPTS FOR INDUSTRIAL ROBOTS OUTLINED
H. SCHEIBNER *In its* East Europe Rept: Sci and Technol (JPRS-ESA-84-045) p 12-24 13 Dec. 1984 refs Transl into ENGLISH from Fertigungstech. (East Berlin), v. 34, no. 7, 1984 p 392-396
Avail. NTIS HC A04/MF A01

The automation in the small and medium production of machine construction which requires flexibility and high productivity and the expansion of CNC machine tools with equipment for automation of the flow of information and materials is discussed. With the introduction of numerically controlled machine tools and processing centers, the working process and tool changes were automated The manual procedures include workpiece handling, workpiece checking, and checking of tool fracture and wear. It is necessary to decrease the need of operators to run the machine tools Modern CNC performs these functions automatically The advantages of these functions are: (1) reduction of auxiliary times; (2) better machine workload, (3) relieving the machine operator from monotonous and physically heavy work; and (4) increasing output while reducing operational and monitoring work E.A.K

N85-15448# Army Construction Engineering Research Lab., Champaign, Ill.
THE APPLICATION OF ARTIFICIAL INTELLIGENCE TO CONTRACT MANAGEMENT Final Report
T. A KRUPPENBACHER Aug. 1984 536 p
(AD-A146681, CERL-TM-P-166) Avail: NTIS HC A23/MF A01 CSCL 09A

The area of contract management currently holds many opportunities for the development of expert systems which are capable of assuming the role of a legal consultant on matters pertaining to claim analysis. To demonstrate the feasibility of this type of expert system, the Differing Site Condition Analysis System (DSCAS) has been developed. DSCAS, built within the ROSIE

programming environment, is capable of performing the legal analysis of a differing site condition (DSC) claim. The DSCAS program is based on logic which is patterned after the decision process used by a lawyer to analyze the DSC claim. DSCAS provides a very user-friendly environment in which the analysis is performed and a number of desirable features Two of the most desirable features are. its ability to make assumptions and continue the analysis if an answer is unknown and its ability to explain the reason behind concluding that the contractor will not be allowed entitlement. GRA

N85-16479# Pattern Analysis and Recognition Corp., McLean, Va
MENTAL MODELS AND COOPERATIVE PROBLEM SOLVING WITH EXPERT SYSTEMS
P. E. LEHNER, F. W. ROOK, and L ADELMAN Sep 1984 48 p
(Contract N00014-83-C-0537)
(AD-A147843; PAR-84-116) Avail: NTIS HC A03/MF A01 CSCL 05H

A cognitive theory of user/expert system interaction is proposed that relates the quality of cooperative problem solving with an expert system to. (1) cognitive consistency--the degree of consistency between the rule-based system and the user's problem solving processes; and (2) mental model--the user's conceptual understanding of the basic principle of the system's problem solving processes. An experimental study is described that strongly supports the theoretical prediction. In particular, the results support the prediction that for users with an accurate mental model, increasing cognitive consistency significantly decreases user/expert system problem solving performance. Users not processing an accurate mental model reach higher performance when utilizing cognitive consistent procedures. The practical implications of this theory are briefly discussed. Originator-supplied keywords include. Human factors, and Man/machine interface. GRA

N85-16690# Ohio State Univ , Columbus. Dept of Computer and Information Science.
DISTRIBUTED KNOWLEDGE BASE SYSTEMS FOR DIAGNOSIS AND INFORMATION RETRIEVAL Annual Report, 1 Jul. 1983 - 30 Jun. 1984
B. CHANDRASEKARAN Aug. 1984 115 p
(Contract AF-AFOSR-0255-82)
(AD-A146890; AFOSR-84-0864TR) Avail: NTIS HC A06/MF A01 CSCL 09B

During the year progress was made in a number of directions. (1) The investigators developed in significant detail a language for representing an agent's understanding of aspects of how a device works, and also developed a compiler which can produce a diagnostic expert problem solving system from this deep level functional representation. (2) The researchers continued their investigation of how design knowledge can be organized as plans and design problem solving can be viewed as design refinement by plan selection and redesign. They have completed the construction of a prototype design expert system called AIR-CYL, which designs a moderately complex mechanical component called an aircylinder for a range of specifications. (3) They continued investigation of high-level languages for expert system construction; in particular they have refined their design of the CSRL language for diagnostic expert system, and implemented it in Interlisp for the Xerox family of Lisp machines. (4) They have initiated a new investigation in reasoning about the behavior of physical systems by qualitative simulation by using a novel technique called consolidation, which infers the behavior of a composite component from the behaviors of its subcomponents GRA

N85-17177# Joint Publications Research Service, Arlington, Va.
MAN-MACHINE COMMUNICATION RESEARCH FOR ROBOTICS REPORTED
K H. TEMPELHOF and R. MEYER *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-046) p 1-3 26 Dec 1984 Transl. into ENGLISH from Volksstimme (Magdeburg), 18 May 1984 p 4
Avail: NTIS HC A03/MF A01

Speech recognition systems in robotics are reviewed. Future trends in speech communication processes are examined along with primary applications B.G

N85-17186# Joint Publications Research Service, Arlington, Va.
FLEXIBLE MANUFACTURING SYSTEM CONCEPT FEATURES CACHE MEMORY Abstract Only
G STEHFEST *In its* East Europe Rept.: Sci. and Technol. (JPRS-ESA-84-047) p 12 28 Dec. 1984 Transl into ENGLISH from Freiheit (Halle), 19 Oct. 1984 p 8
Avail: NTIS HC A04/MF A01

Development technology with an emphasis on robotics, numerical control, and patents was discussed. B G.

N85-17365# Michigan Univ., Ann Arbor. Robot Systems Div
COORDINATED RESEARCH IN ROBOTICS AND INTEGRATED MANUFACTURING Annual Report, 1 Aug. 1983 - 31 Jul. 1984
D. E ATKINS and R A. VOLZ 30 Oct 1984 138 p
(Contract F49620-82-C-0089)
(AD-A148204; RSD-TR-12-84, AFOSR-84-1016TR) Avail: NTIS HC A07/MF A01 CSCL 13H

The research procured under this contract is oriented toward the understanding and development of the flexible robot based manufacturing cells or islands which will increasingly become basic blocks for the building of modern parts production and assembly facilities. Present work spans a hierarchy of sub-systems oriented toward the development and integration of high performance manipulators into flexible manufacturing cells. GRA

N85-18571# Joint Publications Research Service, Arlington, Va.
PROBLEMS OF PSYCHOLOGICAL SUPPORT OF AUTOMATED ORGANIZATION CONTROL SYSTEMS Abstract Only
B. S. BEREZKIN *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci (JPRS-UBB-85-007) p 65-66 6 Feb 1985 Transl. into ENGLISH from Psikhologicheskiy Zh. (Moscow), v 5, no. 4, Jul. - Aug. 1984 p 74-82
Avail: NTIS HC A11

Hopes for improving the quality of administration by introducing automated systems have not been fully realized, primarily because the automation equipment has yet to become a true assistant to administrators at all levels. Automation is hardly used where it might be most effective, in decision support systems at high administrative levels. Many systems now in operation have underestimated the significance of man in modern administrative systems. The problems of psychological support of automatic organizational control systems can be defined as support of inter-organizational interactions as well as internal problems or organization of users, developers, and administrative system personnel Tasks include increasing the convenience of interaction of users with automation equipment, supporting training of users for interaction with automatic equipment, and assuring psychological safety for users as they work with automation equipment. Problems include the creation of the necessary psychological tool kit and development of new forms of interaction among academic, research, and development institutions Author

N85-19213# Joint Publications Research Service, Arlington, Va.
DEAN OF KIEV STATE UNIVERSITY ON IMPACT OF ROBOTS
I. I. LYASHKO *In its* USSR Rept.: Machine Tools and Metalworking Equipment (JPRS-UMM-85-003) p 6-11 12 Feb. 1985 Transl. into ENGLISH from Pod Znamenem Leninizma (Kiev), no. 16, Aug. 1984 p 67-69
Avail NTIS HC A04

In the modern sense of the word, robots are a prospective means of complete automation and of solving pressing national

economic and social problems, including the problem of manpower resources and improving working conditions The role of robotics is discussed in its relationship to electronic components, manufacturing, productivity, and social impact. B.G.

N85-19873# Loughborough Univ. of Technology (England) Dept. of Civil Engineering
EXPERT SYSTEMS IN CONTRACT MANAGEMENT: A PILOT STUDY Interim Report
E. G. TRIMBLE, R J. ALLWOOD, and F C. HARRIS Dec 1984 5 p
(Contract DAJA45-84-C-0024; DA PROJ. 1T1-61102-BH-57)
(AD-A149363; AD-F300533) Avail. NTIS HC A02/MF A01 CSCL 05A

It is reported that Linking of an expert system and a planning program has been achieved; there are now four collaborating contractors; knowledge is being assembled within two of the collaborating companies; six system shells have been evaluated, extensions to the materials handling application have been explored; several important conclusions were drawn from a visit by Mr Frank Kearney; and a teach-in will be held for future expert system applications. GRA

N85-20166# Joint Publications Research Service, Arlington, Va.
ROBOT PRODUCTION LINES IN OPERATION
In its East Europe Rept. Sci and Technol. (JPRS-ESA-85-009) p 1-2 26 Feb 1985 refs Transl into ENGLISH from Otlet (Budapest), 13 Dec. 1984 p 37
Avail NTIS HC A04/MF A01

Bulgaria today occupies a leading place within CEMA in the development of mechanical machine manufacture and electronics Two larger lines of products were manufactured in the Beroe factory. The first contains non-digital robots, mostly lifting robots, used to perform relatively simple operations The other series consists of the so-called flexible, electronically controlled robots, which are suitable for performing a number of work phases. Robot applications and marketing strategies are covered. B.W.

N85-20180# Joint Publications Research Service, Arlington, Va.
FRENCH PANEL MAKES SPECIFIC PROPOSALS FOR ROBOTICS RESEARCH. CURRENT STATE OF FRENCH ROBOTICS
In its West Europe Rept. Sci. and Technol. (JPRS-WST-85-008) p 27-99 19 Feb. 1985 Transl. into ENGLISH from the book "Mission Robotique 1" Paris, 1984 p 27-29
Avail: NTIS HC A07/MF A01

Although because of the novelty of the products and the disparity of needs, it is difficult today to delimit the robotics sector and to precisely estimate the magnitude of its markets, the panel has found it useful to support its conclusions and guidelines with an analysis of current conditions. Four areas of consideration are adequate research level, recent market expansion; delicate and technologically dependent supply; lack of coordination and overall policy. B.G.

N85-20383# Du Pont de Nemours (E. I.) and Co., Aiken, S C.
ROBOTICS AT SAVANNAH RIVER SITE: ACTIVITY REPORT
J. S. BYRD Sep. 1984 35 p
(Contract DE-AC09-76SR-00001)
(DE85-003657; DPST-84-736) Avail: NTIS HC A03/MF A01

The objectives of the Robotics Technology Group at the Savannah River Laboratory are to employ modern industrial robots and to develop unique automation and robotic systems to enhance process operations at the Savannah River site (SRP and SRD). The incentives are to improve safety, reduce personnel radiation exposure, improve product quality and productivity, and to reduce operating costs During the past year robotic systems have been installed to fill chemical dilution vials in a SRP laboratory at 772-F and remove radioactive waste materials in the SRL Californium Production Facility at 773-A A robotic system to lubricate an extrusion press was developed and demonstrated in the SRL robotics laboratory and is scheduled for installation at the 321-M fuel fabrication area A mobile robot was employed by SRP for a radiation monitoring task at a waste tank top in H-Area Several other robots are installed in the SRL robotics laboratories and application development programs are underway. The status of these applications is presented DOE

N85-21316# United Kingdom Atomic Energy Authority, Harwell (England). Computer Science and Systems Div.
THE APPLICATION OF EXPERT SYSTEMS TO CORROSION PROBLEMS
C. WESTCOTT, D. E WILLIAMS, N J. M. WILKINS, G. P. MARSH, J N. WANKLYN, and I F. CROALL Nov. 1984 12 p refs
(AERE-M-3445) Avail: Issuing Activity

An expert system is explained and a case is made for developing and applying expert systems to corrosion problems The nature and structure of expert-customer interactions and the implementation of similar dialogs between computer and user are considered. Problems associated with the user-interface to an expert system are addressed and examples of prototype systems are given. A.R.H.

N85-24191# Joint Publications Research Service, Arlington, Va
PLANS, DEVELOPMENTS IN ROBOTICS
K. G. KOCSIS *In its* East Europe Rept · Sci and Technol. (JPRS-ESA-85-015) p 11-16 16 Apr. 1985 refs Transl into ENGLISH from Maglap Hirlap (Budapest), 28 Feb. p 7
Avail: NTIS HC A06/MF A01

Developments in robotics are described Domestic manufacture is characterized in large part by isolated developments In the mid 1970's, the moderately capable Robi was built Then the FER manipulators were developed and made into an automatic picture tube loading device. A new profile for automatic devices to test and check integrated circuits is being built. E.A.K.

N85-24842# Gordon Research Conferences, Inc., Kingston, R I.
GORDON CONFERENCE ON FUNDAMENTALS OF CYBERNETICS Final Report, 1 Aug. - 31 Oct. 1984
L. STEG 31 Oct. 1984 12 p
(Contract N00014-84-G-0128; DA PROJ. RR0-4209)
(AD-A151074) Avail· NTIS HC A02/MF A01 CSCL 06D

A conference was organized that brought together 110 research scientists of diverse specialities to address a comprehensive review of the relationship of cybernetics to relevant disciplines, including biochemistry, physiology, chemistry and information sciences, and to relevant conceptual areas, including interactive training, organizational autonomy and policy methodology Author (GRA)

N85-25605# Joint Publications Research Service, Arlington, Va.
ROBOT USE IN FRG INCREASES BUT SENSOR TECHNOLOGY LAGS
In its West Europe Rept · Sci and Technol. (JPRS-WST-84-007) p 30 21 Feb. 1984 Transl. into ENGLISH from VDI Nachr. (Duesseldorf) 6 Jan. 1984 p 1
Avail: NTIS HC A03/MF A01

More than 4,800 industrial robots were installed in Germany (FRG). Japan improved its leading position; the increases from 5,000 to a currently estimated 17,000 robots alone is just as great as the total utilization volume in the FRG. The greatest relative increase was recorded in the assembly field So long as the periphery problems are not solved, an explosion in the assembly work sector is really impossible. This elminates a threat to many jobs. The expansion effort still fails because of the absence of sensors in casting cleaning and deburring. The robot industry continues to believe in its growth. By the end of 1984, 6,000 industrial robots in the FRG are predicted E.A.K.

N85-25641# Joint Publications Research Service, Arlington, Va.
FRENCH FIRM PLANS RECAPTURE OF DOMESTIC CAD/CAM MARKET
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-84-009) p 38-39 21 Mar 1984 Transl. into ENGLISH from Electron. Actualites (Paris), 13 Jan. 1984 p 3
Avail NTIS HC A04/MF A01

The plans of the French firm CISI to recapture the computer aided design/computer aided manufacturing (CAD/CAM) market are discussed CISI chose to invest as an overriding priority in CAD/CAM of industrial products, and is bringing out a STRIM Tridimensional System for the Mechanical Industry-100 line of software for the mechanical industry. With this plan, CISI is making its bid as a candidate for the recapture of the domestic CAD/CAM market, a market that is currently being covered to the extent of 80 percent by foreign products. CISI's decision to give priority to CAD/CAM as a development effort is based on the analysis made by the firm regarding the future of data processing Whereas the activity of the data processing sector's industrial firms over the past 20 years centered essentially on the manipulation of alpha-numerical characters, CISI expects that, over the next 10 years, it will be centered on the operational handling of objects and of manufacturing plants; CISI emphasizes, moreover, that this second boom will be as substantial as the first. R.J F

N85-28187# Joint Publications Research Service, Arlington, Va.
FUTURE DIRECTIONS OF ROBOTICS, AUTOMATION IN ITALY
A. STRUMIA *In its* West Europe Rept.: Sci. and Technol (JPRS-WST-84-024) p 38-41 10 Jul 1984 Transl. into ENGLISH from ATA Ing. Automotoristica (Turin), Feb. 1984 p 123-126
Avail: NTIS HC A04/MF A01

The use of robots in Italy is discussed Robots are rarely being used in Italian industry due to lack of investment by both government and industry. A number of areas in which robots would be useful are cited. R J.F

N85-28875# Joint Publications Research Service, Arlington, Va.
GENERAL LAWS OF DEVELOPMENT OF TECHNOLOGY
T LEKHTLA *In its* USSR Rept · Sci. and Technol Policy (JPRS-UST-85-008) p 89-93 8 May 1985 Transl. into ENGLISH from Sovetskaya Estoniya (Tallinn), 2 Nov 1984 p 2
Avail. NTIS HC A06/MF A01

The general development of machines is outlined. How man and machines interact and affect each others existance is discussed. The development of technology follows the general laws of dialectics, and technical systems development proceed in a spiral. The understanding of the essence of what is happening help to make long range decisions and to identify mistakes in time. E.R.

N85-29088# Joint Publications Research Service, Arlington, Va.
COMPONENT PROBLEMS PLAGUE FRENCH ROBOTICS INDUSTRY
M. DEFAUX *In its* West Europe Rept.: Sci. and Technol. (JPRS-WST-84-022) p 22-30 2 Jul. 1984 Transl. into ENGLISH from L'Usine Nouvelle (Paris), 17 May 1984 p 60-66
Avail NTIS HC A04/MF A01

The dependence of French manufacturers of industrial robots on foreign components is examined. The issue of price control in this industry is explored The feasibility of using electric motorization over hydraulic motorization in robot assembly is discussed. B.W.

N85-29094# Joint Publications Research Service, Arlington, Va
MULTINATIONAL PROGRAM TO DEVELOP INTELLIGENT ROBOTS
In its West Europe Rept.: Sci and Technol (JPRS-WST-84-031) p 33-36 11 Sep. 1984 Transl. into ENGLISH from AFP Sci (Paris), 19 Apr 1984 p 1-2
Avail: NTIS HC A03/MF A01

Paris--French researchers and manufacturers will cooperate on the creation of a number of autonomous multipurpose robots (RAM) to be used in a large variety of environments The RAM program is aimed at third generation robotics, namely intelligent, generally mobile robots, which relieve workers from difficult, dangerous, or toxic tasks. G L.C.

N85-29561*# Jet Propulsion Lab., California Inst. of Tech., Pasadena
MAN-MACHINE TRADEOFF STUDY
A. FEINBERG and W. F. ZIMMERMAN *In* NASA. Ames Research Center Proc of the Seminar on Space Station Human Productivity 10 p Mar 1985
Avail. NTIS HC A99/MF E03 CSCL 05H

An automation assessment was conducted to determine which components of the space station should be selected for automation The exercise took the form of a man-machine tradeoff study. G.L.C

N85-30721*# California Univ., Santa Barbara
THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNIQUES TO LARGE DISTRIBUTED NETWORKS
R. DUBYAH, T. R. SMITH, and J L. STAR Apr 1985 15 p refs
(Contract NCA2-OR680-401)
(NASA-CR-177346, NAS 1.26.177346) Avail· NTIS HC A02/MF A01 CSCL 09B

Data accessibility and transfer of information, including the land resources information system pilot, are structured as large computer information networks. These pilot efforts include the reduction of the difficulty to find and use data, reducing processing costs, and minimize incompatibility between data sources. Artificial Intelligence (AI) techniques were suggested to achieve these goals The applicability of certain AI techniques are explored in the context of distributed problem solving systems and the pilot land data system (PLDS) The topics discussed include: PLDS and its data processing requirements, expert systems and PLDS, distributed problem solving systems, AI problem solving paradigms, query processing, and distributed data bases. E A K.

N85-30723# Los Alamos National Lab., N Mex. Atmospheric Sciences Group.
EXPANDING EXPERTISE BY USE OF AN EXPERT SYSTEM
T. G. KYLE 1985 8 p Presented at the Conf. on Intelligent Systems and Machines, Rochester, Mich, 22 Apr. 1985
(Contract W-7405-ENG-36)
(DE85-010759; LA-UR-85-1312; CONF-8504117-1) Avail: NTIS HC A02/MF A01

By constructing an expert system as a research project proceeds it is possible to aid the development of expertise within the research project. When the project involves complex scientific phenomena the use of interconnected simple mathematical models is needed to properly express the relations. The ability of the models to represent the values of a field of parameters permits researchers to refer to the individual phenomena within the realm of the model without having to reexpress all the complex relationships the model approximates. The model is still useful even when the rules being input into the expert system involve modifications that must be applied to the model output in particular situations. DOE

N85-32020 George Washington Univ., Washington, D.C.
DETERMINING FUNCTIONAL REQUIREMENTS FOR NASA GODDARD'S COMMAND MANAGEMENT SYSTEM SOFTWARE DESIGN USING EXPERT SYSTEMS Ph.D. Thesis
J. LIEBOWITZ 1985 389 p
Avail Univ. Microfilms Order No. DA8506073

A new approach to an existing problem concerning the development of functional requirements for NASA-Goddard's Command Management System (CMS) software design was proposed. The CMS is part of the NASA Data System, which entails the downlink of science and engineering data from NASA near-Earth satellites to the user and the uplink of command and control data to the spacecraft. It presently takes 1 to 3 years to determine functional requirements for CMS software design An expert CMS system prototype was developed The knowledge base was formulated through interactions with domain experts and was

then linked with an existing expert system application generator, KES Knowledge-base development focused on four major steps (1) developing the problem-oriented attribute hierarchy, (2) determining the knowledge management approach; (3) encoding the knowledge base, (4) validating, testing, certifying, and evaluating the knowledge base and the expert system prototype as a whole. The effectiveness of using the prototype over that of the status quo for CMS software functional requirements determination is assessed and implementation of the prototype and knowledge refinement issues are discussed. Dissert Abstr.

N85-32134*# SRI International Corp , Menlo Park, Calif Artificial Intelligence Center.
NASA SPACE STATION AUTOMATION: AI-BASED TECHNOLOGY REVIEW
O. FIRSCHEIN, M. P GEORGEFF, W. PARK, P. NEUMANN, W. H. KAUTZ, K. N. LEVITT, R J. ROM, and A. A. POGGIO 1 Apr. 1985 325 p refs Revised
(Contract NAS2-11864, SRI PROJ. 7268)
(NASA-CR-176094, NAS 1.26 176094) Avail· NTIS HC A14/MF A01 CSCL 22B

Research and Development projects in automation for the Space Station are discussed. Artificial Intelligence (AI) based automation technologies are planned to enhance crew safety through reduced need for EVA, increase crew productivity through the reduction of routine operations, increase space station autonomy, and augment space station capability through the use of teleoperation and robotics AI technology will also be developed for the servicing of satellites at the Space Station, system monitoring and diagnosis, space manufacturing, and the assembly of large space structures F M.R

N85-32219# Joint Publications Research Service, Arlington, Va
IMPORTANCE OF AUTOMATION, ROBOTIZATION IN ECONOMY
A PREDOI *In its* East Europe Rept.: Sci and Technol JPRS-ESA-85-023 p 26-31 30 Jul 1985 Transl. into ENGLISH from Era Socialista (Bucharest), no. 8, 25 Apr. 1985 p 9-11
Avail. NTIS HC A03/MF A01

Two decades of Romanian progress in automation and robotization of industry are reviewed. Under the aegis of the Institute for Scientific Research and Technical Engineering for Automation and Telecommunications, the automation equipment field has grown from one enterprise in 1965 to six in 1985, with the percentage of domestic needs being supplied by native products growing from 48 to 98.5% in the same period. The proportion of production achieved using mechanized and automated systems averages 65% in 1985, will be 70% in 1987, and over 90% in 1990 Contribution to the drive for increased industrial automation is a transition to computer-aided research and design and to computerized production control based on an integrated computer system. F M.R.

N85-33172*# Boeing Aerospace Co., Seattle, Wash.
SPACE STATION AUTOMATION AND ROBOTICS STUDY. OPERATOR-SYSTEMS INTERFACE Final Report
Nov. 1984 72 p refs Sponsored by NASA. Johnson Spacecraft Center Prepared in cooperation with Boeing Computer Services, Inc., Seattle
(NASA-CR-176095; NAS 1.26 176095, D483-10027-1, DE85-902175) Avail: NTIS HC A04/MF A01 CSCL 22B

This is the final report of a Space Station Automation and Robotics Planning Study, which was a joint project of the Boeing Aerospace Company, Boeing Commercial Airplane Company, and Boeing Computer Services Company. The study is in support of the Advanced Technology Advisory Committee established by NASA in accordance with a mandate by the U S. Congress. Boeing support complements that provided to the NASA Contractor study team by four aerospace contractors, the Stanford Research Institute (SRI), and the California Space Institute. This study identifies automation and robotics (A&R) technologies that can be advanced by requirements levied by the Space Station Program. The methodology used in the study is to establish functional requirements for the operator system interface (OSI), establish the technologies needed to meet these requirements, and to forecast the availability of these technologies. The OSI would perform path planning, tracking and control, object recognition, fault detection and correction, and plan modifications in connection with extravehicular (EV) robot operations. F.M R.

05

COMPUTERS AND INFORMATION MANAGEMENT

Includes Information Systems and Theory, Information Dissemination and Retrieval, Management Information Systems, Database Management Systems and Databases, Data Processing, Data Management, Communications and Communication Theory, Documentation and Information Presentation, Software, Software Acquisition, Software Engineering and Management, Computer Systems Design and Performance, Configuration Management (Computers), Networking, Office Automation, Information Security.

A85-11096
REUSABILITY IN PROGRAMMING - A SURVEY OF THE STATE OF THE ART
T. C JONES (Nolan, Norton and Co , Lexington, MA) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. SE-10, Sept. 1984, p 488-494 refs

On the basis of a study of computer programs, it is tentatively concluded that of all the code written in 1983, probably less than 15 percent is unique, novel, and specific to individual applications. The remaining 85 percent appears to be common, generic, and concerned with putting applications into computers. In studies regarding the utilization of reusable code, it is attempted to standardize code related to this 85 percent The present investigation is concerned with five subtopics which are considered under the general heading of 'reusability'. These subtopics include reusable data, reusable architecture, reusable designs, reusable programs and common systems, and reusable modules It is found that for the creation of standard reusable modules, it will be necessary to overcome three major obstacles. Such a development will require the solution of the problems of data reusability, the creation of an architecture for reusability, and the establishment of reusable designs G R.

A85-11275
METHODS FOR IMPROVING THE QUALITY OF COMPUTER SOFTWARE [METODY SOZDANIIA KACHESTVENNOGO PROGRAMMNOGO OBESPECHENIIA EBM]
E. A. BUTAKOV Moscow, Energoatomizdat, 1984, 232 p. In Russian. refs

The most significant trends in software-quality improvement are examined with emphasis on questions of program reliability Consideration is given to the standardization of the development and generation of programs and documentation; and to design and documentation facilities. Techniques for improving program correctness are examined, with particular attention given to structured programming, program verification and debugging, and automated testing tools. B J.

A85-17826#
DEVELOPMENT TOOLS - CASE STUDY FOR LARGE SYSTEMS
K. HORNBACH (Lear Siegler, Inc , Instrument Div , Grand Rapids, MI) IN: Digital Avionics Systems Conference, 6th, Baltimore, MD, December 3-6, 1984, Proceedings New York, American Institute of Aeronautics and Astronautics, 1984, p 167-174. refs (AIAA PAPER 84-2635)

Software development tools can be an important aid in controlling the complexity of large digital avionics systems. This paper describes the successful application of modern software tools to the development of the Flight Management Computer

System for the 737-300 aircraft Tools were used to increase productivity and quality during the entire software life cycle. Source code management tools provided thorough, ongoing configuration management of code Static analysis and path coverage of the source aided in meeting stringent verification requirements. Fourth-generation language techniques were used to produce many of the tools cost-effectively and text-formatting tools were used to increase documentation productivity. These and other tools, some in use for the first time, helped in the production of a high quality software product on a very tight schedule. Special attention was paid to the problems of scaling up tools for use on a large project, and to careful tailoring of the tools to correspond to the specific ways the project chose to structure software development.

Author

A85-21457
SOFTWARE DESIGN METHODS

W. J CULLYER (Royal Signals and Radar Establishment, Malvern, Worcs, England) IN: Design and advanced concepts of avionics/weapons system integration; Proceedings of the Symposium, London, England, April 3, 4, 1984 . London, Royal Aeronautical Society, 1984, 10 p. refs

Contemporary civil and military aircraft avionics systems comprise a large number of different, interconnected computers for air data gathering, inertial navigation, automatic flight direction, flight management and stores management; the assembly of such systems involves both mutual understanding as to design methods, and agreement on avionics interface standards, among companies located throughout Western Europe and North America. Attention is presently given to the CORE and MENTOR methods for automated assessment and integration of complex avionics requirements, as well as to the difficulties anticipated in conversion to the Ada high level programming language for military avionics.

O.C.

A85-26784
SOFTWARE TEST PROGRAM FOR COMPUTER HARDWARE DEVELOPMENTS

D. E. GACKE (Sperry Corp., Sperry Computer Systems, St. Paul, MN) IN. AUTOTESTCON '83, Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p. 55-60.

The development of a software test program for computer hardware development is discussed. Computer-hardware features and development planning considerations are examined. It is shown that in a microprogrammable based computer-hardware development, the software must be defined and developed concurrently with the hardware A summary of the hardware-software development process and its relationship to software testing, as well as the characteristics of an emulation processor, are presented The software test approach includes requirements for developmental testing, program performance testing, and system integration testing. Four different types of software: operational, design verification, performance evaluation, and factory acceptance test software; and their relationship with the hardware and with the other components are described. The identification of software test levels and the responsibility for each level of test is an important consideration in defining the software test approach. M.D.

A85-26793
AUTOMATED TOOLS FOR SOFTWARE DEVELOPMENT

R. KARL (Emerson Electric Co, St Louis, MO) IN: AUTOTESTCON '83; Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc., p. 118-121. refs

Reformatting and status/integration software tools are proposed for improving the productivity of programmers and programming teams. The reformatting tool reformats the subroutine specification paragraphs into comment banners and places them into a database, thus saving much time and effort. The status/integration tool aids the programmer by creating command strings to compile subroutines and by interactively creating linkage editor link lists for subsystem testing The tool also updates the tested project library of object modules By using this tool, a log file can be kept on the processing that has occurred The data contained in the log file can be used to determine the status of the project. V.L.

A85-26794
APPLICATION OF THE PERSONAL COMPUTER FOR COST EFFECTIVE ATE/TPS SUPPORT

T. L. DRAGER, P. D. FAULKNER (AAI Engineering Support, Inc., Baltimore, MD), and G. A. MILLES (AAI Corp., Baltimore, MD) IN: AUTOTESTCON '83, Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p. 133-137.

The use of personal computers in various phases of test program set (TPS) development in both managerial and technical areas is discussed. The management tasks discussed include task budgets, proposal cost analysis, resource allocation, manpower scheduling, critical path analysis, and spreadsheets. With reference to technical applications, attention is given to digital simulation, analog analysis, instrumentation control, ATLAS generation, and machine code development. It is noted that while 8- and 16-bit processor based systems are well suited for managerial functions, 32-bit processors are required for large simulators, such as AAIDS, LASAR, or CAPS, to be implemented effectively. V.L.

A85-26807
DATA BASE MANAGEMENT FOR ATE RELIABILITY ENHANCEMENT

W. R HORNEY (General Dynamics Corp., Electronics Div., San Diego, CA) IN: AUTOTESTCON '83; Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers Inc, 1983, p. 240-245

This paper describes a program at the General Dynamics Electronics Division whereby multiple data sources were integraed into a useable management information system This system is designed to track F-16 intermediate-level ATE field performance from the base to component level, identify and prioritize areas where product improvement efforts would pay the highest dividends, and then track the effectiveness of product improvement initiatives. Author

A85-26830
TALLY - AN ATLAS PROGRAM STATISTICAL DATA GATHERING TOOL

J F BROWN (McDonnell Aircraft Co., St Louis, MO) IN: AUTOTESTCON '83; Proceedings of the Conference, Fort Worth, TX, November 1-3, 1983 . New York, Institute of Electrical and Electronics Engineers, Inc , 1983, p 379-383.

To monitor Test Program Set (TPS) development on various F/A-18 Automatic Test Equipment (ATE) systems, Integration Status Accounting Program (ISAP) was developed to provide actual statistical data on various developmental phases of each Abbreviated Test Language for All Systems (ATLAS) TPS TALLY is a software tool installed on each compilation station which automatically extracts all necessary statistical data after a test program compilation, lists and creates input files suitable for ISAP. The statistical data collected for each test program includes the number of ATLAS statements within the test program, the preamble and the procedural sections, the number of analog, digital or non-ATLAS statements and the compilation time. Author

A85-27900
CONFERENCE ON ADA APPLICATIONS AND ENVIRONMENTS, ST. PAUL, MN, OCTOBER 15-18, 1984, PROCEEDINGS

Conference sponsored by the Institute of Electrical and Electronics Engineers. Silver Spring, MD, IEEE Computer Society Press, 1984, 171 p. No individual items are abstracted in this volume

It is pointed out that the emerging Ada technology is having a significant impact on industry, academia, and government. The lectures reported provide information regarding the current status of research and development related to the Ada language and environments. Ada run-time models are discussed, taking into

account the design of an Ada run-time system, a run-time supervisor to support Ada task activation and execution, a capability architecture for Ada, and an efficient evaluation stack for Ada tasking programs Other topics discussed are related to Ada programming environments and tools, applications and the use of Ada, methodologies for Ada, and distributed implementations of Ada. Attention is given to a methodology for the design of Ada transformation tools in a Diana environment, an Ada environment for programming-in-the-large, Ada as a programming design language for a telematic services project, communication between Ada programs, and a message-based kernel to support Ada tasking. G.R.

A85-28797
DESIGN PRINCIPLES FOR FINITE ELEMENTS (FE) PROGRAMS CONCERNED WITH INTENSELY NONLINEAR PROBLEMS [ENTWURFSPRINZIPIEN VON FE-PROGRAMMEN FUER HOCHGRADIG NICHTLINEARE PROBLEME]
P. HERMANN Stuttgart, Universitaet, Fakultaet fuer Luft- und Raumfahrttechnik, Dr.-Ing Dissertation, 1984, 150 p. In German. refs

A description is presented of the data management system 'Matrix Manager' (MM), taking into account applications, internal structures, processes, and expected future developments. The requirements which a program system for nonlinear calculations will have to satisfy are discussed, and software components for implementing suitable approaches are examined. Problems related to data input and output operations are also considered along with various aspects of system software acquisition and maintenance. In a discussion of input operations, the attempt is made to cover the needs of the entire class of nonlinear problem solutions on the basis of an employment of comparatively modest means. Concepts are presented for the output of very large quantities of data, and approaches for obtaining information regarding the proceeding computational operations are described. The problems considered include various degrees of inelastic behavior, plastic deformation up to the point of failure, and thermal, electrical, and hydrodynamic field problems. G.R.

A85-29401
PROTOTYPING INFORMATION SYSTEMS ON MICROCOMPUTERS - A DESIGN PHILOSOPHY FOR ENGINEERING MANAGEMENT
J KRAUSHAAR and L. SHIRLAND (Vermont, University, Burlington, VT) Engineering Management International (ISSN 0167-5419), vol. 3, Feb. 1985, p. 73-84 refs

A framework for engineering managers interested in designing and using information systems to satisfy management needs for decision making and strategy formulation is suggested Guidelines for developing, maintaining, and controlling these systems are presented Recent microcomputer hardware and software developments that make integrated systems feasible and desirable are discussed, and several methods for obtaining an integrated system are described along with their advantages and disadvantages A particularly promising process for developing integrated systems is advocated and compared with the traditional system development process. A rationale for the success of this prototyping process is offered, and resource needs required by it are discussed. C.D

A85-30283#
A METHODOLOGY TO DESIGN DATABASES FOR FINITE ELEMENT ANALYSIS AND STRUCTURAL DESIGN OPTIMIZATION APPLICATIONS
J. S ARORA (Iowa, University, Iowa City, IA) and T. S. MURTHY IN: Structures, Structural Dynamics, and Materials Conference, 26th, Orlando, FL, April 15-17, 1985, Technical Papers. Part 1 . New York, American Institute of Aeronautics and Astronautics, 1985, p. 494-504. refs
(AIAA PAPER 85-0743)

A methodology to design databases for finite element analysis and structural design optimization is presented. The methodology considers three views of data organization conceptual, internal and external. Tabular and matrix forms of data are included. Relational data model is used in the database design Entity, relation, and attributes are considered to form a conceptual view of data. First, second and third normal form of data are suggested to design an internal model. Several aspects like processing, iterative needs, multiple views of data, efficiency of storage and access time, and transitive data are considered in the methodology. Author

A85-31209
STEPS TO AN ADVANCED ADA PROGRAMMING ENVIRONMENT
R. N TAYLOR and T. A. STANDISH (California, University, Irvine, CA) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. SE-11, March 1985, p. 302-310. refs
(Contract N00039-83-C-0567)

Conceptual simplicity, tight coupling of tools, and effective support of host-target software development will characterize advanced Ada programming support environments. Several important principles have been demonstrated in the Arcturus system, including template-assisted Ada editing, command completion using Ada as a command language, and combining the advantages of interpretation and compilation. Other principles, relating to analysis, testing, and debugging of concurrent Ada programs, have appeared in other contexts This paper discusses several of these topics, considers how they can be integrated, and argues for their inclusion in an environment appropriate for software development in the late 1980's. Author

A85-31791
INFORMATION AND COMPUTATION
J. F. TRAUB (Columbia University, New York, NY) and H WOZNIAKOWSKI (Warszawa, Uniwersytet, Warsaw, Poland, Columbia University, New York, NY) IN: Advances in computers Volume 23 . Orlando, FL, Academic Press, Inc., 1984, p. 35-92. refs
(Contract NSF MCS-78-23676; N00039-82-C-0427)

It is pointed out that only partial or approximate information exists for most computational problems Consequently such problems can be solved only with uncertainty in the answer Examples of such problems include computations arising in science and engineering, decision theory, remote sensing, and signal processing. The basic quantities have been identified for such seemingly unrelated problems The 'radius of information' measures the intrinsic uncertainty in the solution of a problem The present article provides some examples of the many domains which can be unified by employing the concept of the radius of information. Fundamentals regarding the considered subject are discussed, taking into account problem formulation, algorithms, optimal algorithms, linear algorithms, optimal information, and computational complexity Attention is given to nonadaptive information and parallel computation, limitations of the algorithm-centered approach, the information-centered approach, and an abstract model. G.R.

A85-34128* Jet Propulsion Lab., California Inst of Tech., Pasadena.
AN AUTOMATED METHODOLOGY DEVELOPMENT
L. R. HAWLEY (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN: Simulation in Ada, Proceedings of the Eastern Simulation Conference, Norfolk, VA, March 3-8, 1985 San Diego, CA, Society for Computer Simulation, 1985, p. 1-5 Army-sponsored research refs
(Contract NAS7-918)

The design methodology employed in testing the applicability of Ada in large-scale combat simulations is described. Ada was considered as a substitute for FORTRAN to lower life cycle costs and ease the program development efforts. An object-oriented approach was taken, which featured definitions of military targets, the capability of manipulating their condition in real-time, and one-to-one correlation between the object states and real world states. The simulation design process was automated by the problem statement language (PSL)/problem statement analyzer

(PSA). The PSL/PSA system accessed the problem data base directly to enhance the code efficiency by, e.g., eliminating non-used subroutines, and provided for automated report generation, besides allowing for functional and interface descriptions The ways in which the methodology satisfied the responsiveness, reliability, transportability, modifiability, timeliness and efficiency goals are discussed. M S K.

A85-34459
MANAGEMENT AND CONTROL OF INTERCONNECTED COMMUNICATIONS NETWORKS
G. D. HINGORANI, F. J. POWERS, and L. K. WENTZ (Mitre Corp., Bedford, MA) IN Milcom '83; Proceedings of the Military Communications Conference, Washington, DC, October 31-November 2, 1983 Volume 1 . New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p. 41-46. refs

NATO is placing increased emphasis on the effective utilization of national military and PTT networks as an approach to achieve an early enhancement of the NATO Integrated Communications System (NICS) presently under implementation. Concepts for interconnection with national military transmission and switched networks are under active consideration to extend NICS services and enhance NICS survivability and flexibility. These concepts necessitate a much greater focus on interoperability aspects and on NATO/national interface arrangements across network boundaries for management and control This paper highlights network management and control issues raised by these different uses of national military systems to enhance NATO communications survivability and flexibility across the threat spectrum Author

A85-34919
PROBLEM-ORIENTED SYSTEMS FOR PROCESSING EXPERIMENTAL DATA [O PROBLEMNO-ORIENTIROVANNYKH SISTEMAKH OBRABOTKI EKSPERIMENTAL'NYKH DANNYKH]
A N. TIKHONOV, V IA. ARSENIN, N. A MARCHENKO, A. KH. PERGAMENT, and M. I PERGAMENT (Akademiia Nauk SSSR, Institut Prikladnoi Matematiki, Moscow, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 281, no. 4, 1985, p 802-806. In Russian. refs

One of the possible approaches to the interpretation of experimental data consist in formulating inverse problems to determine the characteristics of an object from experimental data and using the regularization method to solve these problems The algorithms and programs for solving these problems are used to develop problem-oriented systems for the automatic processing and interpretation of experimental data. Here, the principal structural features and the design of problem-oriented systems are examined, as are their main functions These include data acquisition, primary data processing, which can include normalization, statistical processing, and conversion to a specific coordinate system, and data interpretation proper including determination of the quantitative characteristics of an object on the basis of experimental results and a solution to the inverse problem V L.

A85-38643
ELEMENTS OF THE THEORY OF MULTISTEP PROCESSES OF SEQUENTIAL DECISION MAKING [ELEMENTY TEORII MNOGOSHAGOVYKH PROTSESSOV POSLEDOVATEL'NOGO VYBORA RESHENII]
B. I. MODEL Moscow, Izdatel'stvo Nauka, 1985, 96 p. In Russian. refs

The general structural properties of a large class of sequential decision making processes are examined The main theoretical premises of the dynamic programming method are extended from finite-step processes to infinite-step ones in the framework of this class. In particular, the sufficient condition of the existence of a unique epsilon-optimal strategy is established along with the validity of the Bellman functional equation The results obtained are applied to differential games. B.J

A85-41549
ADA - A GOOD START, AN EXCITING FUTURE
C. L BRAUN (SofTech, Inc., Waltham, MA) Defense Electronics (ISSN 0278-3479), vol. 17, July 1985, p. 105, 106

An evaluation is made of the utility of the U S. Department of Defense standard computer language, Ada, at the current stage of its development, and the further performance improvements that may be obtained in the course of its development history. It is noted that the full advantages that accrue to the comprehensive use of a single high order language by most Pentagon contractors will only begin to be realized as entirely new software-intensive projects are conceived, several major systems now entering service antedate Ada. It is not expected that fourth-generation high order languages incorporating refinements beyond those embodied in Ada will be ready in less than 10 years, which was the development period length for Ada itself O C.

A85-42592*
PROTECTING INTELLECTUAL PROPERTY IN SPACE; PROCEEDINGS OF THE AEROSPACE COMPUTER SECURITY CONFERENCE, MCLEAN, VA, MARCH 20, 1985
Conference sponsored by NASA, AIAA, and Mitre Corp. New York, IEEE, 1985, 98 p For individual items see A85-42593 to A85-42600.

The primary purpose of the Aerospace Computer Security Conference was to bring together people and organizations which have a common interest in protecting intellectual property generated in space. Operational concerns are discussed, taking into account security implications of the space station information system, Space Shuttle security policies and programs, potential uses of probabilistic risk assessment techniques for space station development, key considerations in contingency planning for secure space flight ground control centers, a systematic method for evaluating security requirements compliance, and security engineering of secure ground stations. Subjects related to security technologies are also explored, giving attention to processing requirements of secure C3/I and battle management systems and the development of the Gemini trusted multiple microcomputer base, the Restricted Access Processor system as a security guard designed to protect classified information, and observations on local area network security. G R

A85-42593
SECURITY IMPLICATIONS OF THE SPACE STATION INFORMATION SYSTEM
R. W. BURNS (ORI, Inc., Rockville, MD) IN· Protecting intellectual property in space; Proceedings of the Aerospace Computer Security Conference, McLean, VA, March 20, 1985 New York, IEEE, 1985, p 3-10. refs

The present paper concentrates on aspects of the Space Station itself, all Space Station Program Elements (SSPE) that interact with the Space Station, and the telecommunications of the Space Station to the ground system through NASA's Tracking and Data Relay Satellite System (TDRSS). It is pointed out that one of the major concerns of potential commercial customers of the Space Station is NASA's ability to assure data privacy. A Space Station Information System (SSIS) overview is provided, and the types of user data are examined. Security implications are discussed, taking into account the SSIS environment, the protection of the physical assets of the SSIS, personnel security, computer hardware, computer software, procedural (operational) security, communications security, emanation security, and education and training regarding the security implications of the SSIS. G.R.

A85-42597
A SYSTEMATIC METHOD FOR EVALUATING SECURITY REQUIREMENTS COMPLIANCE
N. W. TYRA and P. A MILES (ORI, Inc., Rockville, MD) IN Protecting intellectual property in space; Proceedings of the Aerospace Computer Security Conference, McLean, VA, March 20, 1985 New York, IEEE, 1985, p. 39-47

This paper introduces the Security Compliance Analysis Model (SCAM) as a tool for evaluating the degree of security requirement satisfaction. The model provides a means for compiling independently derived compliance evaluations over the broad spectrum of security issues, Comsec, Opsec, Tempest and Red/Black, ADPE Security, Physical Security, Information Security, Industrial Security, and System Security Areas The model relates these broad security issues to their constituent parameters (partitioning, shielding, isolation, separation, etc) via a hierarchical tree structure. Also provided is a means for assigning relational weighting factors which signify the parameter's relative significance to the overall security category. Finally, the model interprets compliance factors and proceeds through a mathematical algorithm to generate a series of scoring values which may be graphed over time. Author

A85-45141#
A PRACTICAL APPROACH TOWARD ACHIEVING SOFTWARE RELIABILITY
M. D BATES (USAF, Institute of Technology, Wright-Patterson AFB, OH) IN NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 New York, IEEE, 1984, p. 1224-1228 refs

The objective of this paper is to present a practical approach toward the achievement of a reliable software product. Needs for and the applications of a goal producing software reliability method are discussed. A brief summary of the history of software growth and future projections, along with future needs for improved software reliability practices are presented. Software cost data are provided to reinforce the need for improved software reliability practices. Hardware reliability concepts are compared with software reliability concepts and the basic differences and similarities are discussed as necessary. Emphasis is placed on software 'front-end' development planning as well as designing for change and using techniques and methods necessary to assure a more reliable software product. Author

A85-48511* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
METHODOLOGY FOR SYSTEM DESCRIPTION USING THE SOFTWARE DESIGN & DOCUMENTATION LANGUAGE
H. KLEINE (California Institute of Techology, Jet Propulsion Laboratory, Pasadena) IN: System description methodologies; Proceedings of the IFIP Conference, Kecskemet, Hungary, May 23-27, 1983. Amsterdam, North-Holland, 1985, p. 111-136 refs
(Contract NAS7-100)

The Software Design and Documentation Language (SDDL) can be loosely characterized as a text processor with built-in knowledge of, and methods for handling the concepts of structure and abstraction which are essential for developing software and other information intensive systems. Several aspects of system descriptions to which SDDL has been applied are presented and specific SDDL methodologies developed for these applications are discussed. Author

N85-10685*# Illinois Univ., Urbana Dept. of Computer Science.
SAGA: A PROJECT TO AUTOMATE THE MANAGEMENT OF SOFTWARE PRODUCTION SYSTEMS Progress Report, Jan. - Jun. 1984
R H. CAMPBELL, W BADGER, C. S. BECKMAN, G BESHERS, D HAMMERSLAG, J. KIMBALL, P A. KIRSLIS, H. RENDER, P. RICHARDS, and R. TERWILLIGER 1984 15 p
(Contract NAG1-138)
(NASA-CR-174017, NAS 1 26:174017) Avail NTIS HC A02/MF A01 CSCL 09B

The project to automate the management of software production systems is described. The SAGA system is a software environment that is designed to support most of the software development activities that occur in a software lifecycle. The system can be configured to support specific software development applications using given programming languages, tools, and methodologies Meta-tools are provided to ease configuration. Several major components of the SAGA system are completed to prototype form The construction methods are described M A.C.

N85-10694# Softech, Inc , Waltham, Mass.
ADA (TRADEMARK) TRAINING CURRICULUM. REAL-TIME CONCEPTS L303 TEACHER'S GUIDE
Jul. 1984 228 p
(Contract DAAB07-83-C-K514)
(AD-A145093) Avail: NTIS HC A11/MF A01 CSCL 09B

Ths Ada training curriculum outlines the following points: Concurrent programming concepts; Ada tasking features, Fundamental Task Designs, and Improving Performance B W.

N85-10695# Softech, Inc., Waltham, Mass
ADA (TRADEMARK) TRAINING CURRICULUM. SOFTWARE ENGINEERING FOR MANAGERS M101 TEACHER'S EXERCISE GUIDE
May 1984 24 p
(Contract DAAB07-83-C-K514)
(AD-A145094) Avail NTIS HC A02/MF A01 CSCL 05I

The instructor's guide is designed to illustrate the use of the engineering goals and principles that we have been discussing The class is split into four groups Three with specific goals stated in the exercise, a fourth with no explicit goals. Each of the three groups has a different goal as follows: (1) The user must never fail to build the object, using the documentation (Reliability), (2) The user must build the object within one minute, using the documentation (Performance), (3) Once built, the user must be able to tear down and store the pieces, so the object can be rebuilt later (Maintainability) GRA

N85-10702# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
ESTABLISHING A SOFTWARE ENGINEERING TECHNOLOGY (SET)
Jun. 1983 108 p
(PB84-212141; OSD/FSTC-83/014) Avail: NTIS HC A06/MF A01 CSCL 09B

An approach for establishing and implementing procedures for managing a software engineering program based upon software life cycles is defined. It provides the direction and structure upon which a detailed plan for managing and control of software by establishing and institutionalizing a software engineering technology (SET) for replacing manual tasks with automated procedures. The SET includes the development of software standards, quality assurance, training along with the acquisition and utilization of software tools and the integration of these elements into a suitable productive machine environment. GRA

N85-10703# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
FSTC (FEDERAL SOFTWARE TESTING CENTER) SOFTWARE TOOL CATALOG
Mar. 1984 60 p
(PB84-212158; OIT/FSTC-84/021) Avail NTIS HC A04/MF A01 CSCL 09B

The Federal Software Testing Center (FSTC) is making software tools available to Federal and State Government agencies (lease basis) for reducing the cost of the development and maintenance of computer software. Software tools are specifically designed computer programs used to increase programmer productivity. Software tools can be used to automate tasks that, when performed manually, are repetitive, boring and prone to error. These software tools have been acquired by the Center and are extensively tested before release The Center will provide periodic maintenance and enhancement to these software tools GRA

N85-10704# Office of Software Development, Falls Church, Va. Federal Software Testing Center.
MICROCOMPUTER MANAGEMENT GUIDELINES
Nov. 1983 77 p refs
(PB84-212174, OIT/FSTC-83/019) Avail: NTIS HC A05/MF A01 CSCL 09B

The microcomputer management guidelines describe the many steps involved in the selection, acquisition, and management of microcomputers. Microcomputing is rapidly proliferating throughout government organizations In many agencies, comprehensive policy on microcomputing has not yet been formulated. The technology changes almost daily and new users are eager to capitalize on the many benefits available from microcomputing. With the large number of possible system configurations available in the marketplace, users, anxious to acquire microcomputers, may configure systems having a high degree of incompatibility with other agency systems. The source of the problem can be either hardware, software, or a combination of the two. GRA

N85-10707# Software Systems Technologies, Inc., College Park, Md.
PERFORMANCE EVALUATION OF DATABASE SYSTEMS: A BENCHMARK METHODOLOGY Final Report
S. B. YAO, A. R. HEVNER, and T. ROMEO May 1984 46 p refs
(Contract NB82-SBCA-1645)
(PB84-217504; NBS/GCR-84/467) Avail: NTIS HC A03/MF A01 CSCL 09B

A generalized performance analysis methodology for the benchmarking of database systems is presented. This methodology discusses criterial to be used in the design, execution, and analysis of a database system benchmark. This is a generalized methodology that can apply to any possible database system. By presenting a wide variety of possible considerations in the design and implementation of the benchmark, it is intended to make this methodology applicable to the evaluation, or to the comparison of several systems. GRA

N85-10855# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
OPTIMIZING SEARCH WITH POSITIVE INFORMATION FEEDBACK
T. J. STEWART Sep 1983 27 p refs
(CSIR-TWISK-313) Avail: NTIS HC A03/MF A01

The design of search plans when positive information can be gained during the search regarding the target's location or movement, is considered It is shown that rigorous maximization of detection probability is impracticable and unjustifiable. On the other hand, the information processing requirements are not difficult, which leads to a view of search planning as a statistical experimental design problem In this context, a class of moving horizon rules is proposed. It is suggested that this approach is not merely convenient heuristic, but the more relevant practical search planning tool. Numerical examples illustrate that, even in the classical problem with no positive information feedback, a moving horizon rule can achieve 80 to 90% of the possible gain over myopic rules. A further example demonstrates that the experimental design approach can result in substantial gains in detection probability over the optimal plan which ignores the possibility of positive information feedback at the design stage Author

N85-10859# Naval Postgraduate School, Monterey, Calif
DATA DICTIONARY SYSTEMS AND THEIR ROLE IN INFORMATION RESOURCE MANAGEMENT M.S. Thesis
D. L. ROBERTSON Mar. 1984 93 p
(AD-A144905) Avail: NTIS HC A05/MF A01 CSCL 09B

The explosive proliferation of computers has led to the increasing importance of developing and implementing various management concepts for effective and efficient operation and control. The complex data processing environment of today cannot be handled by hardware alone, but require an information system composed of hardware, software, data, personnel and procedures The vast storage capabilities of modern equipment had led to the development of databases for more effective and efficient use of memory capacity. The increasing importance of software and the cost of developing and maintaining it demands more and better management, giving rise to the software life cycle concept. With the automation of the functions of an organization, data and information become critical organizational resources. Information Resource Management provides effective and efficient management and control of these information resources. A key component in this management and control is the Data Dictionary System. Author (GRA)

N85-11575# Institute for Defense Analyses, Alexandria, Va
DOD RELATED SOFTWARE TECHNOLOGY REQUIREMENTS, PRACTICES, AND PROSPECTS FOR THE FUTURE Final Report, Feb. - Jun. 1984
S T. REDWINE, JR , L. G BECKER, A. B. MARMOR-SQUIRES, R J MARTIN, and S. H. NASH Jun. 1984 351 p
(Contract MDA903-84-C-0031)
(AD-A145493; AD-E500678, IDA-P-1788, IDA/HQ-84-28841)
Avail NTIS HC A16/MF A01 CSCL 09B

This study investigates future DOD software requirements, current practices and approaches to software development, and the time it takes a software technology innovation to become widely used, and offers a glimpse of future possibilities in software technology GRA

N85-12606# Los Alamos Scientific Lab , N. Mex
CONFIGURATION MANAGEMENT FOR MISSION-CRITICAL SOFTWARE: THE LOS ALAMOS SOLUTION
G. CORT and D M. BARRUS 1984 15 p Presented at the Softool Users Group Meeting, Santa Barbara, Calif., 10 Sep. 1984
(Contract W-7405-ENG-36)
(DE84-015515, LA-UR-84-2335, CONF-8409114-1) Avail NTIS HC A02/MF A01

An approach to the utilization of the Softool Change and Configuration Control (CCC) environment is described The steps taken to develop a very powerful development/configuration management environment (incorporating CCC) are outlined and justified The extension of the Los Alamos system to management of large-scale projects is discussed. DOE

N85-12786# Fondo Colombiano de Investigaciones Cientificas y Proyectos Especiales, Bogota (Colombia)
PRIMER ON THE REGISTRATION OF TECHNICAL INFORMATION IN INDUSTRY [CARTILLA PARA EL REGISTRO DE LA INFORMACION TECNICA EN LA INDUSTRIA]
G. C. CARO and C. M GUTIERREZ 1983 131 p In SPANISH
Avail. NTIS HC A07/MF A01

Some methods of recording information about processes, raw materials, plans, models, and other factors germaine to industrial production in formats that are suitable for classification in accordance with the needs of the enterprise are presented. Pilot trials for information recording were carried out in the enterprises

of Induacoples, Racores de Colombia, Metalfisher by Cerverceria Andina. Deficient recordkeeping can result in· lack of valid data for improving production processes and products, impossibility of controlling manufacturing costs; deficient infrastructure for acquiring technology available on the international market, impossibility of capitalizing on technological resources; and difficulty of adopting quality control systems. Other points analyzed are: prototypes, value analysis, and codification with sample forms for keeping records on machinery, tools, processes, etc. B.G

N85-12796# Interior Dept , Washington, D.C
IRM (INFORMATION RESOURCES MANAGEMENT) LONG-RANGE PLAN: FISCAL YEAR 1984-1988 (UPDATE). VOLUME 2: ADP AND TELECOMMUNICATIONS ACQUISITION PLAN
May 1984 51 p
(PB84-229244) Avail. NTIS HC A04/MF A01 CSCL 05B

The IRM LRP provide guidance for improving management of the Interior Department's information resources. Data processing and telecommunications equipment acquisitions are discussed. The types of technology, services, and facility management are detailed. The budget formulation process is reviewed. E.R.

