NASA SP-7500 (09)



# MANAGEMENT

A CONTINUING LITERATURE SURVEY

– With Indexes –

MARCH 1975

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7500 (09)

# MANAGEMENT

## A CONTINUING LITERATURE SURVEY

– With Indexes –

A selection of annotated references to unclassfied reports and journal articles that were introduced into the NASA Scientific and Technical Information System during 1974.

*Scientific and Technical Information Office*
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# INTRODUCTION

## COVERAGE

*Management* is a compilation of references to selected reports, journal articles, and other documents on the subject of management. This publication lists 1064 documents originally announced in the 1974 issues of *Scientific and Technical Aerospace Reports (STAR)* or *International Aerospace Abstracts (IAA)*.

## SCOPE

This publication series includes references on the management of: research and development, contracts, production, logistics, personnel, safety, reliability and quality control. It also includes references on: program, project and systems management; management policy, philosophy, tools, and techniques; decision-making processes for managers; technology assessment; management of urban problems; and information for managers on Federal resources, expenditures, financing, and budgeting.

## ORGANIZATION

Each entry in this bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two sections: *IAA* entries and *STAR* entries, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Following the abstract sections, three indexes are included: subject, personal author, and corporate source.

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## GENERAL AVAILABILITY

All publications abstracted in this literature survey are available to the public through the sources as indicated in the *STAR* entries or *IAA* entries. It is suggested that the literature survey user contact his own library or other local libraries prior to ordering any publications inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

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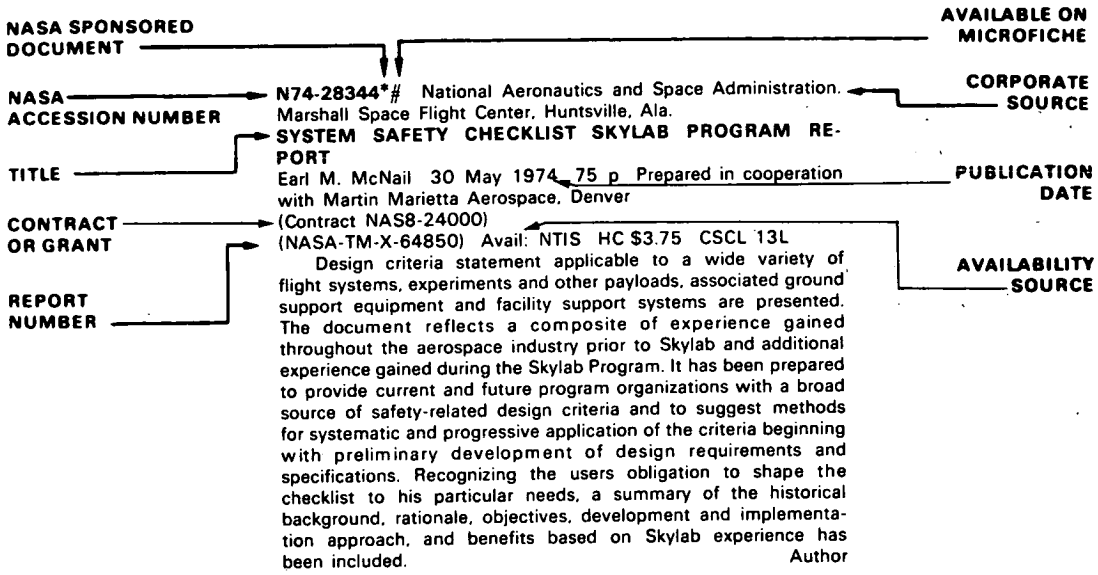


N74-28344*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**SYSTEM SAFETY CHECKLIST SKYLAB PROGRAM REPORT**

Earl M. McNail 30 May 1974 75 p Prepared in cooperation with Martin Marietta Aerospace, Denver

(Contract NAS8-24000)

(NASA-TM-X-64850) Avail: NTIS HC $3.75 CSCL 13L

Design criteria statement applicable to a wide variety of flight systems, experiments and other payloads, associated ground support equipment and facility support systems are presented. The document reflects a composite of experience gained throughout the aerospace industry prior to Skylab and additional experience gained during the Skylab Program. It has been prepared to provide current and future program organizations with a broad source of safety-related design criteria and to suggest methods for systematic and progressive application of the criteria beginning with preliminary development of design requirements and specifications. Recognizing the users obligation to shape the checklist to his particular needs, a summary of the historical background, rationale, objectives, development and implementation approach, and benefits based on Skylab experience has been included. Author

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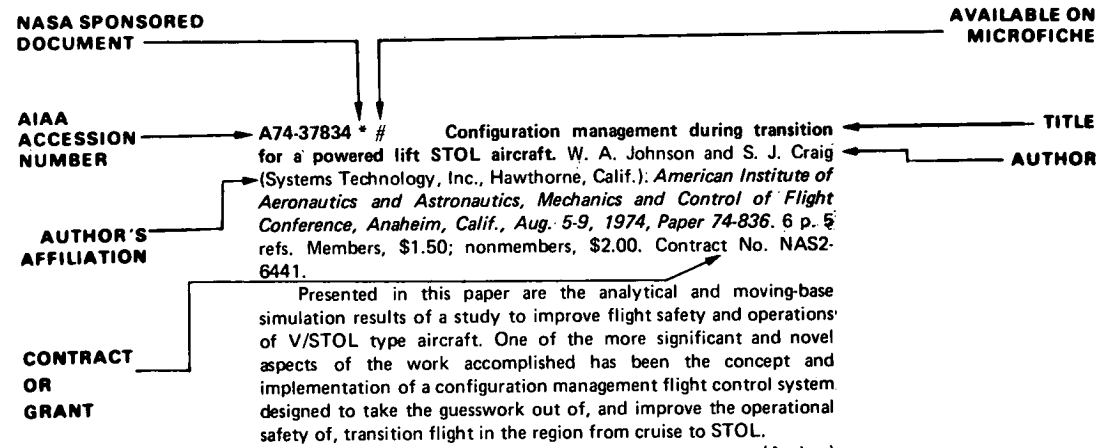


A74-37834 * # **Configuration management during transition for a powered lift STOL aircraft.** W. A. Johnson and S. J. Craig (Systems Technology, Inc., Hawthorne, Calif.): *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-836.* 6 p. 5 refs. Members, $1.50; nonmembers, $2.00. Contract No. NAS2-6441.

Presented in this paper are the analytical and moving-base simulation results of a study to improve flight safety and operations of V/STOL type aircraft. One of the more significant and novel aspects of the work accomplished has been the concept and implementation of a configuration management flight control system designed to take the guesswork out of, and improve the operational safety of, transition flight in the region from cruise to STOL.

(Author)

NASA

# MANAGEMENT

*a continuing literature survey*

MARCH 1975

## IAA ENTRIES

**A74-10275** **Rules relating to mortgage rights and to distraint in air law (Règles relatives aux droits d'hypothèque et de saisie-conservatoire en droit aérien).** G. Jacquemin. *Revue Générale de l'Air et de l'Espace,* vol. 36, no. 2, 1973, p. 182-187. In French.

**A74-10506 * #** **Air transportation noise technology overview.** B. Maggin and D. Chestnutt (NASA, Washington, D.C.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1152.* 10 p. 11 refs. Members, $1.50; nonmembers, $2.00.

The NASA and DOT technology program planning for quieter air transportation systems is reviewed. To put this planning in context, the nature of the noise problem and the projected nature of the air transportation fleet are identified. The technology program planning reviewed here is discussed in relation to the following areas of activity: systems analysis, community acceptance, basic research and technology, and the various classes of civil aircraft, i.e. existing and advanced transports, powered-lift transports, and general aviation. (Author)

**A74-10719** **A new perspective on the intersectoral movement of new technology.** J. P. Kottenstette and J. J. Rusnak (Denver, University, Denver, Colo.). *IEEE Transactions on Engineering Management,* vol. EM-20, Nov. 1973, p. 102-107. 14 refs.

Analysis of NASA mission-oriented research activity and an evaluation of programs conducted by the NASA Technology Utilization Office are considered to construct a basis for intersectoral movement of new technologies from their original applications to other fields. A model is proposed to demonstrate how such shifts can be materialized by two different mechanisms - one of diffusion and one of transfer. V.Z.

**A74-10720** **A review of R&D evaluation methods.** D. R. Augood (Kaiser Aluminum and Chemical Corp., Pleasanton, Calif.). *IEEE Transactions on Engineering Management,* vol. EM-20, Nov. 1973, p. 114-120. 59 refs.

R&D methods and associated techniques are reviewed, covering the uses of checklists of elements, profiles and information patterns, and the interpretation and application of the index method, including a discussion of the Olsen, Pacifico, Teal and Disman formulas. Also considered are risk analysis, credibility forecast, decision tree, impact analysis, and a combination of impact and risk analyses. V.Z.

**A74-10858 #** **Physiological, biochemical, and psychological responses in air traffic control personnel - Comparison of the 5-day and 2-2-1 shift rotation patterns.** C. E. Melton, J. M. McKenzie, R. C. Smith, B. D. Polis, and E. A. Higgins (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.; U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: International Congress on Aviation and Space Medicine, 21st, Munich, West Germany, September 17-21, 1973, Preprints of Lectures. Munich, Sekretariat, Internationaler Kongress für Luft- und Raumfahrtmedizin, 1973, p. 169, 170.

**A74-11096 #** **The air transport of tomorrow - Economic obstacles to surmount (Le transport aérien de demain - Des obstacles économiques à surmonter).** G. Besse (Institut du Transport Aérien, Paris, France). *Air et Cosmos,* Oct. 20, 1973, p. 81-83. In French.

To ensure the orderly development of world air transport, accurate forecasts must be available. Any over- or underestimation of requirements could cause financial problems particularly difficult to overcome. The concept of traffic flow is subject to numerous interpretations, and the actual traffic can vary sensibly depending on the definition utilized. It is necessary to be able to monitor the fluctuations of traffic demand, to have sufficient personnel and financial resources, and to provide overall economic planning. F.R.L.

**A74-11208 #** **Electrical interfaces in the AEROS satellite.** P. Soppa. *Dornier-Post* (English Edition), no. 3, 1973, p. 45-50.

Among the major tasks which face a project group in handling a satellite project are the checking and control of the development of the various subsystems and their mutual compatibility within the overall system. This is naturally an iterative process in both directions, in which the positive and negative information gained in developing the subsystems will affect the overall system, and information concerning the overall system will affect the subsystems. The conversion of this information into appropriate correcting steps during the development and test phases is the job of the project group. (Author)

**A74-11230 #** **Design competence - The mainspring to cost reduction.** W. H. Thomas (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1187.* 7 p. Members, $1.50; nonmembers, $2.00.

The cost of most products has risen dramatically in the past several years. However, the cost of products required for national defense has risen more than five times the rate of inflation. At the same time, money available for these products has decreased substantially. Efforts are being made by the Department of Defense to reduce these escalating costs. One of the tools being employed is a plan called 'design to cost.' This paper deals with this philosophy as it is being applied to the U.S. Army Heavy-Lift Helicopter (HLH) Engine Program. The XT701-AD-700 engine program is the first engine program to adopt the design-to-cost philosophy from its inception. This paper also discusses some specific examples of how it is being applied in the engine design and what the payoffs are expected to be. (Author)

**A74-11318 #** **Cost - The emerging aerospace technology.** D. K. Jorden and M. A. Siegel (United Aircraft Corp., Pratt and Whitney Aircraft Div., West Palm Beach, Fla.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1327.* 5 p. Members, $1.50; nonmembers, $2.00.

A cost management system is designed to give product cost a priority level equal to that of performance, weight and durability. The system provides cost visibility in the conceptual design phase, cost avoidance in the design phase, and cost reduction in the development and production phases. Essential in this system is a central cost management department staffed with engineering, procurement and manufacturing specialists backed by the management. V.Z.

**A74-11538** **Technology transfer - Where we stand today.** M. J. Cetron (Forecasting International, Ltd., Arlington, Va.). In: The impact of competitive technology on engineering management; Annual Joint Engineering Management Conference, 21st, St. Petersburg, Fla., October 25, 26, 1973, Record. Conference sponsored by ASQC, EIC, ISA, AIIE, ASME, and NSPE. New York, American Society of Mechanical Engineers, 1973, p. 11-28. 47 refs.

A framework is suggested for consideration of technology transfer, and the present status of scientific and technological knowledge dissemination is reviewed. Following a brief definition of technology transfer and a discussion of the existing types of technology transfer, such factors are examined as the barriers and stimuli to innovation, licensing, and the multinational corporations which affect the effectiveness of transfer. M.V.E.

**A74-11539 *** **The growing importance of costs and ways to maintain cost control on a large program in today's competitive environment.** J. J. Newman (RCA, Astro-Electronics Div., Princeton, N.J.), D. W. Grimes (NASA, Goddard Space Flight Center, Greenbelt, Md.), and F. W. Gaetano (NASA, Washington, D.C.). In: The impact of competitive technology on engineering management; Annual Joint Engineering Management Conference, 21st, St. Petersburg, Fla., October 25, 26, 1973, Record. Conference sponsored by ASQC, EIC, ISA, AIIE, ASME, and NSPE. New York, American Society of Mechanical Engineers, 1973, p. 57-64.

Discussion of management techniques that make it possible to overcome inflationary and developmental cost rises while holding schedule and performance fixed in scientific space programs. The techniques reviewed pertain to high personnel motivation, continual review of contract rigidity for de facto modification by senior judgment, standardization vs design innovation, cooperative customer/contractor goal orientation vs task orientation, and deep real-time management visibility. M.V.E.

**A74-11573** **Metrication and planning to meet its demands in aerospace engineering and manufacturing.** D. E. E. Carmody (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730924.* 11 p. Members, $1.25; nonmembers, $2.00.

**A74-11585** **Advantages of aircraft system maturity.** W. W. Way (McDonnell Douglas Corp., Long Beach, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730907.* 7 p. Members, $1.25; nonmembers, $2.00.

The maturing air transportation industry is finding profitability to be increasingly elusive. The cost of maintaining the aircraft of this industry has a substantial impact on profitability. It is incumbent on aircraft and system designers to minimize the cost of maintaining those aircraft to maximize profitability. Choosing mature components and systems, which have demonstrated reliability, are familiar to maintenance personnel, and for which spare inventory exists, is an effective technique for minimizing maintenance costs of a new aircraft. This paper discusses examples of such applications and describes the values that can result. (Author)

**A74-11598** **The influence of design to cost and prototyping on the A-10 aircraft.** W. B. Trepel and G. A. Bohmann (Fairchild Republic Co., Farmingdale, N.Y.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730890.* 7 p. Members, $1.25; nonmembers, $2.00.

Increasing concern has been shown at all levels of government over the rising cost of major weapons systems. The implementation of the 'design to cost' approach is intended to reverse this trend by placing greater emphasis on the cost elements during systems design and by restraining the natural desire for maximum performance if the technology required involves the risk of cost escalation. These factors, however, must not detract from the basic goal - the production of a weapons system with acceptable, reliable performance within cost guidelines. The application of design to cost and the effect of prototyping are described as they apply to the A-10 close air support aircraft. (Author)

**A74-11600** **Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter.** W. C. Dietz and W. K. Bailey (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730888.* 9 p. Members, $1.25; nonmembers, $2.00.

**A74-11605** **Spray cooled generators and design-to-cost at Westinghouse.** A. E. King (Westinghouse Electric Corp., Aerospace Electrical Div., Lima, Ohio). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730878.* 9 p. Members, $1.25; nonmembers, $2.00.

An aircraft generator development program is described that has achieved dramatic weight reductions with simultaneous improvements in reliability and performance through application of spray-oil cooling. The program plan employed the classic requirements for achievement based on design-to-cost principles. M.V.E.

**A74-11609 #** **Government spending and innovation.** M. L. Weidenbaum (Washington University, St. Louis, Mo.). *Astronautics and Aeronautics,* vol. 11, Nov. 1973, p. 32-43. 16 refs. NSF-supported research.

Shifts in the federal budget imply a relative decline in Federal support of research and development. It is pointed out that these developments make it necessary to reevaluate the role of science and technology in national priorities. The suggestion is made that 'technological innovation' should possibly be elevated to the status of an end-purpose. The characteristics of alternative expenditure mechanisms are discussed together with an analysis of the relation of government purchases to innovation, the relation of tax incentives to innovation, and questions regarding the relationship between government-sponsored enterprises and new technical advances. G.R.

**A74-11610 #** **U.S. aerospace industry at the crossroads.** R. S. Attiyeh (McKinsey and Co., Inc., Los Angeles, Calif.), E. G. Friberg (McKinsey and Co., Inc., Washington, D.C.), and R. E. Cohen (U.S. Department of Commerce, Washington, D.C.). *Astronautics and Aeronautics,* vol. 11, Nov. 1973, p. 44-51.

It is pointed out that for the first time in recent history Europeans significantly challenge U.S. dominance of the Free World aerospace market. The European challenge comes from the substantial government funding of both military and commercial aircraft

projects, such as the MRCA (multirole combat aircraft) and the A-300 B airbus. Approaches regarding the U.S. response to these developments are discussed, giving attention to the basic economics that must be considered in developing a successful long-term strategy for profitable operations. G.R.

A74-11776 AMST - The approach to the STOL transport of the US (AMST - Der Weg zum STOL-Transporter der USA). N. Lynn. *Flug Revue/Flugwelt International,* Nov. 1973, p. 20-25. In German.

The Advanced Medium STOL Transport (AMST) program is to develop an aircraft which can be used to replace the Lockheed C-130 Hercules of the USAF. Each of two U.S. aerospace firms is to design and manufacture two AMST prototypes. New advanced technological methods are to be used to obtain an economical STOL transport design. The various intended military objectives for the new aircraft are discussed together with the major design specifications of the AMST and the individual characteristics of each of the two prototype versions. It is planned to develop also commercial AMST derivatives for civil aviation, including a model for 100 and a model for 180 passengers. G.R.

A74-12440 Criteria for evaluating the economic expediency of multinational integrated production (Criteri per la valutazione della convenienza economica della produzione integrata multinazionale). G. B. Nicolo (Napoli, Università, Naples, Italy). *L'Aerotecnica - Missili e Spazio,* vol. 52, June 1973, p. 199-204. In Italian.

Use of simple key parameters to characterize an international program of aircraft production under consideration with respect to a program carried out exclusively on national bases for the purpose of satisfying the same need. It is shown that the limits of economic expediency of the multinational program relative to the national program can be easily determined as a function of these characteristic parameters with the aid of diagrams derived from simple analytical relations. It is concluded that the minimum number of aircraft to be added to the national requirement in order to achieve the expediency of multinational operation decreases as the complexity of the aircraft increases and the percentage increase in the development and production costs due to multinationality decreases. A.B.K.

A74-12819 * # Space Tug - Mission and program planning. J. W. Wild and P. E. Culbertson (NASA, Washington, D.C.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 20 p.

An additional propulsive stage, carried in the payload bay, will be necessary for delivery of payloads to orbits beyond those which can be reached by the Shuttle alone. The concept of a reusable third stage, or Space Tug, has been under study for several years. Aspects of space tug operations planning are discussed together with payload studies, shuttle third stage program options, expendable stage studies, growth stage studies, and engine studies. Studies concerning reusable space tugs are considered, giving attention to a minimum development cost tug, a direct developed tug for 1983 operational capability, and a phased developed tug. Payload requirements are examined along with shuttle interface requirements, ground operations, and program options. G.R.

A74-12922 # Cost impact of mission requirements on future engine design selection. R. B. Dyson and W. J. Olsson (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1186.* 6 p. Members, $1.50; nonmembers, $2.00.

Cost is becoming an increasingly important consideration in the selection of new weapon systems. Reducing the ownership costs of future military aircraft engines will require: (1) establishing minimum acceptable airplane performance requirements, and (2) selecting the engine technology level and configuration which will achieve these performance goals at the lowest life-cycle cost. Jet engines are examined from a cost and performance viewpoint and their cost relationship to airplane mission needs developed. Several hypothetical aircraft are studied to show the influence that cost considerations may have on future engine design trends. (Author)

A74-13299 # Status of state air emission regulations affecting gas turbines. N. R. Dibelius and R. J. Ketterer (General Electric Co., Gas Turbine Div., Schenectady, N.Y.). *American Society of Mechanical Engineers, Winter Annual Meeting, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/GT-8.* 13 p. Members, $1.00; nonmembers, $3.00.

A summary of the state regulations as of May 30, 1973, covering air pollution emissions from stationary gas turbines. The summary includes a tabulation of allawable emission for the 50 states, 2 territories, and the District of Columbia for particulates, sulfur dioxide, nitrogen oxides, and visible emission. The tabulation presents a useful quick reference to the overall situation as of June, 1973, even though extensive changes to these regulations may be forthcoming. V.Z.