N85-12803# International Trade Administration, Washington, D C.
COMPETITIVE ASSESSMENT OF THE US INFORMATION SERVICES INDUSTRY Final Report
May 1984 77 p refs
(PB84-174804) Avail· NTIS HC A05/MF A01 CSCL 05B

An operational definition of the four principal segments of the information services industry in the United States. database development, on-line information services, document supply services, and customized search and abstracting services are discussed. Major domestic firms are identified along with a discussion of the current state of information services in Europe and Japan Domestic markets and firms are discussed in terms of their characteristics and trends. Domestic and international competitive issues are identified. Return on investment is calculated for hypothetical data base development and on-line services projects, along with an analysis of the sensitivity of internal rate of return to changes in the most significant factors. Driving forces in the future of the industry are identified. A limited number of international and domestic options for maintaining the competitiveness of the domestic industry are discussed. Author

N85-13494# Royal Signals and Radar Establishment, Malvern (England).
SOFTWARE CONFIGURATION MANAGEMENT ACROSS PROJECT BOUNDARIES AND IN DISTRIBUTED DEVELOPMENT ENVIRONMENTS
M. STANLEY Jan. 1984 31 p refs
(RSRE-MEMO-3704; BR92718; AD-A146662) Avail: NTIS HC A03/MF A01

The problems of software configuration management (SCM) when sharing software between projects and between host development systems, and between projects, using an integrated programming support environment (PSE) is discussed. An SCM data base and tools are outlined. For the proposed SCM schema and tools to work, access controls imposed by the data base management system must permit data base searches across project boundaries. If software development for a project is spread over a number of different host PSEs, separate SCM data bases should exist on each host. It is necessary to import and export software items to and from host PSEs In order to control imported or exported software there should be relationships to entities representing the external host, so that tools searching for possible effects of proposed changes can indicate that other host PSEs should be considered. Author (ESA)

N85-13675# Pacific Northwest Lab , Richland, Wash.
EXECUTIVE INFORMATION SYSTEM
M. VITULLO, C WINTER, and D. R. JOHNSON Jul. 1984 96 p
(Contract DE-AC06-76RL-01830)
(DE84-015355; PNL-5190) Avail: NTIS HC A05/MF A01

The Executive Information System (EIS) is a computer-based information handling system. The system was designed and implemented for energy conversion and utilization technologies to allow program managers easy access and tracking of certain types of reporting at various levels of management interaction, to simplify the handling of program-related data, and to streamline the preparation of reporting documents and responses to requests for information from the program The EIS is especially useful in assisting DOE program managers in the routine dissemination of reports and information. The characteristics of each component of the EIS are discussed A user's guide to the EIS is included. DOE

N85-16498# Boeing Aerospace Co., Seattle, Wash Engineering Technology Div.
SOFTWARE TEST HANDBOOK Final Report, Mar. 1982 - Sep. 1983
E. PRESSON Griffiss AFB, N Y RADC Mar. 1984 58 p
(Contract F30602-82-C-0059)
(AD-A146844; RADC-TR-84-53-VOL-1) Avail NTIS HC A04/MF A01 CSCL 09B

The purpose of the Software Test Handbook effort was to provide Air Force software developers with guidelines and methodology for the effective use of higher order language (HOL) software testing techniques and in the selection of automated tools for the testing of computer programs. The effort resulted in a two volume final technical report The total contractual effort including a project overview, summary for each of three technical tasks, and a bibliography. GRA

N85-16694# Air Force Human Resources Lab., Brooks AFB, Tex.
TECHNICAL ORDER MANAGERS HANDBOOK: UTILIZATION ASSESSMENT Final Report, Mar. 1983 - Mar. 1984
D. E BLAIR Oct. 1984 20 p
(Contract AF PROJ. 9991)
(AD-A147579, AFHRL-SR-84-15) Avail· NTIS HC A02/MF A01 CSCL 05A

This report provides a utilization assessment of the Air Force Technical Order (TO) Managers Handbook The handbook was developed by the Air Force Human Resources Lab. to provide TO managers wtih guidelines for selection of the most appropriate format options and procurement of Air Force TOs. Although the primary user has been the Air Force Systems Command, the handbook has been distributed Air Force-wide to organizations having responsibilities for TO acquisition and management. A number of these organizations were contacted concerning their utilization of the handbook and the results indicated that the handbook is used as a quick reference source, especially for TO managers with limited experience. The handbook is also being used in the training environment where it has been a major source of information for the development of a formal TO acquisition and management course and is a useful tool for organizations that provide inhouse training. Whether the handbook is a guide for TO managers is debatable. A number of recommendations are provided for improving the content of the handbook and for maintaining its relevance when TO procedures, policies, and requirements change. Originator-supplied keywords include· research and development product utilization, technical order acquisition, technical order development, and technical order management. GRA

N85-17592# Institute for Defense Analyses, Alexandria, Va.
CONCEPT PAPER FOR THE DEVELOPMENT OF A DOD ADA (TRADEMARK) SOFTWARE ENGINEERING EDUCATION AND TRAINING PLAN *Final Report*
P R JORDAN, C. W. MCDONALD, and B SCHAAR Nov 1984 26 p
(Contract MDA903-84-C-0031)
(AD-A148774, AD-E500686; IDA-M-7; IDA/HQ-84-28940) Avail NTIS HC A03/MF A01 CSCL 09B

The Ada Joint Program Office (AJPO) was established in December 1980, to manage the Department of Defense (DOD) efforts to implement, introduce, and provide life-cycle support for Ada. As part of this charter, it is the role of the AJPO to address Ada education and training. The goal of this document is to set forth the concepts necessary for Ada software engineering education and training. These concepts will result in an effective use of Ada in the shortest time possible to realize cost savings and achieve reliability and adaptability in computer software development. The full potential of Ada cannot be realized without appropriate education and training GRA

N85-19236*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
CONCEPTS AND TOOLS FOR THE SOFTWARE LIFE CYCLE
R C. TAUSWORTHE *In its* The Telecommun. and Data Acquisition Rept p 103-120 15 Feb. 1985 refs
Avail: NTIS HC A13/MF A01 CSCL 09B

The tools, techniques, and aids needed to engineer, manage, and administer a large software-intensive task are themselves parts of a large softwaare base, and are incurred only at great expense. The needs of the software life cycle in terms of such supporting tools and methodologies are highlighted. The concept of a distributed network for engineering, management, and administrative functions is outlined, and the key characteristics of localized subnets in high-communications-traffic areas of software activity are discussed A formal, deliberate, structured, systems-engineering approach for the construction of a uniform, coordinated tool set is proposed as a means to reduce development and maintenance costs, foster adaptability, enhance reliability, and promote standardization Author

N85-19880# Ad Hoc Committee on Depository Library Access to Federal Automated Data Bases.
PROVISION OF FEDERAL GOVERNMENT PUBLICATION IN ELECTRONIC FORMAT TO DEPOSITORY LIBRARIES
Washington GPO 1984 137 p Rept presented by the Ad Hoc Comm. on Depository Library Access to Federal Automated Data Bases to the Joint Comm. on Printing, 98th Congr, 2nd Sess, 1984
(S-PRT-98-260, GPO-37-868) Avail SOD HC as SN-052-070-05970-2

Federal Government information is increasingly being stored and retrieved through new technologies rather than through traditional formats of paper and microform (with the result) that an increasing amount of information in electronic format is not being provided to depository libraries. The feasibility and desirability of providing access to Federal Government information in electronic formats to the public through the congressional depository libraries was investigated Factors examined include: (1) the kind and amount of Federal Government information in electronic format; (2) whether depository libraries have the ability to access the new formats, and (3) the costs and benefits of providing information in electronic format Major policy areas which should be addressed in order to meet the intent of pertinent provisions of title 44, United States Code, to make Government information publicly vailable to citizens at no charge through the depository library system were also identified. A.R.H.

N85-19891# National Academy of Sciences - National Research Council, Washington, D C
RESEARCH NEEDS ON THE INTERACTION BETWEEN *INFORMATION SYSTEMS AND THEIR USERS: REPORT OF A WORKSHOP Final Report*
Oct. 1984 47 p refs
(Contract NSF IST-83-03062)
(PB85-121523) Avail: NTIS HC A03/MF A01 CSCL 05B

Workshop participants were requested to define the characteristics of information systems that distinguish them in terms of purpose, function, and structure; to estimate the trends of future technological developments; to define the significant behavioral and cognitive issues involved, and to formulate recommendations and justification for basic research most necessary to improve user/information system interaction. The Recommendations are general in nature and not tied to specific information systems. They cover theoryorientation, the acquisition and of information, input-output bandwidth, user training and support, cognitive effects of programming, information technology and jobs, and attitudes and accommodation. GRA

N85-20689*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
SPACE STATION SOFTWARE ISSUES
S VOIGT, ed. and S. BESKENIS, ed. (Kentron International, Inc., Hampton, Va.) Washington Feb. 1985 68 p refs Workshop held in Hampton, Va, 20-21 Aug 1984
(NASA-CP-2361; L-15945; NAS 1.55 2361) Avail NTIS HC A04/MF A01 CSCL 09B

Issues in the development of software for the Space Station are discussed Software acquisition and management, software development environment, standards, information system support for software developers, and a future software advisory board are addressed.

N85-20693*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va
INFORMATION SYSTEMS ISSUES
In its Space Sta. Software Issues p 37-40 Feb 1985
Avail: NTIS HC A04/MF A01 CSCL 09B

A Space Station Project-wide mechanism to document, control, and disseminate program design data required by subsystem implementation efforts is needed In evaluation software requirements at the subsystem implementation level, each software effort should be required to develop and maintain a list and schedule of supporting data needs to be provided by other elements in the Space Station Project A project-level scheme to coordinate and track these needs is essential to the success of these contributing subsystems. A project-wide information system should provide the response information via a computerized mechanism, providing a single controlled source for all such data. Such information may range in content from documentation to actual data base sets used directly as an input to the subsystem software. The Technical and Management Information System (TMIS), formerly known as the Management and Communication Data Systemn (MCDS), will be implemented by NASA to support its Space Station Program. M.G.

N85-20695*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
SOFTWARE TECHNOLOGY WITHIN NASA
In its Space Sta. Software Issues p 47-57 Feb. 1985 refs
Avail: NTIS HC A04/MF A01 CSCL 09B

NASA software technology is assessed in terms of a comparison of the state of practive (SOP) and the state of the art (SOA) The gap between SOP and SOA, the time lag for technology transfer, and the variance in practice of software technology are discussed. Issues regarding the impact of software technology on development cost/benefits are addressed. M.G.

N85-22258# Office of Naval Research, London (England).
THE EEC'S INFORMATION TECHNOLOGY PROGRAM: AN UPDATE
J F BLACKBURN 18 Dec. 1984 11 p
(AD-A150022; ONRL-R-13-84) Avail NTIS HC A02/MF A01 CSCL 09B

The primary goal of the European Strategic Program for Research and Development in Information Technology (ESPRIT) is to make the countries of the European Economic Community competitive in the world market for information technology. This report examines the five areas of the ESPRIT program for 1985: advanced microelectronics, software technology, advanced information processing, office systems, and computer-integrated manufacturing. GRA

N85-22259# California Univ., Berkeley Lawrence Berkeley Lab
REQUIREMENTS FOR A DATABASE MANAGEMENT SYSTEM
J. D. LAWRENCE and J. MCCARTHY Sep. 1984 12 p refs
(Contract DE-AC03-76SF-00098)
(DE85-004661, LBL-18504) Avail: NTIS HC A02/MF A01

The requirements for a database management system that would satisfy the scientific needs of the Scientific Database Project are discussed Actual requirements, for each category, are identified as mandatory, important, and optional. A DBMS would not be considered unless it satisfies all mandatory requirements DOE

N85-23315# Los Alamos Scientific Lab., N Mex.
BOTTLENECKOLOGY: EVALUATING SUPERCOMPUTERS
J. WORLTON 1985 3 p refs Presented at the IEEE Spring COMP/CON Meeting, San Francisco, 25 Feb. 1985
(Contract W-7405-ENG-36)
(DE85-005574; LA-UR-84-3942, CONF-850255-1) Avail: NTIS HC A02/MF A01

Evaluating supercomputer performance is more difficult than evaluating performance for other types of computers because of the wide range of performances encounted Depending on the purpose of the evaluation, methods of evaluation can be used that trade off level of effort and accuracy, including rules of thumb, analytical models, testing, and simulation. DOE

N85-23446 Colorado Univ., Boulder
PERSONAL DECISION MAKING: THE INFLUENCE OF PERCEIVED LOCUS OF CONTROL AND DEGREE OF RATIONALITY ON INFORMATION SEEKING STRATEGIES Ph.D. Thesis
N. S. F. JACKSON 1984 184 p
Avail: Univ. Microfilms Order No. DA8428659

Information seeking strategies that are used by persons making decisions were identified. A decision is defined as a choice among alternatives Using Janis' conflict model and the concept of reactance, five information seeking strategies are described The strategies derive from the individual's perceived locus of control, degree of rationally and are titled vigilance avoidance, reactance, hypervigilance, and unconflicted. Strategies are related to information seeking in such a way that subjective uncertainty ratio will vary in predictable patterns as a function of the information seeking strategy used. The results show that only the strategy avoidance is significantly different from the others in terms of its overall variability Three major areas of value found in clarifying decision making issues are. the expansion of the decision making model for future research, exploration of the interaction of task and individual difference variables in decision making; and the use of subjective predictability of information use as a criteria for decision evaluation. Author

N85-23449# Naval Postgraduate School, Monterey, Calif. Dept. of Computer Science.
GENERAL DESIGN CONSIDERATIONS OF AN AIR FORCE INFORMATION SYSTEM M.S. Thesis
E AYTACER, JR Jun 1984 118 p
(AD-A150611) Avail: NTIS HC A06/MF A01 CSCL 09D

General design issues of an Air Force information system are considered in this thesis The current structure of the system is presented with its requirements. Information storing, retrieving and updating procedures are described An example of a logical database is designed Networking issues are expressed in an undetailed way. Finally, a set of high-end minicomputers are evaluated to present the approximate cost of this system. And a general methodology for minicomputer selection process is presented. GRA

N85-24788 George Washington Univ, Washington, D C.
EVALUATING THE APPROPRIATENESS OF MICROCOMPUTERS FOR LITIGATION DOCUMENT MANAGEMENT USING THE ANALYTIC HIERARCHY PROCESS Ph.D. Thesis
H. A. AMIN 1984 229 p
Avail: Univ Microfilms Order No DA8428944

Attorneys involved in large cases have availed themselves of mainframe computers for speed and ease in document management. A modifiable evaluative methodology was developed that would enable a small to mid-sized law firm to evaluate whether the microcomputer, as compared to the manual method, could economically and technically manage case-related documents involved in its litigation support efforts. The Analytic Hierarchy Process (AHP) was applied to develop this evaluative methodology. The requirements of a litigation document management system were researched and specifications for the microcomputer and manual methods of necessary document management were developed. Expert Choice, a software package was used for automating the AHP. Data collection was accomplished through a questionnaire sent to size-relevant law firms, interviews with litigation support consultants, and working sessions with selected lawyers. Dissert. Abstr.

N85-24793# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
SECURITY OF PERSONAL COMPUTER SYSTEMS: A MANAGEMENT GUIDE Final Report
D D. STEINAUER Jan. 1985 66 p refs
(PB85-161040; NBS/SP-500/120; LC-84-601156) Avail: NTIS HC A04/MF A01, also available SOD HC as SN003-003-02627-1 CSCL 09B

This document is a security guide for managers and users of personal computer systems. It describes the nature of information security problems involved in the use of personal and other small computer systems and provides guidance for addressing those problems GRA

N85-26167# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering
CONTINUED DEVELOPMENT OF A DATA BASE MANAGEMENT SYSTEM PERFORMANCE MONITOR, VOLUME 2 M.S. Thesis
T D. BRUNER Dec 1984 295 p
(AD-A151714; AFIT/GCS/ENG/84D-6) Avail: NTIS HC A13/MF A01 CSCL 09B

This investigation focuses on the problem of analyzing the performance data collected on a Data Base Management System (DBMS) The performance data parameters are categorized and presented to the user using a Data Support System (DSS). The generalized design for a DBMS performance monitor was used to design a user-friendly interface to DBMS performance data. The user interface ot the DBMS performance monitor uses menus to allow the user to select DBMS performance parameter values. The DBMS performance parameter values can also be printed in the form of a performance report. The design was implemented on a VAX 11/780 computer system using the VMS operating system. The TOTAL DBMS was used to collect performance data.

The performance values were collected using existing software monitors, job accounting, system error log, an a utility developed at AFIT to collect Data Manipulation Language (DML) response performance data. GRA

N85-26642# Naval Air Systems Command, Washington, D. C.
DESIGN ADEQUACY: AN EFFECTIVENESS FACTOR
A. R. HABAYEB *In* AGARD Cost Effective and Affordable Guidance and Control Systems 16 p Feb. 1985 refs
Avail: NTIS HC A13/MF A01

The concept of system effectiveness is reviewed and examined from the perspective of weapon systems consisting of launch platforms, targeting avionics, weapons, and targets. The application of system effectiveness to hardware systems is based on three effectiveness factors (1) reliability (dependability), (2) readiness (availability); and (3) design adequacy (capability). Design adequacy is a measure of how well a system performs its functions. It is the most desired factor in the definintion, design, and early stages of system development. A design adequacy quantification methodology is presented and the relationship between design limitation and adequacy is discussed. The design adequacy methodology is based on the measures of adequacy, system parameters, subsystem parameters and the employment phases of the system. In a weapon system context, the performance parameters of a guidance and control subsystem, are interdependent with the parameters of the remaining subsystems The paper deals with three employment phases of a weapon system. The three phases are: (1) prelaunch phase; (2) free flight phase; and (3) end-game phase. Examples based on air-to-air missiles are given to illustrate these relationships and concepts B.W

N85-27550# Naval Postgraduate School, Monterey, Calif.
MANAGEMENT ASPECTS OF SOFTWARE MAINTENANCE M.S. Thesis
B. J. HENDERSON and B J. SULLIVAN Sep 1984 116 p
(AD-A152035) Avail: NTIS HC A06/MF A01 CSCL 09B

The Federal government depends upon software systems to fulfill its mission. These software systems must be maintained and improved to continue to meet the growing demands placed on them The process of software maintenance and improvement may be called software evolution. The software manager must be educated in the complex nature of software maintenance to be able to properly evaluate and manage the software maintenance effort. In this thesis, the authors explore software maintenance from a management perspective, highlighting topics of critical importance. These topics include forecasting software maintenance, estimating the resources required to perform software maintenance, managing maintenance personnel and effectively utilizing software tools The synthesis of these topics forms a managerial paradigm for understanding the evolutionary nature of software maintenance GRA

N85-27551# Naval Postgraduate School, Monterey, Calif.
A FRAMEWORK FOR SOFTWARE DEVELOPMENT M.S. Thesis
E. C HUGHLETT Sep. 1984 102 p
(AD-A152067) Avail: NTIS HC A06/MF A01 CSCL 09B

All sectors of society are confronted with what has been termed the software crisis. As the world's largest single buyer of software, the Department of Defense has undertaken major software initiatives to ameliorate software-related problems associated with major computer systems acquisition. This thesis provides an overview of common problems in both embedded and administrative software development and acquisition It defines quality software in terms of its characteristics, and provides the project manager/acquisition agency with a set of accepted controls to assure that quality is built into software for improved maintainability The difficulties and limitations of providing accurate estimates in software development are discussed in terms of software metrics. A number of DoD current and future standardization efforts are discussed, including the Army's development of a Military Computer Family (MCF), Ada, and the STARS initiative. Author (GRA)

N85-27742# Naval Postgraduate School, Monterey, Calif.
MANAGEMENT CONSIDERATIONS FOR AN INFORMATION CENTER M.S. Thesis
J. D. AUVIL Sep. 1984 52 p
(AD-A151774) Avail: NTIS HC A04/MF A01 CSCL 09B

Recent studies have shown that the data processing industry has a very severe problem to solve In the next few years there is going to be an extensive increase in millions of instructions per second available due to increases in hardware technology. It is imperative that the software development industry find ways to utilize this capability Increased programmer productivity is the key This thesis introduces the Information Center concept that will allow management to better utilize existing data processing capability by providing users the tools required for increased software productivity. An actual government installation is used as an example of using a modern Systems Analysis approach in the installation of an Information Center. Industry trends are discussed and the debate of centralization versus decentralization presented. Author (GRA)

N85-28608* Computer Software Management and Information Center, Athens, Ga.
COSMIC SOFTWARE CATALOG, 1985 EDITION
1985 499 p
(NASA-CR-174070; NAS 1.26:174070) Avail: Computer Software Management and Information Center, Barrows Hall, Univ. of Georgia, Athens, Georgia 30601 $25 00 CSCL 09B

Abstracts containing descriptions of the software supplied by NASA's Computer Software Management and Information Center are given. Abstracts for 1,409 NASA sponsored computer programs are included. Topics include aeronautical engineering, spacecraft design, launch vehicles, composite materials, rocket propellants, geophysics, meteorology, computer programming, statistical analysis, plasma physics, and transportation R.J.F.

N85-28633# Oak Ridge Y-12 Plant, Tenn.
EFFORTS AT OFFICE AUTOMATION AND INFORMATION SYSTEMS UTILIZATION AT MARTIN MARIETTA ENERGY SYSTEMS, INCORPORATED
C A REEVES, JR. 1 Mar. 1985 50 p refs Presented at 32nd PSI Ann Secretarial Inst., Knoxville, Tenn., 6 Mar. 1985
(Contract DE-AC05-84CS-21400)
(DE85-008154; Y/DL-914; CONF-8503118-1) Avail: NTIS HC A03/MF A01

A brief history is given of the efforts at utilization of mainframe computers, personal or desktop computers, standalone word processors, and other such devices at Martin Marietta Energy Systems in Oak Ridge, Tennessee. This discussion is concentrated on how these systems have been used in the office, both for purely technical and management oriented applications. Some detail is also given on how these systems have been used to solve some typical problems in offices, so that others might benefit from lessons learned. DOE

N85-28879# Advanced Technology, Inc., Reston, Va.
DLA: DATA/DATA BASE ADMINISTRATION ANALYSIS Final Report
R. GIROUARD 26 Feb. 1985 134 p
(Contract DLAH00-83-D-0225)
(AD-A153031) Avail: NTIS HC A07/MF A01 CSCL 05B

The scope of this study addresses the following three questions: What Data/Data Base Administration (D/DBA) functions have to be performed to effectively manage the D/DBA environment in DLA? What tools are needed to support the D/DBA functions? What is the required organizational structure for the functions and tools and where should they be located throughout DLA? The goal of this study is to conduct an extensive review and assessment of existing Data/Data Base Administration methods and procedures to develop concepts, directions, and an organizational approach

in accomplishing the management of automated information DLA wide. GRA

N85-29607# National Bureau of Standards, Gaithersburg, Md. Inst. for Computer Sciences and Technology.
ANNOTATED BIBLIOGRAPHY OF RECENT PAPERS ON SOFTWARE ENGINEERING ENVIRONMENTS Final Report
R. C. HOUGHTON, JR and D R WALLACE Apr. 1985 25 p refs
(PB85-191385; NBSIR-85-3113) Avail: NTIS HC A02/MF A01 CSCL 09B

Abstracts are presented for fifty-five recent papers on software engineering environments. Several of these papers present an overview of software engineering environments Other papers discuss issues to be considered in building software engineering environments. The remaining papers describe general software engineering environments, system development environments, and programming environments. GRA

N85-29852# Oak Ridge National Lab., Tenn. Environmental Sciences Div.
GENERIC DATA ENTRY QUALITY ASSURANCE TOOL
A. E. ROSEN and P. KANCIRUK 1985 10 p refs Presented at the SUGI/SAS Users Group Intern. Conf , Reno, Nev., 10 Mar. 1985
(Contract DE-AC05-84OR-21400)
(DE85-008359; CONF-8503114-1) Avail: NTIS HC A02/MF A01

COMPARE is an important SAS quality assurance tool for data base management that is especially useful when the SAS Full-Screen Product (SAS/FSP) is used for data entry. A good way to check input data for typographical errors is to have the same information entered by two different people and compare the versions for differences This has been standard practice for data entered via keypunch machine on cards; however, it has not been as easily accomplished for data entered using SAS/FSP, via terminal, directly into SAS data sets. To facilitate this procedure, a SAS macro, COMPARE, has been developed at Oak Ridge National Laboratory, as part of the US Environmental Protection Agency's National Surface Water Survey Data Base Management Project. Data are directly and independently entered into two SAS data sets COMPARE then automatically compares the data sets and prints out the observation number, variable name, and values for any nonmatching observations. COMPARE is generic in that it can compare values in any two identically defined SAS data sets, regardless of the number or type of variables or the number of observations. DOE

N85-30676# Logistics Management Inst., Bethesda, Md
LOCAL AUTOMATION MODEL SOFTWARE BENCHMARKING: TEST PLAN
R. W. HARTT and D. J. OCONNOR Mar 1985 109 p
(Contract MDA903-81-C-0166)
(AD-A154349; LMI-DL401; DTIC/TR-85/3) Avail: NTIS HC A06/MF A01 CSCL 05B

Sponsored by the Defense Technical Information Center, the Local Automation Model project encompasses requirements determination, system design, prototype system implementation, and production system acquisition for a fully resident integrated library system. The system is designed and will be made available for installation at Federal technical libraries and information centers. With the system, libraries will be able to share cataloging of technical reports with DTIC, relying on machine-aided translation of citations and an intelligent gateway to facilitate data transfer. The intelligent gateway also permits simultaneous searching of multiple, heterogeneous data bases, both Government-operated and commercial. In addition, the system supports full local collection management -- retrieval, cataloging, and circulation management and control. The prototype and production systems will be implemented with commercially available library automation software. The Test Plan is the fifth in a series of life-cycle documentation for the system. It contains criteria -- both performance and functional -- for selecting from among several packages recommended for benchmarking. Using the Test Plan, test participants will exercise features in each of the six packages selected for benchmarking and score the package on how well each feature is performed. GRA

N85-30681# Naval Ship Research and Development Center, Bethesda, Md
COMPUTER CENTER POLICY
G. R. GRAY Mar 1985 32 p
(AD-A154416; DTNSRDC/TM-18-85-03) Avail: NTIS HC A03/MF A01 CSCL 09B

This document describes the general policies and procedures governing the use of computer and related resources at the David W. Taylor Naval Ship Research and Development Center (DTNSRDC) general purpose Computer Center The overall policy is to make automatic scientific computer services available to users to the fullest extent and with the greatest flexibility possible under the existing federal and Navy regulations. GRA

N85-30715# RAND Corp., Santa Monica, Calif
CODA: A CONCEPT ORGANIZATION AND DEVELOPMENT AID FOR THE RESEARCH ENVIRONMENT
J A. DEWAR and J. J. GILLOGLY Nov. 1984 20 p
(AD-A154240; RAND/P-7035) Avail NTIS HC A02/MF A01 CSCL 20A

The hypothesis of this document is that computers can aid the policy research process by acting as a long term memory (storage and retrieval facility) for the researcher's growing data base and changing concepts. The realization of this hypothesis in the form of computer software specifications required constant referral back to the research process and an appreciation of the limitations of modern computers. The resulting system was called CODA (for concept organization and development aid) and that system is the topic of this paper. The authors describe the prototype system built for testing this hypothesis, the system's capabilities and limitations, some of the details of its user interface, what they have learned both from the building and testing of the system, and, finally, some thoughts on further capabilities that appear amenable to computer implementation and that might aid the policy researcher The CODA program most properly qualifies as a file management menu-driven system aimed at small data based and a very limited number of users. It is a system designed and implemented by users (policy researchers) for testing some concepts about the users' environment. As such, there are some specific things that CODA is NOT It is not a full data base management system for general use, it is not particularly suited for large data bases or numerical processing. GRA

N85-30975# Oak Ridge National Lab , Tenn.
METHODOLOGY FOR ASSESSING BENEFITS AND COSTS OF GOVERNMENT INFORMATION COLLECTION
S CANTOR Apr. 1985 36 p refs
(Contract DE-AC05-84OR-21400)
(DE85-010594, ORNL/TM-9510) Avail NTIS HC A03/MF A01

A new approach is described for assessing the benefits and costs of information collected primarily for governmental policy development, planning, and program evaluation. Benefits are assessed by quantifying two judgments of the importance of obtaining the needed information: (1) the importance assigned to a specific item of information by users (usually individuals in government) who bear a degree of responsibility for achieving or pursuing a specific governmental objective, and (2) the importance of that objective, relative to other objectives, pertaining to the information topic One can characterize these (dimensionless) benefits as an index of importance or as a measure of meaningfulness A cost assessment, also dimensionless, is derived from six factors (1) the number of respondents expected to supply the needed information; (2) the availability of data to the respondents; (3) the degree of accuracy required; (4) the frequency of data collection; (5) the level of disaggregation of the information, and (6) the time interval for transforming the raw data into (usually published) information in a more useful form. DOE

N85-30976# National Bureau of Standards, Gaithersburg, Md. Center for Programming Science and Technology.
GUIDE ON LOGICAL DATABASE DESIGN Final Report
E. N. FONG, M. W. HENDERSON, D. K JEFFERSON, and J. M SULLIVAN Feb 1985 119 p refs
(PB85-177970; NBS/SP-500/122, LC-85-600500) Avail. NTIS HC A06/MF A01, SOD HC $4.50 as 003-005-02631-0 CSCL 09B

This report discusses an iterative methodology for Logical Database Design. The methodology includes four phases: (1) Local Information-flow Modeling, (2) Global Information-flow Modeling; (3) Conceptual Schema Design; and (4) External Schema Modeling These phases are intended to make maximum use of available information and user expertise, including the use of a previous Needs Analysis, and to prepare a firm foundation for physical database design and system implementation. The methodology recommends analysis from different points of view - organization, function, and event - in order to ensure that the logical database design accurately reflects the requirements of the entire population of future users The methodology also recommends computer support from a data dictionary system, in order to conveniently and accurately handle the volume and complexity of design documentation and analysis. GRA

N85-31146*# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex
SPACE STATION REFERENCE CONFIGURATION DESCRIPTION
Aug. 1984 798 p refs
(NASA-TM-87493; JSC-19989; NAS 1 15:87493) Avail: NTIS HC A99/MF E03 CSCL 22B

The data generated by the Space Station Program Skunk Works over a period of 4 months which supports the definition of a Space Station reference configuration is documented. The data were generated to meet these objectives (1) provide a focal point for the definition and assessment of program requirements, (2) establish a basis for estimating program cost; and (3) define a reference configuration in sufficient detail to allow its inclusion in the definition phase Request for Proposal (RFP) G.L C

N85-32807# Mitre Corp , Bedford, Mass.
DESIGN GUIDELINES FOR USER-SYSTEM INTERFACE SOFTWARE Final Report
S. L. SMITH and J N. MOSIER Sep 1984 458 p
(Contract F19628-84-C-0001)
(AD-A154907, MTR-9420; ESD-TR-84-190) Avail NTIS HC A20/MF A01 CSCL 09B

In computer-based information systems, special attention must be given to design of the user-system interface (USI) software. This report revises and expands previously published material, and proposes a more comprehensive set of guidelines for design of USI software in six functional areas: data entry; data display; sequence control, user guidance, data transmission, and data protection GRA

N85-33039# Naval Postgraduate School, Monterey, Calif.
THE HUMAN RESOURCE MANAGEMENT INFORMATION NETWORK (HRMIN): A COST COMPARISON IN ACCORDANCE WITH OFFICE OF MANAGEMENT AND BUDGET (OMB) CIRCULAR NO. A-76, 5 APRIL 1979 M.S. Thesis
G. M. MATYAS Dec. 1984 88 p
(AD-A154583) Avail: NTIS HC A05/MF A01 CSCL 05B

The Human Resource Management Information Network (HRMIN) was conceived and developed in-house by the Navy Military Personnel Command (NMPC) and the Navy Personnel Research and Development Center (NPRDC) This thesis is an attempt to ascertain the compliance of this in-house development with the Office of Management and Budget policy on the acquisition of commercial or industrial products and services needed by the government. A cost comparison of the in-house performance cost and the contract-out cost of providing the services required of HRMIN indicate that the present in-house performance is the most cost effective alternative. Therefore conversion to a contracted-out performance should not be undertaken. GRA

N85-33042# RAND Corp., Santa Monica, Calif.
INVESTIGATION OF DBMS (DATA BASE MANAGEMENT SYSTEMS) FOR USE IN A RESEARCH ENVIRONMENT M.S. Thesis - California State Univ., 6 Jul. 1984
P N ROSENFELD Feb. 1985 105 p
(AD-A154862; RAND/P-7002) Avail: NTIS HC A06/MF A01 CSCL 09B

This thesis is an investigative study on whether a data base management system has a place in a research environment The study concentrated on the use of large social science data sets. The following topics were examined: (1) how social science data sets are used in a research environment; (2) the data usage and need of an existing research institution (The Rand Corporation); (3) the differences between research and business applications, (4) the possible DBMS configurations within a research environment, (5) the opinions of Rand computer users when rating importance of DBMS features, and (6) evaluation of commercial DBMS for use in a research environment. Conventional DBMS have been very successful with business/corporate data bases, but DBMS are not widely used with research data bases. There are significant differences between the business and research data management needs. These include different retrieval and update specifications, the need for statistical routines, and less financial data base support Much of research analysis requires the use of statistical procedures. Hence, a DBMS configuration within a research environment must include some access to statistical procedures. Given these requirements, there are a few commercial DBMS which could be considered for a research environment.
Author (GRA)

N85-33736# Sandia National Labs , Albuquerque, N. Mex
INTEGRATION OF OFFICE AUTOMATION WITHIN COMPUTING
1985 19 p Presented at the DOE Conf. on Office Automation, Albuquerque, N Mex., 24 Apr 1985
(Contract DE-AC04-76DP-00789)
(DE85-010021, SAND-85-0925C; CONF-8504129-1) Avail NTIS HC A02/MF A01

An informal talk is given that focuses on the coupling between office automation efforts and the traditional fields of computing, particularly management information systems DOE

N85-34331# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Informatique
TELECOMMUNICATION MARKET RESEARCH PROCESSING Ph.D. Thesis - Rennes Univ. [TRAITEMENT D'ENQUETES POUR LES TELECOMMUNICATIONS]
J. F. DUPONT 9 Jun 1983 208 p refs In FRENCH
(ENST-83E018; ISSN-0751-1353) Avail: NTIS HC A10

The data processing in two telecommunication market investigations is described One of the studies concerns the office applications of communication and the other the experiences with a videotex terminal. Statistical factorial analysis was performed on a large mass of data. A comparison between utilization intentions and effective utilization is made. Extensive rewriting of statistical analysis computer programs was required Author (ESA)

N85-34519*# PRC Kentron, Inc., Hampton, Va.
USER'S OPERATING PROCEDURES. VOLUME 2: SCOUT PROJECT FINANCIAL ANALYSIS PROGRAM
C. G. HARRIS and D K. HARIS Jul. 1985 171 p
(Contract NAS1-18000)
(NASA-CR-177949; NAS 1.26 177949) Avail NTIS HC A08/MF A01 CSCL 09B

A review is presented of the user's operating procedures for the Scout Project Automatic Data system, called SPADS. SPADS is the result of the past seven years of software development on a Prime mini-computer located at the Scout Project Office, NASA Langley Research Center, Hampton, Virginia SPADS was developed as a single entry, multiple cross-reference data

management and information retrieval system for the automation of Project office tasks, including engineering, financial, managerial, and clerical support This volume, two (2) of three (3), provides the instructions to operate the Scout Project Financial Analysis program in data retrieval and file maintenance via the user friendly menu drivers. Author

N85-35645# Naval Postgraduate School, Monterey, Calif
ATTACKING SOFTWARE CRISIS: A MACRO APPROACH M.S. Thesis
T. N. QURESHI Mar. 1985 87 p
(AD-A155846) Avail. NTIS HC A05/MF A01 CSCL 09B

The software crisis refers to a set of problems that are encountered in the development of computer software The problems are not limited to software that does not function properly Rather the software crisis includes problems attached with the development of software, and keeping pace with the ever-increasing demand of software. The software crisis is characterized by many problems: Schedules and cost estimates are often grossly inaccurate, cost overruns of an order of magnitude have been experienced, schedules slip by months or years and software quality is often suspect This thesis attempts to provide solutions to overcome the software crisis The basic premise of this thesis is that unless the problems at the software industry level are solved, no number of technical and project management tools can be of much help in overcoming the software crisis The author examines the existence of the software crisis, its causes and its serious impact on every walk of life The nature of software development is discussed, considering it as a craft and as an engineering discipline After evaluating various alternatives, a managerial approach is emphasized. Issues like education, professionalization, programmer's productivity, and human factors are discussed Action on these recommendations requires crossing organizational boundaries, and viewing the problem from a macro perspective. GRA

06

RESEARCH AND DEVELOPMENT

Includes Contracts and Contract Management, Project Management, Program Management, Research Projects and Research Facilities, Scientific Research, Innovations and Inventions, Technology Transfer and Utilization, R & D Resources, Agency, National and International R & D.

A85-12501
INTERNATIONAL SCIENTIFIC CONFERENCE ON SPACE, 23RD, ROME, ITALY, MARCH 24, 25, 1983, PROCEEDINGS [CONVEGNO INTERNAZIONALE SCIENTIFICO SULLO SPAZIO, 23RD, ROME, ITALY, MARCH 24, 25, 1983, ATTI]
Conference sponsored by the Ministero degli Affari Esteri, Ministero per il Coordinamento della Ricerca Scientifica e Tecnologica, CNR, et al. Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1984, 400 p In Italian, English, and French. For individual items see A85-12502 to A85-12524.

Political, economic, institutional, and technological aspects of space cooperation between industrialized and developing nations are examined in reviews, reports, and abstracts Topics addressed include satellite communications, the Spacelab program as an easy opportunity for developing-country (DC) participation, Italian cooperation with DCs in space development, economical domestic/regional satellite communication systems for DC, the activities of the Argentine National Commission on space research, the role of the UN, applications of space technology in Africa, the orbit-acquisition maneuver for the Lageos-II satellite, strap-on boosters for the Ariane-3 launcher, and the interpretation of thermal-IR imagery using multispectral and multitemporal information. Graphs, drawings, diagrams, and photographs are provided. T.K

A85-12994#
SPACE STATION RELATED INVESTIGATIONS IN EUROPE
W WIENSS (ERNO Raumfahrttechnik GmbH, Bremen, West Germany) and E. VALLERAIN (Aeritalia S p.A., Turin, Italy) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 29 p.
(IAF PAPER 84-28)

Studies pertaining to the definition of Europe's role in the Space Station program are described, with consideration given to such elements as pressurized modules as laboratories for materials processing and life sciences, unpressurized elements, and service vehicles for on-orbit maintenance and repair activities Candidate elements were selected against such criteria as clean interfaces, the satisfaction of European user needs, new technology items, and European financial capabilities; and their technical and programmatic implications were examined. Different scenarios were considered, ranging from a fully Space-Station-dependent case to a completely autonomous, free-flying man-tendable configuration Recommendations on a collaboration between Europe and the United States are presented. B.J.

A85-13010*# National Aeronautics and Space Administration, Washington, D C
SPACE STATION - OPPORTUNITY FOR INTERNATIONAL COOPERATION AND UTILIZATION
K. S. PEDERSEN (NASA, Washington, DC) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 5 p.
(IAF PAPER 84-51)

In connection with his announcement regarding the development of a permanently manned Space Station, President Reagan invited the United States' friends and allies to join in the Space Station program. The President's invitation was preceded by more than two years of interaction between NASA and some of its potential partners in Space Station planning activities. Attention is given to international participation in Space Station planning, international cooperation on the Space Station, the guidelines for international cooperation, and the key challenges. Questions regarding quid pro quos are considered along with aspects of technology transfer, commercial use, problems of management, and the next steps concerning the Space Station program. G.R.

A85-13133#
OPERATIONAL PREPARATION OF THE GERMAN SPACELAB MISSION D1
H STEIMLE and W. WYBORNY (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne, West Germany) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct 7-13, 1984. 24 p.
(IAF PAPER 84-211)

Technological and organizational aspects of the preparations of the first German Spacelab mission D1 planned for October, 1985, are discussed The history of the project is traced; the scientific payloads for life sciences, material science and processing, fluid physics, and communication and navigation are characterized with their operational requirements; the work schedules for the 8-member crew are summarized; the training program for the payload crew and support team is described; the functions of the D1 payload operations center at Oberpfaffenhofen are defined, and the communications links to NASA facilities are considered Drawings, diagrams, flow charts, and tables are provided. T.K.

A85-13920
A SIMPLE METHOD FOR EVALUATION AND SELECTION OF R&D PROPOSALS FOR A COMPETITIVE GRANT FUND
I. SPHARIM (Agricultural Research Organization, Volcani Centre, Bet-Dagan, Israel) and R. SZAKONYI (Institute of Public Administration, Washington, DC) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-31, Nov. 1984, p. 184, 185. refs

A procedure for evaluating and selecting R&D proposals has been developed and applied by the Binational Agricultural Research and Development Fund, a joint United States-Israel venture. Some of the techniques employed may be useful to other competitive grant agencies, especially the employment of a card system for having the information on numerous R&D proposals visually displayed while selection by the committee is actually in progress. Author

A85-16088#
THE EUROPEAN APPROACH TO A STANDARDIZED WORK BREAKDOWN STRUCTURE CONCEPT FOR EUROPEAN SCIENTIFIC SPACE SATELLITES
B. MADAUSS (Messerschmitt-Boelkow-Blohm GmbH, Ottobrunn, West Germany) International Society of Parametric Analysts, Conference, San Francisco, CA, May 15-17, 1984, Paper. 22 p. refs
(MBB-UR-688-84-OE)

In order to improve the visibility of such management data as schedules, costs, technical performance levels, etc, in scientific satellite development work, ESA has applied the Work Breakdown Structure (WBS) technique. The three basic WBS configurations, which are respectively company/hardware-, task/hardware-, and task/model-oriented, were evaluated on the basis of results from six management effectiveness criteria groups The task/hardware WBS was chosen as the most useful for future satellite projects. This WBS calls for the implementation of a unified breakdown structure for ESA satellites, the application of a standardized coding concept, and the introduction of standardized WBS elements and work packages. O C.

A85-16302
FUTURE PROSPECTS IN SPACE ENVISAGED BY A FORUM OF EUROPEAN SPACE COMPANIES
M. TOUSSAINT (Eurospace, Paris, France) (European Space Symposium, 18th, London, England, June 8, 9, 1983) British Interplanetary Society, Journal (Space Technology) (ISSN 0007-084X), vol 37, Dec 1984, p. 537-540.

In June 1980, Eurospace, the Association of the European space industry, presented a paper based on a set of proposals for a European long term space program. A study of this paper shows that the effort devoted by Europe to space activities was decreasing The current situation (1983) is compared with the situation three years earlier. It is found that the ESA budget is slightly higher than in 1979. However, little attention has been paid to proposals regarding large space platforms and recoverable launchers. Now the Future Prospects Group representing the industrial interest in Eurospace has been set up, and the progress of this group is discussed. Attention is given to the level of Europe's space activities in a worldwide context, the mean annual value of governmental and commercial markets accessible to the European space industry, developments in the communication market, the Ariane market, the development of a new generation of launchers for 1992, and the space industrialization market G.R.

A85-23921
EUROPE'S SPACE ODYSSEY 2000
H. GAVAGHAN New Scientist (ISSN 0028-6664), vol. 105, Jan. 24, 1985, p 42-45.

Several important projects of Europe's space program have now been completed With the successful flight of Spacelab in 1983, the first few steps have been taken towards putting astronauts to work in space while an independent ability to launch satellites has been achieved. It is pointed out, however, that with Ariane 4's first flight in the second half of 1986, Europe will have achieved as much as it can with its existing rocket technology. At the next meeting called by the European Space Agency (ESA), the choice of a successor to Ariane 4 will be one of the questions to be discussed Other issues to be considered are related to Europe's response to the American invitation to participate in the permanent space station program, the allocation of money, and a new telecommunication program. In a discussion of new space projects, attention is also given to a suggestion that Europe should develop a pressurized module which carries astronauts, an unmanned space platform, and French proposals for a reusable spacecraft which could carry astronauts. G.R

A85-24525* Jet Propulsion Lab., California Inst of Tech., Pasadena
COMPUTING AND INFORMATION SERVICES AT THE JET PROPULSION LABORATORY - A MANAGEMENT APPROACH TO A DIVERSITY OF NEEDS
F. H. FELBERG (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IN: Jerusalem Conference on Information Technology, 4th, Jerusalem, Israel, May 20-25, 1984, Proceedings. Silver Spring, MD, IEEE Computer Society Press, 1984, p 691-695. NASA-supported research

The Jet Propulsion Laboratory, a research and development organization with about 5,000 employees, presents a complicated set of requirements for an institutional system of computing and informational services. The approach taken by JPL in meeting this challenge is one of controlled flexibility A central communications network is provided, together with selected computing facilities for common use. At the same time, staff members are given considerable discretion in choosing the mini- and microcomputers that they believe will best serve their needs. Consultation services, computer education, and other support functions are also provided. Author

A85-25116
DECISION ANALYSIS IN PROJECT MANAGEMENT - AN OVERVIEW
J M. BOOKER and M C BRYSON (Los Alamos National Laboratory, Los Alamos, NM) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-32, Feb. 1985, p. 3-9. refs

Decision theory encompasses of interacts with many different subject-matter fields. For the manager who requires some access to the literature in these diverse areas, this paper provides a broad overview of the subjects and a guide to further reading in decision theory, emphasizing its application to R&D project management. This paper includes very general topical summaries in utility theory, mathematical programming, statistical methods, scoring and ranking methods, and cognitive science together with a list of 96 references. A more complete reference list, organized by topic and individually annotated, is available from the authors. Author

A85-25856#
PLANNING FOR A JOINT SPACE STATION
R. REICHERT Dornier-Post (English Edition) (ISSN 0012-5563), no. 4, 1984, p 32-37.

ESA and NASA have begun to negotiate a memorandum of understanding concerning cooperation on a Space Shuttle-deployed Space Station. This Station will have, as its functions, manned use as an orbital laboratory and observatory, as a transportation node, as a satellite servicing and repair facility, and as a facility for further space system fabrication and assembly. Engineering research must be undertaken into distributed architecture hardware and fault-tolerant software, high capacity electrical power generation, cryogenic fluids management, thermal management, crew systems and life support, and extravehicular activities. O.C.

A85-26011
EUROPE IN SPACE 1985-2000 [EUROPE SPATIALE 1985-2000]
P. LANGEREUX Air et Cosmos (ISSN 0044-6971), vol. 22, Feb 9, 1985, p. 45-47, 50, 53 (3 ff). In French.

Projects planned by the 13-member ESA in the last part of the century are surveyed, with particular note taken of the West German and French views. The activities will proceed in the areas of science, remote sensing, telecommunications, microgravity materials processing, participation in the U S Space Station effort, and the development of new launch and space vehicles. A desire has been expressed to build the unmanned polar orbiting segment of the Space Station, the Columbus The member nations will all contribute to design studies for the mini-Shuttle, Hermes, a project up to now carried solely by France. Work will continue on the matching launch vehicle, the Ariane 5 and on free-flying platforms which will be visited only periodically and which will carry proof-of-technology experiments. The construction of modules for the U.S Space Station is hoped to provide a technology and manufacturing base for building a European space station at some unspecified epoch in the future. M.S K.

A85-31742
RESEARCH AND DEVELOPMENT IN THE TECHNOLOGY OF TRANSPORTATION LET'S REACH FOR BLUE SKY
W. L. POLHEMUS (Polhemus Associates, Inc., Ann Arbor, MI) and R W LILLEY (Ohio University, Athens, OH) Navigation (ISSN 0028-1522), vol. 31, Fall 1984, p. 200-208.

Financial, technical, organizational, and philosophical aspects of improving the existing traffic management systems governing the airborne, sea, and land transport of the United States are considered. A number of targets to be attained in the time frame of 35 years are identified, including the elimination of airport departure and arrival delays and extended-range remote sensing for nighttime and instrument visibility conditions A need is expressed for an independent research agency similar in form and principle of operation to NASA, dedicated to evaluation development and testing of concepts, strategies, equipment, and systems for solving the transportation problems outlined L.T.

A85-34146
THE ESA SCIENCE PROGRAMME
G. WHITCOMB (ESA, Paris, France) Spaceflight (ISSN 0038-6340), vol. 27, May 1985, p 206-209

Scientific payloads planned by the ESA over the next 20 yr are outlined. Four missions targeted for launch in the 1990s will include a Solar Terrestrial Physics spacecraft, a high throughput X-ray spectroscopy mission, a heterodyne spectroscopy satellite, and a primitive body mission which could be a multiple asteroid and comet rendezvous configuration. Cooperation with NASA might lead to the ESA furnishing a smart ion drive for the spacecraft. Cooperative missions which might follow are a primitive body sample return, Mercury orbiters, out-of-the-ecliptic large telescopes and solar probes. A 7 percent per annum funding increase is required to meet the mission development goals M.S K

A85-35448
USAF NEGOTIATING CONTRACTS FOR F100, F110 IMPROVEMENTS
R. R. ROPELEWSKI Aviation Week and Space Technology (ISSN 0005-2175), vol. 122, May 20, 1985, p. 18, 19.

Competitive bidding is underway for fixed prices contracts to produce upgraded, more reliable, 29,000 lb and 29,500 lb thrust versions of the F100 and F110 engines for the F-15 and F-16 fighters. Initial test engines have demonstrated stall stagnation rates lower than specified, although still exceeding eventual goals The contracts will specify the man-hours required for maintenance, reasonable life cycle costs, and warranty terms. The $454 million program will include funding for the development of improved engine materials, increased engine cycle lifetimes, higher fan pressure ratios, airflow levels, and compressor efficiency and an advanced afterburner Engine controls will be digitized. The first operational engine is scheduled for a 1989 delivery. M S.K.

A85-36421
V-22 OSPREY DEVELOPMENT CONTRACT TESTS NEW PROCUREMENT POLICY
D. E. FINK Aviation Week and Space Technology (ISSN 0005-2175), vol 122, June 3, 1985, p 220, 223-225, 227.

Details of the contractual commitments being entered into by Bell Helicopters and Boeing Vertol to deliver 913 V-22 aircraft to the defense program are outlined The contract was won as a result of competitive bidding and is now in final approval review. The V-22 is to ascend like a helicopter, transition to turbo-prop horizontal flight, then land like a helicopter The companies won the contract largely on the basis of their experience with the XV-15 aircraft. The two companies have established a joint design team and separated tasks such as the designs of he engine and tilt packages and the fuselage. The engines have not yet been chosen. A pilot run of 18 aircraft due by 1989 is expected to be built by identical production facilities one owned by each contractor. The full production order will be manufactured in 10 lots The engineering and design processes are automated and fuly accessed by personnel of both companies M S K.

A85-36987
PROJECT MANAGEMENT: A MANAGERIAL APPROACH
J. R. MEREDITH and S. J. MANTEL, JR (Cincinnati, University, Cincinnati, OH) New York, John Wiley and Sons, 1985, 508 p. refs

This book is primarily intended to be a college textbook for teaching project management at the advanced undergraduate or master's level. The book is also intended for project managers and prospective project managers. Projects in contemporary organizations are examined, and aspects of project initiation are discussed along with questions of project implementation, and project termination. Attention is given to project evaluation and selection, the project manager, project organization, project planning, budgeting, scheduling, resource allocation, monitoring and information systems, project control, project evaluation and auditing, the several varieties of project termination, the present and future of project management, creativity and idea generation, and problems of technological forecasting. G.R.

A85-40334#
A SYSTEMS-ANALYSIS COMPARISON OF SPACE STATION PROJECTS [SYSTEMTECHNISCHER VERGLEICH VON RAUMSTATIONSPROJEKTEN]
E IGENBERGS (Muenchen, Technische Universitaet, Munich, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Jahrestagung, Hamburg, West Germany, Oct 1-3, 1984. 21 p. In German.
(DGLR PAPER 84-118)

Igenbergs (1984) has compared the benefits obtainable for Europe in the case of the development of a European space station with the advantages obtained in the case of a participation in the U S. Space Station program He found that the latter possibility represents the better solution. The present investigation is concerned with the conduction of a systems analysis regarding the characteristics of the various alternatives or scenarios which appear feasible Attention is given to the representation of the scenarios, the evaluation of the scenarios, the various elements and properties, details regarding the examined scenarios, and a description of the interaction matrices. A participation in the U.S. Space Station program according to two alternatives is considered, including one involving manned and unmanned elements, and another involving only unmanned elements. G.R.