A74-13313 Aviation psychological research. Edited by J. D. Anderson. Brussels, Western-European Association for Aviation-Psychology, 1973. 103 p. In English, French, and German. $5.40.

The human factor in flight safety is discussed together with the perceptual defense organization as predictor of the pilot's adaptive behavior in military flying, the personality variables of airline pilots, and flight simulator research at the Royal Air Force Institute of Aviation Medicine. Other topics explored include student and instructor attitude to the simulator, the quantitative evaluation of aircraft flight simulators, the selection of fighter controllers, and aspects of management training in an international airline. G.R.

A74-13814 Technical management techniques for large scale automatic test systems engineering. S. N. Mullin (Lockheed-California Co., Burbank, Calif.). In: Automatic support systems for advanced maintainability; International Symposium, Arlington, Tex., November 5-7, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 113-122. 9 refs.

Large scale automatic test systems (ATS) are defined and potential technical management problem areas are outlined. Critical technical management objectives for ATS projects are listed. Technical management techniques useful in the following areas are discussed: organization, supervisory and technical staffing, establishment of technical, schedule, and cost objectives, product technical quality assurance, and project control. An annotated bibliography is included as well as an appendix containing twenty-five widely believed myths of ATS engineering and management. The point of view reflected throughout the paper is that ATS technology has moved from an adolescent to a mature art rather recently and that similarly mature ATS management techniques have been evolved but are not being vigorously and consistently applied. (Author)

A74-13976 # Improving aircraft productivity - We all have a part of the action. C. S. Glasgow (Douglas Aircraft Co., Long Beach, Calif.). *Air Transport Association of America, Engineering and Maintenance Conference, Miami, Fla., Oct. 10-12, 1973, Paper.* 15 p.

Aircraft productivity is a function of utilization, speed, passenger capacity, load factor, and service life. In order to expedite the solution to delays and high maintenance problems Douglas appointed 'problem managers,' each responsible for elimination of a specific problem. In carrying out their responsibilities the problem managers made observations that clearly illustrate that increasing aircraft productivity involves manufacturers, equipment vendors, and the airlines. Some additional means of improving productivity are outlined, e.g., use of optimum flap setting on takeoff, and operating at the aft center of gravity limit. F.R.L.

**A74-13977** # **Make no mistake about it - Air transport productivity demands a total and dedicated 'team effort.'** J. F. Sutter (Boeing Commercial Airplane Co., Renton, Wash.). *Air Transport Association of America, Engineering and Maintenance Conference, Miami, Fla., Oct. 10-12, 1973, Paper.* 8 p.

It is pointed out that the modern fleet of wide body jet transports can be even more productive by a team effort on the part of the airlines, the FAA, and the manufacturers. Since mid-1971, 36 features have been incorporated in new production aircraft to make the Boeing 747 more productive. An agressive program has been adopted to recognize and develop improvements for in-service problems. A number of details are provided concerning the program to reduce maintenance costs on the 747. G.R.

**A74-14104** * **Experimental payloads - Inception to integration.** M. Bader (NASA, Ames Research Center, Moffett Field, Calif.). In: Space Shuttle payloads; Proceedings of the Symposium, Washington, D.C., December 27, 28, 1972. Tarzana, Calif., American Astronautical Society, 1973, p. 45-53.

Space payload management concepts previously outlined (Bader and Farlow, 1971) are reviewed and are extended to include the aircraft research management scheme. The application of this scheme to the Space Shuttle, both as an orbiting laboratory and as a launch vehicle for unmanned spacecraft is discussed. It is shown that low-cost short-lead-time procedures, based on experience with the use of ordinary laboratory equipment aboard aircraft, are for the most part directly transferable to the Space Shuttle. V.P.

**A74-14132** **MLS program - Phase II.** J. W. Edwards (FAA, Microwave Landing System Branch, Washington, D.C.). In: Western Electronic Show and Convention, San Francisco, Calif., September 11-14, 1973, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1973, p. 24/1-1 to 24/1-9.

Phase II of the national plan for development of a microwave landing system (MLS) is intended for the acquisition of appropriate data and information to support the selection of the best equipment and technique (scanning beam or Doppler scanning). Four contractor teams are presently developing and fabricating hardware that will be tested to evaluate compliance with a specified range of operational requirements. The main features of equipment to be developed by each of the four contractors are delineated, and the anticipated test program is described in terms of the envisioned factory, static-field, and flight tests. T.M.

**A74-14309** **Relating factory test failure results to field reliability, required field maintenance, and to total life cycle costs.** C. M. Ryerson (Hughes Aircraft Co., Culver City, Calif.). *(U.S. Air Force Academy Military Operations Research Symposium, 29th, Colorado Springs, Colo., June 27-29, 1972.) Microelectronics and Reliability*, vol. 12, Oct. 1973, p. 357-384.

**A74-14507** **Changes in the European air transport pattern.** C. Stuart (British European Airways Corp., Ruislip, Middx., England). In: Airports for the 80s; Proceedings of the Fourth World Airports Conference, London, England, April 3-5, 1973. London, Institution of Civil Engineers, 1973, p. 65-72.

The history of European air transport is considered, giving attention to conditions at the beginning of air traffic, questions of aircraft development, predictions concerning future developments, and the liberalization of European air transport. Airline objectives are related to the customer, national aspects, and questions of profitability. Problems of airline creative marketing are discussed together with the significance of airport location, taking into account aircraft movement trends at Heathrow airport. G.R.

**A74-14512** **Maplin - Management aspects.** P. Whitford (British Airports Authority, London, England). In: Airports for the 80s; Proceedings of the Fourth World Airports Conference, London, England, April 3-5, 1973. London, Institution of Civil Engineers, 1973, p. 125-129.

Managing in the 80s a new airport like Maplin will present a different challenge from that which faced the first managers of existing airports. Both the size and the technological content will be different. Objectives and management styles must be carefully chosen and defined, and the airport manager must ensure that the whole airport system gives a high level of passenger service. To do this he must know what the passenger really wants, not what he thinks the passenger wants. It will be difficult to permit large numbers of individual, autonomous organizations to operate in parallel without adversely affecting the level of passenger service. A large degree of automation throughout the whole airport system will be necessary if the maximum planned capacity, approximately 125 million passengers per annum, is to be achieved. (Author)

**A74-14515** **Economic consequences of airport development.** N. Lichfield. In: Airports for the 80s; Proceedings of the Fourth World Airports Conference, London, England, April 3-5, 1973. London, Institution of Civil Engineers, 1973, p. 155-161. 19 refs.

The economic impacts of airport development are so widespread that under this title many different papers could be written. Some selection of topics is thus necessary. Employment in airports, the urban development required for the regular employees and the advantages and disadvantages of airports in economic terms are the themes followed and developed in this paper, in broad terms, after a preliminary discussion of the overall economic framework in which they will be placed. By way of illustration, references are made to the recent major studies for the siting of the third London airport. (Author)

**A74-15045** # **Transport aerospace industry contributions to modern problem solutions /W. Rupert Turnbull Lecture for 1973/.** J. E. Steiner (Boeing Commercial Airplane Co., Renton, Wash.). *(Canadian Aeronautics and Space Institute, Annual General Meeting, Edmonton, Alberta, Canada, May 14, 1973.) Canadian Aeronautics and Space Journal*, vol. 19, Oct. 1973, p. 388-403.

The significance of air transportation in Canada is briefly examined. Economic trends for the period from 1965 to 1985 are discussed, giving attention to a number of countries of different levels of economic development. Questions concerning the stimulation of the economy provided by tourism are considered together with aspects of the world commercial jet transport market, details regarding the pressures and constraints of transportation, program management tools, the cost management cycle, trends of aircraft production cost, airspace control problems, runway acceptance rate, and the growth in U.S. gross national product. G.R.

**A74-16103** **Skylab checkout operations.** K. P. Timmons (Martin Marietta Aerospace, Kennedy Space Center, Fla.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 1-9 to 1-12.

The Skylab Program at Kennedy Space Center presented many opportunities for interesting and profound test and checkout experience. It also offered a compilation of challenges and promises for the Center and for the contractors responsible for the various modules making up Skylab. It is very probable that the various contractors had common experiences during the module and combined systems tests, but this paper will discuss those experiences from the viewpoint of the Multiple Docking Adapter contractor. The experience will consider personnel, procedures, and hardware. (Author)

**A74-16104 * The Skylab Student Project.** H. B. Floyd (NASA, Marshall Space Flight Center, Huntsville, Ala.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 1-13 to 1-28.

The National Aeronautics and Space Administration (NASA) and the National Science Teachers' Association (NSTA) undertook in 1971 a cooperative effort which brought high school students of the Nation into the mainstream of Skylab research through the Skylab Student Project. This paper presents the background, objectives and scope of the project, experiment selection procedures, as well as experiment descriptions and status. The paper includes observations on student caliber and inclinations and implications of some developments for the benefit of future researchers. (Author)

**A74-16107 The Symphonie project organization.** G. Mösl. In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 3-7 to 3-16.

Symphonie is a Franco-German project for the planning, construction, launching, and utilization of an experimental telecommunication satellite. In this lecture, the governmental and contractor organizations are presented as well as the project experiences discussed. (Author)

**A74-16108 * An optimum organizational structure for a large earth-orbiting multidisciplinary Space Base.** J. M. Ragusa (NASA, Sciences and Applications Projects Office, Kennedy Space Center, Fla.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 3-17 to 3-29. 6 refs.

The purpose of this exploratory study was to identify an optimum hypothetical organizational structure for a large earth-orbiting multidisciplinary research and applications (R&A) Space Base manned by a mixed crew of technologists. Since such a facility does not presently exist, in situ empirical testing was not possible. Study activity was, therefore, concerned with the identification of a desired organizational structural model rather than the empirical testing of it. The essential finding of this research was that a four-level project type 'total matrix' model will optimize the efficiency and effectiveness of Space Base technologists. (Author)

**A74-16111 Management systems for operational processing of launch vehicles.** A. G. Mackey (American Airlines, Inc., Tulsa, Okla.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 4-7 to 4-18.

This paper summarizes the status of management information systems with emphasis on applications to planning and management of airline maintenance and refurbishment operations. Past approaches to management of launch operations are reviewed and analyzed for their applicability to the Space Shuttle era. Factors affecting the selection of a management information system for the Shuttle will be analyzed and discussed. (Author)

**A74-16117 Space Test Program.** N. T. Anderson (USAF, Space and Missile Systems Organization, Los Angeles, Calif.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973.
Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 6-1 to 6-17.

The Department of Defense Space Test Program is a unique organization dedicated to stimulating space-related technology by providing launch and orbital support for research and development payloads. This paper delineates program management techniques, past accomplishments, and current activities. The benefit to the DOD is discussed. (Author)

**A74-16124 NASA's International Satellite Projects /A technical overview/.** G. W. Ousley. In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973. Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 7-27 to 7-31.

Discussion of the project management responsibility assigned to the Goddard Space Flight Center for 17 international cooperative satellites previously launched, and five such satellites presently under development. The basic NASA ground rules, guidelines, and practices associated with the establishment and conduct of the NASA International Cooperative Project are reviewed. M.V.E.

**A74-16445 Manufacturing exercise involved in the redesign of the Hawker Siddeley Trident /tri-jet/ fuselage.** J. Fielding (Hawker Siddeley Aviation, Ltd., Woodford, Ches., England). In: Titanium science and technology; Proceedings of the Second International Conference, Cambridge, Mass., May 2-5, 1972. Volume 1. New York, Plenum Press, 1973, p. 45-52.

Three particular areas were chosen for evaluation, viz., the sheet/stringer/frame structure in the keel area, the upper fuselage, and a window panel area. The usual attention was given to fatigue strength, critical crack length, and residual strength. Fusion welding was used whenever practicable, i.e., for skin to stringer joints and panel butt welds, with a little electrical resistance spot welding for the frame to fuselage skin attachment. The weight savings possible with titanium design as compared with an aluminum structure amounted to 23.6% overall on the complete fuselage section. Chemical milling, through welding under tension, welding on the tension draw welding machine, and vacuum hot sizing are discussed. F.R.L.

**A74-16447 B-1 cost/weight trade methodology.** R. E. Edmonson and W. A. Reinsch (North American Rockwell Corp., Los Angeles, Calif.). In: Titanium science and technology; Proceedings of the Second International Conference, Cambridge, Mass., May 2-5, 1972. Volume New York, Plenum Press, 1973, p. 57-68.

A development is described which provides the capability for detailed subsystem selections based on cost/weight to a degree of credibility not previously obtainable. The process is based on the comparison of the weight differentials of competitive subsystem elements, converting these differentials to dollar value, and then evaluating these dollar values along with the detail acquisition cost estimate of the candidate design. This cost/weight trade study methodology has provided early visibility for potential cost and risk problems, and is considered a strong management tool for design decisions. In general, the structural components using titanium are required to be cost/weight effective, and to exhibit high fatigue life, good fracture toughness, and be relatively damage-tolerant. Annealed 6Al-4V was selected for these applications. F.R.L.

**A74-16878** # **The importance of technical cooperation for airline companies in Europe with particular reference to the technical cooperation ATLAS (Die Bedeutung von Technischen Kooperationen für Luftverkehrsgesellschaften innerhalb Europas unter besonderer Berücksichtigung der Technischen Kooperation ATLAS).** H. Gröger. Braunschweig, Technische Universität, Philosophische und sozialwissenschaftliche Fakultät, Doktor der Staatwissenschaften Dissertation, 1972. 152 p. 127 refs. In German. Research supported by Deutsche Lufthansa.

The complexity of the problems involved in establishing technological cooperation based on work division among the member airlines is illustrated, and the various aspects of these problems are discussed. The organization, activity, and the technical information system within the European Airlines Montparnasse Committee are outlined. The aspects of the cooperation of the Swissair/Austrian airlines, the SAS/Swissair airlines, the Dutch/SAS/Swissair and Dutch/SAS/Swissair/French Transport Airlines are discussed. Data concerning the technical cooperation ATLAS (Air France/Lufthansa/Alitalia/Sabena) are covered in detail. V.P.

**A74-17154** # **Specific features of AEROS satellite development (Die besonderen Merkmale bei der Entwicklung des Satelliten AEROS).** K.-J. Gluitz (Dornier-System GmbH, Friedrichshafen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über wissenschaftlich-technische Ergebnisse des AEROS-Programms, Meersburg, West Germany, Oct. 18, 19, 1973, Paper 73-132.* 29 p. In German. Research supported by the Bundesministerium für Bildung und Wissenschaft.

The AEROS project organization and management are discussed, and the principal data on the AEROS mission and the AEROS satellite itself are reviewed. The relationship between the customer and the principal contractor, and between the principal contractor and subcontractors are outlined. The development and model philosphies of the AEROS project are discussed, along with the component and satellite models, and the test phylosophy. Some engineering characteristics and new developments concerning the system structure, the power supply system, the active magnetic attitude control system, the orbital correction system, and the communications system are examined. V.P.

**A74-17158** # **Development of the AEROS structure (Entwicklung der AEROS-Struktur).** W. Walter (Dornier-System GmbH, Friedrichshafen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über wissenschaftlich-technische Ergebnisse des AEROS-Programms, Meersburg, West Germany, Oct. 18, 19, 1973, Paper 73-140.* 22 p. In German. Research supported by the Bundesministerium für Bildung und Wissenschaft.

Description of the various stages of development of the structure of the AEROS satellite. After stating the requirements to be met by the AEROS structure and the philosophy governing the design of the structure, a brief description is given of the structure itself. The latter is basically divided into a star-shaped load-bearing structure which houses most of the components mounted in the satellite and an outer structure in the shape of a cylindrical shell which protects the components from the outside and houses certain sensors, the engines, and the despin system. The methods used in static and dynamic calculations of strength and reliability are summarized, the materials employed in the fabrication of the structure in order to meet the requirements imposed are noted, and a test program is described which consists of structural component tests, developmental tests on a structural test model, and qualification tests on a structural qualification model. Finally, the organization of the structure subsystem management is discussed. A.B.K.

**A74-17159** # **Integrated test planning in the AEROS project (Integrierte Testplanung im Projekt AEROS).** K. Fahlenbock (Dornier-System GmbH, Friedrichshafen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über wissenschaftlich-technische Ergebnisse des AEROS-Programms, Meersburg, West Germany, Oct. 18, 19, 1973, Paper 73-141.* 24 p. In German. Research supported by the Bundesministerium für Bildung und Wissenschaft.

Description of the provisions of an integrated test plan which gives an overview of the flight viability tests to be performed and their incorporation into the schedule planning of the AEROS project. The philosophy underlying integrated test planning is defined, and the role played by simulation of various environmental and space conditions in the qualification and acceptance of components and systems is indicated. The provisions of an integrated test plan are then described which is based on the general philosophy that almost all qualification and acceptance tests at the component level should be carried out as specified for the overall system. This integrated test plan involves a careful consideration of the influence parameters, specification of the qualification and acceptance range, developmental tests, functional tests, and the compiling of documentation. It is shown by examples how the actual integrating process takes place during the project. A.B.K.

**A74-17162** # **The AEROS rocket program (AEROS Raketenprogramm).** H. Demharter and A. Kirchner (Messerschmitt-Bölkow-Blohm GmbH, Ottobrunn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über wissenschaftlich-technische Ergebnisse des AEROS-Programms, Meersburg, West Germany, Oct. 18, 19, 1973, Paper.* 27 p. In German. Research supported by the Bundesministerium für Bildung und Wissenschaft.

A high-altitude research probe program carried out within the AEROS satellite project is described. Particular attention is given to three types of EUV payload and four types of combination payload developed in the program. The scientific task of the payload experiments was to measure in vertical profile the same aeronomic parameters that were measured by the AEROS satellite in horizontal profile. V.P.

**A74-17531** **Avionics design for maintainability - Are we gaining or losing.** T. A. Ellison (United Air Lines, Inc., Chicago, Ill.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730882.* 9 p. Members, $1.25; nonmembers, $2.00.

An overview of avionics maintainability, as indicated from airline operating statistics, shows improvement in some elements and degradation in others, but a slowly degrading overall trend. Maintainability elements and trends are identified and discussed. Principal problems are the shop labor expended for the high proportion of removed equipment found to be in satisfactory condition, and the increasing line maintenance effort required by wide-body aircraft. Built-in test equipment (BITE) or monitoring within the system, if properly designed, appears to be a good approach to improve this situation. Design guidance for effective BITE or monitoring objectives is provided. (Author)

**A74-17536** **The T700-GE-700 turboshaft engine program.** W. J. Crawford, III (General Electric Co., Aircraft Engine Group, Lynn, Mass.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730917.* 14 p. Members, $1.25; nonmembers, $2.00.

The 1500 SHP T700 engine is being developed for the U.S. Army UTTAS and AAH helicopters. Prototype engines have been running well since testing began early in 1973. Qualification is expected in early 1976. Engine history and current details, design features, program milestones and possible future developments are reviewed. The unique T700 design will achieve unusually high levels of reliability and maintainability. T.M.

**A74-17541** **Development of requirements for, and evaluation of, manufacturer advanced design aircraft.** J. D. Graef (American Airlines, Inc., New York, N.Y.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730948.* 15 p. Members, $1.25; nonmembers, $2.00.

**A74-17544 *** **On the management and processing of earth resources information.** C. W. Skinner (North Carolina State University, Raleigh, N.C.) and R. C. Gonzalez (Tennessee, University, Knoxville, Tenn.). In: Machine processing of remotely sensed data; Proceedings of the Conference, West Lafayette, Ind., October 16-18, 1973. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 1A-1 to 1A-11. 13 refs. Grant No. NGT-01-003-044.

The basic concepts of a recently completed large-scale earth resources information system plan are reported. Attention is focused throughout the paper on the information management and processing requirements. After the development of the principal system concepts, a model system for implementation at the state level is discussed. (Author)

**A74-17881** **AIAA experiments and results on SDD, synoptics, miniprints, and related topics.** G. L. Dugger (Johns Hopkins University, Silver Spring, Md.), R. F. Bryans, and W. T. Morris, Jr. (American Institute of Aeronautics and Astronautics, New York, N.Y.). *(Institute of Electrical and Electronics Engineers, Conference on the Future of Scientific and Technical Journals, New York, N.Y., May 17-19, 1973.) IEEE Transactions on Professional Communication,* vol. PC-16, Sept. 1973, p. 100-106, 178.

Description of reader and author surveys conducted to evaluate new document presentation and dissemination concepts for scientific literature published by the American Institute of Aeronautics and Astronautics. Initial experiments demonstrated user satisfaction and a high level of accuracy in selective dissemination of documents according to specified user requirements (designated topics of interest), but subsequent financial considerations and a lack of sufficiently large volume of operations prevented final implementation of such a system of preferential distribution. Publication costs were reduced by presenting a percentage of articles in the form of synoptics (reduced version containing key information). Reader response to these publications is described together with paper review procedures. T.M.

**A74-17984** **Innovations in ATC communication systems.** R. Wainwright (FAA, Washington, D.C.). In: National Telecommunications Conference, Atlanta, Ga., November 26-28, 1973, Conference Record. Volume 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 7C-1 to 7C-3.

Advances and innovations in air traffic communications since the early 1920s are reviewed and shown to have been evolutionary in the sense of successive generations identifiable in relative time frames. The present status of development is defined, and current trends and goals for the future are discussed. M.V.E.

**A74-18099** **An innovative approach to airport planning.** H. L. Newman (FAA, Fort Worth, Tex.). *Journal of Air Law and Commerce,* vol. 39, Summer 1973, p. 353-359.

The spirit of foresight and cooperation is described that made the realization of the mammoth Dallas-Fort Worth Airport Project possible. The airport was officially dedicated in September 1973. The main considerations that went into the planning of this airport and the experiences of the people who worked on this project are reviewed. M.V.E.

**A74-18182** **Air traffic control (Flugsicherung).** O. Heer (Bundesanstalt für Flugsicherung, Frankfurt am Main, West Germany). *VDI-Z,* vol. 115, no. 18, Dec. 1973, p. 1462-1465. 18 refs. In German.

For the last two years studies concerned with the air traffic control system of the future have been conducted in West Germany, giving attention to the time after 1980. Questions of long-term planning are discussed together with new developments in the sector of air traffic control and the improvement of existing procedures and installations. Problems of frequency distribution are considered along with traffic flow questions, navigational systems, instrumental landing systems, radio equipment, and radar installations. G.R.

**A74-18499 #** **An outline of supervisory control fundamentals - Real-time operating systems (Zarys podstaw kierowania - Systemy operacyjne czasu rzeczywistego).** S. Wegrzyn (Polska Akademia Nauk, Zaklad Systemow Automatyki Kompleksowej, Gliwice, Poland). *Podstawy Sterowania,* vol. 3, no. 4, 1973, p. 243-270. 6 refs. In Polish.

Analysis of the operation of a system where a CPU and suitable peripheral equipment are used to control a complex process while also being instructed by the operator to carry out other functions such as delivery of printed records of data, power, and hardware allocation and management. The system consists of basic control and utility programs as well as a supervisory program that selects stored utility and control routines in accordance with process or operator requirements and instructions. The definition corresponds to a real-time operating system whose principal features are examined in detail. T.M.

**A74-18679 #** **Project ACE /acquisition cost evaluation/.** S. C. Phillips (USAF, Systems Command, Andrews AFB, Md.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-279.* 10 p. Members, $1.50; nonmembers, $2.00.

The Air Force Systems Command launched a high priority workshop effort in March 1973 to identify possible ways to drive down the high costs of acquisition and ownership of weapon systems. Acquisition practices, methods, policies, and procedures used by the Air Force were analyzed and are reviewed in detail. Many findings are not new but are restated for renewed emphasis. Lucrative areas having high potential for reducing costs, identified during the Project, are undergoing exhaustive research and study under the cognizance of Systems Command. Actions taken and those

currently underway to resolve Project ACE findings are discussed. (Author)

**A74-18680 * #** **Project management - Factors leading to success or failure.** A. J. Kelley and D. C. Murphy (Boston College, Chestnut Hill, Mass.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-282.* 6 p. Members, $1.50; nonmembers, $2.00. Grant No. NGR-22-003-028.

This paper presents initial findings of a study designed to detail the relationships among situational, structural, and process variables as they relate to project effectiveness. In the paper, emphasis is placed on delineating those variables which tend to improve and those which tend to impede project effectiveness. (Author)

**A74-18890 * #** **A program for transition research.** E. Reshotko (Case-Western-Reserve University, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 12th, Washington, D.C., Jan. 30-Feb. 1, 1974, Paper 74-130.* 8 p. 27 refs. Members, $1.50; nonmembers, $2.00.

Review of the nature and goals of the NASA Transition Study program aimed at developing procedures yielding information relevant to anomalies in boundary layer transition data and future estimation of transition Reynolds numbers. Specific experimental programs have been formulated that emphasize careful and redundant measurements, documentation of the disturbance environment, and elimination of facility induced transition, whenever possible. M.V.E.

**A74-18998** **T700 aims at low combat maintenance.** M. L. Yaffee. *Aviation Week and Space Technology,* vol. 100, Jan. 28, 1974, p. 45, 47-49.

The described T700-Ge-700 engine under development is a small compact turboshaft engine. The 15-sph engine has been selected by the Army to power its utility tactical transport aircraft and advanced attack helicopter. A distinctive feature of the engine is an integral inlet particle separator which will operate all the time with the engine on and which is expected to reduce significantly engine maintenance on helicopters operating in severe combat environments. V.P.

**A74-19353 #** **Hydrogen - Make-sense fuel for an American supersonic transport.** W. J. D. Escher (Escher Technology Associates, St. Johns, Mich.) and G. D. Brewer (Lockheed-California Co., Burbank, Calif.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 12th, Washington, D.C., Jan. 30-Feb. 1, 1974, Paper 74-163.* 11 p. 21 refs. Members, $1.50; nonmembers, $2.00.

Arguments in favor of the use of liquid-hydrogen fuel for power supersonic transport aircraft are presented, with a view toward the 'better and faster' SST the U.S. will eventually build. It is seen that, in addition to the economic and operational advantages, the use of hydrogen will establish a sound basis for evolving out of the present self-limited petroleum era into tomorrow's hydrogen economy. V.P.

**A74-19494** **B-1 operational test and evaluation - An early look.** E. Sturmthal (USAF, Flight Test Center, Edwards AFB, Calif.). *(Society of Experimental Test Pilots, Symposium, 17th, Beverly Hills, Calif., Sept. 26-29, 1973.) Society of Experimental Test Pilots, Technical Review,* vol. 11, no. 4, 1974, p. 57-61.

Details of the B-1 flight test schedule are examined. Phase I represents the testing on three aircraft that occurs before and supports a production decision, now scheduled for May 1976. Phase II is the remaining flight testing presently on contract to be performed after the production decision on the three aircraft. Any additional work that would extend flight testing on the first three aircraft beyond September 1978 would be conducted in Phase III. G.R.

**A74-19568** **An evaluation of some methods for determining the R&D budget.** B. Naslund (Stockholm School of Economics, Stockholm, Sweden) and B. Sellstedt (Stockholm, Universitet, Stockholm, Sweden). *IEEE Transactions on Engineering Management,* vol. EM-21, Feb. 1974, p. 24-29. 30 refs.

Models proposed by the author et al. (1972), Dean et al. (1962), and Gaver et al. (1972) for making decisions on R&D investment are evaluated and are compared with industrial practices. Significant differences between the requirements of these models and the policies of firms are noted. Suggestions are made for bringing business practices in shaping R&D budgets closer to the results of theoretical studies. V.Z.

**A74-19569 *** **Determining an optimal set of research experiments.** B. H. Adams (NASA, Langley Research Center, Business Data Systems Div., Hampton, Va.) and C. E. Gearing (Dartmouth College, Hanover, N.H.). *IEEE Transactions on Engineering Management,* vol. EM-21, Feb. 1974, p. 29-39. 17 refs.

Description of a procedure for optimal selection of research experiments to be performed aboard the Space Shuttle. The procedure is designed to provide the study team with a credible approach to their task. The procedure is characterized as methodologically sound and based on assumptions which reasonably approximate the real conditions. The data-gathering techniques proposed are accepted by scientifically trained personnel. V.Z.

**A74-19630 #** **Protection of the hearing organ - Current status, requirements, and possibilities (Ochrona narzadu sluchu-stan aktualny, potrzeby mozliwosci).** H. Czarnecki and W. Wasala (Wojskowa Akademia Medyczna, Warsaw, Poland). In: Conference on the Topic of Combatting Noise, 3rd, Warsaw, Poland, November 5-8, 1973, Proceedings. Warsaw, Polska Akademia Nauk, 1973, p. 69-73. In Polish.

Measures currently used to safeguard the hearing of personnel exposed to noisy industrial environments are described and critically evaluated in terms of intrinsic drawbacks and enforcement problems. Topics considered include compliance with hearing safety standards, medical selection and periodic examination of personnel exposed to noise, use of personal protective gear such as ear plugs, coordination among medical authorities and industrial management, and standardized definition of hearing damage levels. T.M.

**A74-19698** **The billion-mark failures (Die Milliarden-Pleiten).** R. Olsen. *Flug Revue/Flugwelt International,* Feb. 1974, p. 25-28, 33-36. In German.

The expenditure of about 1.5 billion German marks for the development of VTOL aircraft in West Germany has been criticized because the objective to obtain weapons systems for series production could not be obtained. The reasons for this failure are investigated as a basis for an approach to avoid similar mistakes in the future. The present status of the aircraft production in the various states is explored together with questions of the military and political situation in Europe which the government of West Germany has to take into account. Attention is given to details of the conditions under which the rearmament of West Germany took place after the Second World War. The errors committed in the planning of defense developments are pointed out together with a number of unrealistic aspects in the foreign policy of West Germany. Details of a feasible contribution of West Germany to the defense of Western Europe are briefly discussed. G.R.

**A74-20468** **The conversion of the gold value in an application of the international aviation agreements (Die Umwandlung des Goldwertes bei Anwendung der internationalen Luftfahrtabkommen).** H. A. Perucchi. *Zeitschrift für Luftrecht und Weltraumrechtsfragen,* vol. 23, Jan. 1, 1974, p. 40-45. 12 refs. In German. (Translation).

Liability regulations in the Warsaw Convention are based on a French franc which is equivalent to 65 1/2 miligrams of gold with a

fineness of 900. The corresponding value can be converted in the equivalent amount of money of the national currency of each country. Problems connected with fluctuations of the gold value are considered together with discussions concerning the gold price at a convention in Montreal in April 1973. Effects of the evaluation of gold on insurance regulations are also examined. G.R.

**A74-20534 *** **The Space Shuttle Program and its technology.** R. F. Thompson (NASA, Washington, D.C.). In: International congress of space benefits; Proceedings of the Nineteenth Annual Meeting, Dallas, Tex., June 19, 20, 1973. Tarzana, Calif., American Astronautical Society, 1974, p. 45-68. 22 refs.

Review of the considerations leading to the development of the Space Shuttle system, followed by a description of the system and an analysis of the current program development status. The Space Shuttle system arose out of a need for a reusable vehicle that could routinely carry large payloads (up to 65,000 lb) into earth orbit and return on a cost-effective basis. The system, as currently baselined, consists of a manned reusable Orbiter vehicle and the booster hardware for ground launching. The proposed Orbiter will be 123 feet long, double delta-winged, and roughly the size of a DC-9. The Orbiter will normally carry a crew of four who will work without space suits in a shirtsleeve environment. The Orbiter will be boosted into space through the simultaneous operation of two solid propellant booster rockets and the Orbiter's three high-pressure liquid oxygen/liquid hydrogen main engines. The Orbiter will have reusable external insulation, since each vehicle will have a design life of ten years. A.B.K.

**A74-20835 #** **Space applications - What the people want.** J. W. Symington (U.S. House of Representatives, Washington, D.C.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-248.* 10 p. Members, $1.50; nonmembers, $2.00.

The benefits which have accrued to our citizens from the advent of technological (in particular, meteorological and communications) satellites are noted, and the contributions of the Space Applications Program are reviewed. The necessity of continuing government-supported R & D effort in the field of technological satellites, and especially of advancing and accelerating the ERTS program, is emphasized. V.P.

**A74-20836 #** **Aircraft life cycle profitability - The manufacturer's challenge.** R. E. Brown and J. J. Italiane (Boeing Commercial Airplane Co., Seattle, Wash.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-280.* 15 p. Members, $1.50; nonmembers, $2.00.

The ways in which the aircraft manufacturer influences the profitability of the airplane during the life cycle is shown, starting with the design and construction phases, and terminating with the aircraft's useful life. It is shown that the manufacturer influences all the investment cost, somewhat less than half the airplane operating cost, a small part of traffic costs, and most of the useful life parameter. He also has a substantial influence on the earning capability. V.P.

**A74-20837 #** **Aircraft life cycle profitability - The operator's challenge.** J. G. Borger and L. H. Allen (Pan American World Airways, Inc., New York, N.Y.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 10th, Washington, D.C., Jan. 28-30, 1974, Paper 74-281.* 9 p. Members, $1.50; nonmembers, $2.00.

Two fundamental areas in which the operator can influence aircraft life cycle profitability are examined. The first area includes aircraft design goals, route performance, investment cost, operating costs, growth prospects, passenger appeal, technical specifications, and maintenance requirements. The second area includes operating goals, service quality, revenue production, aircraft life, utilization, and reliability. The fundamentals of good aircraft design are outlined, and the importance that manufacturer and operator adhere to these fundamentals is emphasized. V.P.

**A74-20927** **Allocating time to repair distributions.** D. J. Davis and C. B. Morrison (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 12-16. 5 refs.

Current contracting practices for complex systems require that repair time limitations be defined for use as controls for system availability and cost of ownership. These limitations frequently include a required mean and maximum repair time. It is good management practice to define the allowable maintenance task time limitations for the various subsystems and to do so in a way that will, when achieved, satisfy the requirements which have been defined at the system level. Allocation, in this context, provides standards for the design of the various subsystems. The statistical significance of the relations between the mean and the variance, for allocation purposes, was explored and expanded to the technique developed here. This approach has been to provide a technique for allocating mean and maximum repair times to the sub-indentures and to do so in an explicit fashion that will meet the overall system requirements. (Author)

**A74-20928** **A comparison of demonstrated and achieved equipment maintainability.** F. S. Balogh, J. F. Hennessey, and D. E. Reynolds (Philco-Ford Western Development Laboratories, Palo Alto, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 17-20.

This paper discusses maintainability demonstrations conducted by the Western Development Laboratories Division of the Philco-Ford Corporation on company and associate contractor developed equipments over the past 5 years. The maintenance history of some groups of demonstrated equipments installed in their operational environment was analyzed, and the demonstrated Mean-Time-To-Repair (MTTR) was compared to the achieved MTTR's. Reasons for the differences found between the demonstrated and the achieved MTTR's are presented and corrective measures are suggested. (Author)

**A74-20931** **Life cycle system/cost effectiveness.** E. Peterson (USAF, Washington, D.C.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 48-51.

System effectiveness and cost effectiveness models are basic to most forms of system analysis and trade studies. There is one important feature of these models, however, that is not well used. This feature is the life cycle aspect, or a model's capability to be used and to provide useful information in support of the analyses and trade studies, throughout the life of the system that it is modeling. It is a principal objective of this paper to show the use of such models, on a phase-by-phase basis, and to demonstrate the life cycle characteristics of these models. (Author)

**A74-20932** **Forcing functions integrate R&M into design.** E. G. Metzler (General Dynamics Corp., Electronics Div., San Diego,

Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 52-55. USAF-sponsored research.

A relatively new Department of Defense procurement policy implementing a design-to-price concept is an extremely strong incentive to industry to force successful integration of reliability and maintainability (R&M) into the design process. The AN/ARN-XXX TACAN development program is a design-to-price procurement which specifies: (1) a fixed maximun unit price in production quantities, (2) guaranteed mean-time-between-failure, (3) failure-free warranty, and (4) life cycle cost incentive. Industry's ability to adequately respond to these forcing functions depends upon its capability to integrate reliability and maintainability, as well as all of the other integrated logistics support disciplines, into the design process. The Government ensures technical competition by selecting two or more contractors to perform a parallel design and development for a competitive fly-off before selecting the production contractor. This places heavy emphasis on the successful integration of reliability and maintainability into the design process. (Author)

**A74-20933 Integration of R&M into the design process.** R. T. Walker (RCA, Camden, N.J.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 56-59.

A new organizational approach in which the design engineer is given a more direct responsibility for the reliability of his design is discussed. This approach has been used in the case of the development of manpack radios for the U.S. Army. The reliability program outline presented takes into account aspects of management and control, vendor reliability, a program review, reliability analysis, parts reliability, a program review, and design reviews. G.R.

**A74-20935 Computer software synergism integrates R/M design.** K. G. Blemel. In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 68-72.

Problems concerning the integration of reliability and maintainability practice into the design phase of equipment manufacturing are discussed, giving attention to a method for integrating reliability, maintainability and other design parameters in a unified data base. An example is presented of a skeletal entry in a form which is acceptable for computer assimilation. Changes to the data base files are discussed together with the basic rules for structure and syntax used in the files and the various types of entries. The systems effects analysis produces output which provides information regarding system failure and degradation, taking into account several viewpoints. G.R.

**A74-20936 Reliability program elements - Who needs them.** J. E. Bridgers, Jr. (Hoffman Electronics Corp., El Monte, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 73-77.

Within all equipment catagories there exists an ever increasing requirement for proper selection and phasing of the multitude of reliability activities. Each one of these may be performed in varied levels of thoroughness for any particular program. This, obviously, presents a confusion of multiple interrelated decisions which must be made and explained to others for their review. A logical technique for quantitizing the effectiveness of performing these elements is presented. Examples are provided showing the application of this technique to typical problems. A program evaluation technique establishes the interactive program elements including how much, how soon, and how to actually realize the equipment reliability desired. The model encompasses the following program stages: proposal, conceptual, design and development, preproduction, production, and field deployment. (Author)

**A74-20937 Reliability testing pitfalls.** E. F. Thomas (General Dynamics Corp., Convair Aerospace Div., Fort Worth, Tex.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 78-83.

Important factors which have to be taken into account in connection with basic program management in order to insure the conduction of adequate reliability tests are discussed, giving attention to factors which delay the start of the tests, tight delivery schedules, unsuccessful tests, and problems in predicting equipment complexity. Other critical factors which have to be considered are related to the conduction of the tests and the classification of equipment failures. G.R.

**A74-20939 The simulation of production test economics.** R. G. Cottrell (Hughes Aircraft Co., Tucson, Ariz.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 91-99. 5 refs.

The simulation approach to the assessment of production test economics is discussed. Basic functional models which describe the defect and cost flow through a production line are derived in detail. The effects on product cost and reliability of alternative test policies is accomplished by exercising the simulation composed of the functional models. Minimum cost testing is accomplished by assigning a reliability constraint on the product or by defining a reliability-cost penalty function. Two examples are presented which illustrate the application of production test economics simulations for missile electronics units. (Author)

**A74-20940 An engineer looks at product liability cases.** F. S. Badger. In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 100-103.

The court procedures used in a product liability case are examined, giving attention to the role of the technical expert. The first step of the investigator should be a determination of the causes of failure. Questions of standards are discussed together with aspects of failure analysis, laboratory testing, appearance in court, jury awards, and the protection against product liability actions. It is pointed out that corrosion and joining problems are in many cases responsible for the early failure of a product. G.R.

**A74-20942 The choice between attribute and variables data.** L. D. Maxim (Mathematica, Inc., Mathtech Div., Princeton, N.J.) and R. Roeloffs (New York, Polytechnic Institute, Brooklyn, N.Y.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 130-135.

Decision rules for the selection of an optimal test technique are developed, taking into account the case in which both attribute and variables data can be obtained. The decision rules presume knowledge of the relative cost of testing. It is also assumed that information is available concerning the precision of the measurement of variables data and the probability of misclassification of attribute test results. The decision problem is illustrated with the aid of an example involving the design and the testing of safing and arming devices for ordnance components. G.R.

**A74-20944** **Some experiences from the use of an LCC approach.** H. Ebenfelt (Systecon AB, Stockholm, Sweden) and S. Ogren (Swedish Air Materiel Administration, Stockholm, Sweden). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 142-146.

The LCC approach discussed in this paper has been developed to suit a specific need, determined by factors such as the competitive situation, the time horizon and associated risks, program and contract characteristics. These factors and their implications on techniques and procedures used during different phases of system acquisition are reviewed. A brief description of the approach is included as it applies to conceptual studies, source selection and contracting. The experience thus gained is finally summed up in statements pointing at present problem areas but also indicating advantages. (Author)

**A74-20949** **System safety and human factors - Some necessary relationships.** E. S. Brown (Texas Instruments, Inc., Dallas, Tex.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 197-200. 6 refs.

The analysis of man-machine interactions is an important factor in any human factors or safety program. The general objective of the analysis effort is usually to identify and describe selected interactions prior to taking corrective, preventive, creative, or other supporting actions. An element of increasing importance to the human factors domain is human error, including reliability of task performance. Questions of safety labeling are also discussed together with approaches for supporting the equipment design process to improve personnel and equipment safety. G.R.