A85-41098* National Aeronautics and Space Administration, Washington, D.C.
THE US SPACE STATION PROGRAMME
J. D. HODGE (NASA, Office of Space Station, Washington, DC) (British Interplanetary Society, Space Station Symposium, London, England, Apr. 17, 1985) British Interplanetary Society, Journal (Space Stations) (ISSN 0007-084X), vol 38, July 1985, p 315-318.

The Manned Space Station (MSS) involves NASA, and other countries, in the operation, maintenance and expansion of a permanent space facility. The extensive use of automation and robotics will advance those fields, and experimentation will be carried out in scientific and potentially commercial projects. The MSS will provide a base for astronomical observations, spacecraft assembly, refurbishment and repair, transportation intersection, staging for interplanetary exploration, and storage Finally, MSS operations will be performed semi-autonomously from ground control. Phase B analysis is nearing completion, and precedes hardware development. Studies are being performed on generic advanced technologies which can reliably and flexibly be incorporated into the MSS, such as attitude control and stabilization, power, thermal, environmental and life support control, auxiliary propulsion, data management, etc. Guidelines are also being formulated regarding the areas of participation by other nations.
M S.K.

A85-42585
RADSIM - A METHODOLOGY FOR LARGE-SCALE R&D PROGRAM ASSESSMENT
G A. HAZELRIGG, JR. and F. L. HUBAND (NSF, Div of Policy Research and Analysis, Washington, DC) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. EM-32, Aug 1985, p. 106-115. NSF-DOE-supported research refs

This paper outlines a methodology for the assessment of large-scale research and development programs that involve multiple research phases and parallel approaches. Among its capabilities, the assessment methodology assists in the estimation of the effect of alternative budget levels, allocation of resources within the total budget, and alternative management strategies on various measures of program success The methodology accounts for cost, schedule, and performance uncertainties in the research process, as well as decisions to continue or terminate each research effort. A major innovation of the methodology is to provide a means for assessing the likelihood and impact on the overall program of technological breakthroughs. To demonstrate the use of this methodology, it is applied to an assessement of magnetic confinement fusion research programs The methodology is shown to provide valuable insights for the management of large-scale programs
Author

A85-42694#
SPACELAB AND EURECA AS A BASIS FOR EUROPEAN INVOLVEMENT IN THE SPACE STATION
R. MORY (ESA, Directorate of Space Transportation Systems, Paris, France) ESA Bulletin (ISSN 0376-4265), no. 42, May 1985, p. 30-38

The Eureka free-flyer and Spacelab are seen as major contributors to European participation in the Space Station program A consortium of European manufacturers has invested a billion dollars in Spacelab, which was developed with NASA guidance Spacelab supports experiments in tribology, fluid physics, crystal growth, biology and metallurgy. Eureka stays in orbit up to 6 mos before retrieval by the Shuttle, is capable of demonstrating the feasibility of Space Station components and technologies, provides co-orbiting unmanned platforms for the Space Station, and serves as a learning tool for payload preparation by European industries. Both the Spacelab and Eureka are prototype elements of the polar-orbiting Columbus component of the Space Station. The Columbus could include pressurized modules and could also co-orbit with the Space Station.
M.S.K

A85-43182#
SOME INFORMAL REMARKS ON THE M-FORM SOCIETY
W. G. OUCHI (California, University, Los Angeles) IN. White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 37-45.

The paper describes the business-government relationship in Japan and compares it to similar relationships in the United States. In particular, the paper analyzes the impact that this relationship has on joint research and development in both defense and nondefense sectors.
Author

A85-43206*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CONTRACTOR AND GOVERNMENT - TEAMWORK AND COMMITMENT
G D GRIFFIN (NASA, Johnson Space Center, Houston, TX) IN· White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality, Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p 197-201

Procedures being implemented at NASA to improve cooperation with contractors and increase productivity are reviewed from the NASA point of view. The goals of the U.S. space program for the coming 25 years are listed, and the importance of the commercial utilization of space in these plans is stressed Consideration is given to the ongoing American Productivity Center White-Collar Productivity-Improvement Project, the implementation of the recommendations of the 1984 NASA/Contractor Conferences in present and future contracts, and the use of incentive contracts to create situations in which both NASA and the contractor benefit from increased productivity Future plans call for increased industry responsibility in managing and operating the STS; steamlining of Shuttle operations, advanced design-to-cost procedures, increased commonality, better NASA-contractor communications, and more use of CAD/CAM and robotics for the Space Station; and accommodation of greatly expanded private investment and exploitation of space
T.K.

A85-48595
REPRESENTATION OF ACTIVITY KNOWLEDGE FOR PROJECT MANAGEMENT
A SATHI (Carnegie Group, Inc., Pittsburgh, PA), M S. FOX (Carnegie-Mellon University, Pittsburgh, PA), and M. GREENBERG (Massachusetts, University, Amherst) IEEE Transactions on Pattern Analysis and Machine Intelligence (ISSN 0162-8828), vol. PAMI-7, Sept. 1985, p. 531-552 Research supported by the Digital Equipment Corp. refs

Representation of activity knowledge is important to any application which must reason about activities such as new product management, factory scheduling, robot control, vehicle control, software engineering, and air traffic control This paper provides an integration of the underlying theories needed for modeling activities. Using the domain of large computer design projects as an example, the semantics of activity modeling is described. While the past research in knowledge representation has discovered most of the underlying concepts, this attempt is toward their integration. This includes the epistemological concepts for erecting the required knowledge structure; the concepts of activity, state, goal, and manifestation for the adequate description of the plan and the progress; and the concepts of time and causality to infer the progression among the activities. The issues which arise due to the integration of aggregation, time, and causality among activities and states are also addressed.
Author

A85-49049* Texas Instruments, Inc., Lewisville.
MONITORING SOFTWARE DEVELOPMENT THROUGH DYNAMIC VARIABLES
C W. DOERFLINGER (Texas Instruments, Inc , Lewisville) and V R BASILI (Maryland, University, College Park) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol SE-11, Sept 1985, p. 978-985. Previously announced in STAR as N84-23139 refs (Contract NSG-5123)

Research conducted by the Software Engineering Laboratory (SEL) on the use of dynamic variables as a tool to monitor software development is described Project independent measures which may be used in a management tool for monitoring software development are identified Several FORTRAN projects with similar profiles are examined. The staff was experienced in developing these types of projects. The projects developed serve similar functions. Because these projects are similar some underlying relationships exist that are invariant between the projects. These relationships, once well defined, may be used to compare the development of different projects to determine whether they are evolving the same way previous projects in this environment evolved Author

A85-49556
CONTRACTOR EXPERIENCE USING RADC ORACLE
C. W PLOTKIN (General Electric Co., Utica, NY) IN Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p 222-224

The initial use experience of one contractor who was required to perform a reliability prediction of the Optimized Reliability and Component Life Estimator (ORACLE), a computer implementation of MIL-HDBK-217 (Reliability Prediction of Electronic Equipment) is described Included in the paper are descriptions of ORACLE, the basic contractual requirements, the training session, the outputs available, and the initial startup problems and actual experience after the startup. The use of ORACLE resulted in a more efficient utilization of the Reliability Engineering resources, rendering complete and accurate predictions, and in significant labor savings. I.S.

N85-10929# Martin Marietta Aerospace, Washington, D C. Air Traffic Control Div
SYSTEM ENGINEERING AND INTEGRATION CONTRACT FOR IMPLEMENTATION OF THE NATIONAL AIRSPACE SYSTEM PLAN. VOLUME 2: SECTION 5.0 NAS Plan Audit Report
Aug 1984 211 p
(Contract DTFA01-84-C-00017)
(AD-A145710; ATC-84-0026-VOL-2) Avail: NTIS HC A10/MF A01 CSCL 17G

This section provides the detailed audit findings for each of the NAS Plan F&E projects The individual sections are arranged to follow the sequence and order of the technical program chapters in the NAS Plan. The text on each project is formatted to describe. (1) Project role in the National Airspace System. (2) The products that will be produced by the project. (3) The status of the project. (4) The major audit findings broken into technical, schedule, and cost if appropriate. (5) Recommendations to help achieve a successful project on schedule. GRA

N85-11567# Comptroller General of the United States, Washington, D.C.
CONTRACTING FOR COMPUTER SOFTWARE DEVELOPMENT: SERIOUS PROBLEMS REQUIRE MANAGEMENT ATTENTION TO AVOID WASTING ADDITIONAL MILLIONS
9 Nov 1979 94 p
(FGMSD-80-4) Avail: NTIS HC A05/MF A01

The feasibility of using private firms to develop software for federal agencies is examined. GAO found that too many contracts for software development experience large cost overruns, lengthy delays, and dissatisfaction with the final product. Major causes of problems in contract software development are discussed. Conclusions and recommendations for improving software contracts are detailed. E.R.

N85-11898# Duke Univ , Durham, N C School of Business
DECISION PROCESS MODELS OF CONTRACTOR BEHAVIOR: THE DEVELOPMENT OF EFFECTIVE CONTRACT INCENTIVES Final Report, 17 Feb. 1981 - 11 Jun. 1984
A. Y. LEWIN, K. J. COHEN, and R C. MOREY 11 Jun 1984 74 p
(Contract F33615-81-C-5034)
(AD-A145524, BRMC-81-5034) Avail: NTIS HC A04/MF A01 CSCL 05A

An objective of this research was to develop a capability to model the potential impact of various incentive schemes on the performance of defense contracts It was necessary to develop a computer simulation model such basic elements as DOD project goals, DOD incentive mechanisms, contractor goals, and contractor organizational response mechanisms. Each of these elements, which collectively determine the behavioral pattern of the decision process model (DPM), are decoupled and parameterized to facilitate analysis of different incentive schemes and/or behavioral assumptions The objective of this contract was to validate the DPM simulation and its application to developing and testing alternative incentive schemes. The major practical use of building a DPM type simulation is its ultimate application in answering what if type policy questions involving the design parameters of the contractual relationship between the DOD and defense contractors For example, the simulation results indicated that increasing the contractor's fee improves cost control performance. The DPM simulation results suggest that the higher the weight (including those assigned to the quality of the proposal) the better the cost control performance and social efficiency A simulation model of this type has other uses in the training or education of policy makers and or DOD project managers. In business education similar simulation models have been designed as management games. Such games, which can be extremely complex, are used as laboratories for training students to apply analytical tools and integrate functional area knowledge (marketing, production, accounting, financial planning, etc.) within a competitive decision making environment. GRA

N85-12775# Department of Defense, Washington, D C. Directorate for Information Operations and Reports
COMPANIES PARTICIPATING IN THE DEPARTMENT OF DEFENSE SUBCONTRACTING PROGRAM, FIRST THREE QUARTERS FISCAL YEAR 1984
1984 85 p
(AD-A146137, P14) Avail: NTIS HC A05/MF A01 CSCL 15E

This report presents a variety of subcontract data collected from Department of Defense (DOD) large business firms that have received at least one award in excess of $500,000 ($1,000,000 for construction) Table II-1 shows the dollar amounts and percent distribution of awards from DOD contractors to large, small, and small disadvantaged businesses for first three quarters FY 1983 and first three quarters FY 1984 Table II-2 summarizes DOD subcontracting program commitments for first three quarters FY 1984 Tables II-3 and II-4 summarizes small and small disadvantages business subcontracting goals and achievements Detailed information from the Army, Navy, Air Force, and Defense Logistics Agency (DLA) is presented in Part 3, Sections 1 through 4. GRA

N85-13666*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va
PROJECT RESOURCES PLANNING AND CONTROL
C W. SIBBERS Nov. 1984 145 p refs
(NASA-TM-86339, NAS 1 15:86339) Avail: NTIS HC A07/MF A01 CSCL 05A

This report contains instructional guidelines for the resources planning and control of research and development (R&D) projects managed by NASA's Langley Research Center (LaRC). Although written to serve primarily as a practical guide and reference for those LaRC personnel who perform resources planning, analysis, control, and reporting functions, it should also be meaningful to other NASA personnel who are directly or indirectly involved in or affected by these functions, especially project technical managers

whose responsibilities include resources management. Certain sections should help Contractor personnel to better understand what resources information must usually be submitted on LaRC projects and what use is made of such information. The Project Manager of a large R&D project typicaly receives support from an Analyst in the area of resources management The Analyst provides assistance in four functional areas: Planning, Analysis/Control, Administration, and Reporting Each of these functions are discussed in detail. Examples of techniques used effectively on LaRC projects have been included where applicable A considerable amount of information has been included on the use of Performance Measurement (Earned Value) Systems for contract cost control and reporting as little information is currently available on this subject in NASA publications. Author

N85-13689*# National Aeronautics and Space Administration, Washington, D.C.
INTERNATIONAL COMPARATIVE STUDY OF SYSTEMS FOR THE GOVERNMENT ADVANCEMENT OF RESEARCH AND DEVELOPMENT
M RIPKE and R. FOERST Oct. 1984 298 p Transl. into ENGLISH of "International Vergleichende Untersuchung zu Verfahrensfragen bei der Staatlichen Forderung von Forschung und Entwicklung" rept. PLI-1268-1 Bundesministerium fuer Forschung und Technologie, Bonn, Nov. 1983 p 1-157 Transl. by Kanner (Leo) Associates, Redwood City, Calif
(Contract NASW-3541)
(NASA-TM-77589; NAS 1.15:77589; PLI-1268-1) Avail: NTIS HC A13/MF A01 CSCL 05D

The reorganization, structure and instruments of government advancement of research in three countries was compared: France, Sweden and the USA. In France the powers are centralized; in Sweden and the USA, decentralized. Assistance to projects is provided with grants and contracts in all three countries France and Sweden also give loans with conditional waiving of reimbursement in case of failure. In all three countries indirect assistance is provided only with small tax breaks. E A K.

N85-15784# Office of Technology Assessment, Washington, D C.
A BUYER'S GUIDE TO SPACE INFRASTRUCTURE
In its Civilian Space Stations and the US Future in Space p 85-99 Nov 1984
Avail: SOD HC $7 50

Various factors involved in acquiring a substantial amount of long-term space infrastructuree are considered The roles of the private sector and international partners are discussed, and the degree to which new technology would be used is cited. The costs and capabilities of a number of possible infrastructure options are compared in a table format The cost drivers associated with the listed options are discussed. Tradeoffs regarding the use of automation and people in a space station are considered Buyers may reasonably decide to acquire space infrastructure using an average annual funding rate rather than a lump sum approach Possible infrastructure that could be obtained using average annual funding rates of $0.1, $0.3, $1, and $3 billion (1984$) are presented. The functions that NASA intends to provide in a space station are listed, and alternative infrastructures that could provide those functions are indicated. B.W.

N85-15785# Office of Technology Assessment, Washington, D.C.
BROADENING THE DEBATE
In its Civilian Space Stations and the US Future in Space p 103-110 Nov. 1984
Avail. SOD HC $7.50

The creation, a U.S. civilian space station program is described as a means to various ends rather than an end in itself. The ends proposed may be grouped into four categories: (1) industrial (e g., manufacturing materials); (2) commercial (e.g , servicing satellites); (3) scientific (e g., conducting experiments in the life sciences); and (4) national security (e.g., maintaining a permanent U.S manned presence). Potential users and potential suppliers of a U.S. space station program are discussed. The need for goals and objectives for a new U S. civilian space effort is considered. The role of U.S. space policy in the evolution of the present day civilian space program is discussed President Reagan's call for a space station is addressed, and his directions on the nation's aspiration in regard to it are discussed. B.W

N85-15790# Office of Technology Assessment, Washington, D.C
SYNOPSIS OF THE OTA WORKSHOP ON COST CONTAINMENT OF CIVILIAN INFRASTRUCTURE (CIVILIAN SPACE STATION) ELEMENTS
In its Civilian Space Stations and the US Future in Space p 206-213 Nov. 1984
Avail: SOD HC $7.50

The major cost issues related to a U.S. civilian space station are summarized and discussed in terms of management, technical, and procurement considerations. Incentive contracting and performance specifications are considered. R.S.F.

N85-16675# Information Spectrum, Inc , Arlington, Va.
TECHNICAL PERFORMANCE MEASUREMENT HANDBOOK Final Report
T. B. SEARS and E. P. TAYLOR 31 Jul. 1984 115 p
(Contract MDA903-82-G-0055)
(AD-A147314, ISIL-V-4062-05) Avail: NTIS HC A06/MF A01 CSCL 05A

TPM is defined as: the continuing prediction and demonstration of the degree of anticipated or actual achievement of selected technical objectives. Technical Performance Measurement (TPM) is an integral function of system engineering. For maximum utility, TPM must be compatible with other related program management activities (cost/schedule control system criteria, contract administration, production management, readiness functions). The function of this handbook is to provide program management personnel with insight into how technical performance is measured by the contractor, reported to the government and how this information can be effectively integrated with cost and schedule performance data. Chapters 2 and 3 provide overviews of TPM and C/SCSC taken from published documentation. Chapter 4 was developed using extensive interviews with engineering management personnel within government program offices and DOD contractors. It illustrates how technical, cost and schedule performance are actually being monitored and used to provide program control today The differences between the government program office and the contractor viewpoints are highlighted. Chapter 5 identifies the issues which must be considered in PMO implementation and execution of a TPM program. Author (GRA)

N85-16683# Army Construction Engineering Research Lab., Champaign, Ill
PROJECT MANAGER'S HANDBOOK FOR SPECIAL PROJECTS Final Report
J. G. KIRBY Oct. 1984 79 p
(Contract DA PROJ. 4A1-62731-AT-41)
(AD-A147913; CERL-TR-P-85/01) Avail: NTIS HC A05/MF A01 CSCL 05A

This report identifies unique problem areas that a manager of a Corps of Engineers construction project in a remote area is likely to encounter. The major problems identified from managers of past projects were: (1) procurement and purchasing, (2) planning and control, (3) engineering/design, (4) country-to-country agreement, (5) civilian personnel, (6) construction, (7) communications, (8) office/project manager operation, (9) Corps/contractor relations, and (10) transportation. Based on the results of questionnaires and meetings with former special project personnel, ways of solving or preventing these problems are proposed. It is recommended that the proposals presented in this report be used to supplement existing Corps guidance on special project management. GRA

N85-16686# Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany).
ACTIVITIES REPORT OF THE AEROSPACE INDUSTRY IN WEST GERMANY Annual Report, 1982 [DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT GESCHAEFTSBERICHT 1982]
15 May 1983 64 p In GERMAN Original contains color illustrations
(ISSN-0722-3838) Avail: NTIS HC A04/MF A01
Balance sheet, project and loss account, comments on capital conservation, investment programs and technical progress, surveys by the supervisory and executive board, and Lufthansa group report are presented. Author (ESA)

N85-16687# Deutsche Lufthansa Aktiengesellschaft, Frankfurt am Main (West Germany)
ACTIVITIES REPORT OF THE AEROSPACE INDUSTRY IN WEST GERMANY Annual Report, 1983 [DEUTSCHE LUFTHANSA AKTIENGESELLSCHAFT GESCHAEFTSBERICHT 1983]
24 May 1984 69 p In GERMAN Original report contains color illustrations
(ISSN-0722-3838) Avail: NTIS HC A04/MF A01
The day to day operations and financial status of the Lufthansa group are reviewed B G

N85-17176# Joint Publications Research Service, Arlington, Va.
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
26 Dec. 1984 45 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-046) Avail: NTIS HC A03/MF A01
News items, abstracts, and scientific reports on aspects of science and technology including robotics, man machine systems, artificial intelligence, telecommunications, microcomputers, laser, and genetic engineering are described.

N85-17191# Joint Publications Research Service, Arlington, Va
FRG STUDY LOOKS AT PARTICIPATION IN ESA, US SPACE STATION
G. WANGE *In its* West Europe Rept Sci and Technol. (JPRS-WST-85-001) p 1-3 2 Jan. 1985 Transl into ENGLISH from Flugrev. (Munich), Oct. 1984 p 30-31
Avail. NTIS HC A05/MF A01
International cooperation in space exploration was examined. The participation of the European Space Agency (ESA) in the U S Space Station is discussed Joint technological ventures, economics, and costs are investigated. E.A.K.

N85-17197# Joint Publications Research Service, Arlington, Va.
UK, FRG, FRANCE: R AND D IN SENSORS, RELATED FIELDS
T. JARNE, J. HELLSTEN, K G. NILSSON, and D. ANDREE *In its* West Europe Rept. Sci. and Technol. (JPRS-WST-85-001) p 37-59 2 Jan. 1985 Transl. into ENGLISH from Utlandsrappt (Stockholm), no. 8402, Aug. 1984 p 43-71; 63-71; 78-88; 91-98
Avail: NTIS HC A05/MF A01
Progress in European sensor technology and the marketing of sensors is reported Fiber optics and fiberoptical transducers and their application to cable television are examined. Image processing development and application, fiberoptic sensors, electrochemical sensors and their use in the electronics industry are outlined. E.A.K.

N85-17198# Joint Publications Research Service, Arlington, Va
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
3 Dec. 1984 59 p refs Transl. into ENGLISH from various east European articles
(JPRS-ESA-84-043) Avail: NTIS HC A04/MF A01
New items, abstracts and scientific reports on aspects of science and technology including microprocessors, nuclear reactors, robotics, microelectronics, and software engineering are described.

N85-17737# General Accounting Office, Washington, D C Resources Community and Economic Development Div
OUTLOOK FOR EXPANDING THE FEDERAL RESEARCH IN PROGRESS SYSTEM
22 Oct 1984 23 p
(AD-A148354, GAO/RCED-85-15) Avail NTIS HC A02/MF A01 CSCL 05A
A study of the Federal government's research and development (R&D) efforts in the areas of new materials, electronic devices, and biotechnology was requested There is concern about the lack of a central source of information on federal funding for these technologies and requested that GAO study the system that federal agencies use to catalogue ongoing R&D projects. GAO focused a review on the National Technical Information Service's (NTIS) Federal Research in Progress System (FEDRIP) and how the information systems of the major federal R&D agencies relate to FEDRIP. The overall objective was to review the outlook for making FEDRIP a comprehensive source of information on government-funded R&D. A more detailed description of the objectives, scope, and methodology is contained in enclosure 1. An expansion of FEDRIP could be difficult to achieve. To make FEDRIP a comprehensive R&D data base, all applicable agencies would have to report both project and funding information to NTIS Such a change would not necessarily make it easier to determine overall federal funding levels for particular areas of technology. Budget information and congressional correspondence is included GRA

N85-17745# Vermont Univ , Burlington.
EUROPEAN SCIENTIFIC NOTES. VOLUME 38, NUMBER 11
L. E SHAFFER, ed Nov 1984 39 p
(AD-A148228; ESN-38-11) Avail: NTIS HC A03/MF A01 CSCL 05B
European Scientific Notes (ESN) is a monthly publication with brief articles on recent developments in European scientific research. The publication is not intended to be part of the scientific literature The value of ESN articles to Americans is to call attention to current developments in European science and technology and to the institutions and people responsible for these efforts. ESN authors are primarily ONRL staff members. Occasionally articles are prepared by or in cooperation with staff members of the USAF European Office of Aerospace Research and Development or the US Army Research and Standardization Group Qualified US scientists travelling in Europe may also be invited to author an ESN article Author (GRA)

N85-17933 British Aerospace Aircraft Group, Kingston-upon-Thames (England)
INNOVATION IN BRITISH INDUSTRY (NOTABLY THE AIRCRAFT INDUSTRY) AND ITS VALUE: COLLECTED PAPERS
C L. BORE Aug. 1984 10 p refs
(BAE-KRS-N-GEN-286) Avail: Issuing Activity
Aspects of innovation that most need improving in British industry are reviewed The money values of technical innovations in the aircraft industry are discussed. Author (ESA)

N85-18086# Oak Ridge National Lab , Tenn.
EMERGING ROLE OF THE NATIONAL LABORATORY IN THE DEVELOPMENT AND TRANSFER OF MATERIALS TECHNOLOGY
H. POSTMA 1984 15 p refs Presented at 8th Biennial Conf. on Natl Mater. Policy, Fredricksburg, Va., 11 Sep. 1984
(Contract DE-AC05-84OR-21400)
(DE85-001252; CONF-8409156-1) Avail: NTIS HC A02/MF A01
The national laboratories are in a unique position to contribute to the overall national effort in materials Research and Development The laboratories have the expertise and resources to construct and operate large national facilities for materials research The laboratories provide a framework for integrating basic research and technology development activities at a common site. National laboratories play important roles in the development and transfer of materials technologies. DOE

N85-18946# Office of Naval Research, London (England)
EUROPEAN SCIENTIFIC NOTES, VOLUME 38, NUMBER 12 Monthly Publication
L. E SHAFFER Dec 1984 54 p
(AD-A148713; ESN-38-12) Avail NTIS HC A04/MF A01 CSCL 05B

European Scientific Notes (ESN) is a monthly publication with brief articles on recent developments in European scientific research. The publication is not intended to be part of the scientific literature. The value of ESN articles to Americans is to call attention to current developments in European science and technology and to the institutions and people responsible for these efforts. ESN authors are primarily ONRL staff members. Occasionally articles are prepared by or in cooperation with staff members of the USAF European Office of Aerospace Research and Development or the US Army Research and Standardization Group. Qualified US scientists travelling in Europe may also be invited to author an ESN article GRA

N85-18947# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany)
ACTIVITIES REPORT IN AEROSPACE IN WEST GERMANY Annual Report, 1983 [JAHRESBERICHT 1983]
H. THIMME, ed. Sep 1984 132 p In GERMAN Original contains illustrations
(ISSN-0070-3966) Avail: NTIS HC A07/MF A01

Air traffic control, aircraft design, turbofans and turbines, nonnuclear energy, satellite communications and monitoring, Earth observation (from space), and space systems are discussed. The organization of the agency is also described as well as its relationships with the government, business, and science communities. Author (ESA)

N85-19732# Office of Naval Research, London (England).
FRENCH PLANS FOR FIFTH GENERATION COMPUTER SYSTEMS
J. F. BLACKBURN 7 Dec. 1984 10 p
(AD-A149435; AD-E500690, ONRL-R-12-84) Avail: NTIS HC A02/MF A01 CSCL 09B

Since the October 1981 announcement of Japan's Fifth Generation Project, the French scientific and industrial communities have shown an increased interest in artificial intelligence languages, expert systems, man-computer interaction, novel computer structures, and knowledge-based computer systems. This report describes the French effort and includes a survey of the various French initiatives in hardware and software technologies aimed toward fifth generation computer systems and applications. These separate projects are the National Projects, the Joint Research Projects, the Centre National de Recherche Scientifique Cooperative Research Groups, and the Thematic Research Program. GRA

N85-19919# Vermont Univ , Burlington.
EUROPEAN SCIENTIFIC NOTES. VOLUME 39, NUMBER 2
L. E. SHAFFER, ed. Feb 1985 45 p
(AD-A148994; AD-E301513; ESN-39-2) Avail: NTIS HC A03/MF A01 CSCL 05B

European Scientific Notes (ESN) is a monthly publication with brief articles on recent developments in European scientific research. The publication is not intended to be part of the scientific literature The value of ESN articles to Americans is to call attention to current developments in European science and technology and to the institutions and people responsible for these efforts. ESN authors are primarily ONRL staff members. Occasionally articles are prepared by or in cooperation with staff members of the USAF European Office of Aerospace Research and Development or the US Army Research and Standardization Group Qualified US scientists travelling in Europe may also be invited to author an ESN article. Author (GRA)

N85-20684# Joint Publications Research Service, Arlington, Va
EAST EUROPE REPORT: SCIENTIFIC AFFAIRS
17 Feb 1984 98 p refs Transl. into ENGLISH from various East European articles
(JPRS-ESA-84-006) Avail NTIS HC A05/MF A01

News items, abstracts, and scientific reports on aspects of scientific affairs including weather rocket launching, microcomputers, telecommunication, computer centers, personal computers, computer disks and electrical engineering are described

N85-20933# Defense Systems Management School, Fort Belvoir, Va.
PROGRAM MANAGER: THE JOURNAL OF THE DEFENSE SYSTEMS MANAGEMENT COLLEGE. VOLUME 13, NUMBER 6, NOVEMBER-DECEMBER 1984
R W BALL Dec. 1984 42 p
(AD-A149546, DSMC-63) Avail: NTIS HC A03/MF A01 CSCL 15E

A variety of topics, many dealing with business, are given Program management, productivity improvement, spare parts, contracts, and government procurement are discussed. R.J.F.

N85-21105# Joint Publications Research Service, Arlington, Va.
TRANSPORTATION
27 Feb. 1985 104 p Transl. into ENGLISH from various Russian articles
(JPRS-UTR-85-004) Avail: NTIS HC A06

This U.S.S.R report contains research in the area of transportation Quality control measures in civil aviation plants are investigated. The advantages of flight simulators as compared to conventional flight training methods are cited. The construction of airport facilities in Tenkeli are reported The development and current applications of airships in the U S S.R. are discussed.

N85-21418# Joint Publications Research Service, Arlington, Va
SYSTEMS RESEARCH ON CHINA IN YEAR 2000
W HUIJIANG and L BOXI *In its* China Rept. Sci. and Technol. (JPRS-CST-85-008) p 37-50 27 Mar 1985 Transl. into ENGLISH from Xitong Gongcheng Lilun Yu Shijian (Beijing), no 2, 1984 p 15-23
Avail: NTIS HC A02/MF A01

The ideology for the research in and drafting of development strategy in China is reviewed and the application of generalized systems theory for establishing policies for achieving projected goals in the social, economic, and science and technology areas is examined. Particular emphasis is given to the organization in systems engineering including, input, structural composition, management, technical composition, ideological composition, coordination level, objectives and requirements, environment, and output The research structure envisioned for China by the year 2000 includes departmental and regional research organizations; topic, itemized, and summary reports; and interdependent, interdisciplinary academic societies A.R.H.

N85-22246# Committee on Governmental Affairs (U. S. Senate)
TRANSFER OF TECHNOLOGY
Washington GPO 1984 35 p Presented by the Perm. Subcomm. on Invest. of the Comm on Govt Affairs, 98th Congr , 2d Sess , 5 Oct 1984
(S-REPT-98-664; GPO-51-010) Avail: US Capitol, Senate Document Room

Technology transfer and export control to the Soviet Union were discussed. Topics discussed include: enforcement of the export administration act; organization of Pentagon in export control process; and views from technology exporting community. E.A.K

N85-22264# *Office of Technology Assessment, Washington, D.C*
TECHNOLOGY TRANSFER TO THE MIDDLE EAST
Sep 1984 615 p
(PB85-127744; OTA-ISC-173; LC-84-601109) Avail: NTIS HC A99/MF A01 CSCL 05A

The policy issues surrounding technology transfer to developing countries are discussed by highlighting tradeoffs among various commercial, political and development assistance policy goals, and by suggesting options for more consistent policies affecting technology transfer to developing countries. A region of great strategic importance where significant development efforts during the past decade involved the introduction of technology from the United States and other supplier countries were studied Competition among suppliers of technology, and problems the recipients face in effectively utilizing advanced civilian technologies in five sectors: petrochemical production, telecommunications systems, commercial aircraft support systems, medical services and nuclear power are presented The policy perspectives of the recipient and supplier countries are evaluated. US policy options in light of an evaluation of future prospects for Middle East technology trade are identified. GRA

N85-22403# Joint Publications Research Service, Arlington, Va
USSR REPORT: SPACE
4 Feb 1985 128 p Transl into ENGLISH from various Russian articles
(JPRS-USP-85-001) Avail: NTIS HC A07

News items, abstracts, and scientific reports on aspects of space including life sciences, interplanetary sciences; space policy and administration; launch table; space applications; space sciences, and manned mission highlights are discussed.

N85-22471*# National Aeronautics and Space Administration, Washington, D C.
SPACE STATION TECHNOLOGY PLANNING
R. E. SMYLIE *In* NASA. Lewis Research Center Spacecraft Environ. Interactions Technol , 1983 p 1-8 Mar 1985
Avail NTIS HC A99/MF E03 CSCL 22B

Technological requirements for Space Station design were discussed. The requirements are discussed in relation to the following areas: high voltage arrays; environmental interactions; energy management; power supplies; architecture; and modularity. B G.

N85-25651# Joint Publications Research Service, Arlington, Va
CRITERIA FOR QUALIFYING FOR FRG FEDERAL CAD/CAM SUBSIDIES
In its West Europe Rept Sci and Technol (JPRS-WST-84-014) p 52-54 4 May 1984 Transl. into ENGLISH from Computerwoche (Munich), 27 Jan 1984 p 25
Avail: NTIS HC A04/MF A01

The use of CAD/CAM systems are outlined. Programs amendable to support manufacturing technology program (CAD/CAM) are divided in two phases. The first phase includes system analyses, training of workers, alternatives and feasibility studies and preparation of specification and performance catalogues. In the second phase the procurement of hardware and software, and third party develoment are studied. The CAM system is a dialogue oriented data processing system with the possibility of interactive processing of material in several functional domains such as production planning, materials control, and time control and contract schedule control. The CAD system is a dialogue oriented data processing system, with the possibility of graphical interactive processing in the functional domains of planning, development, and design E A.K.

N85-26456# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LIFE CYCLE COSTING IN GOVERNMENT PROCUREMENT M.S. Thesis
D. H. SHAW May 1985 230 p
(AD-A151878; AFIT/CI/NR-85-30T) Avail: NTIS HC A11/MF A01 CSCL 15E

In the area of government procurement, Life Cycle Costing involves the consideration of post-acquisition costs, such as maintenance and operating expenses, in the making of decisions regarding the acquisition of goods and services This thesis focuses on the use of life cycle costing techniques in determining the method of contracting and/or the determination of the recipient of a government contract in a competitive procurement in order to minimize the total cost of the acquisition from purchase to final disposal Emphasis is given to an examination of the interaction of the practical and legal constraints under which life cycle cost applications must operate. This examination is facilitated through a discussion of the concept and theory of life cycle costing and a review of the factors to be considered in deciding which procurements may benefit from its use. The development of evaluation criteria and its incorporation into a solicitation is also treated in detail. Finally, the use of mechanisms to prevent bidder from gaming such an evaluation is given concise treatment, including the use of post award price adjustment and warranty provisions to achieve this purpose. Within this organizational framework, the thesis deals with the current constraints on the use of life cycle costing arising from various statutory requirements and the procurement guidance issued via Comptroller General Decisions Although federal procurement materials form the basis for the majority of this work, treatment is also given to state procurement policies GRA

N85-26771# European Space Agency, Paris (France).
EUROPEAN SPACE SCIENCE HORIZON 2000
N. LONGDON, ed Dec. 1984 143 p Original contains color illustrations
(ESA-SP-1070; ISSN-0039-6566; AD-A155773) Avail NTIS HC A07/MF A01

The ESA solar system science and space astronomy programs are outlined Mission trends and industrial benefits are considered. Areas covered include solar and heliospheric physics, space plasma physics and planetary research. Author (ESA)

N85-26833# Joint Publications Research Service, Arlington, Va
EAST EUROPE REPORT: SCIENCE AND TECHNOLOGY
24 Aug. 1984 64 p refs Transl into ENGLISH from various East European articles
(JPRS-ESA-84-032) Avail: NTIS HC A04/MF A01

News items, abstracts, and scientific reports on aspects of science and technology including robotics, space research, nuclear power plants, laser applications, radioactive isotopes, computer techniques, mathematical modeling, and soldering are covered.

N85-27303# Joint Publications Research Service, Arlington, Va.
ORGANIZING GEOLOGICAL WORK TASKS FOR 1985 OUTLINED
W JIABAO *In its* China Rept. Sci. and Technol (JPRS-CST-85-012) p 72-77 23 Apr. 1985 refs Transl. into ENGLISH from Zhongguo Dizhi (Beijing) no. 2, 13 Feb. 1985 p 1-4
Avail: NTIS HC A07/MF A01

Reforms in geological work systems are actively promoted to enliven the economy. Ways to more effectively employ the limited budget for geological exploration are discussed. B S

N85-27745# Naval Postgraduate School, Monterey, Calif.
AUTOMATION OF THE REPORTING AND TRACKING REQUIREMENTS OF ARCHITECT-ENGINEERING TYPE CONTRACTS M.S. Thesis
J T ETHERIDGE Sep. 1984 126 p
(AD-A152218) Avail: NTIS HC A07/MF A01 CSCL 15E

The Naval Facilities Engineering Command utilizes several automated systems in carrying out its mission These systems are presently geared toward the Headquarters and major Command levels of management and not toward the field activities and smaller offices. This thesis examines an Architect-Engineer type contracting management procedure and proposes an automated alternative of the contract administration process using micro-computer technology for field activities. A brief examination is made of the NAVFAC automated systems and of the structure of the NAVFAC contracting organization prior to the presentation of a proposed A-E Management Information System. The closing chapters discuss integration of the proposed system, automated tools which make the system possible and the interface designs utilized to make the system user friendly. GRA

N85-27767# Committee on Foreign Relations (U. S. Senate)
EAST-WEST COOPERATION IN OUTER SPACE
Washington GPO 1984 122 p refs Hearing on S J. Res 236 before the Comm. on Foreign Relations, 98th Congr., 2nd Sess., 13 Sep. 1984
(S-HRG-98-1064, GPO-39-395) Avail Committee on Foreign Relations

A joint resolution was introduced to congress to extend the 1972-77 outer space cooperation agreement between the United States and Soviet union. G L C.

N85-27795 Messerschmitt-Boelkow-Blohm G m.b.H., Bremen (West Germany).
THE HELIOS MISSIONS [DIE HELIOS-MISSIONENT]
A KUTZER *In* DFVLR Ten Years of Helios p 39-44 1984 In ENGLISH and GERMAN
Avail: Issuing Activity

Goals and objectives of the Helios project are reviewed The experiments investigate the properties and processes in interplanetary space by approaching the Sun to 0.30 AU Data obtained during the solar cycle contribute to the correlation required for an adequate understanding of complex space phenomena. Author (ESA)

N85-27808 Messerschmitt-Boelkow-Blohm G.m.b H., Bremen (West Germany).
THE SIGNIFICANCE OF HELIOS FOR EUROPE [DIE BEDEUTUNG VON HELIOS FUER EUROPA]
A. KUTZER *In* DFVLR Ten Years of Helios p 159-161 1984 In ENGLISH and GERMAN
Avail: Issuing Activity

The impact of the international cooperative satellite project Helios on Europe is described. The industrial effort was spread over a large number of contractors in several countries. The project exercised firm management control over the participating parties, while simultaneously assuring a degree of openness and communication among all participating groups. Highly skilled professional personnel was trained. The Helios mission was significant for German ground operations Important technical and managerial achievements are obtained. More than 20 projects benefitted from the transfer of processes, materials, techniques, technological advances and/or spin-offs, as well as from managerial procedures and methodologies first used in Europe on Helios. Author (ESA)

N85-27809 Messerschmitt-Boelkow-Blohm G.m b H , Bremen (West Germany).
MANAGERIAL BENEFITS OF HELIOS FOR THE EUROPEAN INDUSTRY [GEWINN AN MANAGEMENTFAEHIGKEITEN DURCH HELIOS FUER DIE EUROPAETISCHE INDUSTRIE]
A. KUTZER and B J. MADAUSS *In* DFVLR Ten Years of Helios p 162-171 1984 In ENGLISH and GERMAN Original contains color illustrations
Avail. Issuing Activity

The benefits of the Helios project management procedures and methods for European industry are described The know-how gained by cooperation in working groups and reviews, and the Helios project procedures and methodologies, now standard management tools in Europe, are presented. Project organization, specification system, work breakdown structure, project scheduling, action item control, project review, and career achievements of Helios personnel are described Author (ESA)

N85-28649# Dynamics Research Corp., Wilmington, Mass.
DEFENSE DATA NETWORK SUPPORT CONCEPT ANALYSIS Final Technical Report, Sep. - Dec. 1984
L COHEN, W J. MILLER, and S. A. GREENE 26 Dec. 1984 90 p
(Contract F19628-84-D-0016)
(AD-A153214; E-9597U) Avail NTIS HC A05/MF A01 CSCL 05A

This report contains an analysis of alternative support concepts for the evolving Defense Data Network. The alternatives analyzed were sole source contractor support, competitively procured contractor support, organic on-site and contractor off-site support, and organic support. The conclusions and recommendations regarding support concepts are based on estimates of incremental *Operations and Support costs and subjective and other* nonquantifiable factors. GRA

N85-28855# Air Force Wright Aeronautical Labs, Wright-Patterson AFB, Ohio.
AIR FORCE TECHNICAL OBJECTIVE DOCUMENT FY 86
W. E WARD Dec. 1984 70 p Supersedes AD-A141 925
(AD-A152730; AD-E440275; AFWAL-TR-84-4000) Avail: NTIS HC A04/MF A01 CSCL 05A

This Technical Objective Document which was prepared by the Materials Laboratory, describes the technical program in materials to meet future Air Force operational needs. The technology program is divided into ten focal areas which encompass the full spectrum of materials capabilities required for future aircraft, missile, space and electronic systems. These ten areas are Thermal protection materials and structures; Metallic structural materials; Nonmetallic structural materials; Nondestructive evaluation, Aerospace propulsion materials, Nonstructural materials, Electromagnetic windows and electronic materials; Laser hardened materials; Computer aided manufacturing/Manufacturing R&D; and Systems support To ease the transition from previous format using Technology Planning Objectives (TPOs), the applicable TPO(s), and Task(s) are listed with each focal area GRA

N85-28859# RAND Corp., Santa Monica, Calif.
THE OUTLOOK FOR SOVIET ADVANCED TECHNOLOGIES
S KASSEL *In* Stanford Univ. Sci. and Technol in the Soviet Union p 53-69 31 Jan. 1985
(AD-P004564) Avail: NTIS HC A10/MF A01 CSCL 05A

The author believes that the future performance of Soviet advanced technologies depends to a large extent on a single organization, the Soviet Academy of Science, an R/D performer in the majority of areas significant to advanced technologies. He focuses on the Academy and the reasons why he considers it pivotal to Soviet technological development. This leads directly to the much discussed topic of industrial innovation and the impediments that characterize the Soviet R/D system. GRA

N85-28865# Commerce Dept., Washington, D.C.
R/D CONTRACTS IN THE SOVIET UNION
J. A. MARTENS *In* Stanford Univ. Sci. and Technol. in the Soviet Union p 155-178 31 Jan. 1985
(AD-P004569) Avail: NTIS HC A02/MF A01 CSCL 05A

This paper examines the evolution of research and development contracting in the post World War II Soviet Union. In particular, the paper analyzes the legal and economic discussions that accompanied numerous changes in the rules for R/D contracts in light of Soviet goals for improving the research, development and innovation performance of the economy. GRA

N85-28867# Michigan State Univ., East Lansing Dept. of Psychology.
LABORATORY RESEARCH: A QUESTION OF WHEN, NOT IF Interim Report
D. R. ILGEN Mar. 1985 28 p
(Contract N00014-83-K-0756)
(AD-A153298; TR-85-1, REPT-2006) Avail: NTIS HC A03/MF A01 CSCL 05A

Laboratory research is discussed in terms of the contribution of laboratory research to knowledge at any given time. Research is viewed as a process of trade-offs. When viewed from this perspective, it is argued that frequently laboratory research may have high utility for addressing problems relevant in the field. Dimensions or classes of trade-offs are addressed. These are: experimental setting fidelity, replication, constraints, threats to health and safety, research not possible in the field, and feasibility. GRA

N85-28959 Marconi Space Systems Ltd., Portsmouth (England)
SPACE STATION STUDY Final Report
Sep. 1984 90 p
(Contract A57A/1667)
(BL-6167) Avail: Issuing Activity

The benefits and disadvantages to British industry of participating in a NASA space station are discussed. The main station, free flying platforms, and transfer vehicles are described. Life science, Earth science, materials science, and astronomy applications are summarized. The power, data management, communications, and remote sensing requirements of the space station are considered. Author (ESA)

N85-29096# Joint Publications Research Service, Arlington, Va.
NEW ESA DIRECTOR ON ARIANE, SPACE STATION, FUTURE TRENDS
In its West Europe Rept. Sci. and Technol. (JPRS-WST-84-032) p 1-4 25 Sep. 1984 Transl. into ENGLISH from Flug Rev. (Stuttgart), Jul. 1984 p 32-33
Avail: NTIS HC A03/MF A01

An interview with the new general director of the European Space Agency (ESA) by a West Germany periodical is given. Thoughts on the policies and direction ESA will take under the new director are presented. Further development of Ariane, cooperation with NASA on the Space Station and budgeting directions are some areas explored. E.R

N85-29110# Joint Publications Research Service, Arlington, Va.
FRG WEIGHS ESA PARTICIPATION, BUDGET ISSUES
In its West Europe Rept.: Sci. and Technol. (JPRS-WST-84-037) p 15-18 27 Nov. 1984 Transl. into ENGLISH from Handelsblatt (Duesseldorf), 10 Sep. 1984 p 10
Avail: NTIS HC A05/MF A01

Policies and expenditures for European space operations for many years to come are outlined. The Europeans must decide in the very near future whether they want to participate in the construction of the large American space station. The decision has to be a session of the ministerial council of the European Space Agency (ESA). The construction of the large rocket suited for manned space travel, the Ariane-5, has to be decided on. European finances are examined and European space expenditures are compared to the feasibility of the projects is analyzed. E.A.K

N85-29834# Logistics Management Inst., Bethesda, Md.
***COST SAVINGS FROM MULTIYEAR CONTRACTING* Final Report, Oct. 1983 - Oct. 1984**
J. S. DOMIN Oct. 1984 44 p
(Contract MDA903-81-C-0166)
(AD-A153564; LMI-RE405) Avail: NTIS HC A03/MF A01 CSCL 05C

Two multilayer contracts are reviewed to determine the savings that are being realized over the cost of annual contracting for the same work, one is an Army contract with the Sikorsky Aircraft Division of United Technologies Corporation for the UH-60A BLACK HAWK helicopters and the other an Air Force contract with the General Dynamics Corporation for the F-16 multimission fighter aircraft. Significant cost savings are being realized on both programs. The broadening of multiyear contracting to include requirements of all services for the same end items for spares, support equipment, and foreign military sales offers an opportunity to achieve even more cost savings than under the current contracting approach. The criteria for multiyear contracting, which include significant cost savings, stability of requirements and configuration, and confidence in contractor cost performance and capability, are found to be appropriate but vague. After several years of cost experience are accumulated, multiyear contract costs should be compared with those for prior annual contracts for the same systems in order to validate savings and to determine the extent to which engineering and requirements changes reduce them. At that time, the criterion for stability of requirements and configuration should be tightened. GRA

N85-29836# North Atlantic Assembly, Brussels (Belgium).
SUB-COMMITTEE ON ADVANCED TECHNOLOGY AND TECHNOLOGY TRANSFER Interim Report
Nov. 1984 34 p
(AD-A153645) Avail: NTIS HC A03/MF A01 CSCL 05D

This is the first report of the North Atlantic Assembly's Sub-Committee on Advanced Technology and Technology Transfer. The report begins with a description of the Sub-Committee's areas of interest, viz. technology transfer, high technology research, and high technology and economic growth. This report concentrates on technology transfer, describing the flow of Western technology to the Eastern bloc and how this assists the Soviet Union and its allies. The report then examines the differing views on East-West technology transfer and what effect this has on the transfer of technology between Alliance nations. Next, there is a description of the relative technological performance of the United States and the Allies. Finally, the report draws together many of the themes raised in order to formulate some specific policy proposals intended to help resolve disagreements on technology transfer. These proposals would involve reorganizing the way in which Alliance nations license high technology exports, and the creation of an Alliance technology agency both to streamline the Alliance's exploitation of technology and to harmonize exportation policies. GRA

N85-29837# Naval Postgraduate School, Monterey, Calif.
CAPITAL INVESTMENT MOTIVATIONAL TECHNIQUES USED BY PRIME CONTRACTORS ON SUBCONTRACTORS M.S. Thesis
K. S. HOLTSCLAW Dec. 1984 177 p
(AD-A153660; AD-E401312) Avail: NTIS HC A09/MF A01 CSCL 05A

The current Acquisition Improvement Program (AIP) has focused a great deal of attention on many of the perceived management problems in the federal acquisition process. Included among these are the motivation of contractors to make productivity enhancing capital investments. Although this problem has been addressed previously by profit policy, the effect has been minimal. Most efforts have been directed at the prime contractor level with little effect to date. This thesis examines the complex array of factors which result in productivity enhancing capital investment and raised the question of what has been accomplished at the subcontractor level. The research, through the use of a subcontractor survey, determined that little if any effort was expended at the prime

contractor level to motivate subcontractor to invest in productivity enhancing capital equipment. Until recently, subcontractors have been excluded from DOD efforts to incentivize capital investment GRA

N85-29841# Naval Postgraduate School, Monterey, Calif.
USING INCENTIVES TO IMPROVE MAINTAINABILITY M.S. Thesis
L. FARNEN, JR. Dec. 1984 93 p
(AD-A153792) Avail: NTIS HC A05/MF A01 CSCL 05A

The objective of this thesis was to determine if contract incentives were appropriate for use in Dept. of Defense contracts for the purpose of motivating defense contractors to improve the maintainability of weapon systems under design To accomplish the objective it was necessary to review the components of maintainability to determine appropriate targets for the incentives and to study the concepts and issues involved in the use of incentives to motivate contractor performance. The conclusions were based in part of the responses obtained during interviews conducted with Government representatives and engineering, contracting, and corporate and program management personnel from the defense industry In addition, the incentive program in the case of the F/A-18 aircraft was reviewed and analyzed to determine the reason for its success. GRA

N85-29979*# National Aeronautics and Space Administration, Washington, D.C.
INTERNATIONAL SPACE RESEARCH PERSPECTIVES OF COMMERCIALIZATION FOR GERMAN INDUSTRY
H. L. JORDAN Jul 1985 31 p Transl. into ENGLISH of "Weltraumforschung - perspektiven der kommerziellen nutzung fur die deutsche industrie" Linder Hoehe, West Germany, 19 Oct. 1984 16 p Presented at Meeting of the Comm. for the Politics of Res. and Sci., Bonn, 19 Oct. 1984 Transl. by Scientific Translation Service, Santa Barbara, Calif Original document prepared by DFVLR, Linder Hoeh, West Germany
(Contract NASW-4004)
(NASA-TM-77657, NAS 1 15:77657) Avail NTIS HC A03/MF A01 CSCL 22A

A brief overview of space flight activities is presented. West German contributions to satellite mapping, communication satellites, navigation, Spacelab, diffusion under weightlessness, crystal growth in space, metal bonding, and biochemistry are described. The future of the research in the space station is analyzed. B.W.

N85-30500# Department of Energy, Washington, D C. Office of the Deputy Assistant Secretary for Renewable Energy.
RENEWABLE TECHNOLOGIES PROGRAM SUMMARIES
Nov. 1984 90 p
(DE85-001509, DOE/CE-0105) Avail NTIS HC A05/MF A01

The renewable energy research and development program supports development of a mix of technologies that can contribute to both energy supply and improved end-use efficiency. In allocating resources, this office is concentrating on applying federal funds only where they are most effective: in sponsoring research and development (R and D) where the potential payoff is high, but which private industry cannot be expected to pursue because the results are difficult to predict or a return on investment would require an exceptionally long time to be realized Research efforts in the following areas are summarized: active solar heating and cooling; passive and hybrid solar; photovoltaics; solar thermal; biofuels, wind; ocean energy technology, geothermal; and small-scale hydropower. DOE

N85-30962*# Gellman Research Associates, Inc., Jenkintown, Pa.
THE ECONOMICS OF PRIVATE SECTOR R AND D DECISIONMAKING IN AERONAUTICS
20 Dec 1984 101 p refs Sponsored by NASA
(NASA-CR-176007; NAS 1.26.176007) Avail. NTIS HC A06/MF A01 CSCL 05A

Information which can be used in planning to insure commercial research and technology programs which are complementary to internally financed private sector activities are presented The main concern is to identify the characteristics of productive projects in which firms are unlikely to invest. It is shown that: (1) if it is difficult to assess the commercial relevance of an R&D project or it it is characterized by high technical risk, or a relatively long payback period, private funding will be unlikely; and (2) if a project is large relative to the size of the firm, it is unlikely to be funded in the early stages of the R&D process. Firms tend to underinvest in projects with these characteristics. E.A.K.

N85-30964# Executive Office of the President, Washington, D. C. Office of Science and Technology Policy.
NATIONAL AERONAUTICAL R AND D GOALS: TECHNOLOGY FOR AMERICA'S FUTURE
Mar 1985 10 p
Avail. NTIS HC A02/MF A01

Aeronautical research and development goals, particularly in the areas of subsonics, supersonics, and transatmospherics, are discussed. Boundary layer control, flight control, powder metallurgy, and composite aircraft structures are among the areas identified as requiring development. R.J.F

N85-30980# Committee on Appropriations (U S House)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Dept. of Housing and Urban Develop.-Independent Agencies Appropriation Bill, 1986 p 41-47 1985
Avail: US Capitol, House Document Room

Research and development activities in the areas of remote sensing, space science, materials processing, spacecraft communication and agronautics technology are summarized Budget information is also presented for the construction of facilities and the space flight control and data communications effort. B.W

N85-31149*# National Aeronautics and Space Administration, Washington, D.C
NASA SPACE CONTROLS RESEARCH AND TECHNOLOGY PROGRAM
D E MCIVER and R W KEY *In* JPL Proc. of the Workshop on Identification and Control of Flexible Space Struct., Vol. 1 p 1-11 1 Apr. 1985
Avail. NTIS HC A20/MF A01 CSCL 05A

The NASA technological organization is outlined. The Office of Aeronautics and Space Technology (OAST) is one of the four major technical offices that comprise NASA. The Office of Space Science and Applications administers programs directed towards using space-based or related techniques to further understanding of the total universe and to apply that understanding to practical applications in such areas as Astrophysics, Solar System exploration, Earth Sciences, Life Sciences, Communications and Information Systems. The Office of Space Flight administers the programs for all U.S. civil launch capability, plus Spacelab development and operations. The Office of Space Tracking & Data Systems administers the programs that operate and maintain a world-wide network of facilities for data acquisition, processing, and ground to spacecraft communications for all NASA missions. The OAST has primary responsibility within NASA for conducting space research and technology development to support commercial and military as well as NASA space interests E A.K.

N85-31215# Office of Technology Assessment, Washington, D.C.
CIVILIAN SPACE STATIONS AND THE US FUTURE IN SPACE Summary Report
1985 34 p
(OTA-STI-242) Avail: NTIS HC A03/MF A01

The OTA assessment of Civilian Space Stations and the U S Future in Space was studied. The study covered the essential technical issues surrounding the selection and acquisition of infrastructure in space, and enables Congress to look beyond these matters to the large context. A set of possible space goals and objectives that demonstrate the diverse opportunities open to us at this time was proposed. E.A.K.