**A74-20952** **Simulation of dispatch reliability for a fleet of large commercial aircraft.** M. O. Locks (Oklahoma State University, Stillwater, Okla.) and G. L. Pauler (Los Angeles, Loyola University, Los Angeles, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 226-228.

For a fleet of large commercial aircraft, management's objectives include attaining a prespecified dispatch reliability (DR), a measure of the radio of departures within a stated time of scheduled departure to total departures. Data from the first 18 months of revenue operation are used to assess and predict DR for future periods. Goodness-of-fit analysis shows the delay times for departures delayed six minutes or more tend to fit lognormal distributions. The estimated distributions were used to assess DR both for historical data and future periods by simulation. The results show that the delay time is too large to meet management's objectives. (Author)

**A74-20954** **Equipment procured reliability and real-life survival.** O. Markowitz (U.S. Navy, Aviation Supply Office, Philadelphia, Pa.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 249-255. 6 refs.

Recommendations are made for improving communications between suppliers and users of equipment in the area of reliability. It is concluded that the hazards in real life equipment flow and end use do not compare to those inherent in equipment laboratory verification of failure rate. Thus any translation of laboratory or specified failure rate as a direct expectation of end use failure rate is inadequate. There is much needed in the way of the operator's understanding of what is required from contractors in the context of reliability and, as well, much is needed in contractor's understanding of the real life equipment flow and hazards of survival. T.M.

**A74-20955** **Accurate LCC estimating early in program development.** M. B. Goldman and R. W. Tipton (Martin Marietta Aerospace, Orlando, Fla.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 256-265.

The feasibility of credible estimates of postdeployment life cycle costs for tactical missile systems, early in a program's development cycle, is discussed. Postdeployment life cycle cost equations are presented whose appropriate utilization makes such early estimates possible. M.V.E.

**A74-20956** **Technology transfer through GIDEP.** E. T. Richards (U.S. Navy, GIDEP Administration Office, Seal Beach Corona, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 266-273.

Description of a cooperative effort in technology transfer between government and industry to reduce costs and enhance systems reliability through the media of the Government-Industry Data Exchange Program (GIDEP). Techniques of technology transfer through the use of a centralized reliability data bank are reviewed, and important program functions such as the ALERT system, Urgent Data Request (UDR) system, and Metrology Data Interchange are explained. The current expansion of GIDEP into Failure Rate Data Interchange; Defective Parts and Components Control; Secretariat for Electronic Test Equipment; and International Reliability Data Exchange are discussed. Examples of the outstanding cooperation achieved between government agencies and industry participants, and the benefits they gain through active program utilization are also described. (Author)

**A74-20963** **Human reliability in man-machine interactions.** R. L. Huston and A. M. Strauss (Cincinnati, University, Cincinnati, Ohio). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 329-334. 11 refs.

New concepts are presented that provide a framework for coordinating the methods and ideas in use among system reliability engineers with the techniques and theories of behavioral scientists. Sociomechanical analysis, simple examples of which are described, is shown to be readily applicable to man-man interaction (sociological system) problems, and multilateral interactions, such as man-machine-management-government-public interactions. The achievement of optimum man-machine interaction may be aided by the proposed methods. Pertinent analytical results include the findings that: (1) man's productivity does not become optimal until some time after machine maintenance; (2) his productivity is optimal midways between maintenance operations; and (3) following a machine breakdown, man's productivity does not attain the pre-breakdown level even after repairs have been made. M.V.E.

**A74-20966** **The use of warranties for defense avionics procurement.** H. Balaban and B. Retterer (ARINC Research Corp., Annapolis, Md.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 363-368. 11 refs. Contract No. F30602-73-C-0207.

Constraints on military budgets in the face of mounting operation and maintenance costs have prompted a search for additional methods of cost reduction. This paper describes an investigation into the use of warranties as a means of making the vendor more responsible for field performance, thus motivating him to produce reliable equipment and introduce improvements as necessary. A life-cycle-cost model is described and used to examine the relative economic advantages of warranty versus nonwarranty purchases. The major conclusions reached are that a properly constituted and applied warranty can yield significant reliability and life-cycle-cost benefits and that broader use of warranties in military avionics procurement is advisable. (Author)

**A74-20968** **Reliability growth - Actual versus predicted.** C. N. Stoll and W. S. Oliveri (Raytheon Co., Electromagnetic Systems Div., Goleta, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 391-395.

Evaluation of a number of case histories of sudden unexpected decreases in device reliability, observed contrary to normal predictions in such standard, mature products as power wirewound resistors, high-voltage triodes, pulse transformers, and bandpass filters. The failure causes involved are discussed, along with the necessary corrective action. M.V.E.

**A74-20969** **DC-10 avionics parts reliability in review.** R. S. Babin (Douglas Aircraft Co., Long Beach, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 403-408.

The McDonnell Douglas DC-10 aircraft program has demonstrated the effectiveness of a number of reliability and quality engineering controls and disciplines. Notable among them are several key controls on electrical, electronic, and electromagnetic parts in the avionics systems. A qualitative review of those parts controls is presented, utilizing DC-10 case histories (actual part-failure problems) as a basis for discussion and evaluation of the relative effectiveness of the controls. The controls that have shown most room for improvement, judged by the impact of their deficiencies on fielded equipment reliability, are: (1) part-failure reporting, analysis, and corrective action, (2) multiple-source part procurement, and (3) the designation and control of microcircuit part quality. (Author)

**A74-20970** **Time series modeling.** P. B. Robinson (AT & T, New York, N.Y.) and A. P. Stamboulis (New York, Polytechnic Institute, Brooklyn, N.Y.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 413-419. 12 refs.

A sequence of component failures or a stream of investment returns may quite conceivably possess significant serial correlation. Preference orderings among alternative investments or system configurations, then, will be heavily dependent on the time series structure of the observable process as well as the levels of its autoregressive parameters. Here, we concentrate on the latter problem. A new detection statistic for the autoregressive parameter of a first order autoregressive process is developed. Its power is shown to be comparable to that of the Durbin-Watson Statistics for the model considered. Moreover, it is related to a two-sample moving range statistic. As such, it is easy to chart and easily understood by practioners of quality control. (Author)

**A74-20982** **A realistic project planning prediction technique.** J. M. Brooks and M. J. Smith (Mechanics Research, Inc., Los Angeles, Calif.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 498-504.

Management teams are required to make several key decisions during the conceptual phase of a project. Analytical prediction techniques aid the decision maker by providing timely insight into the availability and consequences of alternates. This paper describes the application of a computer code entitled PROSIM (PROject SIMulation) as a project planning prediction technique. PROSIM uses a Monte Carlo simulation to evaluate the impact of alternate system design concepts and associated procurement and operating strategies on system operation and cost. This technique has been used successfully and has demonstrated its capability to meet stringent requirements for realism. The specific types of problems amenable to evaluation with PROSIM are presented, and the capabilities and mechanization of the code are discussed. A sample problem is described to show how PROSIM is used to translate the statement of the decision variables into output displays that facilitate decision making. T.M.

**A74-20987** **Risk analysis - A program management tool.** J. D. Gault (Boeing Co., Wichita, Kan.). In: Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 29-31, 1974, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 548-551.

Investigation of the adaptability of risk analysis methodology to evolutionary situations such as environmental problems. Techniques presently used to evaluate airplane fatigue risks are shown to be applicable to any situation having an inherent risk which increases with time but may be countered by periodic application of corrective measures. Control of our environment, mass transportation, and consumer protection are among the problems that fall into this category. The investigation results indicate that risk analysis provides an approximate answer to the right problem by tying together the interrelated influences in a complex system. M.V.E.

**A74-21013** **Microbiological standards for frozen foods.** M. D. Appleman (Southern California, University, Los Angeles, Calif.), M. D. Appleman, Jr. (Southern California Permanente Medical Group, Bellflower, Calif.), and M. D. Appleman. In: Cryogens and gases: Testing methods and standards development; Proceedings of the Symposium, Los Angeles, Calif., June 25-30, 1972. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 3-11. 16 refs.

Factors predetermining quality and safety of frozen food products are discussed along with different types of standards. Attention is drawn to the fact that microbiological standards for frozen foods must be studied thoroughly prior to establishment. The sources and methods of transmission of diseases through the agency of frozen foods and methods of evaluating and minimizing risk are clarified. The inherent inconvenience and danger of establishing microbiological standards for foods without careful evaluative techniques are explained. The impact of microbiological standards for foods upon incipient or frank spoilage is discussed. T.M.

**A74-21320** **General Dynamics lightweight fighter.** C. Gilson. *Flight International*, vol. 105, Feb. 7, 1974, p. 173-176.

According to the regulations of the contract for two prototype YF-16s complete responsibility for design resides with General Dynamics and no detailed military specifications have to be met. The YF-16 shows its advanced technology in several areas, aerodynamically, in its systems, materials, and powerplant. A maximum speed

of Mach 2.2 can be reached. The first YF-16 made an unscheduled first flight on January 20 at Edwards Air Force Base, Calif. G.R.

**A74-21726** **The Fairchild Industries A-10 - Designed for close air support.** J. P. Geddes. *Interavia,* vol. 29, Feb. 1974, p. 119-122.

As a result of the experience provided by the war in Vietnam and of studies concerning the situation in Europe, prototypes of an aircraft for close air support were built. On Jan. 18, 1973 it was announced that Fairchild's A-10 had won the competition. A contract for ten preproduction aircraft was awarded and preparatory steps leading to the production of 600 A-10s beginning in 1975 were considered. Details of A-10 aircraft design are discussed together with aspects of the A-10 systems, questions of survivability, maintenance considerations, and problems of procurement. G.R.

**A74-22145** **Reliability assurance of individual semiconductor components.** R. F. Haythornthwaite, A. R. Molozzi, and D. V. Sulway (Department of Communications, Communications Research Centre, Ottawa, Canada). *IEEE, Proceedings,* vol. 62, Feb. 1974, p. 260-273. 46 refs.

Where small numbers of highly reliable semiconductor devices are required, conventional methods of procurement are found to have deficiencies. An approach to procurement is proposed which is cost effective, accommodates new device types, and assures reliability in the individual device. Although principally applied to silicon planar transistors, the approach can be extended to other semiconductor types. A critical evaluation is made of the manufacturer and his technology. The devices obtained from each diffused wafer are grouped into separate lots. Selected tests are performed on these lots in order to discover possible failure mechanisms. Tests may involve simple electrical measurements or detailed techniques such as scanning electron microscopy and X-ray microprobe analysis. The Canadian/U.S.A. Communications Technology Satellite (CTS) program has adopted this procurement procedure. (Author)

**A74-22189** # **Earth resources satellites - The interest for European industry.** J. Plevin (ESRO, Space Applications Div., Neuilly-sur-Seine, Hauts-de-Seine, France). *(European Space Symposium on International Collaboration in Space, 13th, London, England, June 25-27, 1973.) British Interplanetary Society, Journal,* vol. 27, Mar. 1974, p. 161-172. 11 refs.

In order for the European earth scientist community to take large-scale advantage of earth satellites in geophysical studies, it will be necessary to overcome many problems. In Europe, the more sophisticated remote sensing systems are unavailable, except to military programs. Industry would have to provide vast software support, which would involve risky capital investments unless a program were conducted at a government, and most likely, international level. As earth scientists would generally not be familiar with the operation of the remote sensing equipment, interdisciplinary cooperation would have to be fostered. A preparatory program centered around aircraft equipped with remote sensing instruments is suggested. P.T.H.

**A74-22640** # **Air transportation of hazardous materials.** A. C. Bensmiller (U.S. Department of Transportation, Transportation Safety Institute, Washington, D.C.). In: Economics of air safety and long-range safety research and development; Proceedings of the Twenty-sixth Annual International Air Safety Seminar, Lisbon, Portugal, November 4-7, 1973. Arlington, Va., Flight Safety Foundation, Inc., 1973, p. 198-202.

Some statistics on air transportation of hazardous materials in the U.S. is given. The Hazardous Materials Regulations concerning the air transport of explosives, flammable solids, poisons, radioactive materials, and etiological agents with background information and classification systems are reviewed, with attention to restrictions. V.Z.

**A74-22686** # **International user charges and their impact on world-wide implementation of ATC systems.** D. A. Lewis (International Air Transport Association, Montreal, Canada). In: Upgrading the ATC system; Proceedings of the Annual Meeting, Washington, D.C., November 28, 29, 1973. Washington, D.C., Radio Technical Commission for Aeronautics, 1973. 6 p.

**A74-22687** # **International user charges and their effect on the implementation of ATC, navigation, and communication systems.** R. R. Bohannon (Pan American World Airways, Inc., New York, N.Y.). In: Upgrading the ATC system; Proceedings of the Annual Meeting, Washington, D.C., November 28, 29, 1973. Washington, D.C., Radio Technical Commission for Aeronautics, 1973. 6 p.

In the broadest sense the term 'user charges' includes landing fees, fuel taxes and charges, passenger charges paid by airlines, and en route charges. En route charges are the fastest growing of all and cover fees for en route navigation, communication, air traffic control, and meteorological, and search and rescue facilities and services. Aspects of the rapid escalation of the costs of the charges are discussed together with the reasons for this escalation and the effects of it. G.R.

**A74-23085** **Opportunities for U.S.-European cooperation in application satellite programs.** J. A. Johnson (Communications Satellite Corp., Washington, D.C.). *(Eurospace U.S.-European Conference, 5th, San Francisco, Calif., May 22-25, 1972.)* In: Communications satellite systems. Cambridge, Mass., MIT Press, 1974, p. 47-60.

It is pointed out that the activities of INTELSAT have provided a substantial market for space-related industry. Questions of cooperation in application satellite programs are considered, giving attention to a relative increase in the influence of the developing, non-industrialized nations which make up three-fourths of INTELSAT's membership. INTELSAT procurement policy is discussed together with INTELSAT patent and data policy, the role of European industry in INTELSAT programs, aspects of telecommunications services, and questions of possible COMSAT-ESRO cooperation. G.R.

**A74-23548** **Joint service agreements - A need for consolidation.** D. P. Cannon (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.) and W. J. Hock (USAF, Life Support System Program Office, Wright-Patterson AFB, Ohio). In: Survival and Flight Equipment Association, Annual Symposium, 11th, Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 108, 109.

Review of the background and present status of the new management concept of joint service effort and cooperation in the area of life support equipment and facilities. Efforts have been made to identify and study organizational functions and facilities, capabilities, and capacities in areas of life-support equipment research, development, test, evaluation, and logistics, where consolidation or combined management arrangements could yield a high payoff. These efforts have so far resulted in the Air Force being selected for the management of survival avionics and pressure suits, the Army being assigned body armor, and the Navy taking charge of flotation equipment and antiexposure clothing. M.V.E.

**A74-23549** **Integrated logistics support and acquisition management /ILS-AM/ panel for aviation-crew systems equipment changes.** R. Gilles and J. Harding (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Survival and Flight Equipment Association, Annual Symposium, 11th. Phoenix, Ariz., October 7-11, 1973, Proceedings. Canoga Park, Calif., Survival and Flight Equipment Association, 1974, p. 110, 111.

The purpose of the ILS/AM panel is to coordinate the various logistic support aspects of implementing changes in certain survival, safety, and personal equipment used by Naval aircrews. It consists of representation from advisory, operational, and implementation activities. The advisory portion is staffed in part by representatives from the Office of the Chief of Naval Operations and from the Naval Air Systems Command. P.T.H.

**A74-23596** **A status summary of the MRCA project.** G. Madelung (Panavia Aircraft GmbH, Munich, West Germany). *Aeronautical Journal*, vol. 77, Dec. 1973, p. 606-611.

The air intakes of the multirole combat aircraft (MRCA) are forward of the wing, and their duct is remarkably straight, minimizing boundary layer effects and distortion. Two interfaces are of particular basic interest: the compatibility of the air intake with the engine, and the afterbody-nozzle shaping together with the thrust reverser. The after fuselage-nozzle combination was analyzed and tested in the wind tunnel to arrive at a proper design tradeoff between base drag, thrust, and weight. The early prototype aircraft will concentrate on handling, propulsion, structural leads, performance, and general subsystems. The later prototypes will do avionics system and external stores work. F.R.L.

**A74-23597** **The determination of realistic probability levels for project completion dates.** G. Mitchell and M. J. Willis. *Aeronautical Journal*, vol. 77, Dec. 1973, p. 620-625. 6 refs.

It is considered useful to estimate a probability function of completing a project by a specified date in order that more realistic planning can be executed. Attention is given to network analysis, the activity, the probability distribution of activity duration, determination of subcritical path, and the Monte Carlo simulation for computing the completion date distribution. Planning the project pessimistically and planning it optimistically, optimization of the project network, and estimation of realistic probabilities are discussed. F.R.L.

**A74-23600** **An evaluation of recruitment sources for R&D.** D. W. Jarrell (Drexel University, Philadelphia, Pa.). *Research Management*, vol. 17, Mar. 1974, p. 33-37.

A study is conducted of the relative effectiveness and cost of research employees recruited from four different sources for full-time employment at the Langley Research Center of NASA. Particular attention is given to employees recruited for professional scientific and engineering positions requiring aerospace technology qualifications. The recruitment methods are discussed together with the compensation level and the performance criteria. G.R.

**A74-23877** **The Aeritalia-Lockheed agreement - The package also includes the Lancer (L'accordo Aeritalia-Lockheed : Nel pacchetto c'è pure il Lancer).** I. Coggi. *Aviazione di Linea, Difesa, e Spazio*, vol. 12, Feb. 1974, p. 58-60. In Italian.

Consideration of the implications of an agreement concluded recently concerning collaboration between Italian and U.S. firms with regard to marketing of the G-222 military transport and the F-104 supersonic fighter (the Starfighter) and production of a successor to this fighter called the Lancer. Certain discrepancies between the Italian and U.S. communiqués issued following the agreement are noted, giving rise to the conclusion that production of the Lancer is contingent on successful marketing of the G-222 and the F-104. A detailed description is given of the characteristics of the Lancer, showing how it maintains many of the characteristics of the F-104, while achieving improved maneuverability and eliminating the pitchup phenomenon typical of the Starfighter. A.B.K.

**A74-24961** **Astrononautical research 1972; Proceedings of the Twenty-third Congress, Vienna, Austria, October 8-15, 1972.** Congress sponsored by the International Astronautical Federation. Edited by L. G. Napolitano, P. Contensou, and W. F. Hilton. Dordrecht, D. Reidel Publishing Co., 1973. 366 p. $39.45.

Recent advances in space science and technology are described by papers dealing with basic problems in astrodynamics and bioastronautics, the engineering and management aspects of space technology, space applications in a variety of disciplines, and scientific activities conducted by students at universities. Some specific topics include the theory of spacecraft motion in a noncentral gravitational field, spacecraft wash-water recovery, contamination of the spacecraft atmosphere by carbon monoxide, performance evaluation of dual (mixed) propellant vehicles, spacecraft stability to pogo vibrations, developments in remote sensing applications, materials processing in a zero-gravity environment, use of the finite element method for aerospace structures, and Mercury orbit trajectories.

T.M.

**A74-25357** # **The new constraints on military aircraft (Les nouvelles contraintes de l'aéronautique militaire).** J. Soissons. *Association Aéronautique et Astronautique de France and Union Syndicale des Industries Aéronautiques et Spatiales, Congrès International Aéronautique, 11th, Ecole Nationale Supérieure de Techniques Avancées, Paris, France, May 21-23, 1973, Paper.* 12 p. In French.

A clause that appears regularly at the end of military aircraft specifications, requiring the new weapon system to be 'robust, low-cost, and easy to maintain' is studied in the light of the constraints imposed on the design, development, and manufacture of new generation military aircraft by current economic trends, fiscal policy, and rapidly increasing cost of advanced materials and technological sophistication. Some aspects of possible tradeoffs between costs and sophistication are examined. V.P.

**A74-25388** **User needs and applications for remote sensing.** W. T. Talbot (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). In: Remote sensing of earth resources; Proceedings of the Second Conference on Earth Resources Observation and Information Analysis System, Tullahoma, Tenn., March 26-28, 1973. Volume 2. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1973, p. 39-56.

This paper describes an attempt to improve upon existing techniques and capabilities for assessing critical national problems. It is a beginning, among others, of an attempt to develop a logical approach and methodology for breaking down problems into definitive organizational roles for resolution, and for translating assigned charter responsibilities into investigation requirements and information needs for remote sensing system applications. By integrating each critical national problem with the assigned character responsibilities and objectives of various Government agencies, key problem effects on agency activity can be defined and, from these, basic problem investigation issues and questions for formulating information requirements. (Author)

**A74-25395** **Application of remote sensing to leisure resource planning and management.** D. R. Dunn (Temple University, Philadelphia, Pa.). In: Remote sensing of earth resources; Proceedings of the Second Conference on Earth Resources Observation and

Information Analysis System, Tullahoma, Tenn., March 26-28, 1973. Volume 2. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1973, p. 189-199. 16 refs.

**A74-25398** **Automated approach to the biological survey for pest management systems.** P. D. Fisher, R. H. Caron, R. L. Walton, and D. L. Haynes (Michigan State University, East Lansing, Mich.). In: Remote sensing of earth resources; Proceedings of the Second Conference on Earth Resources Observation and Information Analysis System, Tullahoma, Tenn., March 26-28, 1973. Volume 2. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1973, p. 227-247. 12 refs. Research supported by the Michigan State University; NSF Grant No. GI-20.

An approach to pest insect management is shown. Through this approach multifactor control strategies can be systematically developed and modified from region to region according to day-to-day changes in weather, field, and economic factors. A method for a biological survey which is compatible with this approach to pest insect management is presented. The basic approaches for gathering the required data are described along with details concerning the hardware required for retrieving, storing and processing the raw data. Problems associated with data management and pattern recognition are discussed. An efficient algorithm for performing object isolation in an image plane is also presented and applied to three representative images. G.R.

**A74-26416** **MRCA prepares for flight test.** *Flight International*, vol. 105, Mar. 28, 1974, p. 395-399.

The multirole combat aircraft (MRCA) flight test program is the most comprehensive yet undertaken for any European military aircraft. Nine prototype and six preproduction MRCAs will take part in a closely integrated test schedule. Only in the later stages will this diverge to investigate the special requirements and equipment, particularly weapons, of Britain, West Germany, and Italy. The MRCA flight trials will be supported by a number of 'hack' aircraft equipped to investigate particular aspects in isolation from the main program. F.R.L.

**A74-26471** # **The Soviet-American space experiment (Sovetsko-Amerikanskii kosmicheskii eksperiment).** K. B. Bushuev. *Akademiia Nauk SSSR, Vestnik*, Jan. 1974, p. 59-66. In Russian.

Brief survey of the history, current state, and goals of the joint Soviet-American space laboratory program planned to begin with a rendezvous of a Soviet Soiuz spacecraft and an American Apollo spacecraft in 1975. The organizational and technological aspects of the program are discussed. Some details are given on the projected space experiments. V.Z.

**A74-26567** **The development of the WG-13.** A. H. Smith (Westland Helicopters, Ltd., Yeovil, Somerset, England). *Aeronautical Journal*, vol. 78, Jan. 1974, p. 23-31.

The conception of the initial program for the aircraft is considered together with the management and development of this program. A completely rationalized overall program was completed by December of 1967. Two major changes to the program took place during the year 1969. The early months of 1971 saw the final preparation of the first basic aircraft for flight. Some aspects of development testing are discussed together with questions of flight testing and manufacture. G.R.

**A74-26651** # **Advanced Metallic Air Vehicle Structure Program.** F. D. Boensch (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio) and C. E. Hart (General Dynamics Corp., Convair Aerospace Div., Fort Worth, Tex.). *AIAA, ASME, and SAE, Structures, Structural Dynamics and Materials Conference, 15th, Las Vegas, Nev., Apr. 17-19, 1974, AIAA Paper 74-336*. 11 p. Members, $1.50; nonmembers, $2.00.

The Advanced Metallic Air Vehicle Structure Program offers an opportunity to demonstrate potential increases in the reliability, integrity and efficiency of future Air Force Weapon Systems by the integration of new and emerging structures, material and manufacturing technologies during the design and development of a wing carry through structure. Program objectives and accomplishments are described briefly. Management methods and concepts found to be of value to the program manager are highlighted. Each phase of the program including preliminary design, detail design, fabrication, and test is described in some detail. Emphasis is placed on the use of trade studies during the design phase and the extensive development test program necessary to provide information for the detail design and manufacturing phases. (Author)

**A74-26683** # **The growing procedural problems of washing mammoth aircraft.** H. J. Singletary (Lockheed-Georgia Co., Marietta, Ga.). *AIAA, ASME, and SAE, Structures, Structural Dynamics and Materials Conference, 15th, Las Vegas, Nev., Apr. 17-19, 1974, AIAA Paper 74-376*. 3 p. Members, $1.50; nonmembers, $2.00.

Jumbo jets, like supertankers, are designed to carry larger payloads at less operational cost; yet many benefits can be challenged because of the magnitude of ground service requirements. The author discusses the efforts in progress today to overcome a major ground time consumer: aircraft cleaning. He focuses on the problems of available cleaning materials, equipment, and facilities as they relate to materials of construction in wide-bodied aircraft and to the environments which affect the cleaning capability/application of current technology. Whereas the author recommends an approach to a resolution, he expresses an opinion that many affected organizations have treated the subject of washing like fleas. They do little more than scratch. (Author)

**A74-26874** # **Confidence assessment of military airframe cost predictions.** D. P. Tihansky (RAND Corp., Santa Monica, Calif.). *Operations Research Society of America and Institute of Management Sciences, Joint National Meeting, Boston, Mass., Apr. 22-24, 1974, Paper.* 30 p. 21 refs.

Analysis of the degree of confidence that can be placed in cost predictions for airframes from standard cost models. Each airframe cost observation is partitioned into six components based on phases of the development or production cycle - e.g., flight test costs and manufacturing labor wages. Confidence measures are then compared for alternate model forms and for the use of a single regression on total costs versus the aggregation of regressions on component costs. Statistical theory is developed to test the independence of component models and to estimate predictive statistics for aggregated cost estimates. (Author)

**A74-27011** # **ATC simulation at London Airport.** R. N. Harrison (Ferranti, Ltd., Bracknell, Berks., England). *Aircraft Engineering*, vol. 46, Mar. 1974, p. 4, 5.

To limit the effect of seasonal variations on training and to

make better use of the time available, the CAA is now using a Ferranti digital simulator for training at London Airport. The simulator has two controller positions each equipped with a PPI (plan position indicator) and normal communications. A third PPI in an adjacent room serves the program controller who sits between two blip drivers. A maximum of 24 aircraft can be controlled at one time, but the system is capable of accepting data on up to 90 flights. The program controller can thus call up a steady flow of traffic, with outbounds, overfliers, light aircraft and helicopter traffic as well as the inbounds being controlled by his two students. F.R.L.

**A74-27142** **DCA's role in satellite communications.** G. T. Gould, Jr. (USAF; U.S. Defense Communications Agency, Washington, D.C.). *Signal*, vol. 28, Mar. 1974, p. 42-46.

Discussion of the key role that the Defense Communications Agency (DCA) is to play in the planning, system engineering, and management of future military communications satellite systems. The discussed DCA responsibilities and functions include the Military Satellite Communications (MILSATCOM) System Architect, the MILSATCOM System Office, Phases I and II of the Defense Satellite Communications System (DSCS) Project Management, the Washington-Moscow 'Hot Line', the Defense Communications Engineering Center (DCEC), the System Engineering Facility (SEF), the Defense Communications Engineering Office (DCEO), and the Satellite Simulation Facility. DCEC is shown to provide the technical expertise required to get a complex satellite communications system from the early concept stage to an operational facility. M.V.E.

**A74-27432** # **Recent status on development of the turbofan engine in Japan.** M. Matsuki, T. Torisaki (National Aerospace Laboratory, Tokyo, Japan), and K. Miyazawa (Ishikawajima-Harima Heavy Industries Co., Ltd., Tokyo, Japan). *American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, Zurich, Switzerland, Mar. 30-Apr. 4, 1974, Paper 74-GT-39.* 12 p. Members, $1.00; nonmembers, $3.00.

Efforts to design and develop new jet engines have been made in Japan since 1953. One family of propulsion engine (J3) succeeded in getting into production for installation on two models of Japanese developed aircraft (T1B and P2J). Another family of lift engine (JR) has been successfully used for overall VTOL system studies. Based upon these experiences, studies on a new fan engine for main propulsion are being carried out. This new engine (FJR-710) is a high bypass front fan engine developed for low noise generation and low smoke emission. (Author)

**A74-27490** # **A discussion of effective management of scientific data processing in consideration of design.** D. E. Barbeau (Teledyne, Inc., Teledyne CAE Div., Toledo, Ohio). *American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, Zurich, Switzerland, Mar. 30-Apr. 4, 1974, Paper 74-GT-151.* 16 p. 20 refs. Members, $1.00; nonmembers, $3.00.

Consideration of the management of scientific data processing from a user's point of view. Specific areas considered critical to the user's operational effectiveness are discussed to illustrate approaches to the management system. Two major areas of consideration are programming and error analysis. These are examined in terms of analytic design requirements, which is most representative of the engineering computer functions. The premise is made that effective utilization of computer-related resource will come through effective management of scientific data-processing operations. The means and requirements to accomplish this are discussed as they relate to the user operation. The primary areas of consideration are the allocation of authority and the management tools for effective control - evaluation, planning, and audit. (Author)

**A74-27520** # **Alpha Jet - A German-French joint venture.** S. Haller (Bundesamt für Wehrtechnik und Beschaffung, Koblenz, West Germany). *Dornier-Post* (English Edition), no. 1, 1974, p. 24-28.

The original Dornier Do P 375 project was concerned with the development of a two-seat, twin-jet trainer in response to the German Air Force's need for a jet aircraft for elementary and advanced training during the years from 1976 to 1980. Similar requirements on the part of the French Air Force led to the Alpha Jet TA 501 project undertaken jointly by the Federal Republic of Germany and France. Aspects of the concept phase of the project are discussed together with the definition phase, the execution of the program, and details regarding the bilateral government organization involved. G.R.

**A74-27634** **HS.146 progress report.** A. Hofton. *Flight International*, vol. 105, Apr. 11, 1974, p. 457-462.

Because many operators will use the HS.146 for stages with flight times of about one-half hour, particular attention has been paid to minimizing those costs which are related to the number of flight cycles rather than to flying hours. A target figure for direct maintenance costs has been established and techniques are being employed to monitor and control these costs throughout the design to the same extent as, for example, weight and manufacturing costs. Lycoming reports that test-rig and flight tests have shown that the ALF 502 fan engine has a high tolerance of inlet distortion, and during accelerations with accessory loads the engine is surge-free. The ALF 502 is built up from four basic modules that can be handled and serviced separately, and are interchangeable between engines. F.R.L.

**A74-27804** # **Compatibility planning for improved spectrum use.** D. B. Colby (U.S. Navy, Naval Weapons Laboratory, Dahlgren, Va.). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 5th, Los Angeles, Calif., Apr. 22-24, 1974, Paper 74-432.* 7 p. 7 refs. Members, $1.50; nonmembers, $2.00.

In 1972, the Director of Telecommunications Policy issued Circular 11 which required assessment of spectrum availability prior to funding of Federal Government communication-electronics systems. An early, cooperative, multi-agency evaluation of advance information is applied, with special emphasis on space systems. Experience with this process in 1973 has demonstrated the desired early identification of potential compatibility problems, and helped in developing remedial options for telecommunications developments which will be important to the national economy and security in the future. (Author)

**A74-27834** # **Long-range planning for telecommunications in a multinational environment.** W. G. Gosewinckel (Overseas Telecommunications Commission, Sydney, Australia). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 5th, Los Angeles, Calif., Apr. 22-24, 1974, Paper 74-490.* 7 p. Members, $1.50; nonmembers, $2.00.

The growth and development of international telecommunications services over the recent years is characterized by increasing demand for existing services, the emergence of many new services, and the need for progressive improvement of the availability and reliability of all services. Commercial communications satellites and submarine cable systems are expected to continue as the basic means of intercontinental telecommunications during the next twenty years, and it is viewed that their usage will be on a complementary rather than competitive basis. It is stressed that international

organizations must jointly develop the necessary financing and planning machinery on a global basis to ensure that advanced technology is effectively exploited. The capabilities and activities of the Intelsat organization and of the British Commonwealth telecommunications organization in this area are delineated. T.M.

**A74-27835** # **Philippine domestic satellite system.** G. Cheadle (Philippine Overseas Telecommunications Corp., Washington, D.C.). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 5th, Los Angeles, Calif., Apr. 22-24, 1974, Paper 74-491.* 4 p. Members, $1.50; nonmembers, $2.00.

The Philippines needs to expand its domestic telecommunications capabilities and augment the amount and types of services provided. In particular, educational television is needed by the many schools in remote areas. It appears that a domestic satellite system would be the quickest and most economical solution. Three main questions are discussed: (1) what types of service at which locations should be provided; (2) what is the best overall technical, operational, and economic approach; and (3) how can the project be financed. (Author)

**A74-28501** # **Management problems in European projects with regard to the geographical distribution of tasks.** H. Tolle (ERNO Raumfahrttechnik GmbH, Bremen, West Germany). *(British Interplanetary Society, European Space Symposium on International Collaboration in Space, 13th, London, England, June 25-27, 1973.) British Interplanetary Society, Journal,* vol. 27, May 1974, p. 321-327.

The paper reviews the problems introduced into European space projects by the requirement for a geographical distribution of work in agreement with the funding of the project through the European nations involved. It recommends on the basis of some examples a flexible and generous handling of geographical distribution boundaries and an early commitment of the European countries in the case of new projects. (Author)

**A74-28572 State versus federal regulation of commercial aeronautics.** R. F. Maris. *Journal of Air Law and Commerce,* vol. 39, Autumn 1973, p. 521-557. 215 refs.

Current federal legislation in the field of air law is dominated by the Federal Aviation Act of 1958. The primary stimulus for its enactment was the undesirable state into which the quality of safety regulation of aeronautics had fallen. Since Congress has the constitutional right to regulate all interstate commerce, and since the aeronautics industry is essentially interstate, it is natural that an area of contention would be whether air safety, and now recently, environmental protection, are so intertwined with the commercial aspect of air transportation as to preclude any state regulation in these areas. In addition, federal domination of the area of airspace control is not matched by control in the economic realm. Rather, it seems that the intent of Congress has been to allow a certain degree of concurrent state authority, which has generated a tremendous amount of uncertainty and litigation since no consistent pattern of federal-state regulation has been articulated. The present work maintains that the distinction between rates and certification, on the one hand, and routes and services on the other, is illogical and should be ended. P.T.H.

**A74-28612** # **The American satellite communications system.** S. Ashton and D. Silverman (American Satellite Corp., Germantown, Md.). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 5th, Los Angeles, Calif., Apr. 22-24, 1974, Paper 74-482.* 8 p. Members, $1.50; nonmembers, $2.00.

The American Satellite Corporation (ASC) plans to build a viable satellite communications network during the next two years. The new operations plan calls for start of communications services in July 1974 using leased satellite capacity. The second phase will be initiated in 1977 with the launch of the ASC satellites which will incorporate both 6/4 GHz and 14/12 GHz transponders. Aspects of system performance are considered together with the earth segment, the space segment, dedicated customer-site earth stations, and ASC future plans. G.R.

**A74-28613** # **Design of a ground control system to operate domestic and maritime satellites.** A. J. E. van Hover and W. J. Gribbin (COMSAT General Corp., Washington, D.C.). *American Institute of Aeronautics and Astronautics, Communications Satellite Systems Conference, 5th, Los Angeles, Calif., Apr. 22-24, 1974, Paper 74-483.* 9 p. Members, $1.50; nonmembers, $2.00.

An integrated and automated Tracking, Telemetry and Command (TT&C) Ground System was designed for the Comsat General Domestic and Maritime Satellite Systems. The TT&C earth stations, processing equipment, System Control Center, computer facilities and communication links are described as well as the system design criteria. Tradeoffs of manning versus automation, capital versus operating costs and innovation versus use of known technology are analyzed. General telemetry data management and reduction philosophies are addressed. (Author)

**A74-28675** # **One of a kind spacecraft designed to a cost.** E. Offenhartz (Grumman Aerospace Corp., Bethpage, N.Y.). *Defense Management Journal,* vol. 10, Apr. 1974, p. 24-28.

The program considered is concerned with the achievement of maximum performance for a fixed development cost. A typical spacecraft cost distribution and breakout is shown. The system development approach employed uses a disciplined multiskilled team to translate customer mission and functional requirement into configuration definitions. Relations with the suppliers are discussed together with questions of budget control and customer influence. G.R.

**A74-28726 The national microwave landing system /MLS/.** J. W. Edwards (FAA, Microwave Landing System Div.). *Society of Automotive Engineers, Business Aircraft Meeting, Wichita, Kan., Apr. 2-5, 1974, Paper 740345.* 9 p. Members, $1.25; nonmembers, $2.00.

The microwave landing system (MLS) is being developed as the next generation approach and landing system to replace the present worldwide instrument landing system (ILS). In order to satisfy diverse users such as civil and military aviation and conventional and V/STOL aircraft, the MLS employs compatible modular configurations. The five-year National MLS Development Program, half over, has just completed a hardware feasibility demonstration phase, is about to choose the best technique, either scanning beam or Doppler scan, and in the next phase will select a single national system from among competing contractors. Operational advantages provided by the MLS include far greater flying precision and flexibility, including curved or segmented approaches in three dimensions; and flare guidance for all-weather automatic landing capability, resulting in greater safety while increasing airport capacities. (Author)

**A74-28738 The background to propeller airplane noise regulations.** E. W. Sellman (FAA, Office of Environmental Quality, Oklahoma City, Okla.). *Society of Automotive Engineers, Business Aircraft Meeting, Wichita, Kan., Apr. 2-5, 1974, Paper 740361.* 8 p. 6 refs. Members, $1.25; nonmembers, $2.00.

Outline of the development of noise standards applicable to light, propeller-driven aircraft. The new noise abatement standards required under the Noise Control Act of 1972 are discussed in regard

to their impact on future aircraft designs and their economic effect on the general-aviation industry. Since no type of certification requirements for noise abatement currently existed for propeller-driven aircraft (other than for those in the transport category), it was necessary to set up a testing procedure to determine how the standards could be modified for such aircraft. Discussed in detail are the noise evaluation measures, testing procedures, and maximum noise level standards. (Author)

**A74-28791** **Carrier designs for space shuttle orbiter being refined.** D. E. Fink. *Aviation Week and Space Technology*, vol. 100, Apr. 29, 1974, p. 54, 55, 58, 61, 62.

Boeing Co. and Lockheed Aircraft Corp. are refining their respective design studies of the 747 and the C-5A piggyback carrier aircraft for the space shuttle orbiter under contract extensions recently awarded by NASA. Final selection between the 747 and C-5A concepts now is scheduled for mid- to late May. The C-5A and the 747 are equally capable of performing the shuttle program mission, which involves mainly airlifting the Rockwell International orbiter for initial approach and landing tests and later on cross-country ferry flights. G.R.

**A74-29106** **Organization and management of large-scale research facilities in the USA, France, and Great Britain (Organisation und Management von Grossforschungseinrichtungen in den USA, Frankreich und Grossbritannien).** W. Grillo (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Rechts- und Vertragsabteilung, Porz-Wahn, West Germany), H.-D. Harig (Kernforschungsanlage Julich GmbH, Julich, West Germany), and D. Kutschke (Gesellschaft für Kernforschung mbH, Karlsruhe, West Germany). *DFVLR-Nachrichten*, Apr. 1974, p. 545-547. In German.

The organization of large-scale research projects in the U.S. is considered, taking into account NASA and USAEC. Nuclear research projects in France are conducted by the Commissariat à l'Energie Atomique (CEA). Projects of aeronautics and astronautics in France are distributed between two different public agencies. The United Kingdom Atomic Energy Authority (UKAEA) is responsible for nuclear research in the UK, while the Royal Aircraft Establishment is concerned with aerospace-related research. Attention is given to managerial principles which, although commonly applied in the U.S., France, and the UK, have not yet found wide acceptance in West Germany. G.R.

**A74-29467** # **Critical analyses and laboratory research work at the stage of aircraft preliminary design (Analyses critiques et recherches en laboratoire au stade de l'avant-projet d'un avion).** C. Liévens (Service Technique de l'Aéronautique, Paris, France) and P. Poisson-Quinton (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *(NATO, AGARD, Réunion sur l'Intégration et l'Optimisation des Projets d'Avions, Florence, Italy, Oct. 1-5, 1973.) ONERA, TP* no. 1291, 1973. 27 p. In French.

Development of a procedure for performing critical analyses of preliminary designs of military aircraft, and review of the role of the laboratory in the preliminary design stage. It is noted that in the case of a military aircraft such a critical analysis is based on studies of the sensitivity of the aircraft performance to predictable or probable variations of the aerodynamic and power-plant parameters. The need for an analysis of reliability and maintenance aptitude, leading to an estimate of repair and preventive maintenance costs, is stressed, as well as the need for flexibility of the design objectives. A review is made of analysis techniques based on parametric studies, prior experience, sophisticated calculations, test results, and intuition. A detailed account is given of the role of laboratory research in designing vertical-takeoff supersonic fighter, a short-takeoff transport, ramjet propulsion, the Concorde SST, and a variable-sweepback aircraft. A.B.K.