N85-31217# Societe Nationale Industrielle Aerospatiale, Les Mureaux (France). Div. Systemes Balistiques et Spatiaux.
STUDIES TOWARD A MANNED SPACE STATION: PARTICIPATION OF EUROPEAN INDUSTRY IN NASA SPACE STATION (MSS) Final Report
Paris ESA 5 Aug. 1983 69 p refs
(Contract ESA-5307/82/F)
(SNIAS-S/DT-Y-25-212; ESA-CR(P)-2018) Avail: NTIS HC A04/MF A01

Manned space station (MSS) mission analysis and the design of a small orbital transfer vehicle for a wide range of missions (rendezvous, servicing, retrieval) called the Self-Propelled Teleoperator (SPT) are summarized. The launching of a large cryogenic orbital transfer vehicle (OTV) from the MSS· fueling, mechanical handling, integration, check-out, and flight monitoring is discussed. Space station architecture and the establishment of design driver criteria are considered. The study shows that even where European technologies are comparable to American ones, cooperation must be limited to European firms acting as subcontractors to NASA or US firms, rather than at a transnational European level. At the European level, development of SPT and other teleoperated vehicles satisfies criteria for program size, interface definition, European ability, multiplicity of participants favoring money redistribution, and compatibility of planning schedules Commonality of mission with a European automatic platform is an advantage Author (ESA)

N85-31676# Environmental Protection Agency, Washington, D C. Office of Research and Development.
EPA (ENVIRONMENTAL PROTECTION AGENCY) RESEARCH PROGRAM GUIDE, FY-1985, OCTOBER 1, 1984 - SEPTEMBER 30, 1985
Oct. 1984 75 p
(PB85-181881; EPA-600/9-84-024) Avail NTIS HC A04/MF A01 CSCL 13B

The descriptions contained in this research program guide are organized by medium such as air, water, or hazardous waste. Each description is a broad summary of the research being done, where that research is being done, who to contact for more information about the program, and both the approximate total funding for that area, and the percentage of total funding which is reserved for in house research is spent through extramural contracts, grants and cooperative agreements. Author (GRA)

N85-31836# Research Inst. of National Defence, Stockholm (Sweden).
HUMAN FACTORS ENGINEERING CONTRACTS IN SWEDEN: AN OVERVIEW
H. FURUSTIG Dec. 1984 72 p In SWEDISH, ENGLISH summary Sponsored by National Defence Research Institute and Swedish Work Environment Fund
(FOA-C-56043-H2; ISSN-0347-7665) Avail: NTIS HC A04/MF A01

Mapping of human contacts in Sweden, and an inventory of important sources of human factors data, are reported Impressive human factors resources in Sweden are identified. Building up effective contact networks may decrease unnecessary duplication of work. Universities, institutes and centers, research authorities, supervising and regulating authorities, consultants and societies are covered. Author (ESA)

N85-32021 Elliott-Automation Space and Advanced Military Systems Ltd., Camberley (England) Weapons Systems Div.
THE DEVELOPMENT OF COMPLEX SYSTEMS
D. ODWYER 1984 31 p Presented at Marconi 84, 30 Oct. - 1 Nov. 1984
Avail: Issuing Activity

The need for a well structured and carefully controlled development program to reduce the risks inherent in the development of complex systems is discussed Aspects of the Tornado avionics development program are illustrated Author (ESA)

N85-32034# Van der Meer en Van Tilburg, Innovatie Adviesburo, Enschede (Netherlands)
SPIN-OFFS FROM TECHNICAL SCIENTIFIC INFRASTRUCTURES, NO. 1 [SPIN-OFFS UIT TECHNISCHE WETENSCHAPPELIJKE INFRASTRUCTURE]
J D VANDERMEER, J. J. VANTILBURG, and F. PRAKKE (TNO-Studiecentrum voor Technologie en Beleid) 1983 135 p refs In DUTCH, ENGLISH summary Sponsored by Netherlands Ministry of Economic Affairs 3 Vol
Avail: NTIS HC A07/MF A01

University activities and plans, hindrances, and possible governemental stimulation concerning university spin-offs, i.e , new firms of direct university origin, are investigated. In general the attitude of the universities is rather passive Only in universities with an accent on applied sciences or with a regional tie are activities developed, by a few highly motivated persons with limited resources Author (ESA)

N85-32035# Van der Meer en Van Tilburg, Innovatie Adviesburo, Enschede (Netherlands)
SPIN-OFFS FROM TECHNICAL COMMERCIAL INFRASTRUCTURES, NO. 2 [SPIN-OFFS 2 UIT TECHNISCHE KOMMERCIELE INFRASTRUKTUREN]
J. D VANDERMEER and J. J. VANTILBURG Feb. 1983 202 p Sponsored by Netherlands Ministry of Economic Affairs 3 Vol
Avail NTIS HC A10/MF A01

Company activities and attitudes, problems, and possible governmental stimulation concerning spin-off enterprises from technical commercial infrastructures are investigated One or more persons of 40 large companies were interviewed. Author (ESA)

N85-32036# Van der Meer en Van Tilburg, Innovatie Adviesburo, Enschede (Netherlands)
SPIN-OFFS FROM TECHNICAL SCIENTIFIC RESEARCH ORGANIZATIONS, NO. 5 [SPIN-OFFS 3 UIT TECHNISCHE WETENSCHAPPELIJKE ONDERZOEKSORGANISATIES]
J. D VANDERMEER, F. KOWSOLEEA, and J. J. VANTILBURG Jun. 1983 139 p refs In DUTCH; ENGLISH summary Sponsored by Netherlands Ministry of Economic Affairs 3 Vol
Avail: NTIS HC A07/MF A01

Technical/scientific research organization activities and attitudes, problems, and possible governmental stimulation concerning spin-offs, are investigated. Representatives of 13 companies were interviewed. Author (ESA)

N85-32802# Naval Postgraduate School, Monterey, Calif
AN AUTOMATED QUALITY ASSURANCE SURVEILLANCE PLAN FOR ADP (AUTOMATED DATA PROCESSING) OPERATIONS UNDER THE NAVY'S COMMERCIAL ACTIVITIES PROGRAM M.S. Thesis
H. E. MORTON Dec. 1984 177 p
(AD-A154767) Avail. NTIS HC A09/MF A01 CSCL 09B

This thesis documents the process whereby a Navy Regional Data Automation Center implements an automated quality assurance program to ensure proper performance of a commercial service contract by a civilian contractor. The feasibility of implementing MIL-STD-105D on microcomputers is examined, along with the software tools necessary for that implementation.

Finally, a system design and programs to effect such an implementation are proposed GRA

N85-33038# Office of Naval Research, London (England).
SPACE RESEARCH IN THE UNITED KINGDOM: AN ASSESSMENT
N. F. NESS 19 Apr. 1985 6 p
(AD-A155334; ONRL-R-1-85) Avail NTIS HC A02/MF A01 CSCL 03A

This report examines the history and funding of UK (United Kingdom) space research, discusses work in disciplines such as astronomy and astrophysics, solar system studies, and terrestrial studies, and considers prospects for the future GRA

N85-34153*# National Academy of Sciences - National Research Council, Washington, D. C. Commission on Engineering and Technical Systems.
SPACE STATION ENGINEERING AND TECHNOLOGY DEVELOPMENT: PROCEEDINGS OF THE PANEL ON IN-SPACE ENGINEERING RESEARCH AND TECHNOLOGY DEVELOPMENT
May 1985 194 p Proc. held in Hampton, Va., 21-22 May 1985
(Contract NASW-4003)
(NASA-CR-176110; NAS 1 26:176110) Avail: NTIS HC A09/MF A01 CSCL 22B

In 1984 the ad hoc committee on Space Station Engineering and Technology Development of the Aeronautics and Space Engineering Board (ASEB) conducted a review of the National Aeronautics and Space Administration's (NASA's) space station program planning. The review addressed the initial operating configuration (IOC) of the station. The ASEB has reconstituted the ad hoc committee which then established panels to address each specific related subject. The participants of the panels come from the committee, industry, and universities The proceedings of the Panel on In Space Engineering Research and Technology Development are presented in this report. Activities, and plans for identifying and developing R&T programs to be conducted by the space station and related in space support needs including module requirements are addressed. Consideration is given to use of the station for R&T for other government agencies, universities, and industry. B W

N85-34560# Sao Paulo Univ. (Brazil) Electrical Engineering Dept.
PROJECT MANAGEMENT USING GRAPHICS
F. PETTINATI *In* Canadian Information Processing Society Graphics Interface 1985 p 265-272 1985 refs
Avail: NTIS HC A19/MF A01

The problem of lack of visualization most managers face when using computer-based project control systems is addressed Although highly relevant information is generated, usually no graphical output is produced A system called UniPert that automatically produces high quality drawings showing all activities present in a project and the relationship between them is presented. The UniPert's major components and algorithms are described and examples of its actual use are presented. The integration of many different techniques and concepts that led to the development of the UniPert system are outlined E.A K.

N85-34718# *Department of Energy, Washington, D. C. Office* of Project and Facilities Management.
ANALYZING PERFORMANCE OF SMALL PROJECTS USING URS AND PMAS, INFORMATION PAMPHLET
Mar. 1985 64 p
(DE85-011964; DOE/MA-0184) Avail: NTIS HC A04/MF A01

Some basic tools used in the analysis of small project performance, the Uniform Reporting System (URS) and the Performance Measurement Analysis System (PMAS) are addressed. The flexibility inherent in the URS allows DOE project managers the latitude to negotiate with contractors several key elements in contract performance measurement Through reviews of management systems documentation, analysis of reports, orientation briefings, and site visits, the project team can obtain a good understanding of how the contractor plans and controls work. This knowledge assists them in performing data analysis by understanding how the data is put together The key performance measurement data, which are taken or calculated from the cost and schedule report, quantifies the overall effect of the small problems that the project manager frequently deals with. The PMAS easily permits management to periodically focus on contract performance trends and forecast contract cost at completion by using simple graphic displays and supporting reports DOE

N85-34721# Committee on Appropriations (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND DEVELOPMENT: PROGRAM DESCRIPTION
In its Dept. of Housing and Urban Develop. Independent Agencies Appropriation Bill, 1986 p 62-71 1985
Avail: US Capitol, Senate Document Room

Appropriations for various NASA research programs are discussed. Space science and applications, space shuttles, space stations, the Hubble space elescope, and spacecraft tracking are among the topics discussed. Funding recommendations of the Committee are given. R.J.F

N85-35145*# National Aeronautics and Space Administration, Washington, D.C.
MANAGEMENT OF LARGE-SCALE TECHNOLOGY
A. LEVINE *In its* A Spacefaring People p 39-53 1985 refs
Avail: NTIS HC A08/MF A01; also available SOD HC $3 50 as 033-000-009-33-0 CSCL 05A

Two major themes are addressed in this assessment of the management of large-scale NASA programs (1) how a high technology agency was a decade marked by a rapid expansion of funds and manpower in the first half and almost as rapid contraction in the second, and (2) how NASA combined central planning and control with decentralized project execution R.J.F.

N85-35167# European Space Agency, Paris (France).
RESEARCH REPORT PROGRAM OF THE US ARMY IN EUROPE
S H. LEHNIGK *In its* Lectures of a Flight Mech. Conf. (DFVLR-Mitt-83-05) p 18-24 Jul. 1984 Transl. into ENGLISH from "Vortraege eines Flugmechanik-Kolloquiums" rept. DFVLR-Mitt-83-05 DFVLR, Brunswick, Jul. 1983 p 21-27 Original language document was announced as N84-16122
Avail: NTIS HC A06/MF A01; original German version available from DFVLR, Cologne DM 39.20

The US research liaison office for in Europe is described. Activities include chemistry, biology, computer sciencs, electronics, mechanics, fluid mechanics, materials science, mathematics, physics, and behavioral science. Author (ESA)

N85-35168# European Space Agency, Paris (France)
NEW TECHNOLOGIES AT THE FOREFRONT OF INDUSTRIAL DEVELOPMENTS
H. ULKE *In its* Lectures of a Flight Mech Conf. (DFVLR-Mitt-83-05) p 25-41 Jul. 1984 Transl. into ENGLISH from Vortraege eines Flugmechanik-Kolloquiums" rept. DFVLR-Mitt-83-05 DFVLR, Brunswick, Jul. 1983 p 29-46 Original language document was announced as N84-16123
Avail NTIS HC A06/MF A01; original German version available from DFVLR, Cologne DM 39.20

Dornier's efforts to introduce the findings of aeronautics and astronautics into a broad spectrum of technical processes are described Development trends in electronics using microprocessors are reviewed. They result in a higher technical performance, a cost reduction, and savings of energy and raw materials. In the domain of energy technology, heat pipes developed for satellites are used in solar energy systems; an energy saving system to produce hydrogen from water using high temperature vapor phase electrolysis (Hot Elly) was developed Medical equipment for renal calculus therapy using shock waves was developed. Author (ESA)

N85-35810# DOD Product Engineering Services Office, Alexandria, Va
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT HELD AT LEESBURG, VIRGINIA ON 1-2 NOVEMBER 1984. PART 1. EXECUTIVE SUMMARY
G. FRANK and L PAULSON Jun. 1985 17 p Conf. held at Leesburg, Va , 1-2 Nov 1984
(AD-A156067) Avail: NTIS HC A02/MF A01 CSCL 05A

This Conference Report summarizes and consolidates the proceedings from the 1984 DOD Value Engineering Conference held 1 through 2 November in Leesburg, VA The findings and recommendations with supporting material from the five workshops are provided in addition to the complete plenary session presentations. An Executive Summary is presented in Part 1 Proposed actions include. Up-Front Funding, VECP Processing Time, VECP Approval/Disapproval, VE Training, Improvement of Communication, Accounting for VE Savings, and VE as Performance Review Item. GRA

N85-35811# DOD Product Engineering Services Office, Alexandria, Va
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT HELD AT LEESBURG, VIRGINIA ON 1-2 NOVEMBER 1984. PART 2. PLENARY SESSION
G FRANK and L. PAULSON Jun. 1985 246 p Conf. held at Leesburg, Va , 1-2 Nov. 1984
(AD-A156068) Avail: NTIS HC A11/MF A01 CSCL 05A

This Conference Report summarizes and consolidates the proceedings from the 1984 DOD Value Engineering Conference held 1 through 2 November in Leesburg, VA. The findings and recommendations with supporting material from the five workshops are provided in addition to the complete plenary session presentations. An Executive Summary is presented in Part 1. Plenary Session: Moving Value Engineering Conference, The Hughes Aircraft Company Approach to Value Engineering, E-3A Value Engineering, FMC Value Engineering Program, FAR/DoD FAR Supplement, VECPs - the IG View, Collateral Savings - The Real Challenge, Where's the Map?, and A Value Engineering Coordinator's Preception of the DOD Value Engineering Program. GRA

N85-35812# DOD Product Engineering Services Office, Alexandria, Va.
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT. PART 3, WORKSHOP A: VE IN THE PROGRAM OFFICE
G. FRANK and L PAULSON Jun. 1985 39 p Workshop held at Leesburg, Va., 1-2 Nov. 1984 7 Vol
(AD-A156069) Avail: NTIS HC A03/MF A01 CSCL 05A

Part 3 of the 1984 DOD Value Engineering (VE) Conference held 1 to 2 November in Leesburg, Va., included reports on VE Program Managers and 'VE and the R&D Engineer.' The first of these exhorts the VE manager to make vigorous use of VE methodology to reduce defense expenditures in this area of operation The second report recommends that the R&D Engineer share in the savings brought about through the implementation of VE. F.M.R

N85-35813# DOD Product Engineering Services Office, Alexandria, Va.
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT. PART 4, WORKSHOP B: VE ON SPARE PARTS
G FRANK and L. PAULSON Jun. 1985 190 p Workshop held at Leesburg, Va., 1-2 Nov 1984 7 Vol.
(AD-A156070) Avail: NTIS HC A09/MF A01 CSCL 05A

Part 4 of the 1984 DOD Value Engineering, (VE) Conference held 1 to 2 Nov in Leesburg, Va., included the following papers concerning the procurement and utilization of spare parts. Talking Paper on Spare Parts, Spare Parts Acquisition; Buy Our Spare Parts Smart (BOSS), Contracting and Manufacturing; DLA Value Engineering and Competition; Reverse Engineering, Standardization of 400 Volt input Power Cable, and, GIDEP/VEDISARS F.M.R.

N85-35814# DOD Product Engineering Services Office, Alexandria, Va.
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT. PART 5, WORKSHOP C: VEP/VECP ADMINISTRATION, NEGOTIATION, AND IMPLEMENTATION
G. FRANK and L PAULSON Jun 1985 24 p Workshop held at Lessburg, Va , 1-2 Nov. 1984 7 Vol.
(AD-A156071) Avail: NTIS HC A02/MF A01 CSCL 05A

Part 5 of the 1884 DOD Value Engineering (VE) Conference held 1 to 2 Nov. in Leesburg, Va., discussed Value Engineering Program (VEP)/ Value Engineering Change Concept (VECP) Administration, Negotiation, and implementation. The VECP is a proposal from a DOD VE Project Officer that a contractor modify and element of an ongoing defense contract with a view toward reducing the latter's cost to the country. F.M R.

N85-35815# DOD Product Engineering Services Office, Alexandria, Va.
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT. PART 6, WORKSHOP D: VE TRAINING-ORIENTATION
G. FRANK and L PAULSON Jun. 1985 29 p Workshop held at Leesburg, Va., 1-2 Nov 1984 7 Vol.
(AD-A156072) Avail: NTIS HC A03/MF A01 CSCL 05A

This Conference Report summarizes and consolidates the proceedings from the 1984 DoD Value Engineering Conference held 1 to 2 November in Leesburg, VA. The findings and recommendations with supporting material from the five workshops are provided in addition to the complete plenary session presentations. An Executive Summary is presented in Part 1. Part 6-Workshop D: VE Training/Orientation. GRA

N85-35816# DOD Product Engineering Services Office, Alexandria, Va.
DOD VALUE ENGINEERING CONFERENCE REPORT. VALUE ENGINEERING (VE): A TOOL THAT BENEFITS LINE MANAGEMENT. PART 7, WORKSHOP E: VE IN CONSTRUCTION AND ARCHITECT ENGINEER CONTRACTS
G. FRANK and L. PAULSON Jun. 1985 52 p Workshop held at Leesburg, Va , 1-2 Nov 1984 7 Vol.
(AD-A156073) Avail: NTIS HC A04/MF A01 CSCL 05A

This Conference Report summarizes and consolidates the proceedings from the 1984 DoD Value Engineering Conference held 1 to 2 November in Leesburg, VA. The findings and recommendations with supporting material from the five workshops are provided in addition to the complete plenary session presentations. An Executive Summary is presented in Part 1. Part 7-Workshop E: VE in Construction and Architect Engineer Contracts papers include: Value Engineering Program, Scope of Work for Open-End Contract for Value Engineering Services, A/E Restrictions - Things Beyond His Control, DoD Directive 4245 8, FAR 52.248 With Recommended Changes, 1983 Annual Report of the Deputy Assistant Secretary of Defense Installations. GRA

N85-35829# Committee on Science and Technology (U. S. House).
THE 1986 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION
Washington GPO 1985 1543 p Hearings before the Subcomm. on Space Sci. and Appl of the Comm. on Sci. and Technol., 99th Congr., 1st Sess., 6, 19-21, 26, 28 Feb. and 5-7, 26 Mar 1985
(GPO-47-635) Avail: Subcommittee on Space Science and Applications

On Feb 6, 1985, Mr. James Beggs, NASA Administrator, presented the 1986 budget for his agency before the Subcommittee

of Space Science and Applications of the Committee on Science and Technology, U S House of Representatives. The total NASA request is $7 9 billion, of which 2.9 billion is for research and development, 3.5 billion for space flight, control and data communications, 149 million of construction of facilities, and 1.3 billion for research and program management. This budget will provide for solid progress toward the aeronautics and space objectives of the Administration and the Congress F.M R.

07

ECONOMICS, COSTS AND MARKETS

Includes Costs and Cost Analysis, Cost Control and Cost Effectiveness, Productivity and Efficiency, Economics and Trade, Financial Management and Finance, Investments, Value and Risk (Monetary), Budgets and Budgeting, Marketing and Market Research, Consumerism, Purchasing, Sales, Commercialization, Competition, Accounting.

A85-11349
DISTRIBUTED PHOTOVOLTAIC SYSTEM IMPACT UPON UTILITY LOAD/SUPPLY MANAGEMENT PRACTICES
G J. VACHTSEVANOS (Thrace, University, Xanthi, Greece; Georgia Institute of Technology, Atlanta, GA), A. P. MELIOPOULOS, and B. K. PARASKEVOPOULOS (Georgia Institute of Technology, Atlanta, GA) IN· Photovoltaic Solar Energy Conference, Proceedings of the Fifth International Conference, Athens, Greece, October 17-21, 1983 . Dordrecht, D. Reidel Publishing Co , 1984, p. 383-387 refs

A methodology is described for simulation of the economic and technical factors of photovoltaic (PV) installations interfacing with utility load/management operations. A probabalistic technique is used to model the expected demand, reliability of the generating units, costs and profits from each unit, expected unserviced energy, and the loss of load probability. The available power from PV arrays is treated stochastically with statistical weighting on the basis of site meteorological data The goal is to include the PV power while minimizing operational costs, taking into account the level of penetration of the total PV output. Two sample simulations for a utility with a diverse generating mix demonstrate that overall costs would decrease in both cases with PVs on-line through the emphasis on cheaper-fueled generators and peak-load shaving when possible. M.S.K

A85-11425* Jet Propulsion Lab., California Inst of Tech., Pasadena.
POLYCRYSTALLINE SILICON MATERIAL AVAILABILITY AND MARKET PRICING OUTLOOK FOR 1980 THROUGH 1988
E. N. COSTOGUE and R. R. FERBER (California Institute of Technology, Jet Propulsion Laboratory, Photovoltaic Program Technology Development and Application Lead Center, Pasadena, CA) IN: Photovoltaic Solar Energy Conference, Proceedings of the Fifth International Conference, Athens, Greece, October 17-21, 1983 . Dordrecht, D. Reidel Publishing Co., 1984, p. 1027-1031 Research sponsored by the U.S. Department of Energy and NASA.

The results of the second JPL update to an original report to assess the availability and prices of polycrystalline Si for solar cells in the 1983-88 interval are reported It is noted that the demand for poly-Si for solar cells competes with the demand for the same material for semiconductors, although the solar cell industry can use material rejected from the semiconductor industry A sufficient supply is projected for the 6 yr period, rising from 3224 metric tons to 10,220 metric tons in 1988, with prices dropping from the 1980 level of $140/kg to $25/kg. The price reduction and improved production are noted to be due in large part to DOE efforts at defining lower-cost production processes. M.S.K.

A85-12502#
SPACE EXPLOITATION - SPACELAB AN EASY APPROACH FOR DEVELOPING COUNTRIES: PROSPECTIVES AND SUGGESTIONS BY AERITALIA
E VALLERANI (Aeritalia S p.A., Turin, Italy) IN: International Scientific Conference on Space, 23rd, Rome, Italy, March 24, 25, 1983, Proceedings . Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1984, p. 45-49.

The problem of access by developing countries to space information and resources is discussed from the Italian point of view. The international cooperation involved in the development of IRIS, Spacelab, and Eureca is considered, the ongoing commercialization of space in the STS, Ariane, and Space Station programs is examined; and the need for careful planning and preparation in the developing countries to take advantage of future space-exploitation opportunities is stressed It is proposed that Italian universities and industry provide assistance in training personnel and designing payloads to meet the needs of developing countries. T K.

A85-12507*# National Aeronautics and Space Administration, Washington, D C
INTERNATIONAL COOPERATION IN THE COMMERCIAL ERA OF SPACE
R. F. ALLNUTT (NASA, Washington, DC) IN: International Scientific Conference on Space, 23rd, Rome, Italy, March 24, 25, 1983, Proceedings Rome, Rassegna Internazionale Elettronica Nucleare ed Aerospaziale, 1984, p. 147-158

NASA plans permitting international participation in space activities are reviewed, with an emphasis on the increasing commercialization of these endeavors. The potential indicated by the recent success of the STS, long-term and large-scale Soviet missions, and the Ariane launcher is discussed; the development of the Space Station concept is traced; the increasing use of remote-sensing and telecommunications satellites is documented; currently planned space science missions are listed; and the NASA policy on international cooperation (full payment by the second nation, clean payload-spacecraft interfaces to prevent technology transfer, and open availability of scientific results) is outlined. It is argued that space activity, having passed through first and second phases dominated by exploration and military goals, respectively, will now soon enter a primarily commercial phase, with competition in telecommunications and remote-sensing services and private investment in space processing, manufacturing, and even launchers. T.K.

A85-12979#
COST EFFECTIVE LAUNCH TECHNOLOGY FOR COMMUNICATIONS SATELLITES
T. C. TAYLOR (Taylor and Associates, Inc., Wrightwood, CA) and A. OVERMAN International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct 7-13, 1984 10 p. refs
(IAF PAPER 84-04)

The present investigation is concerned with the possibility to reduce the costs for placing satellites in orbit by making use of an 'Air Launch' system. It is pointed out that the launching of rockets to orbit from aircraft in flight has been done successfully. It is suggested to modify the existing technology for the purpose of launching communications satellites and other payloads to orbit. Thus, the Air Launch Concept combines aircraft and missile technologies to produce a method of transport to orbit. A heavy lift cargo aircraft is employed to fly a rocket and the satellite payload to a specific location at the service ceiling of the aircraft. Attention is given to aspects of cost reduction, commercial and technical benefits, the anticipated market, and technical details. G R.

A85-12991*# National Aeronautics and Space Administration, Washington, D C.
SPACE STATION - AN OVERVIEW OF CURRENT U.S. ACTIVITIES
R. F. FREITAG (NASA, Office of Space Station, Policy and Plans Office, Washington, DC) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 11 p.
(IAF PAPER 84-22)

The National Aeronautics and Space Administration (NASA) has begun developing a permanently manned Space Station as mandated by President Reagan. The Space Station will be operational within a decade and is the 'Next Logical Step' in America's space program. This paper presents a summary of the Space Station status, current planning guidelines, and the possibilities for international participation in the program. The conceptual architecture and evolutionary development options for the Space Station are also briefly discussed Author

A85-13138#
GOVERNMENT TOOLS FOR THE SUPPORT OF COMMERCIAL VENTURES
J S GREENBERG (Princeton Synergetics, Inc., Princeton, NJ) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 11 p. refs
(IAF PAPER 84-216)

A vast array of government programs are undertaken with the specific objective of developing technology and/or creating the environment which will lead to increased private sector investmeent and the formation of commercial ventures which are in the public interest. These include R&D and demonstration programs, taxation (including tax credits, depreciation rules and R&D limited partnerships), subsidization (including joint endeavor agreements, revenue subsidization, recoupment and pricing policies), low interest loans/bonds, loan guarantees, regulation, setting of standards, information dissemination, patents/proprietary rights and institutional arrangements. These are described and areas of influence are discussed The assessment of joint endeavor agreements and divestitures is described in some detail from the point of view of establishing negotiating positions. Author

A85-13139*# National Aeronautics and Space Administration, Washington, D.C.
NASA'S APPROACH TO THE COMMERCIAL USE OF SPACE
I. T. GILLAM, IV (NASA, Washington, DC) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct 7-13, 1984. 6 p.
(IAF PAPER 84-217)

NASA planning activities in the area of commercial development of space resources are reviewed. Examples of specific types of commercial space ventures are given, according to three different categories: new commercial high-technology ventures, new commercial application of existing space technology, and commercial ventures resulting from the transfer of existing space programs to the private sector Basic objectives for reducing technical, financial and institutional risks for commercial space operations are considered. Attention is given to the cooperative working environment encouraged by Joint Endeavor Agreements (JEAs) and Technical Exchange Agreements (TEAs) between industrial organizations in the development of space systems. Benefits of the commercial development of space resources include the production of purer pharmaceuticals for the treatment of cancers, kidney diseases, and diabetes; and the development of ultra-pure semiconductor crystals for use in next generation electronic equipment. I.H.

A85-13142#
ACTIVITIES IN GERMANY FOR THE COMMERCIALIZATION OF SPACE
P KLEBER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne, West Germany) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984 7 p
(IAF PAPER 84-222)

The benefits space has to offer to industrial concerns are discussed with an eye to methods of arousing greater industrial participation. Future technological development hinges on exploitation of the microgravity environment, particularly the free fall produced by blancing the spacecraft velocity against the centripetal force Preliminary experimentation growing single crystals, studying diffusion in materials, the growth of living, cells, etc., must be expanded upon by inducing further trials by more industrial investigators Interest can be heightened through media advertizing, direct mailing, personal contact, and exhibits at industrial fairs. Industrial interest is most likely in the fields of metallic materials, electronics, chemistry, pharmaceuticals, and basic research. The promotions should be targeted at raising *executive-level awareness of the possibilities space offers*
M.S.K.

A85-13233#
ORIENTATION AND TRENDS IN EUROPEAN TECHNOLOGY
H. STOEWER (ESA, Systems Engineering Dept., Noordwijk, Netherlands) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 13 p.
(IAF PAPER 84-377)

The current status and future directions of technology development programs under the direction of the ESA Space Research and Technology Center and on a national level in the ESA member states are surveyed in a number of charts and tables *and briefly characterized Areas examined include data handling,* power generation, structures, controls, software, and robotics, to serve missions including earth-space telematics, the Telecom system, terrestrial remote sensing, deep-space exploration and observation, microgravity utilization, space platforms, and in-orbit operations. T.K.

A85-13914
THE FIRST SPACE PRODUCT
J BIRD Spaceflight (ISSN 0038-6340), vol 26, Nov. 1984, p. 422, 423

The processing and applications of the latex spheres manufactured in the monodisperse latex reactor (MLR) flown on six STS missions are described. Spheres of 2 microns diameter are first made on earth, then placed in the MLR on the Shuttle to begin heated chemical reactions, which are accelerated once the spacecraft is in space. Uniform batches of 30 microns diameter spheres have thus far been obtained. Spheres formed on earth lack uniformity, which is high enough with the space-processed spheres that they can be used to calibrate microscopes or be injected in blood to trace circulation. The spheres are about to be marketed at $20,000/oz., and have been certified as reference material by the National Bureau of Standards. M.S.K.

A85-14923
FINANCING SPACE INDUSTRIALIZATION
S M COHN and C. A. COHN Space World (ISSN 0038-6332), vol. U-11-251, Nov. 1984, p. 4-9.

The components of an infrastructure for space industrialization and the methods of financing it are described. Phases of financing involve the government formation of a partnership between government and private industry and space industrialists operating independently The Taxpayer Stock Corporation, which may be an alternative to forced financial support of a space infrastructure, and the Space Industrialization Corporation are discussed An opinion survey on the many uses of space, part of which sampled the public at large regarding space industrialization, and the results of an experiment carried out on Space Shuttle flights, involving

the production of uniform and precise latex particles to be used as a standard for calibrating sensitive scientific instruments, have been examined. M.D.

A85-15463#
INTELSAT BUSINESS SERVICES
J LEE, M. CUMMINS, S. JAMSHIDI, and L. PERILLAN (International Telecommunications Satellite Organization, Washington, DC) IN: International Conference on Digital Satellite Communications, 6th, Phoenix, AZ, September 19-23, 1983, Proceedings . New York, Institute of Electrical and Electronics Engineers, 1983, p. III-1 to III-11.

A new international digital business service will soon be introduced by Intelsat that will include videoconferencing, data transfer, high-speed facsimile, electronic mail, remote printing, and voice applications. This paper presents the background information concerning the development of the global Intelsat Business Services (IBS). It addresses the potential international market, service concept and service features. Considerations pertaining to system design such as space segment provision, network concepts and network interconnect architectures are discussed Finally, a transmission analysis relating to the Standard E and F earth stations, which would be used to carry IBS in the K-band and C-band, respectively, is presented. Author

A85-16303
COMMERCIAL UTILISATION OF SPACE - NEW BUSINESS OPPORTUNITIES
L. BELLAGAMBA and K. H. ROBINETT (Rockwell International Corp., Downey, CA) British Interplanetary Society, Journal (Space Technology) (ISSN 0007-084X), vol. 37, Dec. 1984, p. 541-546

This paper identifies exploitable space resources which allow for commercialization. Commercial utilization of space implies private industry ownership and operation of facilities in space to produce goods or to provide services for profit The tier structure of the industry and the forces creating this structure are explained The authors argue that widespread involvement should be welcomed by participants, as it lowers the entry risk to all. Simple, but useful, procedures are presented to estimate the development and operating costs of a new space business. To serve as illustrative examples, the charters, customers, products, facilities, and profitability potentials of several space station business opportunities are summarized The market, legal and institutional issues which may pose barriers to commercial utilization of space are discussed. Finally, some actions are recommended for managers interested in pursuing their own commercial space opportunities. Author

A85-17778
A SURVEY OF TECHNOLOGY ASSESSMENT ACTIVITIES IN SELECTED U.S. CORPORATIONS
K. KAWAMURA (Vanderbilt University, Nashville, TN) Engineering Management International (ISSN 0167-5419), vol. 2, March 1984, p. 87-99.

This article presents the results of a survey on industrial practices of technology assessment (TA). The objective of the survey was to elicit qualitative responses to determine the role of technology assessment in corporate planning and decision making as applied by certain selected corporations in the U.S.A. Following the survey process used, the responses are summarized according to the questions used in the survey. Then the responses are analyzed in the following categories: technology assessment and corporate planning; organizational aspects of industrial practices; use of technology assessment results; and reasons for use or lack of use of TA. Finally some important characteristics are presented which show the way technology assessment is currently viewed and practiced in the corporations surveyed. Author

A85-20642#
COMMERCIALIZATION OF REMOTE SENSING DATA - ITS IMPACT ON THE CONTINUITY AND ACCESSIBILITY OF REMOTE SENSING DATA, INCLUDING RESPONSE TO STANDING ORDERS AS WELL AS ON THE STANDARDIZATION OF PRODUCTS
G. BRACHET (SPOT IMAGE, Toulouse, France) United Nations, International Meeting of Experts on Remote Sensing Information Systems, Feldafing and Oberpfaffenhoven, West Germany, May 7-11, 1984, Paper. 14 p

A85-24653
SPACE INDUSTRIALIZATION AND THE SOCIAL AGENDA
J. D SALMON (West Florida, University, Pensacola, FL) Space Solar Power Review (ISSN 0191-9067), vol 4, 1983, p. 273-283. refs

Design of a political and economic regime for exploitation of space resources is complicated by disputes, frequently ideological, over how or whether to combine private enterprise and governmental enterprise, national vs. international controls, and the relative roles of rich and poor nations. Historical experience in opening 'new worlds' suggests that combined governmental and private enterprise is the normal procedure Present international conditions suggest that unilateral development is infeasible. Poor nations are concerned with how space resources are developed and with assuring themselves access to a share of the benefits. Use of 'mixed models' combining private and governmental enterprise, incorporating methods to assure that the benefits of space industries do not accrue only to the already rich nations, requires forethought and a reduction in the ideological content of policy designs. Author

A85-25983
TECHNOLOGY AND THE MARKET PLACE - A CHANGING AIR TRANSPORT EQUATION
J. MORRIS and L ROMBERG (Douglas Aircraft Co , Long Beach, CA) Society of Automotive Engineers, Aerospace Congress and Exposition, Long Beach, CA, Oct. 15-18, 1984. 14 p.
(SAE PAPER 841545)

Air transportation is a technology sensitive field. The impressive growth that has taken place is reviewed and the interaction between technology and marketplace is examined. Future developments as suggested by current changes in the operating industry and technological trends are also discussed It is concluded that technology will continue to support market growth in the foreseeable future, but cost effective applications increasingly present challenges to the manufacturing industry Author

A85-26771#
THE COMMUNICATION-SATELLITE MARKET TO THE YEAR 2000 [DE COMMUNICATIESATELLIETMARKT TOT HET JAAR 2000]
R. J. VAN DUINEN (Fokker, Schiphol, Netherlands) Ruimtevaart, vol. 33, Aug.-Oct 1984, p. 130-141. In Dutch.

The developmental history of communication satellites (CSs) is traced; the demands placed on industry by the increasing sophistication of CS payloads, the need to adapt the CS to different launchers (STS or Ariane), and the requirement of longer service life are reviewed; and the evolution of the markets for fixed (telephone, telex, and facsimile), video, business, and broadcasting service is projected over the period 1980-2000 and illustrated with tables and graphs. It is predicted that the worldwide market, expressed in terms of the demand for 36-Mhz transponders, will increase from 426 in 1980 to 1410 in 1985, 3100 in 1990, 5580 in 1995, and 9870 in 2000, with the main increase in transponders for voice communications. The potential for Netherlands participation in the growth of the CS market is evaluated, and the need for government leadership and for active promotion efforts is stressed. T.K.

A85-27375
COMMERCIALIZATION OF SPACE - INCENTIVES, IMPEDIMENTS AND ALTERNATIVES
H. R. MARSHALL, JR. (U.S. Department of State, Bureau of Oceans and International Environmental and Scientific Affairs, Washington, DC) Journal of Space Law, vol. 12, Fall 1984, p. 163-173. refs

The major issues concerned with the development of commercial enterprises in space are considered Attention is given to the need to streamline redundant national and international regulations to permit greater cooperation between firms in the development of such projects as the NASA Space Station; the ELV, SPOT; and the Ariane ELV project. The possibility of impeding the growth of space enterprises through excessive concern for the political implications of technology transfer is discussed I.H.

A85-27648
WHAT ARE WE IN BUSINESS FOR? - AN ENGINEERING APPROACH TO PROJECT FINANCE
P. YOUNG (Rolls-Royce, Ltd., Bristol, England) Aeronautical Journal (ISSN 0001-9240), vol. 89, Jan. 1985, p. 21-33. refs

A simple econometric model is developed to describe the role of taxpayer investments in large-scale aerospace projects. It is shown that, because aerospace projects do not provide a commercial rate of return on initial investments, taxpayers are being asked more frequently to participate In this connection, a criterion for judging the worth of a large-scale aerospace project is proposed. The criterion is based on a self-financing ratio of the contribution of an initial project to the future self financing capability of an individual company. The quantifiable benefits of large-scale aerospace projects to the national economy are briefly summarized. I.H

A85-28824
BOEING'S AIRLINER LAUNCH CRITERIA
C BIRKETT Flight International (ISSN 0015-3710), vol 127, March 9, 1985, p 30-32.

High R&D costs, market slump and the need for flexibility in any base design for a new aircraft are the factors which presently govern the development of new aircraft by manufacturers. The DC-9 baseline design, e g., accommodates four fuselage stretches, wing and cockpit variants, and engines of different thrusts. The 767, 737, 737-300 and 747 are also adaptable. New starts are not made until a market is assured, keeping in mind that airlines in a deregulated industry have difficulty planning for fleet mixes more than 5 yr ahead. One result has been a high degree of standardization for interior furnishings. Another tactical mode of action now followed is to wait until one manufacturer develops a new aircraft which opens a new market, then produce a better aircraft which incorporates technological improvements to capitalize on the need for increased efficiencies in the new market. M S.K.

A85-29623
INSURANCE FOR SPACE SYSTEMS
S. W. FORDYCE (Advanced Business Communications, Inc., McLean, VA) IEEE Journal on Selected Areas in Communications (ISSN 0733-8716), vol. SAC-3, Jan. 1985, p. 211-214.

This paper describes the practice of insurance of commerical communications satellites. A historical review of the insurance of previous satellites is included, starting with the initial Comsat coverage of Intelsat satellites and continuing with the coverage of domestic communications satellites of the United States and other administrations. The types of insurance offered and their typical associated rates are discussed, together with an explanation of the coverage, premiums, and losses which have occurred to date. In the wake of the 1984 losses, estimates are provided of the currently available rates. The characteristics associated with direct broadcasting (heavy and expensive spacecraft, large deployable solar arrays, and high-power transmitters) will affect the future insurance rates for these satellites. Author

A85-29669#
ADA - WILL DOD'S NEW COMPUTER LANGUAGE CUT SOFTWARE COST?
E. J. LERNER Aerospace America (ISSN 0740-722X), vol. 23, April 1985, p. 58-60.

The key feature of the U.S. Department of Defense standard computer language, Ada, is its ability to structure a program out ot smaller parts that can be put together in different ways. Each part, or package, consists of subprograms, data, data types, and other information required for a certain procedure. A second important feature is its unique approach to parallel or concurrent processing, using the special feature called 'rendezvous' for intertask communications to ensure that tasks remain well synchronized. An important new application of Ada is in the digital flight control system for the F-15 fighter. Attention is given to the experience of this aircraft's manufacturer with Ada software. O.C.

A85-31981#
NEW MODEL INTRODUCTION - THE OPERATORS' PERSPECTIVE
D. A FORD (Bell Helicopter Textron, Customer Support and Service Div., Fort Worth, TX) IN. American Helicopter Society, Annual Forum, 40th, Arlington, VA, May 16-18, 1984, Proceedings Alexandria, VA, American Helicopter Society, 1984, p. 319-323

During the design and introduction of a new model helicopter, it is crucial to the survival of that model for the manufacturer to focus on the needs of the operator This paper presents a case history of Bell Helicopter's most recent new model introduction, the Model 214ST Super Transport. With the aid of a little hindsight, specific actions taken are examined to determine if the requirements of the operator were in fact met. Particular emphasis is placed on the changing operator profile over the last decade and through the remainder of the 1980s. Author

A85-32573
RECTIFYING INSPECTION FOR NONCONFORMING ITEMS AND THE HALD LINEAR COST MODEL
W. C. GUENTHER (Wyoming, University, Laramie, WY) Journal of Quality Technology (ISSN 0022-4065), vol. 17, April 1985, p 81-85.

The Hald linear cost model is discussed with and without a beta prior for the distribution of the fraction of nonconforming items in a lot For both situations, average outgoing quality limit plans, limiting quality level (lot tolerance percent defective) plans, and outgoing quality plans are considered When a prior is used in the model, Bayesian plans are also considered. Under any of these conditions, it is shown how the desired sampling plan can be easily found with a computer. Author

A85-33429*# National Aeronautics and Space Administration, Washington, D.C.
GROOMING THE SHUTTLE FOR COST-EFFECTIVE ACCESS TO SPACE
J. W. MOORE (NASA, Washington, DC) Aerospace America (ISSN 0740-722X), vol. 23, May 1985, p. 50-52, 54.

An assessment is made of the performance of the Space Shuttle-based Space Transportation System (STS) from the initial flights in 1981 to the present, which has involved the launching of 12 satellites and the retrieval of two It is expected that the STS will soon be able to schedule 24 routine missions/year, upon the achievement of full operational status for the full fleet of four Space Shuttles and the completion of support facilities at both the Kennedy Space Center and Vandenberg Air Force Base. The prospects for space industrialization efforts based on STS are noted. O.C

A85-34192
THE OUTLOOK FOR SPACE COMMERCIALIZATION
J. J. HAGGERTY Space World (ISSN 0038-6332), vol. V-5-257, May 1985, p. 20-25.

An evaluation is made of the current status and outlook for space commercialization in five major areas of activity. The demand

for space-based communications relay has been increasing rapidly, and is being addressed by advanced technologies that allow greater numbers of transponders per satellite, more effective employment of existing wavebands, and transmissions in a new band that is not yet in use. The NASA Landsat system of earth resources remote sensing satellites will be augmented by the French-led SPOT Image Corporation. The ESA's Ariane launch vehicle is a strong competitor in NASA Space Shuttle markets for satellite launching. 'Upper stage' orbit transfer systems are under development. Studies indicate that there are about 500 materials that could be advantageously processed aboard orbiting industrial platforms, taking advantage of zero-g conditions. O.C.

A85-34215
INVESTORS BALANCE ENTHUSIASM FOR NEW MARKET AGAINST RISK POTENTIAL
C. A. SHIFRIN Commercial Space (ISSN 8756-4831), vol 1, Spring 1985, p. 19-21

Although the interest in commercial space projects is increasing, the investment community shows caution and hesitancy regarding a commitment to such projects. The caution is a result of the particular situation which exists with respect to space-related commercial projects. They require generally a large amount of capital, the potential return on investment may be years off, and the risks, compared with other potential investments, appear greater. There are, however, a number of entrepreneurial companies which are finding capital for commercial space projects. One is developing Space Shuttle upper stages and vehicles to be used to launch commercial satellites, while another is concerned with the growing of crystals in space. A third company is developing a free-flying man-tended laboratory platform to be used for materials processing and other activities. Attention is also given to a number of Fortune 500 companies which are getting involved in commercial space projects G.R.

A85-34216
AN ASTRONAUT'S LOOK AT COMMERCIAL SPACE OPPORTUNITIES
M. COLLINS Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 24-26.

The commercial opportunities provided by space are related to the unique qualities of the space environment. These qualities are discussed, taking into account weightlessness, a practically perfect vacuum, the great differences between hot and cold, the continuous supply of solar energy, the charged particles, good visibility, absence of noise, the practically infinite size of space, and the high costs of gaining access to it These qualities make possible the production of very precise spheres for calibration purposes, and the manufacture of ultra-pure glass and other materials The production of rare pharmaceuticals in space is likely to have an early payoff, while the production of gallium-arsenide crystals for electronic devices is also very promising. However, the great risks involved in space ventures together with long payback times and the required large investments exert a retarding influence on space commercialization Attention is given to the role of the government in space and opportunities provided by the Space Station G.R.

A85-34217
WIDESPREAD CIVIL USES ENVISIONED FOR SATELLITE NAVIGATION SYSTEM
B. A. SMITH Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 27-29

It is expected that the Defense Department's Navstar global positioning system (GPS) will be utilized by many civil users, taking into account trucks, emergency vehicles, pleasure boats, and commercial aircraft. An important factor regarding the realization of the expectations is the production of reliable and relatively low-cost receiver sets for the GPS signals. Some industry officials believe that the use of receivers will expand gradually during the next two to three years, and then accelerate rapidly once the satellite system has become operational The largest civilian market for receivers is expected to be land-based users, while the second largest segment of the civilian market involves marine applications. Attention is given to a number of applications of the GPS signals and the devices which have been or are being developed for these applications G R

A85-34218
REMOTE SENSING - A TORTUOUS TRIP TO MARKETPLACE
P. MANN Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p 32, 33, 35-37.

Remote sensing represents a thirteen-year old U.S. government experiment in gathering earth surface images by satellite in outer space. If the experiment is transferred successfully from government to private sector, it might develop in the next decade into a data market worth billions of dollars. According to the most recent estimates, remote sensing's gross revenues might reach $2 billion annually by the year 2000 for raw data sales alone. In 1983, President Reagan made the decision to accelerate transfer of remote sensing operations ahead of the schedule set forth by President Carter This decision was partly the result of Reagan's philosophy of removing government from the private economy, another factor was the need to reduce federal expenditures. The present status of remote sensing is discussed along with the services which are provided. A description of future developments is also presented G.R.

A85-34219
PROGRESS OF EUROPE'S ARIANE LAUNCHER CHALLENGES U.S. SHUTTLE ON COST ISSUE
J. M LENOROVITZ Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 39, 42-44.

The Ariane family of European launch vehicles is discussed The final flight of an Ariane 1 is planned for a date between September and November 1985. Ariane 5 will begin operations in the mid-1990s. It will have the function to launch heavy-weight satellite payloads into a geostationary transfer orbit This vehicle can also be employed to launch France's proposed small manned shuttle vehicle Hermes. Arianespace, the marketing/management organization for the Ariane, was established in 1980 by European manufacturers, European banks, and the French space agency. France with just under 60 percent of the shares is the organization's largest shareholder, while West Germany follows with slightly under 20 percent. Other shareholders include Italy, Spain, and the UK. Arianespace holds firm orders for orbiting 30 satellites. One half of the orders come from customers outside the European home market. G.R

A85-34220
GERMANY CITES COMMERCIAL FALLOUT AS JUSTIFICATION FOR U.S. STATION INVOLVEMENT
M. FEAZEL Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 47, 49, 51, 54.

In January, West Germany agreed to provide about $1 billion to Columbus (total cost $2.4 billion), which represents the European contribution to the U.S. Space Station project. The design of Columbus will be derived from the design of Spacelab, the European-built laboratory which is carried in the cargo bay of the Space Shuttle. The German contribution to Columbus was approved by the German Bundestag only on condition that the investment would result in a commercial return. Questions regarding the commercialization of the Space Station are discussed, taking into account also developments related to the flight of the SPAS with the Space Shuttle. G.R.

A85-34221
STARSTRUCK'S PROBLEMS SPOTLIGHT RISKS, OPPORTUNITIES IN SPACE
R. G. OLONE Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 60, 61, 63.

The present article is concerned with a new American company which was founded with the objective to build an inexpensive, reliable booster for customers who want to launch communications satellites but cannot afford the European Ariane or the U.S. Space Shuttle. The money provided by the investors permitted the new

firm to do what no other U.S. company had done, that is to design, test, and launch a space booster completely with private funds. The decisions made by the management of the company in the attempt to implement their plans are critically evaluated. In order to overcome difficulties related to the regulations regarding a land launch, it was decided to launch the booster from water. The Dolphin engine, consisting of the largest hybrid motor developed to date, was tested at a maximum of 42,000-lb thrust, and produced 35,000 lb during a successful launch. G.R

A85-34538* National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex.
COMMERCIAL USE OF SPACE - THE SPACE BUSINESS ERA
G D. GRIFFIN (NASA, Johnson Space Center, Houston, TX) (U.S. Space Technology Conference and Exhibition, Zurich, Switzerland, June 19-21, 1984) Space Solar Power Review (ISSN 0191-9067), vol. 5, no. 1, 1985, p 77-82

Progress and avenues being explored by NASA to hasten the commercialization of space are described. A task force has recommended that the effort begin at once, that bureaucratic barriers to commercial space activities be removed, and that a partnership between government and industry be seriously explored The government role is to establish links with private industry, invest in high-leverage technologies and space facilities which will be attractive to commercial ventures, and contribute to commercial enterprises where risks are high and significant economic benefits can be foreseen. The government/industry relationship can be legally evinced by MOUs, joint endeavor agreements, technical exchange agreements and industrial guest investigator arrangements. The Space Station is the first step in that it allows Americans to live and work in space. It is expected that international participation in Space Station development and utilization will accelerate the space business era. M.S.K.

A85-35314
COST REDUCTION POTENTIAL IN SPACE PROGRAM MANAGEMENT
A. O TISCHLER Acta Astronautica (ISSN 0094-5765), vol 11, Dec. 1984, p. 741-744.

Transforming space development efforts from adventure status to semi-routine endeavors requires the management of a variety of programs with finite budgets. NASA personnel learned a great deal during budgetary constraints and constant program shifts and cancellations experienced in the Shuttle program. It now takes fewer people to guide a program, especially people who have encountered the plethora of public funds managers who have appeared since the earlier, political priority days of the U.S. space program. One allocation is personnel overhead, which grows larger as approved projects are stretched out in time because of budget cuts and contractors needing funds to maintain technical staffs. Steps which will shorten project times to completion and thereby lower overall costs are greater definition at the outset, contingency planning, and ending adversary relationships between parties involved in each project. M S K

A85-35978#
U.S. INITIATIVES IN SPACE COMMERCIALIZATION
J. M. LOGSDON (George Washington University, Washington, DC) International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984. 5 p. refs
(IAF PAPER 84-223)

A campaign has recently been conducted to promote space commercialization. The possibilities for the realization of the envisaged prospects in space technology are evaluated, taking into account sources of space revenues, the requirements for space commercialization, positive developments, and uncertain progress in relation to a number of crucial questions. The results of the evaluation suggest that the commercialization of space will be a long-term, slowly evolving enterprise. There is little doubt that eventually space business will be established and thrive However, there is little likelihood that such a situation will occur in the next ten years. G.R

A85-37256
HOMESTEADING THE NEW FRONTIER
T. F ROGERS Space World (ISSN 0038-6332), vol V-5-258, June 1985, p 4-7.

The use of large SST external tanks as habitation modules for an expanded U.S civilian presence in LEO is proposed. It is pointed out that these tanks could be placed in LEO (instead of being allowed to break up in the atmosphere) at relatively low cost to provide about 70,000 cu ft of pressurized space each, to be made usable by purging any remaining fuel and installing appropriate life-support systems It is recommended that federal-government policy for making such modules available to private users be formulated by analogy to the homesteading legislation of the 19th century Photographs of the external tanks and drawings of various design concepts for LEO spacecraft are included T K.

A85-37954
THE PRIVATE SECTOR - A GLOBAL POOL OF TECHNICAL TALENT FOR REMOTE SENSING TRAINING AND PROGRAM SUPPORT
W. D. CARTER (Globex, Inc , Reston, VA) (COSPAR, IUGS, COSTED, and United Nations, Workshops on Remote Sensing from Satellites, 1st and 9th, and Topical Meeting, Graz, Austria, June 25-July 7, 1984) Advances in Space Research (ISSN 0273-1177), vol. 4, no 11, 1984, p 49-57

An overview of what has happened in space research and technology over the past 25 years, and an outlook for the future are presented. Consideration is given to weather, communications, and earth-resource satellites. It is demonstrated that there is a change from government-financed programs toward greater diversification and development of initiatives in the private sector resulting in cheaper products that are more available to the potential users of space-derived information The private sector and its various elements and capabilities are discussed. A list of 150 space technology companies, their locations and products and/or services is given. M.D.

A85-38901
SYMPOSIUM ON INDUSTRIAL ACTIVITY IN SPACE, STRESA, ITALY, MAY 2-4, 1984, PROCEEDINGS
Symposium sponsored by the European Economic Community, ESA, Aeritalia S.p A., et al. Paris, Eurospace, 1984, 492 p. For individual items see A85-38902 to A85-38917

European research and planning efforts for industrial and commercial activities in space are examined in reviews and reports and illustrated with graphs, diagrams, photographs, and drawings Topics discussed include the potential of the European space industry; processes for space use, applications to glass, ceramic, optical, pharmaceutical, and biological industries; applications to metallurgy, inorganic and organic chemistry, and physics, applications to electronics and electricity, novel uses of space; European space plans, and cooperation with the U S. Also presented are round-table discussions on legal aspects of industrial space activity and on the use of microgravity for industrial and commercial purposes. T.K.

A85-38902#
SPACE - THE CHALLENGE OF A NEW ENVIRONMENT
H L JORDAN (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne, West Germany) IN: Symposium on Industrial Activity in Space, Stresa, Italy, May 2-4, 1984, Proceedings . Paris, Eurospace, 1984, p. 5-26

The history, current status, and future plans for industrial activity in space are surveyed from a European perspective. Topics discussed include the early history of space flight; the progress of remote-sensing technology, the nature of the space environment at altitude 500 km; the effects of microgravity on physical processes of industrial importance; steps to be taken by industry to prepare to take advantage of space processing opportunities; the ongoing rocket-borne TEXUS and STS-borne MAUS, GAS, and Spacelab experiments in material science; legal and organizational aspects of space industrialization, and planned European participation in

the NASA Space Station. Photographs, drawings, diagrams, and graphs are provided. T.K.

A85-38904#
EUROPEAN SPACE INDUSTRY'S POTENTIAL
G. K. C. PARDOE (General Technology Systems, Ltd., London, England) IN: Symposium on Industrial Activity in Space, Stresa, Italy, May 2-4, 1984, Proceedings . Paris, Eurospace, 1984, p. 92-109.

The present role of the space industry in the economies of western Europe is surveyed, and strategies to maintain and increase it are proposed. The history of space utilization by earth-based industry and commerce is traced, including communications and navigation satellites, remote-sensing satellites, material-processing experiments, and already planned unmanned and manned processing facilities, and the earth-based technologies which have made these developments possible are discussed. The mechanism of space development is seen as a cyclic process in which enabling technologies lead to space research which advances technology and creates new demand for space facilities and physical or information products. It is argued that both coordinated marketing and educational efforts by government anad industry (to build an informed user community in Europe) and political support of space programs are necessary if the European space industry is to expand and compete in world markets. T.K.

A85-38917#
THE USE OF MICROGRAVITY FOR INDUSTRIAL AND COMMERCIAL PURPOSES
J P GODON (Aerospatiale, Paris, France) IN: Symposium on Industrial Activity in Space, Stresa, Italy, May 2-4, 1984, Proceedings . Paris, Eurospace, 1984, p. 464-475.

A European strategy for the development of space-based manufacturing facilities utilizing the advantages of microgravity is discussed. Topics considered include the kinds of activities required; ways to inform and involve the nonspace industries which form the potential user community; the progression from preliminary data surveys to R&D activities, processing and production, and marketing; cost and legal considerations; improvement of international channels of technical information, and selection of candidate projects. A list of recommended missions for an ESA/EEC microgravity task force is provided. T.K.

A85-39930#
COMMERCIALIZATION OF A SPACE STATION
T. J SHESKIN (Cleveland State University, Cleveland, OH) American Society of Mechanical Engineers, Winter Annual Meeting, New Orleans, LA, Dec. 9-14, 1984 5 p refs
(ASME PAPER 84-WA/TS-3)

A Space Station will create new opportunities for commercial investment. This paper explores two of the most promising areas: materials processing in space, and the servicing and launching of communications satellites. Risks to commercial investors are identified. Recommendations are offered for providing incentives to private sector companies to invest in a Space Station. Author

A85-40905
CHINESE MODIFY CZ-2/3 ROCKET BOOSTERS, FOCUS ON COMMERCIAL LAUNCH MARKET
C. COVAULT Aviation Week and Space Technology (ISSN 0005-2175), vol. 123, July 22, 1985, p. 77, 79.

A program underway in the People's Republic of China to modify the Titan-class CZ-2/3 satellite-launch and ICBM boosters is described on the basis of a recent visit to the manufacturing plant in Shanghai. The present two-stage CZ-2 and three-stage CZ-3 can place 5000 lbs in LEO or 3080 lbs in GEO, respectively, and are produced on a custom basis with a delivery time of about 2 yrs. Modifications introduced include 4 x 6-ft fins and a pogo-suppression system for the four-engine first stage and a steel support band for the combustion chamber of the 80-ton-thrust second-stage main engine. T.K.

A85-41534
HERMES - DOES EUROPE NEED ITS OWN SPACEPLANE?
C BULLOCH Interavia (ISSN 0020-5168), vol. 40, July 1985, p 815-817.

An assessment is made of the economic/commercial motivations and prospects for the Space Shuttle-like 'Hermes' vehicle of the ESA, which unlike the geostationary orbit-directed Ariane will exploit the emerging low earth orbit market potential for microgravity-production of various high tech products. Attention is given to the provisional design details of the Hermes Orbiter and to the prospective distribution of design, development and construction responsibilities among firms within ESA's political purview. A major motivation for desired European independence from the NASA Space Shuttle is the considerable workload already accumulated for future Space Shuttle commercial launches and the additional U.S. Department of Defense demands on these vehicles. O C

A85-41657
COMMERCIALIZATION OF REMOTE-SENSING TECHNOLOGY
S. A. MORAIN (New Mexico, University, Albuquerque) International Journal of Remote Sensing (ISSN 0143-1161), vol 6, June 1985, p 837-846. refs

The Technology Application Center (TAC) of the University of New Mexico has accumulated a decade of experience in the transfer of remote sensing technology applications to assist commercialization efforts The present management and cost information for 48 completed projects sheds light on small businesses' expectations regarding the frequency and duration of such projects, their requisite level of effort, and before-profit revenues. The presently ascertained gross average salary per full time employee equivalent, which has averaged only $10,500 since 1975, suggests that market forces have not yet generated sufficient demand to support the level of skills entailed by this technology. O C

A85-42553
REMARKS ON GERMAN SPACE POLICY - 1985 TO 1995
W. FINKE (BMFT, Bonn, West Germany) IN: From Spacelab to Space Station, Proceedings of the Fifth Symposium, Hamburg, West Germany, October 3-5, 1984 . San Diego, CA, Univelt, Inc., 1985, p. 3-15
(AAS PAPER 84-319)

The participation of the Federal Republic of Germany (FRG) in European and NASA space programs in the coming decade is discussed by a government official favoring such participation. Current FRG space R&D efforts (primarily in cooperation with the US and France) are surveyed; plans for the Columbus program (ESA's main contribution to the Space Station) and the follow-on development of the ESA Ariane launcher series (based on the HM-60 large cryogenic engine) are characterized; the projected costs of these programs (about 2.7 billion AU each) are indicated; the arguments for and against an extensive manned presence in space (for scientific and commercial missions) are reviewed, and the political consequences of an FRG decision for or against participation are considered. FRG goals with regard to the Space Station include clarification of its nonmilitary status, maintaining the option to use ESA components in an eventual European space station or to use Ariane for component launches, limitations and predictability vis-a-vis costs, and assurances of equal partnership (fair evaluation of services provided by each partner; guaranteed necessary transport, supply, and data-transmission services on most-favored-nation status; unrestricted scientific and commercial use of results; and unlimited technology transfer for development and commercial utilization). T.K.

A85-42678
LIFE-CYCLE-COST-ORIENTED SYSTEM DESIGN IN WEAPON TECHNOLOGY [NUTZUNGSKOSTENORIENTIERTE SYSTEMAUSLEGUNG IN DER WEHRTECHNIK]
J. FEIERLEIN (Messerschmitt-Boelkow-Blohm GmbH, Ottobrunn, West Germany) Deutscher Logistiker Kongress, Berlin, West Germany, Oct. 24-26, 1984, Paper. 49 p. In German. refs (MBB-UA-842-84-OE)

The importance of life-cycle costs (LCCs) in the planning of military-equipment budgets is discussed, and techniques for limiting LCCs beginning in the design phase are proposed, with a focus on the situation in West Germany. It is pointed out that the steep increase in military-systems budgets since 1955 has been driven mainly by LCCs rather than by the development and procurement costs, and the main factors contributing to LCCs (maintaining availability, maintaining a staff of trained personnel, and peacetime operations) are examined, taking both technical and logistic/organizational factors into account The application of computer models such as PRICE and ONSCOSTS to generate long-term predictions of LCCs from design inputs is considered in detail and illustrated with diagrams and flow charts, and the consistent implementation of an LCC-based strategy is recommended. T.K.

A85-43179#
UNDERSTANDING CHANGES IN THE U.S. COMPETITIVE POSITION INTERNATIONAL COMPETITIVENESS
R. E. COLE (Michigan, University, Ann Arbor) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 New York, AIAA, 1985, p. 21-23.

Rather than focus on statistics showing the worsening of the American competitive position, the paper stresses problems in our competitive position resulting from shortages of and mode of deployment of engineers in American consumer goods industries Automotive industry is used as a case in point with specific comparisons between Japanese and U.S firms reported on ratio of engineers to administrative personnel and utilization of engineers Role of technical support personnel and role of engineers in employee involvement activities is also considered. Policy implications include the need to train more engineers, to train them more broadly, and to deploy them more effectively. Paper concludes with a discussion of the potential contribution of industrial policy and a call for a more pragmatic approach to formulating policies that will contribute to a restoration of American industrial strength. Author

A85-43180#
CHALLENGES FACING U.S. INDUSTRY
R. W. FOXEN (Rockwell International Corp , Pittsburgh, PA) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 24-29.

The paper discusses five challenges facing U.S. industry: the technological revolution; low economic growth; changing patterns of labor demand; the global population explosion, and the new world financial system. In the context of 'challenge and response', it is argued that our most effective response will be to allow and even encourage enterprises to adapt flexibly to this new environment with a minimum of government intervention except to aid in the inevitable transitions U.S industry is said to have important competitive advantages in this contest, including an unmatched pool of science and technology; depth and breadth of industrial infrastructure, flexibility of capital markets; the size and strength of our domestic market, and above all, the entrepreneurial spirit of our people The most effective way of making use of these resources will not be through an overall industrial policy or through individual protectionist measures but rather through the application of our inherent abilities to compete in the new world market economy. Author

A85-43181#
QUALITY AND COST COMPETITIVENESS
J A. MANOOGIAN (Ford Motor Co., Dearborn, MI) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 30-33.

Strategies for increasing the quality and cost competitiveness of U.S. industry are discussed on the basis of the recent experience of a major corporation. The strong connections among product, service, and process quality; productivity; and costs are explored. The need for improvements is indicated, and specific measures are suggested. Techniques considered include evaluation of customer needs, long-term commitment of management to quality/productivity goals, promotion of employee training and involvement, defect prevention, management reviews, and inclusion of suppliers and sales/service outlets in the productivity-improvement program. T.K.

A85-43187#
APPLYING PRODUCTIVITY PRINCIPLES TO NEW R&D PROGRAMS NASA/TRW GRO PROJECT
R. L WALQUIST (TRW, Inc., Space and Technology Group, Redondo Beach, CA) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p 71-74

Techniques for improving the productivity of aerospace R&D programs are discussed on the basis of experience gained in the development of the NASA Gamma-Ray Observatory (GRO) by TRW Measures examined include the introduction of CAD/CAM hardware and procedures, office automation, improved communication between TRW and NASA Goddard (PC networks and video conferencing), flexible computerized PERT networks permitting off-line evaluation of alternative structures, subcontractor involvement in the productivity program, motivation of individual employees, and the productivity-effectiveness-modification clause (providing additional contractor earnings for real productivity increases) in the NASA-TRW contract for GRO. T K

A85-43188#
PRODUCTIVITY IMPROVEMENT IN THE ACQUISITION ENVIRONMENT
J A MITTINO (U.S. Department of Defense, Office of the Secretary of Defense, Washington, DC) IN White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 New York, AIAA, 1985, p. 75-84

The paper discusses DOD efforts to improve defense contractor productivity as a way to reduce acquisition costs It provides a perspective on the magnitude of the challenge and examines the unique aspects of the environment that exists. The paper surveys and describes the broad range of initiatives, programs and activities under way aimed at fostering productivity improvement in the acquisition environment Author

A85-43194#
COUNTERACTING THE STIFLING EFFECTS OF A LARGE ORGANIZATION
H. WEISS and R. L. HILL (Digital Equipment Corp , Maynard, MA) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality. Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 121-125.

Techniques for improving productivity in a large organization are discussed using examples from a computer-manufacturing corporation. The measures examined and their applications are: thinking differently (redesign of a factory from conventional assembly line to assembly of the total product by a single worker), investing in people (installation of a company-wide electronic-mail network to lower costs and facilitate communication), and focusing

on the organizational mission (restructuring the organization, with establishment of regional management centers and emphasis on strategic rather than short-term goals) T.K.

A85-43195#
BUILDING TEAMS AND MAINTAINING TRUST
L. L. HILL (U.S. Navy, Naval Surface Weapons Center, Dahlgren, VA) IN: *White-collar productivity and quality issues; Proceedings* of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 126-131

The techniques used to improve productivity and work quality at the Naval Surface Weapons Center, a large RTD&E facility responsible for science and technology, systems/subsystems development, and fleet support/in-service engineering, are reviewed. The organizational structure, current activities, and facilities of the Center are described; management and team productivity seminars, implementation assistance, quality circles, productivity steering committees, and work-unit-level productivity measurements are characterized; and strategic-planning measures such as fostering entrepreneurial spirit, building institutional values, defining strategic business units (of related technical programs), evaluating long-term needs, developing action plans, and establishing 1990 manpower goals are discussed. The extension of the industrial-funding concept to other government agencies is considered. T K

A85-43196#
BALANCING RISK TAKING AND ENCOURAGING ENTREPRENEURISM
G. E. SEEGERS (Citibank, New York, NY) IN: White-collar productivity and quality issues, Proceedings of the Symposium on Productivity and Quality Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 132-136

A85-43199#
PREVIEW OF THE PRESIDENT'S COMMISSION ON INDUSTRIAL COMPETITIVENESS
E. MILBERGS (Commission on Industrial Competitiveness, Washington, DC) IN. White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p 153-156.

A85-43201#
HURDLES STIFLING THE FEDERAL MANAGER'S ABILITY TO IMPROVE PRODUCTIVITY
A. TRIPLETT (Office of Management and Budget, Washington, DC) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 161-164.

A85-43202#
PRODUCTIVITY INITIATIVES AT USDA
J. J. FRANKE, JR. (U.S. Department of Agriculture, Washington, DC) IN: White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality: Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 New York, AIAA, 1985, p. 165-168.

A85-43203#
SONY KEEPS HIGH QUALITY AND PRODUCTIVITY IN THE UNITED STATES
S WADA (Sony Corporation of America, New York, NY) IN White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 183-186.

A85-43204#
KEEPING THE BUREAUCRACY IN CHECK
K. A BOLTE (Intec Corp., Hillsboro, OR) IN. White-collar productivity and quality issues; Proceedings of the Symposium on Productivity and Quality, Strategies for Improving Operations in Government and Industry, Washington, DC, September 25, 26, 1984 . New York, AIAA, 1985, p. 189-191.

Techniques used at Intel Corporation to decrease administrative costs by increasing productivity (measured as output units per employee hour) are described Measures instituted include establishment of an assembly-line-office concept, capacity planning and staff reduction by attrition, weekly review and planning by first-line managers, and top-down determination (by a small staff) of productivity goals to be implemented bottom-up and monitored by a highly visible reporting system The Intel program has saved $17 million over a 4 5-year period, mainly by streamlining procedures and eliminating excess personnel. T.K.

A85-45118
COST EFFECTIVENESS OF SIMULATED AIRCRAFT MAINTENANCE TRAINING SYSTEMS
D W. COUCH and E. H. STEVENS (Honeywell, Inc , West Covina, CA) IN. NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 1038-1043.

Previous studies have shown that maintenance training using Simulated Aircraft Maintenance Trainers (SAMTs) produces technicians that are as adequately trained for Flight Line Maintenance as those that are trained using operational aircraft. Based on these findings, a model has been prepared to assess the cost effectiveness of the SAMTs. Data detailing actual equipment usage prior to F-15 and F-16 SAMT installation and usage after the SAMT installation is evaluated The results of this evaluation lead to a straightforward model that can be used to determine the cost savings that are realized through deployment of SAMTs to Air Force bases. Author

A85-45150#
A COMPARISON OF VARIOUS LIFE CYCLE COST MODELS
L R WELCH (USAF, Avionics Systems Div., Wright-Patterson AFB, OH) IN. NAECON 1984, Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 1287-1292 refs

Life Cycle Cost (LCC) prediction has become an important step in the acquisition of avionics systems. Many models have been developed in an attempt to predict a system's LCC early in the acquisition process. This paper presents a synopsis of various LCC models which have been developed the Reliability, Maintainability and Cost Model (RMGM), the Freiman Analysis of Systems Technique Equipment Model (FAST-E), the Programmed Review of Information for Costing and Evaluation (PRICE) Model, the TI-59 Handheld Calculator Aircraft Top Level Life Cycle Cost (TI-59 ATL2C2) Model, and the Avionics Laboratory Predictive Operations and Support (ALPOS) Cost Model. Each synopsis discusses important aspects of the model, including a description of the model, a summary of model inputs and outputs, and the accessibility of the model. A table comparing the various characteristics of the models are also presented. Author

A85-45817* National Aeronautics and Space Administration, Washington, D.C.
SPACE - THE LONG-RANGE FUTURE
J. VON PUTTKAMER (NASA, Washington, DC) Spaceflight (ISSN 0038-6340), vol 27, Sept.-Oct 1985, p. 348-354. refs

The Space Shuttle/Space Transportation System (STS) provides the basis for future development toward permanent manned Space Stations, manned access to geostationary orbit (GEO), deployment of large space structures, development of closed-cycle life support systems, and the discovery of greater industrial applications in space. Research must continue in order to make an Orbital Transfer Vehicle (OTV) which would provide manned flights to GEO and the establishment of a lunar base a reality by the year 2000. Beyond the year 2000 there should be

advanced complexes in low-earth orbit (LEO), permanently manned scientific and communication stations in GEO, a permanent moon base, manned expeditions to Mars, and a geosynchronous facility. These goals can be achieved through international cooperation, cooperative programs will allow for more research at a faster pace due to joint funding. These advances could lead to improvements in the quality of life on earth and make comfortable space life a reality. I.F

A85-47047
NASA APPROVES FLY-NOW, PAY-LATER PLANS FOR ORBITING INDUSTRIAL FACILITY
C. COVAULT Aviation Week and Space Technology (ISSN 0005-2175), vol 123, Aug. 26, 1985, p 16, 17

In a continuing effort to foster the commercialization of space, NASA has entered into an agreement with Space Industries, Inc. to furnish that company with two STS launches which will be paid for in the form of 12 percent of the revenues from the first five years of operation. The payload will be a Shuttle-tended unmanned module for materials processing. NASA also plans to benefit from access to the module and docking facility technologies which will be developed by the commercial organization. This will avoid in-house development costs for NASA. The first module will be 35 ft long and 14.5 ft wide and will cost from $250-500 million to develop The initial launch is scheduled for 1992 Module power will be furnished by 100-ft long solar cell masts rated at 12 kW. The orbit will be selected to allow operations in concert with the Space Station orbit, thereby facilitating Orbiter visits. M.S K.

A85-49913
HOW MUCH DOES IT COST/HOW MUCH DOES IT WEIGH?
T. E. BRENTS, JR. (*General Dynamics Corp., Fort Worth, TX*) SAWE, Annual Conference, 43rd, Atlanta, GA, May 21-23, 1984. 30 p.
(SAWE PAPER 1593)

Attention is given to cost estimation method trends in the U.S. military aircraft industry, where weight-drive parametric estimation has been used for such products as the F-16 fighter in order to deliver firm prices on proposed changes. Parametric estimates are also used to provide customers with budgetary information. The engineering change proposal pricing practices presently detailed were first applied in the negotiation of a pricing agreement for tooling in 1980. O C.

N85-10907*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va
FOREIGN CIVIL AVIATION COMPETITION: 1976 SUMMARY AND IMPLICATIONS
W. J ALFORD, JR. (comp.) and D. V. MADDALON (comp.) 17 Jun. 1976 48 p
(NASA-TM-X-73907; NAS 1 15 X-73907) Avail. NTIS HC A03/MF A01 CSCL 01B

A summary assessment is made of foreign civil aviation as it relates to the posture of the United States civil aviation industry. Major findings include· (1) Main competitors - European Economic Community (EEC) and Union of Soviet Socialist Republics (USSR). (2) Largest commercial market - Transport aircraft. (3) Current market status and projections - U.S. currently dominates the civil aviation market but foreign markets show greater growth trends (4) Competitive comparisons - Status comparisons are made in technology (aerodynamics, structures and materials, propulsion, avionics, systems, design coordination, and manufacturing), production runs; marketing, and postsales support The U.S. generally leads except in aerodynamics and propulsion. (5) Multinational ventures - Joint U.S industry/foreign government development of advanced technology engines is well developed, airframe industry discussions are now underway. (6) Implications - Although the U.S., is currently preeminent in most areas, this may be only a temporary condition. Past U.S. success in aviation has provided many benefits to the nation. These benefits may be lost. M.A C.

N85-11011*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SECOND SYMPOSIUM ON SPACE INDUSTRIALIZATION
C. M. JERNIGAN, ed. Oct. 1984 427 p refs Symp. held in Huntsville, Ala., 13-15 Feb 1984 Sponsored in cooperation with AIAA and Alabama Univ
(NASA-CP-2313; M-464; NAS 1.55:2313) Avail. NTIS HC A19/MF A01 CSCL 22A

The policy, legal, and economic aspects of space industrialization are considered along with satellite communications, material processing, remote sensing, and the role of space carriers and a space station in space industrialization.

N85-11012*# National Aeronautics and Space Administration, Washington, D C
NON-US APPROACHES TO SPACE COMMERCIALIZATION
P G SMITH *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 2-27 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 22A

The approaches to the commercialization of space taken by the four foreign countries most active in the field - Canada, France, the Federal Republic of Germany, and Japan are described. National space program elements with commercial potential are examined in the context of national industrial and science policies, with special attention to objectives, timetables, and budgetary priority relative to other sectors. The role of the European Space Agency in attaining national and regional commercialization objectives is also examined Author

N85-11014*# Coopers and Lybrand, Washington, D.C.
FINANCIAL ISSUES FOR COMMERCIAL SPACE VENTURES: PAYING FOR THE DREAMS
J. J EGAN *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 38-47 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 05C

Various financial issues involved in commercial space enterprise are discussed. Particular emphasis is placed on the materials processing area: the current state of business plan and financial developments, what is needed for enhanced probability of success of future materials development efforts in attracting financial backing, and finally, the risks involved in this entire business area. R S.F.

N85-11015*# Science Applications, Inc., McLean, Va.
SPACE INDUSTRIALIZATION: A NATIONAL PERSPECTIVE
V. H. REIS *In* NASA Marshall Space Flight Center 2nd Symp. on Space Industrialization p 48-51 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 22A

Space industrialization (or commercialization) has the potential to be a major player in America's space program. If this potential is to be realized, however, industrialization efforts must be considered within the context of the other major portions of the space program: shuttle, space station, and civil remote sensing. Further, development efforts must be based upon a sound scientific and technical understanding of the products and processes, and there must be a trained cadre of dedicated individuals willing to devote time and effort to this effort. There remain considerable risks and uncertainties. Given all this, the best path to follow would seem to be a long term, balanced commitment, emphasizing government, industry, and academia partnerships. Several points are addressed: (1) the place of space industrialization in the overall national space program; (2) the meaning of space industrialization with respect to the historic, national aims of space, and (3) specifically what is being industrialized R.S.F.

N85-11024*# National Oceanic and Atmospheric Administration, Washington, D. C National Environmental Satellite, Data, and Information Service
LAND REMOTE SENSING COMMERCIALIZATION: A STATUS REPORT
W. P. BISHOP and E. L HEACOCK *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 87-95 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 05B

The current offer by the United States Department of Commerce to transfer the U.S land remote sensing program to the private sector is described. A Request for Proposals (RFP) was issued, soliciting offers from U.S. firms to provide a commercial land remote sensing satellite system. Proposals must address a complete system including satellite, communications, and ground data processing systems Offerors are encouraged to propose to take over the Government LANDSAT system which consists of LANDSAT 4 and LANDSAT D'. Also required in proposals are the market development procedures and plans to ensure that commercialization is feasible and the business will become self-supporting at the earliest possible time As a matter of Federal Policy, the solicitation is designed to protect both national security and foreign policy considerations. In keeping with these concerns, an offeror must be a U.S Firm. Requirements for data quality, quantity, distribution and delivery are met by current operational procedures. It is the Government's desire that the Offeror be prepared to develop and operate follow-on systems without Government subsidies. However, to facilitate rapid commercialization, an offeror may elect to include in his proposal mechanisms for short term government financial assistance.
M.G.

N85-11033*# Space Vector Corp., Northridge, Calif.
CONESTOGA 2: A LOW COST COMMERCIAL SPACE TRANSPORT SYSTEM
R. O. RASMUSSEN *In* NASA Marshall Space Flight Center 2nd Symp. on Space Industrialization p 169-195 Oct 1984
Avail: NTIS HC A19/MF A01 CSCL 22B

Conestoga 2 is currently under development. It is capable of inserting 500 Kg satellites into 800 Km circular polar orbits. Conestoga 2 makes maximum use of existing (developed) technology and hardware. Its commercial objective is to fill a need for low cost low Earth orbital transport not efficiently served by Shuttle or larger space transport systems Low Earth orbit markets, foreign participation, and launch site considerations are discussed along with technical and economic trade-offs Author

N85-11035*# Booz-Allen and Hamilton, Inc., Arlington, Va
CONCEPT FOR A COMMERCIAL SPACE STATION LABORATORY
P. W. WOOD and P. M. STARK *In* NASA. Marshall Space Flight Center 2nd Symp on Space Industrialization p 204-215 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 22B

The concept of a privately owned and operated fee-for-service laboratory as an element of a civil manned space station, envisioned as the venture of a group of private investors and an experienced laboratory operator to be undertaken with the cooperation of NASA is discussed. This group would acquire, outfit, activate, and operate the labortory on a fee-for-service basis, providing laboratory services to commercial firms, universities, and government agencies, including NASA. This concept was developed to identify, stimulate, and assist potential commercial users of a manned space station. A number of the issues which would be related to the concept, including the terms under which NASA might consider permitting private ownership and operation of a major space station component, the policies with respect to international participation in the construction and use of the space station, the basis for charging users for services received from the space station, and the types of support that NASA might be willing to provide to assist private industry in carrying out such a venture are discussed. R J.F.

N85-11039*# Wyle Labs., Inc , Huntsville, Ala.
COMMERCIAL SPACE SERVICES
D. L CHRISTENSEN *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 272-274 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 22A

An overview of space service opportunities as identified by a Wyle Laboratories' research team is given Through the use of a baseline space scenario, a variety of space hardware, services, and commercial activities are identified and related on a time-phased basis A model is presented to relate the potential functions of government and the private sector in a commercialized space environment during the period 1984 to 2004. Barriers, incentives and key issues are likewise identified and addressed to aid in the implementation of private sector activities for spacerelated programs. Broader awareness, legislative actions, incentive development and benefit analyses are considered in the presentation The time-phased plan provides a useful planning and management tool, allows broader communication, and supports overall space commercialization program assessment. R.J F.

N85-11044*# Grumman Aerospace Corp., Bethpage, N.Y.
DEVELOPING COMMERCIAL USERS OF SPACE Abstract Only
L H. HEMMERDINGER *In* NASA. Marshall Space Flight Center 2nd Symp on Space Industrialization p 305 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 05A

The use of low gravity in the development of new products is examined. Low gravity fundaments are presented clearly and simply. A display of past low gravity experiments highlights some of these precepts which are followed by a description of where and how the commercial user can fly his experiment or process.
M.A.C.

N85-11052*# SRI International Corp., Arlington, Va.
SPACE COMMERCIALIZATION: ANALYSIS OF R AND D INVESTMENTS WITH LONG TIME HORIZONS
T P. SHEAHEN *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 350-361 Oct. 1984 refs
Avail NTIS HC A19/MF A01 CSCL 22A

By following a single hypothetical example through a series of variations, the way different potential investors might look at the opportunity to participate in space commercialization is described. The example itself is fairly typical of commercial opportunities in space. The chief characteristics are a steadily increasing requirement for capital infusion over an 8 year period, followed by a very generous stream of profits running another decade or more beyond. There is a decision point at 3 years, at the conclusion of laboratory R&D; and another at 6 years, following 2 initial space flights M A C.

N85-11055*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPPORTUNITIES FOR COMMERCIAL ORGANIZATIONS Abstract Only
W K. VARDAMAN, H. ATKINS, and K R. TAYLOR *In its* 2nd Symp on Space Industrialization p 369 Oct. 1984
Avail NTIS HC A19/MF A01 CSCL 05A

The possible applications of technology of materials processing in low gravity is discussed. A special office established by NASA to familiarize commercial organizations with materials processing in low gravity is described. This office provides information on present research and will, if requested, hold a seminar to present the technological and business aspects of joint investigations and joint endeavors to interested organizations. Arrangements can be made for visits to laboratories where ground based research is in progress M.A.C.

N85-11056*# TRW Space Technology Labs., Redondo Beach, Calif.
SATELLITE SERVICING: A BUSINESS OPPORTUNITY? Abstract Only
R. E. WONG and E. H. MEDLER *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 370 Oct. 1984
Avail. NTIS HC A19/MF A01 CSCL 05A

The possibilities of satellite servicing as a business opportunity are examined. The service rate which a user must be charged to yield a reasonable return is derived and then compared against the market's willingness to pay that rate Steps taken to provide the basis from which the service rate could be derived include. (1) constructing a hypothetical on orbit servicing business offering both on orbit and associated ground services; (2) estimating the total on orbit service business potential by analyzing mission models to the year 2000; and (3) setting up ground rules to bound the conduct of the business. Using this basic information service demand (business volume) cost to set up the business, costs for operation and maintenance tax rates and desired rate of return are estimated to determine the user charge. Sensitivity of the service rate to various parameters are also assessed. The time span for the business venture runs from 1986 through 2000 with service to 1991 provided via the orbiter and by a space station beyond 1991. This point analysis shows about five years of negative cash flow, with steady profits thereafter.

N85-11057*# Booz-Allen and Hamilton, Inc., Arlington, Va.
DOING BUSINESS IN SPACE: HOW TO GET THERE FROM HERE
P. W. WOOD and P. M STARK *In* NASA. Marshall Space Flight Center 2nd Symp. on Space Industrialization p 371-382 Oct. 1984
Avail: NTIS HC A19/MF A01 CSCL 05A

A step by step process is described through which an existing enterprise or an entrepreneurial venture can initiate and carry out a new space venture. Throughout this process the business and technical aspects must be advanced in parallel with each other Each depends on the other for its continued success, and companies may be unable to complete the venture if one or the other is neglected The existing NASA programs and the experience of early trailblazers provide sufficient examples and opportunities for other firms to undertake new ventures with confidence With the introduction of NASA's Commercial Space Policy, both the opportunities and the ease with which ventures can be carried out should increase significantly. M.A.C.

N85-11059# Committee on Science and Technology (U S House).
STATEMENT OF HON. JAMES M. BEGGS, ADMINISTRATOR, NASA, WASHINGTON, DC
In its Initiatives to Promote Space Commercialization p 12-26 1984
Avail: Subcommittee on Space Science and Applications

NASA activities for the commercial use of space are discussed. Space shuttle payloads, space commercialization plans, launch costs, and government/industry cooperation are among the topics discussed. R.J.F.

N85-11556# Naval Postgraduate School, Monterey, Calif.
SYSTEMS ANALYSIS FOR MICROCOMPUTER ACQUISITIONS M.S. Thesis
H. P. RHOADES Mar. 1984 62 p
(AD-A145447; AD-E750943) Avail: NTIS HC A04/MF A01 CSCL 09B

This thesis outlines the procedures for an analysis to be conducted to assist in the acquisition of a microcomputer It provides a methodology to analyze present system operations, determine technical and economic feasibility of a microcomputer, and select hardware and software to meet organizational requirements. The intent of this thesis is to assist a Division Officer, Branch Chief, or small unit Commanding Officer who wants to increase productivity of specific outputs and feels a microcomputer may be the answer. GRA

N85-11911# Committee on Science and Technology (U. S. House)
INTERNATIONAL COOPERATION AND COMPETITION IN SPACE
Washington GPO 1984 230 p refs Hearing before the Comm. on Sci. and Technol., 98th Congr., 2d Sess., No. 104, 25 Jul 1984
(GPO-38-001) Avail: Subcommittee on Space Science and Applications

Testimony and dialogue from a meeting of the House Subcommittee on Space Science and Applications are presented. The Subcommittee met to survey the status of and prospects for international cooperation and competition in space.

N85-11912# Committee on Science and Technology (U S. House).
INTERNATIONAL COOPERATION AND COMPETITION IN SPACE. INTRODUCTION
In its Intern. Coop. and Competition in Space p 1-32 1984 refs
Avail *Subcommittee on Space Science and Applications*

Testimony given during a meeting of the House Subcommittee on Space Science and Applications is presented. The Subcommittee met to survey the status of and prospects for international cooperation and competition in space. Expendable launch vehicles and the space shuttle program were discussed The U S. position vis-a-vis the U N. Committee on the Peaceful Use of Outer Space (COPUOS) was addressed. R S F.

N85-12805# Army Missile Command, Redstone Arsenal, Ala.
ECONOMIC ANALYSIS HANDBOOK
J. L. GOSSETT Jun 1984 60 p
(AD-A146263; USAMICOM-RR-84-15) Avail NTIS HC A04/MF A01 CSCL 05C

This effort is provided as an aid in the preparation of an economic analysis Information extracted from various sources was identified in the references. Material and assistance were received from the US Army Armament, Munitions and Chemical Command. Contents are: Introduction, Documentation, Constant Dollars, Cost Analysis, Economic Life, Comparison and Ranking of Alternatives, Present Value of Money and Terminal Value. GRA

N85-13792# European Space Agency, Paris (France).
GERMAN DOMESTIC SCHEDULED AIR TRANSPORT IN THE YEAR 2000
R. J. HAUPT May 1984 94 p refs Transl. into ENGLISH of "Innerdeut Linienluftverkehr des Jahres 2000', DFVLR, Cologne Rept. DFVLR-FB-83-03, 1983
(ESA-TT-828; DFVLR-FB-83-03) Avail: NTIS HC A05/MF A01; original German version available from DFVLR, Cologne DM 28.60

Supply alternatives for domestic scheduled air transport in Germany, based on the year 2000, are presented and evaluated. The financial effects of changes in the available services on an air transport company and on airports (altered revenue from landing charges) are shown, based on a forecast of the air transport market from a cost/revenue calculation model for this market. Substitution effects involving high-speed rail transport are presented. Author (ESA)

N85-15781# Office of Technology Assessment, Washington, D.C.
CIVILIAN SPACE STATIONS AND THE US FUTURE IN SPACE
Nov. 1984 238 p refs
(OTA-STI-241; LC-84-601136) Avail SOD HC $7.50

The U.S. aerospace industry is now beginning to position itself to provide space assets and services independently, and anticipates conducting in space investigations and commercial-industrial activities privately financed, either on its own or in combination with other business concerns. The leaders of the U.S. civilian

space community have advanced the view that the next major logical step in space should be the acquisition of specific, permanent in space infrastructure: a civilian space station The following aspects involved in a shift to civilian space station are discussed: space infrastructure, buyer's guide, uses and functions, international concepts, federal budgets, cost containment, and policies

N85-15782# Office of Technology Assessment, Washington, D.C.
ISSUES AND FINDINGS
In its Civilian Space Stations and the US Future in Space p 25-46 Nov. 1984 refs
Avail: SOD HC $7.50

Long-term space goals and objectives; international space cooperation; cost reductions; transitions from NASA to civilian management; low-Earth-orbit infrastructure; non-government policy studies; and creation of space policy study centers are discussed. B.G

N85-16681# Analytics, Inc., Dayton, Ohio.
EVALUATION OF THE EFFECTIVENESS OF THE WEIGHTED GUIDELINES TO INDUCE CONTRACTOR'S INVESTMENT IN COST REDUCING FACILITIES EQUIPMENT Final Report, Apr. 1983 - Aug. 1984
L. KOVICH and T. MCCANN 15 Aug 1984 62 p
(Contract MDA903-82-G-0053)
(AD-A147586, TR-1867-03) Avail: NTIS HC A04/MF A01 CSCL 15E

The main objective of this report was to determine the adequacy of the present Weighted Guidelines profit policy for improving the productivity of defense contractors and to assess whether or not the profit policy is providing a stimulus for strengthening the industrial base. The scope of the analysis consisted of the following approach: (1) Reviewed literature of all material which pertained to the Weighted Guidelines profit policy which had been published since 1976; (2) Developed an investment model as the foundation to understanding the process of corporate capital investments; (3) Compared analyses and tests which were presented in Profit '76 and Profit '82. (4) Used Weighted Guidelines profit policy information gained through contacts within the Services and industry; (5) Performed analyses on financial information obtained from various government profit centers. GRA

N85-17580# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
AN APPLICATION OF DISCRIMINANT ANALYSIS TO THE SELECTION OF SOFTWARE COST ESTIMATING MODELS M.S. Thesis
J. T STEIG Sep. 1984 97 p
(AD-A147632; AFIT/GSM/LSY/84S-26) Avail: NTIS HC A05/MF A01 CSCL 14A

Currently, no quantitative methods exist to quantitatively select the best software cost estimating model for a particular software type or environment. By identifying the characteristics of the software that each model was best able to estimate, those characteristics could be used as a basis for predicting the best model The analysis began by using selected models to concurrently estimate development costs for 25 known projects. Estimates from each model were compared and the most accurate model for each project was identified The projects were assigned to the group of projects for which each model most accurately estimated development costs After grouping each project, discriminant analysis was used to identify those input variables from all the estimating models that best discriminated between the groups. The identified input variables were then used as determinant variables as a basis to predict which model was most likely to best estimate cost for each project The unbiased prediction rate was 60%. Despite the high prediction rate, the overall estimating accuracy was not reduced. Results indicate that use of the pre-analysis determinants to select a model would not reduce estimating error more than a random selection of models GRA

N85-17733# Air Force Inst. of Tech, Wright-Patterson AFB, Ohio School of Systems and Logistics
AN ANALYSIS OF PRODUCTION COMPETITION AND AWARD METHODOLOGY M.S. Thesis
G T. SPARROW and J. A. STEVENS Sep. 1984 129 p
(AD-A147775; AFIT/GLM/LSM/84S-60) Avail NTIS HC A07/MF A01 CSCL 05A

The injection of competition into the production phase of an acquisition is an important issue in todays defense acquisition environment Developing a second production source is the primary means of achieving this type of competition. Various techniques to accomplish production competition have been used with mixed results. This thesis reviews the theoretical basis for and the Government's policy reguarding production competition along with the determination of second source applicability to a given program In addition, this work reviews five methods of developing a second source, along with five methodologies for determining the award between two sources After the award methodologies are discussed, one method (the Solinsky Technique) was chosen for a more indepth analysis. GRA

N85-17735# Air Force Inst. of Tech, Wright-Patterson AFB, Ohio.
COST-PLUS-PERCENTAGE-OF-COSTS IN GOVERNMENT CONTRACTS M.S. Thesis
S. J ROSER Sep. 1984 143 p
(AD-A147779; AFIT/CI/NR-84-83T) Avail: NTIS HC A07/MF A01 CSCL 05A

Cost-percentage-of-cost (CPPC) is a method of contracting or a type of contract under which the contractor is not only reimbursed his performance costs but is also paid a stated percentage of his cost. World War I wrought havoc on traditional Government procurement practices The tremendous demand for war production, along with volatile labor and material prices, dictated a relaxing of the customary fixed price system of acquisition. Competitive bidding and fixed price contracts proved untenable because, not only did many contractors refuse to bid for war production contracts on a lump sum basis, those that did often factored in exorbitant contingencies. CPPC appeared to be the answer to Government prayer, since it seemed to solve the problem of reluctant or unventuresome contractors. Perhaps it was also apropos for that unsettled era, but in any event, CPPC soon became a virtual cornerstone of Government acquisition! GRA

N85-17750# Office of Technology Assessment, Washington, D C
INTERNATIONAL COOPERATION AND COMPETITION IN CIVILIAN SPACE ACTIVITES Summary Report
Jul. 1984 35 p
(OTA-ISC-240) Avail. NTIS HC A03/MF A01

The state of international competition in civilian space activities is assessed, U.S. civilian objectives in space are explored, and alternative options are suggested for enhancing the overall U.S. position in space technologies and space science. Past, present, and projected international cooperative arrangements for space activities are investigated and their relationship to competition in space is examined. The relationship between space policy and foreign policy is examined with respect to the extent that they affect international civilian activities in space. Two major problems which dominate the organization and implementation of U.S. civilian policies towards space are identified. there is no national consensus about long term goals and activities, and the political and economic dimension of space activities now exceed the purview of any one government agency A.R.H.

N85-18030# Transportation Research Board, Washington, D.C
ISSUES IN AIR TRANSPORT
J. C. OCALLAHAN, D J BENNETT, G R. MORRISSEY, D. S. MCLEOD, R. D. SANDLER, E. T. DENHAM, J BLAIR, M L. FORD, R. SHIRACK, and M. M. ETSCHMAIER 1984 59 p refs
(PB85-121374/GAR; TRB/TRR-958; ISBN-0-309-03704-2, LC-84-22804) Avail· NTIS HC A04/MF A01 CSCL 01B

Some probable effects of deregulation on airline industry economics; discount fare market research, 1981 to 1983; airline cost trends as viewed by an airframe manufacturer; economic impact of general aviation in Florida: suggested method of analysis; estimating aircraft activity at nontowered airports: results of the aircraft activity counter demonstration projects, mission-oriented maintenance for military aircraft and implications for public transportation fleet maintenance; a model for determining the width of airport pedestrain corridors, and, aviation legislation and infrastructure. policy implications for the 1980s are discussed.
GRA

N85-19205# Joint Publications Research Service, Arlington, Va
COMMERCIAL SPACE: EUROPE SHOULD HAVE INDEPENDENT STRATEGY
In its West Europe Rept.: Sci. and Technol (JPRS-WST-85-004) p 1-5 30 Jan. 1985 Transl into ENGLISH from Aarde and Kosmos (Netherlands), Nov. - Dec 1984 p 518-522
Avail· NTIS HC A04/MF A01

The impact of space commercialization on Europe is discussed Advantages and disadvantages are discussed with emphasis on the following areas: competition, legal liabilities, economics, and development of European spacecraft B.G.

N85-23341# National Research Inst for Mathematical Sciences, Pretoria (South Africa)
AN ANALYSIS OF A DYNAMIC PROJECT COST PROBLEM
A. MEHREZ and M SNIEDOVICH Nov 1983 30 p refs Submitted for publication
(CSIR-TWISK-338) Avail: NTIS HC A03/MF A01

A stochastic allocation model for a sequential financial problem involving the allocation of funds to uncertain future payments is presented. It is shown that under certain conditions the optimal allocation policies are piecewise linear with the budget available and that there exists an intimate relationship between these policies and the myopic policies obtained from the solution of a sequence of single-payment problems. Certain technical and methodological issues associated with a chance constrained version of the problem are also discussed. B.W.

N85-24810# IBM S.A. Proprietary Ltd., Johannesburg (South Africa). Industry Marketing.
SELECTION CRITERIA FOR A CAD/CM SYSTEM
C. J. GRAHAM *In* CSIR Mini-Seminar on CAD/CAM 9 p Aug. 1983
Avail. NTIS HC A03/MF A01

The role of computer aided design/manufacturing (CAD/CAM in the product development process is reviewed and a CAD/CAM selection scenario is described Criteria for system selection are identified and discussed Highly desirable characteristics of a good CAD system include: fast response time; efficient use of computer resources; draftsman and designer oriented; integrated data base (interactively accessible by each user discipline), and general purpose applications M G

N85-25616# Joint Publications Research Service, Arlington, Va.
MBB COST-REDUCTION PLAN FOR AIRBUS CONSTRUCTION DESCRIBED
K. WIBORG *In its* West Europe Rept Sci and Technol (JPRS-WST-84-027) p 18-20 17 Aug. 1984 Transl. into ENGLISH from Franfurter Allgem. Zeitung (Frankfurt am Main), 8 Jun 1984 p 18
Avail: NTIS HC A04/MF A01

The economics of designing and producing a competitive major passenger aircraft is explored Factors involved are producing an aircraft at economically acceptable cost and keeping pace with competition in terms of quality as well as manufacturing hours and manufacturing cost The economics of manufacturing a plane in one or two plant site as opposed to several plant sites is examined. E.R.

N85-26457# Loughborough Univ of Technology (England). Dept. of Transport Technology
INFORMATION TECHNOLOGY APPLICATIONS IN VOLUNTARY SECTOR TRANSPORT OPERATIONS. SP1: OBJECTIVES AND PROGRAMME OF WORK
D. GILLINGWATER and J. SUTTON Mar. 1985 13 p refs
(TT-8501) Avail: NTIS HC A02/MF A01

The practical application of information technology to improve the effectiveness of the operation of transport services organized by the voluntary sector is to be demonstrated and evaluated. The objectives are as follows to identify existing operational problems with and barriers to the application of information technology to voluntary sector transport initiatives; to demonstrate the scope and feasibility, and identify the limitations, of the use of personal computers in, for example, facilitating vehicle sharing and improving vehicle utilization; to evaluate, through selected case studies, the relative merits of mini- and micro-computer use in providing a more effective operation through the application of data base management, financial management, performance evaluation, and word processing facilities; and to disseminate the practical relevance and feasibility of information technology applications in voluntary sector transport initiative through the medium of intensive training packages for community transport managers and operators, and the provision of guidelines for agencies and groups funding such schemes. Author

N85-26645# Singer Co, Wayne, N J
DESIGN-TO-COST (DTC) METHODOLOGY TO ACHIEVE AFFORDABLE AVIONICS
A. J. SHAPIRO *In* AGARD Cost Effective and Affordable Guidance and Control Systems 18 p Feb. 1985 refs
Avail· NTIS HC A13/MF A01

In response to the continual exponential growth in the complexity and cost of military weapon systems, especially the electronics portions, the United States Department of Defense has implemented a Design to Cost (DTC) procurement policy. The objective of this policy is to meet essential and desired operational requirements in the most cost effective manner by setting cost targets at the start of the procurement process. A methodology is described for developing electronic equipment to meet DTC requirements. Specific management action is required in establishing an appropriate organization as well as procedures and guidelines for the engineering development process and subsequent production to achieve the cost targets. The critical role of computer aided design in optimizing the electronic system design is highlighted. An example of a DTC program successfully applied to the Lightweight Doppler Navigation System (LDNS) AN/APN-128 is reviewed. Author

N85-26657# Bodenseewerk Geraetetechnik G.m.b.H., Ueberlingen (West Germany). Missile Div.
SIMULATION: A TOOL FOR COST-EFFECTIVE SYSTEMS DESIGN AND LIVE TEST REDUCTION
R GAUGETT *In* AGARD Cost Effective and Affordable Guidance and Control Systems 9 p Feb. 1985 refs
Avail: NTIS HC A13/MF A01

Taking advanced passive infrared guided missiles as an example of missile system simulation - both software and realtime hardware-in-the-loop including background - is a valuable tool to find cost-effective system designs and also to drastically reduce costs of field testing and live firing trials. The development of complex missile systems becomes questionable from a cost standpoint if the majority of the increased test efforts for this type of missiles is not substituted by missile system simulation. The author addresses Bodenseewrk's missile system simulation philosophy, simulation methods, high level programming language and the interfaces between the involved hardware and software. An in-depth discussion of the influence of simulation onto the

flight testing requirements of missile developments and the resultant cost savings conclude this paper G.L.C.

N85-26842*# Hoffman (F. E) and Associates, Montrose, Calif.
COST PREDICTION MODEL FOR VARIOUS PAYLOADS AND INSTRUMENTS FOR THE SPACE SHUTTLE ORBITER Final Report
F. E. HOFFMAN 17 Aug. 1984 36 p refs Prepared for JPL (Contract NAS7-918)
(NASA-CR-175781; JPL-9950-1061; NAS 1.26.175781; FEHA-84-08-01) Avail: NTIS HC A03/MF A01 CSCL 22B

The following cost parameters of the space shuttle were undertaken: (1) to develop a cost prediction model for various payload classes of instruments and experiments for the Space Shuttle Orbiter; and (2) to show the implications of various payload classes on the cost of: reliability analysis, quality assurance, environmental design requirements, documentation, parts selection, and other reliability enhancing activities. G.L.C

N85-32138# Congressional Budget Office, Washington, D. C.
PRICING OPTIONS FOR THE SPACE SHUTTLE. SPECIAL STUDY
Mar 1985 58 p refs
Avail: NTIS HC A04/MF A01

The space shuttle is the most important means of placing satellites into orbit for scientific, commercial, and military purposes. The price which the National Aeronautics and Space Administration (NASA) charges foreign and commercial customers to use the shuttle's launch services has important implications for the development of space and for the future of the U S. space program. Alternative shuttle prices, their relation to shuttle costs, and how alternative prices could affect the goals of the national space effort are analyzed. The costs of the shuttle system is analyzed, a set of pricing options is developed, the implications of these options for space policy objectives are explored E.A.K.

N85-32813# Naval Postgraduate School, Monterey, Calif.
A MICROCOMPUTER TUTORIAL ON SPREADSHEETS AND DATABASES WITH A SIMULATED BUDGET PREPARATION M.S. Thesis
S T. COWEN, III Mar. 1985 116 p
(AD-A155516) Avail· NTIS HC A06/MF A01 CSCL 05A

The objective of this thesis is to illustrate to financial managers in the Practical Comptrollership Course (PCC) some of the potential for microcomputers in budget preparation and execution. This will be accomplished through the use of a tutorial on electronic spreadsheets and databases, and a simulated budget generated using an electronic spreadsheet. The background of microcomputer implementation into the federal government and commercial industry and the problems encountered in this implementation are presented. The theory of tutorial development, along with a methodology which uses a layered procedure is discussed and used to develop the tutorial which resulted from this thesis. The tutorial manual is enclosed as Appendix A and the computer program is enclosed as Appendix B. It is recommended that this tutorial be included as a requirement for all PCC students. GRA

N85-34147*# Wilson (James E), La Plata, Md.
STUDY TO ENCOURAGE AND FACILITATE INDUSTRIAL INVESTMENT AND INVOLVEMENT IN SPACE Final Report
J. E. WILSON 29 Feb. 1984 13 p
(Contract NASW-3873)
(NASA-CR-176152, NAS 1.26:176152) Avail. NTIS HC A02/MF A01 CSCL 22A

A simple and efficient means to alert the Director, Space Station Commercialization Task Force (DSCTF) and the equivalent director of a permanent office for the same function, to actions required to assure comprehensive support of the NASA objectives for commercial uses of space during the annual budget cycle is described. G.L.C.

08

LOGISTICS AND OPERATIONS MANAGEMENT

Includes Inventory Management and Spare Parts, Materials Management and Handling, Resources Management, Resource Allocation, Procurement Management, Leasing, Contracting and Subcontracting, Maintenance and Repair, Transportation, Air Traffic Control, Fuel Conservation, Operations, Operational Programs

A85-14896
R&M IMPLICATIONS OF THE DOD ACQUISITION IMPROVEMENT PROGRAM
H L. GILMORE (Pennsylvania State University, Middletown, PA) IEEE Transactions on Reliability (ISSN 0018-9529), vol. R-33, June 1984, p 138-144. refs

The objectives and procedures initiated after issuance of the DoD Acquisition Improvement Program, intended to hold down procurement costs while enhancing reliability and maintainability (R&M) of hardware and software, are described. Limits have been removed from costs while more thorough cost projections are required during project bidding The inclusion of architectures (of electronic components) which are amenable to evolutionary changes has been mandated as a means to eventually achieve desired capabilities before they are defined. Additional definitions of R&M thresholds are required on the bases of operational readiness, mission success probabilities, maintenance, manpower costs and logistics support costs. Successive changes to long-term procurements must be incremental and meet the R&M goals. M.S.K.

A85-21548* College of William and Mary, Williamsburg, Va.
OPTIMAL MAINTENANCE CENTER INVENTORIES FOR FAULT-TOLERANT REPAIRABLE SYSTEMS
S. H. LAWRENCE and M. K SCHAEFER (College of William and Mary, Williamsburg, VA) Journal of Operations Management (ISSN 0272-6963), vol. 4, Feb. 1984, p. 175-181. Research supported by the College of William and Mary. refs
(Contract NSG-1625)

A probabilistic approach is taken to determine the optimal repairable parts inventory for a maintenance center, servicing machines which contain several m-out-of-n systems of different parts, with a constraint on the total inventory investment. A model, based on the discrete Markov process, accounts for a typical ultrareliable avionics system, such as one presently being developed by NASA The dynamic programming algorithm for minimizing the stockout and holding costs is applied to an exemplary maintenance center, and solutions for single-item and multi-item cases are given. The computational burden is noted to be reasonable and a computer program is used to generate optimal solutions. L T.

A85-25978
INTEGRATION OF MSG-3 INTO AIRLINE OPERATION
L F BRETT (Trans World Airlines, Inc., Kansas City, MO) Society of Automotive Engineers, Aerospace Congress and Exposition, Long Beach, CA, Oct. 15-18, 1984 5 p.
(SAE PAPER 841483)

An airline operator's development of an initial maintenance program has its basis in the FAA's MSG-3 guidelines. The accuracy and clarity of the MSG-3 review process provide a smooth transition for the airline's manpower, parts, tooling, ground equipment, and other established systems, from a given aircraft to a new type. By clearly identifying maintenance tasks, MSG-3 makes manpower resource requirement forecasting easier, allowing determinations to be made of the level of skills that must be used in maintenance tasks. O.C.

A85-25979
MSG-3 - A METHOD FOR MAINTENANCE PROGRAM PLANNING
J. A. PONTECORVO (FAA, Office of Airworthiness, Washington, DC) Society of Automotive Engineers, Aerospace Congress and Exposition, Long Beach, CA, Oct. 15-18, 1984. 6 p.
(SAE PAPER 841485)

An account is given of the development of the Airliner/Manufacturer Maintenance Program Planning document, which, having been formulated by the FAA's Maintenance Steering Group-3 Task Force, is designated 'MSG-3'. Before any new model aircraft enters commercial service, the airline in question must have its maintenance and inspection program approved by the FAA. The airline develops a program for submission to the FAA which is in accord with MSG-3's general organization and decision process for determining the scheduled maintenance requirements projected for the life of both aircraft and powerplant. O C

A85-35073
COMMISSION STACKER - INCORPORATION IN A TOTAL LOGISTIC CONCEPT [KOMMISSIONIERSTAPLER - EINBINDUNG IN EIN LOGISTISCHES GESAMTKONZEPT]
P. ORLOWSKI (Messerschmitt-Boelkow-Blohm GmbH, Bremen, West Germany) Dortmunder Gespraeche '84 - Flexible Automatisierung von Flurfoerderzeugsystemen, Dortmund, West Germany, Mar. 28, 29, 1984, Paper. 5 p In German
(MBB-UT-36-84-OE)

The increase in Airbus production rates and the necessity to improve the cost efficiency of production has led to changes in the structure of the manufacturing plants of a West German aerospace company. An important factor, in addition to the employment of new technologies and installations, was the economic solution of problems of integration. Concepts of logistics for use throughout the plant organization were developed, and, in part, already implemented. The storage of parts and devices needed in subsequent manufacturing and assembly operations is considered, taking into account the 'commissioning' or assignment of items required for a specific operation. The commissioning or assignment of items required for a specific operation. The commissioning was considered as a problem for which an optimal solution had to be obtained. It was found that the utilization of a 'commission stacker' was an important factor in a procedure providing such an optimal solution. Another important element in the envisaged procedure involves the employment of data processing techniques and a closed informational chain of logistics. G R

A85-37903
UNITS OF EQUIPMENT AVAILABLE USING CANNIBALIZATION FOR REPAIR-PART SUPPORT
D. L. BYRKETT (Miami University, Oxford, OH) IEEE Transactions on Reliability (ISSN 0018-9529), vol. R-34, April 1985, p. 25-28.