**A74-29833** **Air traffic control of the 1980s (Flugsicherung der 80er Jahre).** *Flug Revue/Flugwelt International*, May 1974, p. 95-98. In German.

The requirements in West Germany regarding the operational capacity of the air traffic control system of the 1980s are examined together with requirements concerning the organization of the airspace, the utilization of the airspace, and the organization of the air traffic control services. A determination of the control capacity of ATC operational positions is discussed along with the concept of future ATC systems in West Germany, the utilization of electronic data processing, questions of aircraft position determination, and details regarding the navigation techniques to be used. G.R.

**A74-30059** # **A project information and simulation system for aerospace management.** A. C. Singhal (Engineers India, Ltd., New Delhi, India), J. J. Rosati, and G. Doeh (TRW Systems Group, Redondo Beach, Calif.). *Institution of Engineers (India), Journal, Mechanical Engineering Division*, vol. 54, Nov. 1973, p. 55-62.

An integrated system, requiring a dynamic data base, provides management decision data related to the overall effect of typical problems in aerospace vehicle development programmes. Simulation models allowing management to determine the impact of engineering changes and delays on programme and subprogramme costs and schedules, with a technique for projects status evaluation, are presented in this paper. Analytical simulation models permit design optimization, evaluation of competitive proposals, vehicles and system performance verification configuration tradeoff studies, and identification of potential problems. Advantages of the system to project management are discussed and several examples of simulation model usage for a hypothetical helicopter programme are given. (Author)

**A74-30116** **Technology transfer: Successes and failures; Proceedings of the Conference, Seattle, Wash., November 28-30, 1972.** Conference supported by Battelle Memorial Institute. Edited by G. K. Manning. San Francisco, San Francisco Press, Inc., 1974. 255 p. $7.50.

Experiences with technology transfer are described in papers detailing viewpoints, problems, successes, and failures in activities involving universities, research institutes, government agencies, and commercial enterprises. Information systems and processes involved in technology transfer are explained in several works specifically devoted to this topic. The remaining majority of papers discuss techniques and circumstances of technology development, dissemination, and application in various domestic disciplines and in international cooperation efforts. Experiences gained by NASA in domestic and international technology transfer programs are summarized.

Individual items are announced in this issue. T.M.

**A74-30117** **Information processes in technology transfer.** J. W. Murdock (Battelle Columbus Laboratories, Columbus, Ohio). In: Technology transfer: Successes and failures; Proceedings of the Conference, Seattle, Wash., November 28-30, 1972. San Francisco, San Francisco Press, Inc., 1974, p. 7-17.

The transfer of information and the transfer of technology are often integrally related in a manner that leads to confusion on their differences. The present paper provides a qualitative clarification of some characteristics of the technology transfer process and illustrates certain distinguishing features between information transfer and technology transfer. Selective acquisition, storage, retrieval, and organized dissemination of information are discussed, and attention is given to functional elements and operation of an information analysis system and a technology transfer system. T.M.

**A74-30118** * **Technology transfer - The NASA perspective.** J. M. Carlson (NASA, Dissemination and Program Evaluation Div., Washington, D.C.). In: Technology transfer: Successes and failures; Proceedings of the Conference, Seattle, Wash., November 28-30,

1972. San Francisco, San Francisco Press, Inc., 1974, p. 148-155.

Domestic and international NASA technology utilization experiences are described together with prospects for applying technology to problems of local and state governments. Transfer mechanisms used by NASA to introduce new technology in both the private and public sectors of the domestic scene are discussed, and attention is given to experiences gained in a pilot program designed to establish a refined methodology for the transfer of aerospace-developed technology to developing nations. Technical assistance to local and state governments involves applications of NASA experiences to further the constructive involvement of industry. T.M.

**A74-30119 Transfer of commercial technology.** G. R. White (Xerox Corp., Stamford, Conn.). In: Technology transfer: Successes and failures; Proceedings of the Conference, Seattle, Wash., November 28-30, 1972. San Francisco, San Francisco Press, Inc., 1974, p. 194-207.

Description of prevailing circumstances and utilized techniques in several specific cases of commercial technology transfer between corporations, from government to corporation, from technical institute to corporation, and from university to corporation. Each of these cases is analyzed to draw general guidelines on the responsibilities of commercial enterprises, the government, technical institutes, and universities as efficient components of a technology development and distribution system. T.M.

**A74-30353 # Federal aviation requirements for future air navigation improvements.** A. B. Winick (FAA, Washington, D.C.). In: National Radio Navigation Symposium, Washington, D.C., November 13-15, 1973, Proceedings. Washington, D.C., Institute of Navigation, 1974, p. 13-17. 6 refs.

Aviation requirements for long distance navigation aids are based on the need to assure safe separation in high traffic density portions of the airspace. In domestic areas, a growing need appears to exist for a supplement to the standard short-distance navigation system. A worldwide ground reference aid appears desirable as an adjunct to self-contained systems, and as primary device in other cases. Accuracy requirements are not extreme; reliability and suitability for cockpit operation have equal importance. The goal of a single ground-based system appears feasible, if agreement can be reached on common requirements and sufficient time is planned for an orderly transition. (Author)

**A74-30358 # Economical usage of long range navigation.** W. K. Vogeler (Telcom, Inc., McLean, Va.). In: National Radio Navigation Symposium, Washington, D.C., November 13-15, 1973, Proceedings. Washington, D.C., Institute of Navigation, 1974, p. 63-70. 5 refs.

A description of the operational requirements and economic factors which confront the low-cost user of long range navigation/positioning systems serves as an introduction to the comparison of satellite, Omega, Decca, and Loran-C usage in the non-military area. Three categories of users are described: the direct user who desires to know his location, the analytic user who desires a documented record of his unit's track, and the controller who desires the location of other units. The four systems are then compared with respect to those considerations which are of importance from the user's viewpoint. Loran-C is selected as the system which best meets the user requirements. The manner in which Loran-C can be utilized with a description of industrial and governmental tasks concludes the paper. (Author)

**A74-30416 The significance of titles, abstracts, and other portions of technical documents for information retrieval.** F. L. Scheffler, H. H. Schumacher, and J. F. March (Dayton, University, Dayton, Ohio). *IEEE Transactions on Professional Communication*, vol. PC-17, Mar. 1974, p. 1-8. 8 refs. Contract No. F33615-71-C-1069.

Review of the results of an experimental program that was designed to test the effect of using various sources of index terms on retrieval effectiveness and costs and to provide quantitative data as a basis for a management decision on optimal indexing procedures for an information storage and retrieval system. The results include the finding that indexing efficiency is greatest when title and abstract are used as sources of index terms. M.V.E.

**A74-30942 Organizing an R & D oriented computer activity - Management and control of an Independent Research & Development Program.** I. M. Datz. *Angewandte Informatik*, May 1974, p. 209-218.

An analysis of the effectiveness of a research and development program is discussed, giving attention to the problems associated with management and control activities. The establishment is considered of tools and criteria which will provide management with quantitative guidelines as an aid for the maintenance of conditions conducive to creative thought and innovation. G.R.

**A74-31274 Major advances expected from ATS-F.** C. Covault. *Aviation Week and Space Technology*, vol. 100, May 27, 1974, p. 38-42.

Major technology innovations for communications spacecraft on board the ATS-F include passive thermal control, graphite composite materials usage, offset pointing capability, and attitude control innovations. The spacecraft's design consists of five major structural elements, including an environmental measurement package, solar arrays, the reflector, the support truss, and an earth viewing module. The ATS-F experiments are considered. G.R.

**A74-31339 Variables sampling and MIL-STD-414.** E. G. Schilling (General Electric Co., Lamp Business Div., Cleveland, Ohio). *Quality Progress*, vol. 7, May 1974, p. 16-20.

The principal advantage of variables plans over attributes is reduction in sample size. Probably the most important consideration in applying variables sampling plans is the requirement that the shape of the underlying distribution of measurements to which the plan is to be applied must be known and stable. This means that statistical tests on past data must show that the distribution of measurements involved actually is that assumed by the plan. Control chart evidence also is desirable to indicate its stability. Military Standard 414 is an acceptable quality level (AQL) type sampling scheme that assumes underlying normality of distribution of the measurements to which it is applied. Since it is an AQL plan, it incorporates switching rules to move from normal to tightened or reduced inspection and return. F.R.L.

**A74-31446 Energy self-sufficiency - An economic evaluation.** M. A. Adelman, H. D. Jacoby, P. L. Joskow, P. W. MacAvoy, D. C. White, M. B. Zimmerman (MIT, Cambridge, Mass.), and H. P. Meissner. *Technology Review*, vol. 76, May 1974, p. 22-58. Research sponsored by the Massachusetts Institute of Technology.

On the assumption that the U.S. meets all its energy demands from internal sources by 1980, forecasts are made of the prices at which supply and demand will be in equilibrium. The results indicate that prices in the range from $10.00 to $12.00 per barrel (oil-equivalent) will be necessary to bring forth enough additional supplies of fossil fuels to satisfy demands in domestic energy markets by that time. The development of special price policies is recommended for the synthetics industry. Security can be provided against import disruption by the introduction of radically new import policies. One important element would be an import storage program. G.R.

**A74-32319** # **DOD's Space Test Program.** F. A. Paparozzi and N. T. Anderson (USAF, Directorate of Space, Washington, D.C.). *Astronautics and Aeronautics,* vol. 12, June 1974, p. 42-47.

The Department of Defense Space Test Program provides prompt spaceflight support to developmental, preoperational, and research payloads. The program has encompassed 56 payloads on 18 different spacecraft missions, and another 31 payloads have been assigned to missions not yet flown. Although the Air Force is the executive agency, the management procedures for the program are outlined in a joint Army, Navy, and Air Force manual. Payloads may be submitted by any one of dozens of laboratories and program offices, while the Space Test Program selects the payloads and sets their priority. The general steps involved in the cost analysis of a given payload are outlined. P.T.H.

**A74-32320** * # **Mariner Venus/Mercury '73 - A strategy of cost control.** J. R. Biggs (NASA, Office of Space Science and Applications, Washington, D.C.) and W. J. Downhower (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Astronautics and Aeronautics,* vol. 12, June 1974, p. 48-53.

The Mariner Venus/Mercury '73 project kept within its originally established goals for schedule, performance, and cost. Underlying this development success was the availability of the Mariner technology. But meeting the goals demanded management determination, planning, and discipline to make optimum use of state-of-the-art technology. The present work points out management approaches and techniques that kept schedules and controlled costs, the intent being to stimulate thought about how to do the same with future spacecraft and payloads. P.T.H.

**A74-32321** # **Ground testing and simulation. I - Key to efficient development of aerospace systems.** J. D. Whitfield (ARO, Inc., von Karman Gas Dynamics Facility, Arnold Air Force Station, Tenn.). *Astronautics and Aeronautics,* vol. 12, June 1974, p. 54, 55. 6 refs.

Future developments of aerospace systems can be carried out faster, safer, and at a lower cost through more complete and earlier ground testing and simulation. This requires a change in present development philosophies as well as the availability of more advanced facilities, such as high-Reynolds-number transonic tunnels, large full-scale subsonic tunnels, and propulsion facilities for testing very large turbine engines. (Author)

**A74-32733** **European space activities since the war - A personal view.** A. V. Cleaver. *(British Interplanetary Society, Meeting, London, Mar. 8, 1974.) Spaceflight,* vol. 16, June 1974, p. 220-238.

If European collaboration is to be meaningful, an attempt must be made to subordinate national interests to the common aim. Long-term objectives must always be borne in mind; basic decisions can rarely be taken as a result of short-term cost-benefit analyses. Effective European collaboration is impracticable unless better political continuity can be assumed, with fewer changes of policy, delays in decision-making, and cycles of 'stop-go' decisions. Perhaps the only possible solution to the problem would be for European ministers to confine their own powers to laying down certain very broad but firm guidelines, thereafter leaving the implementation of such policies to the professionals within agencies and industry. F.R.L.

**A74-33072** * **A catalog system for remote-sensing data.** R. S. Singh and J. P. Scherz (Wisconsin, University, Madison, Wis.). *Photogrammetric Engineering,* vol. 40, June 1974, p. 709-720. 8 refs. Grant No. NGL-50-002-127.

The Practical System for Cataloging, Indexing, and Retrieval of Remote Sensing Data developed by the Interdisciplinary Remote Sensing Group at the University of Wisconsin consists of a card catalog, a site-index-map, a site-index-file, an industry-index-file, and a project-index-file. The system is designed for retrieval of remote-sensing data which include imagery, magnetic tapes, flight logs, maps, ground-truth reports, and research reports containing raw data. It can be operated by conventional library methods, but provision has been made for digitizing the system for computer retrieval. P.T.H.

**A74-33298** **A proposed pricing procedure for domestic airlines.** C. K. Walter (Nebraska, University, Lincoln, Neb.). *Journal of Air Law and Commerce,* vol. 40, Winter 1974, p. 61-74. 34 refs.

A tariff construction system for domestic airlines is proposed which it is argued is equitable to both passengers and airlines, logical, and programable for computation. The basis for determining fares would be the distance from origin airport to destination airport. A table of all commercial airports, their latitudes and longitudes, and some basic formulas would constitute sufficient information to determine the distance between any airport pair. The class of service would also be considered. This linear pricing system is simple, although possible arguments against it are also brought forward. P.T.H.

**A74-33299** **An analysis of the national transportation policy.** S. D. Browne (MIT, Cambridge, Mass.). *(Annual Air Law Symposium, 8th, Dallas, Tex., Mar. 14, 1974.) Journal of Air Law and Commerce,* vol. 40, Winter 1974, p. 75-79.

The present work advocates greater central control of national transportation policy making, and states that Congress must address the problem of an all-mode transportation department with power to allocate resources between the modes. It is also pointed out that recent data concerning the fuel efficiency of various modes of transportation are out of line. It is argued that these data, obtained by dividing total passenger miles by total fuel, reflected badly on air transportation without taking into consideration actual trip distances, infrastructure costs, and time considerations. P.T.H.

**A74-33300** **Dynamics and forecasts of R & D funding.** C. E. Falk (National Science Foundation, Div. of Science Resources Studies, Washington, D.C.). *Technological Forecasting and Social Change,* vol. 6, no. 2, 1974, p. 171-189. 21 refs.

The relationships between U.S. R & D funding and other macroparameters are analyzed on an overall national basis and within the four major sectors of the economy. The study concentrates on the dynamics of the two largest funding sources, government and industry, which are examined at decreasing levels of aggregation. Various numerical relationships are demonstrated and explanations of observed dynamical interactions are presented. The effects of the introduction of new areas of R & D interest are investigated. Funding patterns are shown to reflect an inherent stability of R & D operations, as illustrated by lack of good, short-term correlations between R & D funding and cyclical variants such as profits in industry or science and engineering graduate enrollments in institutions of higher education. The analyses and evolved numerical relationships are utilized to develop sectoral and national R & D expenditure projections for the year 1980. (Author)

**A74-33612** # **Space law and international action.** E. Brooks. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 188-196. 24 refs.

Some written agreements which outline the political contours of space are reviewed for the models they set for future international space activities. Particular attention is given to the Intelsat agreement and to bilateral agreements between the USSR and the United States, such as the agreements on cooperation in the field of environmental protection, in the exploration and use of outer space for peaceful purposes, and in the fields of medical science and public health and of science and technology. It is submitted that, although the monopoly of space technology of U.S. and USSR leads to the line of least diplomatic resistance, which is bilateralism, the larger significance of planetary exploration and near-space scientific studies and environmental monitoring requires a multilateral approach. V.P.

**A74-33613 # Legal problems of sustaining manned spaceflights, space stations, and lunar communities through private initiative and non-public funding.** G. S. Robinson. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 214-229. 12 refs.

**A74-34156 # Integration of the emerging solid state microwave technology into government systems.** R. H. Chilton (USAF, Rome Air Development Center, Griffiss AFB, N.Y.). In: Microwave semiconductor devices, circuits, and applications; Proceedings of the Fourth Biennial Cornell Electrical Engineering Conference, Ithaca, N.Y., August 14-16, 1973. Ithaca, N.Y., Cornell University, 1973, p. 33-42. 5 refs.

With the exception of bipolar transistors, the Gunn device is the most mature device in the microwave semiconductor field. Other devices considered include limited space charge accumulation devices, IMPATT devices, TRAPATT devices, and transistors. The advent of solid state microwave generators has opened the way for many new systems. Systems selected to illustrate general considerations of systems employing solid state microwave transmitters include the navigational system, the communications system, and the phase array radar system. G.R.

**A74-34319 * The effects of techno-economic and organizational factors on the adoption of NASA-innovations by commercial firms in the U.S.** A. K. Chakrabarti (Northwestern University, Evanston, Ill.). In: Academy of Management, Annual Meeting, 33rd, Boston, Mass., August 19-22, 1973, Proceedings. Tampa, Fla., R. D. Henderson, University of Tampa, 1974, p. 469-475. 10 refs. NASA-Army-supported research.

The present work reports on the effects of several organizational and techno-economic factors which tend to facilitate or inhibit the successful transfer and commercial utilization of technology generated outside the organizational setting of a potential industrial user. Innovations were regarded as either product cases or process cases, and successful adoption of these innovations was related to systematic data on the relation between innovator and user and on channels of communication. P.T.H.

**A74-34762 Twenty commandments for managing the development of tactical computer programs.** J. A. Ward (U.S. Navy, Ordnance Systems Command, Arlington, Va.). In: National Computer Conference and Exposition, Chicago, Ill., May 6-10, 1974, Proceedings. Montvale, N.J., AFIPS Press, 1974, p. 803-806.

The management decisions and policies behind the development of the digital computer program for the naval shipborne anti-air warfare system AEGIS are revealed. The use of contractors, allocation of responsibilities, liaison and coordination, testing and integration of units, timetables, accounting, and security are some of the subjects in the guidelines suggested here. It is felt that strict adherence to these policies was a major factor in the successful completion of the program. J.K.K.

**A74-34857 # Data management during the Navy performance test and evaluation of the F-14A airplane.** W. M. Branch (U.S. Navy, Naval Air Test Center, Patuxent River, Md.). In: Flight testing today - 1973; Proceedings of the Fourth National Symposium, Las Vegas, Nev., August 21-23, 1973. California, Md., Society of Flight Test Engineers, 1973. 7 p.

The tasks of the Naval Air Test Center with regard to the F-14A performance include the evaluation of the total system performance and the provision of Navy flight test data to decision making agencies. Flight test data for the generation of performance charts for the fleet are also to be provided. The test aircraft and the employed instrumentation are discussed along with questions of test methodology and program management, aspects of data acquisition, and details concerning the test maneuvers. G.R.

**A74-34876 The contribution of civil aviation to the economic strength and well-being of the UK /29th British Commonwealth Lecture/.** Mr. Boyd-Carpenter (Civil Aviation Authority, London, England). *Aeronautical Journal*, vol. 78, May 1974, p. 181-184.

It is maintained that civil aviation in the UK plays a considerable role in the economic life of that country and that it will play an even more important role in the future. It is asserted that Britain increasingly lacks competitive advantages in heavy manufacturing industry, which means that she will be forced to rely more and more on performance in the so-called service industries, of which air travel and air cargo form an essential part. It is pointed out, for example, that last year, Heathrow became Britain's second largest cargo port, behind the Port of London. P.T.H.

**A74-34929 F-14, A-6 assembly woes seen easing.** W. H. Gregory. *Aviation Week and Space Technology*, vol. 100, July 1, 1974, p. 34-38.

Evaluation of the current state of Navy F-14 and A-6 aircraft assembly and delivery schedules at the Grumman Calverton facility indicates an improvement of the production cost and output situation in the final stage of the assembly process. The efforts made to correct the crisis situation which existed heretofore are reviewed. V.Z.

**A74-34930 Task kits help to speed F-14 deliveries.** W. H. Gregory. *Aviation Week and Space Technology*, vol. 101, July 8, 1974, p. 36, 37, 40-43, 45.

The use of task kits was one of the approaches used in a reorganization of the assembly procedure of the Navy F-14 Tomcat fighter. Other improvements introduced in connection with the reorganization include advances in wiring procedures, approaches for eliminating fuel leaks, and solutions to reduce the number of avionics black box failures. A change that smoothed the work flow at least indirectly was to move air hoses and electrical lines underground. G.R.