This paper presents a mathematical model to predict the number of units of equipment available in the future The components of this equipment are subject to Poisson failures and replacements are obtained by cannibalization. A numerical example is presented, and some difficulties encountered in the practical application of this model are discussed. Author

A85-39070
FAILURE MODES AND EFFECTS ANALYSIS METHOD FOR NEW PRODUCT INTRODUCTIONS
R. E. WARR (General Electric Co., Bridgeport, CT) IN Advances in aerospace propulsion; Proceedings of the Aerospace Congress and Exposition, Long Beach, CA, October 15-18, 1984 . Warrendale, PA, Society of Automotive Engineers, Inc., 1984, p. 145-150.
(SAE PAPER 841600)

A different method of performing Failure Modes and Effects Analyses (FMEAs) is described that is beneficial in improving product quality and in avoidance of product problems in-house and in the field. The method is usefully applied to mechanical products since there is a dearth of mechanical failure rate data and is suitable for new product introductions during the concept or early design phase to help answer many of the quality, producibility, safety and reliability questions that arise concerning new product designs. The method is different from the traditional methods of performing FMEAs since it is accomplished without historical part failure rate data, an area that frequently creates significant problems to the analyst of new product introductions. The method of performing FMEAs allows for continuing update during a product design program since the analysis can be automated Author

A85-45148#
DYNA-METRIC - NEW CAPABILITIES
B J. WIELAND (USAF, Logistics Command, Wright-Patterson AFB, OH) IN· NAECON 1984; Proceedings of the National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1984. Volume 2 . New York, IEEE, 1984, p. 1280-1283 refs

Dyna-METRIC, a Dynamic Multiechelon Technique for Recoverable Item Control, is an analytical model developed by the Air Force to improve the management of multiindenture reparable spare parts. A general overview of the basic components of the Dyna-METRIC model is given, and some new features incorporated into the fourth version of the model are described. The improved features include· the ability to consider the depot as more than a supply of stock; sortie-based part failure determination; and greater flexibility in assigning part repair times. I.H.

A85-47683* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif
CONCEPTS AND ALGORITHMS FOR TERMINAL-AREA TRAFFIC MANAGEMENT
H. ERZBERGER and J. D. CHAPEL (NASA, Ames Research Center, Moffett Field, CA) IN. 1984 American Control Conference, San Diego, CA, June 6-8, 1984, Proceedings. Volume 1 . New York, IEEE, 1984, p 166-173. refs

The nation's air-traffic-control system is the subject of an extensive modernization program, including the planned introduction of advanced automation techniques. This paper gives an overview of a concept for automating terminal-area traffic management. Four-dimensional (4D) guidance techniques, which play an essential role in the automated system, are reviewed One technique, intended for on-board computer implementation, is based on application of optimal control theory. The second technique is a simplified approach to 4D guidance intended for ground computer implementation. It generates advisory messages to help the controller maintain scheduled landing times of aircraft not equipped with on-board 4D guidance systems. An operational system for the second technique, recently evaluated in a simulation, is also described Author

A85-48239* College of William and Mary, Williamsburg, Va.
OPTIMAL INVENTORIES FOR OVERHAUL OF REPAIRABLE REDUNDANT SYSTEMS - A MARKOV DECISION MODEL
M K. SCHAEFER (College of William and Mary, Williamsburg, VA) IN: Reliability theory and models: Stochastic failure models, optimal maintenance policies, life testing, and structures; Proceedings of the Symposium on Stochastic Failure Models, Replacement and Maintenance Policies, and Accelerated Life Testing, Charlotte, NC, June 24-26, 1983 . Orlando, FL, Academic Press, Inc., 1984, p. 141-151. refs
(Contract NSG-1625)

A Markovian decision model was developed to calculate the optimal inventory of repairable spare parts for an avionics control system for commercial aircraft. Total expected shortage costs, repair costs, and holding costs are minimized for a machine containing a single system of redundant parts. Transition probabilities are calculated for each repair state and repair rate, and optimal spare parts inventory and repair strategies are determined through linear programming. The linear programming solutions are given in a table. I.H.

A85-48851
THE IMPOSITION OF FLOW CONTROL AVOIDS ATC OVERLOADS
C. EIGL (International Civil Aviation Organization, Search and Rescue Section, Paris, France) ICAO Bulletin, vol. 40, Feb. 1985, p 13-16.

The Air Traffic Flow Management (ATFM) unit was organized by the European Air Navigation Planning Group (EANPG) to ensure that an overload of the air traffic control (ATC) in the ATFM Region (which covers all Europe and has a USSR unit) does not occur, and that the traffic flow restrictions are minimized. The most important task of the ATFM is to establish early the anticipated high airspace and landing demand/ATC capacity ratio, and undertake specific action within either the strategic (early planning and coordination) or tactical, short-time measures. In practice, full use of the available ATC capacity is made on a local scale through the allocation of time slots to individual flights, and the adaptation of traffic flow into a given area A truly regionwide coordination awaits full development of a reliable common data base, the Central Data Bank, which is now in its early phases of operation. This and other activities of the ATFM are planned and coordinated at the periodic EUR meeting of EANPG. I.S.

A85-49171
AUTOMATION IN AIR TRAFFIC MANAGEMENT
S. RATCLIFFE Journal of Navigation (ISSN 0020-3009), vol. 38, Sept. 1985, p. 405-412. refs

ATC procedures are currently limited by the manpower-intensive nature of the work, the necessity for each ATC to find local solution instead of for the flight as a whole, and the practice of imposing standarized traffic patterns. Automating the critical ATC functions would require reliability at an expected accident potential of 1:1 billion. Computer hardware reliability could be assured with fault tolerant techniques However, there is no experience base with the needed reliability which would be required of the real-time software required to handle the associated complex situations. Also, humans must be able to oversee the automatic processes. The FAA has announced intentions of automating the cruise flight phase ATC functions with the AERA plan The system would also, optimally, interface with aircraft on-board flight management computers to enhance flight efficiency. It is concluded that progress toward automation must be pursued cautiously, and at present ATC functions should continue to be in the control of humans aided by computers. M S K.

A85-49536
MAINTAINABILITY ASPECTS IN MAINTENANCE MANAGEMENT
W. R DOWNS (Wm. Downs Technical/Management Services, Rancho Palos Verdes, CA) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p. 62-66. refs

This paper discusses the need for the operator of equipment to continue the efforts of the manufacturer in the user environment in order to assure the maintainability performance potential built into the system The maintainability performance predicted for the system is usually based on an operations model that is assumed to be real but may differ in many ways from the actual operations environment. Downtime, availability, and maintenance manhours, the common maintainability performance criteria, can vary widely as a function of maintenance concepts and maintenance planning to control those elements that are crucial to the attainment of maintainability performance objectives. Data relating to operations are presented in regard to the maintainability performance parameters they affect, and analyses are presented as examples of the types of analyses system operators may perform in order to optimize maintainability performance in the field. Author

A85-49588
R&M ANALYSIS TECHNIQUES FOR FAULT-TOLERANT SYSTEMS
M. H. VEATCH, A B. CALVO (Analytic Sciences Corp., Reading, MA), and J. L. MCMANUS (USAF, Logistics and Human Factors Div., Wright-Patterson AFB, OH) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p 530-536. refs

Reliability and logistics support analysis techniques for fault-tolerant avionics systems are presented. The systems considered contain integration and dynamic reconfigurability as part of their fault-tolerant design. These characteristics, combined with the need for analysis during the early stages of development, pose unique modeling requirements The techniques developed address this need by providing design criteria based on reliability and maintainability during the early stages of design. They are applicable to the Integrated Communication, Navigation and Identification Avionics (ICNIA) architectures which are currently entering the advanced development phase. Author

A85-49914
WEIGHT CONTROL - A PROCUREMENT AGENCY PERSPECTIVE
D. M CATE (U.S. Naval Air Systems Command, Washington, DC) SAWE, Annual Conference, 43rd, Atlanta, GA, May 21-23, 1984. 14 p.
(SAWE PAPER 1594)

A procurement agency perspective on the factors which make success in weight control efforts difficult to achieve is presented, with attention to technological uncertainty, psychological pressures toward optimistic estimates, insufficient resources, and competing priorities. It is suggested that these factors can be significantly balanced by undertaking weighings for estimate verification, by the use of derivation and modification programs, and by means of center-of-gravity control O.C.

N85-11993# Naval Supply Center, San Diego, Calif.
SUPPLY CENTER PROCESSES
A. SENHEN *In* Defense Systems Management Coll. DoD Robotics Appl. Workshop Proc. p 438-461 1983
(AD-P004014) Avail: NTIS HC A21/MF A01 CSCL 15E

The Naval Supply Centers supply the material needs for the fleet and shore activities including virtually all parts, provisions, and fuel needed to sustain day-to-day operations (The Supply Centers are not responsible for maintaining or distributing ordnance) GRA

N85-11996# General Accounting Office, Washington, D. C. National Security and International Affairs Div.
LOGISTICS SUPPORT COSTS FOR THE B-1B AIRCRAFT CAN BE REDUCED
20 Sep. 1984 49 p
(AD-A145846; GAO/NSIAD-84-36) Avail: NTIS HC A03/MF A01 CSCL 14D

While the Air Force's logistics support planning for the B-1 bomber has been extensive, the inadequacy of the logistics data developed during research and development of the B-1B's predecessor-the B-1A-and the concurrent development and production schedule necessitated by a congressional mandate that the aircraft be operational not later than 1987 have forced Air Force planners to make logistics support decisions before they had sufficient data to support them. This has increased the risk that operating and support costs will be more than they would have been had normal Defense development procedures been employed before starting production. GAO has identified opportunities to reduce these costs which should be considered. They are: (1) combining the purchase of investment spares (components that can be repaired and reused) with the purchase of production components; (2) buying spares directly from the manufacturers instead of through the four B-1B contractors; (3) reducing the number of bases from four to three; and (4) centralizing all avionics maintenance repair at the B-1B airframe and engine

depot repair facility and not establishing any repair shops at the planned B-1B bases GRA

N85-12790# Lesley Coll., Cambridge, Mass.
MAINTENANCE MANAGEMENT INFORMATION AND CONTROL SYSTEM (MMICS): ADMINISTRATIVE BOON OR BURDEN
T P. MURRAY Mar. 1984 59 p
(AD-A145762) Avail: NTIS HC A04/MF A01 CSCL 05B

Thirteen years of Air Force design and development went into the Maintenance Management Information and Control System (MMICS), an automated maintenance information system, because maintenance managers need fast, up-to-date maintenance-related data. MMICS is an on-line computer system accessed through remote terminals located in the work area. These terminals communicate with a central base-level computer via telephone circuits. MMICS has wide application and provides automated information to managers of aircraft, missile and communications-electronic organizations. MMICS is currently in operation at one hundred forty Air Force units located at more than one hundred bases. Approximately eight hundred remote terminals and five hundred line printers are installed and in use worldwide. In aircraft maintenance organizations, MMICS provides information on changing aircraft and equipment conditions, parts requirements, aircraft schedules, equipment status and personnel resources and training. Personnel training is an important aspect of a manager's job and is vital to any organization that must maintain a proficient and experienced work force. The purpose of the project is to examine, determine and evaluate the benefit of the MMICS to managers and supervisors in conducting and monitoring training and training programs within their sections GRA

N85-16008# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
A BIRD STRIKE HANDBOOK FOR BASE-LEVEL MANAGERS M.S. Thesis
R. P PAYSON and J. D. VANCE Sep. 1984 223 p
(AD-A147928; AFIT/GLM/LSM/84S-52) Avail NTIS HC A10/MF A01 CSCL 05A

To help develop more awareness about bird strikes and bird strike reduction techniques, this thesis compiled all relevant information through an extensive literature search, review of base-level documents, and personal interviews. The final product--A Bird Strike Handbook for Base-Level Managers--provides information on bird strike statistics, methods to reduce the strike hazards, and means to obtain additional assistance. The handbook is organized for use by six major base agencies: Maintenance, Civil Engineering, Operations, Air Field Management, Safety, and Air Traffic Control. An appendix follows at the end. GRA

N85-16673# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio School of Systems and Logistics.
AN EVALUATION OF THE EFFECT OF ESTABLISHING A MINIMUM ECONOMIC ORDER QUANTITY (EOQ) ON THE AIR FORCE EOQ ITEM MANAGEMENT SYSTEM M.S. Thesis
T. E. DISZ Sep. 1984 93 p
(AD-A147121, AFIT/GLM/LSM/84S-14) Avail: NTIS HC A05/MF A01 CSCL 15E

Policy decisions concerning the Air Force economic order quantity (EOQ) item management system affect thousands of items, billions of dollars, and the readiness of the Air Force This thesis was initiated as a result of a March 1983 Air Force audit Agency report finding potential waste of monies because of deviation from normal procurement cycle periods (PCPs). It evaluates different PCP policies and their affect on several system performance measures for the Air Force consumable item management system The evaluation was performed using simulation models and actual Air Force item data The results support the audit report showing increased cost and investment as a result of larger minimum PCPs. In the first year, larger minimum PCP policies require more stock fund dollars to fund inventory growth, approximately $1211M, $1311M, and $1560M for the 3, 6, and 12 month policies respectively. After the inventory reaches its new level the differences in the annual commit dollar requirements between policies becomes insignificant. GRA

N85-16678# Air Force Inst of Tech , Wright-Patterson AFB, Ohio School of Systems and Logistics.
AN ANALYSIS OF THE EFFECT OF PROCESS CONTROLS ON PRODUCTIVITY AND WEAPON SYSTEM COSTS IN DOD PROCUREMENT M.S. Thesis
M. W OMEARA Sep. 1984 122 p
(AD-A147496, AD-F300490, AFIT/GLM/LSM/84S-50) Avail: NTIS HC A06/MF A01 CSCL 15E

This thesis was a preliminary evaluation of the relationships among quality assurance process controls, productivity and weapon system costs. The available literature indicated positive relationships should exist among the three elements examined, but little empirical evidence was presented to support the positions of the authors. As a result, a detailed interview method was developed to describe the relationships that exist at major DoD aerospace facilities. On-site interviews were conducted at five randomly selected aerospace facilities identified as DoD Plant Representative Offices The results of this initial study were inconclusive. The examined relationships appeared to be positive, but the cognizant DoD personnel had not validated the contractor data claiming increased productivity and reduced costs associated with adequate process controls. Recommendations are provided to improve the DoD surveillance methods Originator-supplied keywords include: Acquisition/Procurement costs. GRA

N85-21680# Stanford Univ., Calif.
ON MAXIMIZING THE EXPECTED LIFETIME OF REPLACEABLE SYSTEMS
M. M. PERKINS Dec 1984 80 p
(Contract N00014-84-K-0244)
(AD-A150003; TR-213) Avail: NTIS HC A05/MF A01 CSCL 15E

Consider the following model. A system has one vital component with n spares. When the vital component fails, the system fails. Derman, Lieberman, and Ross have considered the problem of maximizing the time until failure of the system. They obtained optimal schedules when the lifetime distributions of the spares were known. This paper treats several different cases of this model and finds optimal schedules together with their properties. Assuming only the first two moments of the spare component lifetime distributions are known, the minimax replacement schedules is obtained. These minimax replacement schedules are then compared with schedules based on different amounts of information. When the spares are different from each other, it must be decided in which order they should be used. A general sufficient condition is given under which the greedy order is maximal This condition applies when the complete lifetime distribution is known, or for any minimax schedule. Two special cases are also considered. The first is the case in which groups of spares may be used in parallel. In the second special case, an additional spare will become available at some future time.
Author (GRA)

N85-22349# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Science.
AVIATION MAINTENANCE COMPUTERIZED MANAGEMENT INFORMATION SYSTEMS: PERSPECTIVE FOR THE FUTURE M.S. Thesis
J. F DERRICK and T. A MILLER Jun. 1984 89 p
(AD-A150637) Avail: NTIS HC A05/MF A01 CSCL 01C

The Naval Aviation Logistics Command Management Information System (NALCOMIS) is the next generation solution to the information assimilation gap faced by Naval Aviation maintenance managers. This thesis examines the scope of the problem at the Organizational and Intermediate levels of maintenance, and the intended effect of NALCOMIS and three peripheral information systems. The underlying concepts of the four systems investigated are used to explore Artificial Intelligence as the logical augmentation or follow-on to the NALCOMIS program.

Recommendations regarding the implementation of AI and expert systems are made. GRA

N85-25169# RAND Corp., Santa Monica, Calif.
MANAGING RECOVERABLE AIRCRAFT COMPONENTS IN THE PPB (PLANNING, PROGRAMMING AND BUDGETING) AND RELATED PROCESSES. TECHNICAL VOLUME Interim Report
J. H. BIGELOW Jun. 1984 390 p
(Contract MDA903-81-C-0381)
(AD-A152014; RAND/R-3094-MIL) Avail: NTIS HC A17/MF A01 CSCL 05A

This report describes a methodology called ORACLE--Oversight of Resources and Capability for Logistics Effectiveness. ORACLE's purpose is to assess the effects of varying certain resource levels on the peacetime materiel readiness and wartime sustainability of U S. Air Forces, so that resource requirements can be better estimated and justified. It is intended primarily for use in the Planning, Programming, and Budgeting (PPB) process, but it can also be useful during execution. The author concludes that by itself, ORACLE should have significant value for resource planning. In conjunction with an improved forecasting capability and an execution tracking and control system, ORACLE's value will only be enhanced. GRA

N85-25193# Joint Publications Research Service, Arlington, Va.
ADMINISTRATION CHIEF ON AIR TRAFFIC CONTROL IMPROVEMENTS
A. A. KOLESNIKOV *In its* USSR Rept.: Transportation (JPRS-UTR-84-015) p 1-4 31 May 1984 Transl. into ENGLISH from Grazhdanskaya Aviats (Moscow), no 3, Mar. 1984 p 30-31 Avail NTIS HC A03

The implementation of a unified system of air traffic control in the Soviet Union, the introduction of automated air terminal and air routing systems, and the installation of unified air traffic controllers' consoles with modern radio and secondary radar equipment are discussed. The main link in the operation of the air traffic control system is the controller. Intense attention is being paid to raising the professional, ethical, and political level of these personnel through training at educational establishments, the use of special training equipment, and in-service training at aviation enterprises. More attention should be given to technical training and system work in the traffic control services themselves. The role of flight supervisors as the primary teachers for each shift is examined. A.R H

N85-26692# Federal Aviation Administration, Washington, D.C
NATIONAL AIRSPACE SYSTEM PLAN: FACILITIES, EQUIPMENT AND ASSOCIATED DEVELOPMENT
Apr. 1985 358 p
Avail: NTIS HC A16/MF A01

The National Airspace System (NAS), a mixture of equipment, techniques, and skills that evolved over 40 years is discussed. Improvements in the systems are outlined The need to accommodate safely the increasing demand for aviation services, constrain costs, and solve the problems of aging facilities is emphasized. The specific improvements required long-term capabilities, and the planned system evolution remains essentially unchanged from previous editions. However, four new projects were added. The FAA has put in place a formal and disciplined management process to monitor and control schedules and costs of the NAS Plan. The NAS system requirements specification for the NAS and the system-level design are documented, baselined, and placed under configuration control. Risk areas in the program are identified, and SEI technical resources are applied to assist NAS projects in achieving milestone schedules The new program management controls, SEI resources in place, and most of the major contracts awarded, the outlook is very favorable for the successful execution of the NAS Program Plan. E.A.K.

N85-27744# Naval Material Command, Washington, D. C.
NAVY PROGRAM MANAGER'S GUIDE, 1985 EDITION Final Report
G. S. HANDLER, G. HEMMERLE, and W. RUCKER Jan. 1985 277 p
(AD-A151925; NAVMAT-P-9494) Avail. NTIS HC A13/MF A01 CSCL 15E

The guide describes the Department of the Navy system acquisition process, leaning heavily on lessons learned in past acquisition programs. It outlines the system acquisition process, identifies participants and describes their roles, describes the procedures necessary to move the program from one milestone to the next, and identifies possible pitfalls along the way. The Guide, where possible outlines methodologies and strategies and directs the program manager to specific sources of assistance It is an introduction and ready reference to the Navy acquisition process, not a formal instruction. GRA

N85-28711# Technische Hogeschool, Delft (Netherlands). Dept of Mathematics and Informatics.
FUTURE DIRECTIONS IN OPERATIONS RESEARCH
L. FORTUIN (Nederlandse Philips Bedrijven B.V.) and F. A. LOOTSMA 1984 36 p refs Submitted for publication
(REPT-84-24) Avail: NTIS HC A03/MF A01

The gap between Operations Research (OR) theoretical developments and the application of methods and techniques to analyze and solve real-life management problems is discussed. Developments of the mathematics of OR and of the application of OR in industrial practice are outlined. Author (ESA)

N85-28712# National Aerospace Lab., Amsterdam (Netherlands).
OPERATIONS RESEARCH
1983 15 p In DUTCH, ENGLISH summary Sponsored by Netherlands Agency of Aerospace Programs
(B8561897) Avail. NTIS HC A02/MF A01

Research projects were carried out to improve the effectiveness and safety of civil and military aircraft operations. Quantitative methods such as (computer) simulations (either on a deterministic or statistical basis), network planning, and linear programming are used. Intercontinental and continental civil aircraft traffic; air traffic in the vicinity of airports; and ground traffic at airports are discussed. Military flight path measurements, low level and ground attack missions, and electronic countermeasures are discussed.
Author (ESA)

N85-28997# National Bureau of Standards, Gaithersburg, Md. Center for Analytical Chemistry.
PRINCIPLES OF QUALITY ASSURANCE OF CHEMICAL MEASUREMENTS
J. K. TAYLOR Feb. 1985 81 p refs
(PB85-177947, NBSIR-85-3105) Avail: NTIS HC A05/MF A01 CSCL 07D

The principles of quality assurance of chemical measurements are discussed. They may be classified as quality control - what is done to control the quality of the measurement process, and quality assessment - what is done to evaluate the quality of the data output. Quality assurance practices are considered as a hierarchy with levels progressing from the analyst, the laboratory, the project, to the program The activities of each level are different and depend upon the ones beneath it. Recommendations are presented for developing credible quality assurance practices at each level An appendix contains outlines that may be used to develop the various documents associated with a quality assurance program.
Author (GRA)

N85-29840# Air Force Logistics Management Center, Gunter AFS, Ala.
INVENTORY POLICY FOR HIGH BACKORDER ITEMS
D J BLAZER and C. CARTER Oct. 1984 24 p
(AD-A153696, AD-F630670, AFLMC-LS840810) Avail: NTIS HC A02/MF A01 CSCL 15E

In this study the item-by-item performance of the Standard Base Supply System (SBSS) is compared with the results of an aggregate model that minimizes backorders We found that a small group of relatively inexpensive items generate nearly 90% of the units backordered in the SBSS in a year. By adding a lot size to the reorder point for those high backorder items, we can significantly reduce the number of units backordered. In this study we show how to identify these items, the theory behind the proposed inventory policy change, and the stock fund impact of implementing the policy change. GRA

N85-30965# Air Force Logistics Management Center, Gunter AFS, Ala
EOQ (ECONOMIC ORDER QUANTITY) RANGE MODEL
D. J. BLAZER, W. FAULKNER, and M. P. HAM Jan. 1985 47 p
(AD-A153709; AD-F630708, AFLMC-LS840612) Avail: NTIS HC A03/MF A01 CSCL 15E

In compliance with DOD Instruction 4140 45, the Air Force implemented range model in December 1981 that was based on economics This economic range model determines what items to stock at base level, by comparing the cost to stock the item to the cost to not stock the item The item is stocked if it is economical. In this report we determine the: (1) Performance of the current range model, (2) Sensitivity of the range model to cost, item, and other factors, and (3) Operational, stockage, and cost performance of an alternative method of determining the range of stock for base level. We measured the performance of the current range model and found we had increased the number of line items we stock, but we have not increased the unit issue effectiveness We also found General Support Division items with large lot sizes and high unit prices have a lower likelihood of stocking with the current range model than they did before the model was implemented. The reason the unit issue effectiveness is low is because the current range model is a customer model; it favors individual customers rather than satisfying the quantity of individual items all customers - large and small - request. GRA

N85-31096 Direction Generale de L'Aviation Civile, Toulouse (France). Section d'Etudes et de Coordination SAR
SEARCH AND RESCUE OF AIRCRAFT IN DISTRESS IN FRANCE. ORGANIZATION, MEANS [LA RECHERCHE ET SAUVETAGE DES AERONEFS EN DETRESSE EN FRANCE. ORGANISATION, MOYENS]
P. ROCHEFORT *In* CNES Satellite Aided Search and Rescue. Exptl Results and Operational Prospects p 65-72 1984 In FRENCH
Avail: CEPADUES, Toulouse

The administration of France's air-sea rescue services is outlined. Marine and terrestrial (including mountain rescue) aspects are covered. The SARSAT/COSPAS system is mentioned
Author (ESA)

N85-31868# Urban Mass Transportation Administration, Washington, D.C. Methods Div.
MICROCOMPUTERS IN TRANSPORTATION: SOFTWARE AND SOURCE BOOK, FEBRUARY 1985
R JENSEN-FISHER Feb. 1985 202 p Supersedes PB84-230366; N85-13490
(PB85-181022, UMTA-URT-41-85-1; PB84-230366) Avail: NTIS HC A10/MF A01 CSCL 13B

The Urban Mass Transportation Administration (UMTA) and the Federal Highway Administration (FHWA) of the U S. Department of Transportation provide trainin and technical assistance in the new and rapidly changing area of transportation application of microcomputers. These two agencies maintain up-to-date microcomputer references for transit and paratransit operators, transportation planners, and traffic engineers. This document contains information pertaining to: (1) Microcomputer references and training and; (2) descriptions of software in the areas of transit operations, transportation planning, traffic engineering and paratransit planning and operations GRA

N85-32244# Naval Postgraduate School, Monterey, Calif
SECURITY CONTROLS IN THE STOCKPOINT LOGISTICS INTEGRATED COMMUNICATIONS ENVIRONMENT (SPLICE) M.S. Thesis
D. S. ARSENEAULT Mar. 1985 91 p
(AD-A155536) Avail. NTIS HC A05/MF A01 CSCL 09B

This thesis examines security controls specified and implemented in the Stock Point Logistics Integrated Communications Environment (SPLICE) project. Controls provided by the Defense Data Network and the Tandem operating system are reviewed Alternatives from current literature in areas of authentication, encryption, and dial-port protection are reviewed for the purpose of suggesting enhancements Issues discussed apply to most interactive/decentralized systems in operation today and include administrative as well as technical recommendations. GRA

N85-33036# Army Procurement Research Office, Fort Lee, Va.
FEASIBILITY OF APPLICATIONS OF COMPETITION DECISION ASSIST PACKAGE (CDAP) TO SPARE PARTS Final Report
V. G. LANKFORD and B. L. STEWART Jan. 1985 48 p
(AD-A154716, APRO-84-13) Avail: NTIS HC A03/MF A01 CSCL 14A

Defense Acquisition Regulation Supplement No. 6, DOD Replenishment Parts Breakout Program, 1 June 1983, prescribes a screening of replenishment parts designed to reduce costs by breaking out parts for purchase from other than prime weapon system contractors. The US Army Audit Agency recommended that a cost model be constructed and implemented to: (1) estimate potential costs and price reductions attributable to breakout or increased competition, (2) compare the two figures, and (3) identify whether breakout or competition is cost effective. In September 1983, the Army Procurement Research Office (APRO) published the Competition Decision- Assist Package (CDAP), APRO Study Report 82-08, which described an automated model designed to calculate estimates of recurring costs associated with two producers involved in a competitive production effort. This model had been developed as a tool to assist in the economic evaluation of production competition for a major weapon system. The objective of this study was to determine if it is feasible and beneficial to modify the existing CDAP model so it can be applied to spare parts breakout or competition as an economic analysis model. While the CDAP model may be useful for some major assemblies/subassemblies where an extensive manpower effort for developing model input is warranted, it is impractical as a general purpose economic analysis model for spare parts breakout or competition. Other, more appropriate models exist. GRA

N85-34719# Rolls-Royce Ltd., Derby (England) Operational Research Group.
DISCRETE SIMULATION MODELS - THEIR ROLE IN THE DESIGN, DEVELOPMENT AND MANAGEMENT OF INVENTORY CONTROL SYSTEMS
T. COOPER 24 Jan. 1985 13 p Presented at BPICS Seminar, 24 Jan. 1985
(PNR-90249) Avail: NTIS HC A02/MF A01

Discrete event simulation models were used as testbeds for the design, development and management of computer-based inventory control/scheduling systems. Inventory management at Rolls-Royce, and a case study are described Author (ESA)

N85-35819# Office of Science and Technology, Washington, D. C.
PROGRESS REPORT ON IMPLEMENTING THE RECOMMENDATIONS OF THE WHITE HOUSE SCIENCE COUNCIL'S FEDERAL LABORATORY REVIEW PANEL, VOLUME 1 Summary Report
Jul. 1984 35 p
(PB85-185072) Avail: NTIS HC A03/MF A01 CSCL 14B

The White House Science Council's Federal Laboratory Review Panel looks at Federal laboratory missions, identifies any systemic impediments to performance, and determine whether this Nation is getting the optimum return on its substantial investment in talent and facilities at the Federal laboratories GRA

09

RELIABILITY AND QUALITY CONTROL

Includes Fault Tolerance, Failure and Error Analysis, Reliability Engineering, Quality Assurance, Wear, Safety Management and Safety, Standards and Measurement, Tests and Testing Inspections, Specifications, Performance Tests, Certification.

A85-10055
RELIABILITY AND MAINTAINABILITY CONSIDERATIONS IN COMPUTER PERFORMANCE EVALUATION
V. B. PATKI (Tata Engineering and Locomotive Co., Poona, India), A. B. PATKI (Centre for Reliability, Madras, India), and B. N. CHATTERJI (Indian Institute of Technology, Kharagpur, India) IEEE Transactions on Reliability (ISSN 0018-9529), vol R-32, Dec. 1983, p 433-436. refs

This paper describes the application of R&M concepts to computer performance evaluation. The relevance of reliability to maintenance cost of computer system is established. Although a simple reliability model is used, one can use more complex models. The mathematical model for maintenance cost analysis must be tailored for individual cases, depending upon the maintenance philosophy of the organization. The computer performance analysis from maintenance view points should examine software reliability and recovery procedures, which are relatively difficult in distributed processing Author

A85-10057
GENERAL PROBABILITY OF SYSTEM FAILURE
J. KARPINSKI (Polish Academy of Sciences, Systems Research Institute, Warsaw, Poland) IEEE Transactions on Reliability (ISSN 0018-9529), vol. R-32, Dec 1983, p. 444-449.

This paper presents a general method to determine probabilities of failure of any fixed subset of coherent system components under various conditions. The method uses a known reliability structure of the system and the known joint probability distribution of its component times-to-failure. This method is universal and can be applied in many cases Nevertheless, for large systems it is troublesome. In practice a problem is solved using a numerical program. Author

A85-11351
SYSTEM SIZING - THE THEORY AND THE PRACTICE
G. S. M. TEALE (Petroleum Development Oman LLC, Muscat, Oman) and P. R WOLFE (Solapak, Ltd., High Wycombe, Bucks., England) IN: Photovoltaic Solar Energy Conference; Proceedings of the Fifth International Conference, Athens, Greece, October 17-21, 1983 . Dordrecht, D. Reidel Publishing Co., 1984, p 417-423.

System-sizing safety margins are developed for solar power arrays providing relatively small amounts of energy at remote locations, using theoretical models and empirical data obtained by the Ministry of Petroleum and Minerals of Oman. The availability requirements of typical loads (microwave chains, single-channel VHF repeaters, and pipeline cathodic protection systems) are characterized; generator parameters (including shadowing and dust-accumulation effects) are assessed, and corrections to be applied to typical sizing programs to take these phenomena into account are presented in tables and graphs. The need for users to perform careful analyses and specify safety factors themselves is stressed T.K.

A85-11666
FAILURE PREVENTION AND RELIABILITY - 1983; PROCEEDINGS OF THE FIFTH CONFERENCE, DEARBORN, MI, SEPTEMBER 11-14, 1983
G. M. KURAJIAN, ED. (Michigan, University, Dearborn, MI) Conference sponsored by the American Society of Mechanical Engineers. New York, American Society of Mechanical Engineers, 1983, 211 p For individual items see A85-11667 to A85-11679

Various papers on failure prevention and reliability are presented. Case studies on reliability, failure analysis, and testing are reported The general topics addressed include: fatigue failure and crack growth, procedures, programs, and techniques for failure prevention and reliability; failure and related concepts; and stress and failure analysis of components Individual subjects discussed include. probabilistic fatigue crack growth and design, fatigue crack growth analysis under random spectrum loading using the generalized Willenborg model; new method for determining threshold values of creep crack growth; study of elastic-plastic fracture problem using finite element technique; crack arrest in structural ceramics; fatigue behavior of notched thermoplastics. Also considered are fatigue failure warning method for fiber-reinforced composite structures; reliability improvement by aerothermal analysis of high-speed rotating machinery; reliability estimates through statistics of random response excursions; stress analysis applications to service failures of travelling wave tubes; role of stress analysis in failure prevention; probabilistic design criteria for cylinders and spheres under thermal stresses. C.D.

A85-12645
GROUP TESTING
A. B. MUNDEL Journal of Quality Technology (ISSN 0022-4065), vol 16, Oct. 1984, p. 181-188. refs

Group testing, the simultaneous testing of more than one unit by one test, can provide substantial economies. Group testing can be done in two stages: the testing of groups followed by testing all units in groups that fail This procedure can be optimized by selecting the most efficient group size for a process with a specific fraction nonconforming Greater efficiency can be obtained by multistage group testing. subdividing a group that fails acceptance into successively smaller subgroups, and eventually testing the individual units in the subgroups that fail These procedures, as opposed to sampling, submit all units to acceptance tests rather than accepting a group whose samples pass an acceptance criterion. Author

A85-14101
TESTING, EVALUATION AND QUALITY CONTROL OF COMPOSITES; PROCEEDINGS OF THE INTERNATIONAL CONFERENCE, UNIVERSITY OF SURREY, GUILDFORD, SURREY, ENGLAND, SEPTEMBER 13, 14, 1983
T. FEEST, ED Sevenoaks, Kent, England, Butterworth Scientific, Ltd., 1983, 352 p. For individual items see A85-14102 to A85-14119.

The topics considered include the measurement of fiber/matrix interfacial bond shear strength, the fracture toughness of carbon/epoxy composites, the prediction of notch-tip energy absorption, the assessment of fatigue damage in carbon-reinforced plastic laminates, the X-ray radiography of delamination growth in notched carbon/epoxy laminates, the nondestructive testing of aircraft composite structures, acoustic emission studies in composites with rubber-toughened matrices, quality assurance in a production environment, and the thermo/hygro-response behavior and measurement of selected composite systems. Also discussed are microdamage development in composite laminates during fatigue loading, the dynamic behavior of brittle materials, pattern

recognition in the ultrasonic testing of composites, and vibrothermographic nondestructive evaluation. O C

A85-14109
QUALITY ASSURANCE IN A PRODUCTION ENVIRONMENT
A W. THOMPSON (Bristol Composite Materials Engineering, Ltd., Bristol, England) IN: Testing, evaluation and quality control of composites; Proceedings of the International Conference, Guildford, Surrey, England, September 13, 14, 1983 Sevenoaks, Kent, England, Butterworth Scientific, Ltd., 1983, p. 127-136.

A development history is presented for the methods used to achieve consistently high quality in the fabrication of composite structures, at a major British manufacturing plant, over the course of 30 years. A series of recommendations are made on the basis of experience with numerous and varied aerospace and defence composites-manufacturing tasks. It is noted that workmen must have both adequate training and explanations justifying the procedures and methods to be employed. In order to keep complicated records systems, batches of components must remain clearly differentiated from others for all manufacturing and assembly operations The recurrence of processing errors is best prevented by making the worker in question responsible for the remedial action required O.C

A85-16254
APPLICATION OF A QUALITY ASSURANCE SYSTEM IN THE PRODUCTION OF MATERIALS AND COMPONENTS
K H. BUCHNER and O PAAR (Vereinigte Edelstahlwerke AG, Ternitz and Kapfenberg, Austria) IN: Structural failure, product liability and technical insurance; Proceedings of the First International Conference, Vienna, Austria, September 26-29, 1983 . Amsterdam, North-Holland, 1984, p 149-158 refs

The application of a strict quality-assurance system with precisely defined written procedures and step-by-step documentation to the industrial fabrication of stainless-steel components for steam generators and nuclear reactors is discussed and illustrated with block diagrams, photographs, and tables It is found that the reduced flexibility imposed by this type of system is outweighed by the advantages of easy quality verification and system transparency (permitting the ongoing identification and correction of shortcomings during the manufacturing process). T.K

A85-17779
THE MANAGEMENT OF FAILURE
J. D. GOODLETTE (Martin Marietta Aerospace, Denver, CO) Engineering Management International (ISSN 0167-5419), vol. 2, May 1984, p. 165-171.

The present investigation is mainly concerned with the full-scale engineering development of a product, which, according to definition, begins with the end of preliminary design. The role of testing in a development project is considered, and aspects related to failure management are discussed, taking into account expectations of failure, failure analysis and corrective action, unverified failure, generic failure, personnel error, software change, and heritage hardware. Particular attention is given to the importance of investigating a failure. The engineering manager must find a way to reproduce a failure which has occurred Such a reproduction will provide a basis for the detection of the physical cause of the failure, which in turn will lead to actions needed to prevent the problem from recurring. G.R.

A85-17833*# Battelle Columbus Labs., Ohio
A FAULT-TOLERANT SOFTWARE STRATEGY FOR DIGITAL SYSTEMS
E. F. HITT and J J WEBB (Battelle Columbus Laboratories, Columbus, OH) IN: Digital Avionics Systems Conference, 6th, Baltimore, MD, December 3-6, 1984, Proceedings . New York, American Institute of Aeronautics and Astronautics, 1984, p 211-216 refs
(Contract NAS1-17412)
(AIAA PAPER 84-2646)

Techniques developed for producing fault-tolerant software are described. Tolerance is required because of the impossibility of defining fault-free software. Faults are caused by humans and can appear anywhere in the software life cycle. Tolerance is effected through error detection, damage assessment, recovery, and fault treatment, followed by return of the system to service Multiversion software comprises two or more versions of the software yielding solutions which are examined by a decision algorithm. Errors can also be detected by extrapolation from previous results or by the acceptability of results. Violations of timing specifications can reveal errors, or the system can roll back to an error-free state when a defect is detected. The software, when used in flight control systems, must not impinge on time-critical responses. Efforts are still needed to reduce the costs of developing the fault-tolerant systems. M.S.K.

A85-17848#
VERIFICATION TECHNIQUES FOR IMPROVING SOFTWARE QUALITY THROUGH AUTOMATED REQUIREMENTS DATA BASES
G. LUEDERS (Sperry Corp , Sperry Flight Systems Div , Phoenix, AZ) IN Digital Avionics Systems Conference, 6th, Baltimore, MD, December 3-6, 1984, Proceedings . New York, American Institute of Aeronautics and Astronautics, 1984, p. 309-311.
(AIAA PAPER 84-2669)

The verification testing problem posed by large systems is considered It is pointed out that with thousands of requirements and multiple submodes and configurations, it may be very difficult to confirm that a test has been conducted on each requirement in the relevant mode or configuration. Traceability and coverage problems inherent in large systems were resolved on the 757/767 flight management computer (FMC) system, taking into account detailed verification testing by the use of automated requirements data bases. Attention is given to the 757/767 FMC system verification data base, the implementation of the system data base, the 757/767 detailed verification data bases, and the use of the thread matrix and function matrix data bases. G.R.

A85-17873*# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
USING ADA FOR A DISTRIBUTED, FAULT TOLERANT SYSTEM
J B DEWOLF, N. M. SODANO, and R. S. WHITTREDGE (Charles Stark Draper Laboratory, Inc., Cambridge, MA) IN: Digital Avionics Systems Conference, 6th, Baltimore, MD, December 3-6, 1984, Proceedings New York, American Institute of Aeronautics and Astronautics, 1984, p. 477-484. refs
(Contract NAS9-16023; NASA TASK 84-18)
(AIAA PAPER 84-2703)

It is pointed out that advanced avionics applications increasingly require underlying machine architectures which are damage and fault tolerant, and which provide access to distributed sensors, effectors and high-throughput computational resources. The Advanced Information Processing System (AIPS), sponsored by NASA, is to provide an architecture which can meet the considered requirements. Ada was selected for implementing the AIPS system software. Advantages of Ada are related to its provisions for real-time programming, error detection, modularity and separate compilation, and standardization and portability. Chief drawbacks of this language are currently limited availability and maturity of language implementations, and limited experience in applying the language to real-time applications The present investigation is concerned with current plans for employing Ada in the design of

the software for AIPS. Attention is given to an overview of AIPS, AIPS software services, and representative design issues in each of four major software categories. G R.

A85-18440#
MILITARY ELECTRONICS - WHY SO UNRELIABLE?
E. J. LERNER Aerospace America (ISSN 0740-722X), vol 23, Jan. 1985, p. 106-109.

The causes and remedies for unreliable electronics components procured by the DOD are examined. It is noted that the procurement agencies have in the recent past failed to specify the required lifetimes, have sacrificed reliability to lower costs, meet schedules or reach performance goals, and have not monitored the programs. The burden of reliability is to be left to reliability engineers, who have to review the works of designers before parts are manufactured for testing. Oversight is necessary to assure that all parts of an assembly actually meet mil-specs and are not commercial analogs or untested materials A different problem exists for aluminum in circuit components, which may experience electromigration during burn-in. It is recommended that manufacturers be required to answer questions of reliability assurance before bidding begins, rather than after awards of contracts. M.S.K.

A85-24084
QUALITY MANAGEMENT TECHNOLOGY - PRACTICAL CONSIDERATIONS
E. F MILLER, JR. (Software Research Associates, San Francisco, CA) Journal of Test and Evaluation, vol. 5, Oct. 1984, p. 13-19. refs

Methods are currently available for the testing of software and hardware systems. The present investigation is concerned with these methods, taking into account also relations between hardware and software testing problems A design level complexity comparison is conducted, giving attention to the 'tr' function, the search function, the central processor unit, and the complete computer system A software test methods survey is provided, and inspection methods are considered along with inspection method details, and aspects of experience and recommendations. Static analysis methods are discussed, and dynamic analysis methods are examined In a description of advanced testing methods, symbolic analysis methods and formal verification procedures are taken into account. Attention is given to ad hoc testing, structural testing, advanced path testing, and practical test certifications. G.R.

A85-25108
PERFORMANCE/RELIABILITY MEASURES FOR FAULT-TOLERANT COMPUTING SYSTEMS
S. OSAKI (Hiroshima University, Higashi-Hiroshima, Japan) IEEE Transactions on Reliability (ISSN 0018-9529), vol R-33, Oct. 1984, p. 268-271. refs

Some fault-tolerant computing systems are discussed and existing reliability measures are explained Some performance/reliability measures are introduced Several systems are compared by using numerical examples with the new measures. Author

A85-25109
SOME REMARKS ON OPTIMUM INSPECTION POLICIES
N. KAIO (Hiroshima Shudo University, Hiroshima, Japan) and S. OSAKI (Hiroshima University, Higashi-Hiroshima, Japan) IEEE Transactions on Reliability (ISSN 0018-9529), vol R-33, Oct. 1984, p. 277-279. refs

Optimum inspection policies are discussed, introducing the inspection density and using it to derive the optimum inspection policy. The models discussed are: the basic model, the basic model with checking time, and the basic model with imperfect inspection. For each model, the approximate optimum inspection policy minimizing the total s-expected cost is obtained by applying the calculus of variations. Author

A85-32010#
SOFTWARE QUALITY ASSURANCE PROGRAM FOR THE AH-64 ADVANCED ATTACK HELICOPTER (AAH)
B R GANTZ, L KENISON, and S. D. KUCHLAK (Hughes Helicopters, Inc., Mesa, AZ) American Helicopter Society, Annual Forum, 40th, Arlington, VA, May 16-18, 1984, Paper. 18 p.

The importance of a Software Quality Assurance (SQA) Program is discussed, taking into account the need for such programs in connection with the requirements of the Department of Defense (DOD), specifications imposed by the DOD, and the Software Quality Assurance Organization. It is pointed out that an effective SQA organization develops a Software Quality Assurance Program Plan (SQAPP) which serves as a guide to monitor, audit, inspect, and report on all software developed. A description is given of the history of the SQA development in the organization of an American aerospace company. In mid-1981, with the first production contract for the AAH-64 in the negotiating stage, it became apparent that the U.S. Army was going to make software quality assurance a part of the production contract Attention is given to the various developments which led to a Software Quality Assurance Program Plan in December 1982, and its approval by January 1983. G.R.

A85-34449
STATISTICAL ESTIMATION OF SOFTWARE RELIABILITY
S. M. ROSS (California, University, Berkeley, CA) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol SE-11, May 1985, p. 479-483. refs
(Contract AF-AFOSR-81-0122)

A procedure commonly used in the testing of new computer software packages is the package's application to a set of well known problems. Specific bugs that may be responsible for the errors observed are then sought, and the package is accordingly altered In order to model this process, it is presently supposed that the package contains an unknown number of bugs which generate errors in accordance with an independent Poisson process having unknown rates, and that the errors are independently detected with some known property. The error rate for the revised package is determined under a variety of assumptions as to what is learned when debugging occurs. O.C.

A85-34460
A FAULT TOLERANT MILITARY SATELLITE NETWORK MANAGEMENT SYSTEM
C. SCHIANO and A VAN NOSTRAND (Grumman Data Systems Corp , Calverton, NY) IN: Milcom '83, Proceedings of the Military Communications Conference, Washington, DC, October 31-November 2, 1983 Volume 1 New York, Institute of Electrical and Electronics Engineers, Inc., 1983, p. 47-59.

Defense Satellite Communications Systems are increasingly being structured as networks It becomes, therefore, critical to be able to monitor and control the activity and performance of the network. Traditionally, this has been done through the use of ground station equipment manufacturer's standard monitor and control systems The ground station ground communications equipment has been continually updated to provide redundance and fault tolerance. This paper provides a description of a Military Satellite Network Monitor and Control System which uses the most modern fault-tolerant computing techniques to provide continuous, correct network management. G.R

A85-36291
IMPLEMENTING FAULT-TOLERANT DISTRIBUTED OBJECTS
K P BIRMAN, T. A. JOSEPH, T. RAEUCHLE, and A. EL ABBADI (Cornell University, Ithaca, NY) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. SE-11, June 1985, p 502-508. Research supported by Sperry Corp. refs

This paper describes a technique for implementing k-resilient objects - distributed objects that remain available, and whose operations are guaranteed to progress to completion, despite up to k site failures. The implementation is derived from the object specification automatically, and does not require any information beyond what would be required for a nonresilient nondistributed

implementation. It is therefore unnecessary for an applications programmer to have knowledge of the complex protocols normally employed to implement fault-tolerant objects. The technique is used in ISIS, a system being developed at Cornell to support resilient objects. Author

A85-36297
A TECHNIQUE FOR ESTIMATING PERFORMANCE OF FAULT-TOLERANT PROGRAMS
R. D. SCHLICHTING (Arizona, University, Tucson, AZ) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. SE-11, June 1985, p 555-563. refs
(Contract NSF MCS-82-02869)

A technique is presented for estimating the performance of programs written for execution on fail-stop procesors It is based on modeling the program as a discrete-time Markov chain and then using z-transforms to derive a probability distribution for time to completion Author

A85-37901
THE LINEAR SOFTWARE RELIABILITY MODEL AND UNIFORM TESTING
M TRACHTENBERG (RCA, Missile and Surface Radar Div, Moorestown, NJ) IEEE Transactions on Reliability (ISSN 0018-9529), vol. R-34, April 1985, p. 8-16. refs

The Jelinski-Moranda, Shooman, and Musa software reliability models all predict that the software error detection rate in a software system is a linear function of the detected errors The basic differences among the models are that the error rates are, respectively, in terms of calendar-time, manpower, and computer-time The models are simple to use for estimating the number of errors still in the tested software Published studies generally show that error rates during system testing correlate best with the Musa model, and progressively less with the Shooman, and Jelinski-Moranda models. Simulation shows that, with respect to the number of detected errors, (1) testing the functions of a software system in a random or round-robin order gives linearly decaying system-error rates, (2) testing each function exhaustively one at a time gives flat system-error rates, (3) testing different functions at widely different frequencies gives exponentially decaying system-error rates, and (4) testing strategies which result in linear decaying error rates tend to require the fewest tests to detect a given number of errors Author

A85-37904
A SYSTEM RELIABILITY MODEL WITH CLASSES OF FAILURES
A. HAC (Johns Hopkins University, Baltimore, MD) IEEE Transactions on Reliability (ISSN 0018-9529), vol. R-34, April 1985, p. 29-33. Research sponsored by the British Council. refs

This paper presents an approach to system reliability involving s-dependence of the workload as well as the system configuration Four classes of failures are described and then incorporated into the workload model Mean time to failure and the system reliability are the functions of parameters estimated by monitoring a real system. The model allows multiple classes of users and priority requests to be represented. The model is validated using measurement data collected in an IBM installation. Author

A85-38267#
ECONOMIC CONSIDERATIONS IN SELECTING SPACECRAFT QUALITY ELECTRONIC PARTS
M L. ADAMS (Rockwell International Corp., Pittsburgh, PA) IN: Aerospace Testing Seminar, 8th, Los Angeles, CA, March 21-23, 1984, Proceedings . Mount Prospect, IL, Institute of Environmental Sciences, 1984, p 177-184. refs

The space industry is concerned with the continuous improvement of systems capability and reliability, and the prolongation of the useful life for space systems. It is highly important to achieve these goals in a cost-effective manner. Within the U.S. Air Force Space Division (AFSD) programs, two have received particular attention. One is the Class S program which involves the improvement of electronic piece part quality and reliability, while the other is concerned with the improvement of test requirements and criteria through use of MIL-STD-1540. The present paper focuses on the implementation of the Class S requirements in a particular case, taking into account applications to the space segment of the Global Positioning System (GPS). Attention is given to a Class S background, reliability improvements, Class S implementation on Navstar, and aspects of cost avoidance/savings. G.R.

A85-40255
THE DEMING INSPECTION CRITERION FOR CHOOSING ZERO OR 100 PERCENT INSPECTION
E. P PAPADAKIS (Ford Motor Co., Detroit, MI) Journal of Quality Technology (ISSN 0022-4065), vol 17, July 1985, p. 121-127. refs

An analysis of Deming's (1981) inspection criterion (DIC) for choosing zero or 100 percent inspection is presented, based on examples from the inspection practices of a large U.S. automaker. The DIC is derived from statistical principles to express the cost to the firm of sampling incoming lots of material for statistical quality control (SQC). It is shown by the examples that practice was related to the DIC only in the specific cases cited, and cost savings and cost avoidance were obtained from 100 percent inspection only in those cases in which the DIC indicated 100 percent inspection was warranted. In four out of five of the cases studied, 100 percent inspection was mandated on the basis of the DIC, and slow progress in improving production processes did not permit the removal of the 100 percent inspection requirement after a period of six years I.H

A85-40333#
RELIABILITY FOR REAL-TIME SYSTEMS [ZUVERLAESSIGKEIT FUER REALZEITSYSTEME]
S. OMLOR (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Jahrestagung, Hamburg, West Germany, Oct. 1-3, 1984. 22 p In German. refs
(DGLR PAPER 84-117)

A software reliability model is developed for use in the design of real-time control systems. The characteristics of real-time systems are reviewed; the criteria and models used to measure reliability are examined; and the need for a model which can be applied during the design phase is indicated The present model is based on Markov processes, assuming that the reliability of each program subunit and the information flow are stochastic while the program structure is deterministic, and can be derived from a system configuration with structured analysis and modular design. In effect, the model permits an approximate simulation of the program reliability and identifies the critical program subunits for the test phase T.K.

A85-43176* American Inst. of Aeronautics and Astronautics, New York.
WHITE-COLLAR PRODUCTIVITY AND QUALITY ISSUES; PROCEEDINGS OF THE SYMPOSIUM ON PRODUCTIVITY AND QUALITY: STRATEGIES FOR IMPROVING OPERATIONS IN GOVERNMENT AND INDUSTRY, WASHINGTON, DC, SEPTEMBER 25, 26, 1984
M GERARD, ED. and P. W EDWARDS, ED. (AIAA, New York) New York, AIAA, 1985, 252 p. For individual items see A85-43177 to A85-43207.
(Contract NASW-3977)

Techniques for improving the productivity of white-collar workers while maintaining high product quality are examined in reviews and reports The emphasis is on the application of strategies developed in the private sector to government-agency and aerospace-industry operations. Topics discussed include international competition, organizational attitudes and orientation, management practices, education and training, renewing large organizations, encouraging innovation, national initiatives, employee involvement, management involvement, and applications of new technology. T.K

A85-45433
SPACE REACTOR SAFETY
D. F. BUNCH (DOE, Washington, DC) IN: IECEC '84 Advanced energy systems - Their role in our future; Proceedings of the Nineteenth Intersociety Energy Conversion Engineering Conference, San Francisco, CA, August 19-24, 1984 Volume 1 . La Grange Park, IL, American Nuclear Society, 1984, p 605-608. refs

Attention is given to spacecraft missions which have been identified as candidates for application of new-generation nuclear power systems, from the viewpoint of safety criteria. An evaluation is conducted of the SP-100 space nuclear reactor program, whose mass, power, service life and volume characteristics will have an impact of questions of safety It is concluded that some relaxation of performance standards may be required in the course of design development in order to meet the requisite safety goals. O.C.

A85-49526
ANNUAL RELIABILITY AND MAINTAINABILITY SYMPOSIUM, SAN FRANCISCO, CA, JANUARY 24-26, 1984, PROCEEDINGS
Symposium sponsored by IEEE, AIAA, ASME, et al New York, IEEE, 1984, 576 p. For individual items see A85-49527 to A85-49589

The present conference addresses topics in computer-aided reliability and maintainability, mechanical reliability, the management of reliability and maintainability (R&M), the status of the U.S. Department of Defense/industry R&M study, reliability assessment, testing, and screening, testability and automatic testing, dormant reliability, the use of R&M field data, software reliability, built-in testing (BIT), modeling and simulation methods, robotics and automation, operational readiness, reliability growth, and maintainability. Specific attention is given to electronic equipment *thermal management, MTBF predictions, BIT self-verification*, expert systems in software maintainability, spacecraft anomalies and lifetimes, fiber-optics reliability, and lower limits for total ship reliability. O.C.

A85-49539#
ESTABLISHING REALISTIC REQUIREMENTS FOR RELIABILITY, MAINTAINABILITY, AND BUILT-IN-TEST
R. C. TRAKAS (U.S. Navy, Naval Air Systems Command, Washington, DC) IN Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings New York, IEEE, 1984, p 103-107

Steps have been taken within the Naval Air Systems Command to provide a repeatable, logical approach to establishing realistic requirements for reliability, maintainability, and built-in-test (BIT) This approach prevents problems on programs under development where failure to meet specified requirements in the areas of reliability, maintainability, and BIT could be attributed to establishment of arbitrary, unrealistic requirements with little or no basis in fact. The approach taken ensures the proper relationship between the program thresholds within the Navy and the contractually specified requirements. This provides for a cost-effective and realistic method for ensuring that adequate inherent reliability, maintainability, and BIT capabilities are designed into the equipment to meet the stated operational requirements. Author

A85-49540
RELIABILITY PREDICTION - IMPROVING THE CRYSTAL BALL
N. HARRIS and P. D. T OCONNOR (British Aerospace, PLC, Dynamics Group, Stevenage, England) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings New York, IEEE, 1984, p 108-113 refs

In principle, given sufficient knowledge of load and strength variations, it is possible to use statistical and probability theory to evaluate the failure probability of any component within a system, and therefore of the system itself. Even with complete knowledge of variations of the component and the load, however, very small changes in the distributional parameters may generate orders-of-magnitude changes in predicted reliability. The present treatment of these problems gives attention to system modeling criteria, the limits of validity of a reliability model, the unique problems posed by consideration of microelectronics and software, and human factors in reliability prediction O.C.