**A74-34992 FAA aircraft retrofit feasibility program.** J. F. Woodall (FAA, Washington, D.C.). *Society of Automotive Engineers, Air Transportation Meeting, Dallas, Tex., Apr. 30-May 2, 1974, Paper 740489.* 11 p. Members, $1.40; nonmembers, $2.25.

The FAA retrofit feasibility program is a success story. The cooperation of the aircraft industry in general, and the FAA's contractors in particular have made the success of the program possible. We can now state that all JT3D- and JT8D-powered aircraft can meet reduced noise levels, such as FAR 36 levels, by means of technologically feasible and economically reasonable nacelle retrofit

solutions. These solutions will not aggravate the energy crisis by virtue of a negligible increase in fuel consumption for the nominal flight conditions. A Notice of Proposed Rulemaking (NPRM) is about to be disseminated which could lead to the requirement that all JT3D/JT8D-powered aircraft be retrofitted by 1978 with quiet necelles so that FAR 36 requirements can be satisfied. (Author)

**A74-34999** **The paradox of airport capacity.** A. DerHohannesian (Massachusetts Port Authority, Boston, Mass.). *Society of Automotive Engineers, Air Transportation Meeting, Dallas, Tex., Apr. 30-May 2, 1974, Paper 740475.* 10 p. 8 refs. Members, $1.40; nonmembers, $2.25.

In a comparatively short time, air transportation has established itself as by far the dominant mode of intercity travel by common carrier and it will continue to be in the foreseeable future. However, the ability to continue to provide the safest and most convenient method of intercity transportation is in jeopardy if airport facilities are not available in time to accomodate adequately the levels of traffic which the demands for air service generate. This paper, although recognizing the importance of all airport system components, assesses the airfield capacity problem of today and the future and describes various influences that affect the airport operator's attempts to improve capacity. (Author)

**A74-35105 #** **Organizational systems and methods of strategic planning of scientific research and development /Survey/ (Organizatsionnye sistemy i metody strategicheskogo planirovaniia nauchnykh issledovanii i razrabotok /Obzor/).** O. I. Larichev. *Avtomatika i Telemekhanika,* May 1974, p. 133-142. 31 refs. In Russian.

The present state and main trends in the evolution of organizational systems and methods of strategic planning of research and development are discussed, and a survey of literature in this field is presented. Modern planning methods are given two main classifications: (1) methods of project evaluation, and (2) methods for determining means of attaining the desired goals. P.T.H.

**A74-35110** **HEAPS - A concept in optimization.** P. J. Burville (Sussex, University, Brighton, England). *Institute of Mathematics and Its Applications, Journal,* vol. 13, June 1974, p. 263-278.

The Heuristically Evaluated Access Probability System (HEAPS) provides an approach for the optimization of information storage and retrieval processes. In its most simple form the HEAPS concept uses a primary source set of all the items of information to which many references are to be made. A secondary subset of these items is held in a 'heap'. The last used item is placed on the top of the heap. Examples of the application of the HEAPS optimization technique are discussed. G.R.

**A74-35242 *** **New development in high reliability strapdown platforms using TDF sensors.** Y. D. Tsuei and J. C. Hung (Tennessee, University, Knoxville, Tenn.). In: Joint Automatic Control Conference, 15th, Austin, Tex., June 18-21, 1974, Proceedings.

New York, American Institute of Chemical Engineers, 1974, p. 83-91. 7 refs. Contract No. NAS8-27296.

New development in high reliability strapdown navigation platform using two-degree-of-freedom sensors and redundancy concept is presented in this paper. The development is based on the assumption that each axis of the sensor can fail without affecting the remaining axis. The systems reliability is investigated, the optimum redundancy configurations are proposed, a technique of sensor performance management is developed for the proposed systems. (Author)

**A74-35285 #** **Notification of incident and report of action (Avis d'incident et rapport d'action).** M. Chambrillon (Société des Moteurs Perkins, France). *AFCIQ, AFNOR, and AAAF, Journées sur la Fiabilité des Equipements, Paris, France, Apr. 9, 10, 1974, Paper.* 25 p. In French.

An attempt is made to describe a part of the functions of the Reliability Division, based on the exchange of information. The action which may be undertaken by Reliability is only valuable if it receives the help and cooperation of all. This exchange has the merit not only of keeping management informed of the reliability of the product, to permit all involved to initiate positive action, but also to keep the different persons responsible for action informed. Reliability is considered to be the affair of everyone. F.R.L.

**A74-35632 #** **Concorde - Testing the market.** R. D. Fitzsimmons (Douglas Aircraft Co., Long Beach, Calif.). *Astronautics and Aeronautics,* vol. 12, July-Aug. 1974, p. 46-52.

It is pointed out that the future of the supersonic transport will be determined by the response of the passenger in 1976 when the Concorde will begin its service as a commercial airliner. A survey of North Atlantic traffic shows that 90% of today's first-class and 40% of today's full-fare-paying economy passengers would take the Concorde service if it were offered at present first-class fares. The situation which will occur in 1976 is compared with conditions in the early 1950s when jet airliner service was first provided by the British airliner Comet. Because of a very favorable response of the passenger to the new jet transport, the manufacturers of the Comet would have captured a great part of the world's airliner markets had it not been for a number of unfortunate accidents ending in the grounding of the Comet fleet in 1954. G.R.

**A74-35668** **Those Concorde economics again.** A. Hofton. *Flight International,* vol. 106, July 4, 1974, p. 5-7.

British Airways state that Concorde will break even (excluding capital charges) at a seat factor of 56%, based on an average of 93 seats for sale; this corresponds to a break-even load of 52 passengers. British Airways proposes to fit 100 seats at 38-in. pitch to its Concordes and this configuration will give a break-even load factor, under the British Airways definition, of 52%. Perhaps more than anything else, the success of Concorde is dependent on market penetration. A measure of Concorde's sensitivity to marketing is that one additional passenger per aircraft per flight provides an extra 1,000,000 pounds in annual revenue on a fleet of five Concordes. F.R.L.

**A74-35724** **Prospects of development of national and European space activities (Prospettive di sviluppo delle attività spaziali nazionali ed Europee).** U. Sacerdote (Aeritalia S.p.A., Naples, Italy). *(Associazione Italiana di Aeronautica e Astronautica, Congresso Nazionale, 2nd, Pisa, Italy, Sept. 23-28, 1973.) L'Aerotecnica - Missili e Spazio,* vol. 53, Feb. 1974, p. 54-60. 5 refs. In Italian.

Review of the European space program in the light of the most recent international decisions. Mention is made of the unsuccessful conclusion of the ELDO launch vehicle programs and of the prospects offered by the impending formation of a European space agency. Programs currently underway in the field of scientific and application satellites are reviewed, with particular reference to space activities being carried out in Italy. Finally, the prospects offered by the post-Apollo program are indicated, with particular emphasis being placed on the realization of a manned space laboratory (Spacelab) in Europe. A.B.K.

**A74-36017 *** **Cost effectiveness as applied to the Viking Lander systems-level thermal development test program.** T. Buna and

T. C. Shupert (Martin Marietta Aerospace, Denver, Colo.). In: Cost effectiveness in the environmental sciences; Proceedings of the Twentieth Annual Meeting, Washington, D.C., April 28-May 1, 1974. Mount Prospect, Ill., Institute of Environmental Sciences, 1974, p. 133-137. 9 refs. Contract No. NAS1-9000.

The economic aspects of thermal testing at the systems-level as applied to the Viking Lander Capsule thermal development program are reviewed. The unique mission profile and pioneering scientific goals of Viking imposed novel requirements on testing, including the development of a simulation technique for the Martian thermal environment. The selected approach included modifications of an existing conventional thermal vacuum facility, and improved test-operational techniques that are applicable to the simulation of the other mission phases as well, thereby contributing significantly to the cost effectiveness of the overall thermal test program. (Author)

**A74-36035** **.Cost effective tests - Or, 'more bang for the buck'.** B. C. Moore (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.). In: Cost effectiveness in the environmental sciences; Proceedings of the Twentieth Annual Meeting, Washington, D.C., April 28-May 1, 1974. Mount Prospect, Ill., Institute of Environmental Sciences, 1974, p. 378, 379.

The cooperative method of developing a test plan is a fluid, dynamic interaction between customer and laboratory. During this interactive process, many areas are discussed having to do with the customer's objectiv · and expectations for the test, and the capabilities of th · laboratory to meet these. When test planning is approached as a cooperative creative process, significant savings can be achieved, as compared to the best efforts of the parties working separately. Costly surprises during the test can be reduced by a systematic estimate of the uncertainties ahead. F.R.L.

**A74-36137** # **Operational and accidental petroleum product losses and their control and prevention /2nd revised and enlarged edition/ (Ekspluatatsionnye i avariinye poteri nefteproduktov i bor'ba s nimi /2nd revised and enlarged edition/).** N. D. Ivanov. Leningrad, Izdatel'stvo Nedra, 1973. 160 p. 41 refs. In Russian.

This book discusses petroleum product losses during storage, transportation, delivery and handling as such losses take place according to experience in concerned Soviet industries. Vaporization, leakage, spillage, oxidation, and accidental losses are covered, pointing out their significant level in the Soviet Union. Indicated as measures for control and prevention of losses are the reduction of the gas-filled space in storage tanks, the use of tanks with floating covers, the reduction of storage temperature fluctuation, the use of high pressure containers, and improved pumping system designs. V.Z.

**A74-36335** # **Growing federal support for solar energy applications.** L. O. Herwig (National Science Foundation, Washington, D.C.). In: The energy crisis and energy from the sun; Proceedings of the Symposium on Solar Energy Utilization, Washington, D.C., April 30, 1974. Mount Prospect, Ill., Institute of Environmental Sciences, 1974, p. 93-103.

The general objectives of the Federal Solar Energy Program are described as ones intended to provide the research and technology for economic terrestrial solar energy applications with the implementation of practical systems for commercial uses within the framework of national energy planning. The Program covers the following specific solar energy applications and technologies: heating and cooling of buildings, solar thermal energy conversion, photovoltaic conversion, biomass production and conversion, wind energy conversion, and ocean thermal energy conversion. It is believed that solar energy applications such as heating and cooling of buildings, wind energy conversion and biomass production and conversion will have impact on U.S. energy requirements by the early 1980's. V.Z.

**A74-36597** **0-0-1% - Q. A. by objectives.** J. M. Gooch (Bell Helicopter Co., Fort Worth, Tex.). *American Helicopter Society, Annual National V/STOL Forum, 30th, Washington, D.C., May 7-9, 1974, Preprint 851.* 5 p. Members, $1.50; nonmembers, $2.00.

A special audit concept is presented that provides the objectives and feedback methods for independent quality assurance. This 0-0-1% audit scheme is shown to have proven to be a good management tool, one which makes possible an accurate judgment of the product performance of primary part producers. M.V.E.

**A74-36600** **Helicopter reliability testing.** T. L. House (U.S. Army, Air Mobility Research and Development Laboratory, Fort Eustis, Va.). *American Helicopter Society, Annual National V/STOL Forum, 30th, Washington, D.C., May 7-9, 1974, Preprint 860.* 14 p. Members, $1.50; nonmembers, $2.00.

Review of the technical and management issues related to helicopter reliability development testing. Special attention is given to the impact of reliability on life cycle cost, and how issues such as fleet size, program schedule, and test technique effectiveness contribute to decisions regarding development test requirements. The risk of errors in judgments is also discussed. M.V.E.

**A74-37533** # **Development of noise-reduction concepts for the 707 airplane.** M. D. Nelsen (Boeing Co., Wichita, Kan.) and V. E. Callaway (Boeing Commercial Airplane Co., Seattle, Wash.). *Acoustical Society of America, Meeting, 87th, New York, N.Y., Apr. 23-26, 1974, Paper.* 9 p. 14 refs. Research sponsored by the Boeing Co.; U.S. Department of Transportation Contract No. FA71WA-2728.

Flyover noise characteristics are presented for the Boeing 707-300B/C equipped with standard production nacelles and with experimental quiet nacelles modified by the addition of sound-absorbing materials. Acoustic treatment theory and technology development concepts required to develop the quiet nacelles are discussed. Results from, and techniques for, noise certification flight testing to meet FAA regulations are presented. Comparisons of noise levels of a modified 707 aircraft, noise floors, and noise from other operational aircraft are provided. (Author)

**A74-37534** # **Aircraft noise retrofit feasibility program results and applications.** R. J. Koenig (FAA, Systems Research and Development Service, Washington, D.C.). *Acoustical Society of America, Meeting, 87th, New York, N.Y., Apr. 23-26, 1974, Paper.* 10 p. 11 refs.

Government/Industry cooperation has led to a successful noise retrofit feasibility program. Technologically feasible, economically reasonable solutions are available for the problem of quieting the JT3D and JT8D powered aircraft fleet. Results previously presented are reviewed and their potential applications are covered. Attention is given to FAA rule making activity directed toward implementation of retrofit. Acoustic treatment of nacelle inlets and exhaust ducts proved to be effective in attainment of FAA lower acoustic goals. F.R.L.

**A74-37535** # **Aircraft noise retrofit feasibility program objectives and scope.** R. J. Koenig (FAA, Systems Research and Development Service, Washington, D.C.). *Acoustical Society of America, Meeting, 87th, New York, N.Y., Apr. 23-26, 1974, Paper.* 10 p. FAA-sponsored research.

Government and the air transport industry have been faced with the problem of quieting existing low-bypass-ratio turbofan-powered aircraft which constitute nearly 90% of the current U.S. air carrier fleet. A description is given of the FAA-sponsored retrofit feasibility program and related NASA and industry-funded efforts. The program was designed to provide test data for use in determining whether the older-design aircraft could be modified for meaningful noise reduction. The modifications were required to be technologically practicable, economically reasonable, and appropriate for the

aircraft type. The program included ground and flight tests of flight-weight hardware capable of airworthiness certification.
(Author)

**A74-37546** # **Development of noise-reduction concepts for 727 and 737 airplanes.** C. L. Arctander, C. G. Hodge, and R. B. Tate (Boeing Commercial Airplane Co., Seattle, Wash.). *Acoustical Society of America, Meeting, 87th, New York, N.Y., Apr. 23-26, 1974, Paper.* 16 p. 9 refs.

A review is given of various noise-reduction concepts pertinent to JT8D-powered 727 and 737 airplanes, with emphasis on acoustic technology. Two jet noise suppression concepts aimed at further 727 noise reduction are discussed. An ejector/suppressor concept that has been demonstrated in an FAA-sponsored ground and flight test program is shown to achieve 6 to 8 EPNdB suppression of jet noise at engine takeoff power. Airplane performance penalties, however, have precluded production application of this configuration. The refan concept, currently under development on a NASA contract, involves JT8D engine modifications to incorporate a higher work-extraction fan. This modification realizes lower jet noise that, when coupled with extensive acoustic treatment, results in significant noise reductions with a minimum impact on airplane performance.
(Author)

**A74-37548** * # **Noise reduction programs for DC-8 and DC-9 airplanes.** R. L. Frasca (Douglas Aircraft Co., Long Beach, Calif.). *Acoustical Society of America, Meeting, 87th, New York, N.Y., Apr. 23-26, 1974, Paper.* 18 p. 12 refs. Research supported by the Douglas Aircraft Co.; U.S. Department of Transportation Contracts No. FA72WA-3116; No. FA73WA-3161; Contracts No. NAS3-16814; No. NAS3-17841.

A summary review is presented of the results of current and recently completed noise-reduction programs for DC-8 and DC-9 airplanes. The relationship of these programs to other efforts by Douglas to develop quieter CTOL airplanes is briefly outlined. The engine/nacelle concepts studied were: (1) application of nacelle acoustic treatment, (2) variable-area exhaust nozzles, (3) jet exhaust noise suppressors, and (4) engines with larger-diameter new front fans. Acoustic analyses leading to the selection of certain engine/nacelle configurations are described, as well as design constraints which limit the noise reduction capability of certain designs. Acoustic design features of the modified engine/nacelles are discussed along with estimates of the changes in aircraft community noise levels, as well as estimates of the changes in aircraft weight, performance, cost, and operational restrictions. (Author)

**A74-37655** # **A dynamic model of interacting commercial units (Dinamicheskaia model' vzaimodeistvuiushchikh ekonomicheskikh ob'ektov).** T. K. Sirazetdinov and S. K. Dzhaksybaev. *Aviatsionnaia Tekhnika,* vol. 17, no. 1, 1974, p. 25-30. In Russian.

A mathematical description is given for a production process performed by an industrial system consisting of n interacting units with set input and output characteristics. Expressions are derived to interrelate the output capacity, the total amount of input resources, the total working capital expenditure and the product output per unit time in one component unit of a multiunit industrial or commercial system. Particular attention is given to a mathematical model of the development of a two-unit commercial production system. The mathematical problem involved is reduced to the solution of the Cauchy problem of a system of ordinary differential equations. V.Z.

**A74-37834** * # **Configuration management during transition for a powered lift STOL aircraft.** W. A. Johnson and S. J. Craig (Systems Technology, Inc., Hawthorne, Calif.). *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-836.* 6 p. 5 refs. Members, $1.50; nonmembers, $2.00. Contract No. NAS2-6441.

Presented in this paper are the analytical and moving-base simulation results of a study to improve flight safety and operations of V/STOL type aircraft. One of the more significant and novel aspects of the work accomplished has been the concept and implementation of a configuration management flight control system designed to take the guesswork out of, and improve the operational safety of, transition flight in the region from cruise to STOL.
(Author)

**A74-37894** # **Impact of new MIL-F-9490D requirements on future flight control developments.** J. L. Townsend (Boeing Co., Wichita, Kan.) and P. E. Blatt (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-914.* 7 p. 9 refs. Members, $1.50; nonmembers, $2.00. Contract No. F33615-72-C-1090.

The task objective was to develop a general purpose quantitative flight control specification having long-term applicability for all Air Force piloted aircraft. These aircraft span the entire range of fighters, transports, bombers, trainers, STOL, VTOL, helicopters, and utility vehicles. Mechanizations span the gamut of mechanical, electrical (both analog and digital), hydraulic, pneumatic, and optical designs with many combinations of elements. Requirements were to be specified in such a way as to provide maximum designer freedom for design, since progressive improvement in the state-of-the-art is desired. At the same time, quantitative system requirements (safety, mission reliability, stability margins, failure transients, AFCS modes, etc.) were to be established based on state-of-the-art knowledge. Past experience and recent technology development programs formulate these state-of-the-art requirements. F.R.L.

**A74-38049** # **Air transport. Volume 3 (Vozdushnyi transport. Volume 3).** Z. P. Rumiantseva and N. G. Savusia. Moscow, VINITI, 1973. 132 p. 105 refs. In Russian.

The technical and economic aspects of the development of air transportation are reviewed, and methods of predicting air transportation over 10 to 15 year periods are discussed. The current status and developmental trends of passenger aircraft are reviewed. The irregularity and inconsistency characterizing the development of civil aviation during the past decade are noted, along with the competitive struggle for markets between regular airlines and charter organizations of the western world, and the economic integration and cooperation between individual airlines. V.P.

**A74-38067** **Computer analysis of airfield operations.** R. Horonjeff (California, University, Berkeley, Calif.) and D. Maddison. *Airport Forum,* vol. 4, June 1974, p. 41-44, 46, 47, 49, 50. In English and German.

In connection with a major expansion of the apron-gate area at San Francisco International Airport the number of aircraft gates will be increased from 56 to about 90. Two alternate plans were developed for increasing the number of gates. A computer-simulation approach was used for obtaining data regarding the performance of the two terminal schemes. The computer simulation was to provide information concerning the magnitude of aircraft delays, the cause of these delays, and lengths of the lines of waiting passengers. The results of the computer simulation were one of a number of factors which led to the selection of one of the two schemes being considered. G.R.

**A74-38068** **Growing concern in aviation with costs and benefits.** R. F. Grosch (Berliner Flughafen GmbH, Berlin, West Germany). *Airport Forum,* vol. 4, June 1974, p. 54, 56, 57, 59-62, 64, 67. In English and German.

Aspects of suitable runway design for safe operation are considered along with the width of taxiways, runway pavements, runway surfaces, the provision of obstruction-free areas, lighting aids, fog dispersal, fire and rescue services, safety questions, and environmental aspects. Problems of the airlines are discussed, taking into account the world fuel crisis, world-wide inflation, and rising costs. Future developments under consideration include the development of a hydrogen-powered transport which would carry 400 to 500 passengers to anywhere on the globe within three of four hours. G.R.

**A74-38249** * # **Management of analytical redundancy in digital flight control systems for aircraft.** R. C. Montgomery and D. B. Price (NASA, Langley Research Center, Flight Dynamics and Control Div., Hampton, Va.). *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-887.* 11 p. Members, $1.50; nonmembers, $2.00.