A85-49541
A MANAGEMENT GUIDE TO RELIABILITY PREDICTIONS
F. A. STOVALL (Lockheed-Georgia Co., Marietta, GA) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings New York, IEEE, 1984, p 114-116.

Although reasonably accurate reliability predictions are obtainable through the procedure contained in military standard MIL-HDBK-217, if enough is known about operational environment, equipment design, vendor manufacturing capability, and delivery schedule, a less costly procedure may sometimes be required for the assessment of vendor-claimed reliability levels or the estimation of probable equipment reliability level. Attention is presently given to a simplified prediction chart which, while not as accurate as MIL-HDBK-217, may nevertheless be useful in the preliminary determination pf probable need for part screening, thermal imaging, reliability growth tests, etc. O C.

A85-49543
FIELD DATA - THE FINAL MEASURE
H. S. BALABAN and R A. KOWALSKI (ARINC Research Corp , Annapolis, MD) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p 123-128. refs

This paper examines causes for differences between field reliability measurements and estimates obtained from equipment predictions or development tests. It describes several *characteristics of field data collection systems that affect the utility* of the resulting data. Finally, it presents both graphic and analytic techniques for analyzing field reliability data to identify failure occurrence trends Author

A85-49562
SOFTWARE RELIABILITY - LET'S START DOING IT
D J. BEHUN (Honeywell, Inc , Military Avionics Div , Minneapolis, MN) IN· Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings New York, IEEE, 1984, p. 289-294.

An examination is undertaken of the complete software development process cycle, with attention to the role of reliability engineering and illustrations drawn from the development of real time operation software for the Space Shuttle Main Engine Controller The interrelations among reliability engineering, system engineering, software engineering, software testing, and quality assurance engineering, are highlighted. O.C.

A85-49577
SPARING CRITERIA - CLEAR MANAGEMENT APPROACH
Z. BLUVVBAND and S. SHAHAF (Israel Aircraft Industries, Ltd., Lod) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings . New York, IEEE, 1984, p. 446-451. refs

Reference is made in this paper to the possibility of defining logistic system parameters, allowing the Logistics Sensitive Operational Availability (LSOA) usage. To this end, a parameter of Back Order Probability (BOP) was introduced, allowing calculation of the Average Wait Time per Order (TWAIT), which together with the Weighted Demand Rate (WDR) expresses the Mean Logistic Down Time (MLDT). The mechanism of the effect of spares quantities on the Availability was analyzed, taking into account different Indenture Levels (IL) and different Levels Of Repair (LOR) in a multi-echelon case. Algorithms for calculation of BOP, TWAIT, LSOA and Operational Readiness (OR) were developed with consideration of the Poisson Distribution of demands. In addition, a proper technique for total cost constraints calculation, adequate for sparing applications, was established. Author

A85-49580
A RELIABILITY GROWTH MODEL
S S. TUNG (Hughes Aircraft Co., El Segundo, CA) IN: Annual Reliability and Maintainability Symposium, San Francisco, CA, January 24-26, 1984, Proceedings New York, IEEE, 1984, p 490-492

This paper describes a convenient alternative to traditional reliability growth models This new reliability growth model utilizes Bayesian statistics. Equations for estimating MTBF, theta, or failure rate, lambda, and its confidence limits were derived by assuming that the prior density function of 1/theta is gamma. These equations can be used to periodically estimate MTBF and its confidence limit. A smooth growth curve can be obtained by best-fitting a function through the estimated points This reliability growth model provides a simple and efficient tool to evaluate reliability growth of a system. Author

N85-10339# National Bureau of Standards, Washington, D.C. Office of Physical Measurement Services.
MEASUREMENT ASSURANCE PROGRAMS. PART 1: GENERAL INTRODUCTION Final Report
B. BELANGER May 1984 74 p refs 2 Vol.
(PB84-217868; NBS/SP-676/1-PT-1; LC-84-601030-PT-1) Avail: NTIS HC A04/MF A01; also available SOD CSCL 14B

This publication is Part 1 of a two part guide describing NBS Measurement Assurance Program (MAP) Services and how to use them for measurement quality control. Part 1 describes the general philosophy of MAP Services and how they are used; Part 2 (Development and Implementation, by C Croarkin) describes the statistical tools used in MAPs. MAPs constitute a more rigorous method for ascertaining and controlling measurement uncertainty than traditional NBS calibration services. GRA

N85-10676 Gesellschaft fuer Mathematik und Datenverarbeitung, Bonn (West Germany). Inst fuer Systemtechnik.
COMPARATIVE DESCRIPTIONS OF SOFTWARE QUALITY MEASURES
H HOECKER (Hochschule Bremen, West Germany), W D. ITZFELDT, M. SCHMIDT, and M. TIMM (Cologne Univ) Mar. 1984 146 p refs Sponsored by EEC Prepared in cooperation with National Computing Centre, Manchester, England
(GMD-STUDIES-81; ISBN-3-88457-057-9; ISSN-0170-8120)
Avail. Issuing Activity

Fifty software quality measures are compared Analysability, complexity; fault; modifiability, modularity, system independence; testability, and text comprehensibility are covered. Author (ESA)

N85-10943# Battelle Columbus Labs., Ohio.
AVIONICS INTEGRITY PROGRAM (AVIP). VOLUME 1: PROCUREMENT PHASE ISSUES: DESIGN, MANUFACTURING, AND INTEGRATION Final Report, Sep. 1983 - Mar. 1984
D ELDRIDGE, E. F. HITT, R. K. THATCHER, and L. D SCURLOCK Mar. 1984 229 p
(Contract F33657-83-C-0229)
(AD-A145651, ASD-TR-84-5010-VOL-1) Avail NTIS HC A11/MF A01 CSCL 05A

This report addresses program phases of design, manufacturing and integration. It includes assessments of methodologies of work which can be used to develop a proven, tolerant product capable of withstanding the use environment The goal of the process described is to eliminate defective piece parts, processes and final product, prior to delivery to the purchasing activity A tolerable systems engineering process, dealing with activities that are known to take place during each phase can be developed through use of the material provided. GRA

N85-11646# George Washington Univ., Washington, D C Inst. for Management Science and Engineering.
ON SOME COMMON INTERESTS AMONG RELIABILITY, INVENTORY AND QUEUING
D. GROSS 13 Jun. 1984 18 p
(Contract N00014-83-K-0217; NSF ECS-82-00837)
(AD-A145595, GWU/IMSE/SERIAL-T-491/84) Avail NTIS HC A02/MF A01 CSCL 12B

Queuing networks can be used to model maintained systems. Under many conditions, closed queuing network theory can be applied to ascertain the availability of such systems. Multi-echelon repairable item inventory systems serve as one such class of examples. Problems of common interest to the reliability, queuing, and inventory communities are highlighted, and solution techniques for these problems presented. Author (GRA)

N85-12773# California Univ, Berkeley. Operations Research Center.
RESEARCH IN DATA MANAGEMENT AND SYSTEM *RELIABILITY Interim Scientific Report, 1 Jun. 1983 - 31 May* 1984
R E. BARLOW 20 Jul 1984 11 p
(Contract AF-AFOSR-0122-81)
(AD-A145498; AFOSR-84-0728TR) Avail: NTIS HC A02/MF A01 CSCL 05A

The report summarizes research during this period supported by the grant. Topics covered include system reliability, determining sample size for life test experiments, data extractions procedures, and acceptance sampline procedures. Abstracts of papers written during this period are included. Author (GRA)

N85-13257# Centre National d'Etudes Spatiales, Toulouse (France). Direction des Lanceurs
QUALITY ORGANIZATION [L'ORGANISATION DE LA QUALITE]
C. PETITDEMANGE Apr. 1983 139 p refs In FRENCH; ENGLISH summary
(CNES-NT-106) Avail: NTIS HC A07/MF A01

The goals, means and organization of quality control are discussed. Quality manuals, corrective and preventive actions, control planning, and quality audits are described. Author (ESA)

N85-13259# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance Div.
THE ESA PRODUCT ASSURANCE SPECIFICATION SYSTEM: EXPLANATORY NOTE
6 Jul. 1984 15 p
Avail: NTIS HC A02/MF A01

The ESA product assurance specifications were rewritten and reidentified to fit into a three-level structure. The ESA PSS-01-0 contains the basic requirements for product assurance and is the only document in the top level, i.e , level 1. Level 2 comprises 9 disciplines, each of which expands into detailed requirements one of the major disciplines covered more generally in PSS-01-0. The remainder of the specifications are in level 3 and are intended as supporting specifications which cover methods, special processes, data, etc. They can be direct extensions of requirements in the level 2 specifications. Author (ESA)

N85-16745# LITEF, Freiburg (West Germany).
DOCUMENTATION AND SEPARATE TEST PROGRAM DEVELOPMENT IS MOST IMPORTANT FOR TEST/MAINTENANCE
B. GUSMANN and N. SANDNER *In* AGARD Design for Tactical Avionics Maintainability 11 p Oct 1984 refs
Avail: NTIS HC A13/MF A01

Well defined development phases with standardized documentations supported by computer based tools are important for test and maintenance Systems for transport aircraft and military applications are discussed. Documentation is stressed throughout the life cycle and the independent testing. B G

N85-17601# Software Architecture and Engineering, Inc., Arlington, Va.
A UNIFIED MODEL FOR PERFORMANCE AND RELIABILITY OF FAULT-TOLERANT/MULTI-MODE SYSTEMS
V. G. KULKARNI, V. F. NICOLA, and K. S. TRIVEDI Nov. 1984 35 p
(Contract DAAG29-84-C-0045; AF-AFOSR-0132-84)
(AD-A148789, CS-1984-12; AFOSR-84-1094TR) Avail. NTIS HC A03/MF A01 CSCL 12A

This paper unifies different models and relates different performance and reliability measures that have been proposed for the analysis of fault-tolerant computer systems We model the changes in the structure of the system due to different events (such as degradation, failure or repair) as a continuous time Markov chain. In particular, we consider the execution of a job on such a computer system where a service rate (or a reward rate) is associated with each structure-state. We allow different types of service-preemption interactions due to changes in the structure-state of the system. We derive the distribution of the completion time of a given job Although the developed techniques are suitable for the analysis of complex systems, we demonstrate their use through a simple switching server example. GRA

N85-18618# Rolls-Royce Ltd., Derby (England)
MATERIAL FLOW IN THE MANUFACTURING SYSTEM: FAULT-DIAGNOSIS SYSTEMS AS SUPPORT FOR THE MAINTENANCE OF HIGHLY AUTOMATED MANUFACTURING SYSTEMS
E. MATULL (MTU Motoren-u. Turbinen-Union Munchen GMBH) 14 Nov. 1984 10 p refs Transl into ENGLISH from Z. Wirt. Fertigung (Hanover), v. 77, no. 1, 1982 p 25-27
(PNR-90238; TRANS-16528/TLT-00916) Avail: NTIS HC A02/MF A01

Experience in a large commercial vehicle plant using advanced automation techniques is discussed. Maintenance services requirements can be met satisfactorily, provided the production and maintenance personnel involved are properly trained. The use of computer systems with efficient fault diagnosis is a prerequisite to ensure a high level of machine availability, particularly in complex manufacturing systems equipped with a large number of actuating elements. The exploitation of computer intelligence to support maintenance is increasingly important. Author (ESA)

N85-19009*# Teledyne Brown Engineering, Huntsville, Ala. Space Integration Div.
DATA REQUIREMENT (DR) MA-03: PAYLOAD MISSIONS INTEGRATION Progress Report, 17 Nov. 1984 - 15 Jan. 1985
28 Jan. 1985 47 p
(Contract NAS8-32712)
(NASA-CR-171331, NAS 1.26:171331, PMIC-MA03-469-35)
Avail: NTIS HC A03/MF A01 CSCL 22B

Project management and payload integration requirements definition activities are reported. Mission peculiar equipment; systems integration; ground operations analysis and requirement definition, safety and quality assurance; and support systems development are examined for payloads planned for the following missions: EOM-1, SL-2, SI-3 Astro-1; MSL-2, EASE/ACCESS, MPESS; and the middeck ADSF flight. A.R H.

N85-19607# Joint Publications Research Service, Arlington, Va.
HEALTH STANDARDS FOR GENERAL VIBRATION Abstract Only
G. A. SUVOROV *In its* USSR Rept.: Life Sci. Biomed and Behavioral Sci. (JPRS-UBB-85-008) p 23 13 Feb. 1985 Transl. into ENGLISH from Gigiyena Tr. i Prof. Zabolevaniya (Moscow), no. 10, Oct. 1984 p 9-13
Avail: NTIS HC A05/MF A01

Theoretical considerations are presented for the assessment and health standardization of the various vibrations that may affect human health. Primary effort is directed at work-related vibrations and the potential of vibration sickness arising from various man-machine interactions. Regulations established by various governmental agencies on allowable vibration levels in different situations in relation to thresholds of perception are discussed. The different intensities and their physiological and health consequences for workers are discussed. In the USSR, effective limit values were established and are being enforced, but are subject to re-evaluation as new scientific data accumulate. A R.H.

N85-20691*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOFTWARE DEVELOPMENT ENVIRONMENT ISSUES
In its Space Sta. Software Issues p 16-23 Feb. 1985
Avail: NTIS HC 04/MF A01 CSCL 09B

Issues related to the definition and provision of a standard environment for space station software development are examined The benefits of a uniform, central NASA software development environment and the impact of such an environment on contractors are adderessed. In addition, the control of environment maintainance and evolution over the 30 year lifetime is discussed. M G.

N85-20692*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOFTWARE STANDARDS ISSUES
In its Space Sta. Software Issues p 24-37 Feb. 1985
Avail: NTIS HC A04/MF A01 CSCL 09B

Standardization requirements for the space station software development project are discussed. Major issues include the need for common terminology, software technology selection and portability, languages, project directives, and documentation. Essential considerations for each of the topics is outlined and recommendations are given. M G.

N85-20936# Hanford Engineering Development Lab., Richland, Wash.
QUALITY OF SCIENTIFIC AND ENGINEERING DATA
W L. DELVIN Jul. 1984 49 p refs
(Contract DE-AC06-76FF-02170)
(DE85-000294; HEDL-7471) Avail: NTIS HC A03/MF A01

Quality is a subject receiving much attention today within industry and government agencies. This attention focuses basically on the quality of products, which are the outputs of work activities. A primary product of research and development is data, the quality of which should be of concern to both users and the scientists and engineers producing data The literature offers only bits and pieces of information on the nature of quality as applied to data. Five characteristics of quality data were developed by refining and expanding several concepts found in the literature. These characteristics are validity, integrity, reliability, preservation, and retrievability and they collectively define quality as it relates to data The practices commonly used in research and development to assure quality of data are discussed and related to the five characteristics. This relationship between laboratory practices and the characteristics of quality is a basis for assessing the quality of data. DOE

N85-21106# Joint Publications Research Service, Arlington, Va
AVIATION REPAIR PLANT DIRECTORS ON QUALITY CONTROL MEASURES
In USSR Rept.: Transportation (JPRS-UTR-85-004) p 1-4 27 Feb. 1985 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 29 Dec. 1984 and 3 Jan 1985
Avail: NTIS HC A06

Responses to an editorial concerning the quality of aircraft maintenance in he U.S S.R. are reported. Special plans and measures are developed in connection with the problems raised in the article. New reserves which make it possible to improve the quality of maintenance work are also introduced. Technical control measures are investigated. B.W.

N85-21135*# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE SAFETY ADVISORY PANEL Annual Report, 1983
Jan. 1984 80 p
(NASA-TM-87428, NAS 1.15:87428) Avail: NTIS HC A05/MF A01 CSCL 13L

An assessment of NASA's safety performance for 1983 affirms that NASA Headquarters and Center management teams continue to hold the safety of manned flight to be their prime concern, and that essential effort and resources are allocated for maintaining safety in all of the development and operational programs. Those conclusions most worthy of NASA management concentration are given along with recommendations for action concerning; product quality and utility; space shuttle main engine; landing gear, logistics and management; orbiter structural loads, landing speed, and pitch control; the shuttle processing contractor, and the safety of flight operations. It appears that much needs to be done before the Space Transportation System can achieve the reliability necessary for safe, high rate, low cost operations. A.R.H.

N85-27237# Centre d'Essais Aeronautique Toulouse (France). Groupe de Travail Fiabilite.
GUIDE FOR THE EXECUTION OF RELIABILITY TESTS IN THE LABORATORY [GUIDE POUR LA REALISATION D'ESSAIS DE FIABILITE EN LABORATOIRE]
10 Oct. 1984 208 p refs In FRENCH Sponsored by Delegation Generale pour l'Armement
Avail: NTIS HC A10/MF A01

The guide includes reliability mathematics, reliability test planning, administration aspects, experimental design, estimation of reliability parameters, report content and information storage and retrieval. Author (ESA)

N85-29593# Boeing Aerospace Co., Seattle, Wash
SPECIFICATION OF SOFTWARE QUALITY ATTRIBUTES, VOLUME 1 Final Report, Aug. 1982 - Oct. 1984
T P. BOWEN, G B. WIGLE, and J. T TSAI Griffiss AFB, N.Y. RADC Feb. 1985 111 p 3 Vol.
(Contract F30602-82-C-0137; AF PROJ. 2527)
(AD-A153988; D182-11678-VOL-1; RADC-TR-85-37-VOL-1)
Avail: NTIS HC A06/MF A01 CSCL 09B

The methodology and framework elements was developed to focus on an Air Force software acquisition manager specifying quality requirements for embedded software that is part of a command and control application. This methodology and most of the framework elements are generally useful for other applications and different environments. Volume 1 describes the results of research efforts conducted under this contract, including recommendations for integrating quality metrics technology into the Air Force software acquisition management process, recommended changes to Air Force software and acquisition documentation, and summaries of software quality framework changes and specification methodology features. GRA

N85-29594# Boeing Aerospace Co , Seattle, Wash
SPECIFICATION OF SOFTWARE QUALITY ATTRIBUTES. VOLUME 2: SOFTWARE QUALITY SPECIFICATION GUIDEBOOK Final Report, Aug. 1982 - Oct. 1984
T. P. BOWEN, G. B. WIGLE, and J. T TSAI Griffiss AFB, N.Y. RADC Feb. 1985 147 p 3 Vol.
(Contract F30602-82-C-0137, AF PROJ 2527)
(AD-A153989, D182-11678-VOL-2, RADC-TR-85-37-VOL-2)
Avail: NTIS HC A07/MF A01 CSCL 09B

The methodology and framework elements was developed to focus on an Air Force software acquisition manager specifying quality requirements for embedded software that is part of a command and control application. Volume 2 and 3 describe the methodology for using quality metrics technology and include an overview of the software acquisition process using this technology and the quality frame work. Volume 2 describes methods for specifying software quality requirements and addresses the needs of the software acquisition manager. Volume 2 also describes procedures and techniques for specifying software quality requirements in terms of quality factors and criteria. Factors interrelationships, relative costs to develop high quality levels, and an example for a command and control application are also described. Procedures for assessing compliance with specified requirements are included GRA

N85-29595# Boeing Aerospace Co , Seattle, Wash.
SPECIFICATION OF SOFTWARE QUALITY ATTRIBUTES. VOLUME 3: SOFTWARE QUALITY EVALUATION GUIDEBOOK Final Report, Aug. 1982 - Oct. 1984
T. P BOWEN, G. B. WIGLE, and J. T TSAI Griffiss AFB, N.Y RADC Feb. 1985 302 p 3 Vol.
(Contract F30602-82-C-0137; AF PROJ. 2527)
(AD-A153990; D182-11678-VOL-3, RADC-TR-85-37-VOL-3)
Avail: NTIS HC A14/MF A01 CSCL 09B

The methodology and framework elements was developed to focus on an Air Force software acquisition manager specifying quality requirements for embedded software that is part of a command and control application This methodology and most of the framework elements are generally useful for other applications and different environments. Volume 3 describes methods for evaluating achieved quality levels of software products and addresses the needs of data collection and analysis personnel. Volume 3 also describes procedures and techniques for evaluating achieved quality levels of software products. Worksheets for collecting metric data by software lifecycle phase and score sheets for scoring each factor are provided in the appendixes. Detailed metric questions are nearly identical to questions in the Software Evaluation Reports proposed as part of the Software Technology for Adaptable Reliable Systems (STARS) Measurement data item descriptions GRA

N85-30665# California Univ , Berkeley. Operations Research Center.
STATISTICAL ESTIMATION OF SOFTWARE RELIABILITY
S. M ROSS Mar. 1985 24 p
(Contract AF-AFOSR-0122-81)
(AD-A154097; ORC-85-3) Avail: NTIS HC A02/MF A01 CSCL 09B

When a new computer software package is developed, a testing procedure is often put into effect to eliminate the faults, or bugs, in the package One common procedure is to try the package on a set of well known problems to try to see if any errors result. This goes on for some fixed time with all detected errors being noted Then the testing stops and the package is carefully checked to determine the specific bugs that were responsible for the observed errors, and the package is then altered to remove these bugs. A problem of great importance is the estimation of the error rate of this revised software package. To model the above, we suppose that initially the package contains m , an unknown number, of bugs which cause errors to occur in accordance with independent Poisson process having unknown rates lambda sub i , i = 1, ..., m. We suppose that the package is to be run for t time units and that each error is, independently, detected with some known probability p . At the end of this time, a careful check of the package is made to determine the specific bugs that caused the detected errors (that is, a debugging takes place) These bugs are then removed and the problem of interest is to determine the error rate for the revised package. In this paper we show how to estimate this quantity under a variety of assumptions as to what is learned when the debugging occur. GRA

N85-31005 Consiglio Nazionale delle Ricerche, Naples (Italy) Ist. Motori
NOTE FOR A RESEARCH FEASIBILITY PROJECT: HIGH RELIABILITY DESIGN IN THE AERONAUTICAL FIELD Final Progress Report [NOTE PER UN PROGETTO DI FATTIBILITA' DELLA RICERCA: PROGETTAZIONE AD ALTA AFFIDABILITA IN CAMPO AERONAUTICO]
P. ERTO and M. GUIDA 1984 15 p In ITALIAN
(REPT-84-RR-350) Avail Issuing Activity

Knowledge and applications of reliability engineering to the aeronautical industry are reviewed Design, safety surveillance and

maintenance are related to the general reliability problem A list of proposed research subjects is included. Author (ESA)

N85-35720# Sandia National Labs , Albuquerque, N. Mex.
QUALITY ASSURANCE CONSIDERATIONS FOR THE IMPLEMENTATION OF A PULSED POWER R AND D PROJECT
J P. FURAUS, G W. BARR, and C. G. SHIRLEY 1985 15 p Presented at the 5th IEEE Pulsed Power Conf., Washington, D.C., 10 Jun. 1985
(Contract DE-AC04-76DP-00789)
(DE85-012357, SAND-84-2538C; CONF-850616-3) Avail: NTIS HC A02/MF A01

The second generation Particle Beam Fusion Accelerator (PBFA II) at Sandia National Laboratories (SNLA) is a $48.15M construction project that includes conventional facilities such as buildings as well as state-of-the-art pulsed power designs and special support systems. The project also includes considerations for longer term program goals, such as breakeven fusion reactions. This project started in May 1980 and is scheduled for completion in January 1986. Implementation of Quality Assurance (QA) policies, techniques and programs, although not a straightforward problem for this complex project, has been effective as demonstrated by progress thus far The discussion will describe key features of the QA program, their implementation and the results DOE

N85-35817# Air Command and Staff Coll., Maxwell AFB, Ala.
AERONAUTICAL SYSTEMS DIVISION MANUFACTURING/QUALITY ASSURANCE ORIENTATION
W. F. LAESSIG and A. LAIRD Apr 1985 61 p
(AD-A156128, ACSC-85-1535) Avail: NTIS HC A04/MF A01 CSCL 13H

Aeronautical Systems Division (ASD) Manufacturing/Quality Assurance (Mfg/QA) Orientation (videotape) includes ASD organization, program management team concept, matrix management, generic acquisition milestones with associated Mfg/QA inputs, and general sources of expertise Intended as an overview to enhance big picture understanding of new Mfg/QA managers. Mfg/QA Orientation for the Mfg/QA Managers (sound-on-slide) expands explanation of Mfg/QA inputs to the request for proposal (RFP), source selection participation, pre/post-award contact reviews and audits, and more specific on additional help. Intended to start the new Mfg/QA manager working. Mfg/QA Orientation for Program Managers (sound-on-slide) provides an overview covering Mfg/QA requirements, expected participation, and potential sources of help covering RFP preparation, source selection, and reviews and audits. GRA

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LEGALITY, LEGISLATION, AND POLICY

Includes Laws and Legality, Insurance and Liability, Patents and Licensing, Legislation and Government, Regulation, Appropriations and Federal Budgets, Local, National, and International Policy.

A85-10049
DESTRUCTION OF KOREAN AIR LINES BOEING 747 OVER SEA OF JAPAN, 31 AUGUST 1983
P. MARTIN (Frere Cholmeley, London, England) Air Law (ISSN 0165-2079), vol 9, no 3, 1984, p. 138-148. refs

The legal repercussions of the destruction of flight KE007 by a Soviet interceptor are examined. The provisions of the Chicago Convention of 1944 and of international customary law regarding the rights and obligations of territorial states in cases of intrusion of a commercial aircraft are reviewed, and the Soviet and ICAO reports on the KE007 incident are compared and found to be in sharp disagreement. With respect to the liability claims being litigated on behalf of the families of the victims against the airline, the manufacturers of the aircraft and navigation aids, and the US government (for neglecting to warn the air crew of its true location), it is argued that the US and manufacturers are probably not liable, while the airline liability depends on the applicability of the Warsaw Convention (to which the US is party) or the amended version Warsaw/Hague (to which Korea is a party) in the US courts and on the question of the USSR's compliance with Article 25 of the Chicago Convention (requiring states to assist aircraft in distress) T K

A85-10050
US JURISDICTION AND BILATERAL AIR AGREEMENTS
H. A WASSENBERGH Air Law (ISSN 0165-2079), vol. 9, no. 3, 1984, p. 170-183. refs

The opinion of the US Court of Appeals in the case Laker vs Sabena/KLM in March, 1984, is examined in detail as an example of US legal doctrine with regard to bilateral air-transport agreements. The litigation history of the case is reviewed, and such aspects as immunity, jurisdiction, discrimination, interest balancing, and international comity are explored The US view that free competition and antitrust control should coexist is found to be in disagreement with the practices of many other states T.K

A85-10178#
A CONGRESSIONAL VIEW OF NATIONAL POLICY DIRECTIONS IN REMOTE SENSING
R BYERLY, JR. (U.S. House of Representatives, Committee on Science and Technology, Washington, DC) IN: International Symposium on Remote Sensing of Environment, 17th, Ann Arbor, MI, May 9-13, 1983, Proceedings Volume 1 Ann Arbor, MI, Environmental Research Institute of Michigan, 1984, p. 21-30 refs

A85-11937
A LEGAL ANALYSIS OF THE SHOOTING OF KOREAN AIRLINES FLIGHT 007 BY THE SOVIET UNION
F. HASSAN (Willamette University, Salem, OR; San Diego, University, San Diego, CA) Journal of Air Law and Commerce (ISSN 0021-8642), vol 49, no. 3, 1984, p. 555-588. refs

A legal analysis is offered examining the central issue in the controversy over the shooting of the Korean commercial airliner KAL 007 by the Soviet Union in 1983 the legal status of a trespassing civilian aircraft in the airspace of another country. The application of international law to this issue is considered, with emphasis given to the evolution of legal doctrine since the Chicago Convention of 1955 Attention is also given to a number of legal precedents upon which the general principle has been established that it is unlawful to fire upon an intruder civilian aircraft without first making an attempt to force the aircraft to land It is concluded on the basis of evidence now available about the KAL 007 incident, that the Soviet Union did act illegally in its response to the trespass of the foreign aircraft. I.H.

A85-11938
FAA REGULATION OF ULTRALIGHT VEHICLES
S. THOMPSON Journal of Air Law and Commerce (ISSN 0021-8642), vol 49, no. 3, 1984, p. 591-620. refs

The development of FAA standards and operating regulations for ultralight aircraft is discussed. Particular emphasis is given to the definition of aircraft design characteristics, registration and flight certification requirements for ultralight pilots, as well as the operating rules governing right of way, and times and areas of legal operation. Attention is also given to the beneficial effects of self-regulation by the ultralight manufacturers and pilots in order to avoid what are considered to be the inhibiting aspects of FAA regulation. A complete list of proposed FAA regulations is provided in a series of footnotes. I.H.

A85-12623
COLLOQUIUM ON THE LAW OF OUTER SPACE, 26TH, BUDAPEST, HUNGARY, OCTOBER 10-15, 1983, PROCEEDINGS
Colloquium sponsored by the International Astronautical Federation. New York, American Institute of Aeronautics and Astronautics, 1984, 366 p. No individual items are abstracted in this volume.

Various papers on the law of outer space are presented. The general topics discussed include: telecommunications and the geostationary orbit, the interrelationship between air and space law, responsibility for space activities, and legal aspects of international cooperation in space C D

A85-12644
SPACE LAW - JUSTICE FOR THE NEW FRONTIER
C. Q CHRISTOL (Southern California, University, Los Angeles, CA) Sky and Telescope (ISSN 0037-6604), vol. 68, Nov. 1984, p 406-409.

The legal principles realized in the five international treaties on the use of outer space are reviewed Consideration is given to the roles of technological innovation and political pressure from the underdeveloped world in shaping U.N. space law. Among the specific areas of space law currently covered by U N. treaties, there are: guarantees of equal opportunity in the exploitation of space resources; the return and rescue of astronauts and objects in outer space, and liability for damage caused by fallen space objects Issues currently under discussion include treaties on nuclear weapons in space, the legal status of DBS systems and remote sensing satellites, and the definition of the air-space boundary I.H.

A85-13140#
FEDERAL POLICY OPTIONS AND THE COMMERCIALIZATION OF SPACE
G. A. HAZELRIGG International Astronautical Federation, International Astronautical Congress, 35th, Lausanne, Switzerland, Oct. 7-13, 1984 14 p. refs
(IAF PAPER 84-218)

Private enterprise seeks to undertake virtually any activity that is institutionally and technologically feasible and which promises a high return on investment. Commercial activities in space would seem to be no exception. Indeed, it is reasonable to expect that, at some future date, commercial activities in space will overshadow government-sponsored research and military activities combined. But this date remains well into the future, it is highly uncertain, and it depends on government policies Space is much like a less developed nation; before industrial development can occur, necessary infrastructures must be created A government could create these infrastructures and, by so doing, hasten the commercialization of space, assuring opportunities for its industries But this is not likely to happen Instead, infrastructures are more likely to evolve on an ad hoc basis, forced by technology rather than policy. Author

A85-18469
NASA FORMULATES POLICY TO SPUR PRIVATE INVESTMENT
C. COVAULT Aviation Week and Space Technology (ISSN 0005-2175), vol 121, Nov 26, 1984, p. 18, 19

Features of the new NASA commercial space policy are delineated. The policy is intended to stimulate commercial participation in space through research, facility sharing, clearly defined procedures, organization and outreach programs. NASA will provide seed money to industry, purchase commercial space products, make the Shuttle/Spacelab configuration available to industry once a year, and will invest in facilities in space that will be of use for commercial purposes. Legal research is being performed to ascertain if NASA's charter should be altered to permit several of the activities put forth in the policy statement Payload charges will be lowered for seed enterprises and NASA has made it policy to avoid a regulatory role in commercial space ventures Some benefits will not be available to companies who do not sign a Joint Endeavor Agreement with NASA. Attempts will be expended to increase the flow of NASA-developed technology and data to the private sector and to portray space as a new commercial frontier for the U.S. to the public. M.S.K

A85-20512
ASTROBUSINESS: A GUIDE TO THE COMMERCE AND LAW OF OUTER SPACE
E. R. FINCH, JR. (Finch and Schaefler, New York, NY) and A. L. MOORE New York, Praeger, 1985, 157 p refs

This book documents the commercialization of outer space by the incredible growth of space-related opportunities for the private sector The commercial uses of space are related to communications, remote sensing, space manufacturing, and energy. Possibilities of a manufacture in space are considered for pharmaceuticals, electronics, glass, and metallurgy Structures for space discussed include Spacelab, space platforms, the Space Station, and space structures in geostationary orbit, a high orbit between the earth and the moon, and on the moon itself Attention is also given to space transportation services, space risks and liabilities, questions regarding the financing of business in space, the national space law, international space law, and the militarization of space. An outlook is provided regarding future commercial space business opportunities G R.

A85-21620
THE MANNED SPACE STATION - NASA'S LAST HURRAH?
W LASSER (Clemson University, Clemson, SC) Technology Review (ISSN 0040-1692), vol. 88, Feb.-Mar. 1985, p. 12, 13.

An evaluation is made of the changing cultural and political climate of the U S., with a view to its impact on the funding of NASA's Space Shuttle program and the projected permanent Space Station Public interest in space exploration and exploitation activities is noted to have waned since the 1960s, when a widespread perception of the dependency of national prestige on space-related achievements existed and formed the basis of generous funding appropriations for NASA. An especially potent threat to the financial viability of the NASA Space Shuttle and Space Station programs comes from foreign payload launch services' development, and from the growing commercial launch services sector. O C

A85-21621
SCIENCE AND TECHNOLOGY POLICY - THE NEXT FOUR YEARS
G A. KEYWORTH, II (Office of Science and Technology Policy, Washington, DC) Technology Review (ISSN 0040-1692), vol. 88, Feb -Mar. 1985, p. 45, 46, 48, 50-53

The first four years of the Reagan administration, covering Federal fiscal years 1981-1985, were characterized by a reduction of funding for technology application-related research, such as that for energy projects, in order to substantially increase basic research funding. Overall, the U.S. will spend nearly $8 billion in basic research during fiscal 1985, by comparison with $5 billion in fiscal 1981. Beyond 1985, the five priorities of the Reagan administration's second term are identified as (1) continued basic research funding growth, especially at universities; (2) the fostering of technical education; (3) increased cooperation between university research programs and industry; (4) continued growth in defense-related R&D; and (5) a clear delineation of R&D responsibilities proper for the federal government and those of the private sector O C

A85-23799
ANNALS OF AIR AND SPACE LAW. VOLUME 8
N. M. MATTE, ED (McGill University, Montreal, Canada) Toronto/Paris, Carswell Co., Ltd./Editions A. Pedone, 1983, 586 p. In English and French. No individual items are abstracted in this volume.

Current problems in air and space law are discussed, and the activities of various international organizations during 1983 are surveyed Topics examined include the international unification of civil air law, liability problems in aircraft maintenance and repair, bilateral air-transport agreements, the orbit-spectrum issue, liability

in space law, legal and policy aspects of space remote sensing, and the 'aerospace vehicle' as a legal concept; organizations surveyed are the ICAO, IFALPA, IATA, and Inmarsat. The texts of important court decisions from the US, Canada, and West Germany and of international and national legislation are provided. T.K

A85-24089
TRANSBORDER DIRECT-TO-HOME SATELLITE SERVICE
M. A ROTHBLATT (Martin A. Rothblatt Law Offices, Washington, DC) Telematics and Informatics (ISSN 0736-5853), vol. 1, no. 3, 1984, p 295-307. refs

Transborder receipt of direct-to-home satellite transmissions is a timely topic which has international implications. This article addresses some of these international implications, but for the most part, it focuses on transborder receipt of satellite services in the United States and the legal ramifications thereof under American law. Some legal terms and the regulatory nature of the aforementioned satellite service will first be discussed. Then, the role of the Federal Communications Commission in terms of its rulings and authority in transborder direct-to-home satellite service will be presented. Afterwards, the policy implications of foreign direct-to-home satellite service to the United States will be examined. Author

A85-24709
RECENT DEVELOPMENTS IN AVIATION CASE LAW
D. R. ANDERSEN (Mozley, Finlayson, Wedge and Andersen, Atlanta, GA) Journal of Air Law and Commerce (ISSN 0021-8642), vol 49, no. 4, 1984, p. 707-769. refs

Eight aviation cases before the U.S. Supreme Court in 1983, three which received decisions, are reviewed, along with related materials. It has been decided that the FAA is the only valid registry for ownership of an aircraft, and no transfer of ownership is valid until filed in the registry. In another ruling, the Court decided that discriminatory taxes could be levied by states on out-of-state-based airlines who use in-state airports, the judgment residing on the premise that the monies are targeted for use at airports. Finally, the Court ruled that state law is supreme in establishing the health and safety standards of airport ground maintanance workers. Actions are still pending on 'in personam' jurisdiction in out-of-country aircraft accidents, liability procedures being decided in one state for accidents in another, and the validity of a manufacturer filing a claim with the federal government for indemnity claims filed by a federal employee against the manufacturer. Air carrier, insurance coverage, and damage extent and calculations rulings are also under consideration M.S K.

A85-24710
FIRE SAFETY IN TRANSPORT CATEGORY AIRCRAFT - LITIGATING A POST-CRASH OR IN-FLIGHT AIRCRAFT FIRE
P. M. FOSS and R. D. TEPPER Journal of Air Law and Commerce (ISSN 0021-8642), vol. 49, no 4, 1984, p. 801-825. refs

The impact of Federal Aviation Regulations (FAR) on transport aircraft design, certification, accident investigations for liability, and the chances that passengers can survive specified accidents are discussed. The design must not be hazardous and must include doors that open from the inside or outside even if people are pressed against the inside. Ventilation must protect the crew and passengers from noxious gases and vapors. Materials should be fire suppressant or self-extinguishing and fire extinguishers and all compartments must be accessible to the crew. Fire zones which seal off flammable liquids must be installed, etc. The manufacturer may be liable even if the FAR are complied with. Techniques for conducting a post-accident fire investigation are delineated. It is noted that fire retardants in aircraft interior furnishings can generate gases more lethal than heat or other effects of cabin fires. M.S.K.

A85-27373
THE COMMERCIALIZATION OF SPACE - TWENTY YEARS OF EXPERIENCE: SOME LESSONS LEARNED
J B GANTT (Counsel, Hunton and Williams, Washington, DC) Journal of Space Law, vol. 12, Fall 1984, p. 109-135. refs

A historical review of the legal issues concerned with global satellite communications is presented. Consideration is given to the important role of the COMSAT agreement (1961) in defining the relationship between government and industry in the promotion and regulation of satellite communications enterprises. The model of international cooperation exemplified by the INTELSAT consortium is also discussed. Some implications of the growing role of FCC regulation in determining economic conditions in the international satellite communications market are also examined. I H

A85-27374
PROPOSED DRAFT CONVENTION ON THE SETTLEMENT OF SPACE LAW DISPUTES
K -H. BOECKSTIEGEL (Koeln, Universitaet, Cologne, West Germany) Journal of Space Law, vol. 12, Fall 1984, p. 136-162. refs

Attention is given to the growing need for a legal framework for the settlement of disputes arising from space activities. The history of international efforts to develop an international space law instrument are briefly reviewed, and the Draft Convention on the Settlement of Space Law Disputes of the International Law Association is presented as an example of a typical proposal. The text of the Draft Convention is reproduced in full I.H.

A85-27394
PUNITIVE DAMAGES IN AVIATION PRODUCTS LIABILITY CASES
I. AWFORD (Barlow Lyde and Gilbert, Solicitors, London, England) Air Law (ISSN 0165-2079), vol. 10, Feb. 1985, p. 2-9.

Historical U.S. court decisions regarding punitive damages for air accidents are reviewed noting their potential impact on British air carriers and aircraft manufacturers Punitive damages for various causes are permitted by law in 46 states. Juries can consider, e g , the feasibility of safer design, manufacturer knowledge of defects, actual and potential injuries, intentionality with regards profits vs. costs vs. safety, and the wealth of the defendant corporation Manufacturers may be held liable even if the actions were performed by employees acting outside of company policy. It is recommended that British companies carry full insurance - with British companies - to cover possible punitive awards to plaintiffs. Awards may be reduced in general if criminal charges, rather than liability assessments, are levied against companies and managers. M.S.K.

A85-27395
CARGO CLAIMS - FROM THE CARRIER'S POINT OF VIEW
S. GATES (Beaumont and Son, London, England) Air Law (ISSN 0165-2079), vol 10, Feb. 1985, p. 10-14.

Techniques for avoiding litigation in British air freight claims are discussed, along with procedures most probably followed if litigation begins. Courteous and prompt handling of claims by airlines claims officers is recommended, although the chain of events may be upset by apathetic or hostile interim freight carriers. Full freight insurance is necessary in all cases. If litigation arises the petitioner needs to seek as many defendants as possible in order to exceed the limits of liability. The carrier then attempts to assign liability to the handling agent. A current trend is to accept that fault and responsibility are inseparable, and can extend to the Airport Authority, the aircraft manufacturer and the manufacturer of equipment which causes the damage. M.S.K.

A85-27396
REGISTRATION AND NATIONALITY OF AIRCRAFT OPERATED BY INTERNATIONAL AGENCIES IN LAW AND PRACTICE
K. EL-HUSSAINY (Egyptian Civil Aviation Authority, Air Transport, Cairo, Egypt) Air Law (ISSN 0165-2079), vol. 10, Feb. 1985, p. 15-27. refs

The implications of the ICAO Regulation of 1967, which permits the registration of aircraft on other than a national basis, are discussed, particularly for the Arab Air Cargo (AAC) company. The Regulation applies only to States who are parties to the Chicago Convention of 1944 and treats the operating parties as a multinational entity. The entity must operate as if it were a State for the purposes of the Convention, and thereby is exempt from seizure on patient claims in States which are signatories One of the entity States must be designated as the site of representations of the entire company The Resolution is vague, however, in terms of assigning the responsibility for air accidents The Jordan-Iraq AAC petitioned for ICAO certification in 1982 and planned to use aircraft registered exclusively to one of the two partners. It was recommended that all the aircraft used by the AAC be regarded as the responsibility of Jordan, the designated responsible State. M.S.K.

A85-27397
THE LIABILITY OF AIRCRAFT MANUFACTURERS AND CERTIFICATION AUTHORITIES IN THE UNITED KINGDOM
T. SCORER (Barlow Lyde and Gilbert, Solicitors, London, England) Air Law (ISSN 0165-2079), vol. 10, Feb. 1985, p. 28-43. refs

Fine points of an aircraft manufacturer's liability for the product are explored, noting differences which exist between contract and tort issues and procedures in the United Kingdom. Most claims against manufacturers are filed in the U.S , where most of the world's aircraft are manufactured Claims can be laid at any point in the chain of production and distribution once an article fails and causes damage to health, property or economic well-being British law requires that all goods are understood as warrantied when used for purposes for which they were sold, even if contractual terms 'unfairly' limit the liability. The existence of unfairness of negligence is left somewhat to the discretionary decision of British judges, and this is done on the bases of 'common sense'. Also, the British Civil Aviation Authority, responsible for certifying aircraft and personnel, may be held negligent if in the case of an accident the Authority is discovered not to have fully discharged their duties of inspection or certification investigation for flightworthiness M.S.K

A85-29025
COLLOQUIUM ON THE LAW OF OUTER SPACE, 27TH, LAUSANNE, SWITZERLAND, OCTOBER 7-13, 1984, PROCEEDINGS
Colloquium sponsored by the International Astronautical Federation New York, American Institute of Aeronautics and Astronautics, 1985, 426 p. No individual items are abstracted in this volume.

Selected aspects of space law are examined in reviews and reports. Topics discussed include space law and domestic law, space activities and intellectual property (including industrial property), nuclear power sources in outer space, legal aspects of large space structures, conditions essential for maintaining outer space for peaceful uses, and the impact of present and expected uses of outer space on the space environment. Consideration is given to U.S. law applying to land remote sensing, U.S -government authorization and supervision of nongovernmental space activities, space law and the concepts of Roman law, patent law activities of states in industrial-property technology cooperation, prospects for the demilitarization of manned space stations, jurisdiction problems of large space systems, large structures on the moon, legal measures for the prevention of an arms race in space, collision probabilities in the geostationary ring, and the indivisibility of environmental protection in vertical space T.K.

A85-29555
THE CONGRESSIONAL AUTHORIZATION PROCESS AS IT APPLIES TO AERONAUTICAL RESEARCH AND TECHNOLOGY
P. J LEGENDRE IN· International Instrumentation Symposium, 29th, Albuquerque, NM, May 2-6, 1983, Proceedings . Research Triangle Park, NC, Instrument Society of America, 1983, p. 101-111. refs

The present paper provides a descriptioon of the political process as it affects the National Aeronautics and Space Administration (NASA) budget dealing with the fiscal year 1983 aeronautics technology programs funding. In connection with the budget process, the various congressional committees and joint committees must submit reports on the proposed budget within their jurisdictions to the Budget Committees on both Houses. Attention is given to NASA authorization hearings, an aeronautics hearing on April 1, 1982, a statement for the record, letters to Congress, House action, Senate action, a joint conference, and the NASA appropriations bill G.R.

A85-30014
JURISDICTION OVER AND SUPERVISION OF INTERNATIONAL CREWS IN SPACE [JURYSDYKCJA I KONTROLA NAD MIEDZYNARODOWA ZALOGA W PRZESTRZENI KOSMICZNEJ]
E. MIKOS-SKUZA (Warszawa, Uniwersytet, Warsaw, Poland) Postepy Astronautyki (ISSN 0373-5982), vol. 17, no 2, 1984, p. 21-37. In Polish. refs

The need for a multilateral international treaty regulating the legal problems that arise in connection with international manned space missions is examined. Particular attention is given to the problem of jurisdiction over and supervision of multinational crews in space. This problem includes determining the content and territorial limits of jurisdiction and control; defining the term 'crew'; and establishing the legal status of crew members leaving their spacecraft for performing various tasks in open space or on a celestial body and of crew members leaving their spacecraft to visit another spacecraft. V L.

A85-30167
SELECTED AMERICAN DECISIONS ON THE WARSAW CONVENTION AND RELATED MATTERS - FEBRUARY 1981 TO JUNE 1984. I
R. MANKIEWICZ Zeitschrift fuer Luft- und Weltraumrecht (ISSN 0340-8329), vol 34, March 1985, p. 24-43

A85-30998
LAUNCHING THE ROCKET INDUSTRY IN THE UNITED STATES - DOMESTIC REGULATION OF PRIVATE EXPANDABLE LAUNCH VEHICLES
A. D. WEBBER (Baker and McKenzie, Washington, DC) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 50, no. 1, 1984, p. 1-67. refs

The regulation of private expendable-launch-vehicle launches by agencies of the US government is characterized in a review of legal and administrative aspects The history of regulation is briefly traced, the roles of FAA, Department of State, NASA, DOD, Coast Guard, Department of Treasury (BATF), FCC, and NORAD in the current confused and overlapping regulatory structure are outlined; the experience of Space Services Incorporated and Starstruck in attempting to obtain permission for private launches is recounted; and the derivation of legal authority to regulate private launches from the Outer Space Treaty of 1967 is explained. A unified regulatory structure with the Department of Transportation as lead agency, clearly defined and realistic time limits, long-term licensing procedures, provision for foreign launches by US companies, payload regulations, public-safety guarantees, and specific rules for launches from government facilities is proposed. T.K.

A85-30999
ATTEMPT TO REGULATE RESTRICTIVE COMMERCIAL PRACTICES IN THE FIELD OF AIR TRANSPORTATION WITHIN A TRANSNATIONAL ANTITRUST LEGAL AND INSTITUTIONAL FRAMEWORK
J. K. BENTIL (La Trobe University, Melbourne, Australia) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 50, no. 1, 1984, p. 69-120 refs

The legal and economic consequences of applying international antitrust law to the air-transport industry are examined, with a focus on the measures proposed to the EEC by the EC Commission in 1981. The range of anticompetitive or protectionist practices allowed under the current rule of national sovereignty and bilateral agreements is surveyed; the substantial and procedural provisions of EEC general antitrust law are summarized, and the strategies adopted by the EC Commission to overcome difficulties in applying them to air transportation are discussed The scope of the proposed secondary legislation (applying to private comercial carriers but not national-government-controlled carriers) is found to limit its effectiveness, but its implementation and strict enforcement are recommended as first steps. T K.

A85-31968#
CIVIL CERTIFICATION OF A U.S. GOVERNMENT PROCURED HELICOPTER
J. C. HART (Aerospatiale Helicopter Corp , Grand Prairie, TX) IN American Helicopter Society, Annual Forum, 40th, Arlington, VA, May 16-18, 1984, Proceedings Alexandria, VA, American Helicopter Society, 1984, p. 203-205.

In June 1979, the U.S Coast Guard awarded to an aerospace company a contract for the production of 90 helicopters to replace the aging H-52. This new helicopter, the HH-65A, would be used in the Short Range Recovery rescue role which includes such objectives as drug interdiction, fishing law enforcement, and coastal patrol. The new helicopter was to be qualified according to both military and civil standards. In connection with these qualifications, it was found that with respect to certain items a conflict exists between the desires of the Coast Guard and the regular requirements of the Federal Aviation Agency (FAA) Difficulties arising in connection with the attempt to satisfy the various requirements are discussed, and the lessons learned are evaluated. G.R.

A85-33872
HOW DOES NASA PLAN TO HELP?
Interavia (ISSN 0020-5168), vol. 40, April 1985, p 390, 391.

NASA has assembled a task force assigned to the implementation of its space commercialization policy. The Commercial Space Policy has as its aim the reduction of risk levels for space industrial development to the point where they are comparable with conventional investments. This will be accomplished by providing seed funds for private sector R&D activities, by encouraging private sector development of products and services that NASA may need, by sharing patents with the U.S. private sector, and by facilitating the launching of experimental payloads at zero cost O.C.

A85-34214
EVOLVING GOVERNMENT POLICY EASES WAY FOR SPACE VENTURES
C COVAULT Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 14-18.

It is pointed out that the formation of a commercial space policy at both the White House and NASA has introduced greater predictability into corporate planning for space ventures. As a consequence of this development, new groups have begun to show interest in commercial space endeavors. These groups include a broader cross section of finance and lending institutions, state and local governments interested in stimulating space business in their geographical areas, and more companies with innovative ideas. According to a new analysis, gross annual revenues for all commercial space endeavors should total between $44.5 billion and $53 billion by the year 2000. The key areas of NASA policy interest for the next two years are related to centers for commercial development, technology utilization, new NASA facilities, limited seed funding, and expanded agreements. G.R.

A85-34223
REAGAN COMPETITIVE POLICY PLACES INTELSAT'S FUTURE AT CROSSROADS
P. J KLASS Commercial Space (ISSN 8756-4831), vol. 1, Spring 1985, p. 70, 71, 75-77

It is pointed out that the future of the International Telecommunications Satellite Organization and of international satellite communications in general is approaching a crucial crossroads as a result of the Reagan Administration's policy of encouraging limited, special-service competition with Intelsat At present, there are five companies which have filed for approval of Intelsat-competitive satellite systems. The international reaction to the new developments is discussed, taking into account comments coming from France, the Federal Republic of Germany, Switzerland, the United Kingdom, Tanzania, Cameroon, Zambia, and the People's Republic of China. Attention is given to the position of Intelsat to compete with the proposed independents, and other serious changes taking place in traditional telecommunications services and suppliers. G.R.

A85-36289
SATELLITE BROADCASTING AND THE USE OF THE GEOSTATIONARY ORBIT - SOME INTERNATIONAL LEGAL ASPECTS
A. GORBIEL (Lodz, Universytet, Lodz, Poland) Space Communication and Broadcasting (ISSN 0167-9368), vol. 3, March 1985, p. 61-66. refs

The positioning of artificial earth satellites in the geostationary orbit is of great importance for telecommunications. The maximum number of satellites which can be placed there is, however, limited for technical reasons. The international legal status of the geostationary orbit, labelled by the ITU a 'scarce natural resource', became the subject of a diplomatic controversy since a group of equatorial states in 1976 proclaimed national sovereignty over some segments of it situated over their territories This paper analyses critically their claims to sovereignty. In conclusion, the author substantiates his opinion that any national appropriation of the geostationary orbit is categorically inadmissible whereas its use, for broadcasting purposes also, must be governed by special international regulation. Author

A85-36666
THE DEREGULATION OF INTERNATIONAL SATELLITE COMMUNICATIONS
L. MCKNIGHT (MIT, Cambridge, MA) IN: ICC '84 - Links for the future: Science, systems and services for communications; Proceedings of the International Conference on Communications, Amsterdam, Netherlands, May 14-17, 1984. Volume 3 . New York/Amsterdam, Institute of Electrical and Electronics Engineers, Inc /North-Holland, 1984, p. 1346-1351 refs

Proposed changes in U.S. international satellite communications policy intended to extend to the international market the presumed benefits of deregulation are analyzed. The effect of changes in the structure and mandate of Comsat, the definition of an authorized use of Comsat facilities, deregulating Intelsat earth station ownership, permitting additional firms to have direct access to Intelsat space segment, as well as proposals to bypass Intelsat altogether by permitting private ownership of international communications satellites are discussed. Author

A85-36997
INTERNATIONAL SPACE LAW
IU. KOLOSOV (Ministerstvo Inostrannykh Del SSSR, Moscow, USSR) and G. ZHUKOV New York, Praeger, 1984, 238 p. Translation. refs

The fundamental principles, historical development, and current problems of international space law (ISL) are reviewed from a Soviet perspective. Chapters are devoted to the concept and sources of ISL, the principles of ISL, the legal status of artificial

space objects, international cooperation in the rescue of cosmonauts, international responsibility for space activities, international systems of space communications (Intersputnik, Intelsat, and Inmarsat), ISL of direct TV broadcasting via satellite, ISL of space meteorology, ISL of remote sensing, the delimitation of outer space, and the status of the moon and other celestial bodies of the solar system in ISL. The need for further legislation regarding national or international permanent manned space stations is indicated. T K.

A85-37805#
THE GLOBAL POSITIONING SYSTEM (GPS) DOD POLICY ISSUES
P. J. BAKER (U.S. Department of Defense, Washington, DC) IN: PLANS '84 - Position Location and Navigation Symposium, San Diego, CA, November 26-29, 1984, Record . New York, Institute of Electrical and Electronics Engineers, Inc., 1984, p. 46-50. DOD-supported research.

This paper covers the major policy issues of the Global Positioning System (GPS). The GPS is a space-based, worldwide, all-weather, continuous position/navigation system being developed by the Department of Defense and scheduled to be fully operational by the end of 1988. Major issues in the GPS Program will be covered. These issues include civil use of GPS, user charges, potential phase-out of other systems after the introduction of the GPS and accuracy enhancement techniques that are being investigated. Author

A85-38699
INTERNATIONAL SPACE LAW [MEZHDUNARODNOE KOSMICHESKOE PRAVO]
A. S PIRADOV, I. P BLISHCHENKO, V. S. VERESHCHETIN, and IU. M. KOLOSOV Moscow, Izdatel'stvo Mezhdunarodnye Otnosheniia, 1985, 209 p. In Russian. refs

This textbook presents a systematic exposition of the main aspects of international space law (ISL), including current problems that are being discussed in the United Nations and other international organizations Topics discussed include the concept, nature, and basic features of ISL, the subjects and object of ISL, the legal regime of outer space, with emphasis on the legal status of astronauts and space objects, international-legal forms of cooperation in space exploration; problems related to the militarization of space; the codification and further evolution of ISL, and questions of legal responsibility. A brief history of ISL is also provided, and an appendix contains basic ISL documents. B J

A85-38914#
NEED FOR ALTERNATIVE SPACE LAUNCH SERVICES GIVEN NASA REFUSAL TO LAUNCH SPARX-01 MISSION UNDER STANDARD FORM COMMERCIAL LAUNCH SERVICES AGREEMENT
K. P HEISS IN: Symposium on Industrial Activity in Space, Stresa, Italy, May 2-4, 1984, Proceedings . Paris, Eurospace, 1984, p 355-368.

Legal, political, and economic implications of the refusal by NASA to launch the SPARX-01 commercial terrestrial-remote-sensing satellite under terms acceptable to SPARX are discussed from the SPARX perspective. The history of negotiations between SPARX and NASA since 1983 is recalled; the terms of the original Standard Form Commercial Launch Agreement and the new terms (based on the language of HR-5155, a remote-sensing bill passed by the U.S. House of Representatives) proposed by NASA in April 1984 are summarized; and the reasons for SPARX rejection of the new terms (exclusion of any proprietary rights to the remote-sensing data, subjection to U.S. licensing and regulation) are indicated. It is argued that the new terms are illegally imposed (since launch reservation fees were paid in 1983) and constitute a 'closed skies' policy resulting in a government monopoly on remote sensing, an infringement on the freedom to gather and disseminate information, and eventually in a loss of commercial launch business for NASA (since alternative launch possibilities are being developed; e.g., Ariane). T.K

A85-38916#
SOME LEGAL ASPECTS OF INDUSTRIAL ACTIVITY IN OUTER SPACE
M F. MURPHY (Aerospatiale, Paris, France) IN Symposium on Industrial Activity in Space, Stresa, Italy, May 2-4, 1984, Proceedings Paris, Eurospace, 1984, p 449-463 refs

The provisions of international public law and of U.S and European private law regarding the exploitation of outer space, and in particular, the rights of commercial users of space facilities to the intellectual and physical products of space activities, are reviewed The international space treaties are listed, the interpretations of the Common Heritage of Mankind doctrine are discussed; the limitations imposed by the NASA Technical Exchange Agreement, Industrial Guest Investigator contract, and Joint Endeavor Agreement are examined in detail; and the need for agreement among the national space agencies and ESA on European standards is indicated It is argued that private investment in space activities and the European share in the world market for space products can be increased by adopting secrecy and property-rights policies more favorable to industry than those in force in the U.S. T K

A85-39093
LEGAL ASPECTS OF SPACE ACTIVITIES
I. DIEDERIKS-VERSCHOOR (International Institute of Space Law, Baarn, Netherlands) (Universita di Napoli, Aeritalia S.p.A., ESA, and NASA, International Symposium on Spacelab 1 - Results, Implications and Perspectives, Naples and Capri, Italy, June 11-16, 1984) Earth-Oriented Applications of Space Technology (ISSN 0277-4488), vol 5, no. 1-2, 1985, p 123-127. refs

The application of international law to space activities is considered. The design of a legal apparatus to control the collection and dissemination of remote sensing data is discussed, and examples of such an apparatus in the Landsat Treaties (1982 and 1983), and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space are discussed. Legal problems created by the growth of technology in direct satellite telecommunications, the construction of large space structures, and solar power satellites are also considered I.H.

A85-39731#
ORBITAL VEHICLE TRANSPORTATION - ISSUES OF LAW AND INSURANCE
P. D. NESGOS (Johnson and Higgins, Space Systems Group, New York, NY) AIAA, SAE, ASME, and ASEE, Joint Propulsion Conference, 21st, Monterey, CA, July 8-10, 1985 8 p
(AIAA PAPER 85-1337)

It is pointed out that the introduction of vehicles operating exclusively in space presents a host of novel legal and insurance issues. This form of transportation is subject to existing space law which was established prior to the notion of routine orbital operations. Applicable are general international and national law, and more specific regulations Attention is given to international law issues, the principal space treaties, the principle of freedom to explore space, U.S regulation of space transportation, the liability for the conduct of orbital transportation, the management of risk by insurance, and new challenges for space insurers. G R

A85-44097
OBTAINING TITLE AND FINANCING TRANSPORT CATEGORY AIRCRAFT NATIONAL AND INTERNATIONAL IMPLICATIONS
J. T. STEWART, JR (Zuckert, Scoutt, Rasenberger, and Johnson, Washington, DC) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 50, no 2, 1985, p. 191-218 refs

The most important elements of U.S. and international law relating to the possession of title to transport category aircraft are discussed with a view to their influence on lenders, purchasers, and sellers of such aircraft Security interests have influenced the adoption by almost all states of the U.S. of the Uniform Commerical Code (Louisiana is the only exception), and the Federal Aviation Act has been amended to accommodate the changing environment of deregulation The international community has amended international undertakings to recognize the viable use of aircraft

by permitting the delegation of authority from the countries of registry to the countries of the operators. It is suggested that computerized information services may be harnessed to effectively implement the international flow of aircraft registry and ownership data. O.C.

A85-44098
A NEW PROPOSAL FOR THE REFORM OF COMMERICAL AIR CRASH LITIGATION
A. J. CHALK (Southern Methodist University, Dallas, TX) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 50, no. 2, 1985, p. 219-252. refs

A critical evaluation is conducted of the current system of litigation for aircraft accidents, and its performance is compared with the features of a hypothetical insurance system which circumvents the shortcomings of current tort liability. While tort liability is a system suited to the resolution of conflict among separate parties, insurance is a contractual matter between parties who interact in advance. A carefully structured passenger insurance system would transfer the locus of decision-making authority to the consumer, thereby eliminating the problems associated with tort liability. O.C.

A85-44099
AIRLINE DEREGULATION - ANOTHER LOOK
E. A. MORASH (Kent State University, OH) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 50, no. 2, 1985, p. 253-282. refs

It is noted that the poor capital market currently being encountered by U.S. airlines, at a time when they must raise capital to replace aging equipment, has increased their future debt costs relative to those of other industries and modes of transportation, these developments are presently attributed to the price competition unleashed by the Airline Deregulation Act of 1978. A policy of 'regulation by exceptions' is proposed which emphasizes regulatory involvement in rate setting only for significant departures from the norm. This is suggested to be capable of restraining destructive price wars. A degree of competition would be preserved while reducing excessive discounts, objectionable price discrimination, and industry instability. O.C.

A85-49971* National Aeronautics and Space Administration, Washington, D.C.
NASA AND THE PRACTICE OF SPACE LAW
S. N. HOSENBALL (NASA, Washington, DC) Journal of Space Law, vol. 13, no. 1, 1985, p. 1-7. refs

The paper discusses the need for increased awareness in space law due to advances in space technology and a trend toward commercialization of space. A list of national and international treaties, conventions, agreements, laws, and regulations relevant to space activities is presented. NASA lawyers specialize in international and municipal laws that affect the NASA space mission; an example of the lawyers working with insurance companies in negotiating the first Space Shuttle liability policy is provided. The increased participation of the public sector in space activities, for example, the commercialization of the Space Shuttle transportation system, is examined. I.F

A85-49972
INTELLECTUAL PROPERTY AND SPACE ACTIVITIES
B. LUXENBERG (U S. Department of Commerce, Washington, DC) and G. J. MOSSINGHOFF (Pharmaceutical Manufacturers Association, Washington, DC) Journal of Space Law, vol. 13, no. 1, 1985, p. 8-21. refs

The need for protection of data, products, and ideas as the commercialization of space continues is discussed. Some of the international and national laws of space which govern proprietary information and commercialization are presented The development of laws to protect copyrighted works transmitted by satellite and remote sensing is described. NASA's policy toward intellectual property rights is to protect proprietary interests and encourage industrial participation in commercial space activities. Explanations of these policies are provided. The future property rights to possible inventions made by reimbursable users on the Space Shuttle and the Space Station are examined. I.F.

A85-49973
CUSTOM AS A SOURCE OF INTERNATIONAL LAW OF OUTER SPACE
V. S VERESHCHETIN and G. M. DANILENKO (AN SSSR, Institut Gosudarstva i Prava, Moscow, USSR) Journal of Space Law, vol. 13, no. 1, 1985, p 22-35 refs

The role of custom in the maintenance of international law in outer space is discussed. Due to the continuous advances in space technology and the number of states participating in space development it is not possible for treaties to establish all the necessary laws, therefore, internatinal custom is used as a means of creating legal rights or obligations of states independent of any existing treaty regulation and can regulate the relations of states which are nonparticipants in codifying conventions. Some principles which have become customary norms are described. Examples of the implementation of customary rules to control outer space questions are presented. Interaction between custom and treaty occurs through the incorporation of existing customary laws into treaties and the use of treaties to regulate new problems or change existing norms; these areas of interaction are explained. I.F.

A85-50055
LEGAL ISSUES OF MANNED ORBITING SPACE STATIONS
A GORBIEL (Lodz, Uniwersytet, Poland) Postepy Astronautyki (ISSN 0373-5982), vol. 18, no. 1-2, 1985, p. 7-24. refs

A necessity is postulated for negotiating a special international agreement, in the framework of the United Nations, addressing a number of detailed legal issues connected with the use of orbiting space stations. The topics to be considered in such a document are investigated, and the views advanced in the space law literature concerning the international legal specificity of the manned space stations are analyzed Questions of jurisdiction concerning the space stations are examined, in particular the registration of a station constructed from two or more parts launched separately, and assembled later in space. The need for precise treaty regulations concerning the limits of authority of the station commander and the general relationships among the station personnel is emphasized. Finally, the problems concerning the personnel manning the space stations that belong to international organizations are discussed. I S.

A85-50056
TOWARDS THE ENTIRE DEMILITARIZATION OF OUTER SPACE
A. GORBIEL (Lodz, Uniwersytet, Poland) Postepy Astronautyki (ISSN 0373-5982), vol 18, no. 1-2, 1985, p. 25-56. refs

The potential use of space-based destruction weapons and antisatellite weapons is discussed in the light of the January 27, 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies. This treaty stipulates total demilitarization of celestial bodies, but in outer space itself it bans only the mass destruction weapons. Discussions in the UN organs concerning the means to be undertaken for the prevention of outer space armament are summarized An opinion is expressed and motivated, that it is necessary to adopt a new international treaty banning the use of space for any military purposes whatever, expressly the testing, placing, and use of outer space weapons of any kind, rather than only weapons of mass destruction. In the context of this new treaty, the admissibility of using satellites for reconnaissance and communication is questioned. I.S.

N85-10870# Committee on Appropriations (U. S. Senate)
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND CERTAIN INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1985, PART 2
Washington GPO 1984 883 p *Hearings on* H. R 5713 before a Subcomm of the Comm. on Appropriations, 98th Congr , 2nd Sess., 1, 29 Mar., 12 Apr., and 1 May 1984
(S-REPT-98-889-PT-2, GPO-31-248) Avail: Committee on Appropriations

Requests of $1,501,792,000 for the National Science Foundation, $7,491,400,000 for NASA, $630,072,000 for the Federal Emergency Management Agency, $67,428,000 for the Federal Home Loan Bank Board and $10,500,000,000 for the Housing and Urban Development are justified. Office Technology Assessment findings on automatic and the civilian space station are included.

N85-10871# Committee on Appropriations (U S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
In its Department of Housing and Urban Development and Certain Independent Agencies for Fiscal Year 1985, Pt. 2 p 1075-1241 *Washington* GPO 1984
Avail: Committee on Appropriations

Appropriations for the space station; space transportation capability development; space science and applications; technology utilization, aeronautical research and technology; space research and technology, tracking and data advanced system; shuttle production and operational capability; space and ground networks, communication and data systems; and construction of facilities are detailed B.G.

N85-11013*# National Aeronautics and Space Administration, Washington, D.C.
LEGAL CONSIDERATIONS AND COOPERATIVE OPPORTUNITIES FOR SPACE COMMERCIAL ACTIVITIES
S N. HOSENBALL *In* NASA Marshall Space Flight Center 2nd Symp. on Space Industrialization p 28-37 Oct 1984
Avail: NTIS HC A19/MF A01 CSCL 05D

It is a national policy to make the capabilities of the Space Transportation System available to a wide range of potential users. This includes its availability as a space manufacturing facility for commercial activities, which may be carried out on a reimbursable *basis or as a joint endeavor with NASA, but with substantial private* investment In any high risk, long lead-time research and development activity directed towards commercialization, the protection afforded the results of the research and development under the laws relating to intellectual property rights may provide an important incentive for private investment. The policies and practices of NASA directed towards the protection of privately-established intellectual property rights involved in STS use are reviewed with particular emphasis on reimbursable launch agreements and joint endeavor agreements. R S.F.

N85-12806*# National Aeronautics and Space Administration, Washington, D.C.
THE STRUCTURES AND THE ROLE OF AN INTERNATIONAL AGENCY FOR THE CONTROL OF SATELLITES
R. J. DUPUY Jun. 1984 13 p refs Transl. into ENGLISH from Ann. of Air and Space Law (Montreal), v. 6, 1981 p 333-341 Original language document was announced as A82-37836 Transl. by Kanner (Leo) Associates, Redwood City, *Calif*
(Contract NASW-3541)
(NASA-TM-76765; NAS 1.15:76765) Avail: NTIS HC A02/MF A01 CSCL 05D

Legal questions involved in the liability of a proposed agency which would control internationally owned satellites for monitoring worldwide compliance with arms control agreements are discussed Difficulties in acquiring the signed consent of all the relevant nations, and guaranteeing satisfactory compliance with the terms of such an agreement are noted. Additional problems to be solved comprise the construction of the ground based facilities and the satellites, the funding for the venture, and the reconciliation of the functions of the proposed agency with the sovereignty of individual states The agency would gather, treat, and format data for signatories of arms control agreements and provide technical assistance in crisis conditions. It is concluded that the existence *and functioning of the agency would reduce the amount of classified* information and would consequently reduce the level of international tensions. E.A K.

N85-12919# Committee on Science and Technology (U S. House).
THE EXPENDABLE LAUNCH VEHICLE COMMERCIALIZATION ACT
Washington GPO 1984 120 p *Hearings before the Subcomm.* on Space Sci. and Appl of the Comm. on Sci. and Technol , 98th Congr., 1st and 2nd Sess., No. 85, 18 Nov. 1983 and 29 Mar. 1984
(GPO-30-838) Avail Subcommittee on Space Science and Applications

The Department of Transportation will serve as the lead agency in the transfer of Expendable Launch Vehicles (ELV) to the private sector. The roles of the FAA, Coast Guard and materials Transportation Bureau were discussed B.G.

N85-13690# Committee on Commerce, Science, and Transportation (U. S Senate).
COMMERCIAL SPACE LAUNCH ACT
Washington GPO 1984 72 p Hearing on S. 2931 before the Subcomm. on Sci., Technol and Space of the Comm on Com , Sci. and Transportation, 98th Congr., 1st Sess., 6 Sep. 1984
(GPO-39-613) Avail: Subcommittee on Science, Technology and Space

Several initiatives designed to develop the commercial potential of space through increased private sector investments and involvement are considered The primary focus is on 2931 which seeks to facilitate private sector space launch activity by establishing the Department of Transportation as the lead Federal agency with licensing authority over private expandable launch vehicle operations and by providing a framework within which this *new industry can most effectively operate Economic, regulatory,* and legal incentives are covered as well as NASA support for commercial space ventures. A R H.

N85-14201# Committee on Commerce, Science, and Transportation (U. S Senate).
LAND REMOTE-SENSING COMMERCIALIZATION ACT
Washington GPO 1984 35 p Rept. to accompany H. R. 5155 presented by the Comm. on Com., Sci., and Transportation, 98th Congr., 2nd Sess., 17 May 1984
(S-REPT-98-458) Avail: US Capitol, Senate Document Room

A bill is described which provides a framework for a phased, orderly commercialization of land remote sensing technologies The commercialization ramework includes provisions for appropriate Government regulation of private land remote sensing, continued Federal research and development in remote sensing, and continued Government archiving of land remote sensing data. A.R H.

N85-15533# Executive Office of the President, Washington, D. C.
PUBLICATIONS OF THE EXECUTIVE OFFICE OF THE PRESIDENT: JANUARY 20, 1981 - JUNE 30, 1984
1984 7 p
(PB84-230671) Avail NTIS HC A02/MF A01 CSCL 05B

Over 140 documents issued by the components of the Executive Office of the President, and available for sale to the public are listed. GRA

N85-15792# Office of Technology Assessment, Washington, D.C.
FINANCING CONSIDERATIONS AND FEDERAL BUDGET IMPACTS
In its Civilian Space Stations and the US Future in Space p 217-226 Nov. 1984 refs
Avail: SOD HC $7.50

Private sector funding and international funding of U S civilian space activities are discussed The projected growth in private sector sales and related tax revenues is considered. Historical bases for a projection of sales growth in the private sector are given along with legal and experiential bases for Federal/private sector cooperation in economically directed research and development. Impacts on the Federal space budget are addressed R.S F.

N85-16684# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
GOVERNMENT CONTRACT CONTINGENT LIABILITIES. THE ANTI-DEFICIENCY ACT, AND THE HOBGOBLIN OF LITTLE MINDS M.S. Thesis George Washington Univ.
S. D. HEDLUND Sep. 1984 197 p
(AD-A147919; AFIT/CI/NR-84-82T) Avail. NTIS HC A09/MF A01 CSCL 05A

Contents: The Anti-Deficiency Act; (1) Overview of the Act, (2) Perceived Reasons for the Ineffectiveness of the Act; (3) Relevant Features and Applications of the Act; (4) What the Act means for Contingent Liabilities; The Problem of Statutory Authority in Contractually Assuming Contingent Risks, How the Government may Assume Contingent Obligations without Violating the Anti-Deficiency Act Contingencies in Fact, (1) Indemnity, (2) Clauses which may vary the Contract Price, (3) Constructive Changes and Differing Site Conditions, Termination Issues. GRA

N85-16697*# National Aeronautics and Space Administration, Washington, D C
OUTER SPACE LAW: A PROBLEM OF ASTRONAUTICS
V. MANDL Dec 1984 55 p Transl into ENGLISH of "Das weltraum-recht Ein problem der raumfahrt" Rept. Germany, 1983 48 p Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASW-4005)
(NASA-TM-77760, NAS 1.15 77760) Avail NTIS HC A04/MF A01 CSCL 05D

The theory of space law is discussed from the point of view of similarities and differences between hypothetical space law and current (1932) aviation law International legal aspects and economic and cultural effects are also addressed Author

N85-16852# Engineering and Economics Research, Inc, Falls Church, Va.
NATIONAL AIRSPACE REVIEW ENHANCEMENT PLAN, REVISION 3
19 Dec 1984 64 p
(AD-A150743) Avail. NTIS HC A04/MF A01

The National Airspace Review (NAR) Plan was retitled as the National Airspace Review Enhancement (NARE) Plan to reflect the expanded scope of this undertaking. The airspace allocation, procedural, and regulatory aspects of improvements scheduled under the National Airspace System (NAS) plan and the shift of program sponsorship from the Associate Administrator for Air Traffic to the Director of Management Systems are reviewed. B.G

N85-19309# Joint Publications Research Service, Arlington, Va.
WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT
24 Jan. 1985 63 p refs Transl into ENGLISH from various foreign articles
(JPRS-TTP-85-002) Avail: NTIS HC A04/MF A01

Research topics in the area of telecommunication are covered in this Worldwide Report The development and design of traveling wave tubes and optical fibers from Japan are discussed Chinese domestic satellite communications systems are also discussed.

N85-19314# Joint Publications Research Service, Arlington, Va
WORLDWIDE REPORT: TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT
26 Feb. 1985 64 p Transl into ENGLISH from various worldwide articles
(JPRS-TTP-85-006) Avail: NTIS HC A04/MF A01

The development and utilization of various communications technologies in individual countries in Asia, sub-Saharan Africa, Latin America, Europe, and the Near-East are reported. Specifications for Brasilsat are included along with examples of international cooperation for technology transfer.

N85-20182# Joint Publications Research Service, Arlington, Va.
FRENCH RESEARCH MINISTER ON POLICY, TECHNOLOGY TRANSFER
P. GRANGE and J. C. HANUS *In its* West Europe Rept: Sci. and Technol. (JPRS-WST-85-008) p 128-135 19 Feb 1985 Transl into ENGLISH from Micro et Robots (Paris), Nov. 1984 p 42-45
Avail. NTIS HC A07/MF A01

Technology transfer, relationship of science and politics; robotics; industry responsibility, research laboratories; and regionalization are discussed B.G.

N85-21214*# National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md.
DEBRIS IN THE GEOSTATIONARY ORBIT RING, THE ENDLESS SHOOTING GALLERY: THE NECESSITY FOR A DISPOSAL POLICY
D H SUDDETH *In* NASA Lyndon B Johnson Space Center Orbital Debris p 349-364 Mar. 1985
Avail NTIS HC A20/MF A01 CSCL 03C

NASA is considering establishing a policy for the limitation of the physical crowding of the geostationary orbit The proposed policy is intended to address the following issues: (1) deal only with geostationary altitudes; (2) illustrate the unique value and usefulness of the geostationary orbit ring; (3) describe the orbital dynamics as simply as possible, (4) describe the current spacecraft and debris situation; (5) briefly review current industry and agency policies, (6) project future trends of physical crowding with the present nonpolicy; (7) propose solutions that can be implemented in the near future; and (8) use previous work as much as desirable. G.L C.

N85-21218*# Battelle Columbus Labs., Ohio. Space Systems and Applications.
ORBITAL DEBRIS POLICY ISSUES: BATTELLE INVOLVEMENT AND SOME PERSONAL OBSERVATIONS
D. S EDGECOMBE *In* NASA. Lyndon B Johnson Space Center Orbital Debris p 402-409 Mar. 1985 refs
Avail: NTIS HC A20/MF A01 CSCL 22A

The possible hazards presented by orbital debris have been a matter of concern since the early 1960s. The area of initial concern was the potential hazard of the Earth from reentering debris. In the very early days of the space program, it was believed that only specially protected objects would survive reentry Subsequent events showed this to be incorrect. The recognition of the potential hazard of orbital debris to orbiting objects did not occur until the late 1970s. Concern over this potential hazard has increased, and has also given rise to a number of policy issues These issues are, at present, largely unresolved G L C.

N85-21219*# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex.
CONSIDERATIONS FOR POLICY ON MAN-MADE DEBRIS PROPAGATION CONTROL
D FIELDER *In its* Orbital Debris p 410-418 Mar. 1985
Avail. NTIS HC A20/MF A01 CSCL 22A

The present rates of man-made, space object propagation are such that there is a real probability of self propagation which, if uncontrolled can lead to a serious limitation to future uses of spacecraft for beneficial purposes Effective control over the debris issue requires adoption and adherence to policy at a world wide

level (any one nation's unknowing, selfish or deliberately adverse action can conceivably jeopardize other useful applications of space satellites for years into the future) The near-term environment may not seriously jeopardize the near-term missions However, absence of control and/or nonadherence to a control policy in the near-term can result in a debris environment that can severely limit long - term mission opportunities The data upon which these observations are based continues to be investigated. These investigations tend to validate the preceding observations and emphasize the need for near-term action to establish responsible control policy and implementation actions Author

N85-21225# Committee on Commerce, Science, and Transportation (U S. Senate).
COMMERCIAL SPACE LAUNCHES
Washington GPO 1984 19 p Rept to accompany H R 3942 presented by the Comm. on Com., Sci , and Transportation, 98th Congr., 2nd Sess , 3 Oct 1984
(S-REPT-98-656; GPO-51-010) Avail US Capitol, Senate Document Room

This bill is to establish a framework within which expendable launch vehicles (ELVs) and their associated facilities and launch services may be licensed for commercial launches. This legislation also designates the Department of Transportation (DOT) as the lead Federal agency to facilitate and expedite the issuance and transfer of commercial space launch licenses Author

N85-22244# Committee on Science and Technology (U S House).
1984 SCIENCE AND TECHNOLOGY POSTURE HEARING WITH THE DIRECTOR OF THE OFFICE OF SCIENCE AND TECHNOLOGY POLICY
Washington GPO 1985 65 p Hearing before the Comm. on Sci and Technol , 98th Congr , 2nd Sess , No. 134, 1 Feb. 1984
(GPO-41-060) Avail: Committee on Science and Technology

The U.S. Government Science and technology policy is reviewed. Topics discussed include research and development, technology utilization, development of high quality technical talent, pursuit of excellence in research, and expansion and strengthening of partnership between government industry, and academia. E.A.K.

N85-22245# Committee on Science and Technology (U. S. House).
AN AGENDA FOR A STUDY OF GOVERNMENT SCIENCE POLICY
Washington GPO 1985 67 p Rept. presented by the Task Force on Sci. Policy to the Comm. on Sci and Technol., 98th Congr , 2nd Sess., Dec 1984
(GPO-40-860) Avail: Committee on Science and Technology

The proposed agenda was developed in response to the charge to focus on the issues of maintaining America's leadership in science in view of the changing environment facing us over the coming decades In developing the proposed agenda, the importance which science has come to play in our national life and in our international relations was considered At the same time, the two factors which inevitably will affect American science in the future: the growing international strength in science and the urgent need to ensure that science expenditures, as an important component of a federal budget, be provided at optimum levels and be expended in the most effective manner, were considered. As a result, the proposed agenda is broad and raises questions about both the basic purposes of federal funding for scientific research and the specific practices of the governmental agencies for the expenditure of those funds G.L C.

N85-22253# President's Private Sector Survey on Cost Control, Washington, D.C
PRESIDENT'S PRIVATE SECTOR SURVEY ON COST CONTROL, REPORT ON RESEARCH AND DEVELOPMENT
1983 173 p
(PB84-173269) Avail. NTIS HC A08/MF A01 CSCL 05A

Results of the Research and Development Task Force of the President's Private Sector Survey on Cost Control in the Federal Government are presented Recommendations are made which, when fully implemented, could result in significant cost savings Individual topics addressed include: strategic planning, R and D management and the budget process; privatization, administration of research grants to universities; NASA cost reporting; and research program reporting M.G

N85-22455# Joint Publications Research Service, Arlington, Va.
U.S., SOVIET SPACE PROGRAM AIMS CONTRASTED
G S KHOZIN *In its* USSR Rept.: Space (JPRS-USP-85-001) p 104-110 4 Feb. 1985 Transl. into ENGLISH from Zemlya i Vselennaya (USSR), no. 2, Mar.-Apr. 1984 p 14-18
Avail. NTIS HC A07

International treaties and agreements which establish the principles for research and use of space for peaceful purposes are used to assess the U S. and U.S.S.R. space programs B G.

N85-23442# Joint Publications Research Service, Arlington, Va
USSR REPORT: SCIENCE AND TECHNOLOGY POLICY
27 Feb. 1985 102 p refs Transl. into ENGLISH from various Russian articles
(JPRS-UST-85-002) Avail· NTIS HC A06

Scientific and technological policies are presented and discussed Some areas covered are (1) Economic mechanism of integration of science and production; (2) Scientific and technical progress and factors of intensification of the economy; (3) Contributions of technical community to scientific and technical progress; (4) Coordination of regional management of scientific and technical activity, and (5) dissemination of information on advanced know how

N85-23452# Committee on Science and Technology (U S House)
AUTHORIZING APPROPRIATIONS TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION FOR FISCAL YEAR 1986
Washington GPO 1985 223 p Presented to accompany H.R 1714 to the Comm of the Whole House on the State of the Union, 99th Congr , 1st Sess., 28 Mar. 1985
(H-REPT-99-32; GPO-44-360) Avail US Capitol, House Document Room

The authorization of appropriations for aerospace research and development were discussed. The appropriation concerned space flights, research and program management, control and data communications, and construction of facilities E A.K.

N85-23453# Naval Postgraduate School, Monterey, Calif.
COPYRIGHT LAW, COMPUTER SOFTWARE, AND GOVERNMENT ACQUISITION M.S. Thesis
P. R. DAUPHINIAS Sep. 1984 81 p
(AD-A150347) Avail NTIS HC A05/MF A01 CSCL 09B

This thesis examines copyright law as it relates to computer software and how this law affects the Government acquisition of computer software. Following a differentation of copyright law, patent law, and trade secrets, a brief history of the evolution of copyright law is presented Current Government software acquisition practices are examined with respect to copyright statutes The 1984 Betamax case is examined and related to software issues which concern the Government as an entity. Finally, considerations which influence software procurement and copyrights are examined GRA

N85-25360# Joint Publications Research Service, Arlington, Va
MILITARIZATION OF SPACE ACTIVITY IN UNITED STATES
O. MIKHAYLOV *In its* USSR Rept.: Space (JPRS-USP-85-003) p 137-144 4 Mar. 1985 Transl into ENGLISH from Politicheskoye Samoobrazovaniye (USSR), no 6, Jun 1984 p 115-120
Avail: NTIS HC A08/MF A01

Policies of the Reagan administration adopted to achieve a strategic advantage over the U.S.S R. are examined. Civilian departments in the United States are being increasingly drawn into the orbit of the space aspirations of the Pentagon. The expenditures of NASA on military space research are not less than one third of its budget and former military personnel are directing the agency's activity. Space command and reconnaissance systems are being developed and satellites are being used to intercept communications. The strategic aggressive antisatellite system is a violation of the 1972 agreement on antimissile defense systems. Space shuttle is becoming an important means for the testing, collection and in orbit servicing of promising space weapons, including an antimissile defense system. Variants of automatic and manned maneuverable spaceships of a lesser size and orbital stations are being actively investigated. The intention of the Washington political leaders to break the existing equilibrium of strategic forces by means of the militarization of space is a dangerous turn in the arms race which is a threat to all mankind. A.R H.

N85-27766# Committee on Energy and Commerce (U. S. House).
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION AUTHORIZATION
Washington GPO 1984 78 p Hearing on H. R. 5497 before the Subcomm. on Telecommun , Consumer Protection, and Finance of the Comm. on Energy and Com., 98th Congr., 2nd Sess , 24 Apr 1984
(GPO-38-660) Avail: Subcommittee on Telecommunications, Consumer Protection, and Finance

A bill to authorize appropriations for the National Telecommunications and Information Administration (NTIA) for the fiscal years 1985 and 1986 is given. The activities of the NTIA are discussed. R J F.

N85-27768# Committee on Appropriations (U S. House).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATIONS FOR 1986. PART 6: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington GPO 1985 1026 p refs Hearings before a subcomm. of the Comm. on Appropriations, 99th Congr., 1st Sess , 1985
(GPO-47-235) Avail: Committee on Appropriations CSCL 05A

The president's budget for NASA of $7.9 billion allocate $2 9 billion for research and development, $3 5 billion for space flight, control and data communications; $149 million for construction of facilities; and $1 3 billion for research and program management Space station and space shuttle budgetary requirements are explored in detail, along with space science, science and applications, commercial programs/technology utilization and aeronautics research and technology. E R.

N85-28860# American Univ., Washington, D. C.
SOCIAL AND POLITICAL PROBLEMS IN SOVIET BASIC RESEARCH
L. L. LUBRANO *In* Stanford Univ. Sci. and Technol in the Soviet Union p 71-95 31 Jan. 1985
(AD-P004565) Avail NTIS HC A10/MF A01 CSCL 05A

The impact by social and political factors on Soviet based research is discussed Policy implications, decisionmaking in the USSR academy, and politics and furman flights are discussed. GRA

N85-28885# Committee on Commerce, Science, and Transportation (U. S. Senate)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1986
Washington GPO 1985 29 p H. R. 1714, an act, referred to the Comm. on Com., Sci., and Transportation, 99th Congr , 1st Sess., 16 Apr 1985
(S-REPT-99-91) Avail: US Capitol, Senate Document Room

An act to authorize appropriations for various NASA programs is given. Research and development, space flight, control and data communications, construction and maintenance of facilities, and project management are among the purposes for which the authorization was written. R.J.F.

N85-28886# Bundesministerium fuer Forschung und Technologie, Hamburg (West Germany).
DOCUMENTATION FOR THE WEST GERMAN FEDERAL CABINET'S SPACE POLICY DECISION [UNTERLAGEN ZUR ENTSCHEIDUNG DES BUNDESKABINETTS ZUR WELTRAUMPOLITIK]
GREGER Apr. 1985 33 p In GERMAN
Avail: NTIS HC A03/MF A01

The financial and technical contribution of the German government to the Columbus program and the HM 60/Ariane 5 program as well as the time schedule are presented. The different programs and the NASA space station are described. The importance of the NASA space station for Europe is studied in its scientific, technological, financial and political aspects. Author (ESA)

N85-30978# Committee on Commerce, Science, and Transportation (U. S. Senate)
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, 1986
DANFORTH Washington GPO 1985 64 p Rept. to accompany H R 1714, presented by the Comm. on Com , Sci., and Transportation, 99th Congr., 1st Sess., 24 Jun. 1985
(S-REPT-99-91; GPO-51-010) Avail: US Capitol, Senate Document Room

The provisions of H.R 1714, a bill to authorize appropriations to the National Aeronautics and Space Administration for research and development, space flight, control and data communications, construction of facilities, and research and program management are given. Space stations, the Hubble Space Telescope, Spacelab, upper stages, tethered satellites, and the Gamma Ray Observatory are among the numerous projects discussed. R.J.F.

N85-30979# Committee on Appropriations (U. S. House)
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION BILL, 1986
Washington GPO 1985 89 p Rept. to accompany H.R. 3038 presented by the Comm. on Appropriations, 99th Congr., 1st Sess., 18 Jul. 1985
(H-REPT-99-212; GPO-50-177) Avail: US Capitol, House Document Room

Appropriation hearings for the Department of Housing and Urban Development Independent Agencies are presented. Major agencies discussed include Environmental Protection Agency, Federal Emergency Management Agency, National Aeronautics and Space Administration, the National Credit Union Administration and the Veterans Administration. Salaries and expenses are presented for most organizations.

N85-32038# National Academy of Sciences - National Research Council, Washington, D. C.
NAVY INFORMATION SYSTEMS: PLANNING, POLICY, ORGANIZATION, AND MANAGEMENT Final Report
Jan. 1985 60 p
(Contract N00014-80-C-0160)
(PB85-176113) Avail: NTIS HC A04/MF A01 CSCL 05B

The committee automatic data processing that reviewed Navy's management and planning of (ADP) systems presents its findings.

Committee recommends new thrust that focuses on information rather than transactional ADP systems; change ADP systems into information systems. The following specific recommendations were made: The Navy needs a strong advocate of information systems at Chief of Naval Operations-level (CNO), Create a new CNO division, Information Systems Division, under a flag officer to report to Command and Control. How well the Navy has implemented the committee's recommendations is discussed. GRA

N85-32039# Committee on Science and Technology (U S House).
NASA AUTHORIZATION, 1986, VOLUME 1
Washington GPO 1985 180 p Hearing before the Subcomm on Transporation, Aviation and Mater. of the Comm on Sci and Technol., 99th Congr., 1st Sess., No. 3, 5 Mar. 1985
(GPO-46-385) Avail. Subcomm. on Transportation, Aviation and Mater.

A congressional hearing was conducted wherein testimony was heard and evidence presented in support of NASA's civil aviation program. Of primary concern were budget considerations and appropriations It was stressed that this program benefits a broad segment of the population through its end applications. G.L.C.

N85-32041# Committee on Appropriations (U. S Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT-INDEPENDENT AGENCIES APPROPRIATION ACT, 1986
Washington GPO 1985 50 p H. R 3038 referred to the Comm. on Appropriations, 99th Congr., 1st Sess , 29 Jul. 1985
Avail US Capitol, House Document Room

Appropriations for the year ending September 30, 1986 as approved by the 99th congress are presented.

N85-32042# Committee on Appropriations (U. S. Senate).
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND DEVELOPMENT
In its Dept. of Housing and Urban Develop -Independent Agencies Appropriations Act, 1986 p 24-27 1985
Avail US Capitol, House Document Room

The department of Housing and Urban Development Independent Agencies Appropriations Act, 1986 contains appropriation guidelines for funding of NASA programs for the year ending September 30, 1986. The amount provided is $2,756,800,000 G L.C

N85-33173*# National Aeronautics and Space Administration Lyndon B. Johnson Space Center, Houston, Tex.
TESTIMONY OF ROBERT A. FROSCH BEFORE THE SUBCOMMITTEE ON HUD AND INDEPENDENT AGENCIES OF THE SENATE COMMITTEE ON APPROPRIATIONS
R. A. FROSCH 14 Mar. 1985 4 p
(NASA-TM-87496, NAS 1.15:87496) Avail: NTIS HC A02/MF A01 CSCL 22B

An agreement between NASA and the Congress was arranged as part of the activities supporting the establishment of NASA Policy on Automation and Robotics for the space station. This agreement is dicussed. A panel brought together experts from industry, universities, national laboratories, other government agencies, and NASA to perform an independent study of how NASA could use automation and robotics in the space station in ways that would be most useful to carrying out the mission of the station, and that would lead to useful benefits to the U S. economy and industry on the ground. Author

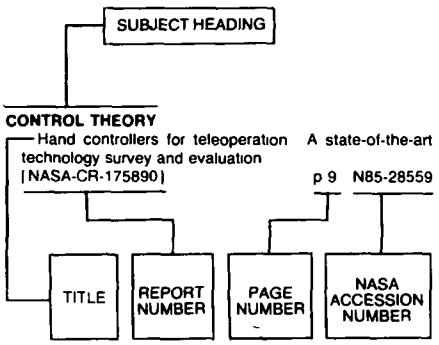
N85-34720# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT INDEPENDENT AGENCIES APPROPRIATION BILL, 1986
Washington GPO 1985 117 p Rept. to accompany H.R. 3038 presented by the Comm. on Appropriations to the 99th Congr., 1st Sess., 16 Jul. 1985
(S-REPT-99-129) Avail: US Capitol, Senate Document Room

The Department of Housing and Urban Development-Independent Agencies Appropriations Bill, 1986 is discussed. Various amendments are presented and an explaination of the contents of the bill is given. NASA programs, Antarctic research, environment protection, and construction projects are discussed.

N85-35147*# George Washington Univ., Washington, D C.
OPPORTUNITIES FOR POLICY HISTORIANS: THE EVOLUTION OF THE US CIVILIAN SPACE PROGRAM
J. LOGSDON *In* NASA, Washington A Spacefaring People p 81-107 1985 refs
Avail: NTIS HC A08/MF A01; also available SOD HC $3.50 as 033-000-009-33-0 CSCL 05A

The evolution of U.S. civilian space policy and the institutional framework through which that policy was implemented are discussed Space policy principles the governed decision making between 1957 and 1962 are identified The government/industry relations regarding space related research and development are discussed R.J.F.

Typical Subject Index Listing



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SUBJECT

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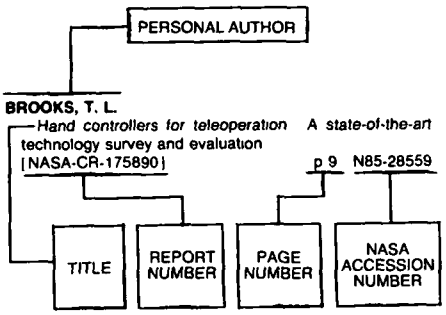

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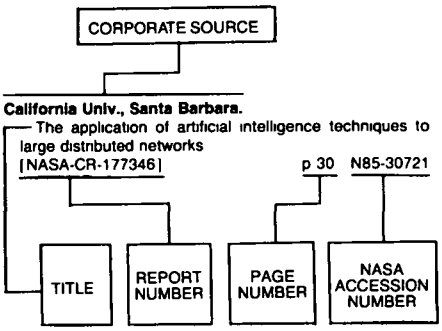

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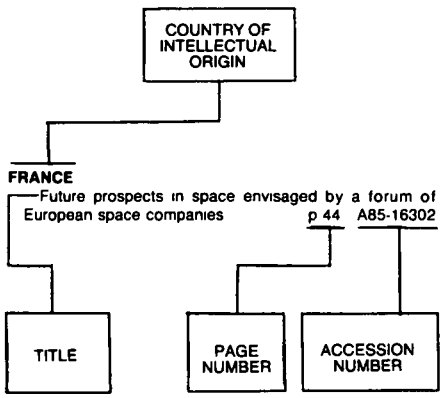

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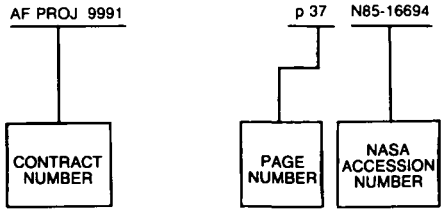

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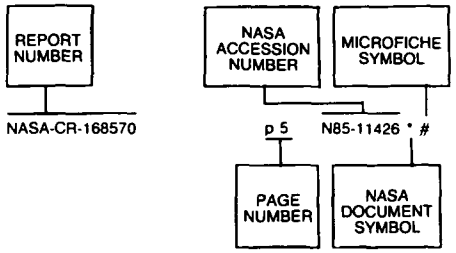

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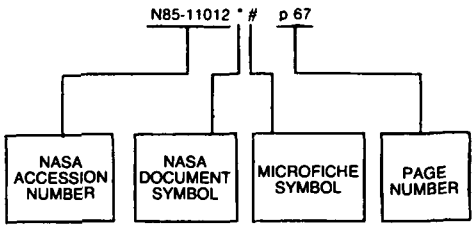

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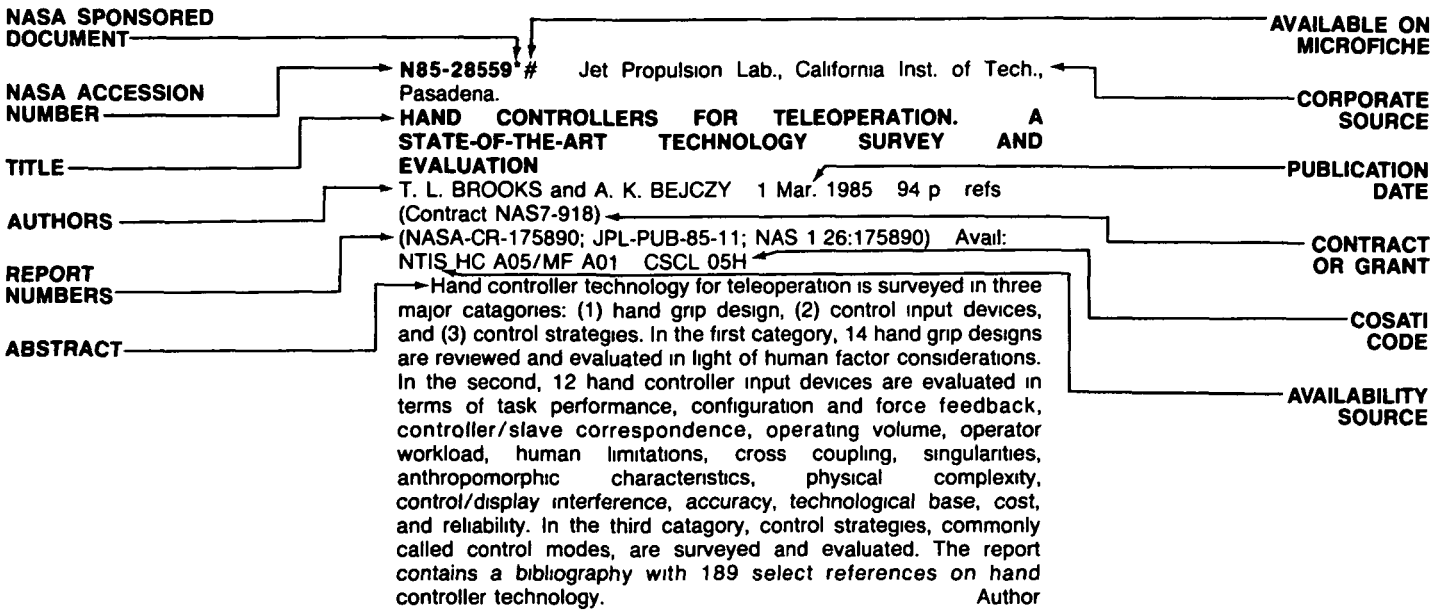

N85-28559*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

HAND CONTROLLERS FOR TELEOPERATION. A STATE-OF-THE-ART TECHNOLOGY SURVEY AND EVALUATION

T. L. BROOKS and A. K. BEJCZY 1 Mar. 1985 94 p refs

(Contract NAS7-918)

(NASA-CR-175890; JPL-PUB-85-11; NAS 1 26:175890) Avail: NTIS HC A05/MF A01 CSCL 05H

Hand controller technology for teleoperation is surveyed in three major catagories: (1) hand grip design, (2) control input devices, and (3) control strategies. In the first category, 14 hand grip designs are reviewed and evaluated in light of human factor considerations. In the second, 12 hand controller input devices are evaluated in terms of task performance, configuration and force feedback, controller/slave correspondence, operating volume, operator workload, human limitations, cross coupling, singularities, anthropomorphic characteristics, physical complexity, control/display interference, accuracy, technological base, cost, and reliability. In the third catagory, control strategies, commonly called control modes, are surveyed and evaluated. The report contains a bibliography with 189 select references on hand controller technology. Author

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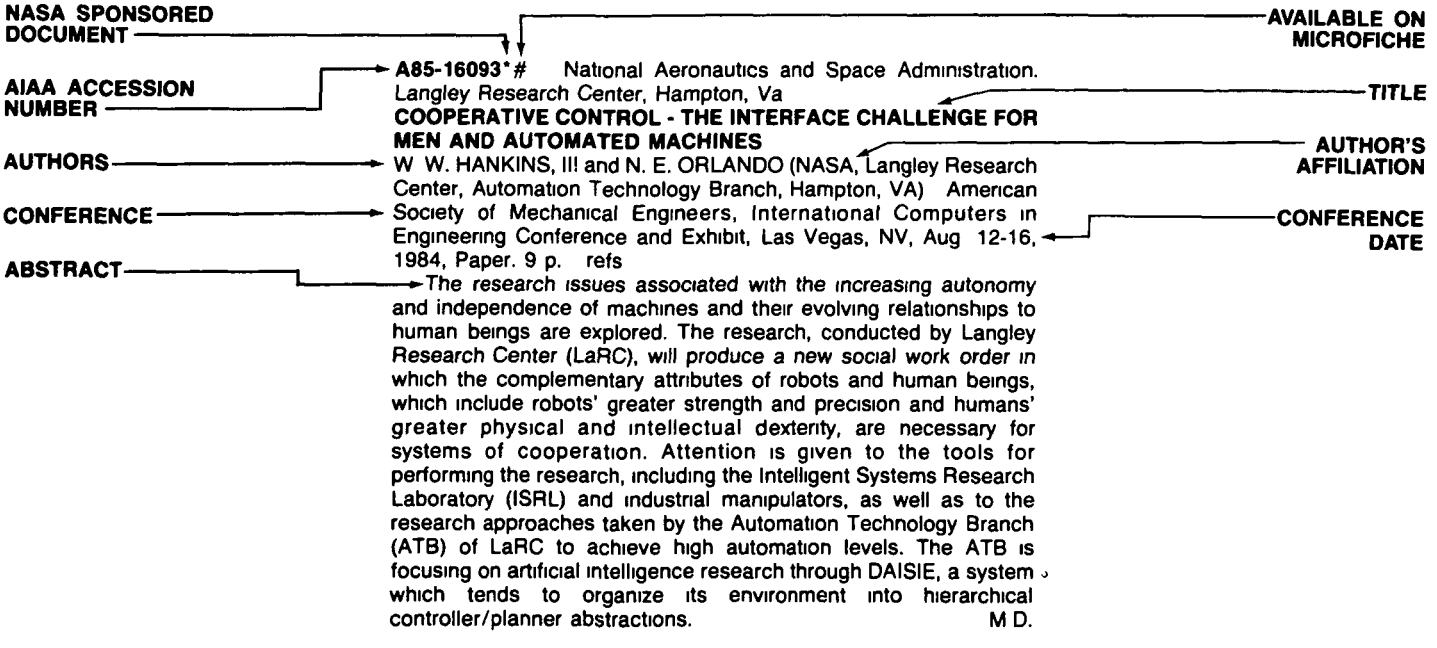

A85-16093*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va

COOPERATIVE CONTROL - THE INTERFACE CHALLENGE FOR MEN AND AUTOMATED MACHINES

W W. HANKINS, III and N. E. ORLANDO (NASA, Langley Research Center, Automation Technology Branch, Hampton, VA) American Society of Mechanical Engineers, International Computers in Engineering Conference and Exhibit, Las Vegas, NV, Aug 12-16, 1984, Paper. 9 p. refs

The research issues associated with the increasing autonomy and independence of machines and their evolving relationships to human beings are explored. The research, conducted by Langley Research Center (LaRC), will produce a new social work order in which the complementary attributes of robots and human beings, which include robots' greater strength and precision and humans' greater physical and intellectual dexterity, are necessary for systems of cooperation. Attention is given to the tools for performing the research, including the Intelligent Systems Research Laboratory (ISRL) and industrial manipulators, as well as to the research approaches taken by the Automation Technology Branch (ATB) of LaRC to achieve high automation levels. The ATB is focusing on artificial intelligence research through DAISIE, a system which tends to organize its environment into hierarchical controller/planner abstractions. M D.

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Gainesville, FL 32611
(904) 392-0367

GEORGIA

UNIV. OF GEORGIA LIBRARIES
Government Reference Dept
Athens, Ga 30602
(404) 542-8951

HAWAII

UNIV. OF HAWAII LIBRARY
Govt Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948-8230

IDAHO

UNIV. OF IDAHO LIBRARY
Documents Section
Moscow, ID 83843
(208) 885-6344

ILLINOIS

ILLINOIS STATE LIBRARY
Information Services Branch
Centennial Building
Springfield, IL 62706
(217) 782-5185

INDIANA

INDIANA STATE LIBRARY
Serials Documents Section
140 North Senate Avenue
Indianapolis, IN 46204
(317) 232-3686

IOWA

UNIV. OF IOWA LIBRARIES
Govt Documents Department
Iowa City, IA 52242
(319) 353-3318

KANSAS

UNIVERSITY OF KANSAS
Doc Collect—Spencer Lib
Lawrence, KS 66045
(913) 864-4662

KENTUCKY

UNIV. OF KENTUCKY LIBRARIES
Govt Pub Department
Lexington, KY 40506
(606) 257-3139

LOUISIANA

LOUISIANA STATE UNIVERSITY
Middleton Library
Govt Docs Dept
Baton Rouge, LA 70803
(504) 388-2570

LOUISIANA TECHNICAL UNIV. LIBRARY
Documents Department
Ruston, LA 71272
(318) 257-4962

MAINE

UNIVERSITY OF MAINE
Raymond H Fogler Library
Tri-State Regional Documents Depository
Orono, ME 04469
(207) 581-1680

MARYLAND

UNIVERSITY OF MARYLAND
McKeldin Lib —Doc Div
College Park, MD 20742
(301) 454-3034

MASSACHUSETTS

BOSTON PUBLIC LIBRARY
Government Docs Dept
Boston, MA 02117
(617) 536-5400 ext 226

MICHIGAN

DETROIT PUBLIC LIBRARY
Sociology Department
5201 Woodward Avenue
Detroit, MI 48202
(313) 833-1409

MICHIGAN STATE LIBRARY
P O Box 30007
Lansing, MI 48909
(517) 373-0640

MINNESOTA

UNIVERSITY OF MINNESOTA
Government Pubs Division
409 Wilson Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 373-7813

MISSISSIPPI

UNIV. OF MISSISSIPPI LIB.
Documents Department
University, MS 38677
(601) 232-5857

MONTANA

UNIV. OF MONTANA
Mansfield Library
Documents Division
Missoula, MT 59812
(406) 243-6700

NEBRASKA

NEBRASKA LIBRARY COMM.
Federal Documents
1420 P Street
Lincoln, NE 68508
(402) 471-2045
In cooperation with University of Nebraska-Lincoln

NEVADA

UNIVERSITY OF NEVADA LIB.
Govt Pub Department
Reno, NV 89557
(702) 784-6579

NEW JERSEY

NEWARK PUBLIC LIBRARY
5 Washington Street
Newark, NJ 07101
(201) 733-7812

NEW MEXICO

UNIVERSITY OF NEW MEXICO
Zimmerman Library
Government Pub Dept
Albuquerque, NM 87131
(505) 277-5441

NEW MEXICO STATE LIBRARY
Reference Department
325 Don Gaspar Avenue
Santa Fe, NM 87501
(505) 827-2033, ext 22

NEW YORK

NEW YORK STATE LIBRARY
Empire State Plaza
Albany, NY 12230
(518) 474-5563

NORTH CAROLINA

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL
Wilson Library
BA/SS Documents Division
Chapel Hill, NC 27515
(919) 962-1321

NORTH DAKOTA

UNIVERSITY OF NORTH DAKOTA
Chester Fritz Library
Documents Department
Grand Forks, ND 58202
(701) 777-2617, ext 27
(In cooperation with North Dakota State Univ Library)

OHIO

STATE LIBRARY OF OHIO
Documents Department
65 South Front Street
Columbus, OH 43215
(614) 462-7051

OKLAHOMA

OKLAHOMA DEPT. OF LIB.
Government Documents
200 NE 18th Street
Oklahoma City, OK 73105
(405) 521-2502

OKLAHOMA STATE UNIV. LIB.
Documents Department
Stillwater, OK 74078
(405) 624-6546

OREGON

PORTLAND STATE UNIV. LIB.
Documents Department
P O Box 1151
Portland, OR 97207
(503) 229-3673

PENNSYLVANIA

STATE LIBRARY OF PENN.
Government Pub Section
P O Box 1601
Harrisburg, PA 17105
(717) 787-3752

TEXAS

TEXAS STATE LIBRARY
Public Services Department
P O Box 12927—Cap Sta
Austin, TX 78753
(512) 471-2996

TEXAS TECH UNIV. LIBRARY
Govt Documents Department
Lubbock, TX 79409
(806) 742-2268

UTAH

UTAH STATE UNIVERSITY
Merrill Library, U M C 30
Logan, UT 84322
(801) 750-2682

VIRGINIA

UNIVERSITY OF VIRGINIA
Alderman Lib —Public Doc
Charlottesville, VA 22901
(804) 924-3133

WASHINGTON

WASHINGTON STATE LIBRARY
Documents Section
Olympia, WA 98504
(206) 753-4027

WEST VIRGINIA

WEST VIRGINIA UNIV. LIB.
Documents Department
Morgantown, WV 26506
(304) 293-3640

WISCONSIN

MILWAUKEE PUBLIC LIBRARY
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-3000

ST. HIST LIB. OF WISCONSIN
Government Pub Section
816 State Street
Madison, WI 53706
(608) 262-4347

WYOMING

WYOMING STATE LIBRARY
Supreme Ct & Library Bld
Cheyenne, WY 82002
(307) 777-6344