This paper presents a design method for optimal redundancy management for nonlinear systems with application to highly maneuvering aircraft. The approach taken is based on selecting the failure states to be covered by the system design and constructing a cost function that represents the cost of making an incorrect decision. The decision logic which minimizes the cost requires a bank of extended Kalman filters running in parallel. This produces a severe computational requirement. To reduce this requirement, a suboptimal logic is developed based on using a nonlinear single-stage prediction algorithm in the filters with filter gains and decision logic selected using steady-state results obtained from a linearization of the vehicle and sensor dynamics. The design process is then applied to designing a redundancy management system for the F8-C aircraft. Results indicate that the system is superior in failure detection to a system using the same structure but using a linear single-stage prediction algorithm in the filters. (Author)

**A74-38298** **Design to cost requires common understanding, clear direction.** F. A. Hinrichs (U.S. Army, Aviation Systems Command, St. Louis, Mo.). *Defense Management Journal,* vol. 10, July 1974, p. 59-66.

It is pointed out that the design to cost concept must be viewed in the light of past DOD practice and philosophy, because it is this practice and philosophy the design to cost approach is attempting to change. The intent of the design to cost concept is to seek quality weapon systems at an affordable reduced cost through innovation and better cost management. Design to cost has been established as a requirement in several development contracts including the contracts for the advanced attack helicopter, a new main battle tank, a surface-to-air missile, and a lightweight fighter. G.R.

**A74-38399** **Logistic support for the Guiana Space Center (Support logistique du Centre Spatial Guyanais).** *La Recherche Spatiale,* vol. 13, July-Aug. 1974, p. 17-22. In French.

The present work describes several main facilities at the French space center in Guiana, including fuel storage (both liquid and solid), liquid fuel preparation, payload preparation, the meteorological station, port facilities, electric power plant, water production, medical support, and professional training. P.T.H.

**A74-38524** **Distributed avionics information systems.** C. O. Beum, Jr. and E. Levin (System Development Corp., Santa Monica, Calif.). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 78-84. 18 refs.

The recommendations contained in a report 'Standardization of Avionics Information Processing Systems' recently completed for the Institute of Defense Analysis are analyzed and discussed. They include arrangement of digital processors in a distributed hierarchical architecture, functionally dedicated processors that trade hardware inefficiency for system simplicity, maximum use of LSI, hard wiring, and firmware, system design favoring the total systems approach, use of self-contained diagnostics and failure detection at each level, dedicated redundancy as opposed to software reconfiguration, and use of on-board testing and line replaceable units. J.K.K.

**A74-38533** **Considerations in the design of a digital flight control function for a high performance aircraft.** J. G. Mrazek (Texas Instruments, Inc., Dallas, Tex.) and D. P. Rubertus (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 186-193.

Current interest in applying digital information management techniques to a broad spectrum of military aircraft functions has stimulated increased attention to identifying the design criteria required to achieve satisfactory dynamic performance in a digital flight control function. The investigation uses an analog, quadruple, fly-by-wire system as a model. The flight control algorithms were developed from the analog filter definitions using the Tustin transformation. A data rate was selected for each segment of the system in the interest of distributing the processor load to the best overall advantage. The computer load was assessed using the flight control algorithms and data rates associated with each loop segment. It was determined that the computation cycle time was dominated by the redundancy management function. (Author)

**A74-38568** **An approach to evaluation of a computer aided management system.** W. G. James (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 412-419.

A method for evaluating the model behavior of the computer-implemented resource allocation process is developed. A set of characteristics (e.g. timing, cost, risk, and payoff) which comprise model behavior is identified, and a measure of each characteristic applicable to each proposed research effort is determined. The data for all tasks is tabulated in a matrix for each of the characteristics which show the relationship between the computer-recommended resource level and the level of the variable. The model behavior for each characteristic is hypothesized and then tested with a correlation technique. Application of this method to a computer-aided decision process is described. The method can be extended to other computer management systems. J.K.K.

**A74-38581** **Fire control radar and airborne computer cost prediction based on technical parameters.** R. W. Grimm (USAF, Avionics Laboratory, Wright-Patterson AFB, Ohio). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 506-513.

Consideration of the problem of predicting avionics development and production cost before a detailed description of the hardware's physical make-up is available. Fire control radars and airborne digital computers were chosen to illustrate the techniques. The approach is to derive cost estimating relationships (CERs) which use technical design parameters of critical interest to the engineer and which incorporate a measure of the projected equipment's advancement in the state of the art. The radar and computer examples show that accurate CERs can indeed be established based on technical parameters. They are, however, subject to rather wide variances, which require care in using them to estimate costs at the low end of the scale. (Author)

**A74-38582 Life cycle cost comparisons of avionic system design alternatives.** P. S. Kilpatrick and A. L. Jones (Honeywell, Inc., Minneapolis, Minn.). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 514-520.

**A74-38583 Avionic equipment reliability and low life cycle cost.** W. R. Perrigo (USAF, Avionics Laboratory, Wright-Patterson AFB, Ohio) and J. L. Easterday (Battelle Memorial Institute, Columbus, Ohio). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 521-532. 12 refs.

Basic activities in the conduct of a reliability program are related to technical program aspects, management visibility and control, and philosophical concepts of a reliability program. Questions of initial or preprogram planning are examined. The program manager must make certain that a realistic, achievable goal is defined for the reliability program. A program manager's checklist is presented. Major management functions are summarized, taking into account the evaluation of the actual status of each activity in relation to the schedules, reliability task status reports, and reliability monitoring. G.R.

**A74-38584 Avionics cost reduction through improved tests.** R. M. Genet (USAF, Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 534-538. 32 refs.

Over the past five years, new analytic techniques have been developed and applied to the evaluation of the economic significance of build and test errors in avionics repair processes. The cost of such build and test errors in one repair process accounted for 50% of the total cost of repair, and contrary to what might have been expected, the cost of test errors was much higher than the cost of build errors. It is considered that such high repair costs due to test errors are a relatively recent phenomenon associated with most of the recent very complex avionics systems, and while already a serious problem, it will become even more serious as the general level of avionics complexity increases. F.R.L.

**A74-38585 A realistic approach to system life cycle cost.** J. H. Taylor (Honeywell, Inc., Aerospace Div., St. Petersburg, Fla.). In: NAECON '74; Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, May 13-15, 1974. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 539-546.

The case history of a life-cycle cost study performed on the AN/ASN-101 gimbaled electrostatic gyro aircraft navigation system is presented. This study takes into account all the procurement and maintenance costs encountered in the ten year service life of the system. The validity of existing cost standards is criticized, and the need for simple, standardized life-cycle costing procedures is emphasized. The contributions of other disciplines, among them maintenance and reliability techniques, to reducing the overall cost of ownership are discussed. J.K.K.

**A74-38640 Orthophoto project planning.** D. Hobbie (Carl Zeiss, Oberkochen, West Germany). *Photogrammetric Engineering,* vol. 40, Aug. 1974, p. 967-984.

It is the purpose of project planning for the production of orthophotos or photo maps to lay down the parameters to be used for the photoflight and differential rectification. After classification of the known orthoprojection instruments, the parameters of 'focal length', 'photo scale', 'flight data', 'end and side lap' as well as 'design and time of photoflight', guidelines are developed. As regards rectification, various factors affect the parameters of 'scan width' and 'scanning speed'. (Author)

**A74-38671 Air travel and economy of materials - Often too much, sometimes too little (Luftfahrt und Materialwirtschaft - Oft zuviel-manchmal zuwenig).** W. H. Kuhl. *Flugrevue/Flugwelt International,* Aug. 1974, p. 29-33. In German.

The problems encountered by large airlines in keeping themselves supplied with spare parts are described. Care is needed to ensure fast availability without wasting money on excess inventory. This problem can be alleviated somewhat by intelligent ordering procedures, and by pooling of parts, service, and warehouse facilities among major firms flying to remote airports. Modern data processing can also be effective in estimating various part lifetimes and planning inventories. Further, fast access to available spare parts can be facilitated by elaborate shelving procedures such as the Lufthansa vertical warehousing setup which uses multitiered shelves with special vehicles that move through the stacks. J.K.K.

**A74-38726 * # Cost-effectiveness of integrated analysis/design systems /IPAD/ - An executive summary. II.** R. E. Miller, Jr., S. D. Hansen, D. D. Redhed, J. W. Southall (Boeing Commercial Airplane Co., Seattle, Wash.), and A. S. Kawaguchi (Boeing Computer Services, Inc., Seattle, Wash.). *American Institute of Aeronautics and Astronautics, Aircraft Design, Flight Test and Operations Meeting, 6th, Los Angeles, Calif., Aug. 12-14, 1974, Paper 74-960.* 13 p. 18 refs. Contract No. NAS1-11441.

Evaluation of the cost-effectiveness of integrated analysis/design systems with particular attention to Integrated Program for Aerospace-Vehicle Design (IPAD) project. An analysis of all the ingredients of IPAD indicates the feasibility of a significant cost and flowtime reduction in the product design process involved. It is also concluded that an IPAD-supported design process will provide a framework for configuration control, whereby the engineering costs for design, analysis and testing can be controlled during the air vehicle development cycle. V.Z.

**A74-38727 # Aircraft structures designed to cost.** L. J. Marchinski (Boeing Vertol Co., Philadelphia, Pa.). *American Institute of Aeronautics and Astronautics, Aircraft Design, Flight Test and Operations Meeting, 6th, Los Angeles, Calif., Aug. 12-14, 1974, Paper 74-962.* 14 p.

Discussion of an active step-by-step design-to-cost aircraft development program which calls for cost, weight and performance considerations in every design decision aimed at cost reduction at every design stage from top management down to the drawing board designer. The program also calls for the establishment of parts-count targets for each structural design and for a documentation system with a manual of design-to-cost specifications. The program implies the enhancement of cost consciousness and discipline in both government and industrial management. V.Z.

**A74-38728** # **Design-to-cost for the A-10 close air support aircraft.** C. W. Adams and U. A. Hinders (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics, Aircraft Design, Flight Test and Operations Meeting, 6th, Los Angeles, Calif., Aug. 12-14, 1974, Paper 74-963.* 5 p.

Discussion of the design philosophy and performance characteristics of the A-10 aircraft shown to embody the specific weapon system that fulfills the mission requirements of close air support for ground forces at an average unit flyaway cost of $1.5 million in 1970 dollars for 600 aircraft at peak rate of 20 per month. The underlying design-to-cost concept is believed to result in significantly superior cost efficiency than would otherwise be possible. M.V.E.

**A74-38883** # **Information flows in control systems (Potoki informatsii v sistemakh upravleniia).** V. I. Sadovnikov and V. L. Epshtein. Moscow, Izdatel'stvo Energiia, 1974. 240 p. 104 refs. In Russian.

Methods of data flow description in automatic control systems and related subjects are discussed, covering graphic methods, organization analysis, formalization methods, data structural analysis, and automatic systems synthesis. A general specification is compiled for the structural components of data flows in an attempt to optimize the existing data flow specifications. The formalization method is applied to construct an automatic data processing system. Identification and separation of given elements and characteristics from information flows are carried out by using various data treatment methods. Diagrams of these processes are included. The book is addressed to mathematicians, economists and engineers interested in the field. V.Z.

**A74-38887** **Arming America: How the U.S. buys weapons.** Research supported by Harvard University. J. R. Fox. Boston, Graduate School of Business Administration; Cambridge, Harvard University Press, 1974. 496 p. 223 refs. $15.

An overview concerning the acquisition of a major weapon system is presented, giving attention to the acquisition process and the Department of Defense budget categories. The defense market is considered along with the defense contractors, the role of the Pentagon, aspects of planning for major development and production programs, the involvement of Congress in the weapons acquisition process, program management, government representatives at contractor plants, types of contracts, and methods of government procurement. Other subjects discussed are related to the source selection process, questions of defense marketing, profits in the defense industry, indirect costs in the defense industry, and problems of program control. G.R.

**A74-38985** **The large earth orbital space station - An international program.** R. B. Demoret and G. W. Morgenthaler (Martin Marietta Aerospace, Denver, Colo.). In: Orbital international laboratory. Tarzana, Calif., American Astronautical Society, 1974, p. 39-61. 5 refs.

The organization, management, and purposes of a large earth-orbiting space station program to be established by a United Nations Earth Resources Agency with the broadest international participation is discussed. It is suggested that this agency coordinate the development of mathematical resource models, plan the science and flight mission programs, and coordinate the distribution of roles and responsibilities. A possible allocation of responsibilities to the U.S., USSR and other participating nations in presented along with a timetable for establishing such a program. M.V.E.

**A74-38987** **The experience of ESRO in managing international space projects.** J. A. Vandenkerckhove (ESRO, Paris, France). In: Orbital international laboratory. Tarzana, Calif., American Astronautical Society, 1974, p. 153-159.

Discussion of the various aspects of international space project management, and review of ESRO's particular experience in the management of such projects. Special attention is given to the development of scientific experiments and hardware, as well as to the cooperation this required on the part of ESRO with scientific groups, industrial contractors, and (for the launch of scientific payloads) with NASA. M.V.E.

**A74-39011** **Continuous maintenance and automatic reconfiguration of systems (Maintenance continue et reconfiguration automatique de systèmes).** J.-L. Badault (Société ECA-AUTOMATION, Paris, France). In: Onboard computers and their applications; Workshop, Toulouse, France, June 10-12, 1974, Proceedings. Toulouse, France, J. Lagasse, CNRS, Laboratoire d'Automatique et d'Analyse des Systèmes; Privat, Editeur, 1974, p. 305-320. In French.

Description of two techniques that have been developed to ensure a high probability of good operation of data processing systems used on board warships. The two techniques are complementary and are called automatic reconfiguration and continuous maintenance, respectively. Automatic reconfiguration consists in putting into operation degraded versions of the system when a breakdown occurs. This implies the definition of a hierarchy of operational functions which makes it possible to choose the functions to be abandoned in case of breakdown of an element of the system. Continuous maintenance consists, on the one hand, in real-time detection of hardware breakdowns and, on the other hand, in programmed localization of these breakdowns. A.B.K.

**A74-39174** # **Large Space Telescope and a low cost approach.** B. R. Bulkin (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.). In: Large Space Telescope - A new tool for science; Proceedings of the Twelfth Aerospace Sciences Meeting, Washington, D.C., January 30-February 1, 1974. New York, American Institute of Aeronautics and Astronautics, Inc., 1974, p. 103-111.

A representative cross section of areas involved in a low-cost payload approach for the Large Space Telescope (LST) system is presented. The roles of program management, future scientific instrument requirements, and system design factors (including design flexibility and universality) are explored. Low-cost system design criteria are indicated. Test requirements and concepts are discussed. An LST system integration concept is considered. (Author)

**A74-39381** # **Inside the 747.** B. C. Stephens (Boeing Commercial Airplane Co., Seattle, Wash.). *AIAA Student Journal,* vol. 12, Feb. 1974, p. 10-17, 27, 47.

Discussion of the Boeing 747 as a complex organization of structure, accommodations and systems directed to meet certain major operational criteria, including 385 and baggage over 5000 NM, 200,000 lb containerized cargo over 3500 NM, cruise speed higher than that of available jets, community noise improvement, increased safety level through system redundancy, 97% schedule reliability, and 60,000 fatigue life. The development of the Boeing 747 is reviewed by stages. Technological, economic, air traffic aspects, safety, and comfort aspects are covered. V.Z.

**A74-39481** # **Data distribution system for post Apollo space vehicles.** M. Falleni (Montedel-Montecatini Edison Elettronica S.p.A., Milan, Italy). *IFAC, IIC, and ANIPLA, Symposium on Automatic Control in Space, 5th, Genoa, Italy, June 4-8, 1973, Paper.* 35 p. 8 refs.

Preliminary studies on the possible implementations of a data distribution system (DDS) are reported. Advantages and drawbacks of several DDS configurations are noted, and the provisional choice is indicated. The open bus structure and ring bus structure are discussed as alternate bus line organizations, the ring structure being superior in several respects. The data bus interface control circuits, injection box, and distribution matrix are described in some detail. The need for further analysis and study is recognized. J.K.K.

**A74-39499** # **Automation and flight management in commercial aviation.** J. Rabary (Compagnie Nationale Air France, Paris, France). *IFAC, IIC, and ANIPLA, Symposium on Automatic Control in Space, 5th, Genoa, Italy, June 4-8, 1973, Paper.* 11 p.

As with any repetitive activity involving processes for which satisfactory mathematical models can be made, flight operations in commercial aviation are inevitably going to lead to a large use of automation. This is to achieve safety and financial management. Major attention is given to SST operations, air traffic management, and operations program simulation. It is considered that the way to success for automation in this field is an open minded system analysis concept. Owing to the wide scope covered by the various problems, automation is a condition for good financial management, usefulness, and even the existence of air transport. F.R.L.

**A74-39879** **Military specification for weight control procedural guide.** J. T. Werner (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *Society of Allied Weight Engineers, Annual Conference, 33rd, Fort Worth, Tex., May 6-8, 1974, Paper 1007.* 24 p.

A specification is presented that defines the requirements and responsibilities of a contractor regarding the provision of a proper weight and balance control system. The specification provides brief general statements of requirements with respect to the organization and functioning of weight control personnel. The purpose of the specification is to determine the type of organization and the procedures by which the control function is to be carried out for optimizing the design weight and for producing the required data. M.V.E.

**A74-39890** **Aircraft proposal evaluation methods.** G. A. Spangenberg. *Society of Allied Weight Engineers, Annual Conference, 33rd, Fort Worth, Tex., May 6-8, 1974, Paper 1020.* 13 p.

The design competition method now used by the Navy in the process of aircraft evaluation and contractor selection is described and defended. The workings of the system are followed from the initial decision to solicit proposals to the final signing of a contract. The combined deliberation on evaluation and selection is shown in favorable contrast with the practice of the other services, which separate these functions. The qualifications of the evaluators and the criteria of the evaluation are outlined, and the systemic aspects of the procedures are discussed. It is held to be desirable that the ultimate control of the process rests in the hands of those responsible for the final implementation of the accepted design. The record of the Navy is reviewed in this area and conclusions are drawn for the existing procedures. J.K.K.

**A74-40036** **LSI technology overview.** B. Dunbridge (TRW Systems Group, Redondo Beach, Calif.). In: Communication Systems and Technology Conference, Dallas, Tex., Apr. 30, May 1, 1974, Conference Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 22-28.

This paper provides a broad survey of present and future LSI technology, and attempts to focus on the general technologies which are available, the directions these LSI technologies are taking, and the impact of LSI on electronic equipment applications. The rapid pace of technology is reviewed and the trends are projected to possible LSI and VLSI products which may exist in 1980. The advantages and disadvantages of custom LSI and its associated cost analysis tradeoffs are discussed. General considerations for the successful application of LSI to communication signal processing are briefly indicated. (Author)

**A74-40181** # **The starship as an exercise in economics.** B. Parkinson. *British Interplanetary Society, Journal,* vol. 27, Sept. 1974, p. 692-696. 5 refs.

Construction of a quasi-statistical model for determining the ability of a society to finance an advanced technology project such as the starship. Starting from a model proposed by Woodcock (1973) for that part of the economy concerned with manufactured products, a product density function is obtained which shows that the money available for such high-value products decreases as the inverse cube of the value. Moreover, it is shown that improvement in the real per capita income is likely to be more effective in making such finance available than a simple increase in the gross national product. It is concluded that a society capable of building an interstellar vehicle will have to possess an advanced technology and have already accumulated great experience in interplanetary flight. A.B.K.

**A74-40331** # **Problems of cost accounting at INTERFLUG. I (Probleme der Kostenrechnung der INTERFLUG. I).** H. Uhrig (Gesellschaft für internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 2, 1973, p. 91-101. In German.

Factors which have to be taken into account in a cost analysis are related to questions regarding cost control, cost planning, the relation of cost to performance, and the possibility to determine exactly all costs according to their origin. Special problems are presented by cases in which cost and performance belong to different time periods. Cost accounting procedures used in connection with costs of different origin are considered, giving attention to the consumption of means of operation, the consumption of material, the consumption of productive performance values, wages, compensation payments, allocation of money to a number of special funds, the consumption of nonproductive performance values, special contributions, interest, and housekeeping obligations. G.R.

**A74-40332** # **Operational research in air traffic control and communications (Operationsforschung im Flugsicherungs- und Nachrichtenwesen).** R. Küttner (Gesellschaft für internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 2, 1973, p. 102-106. In German.

The operational research considered is concerned with the analysis and the synthesis of systems for the planning, management, and control of motion procedures. The objective of the investigations conducted is the improvement of the systems. The analysis of traffic

flow is discussed along with approaches for providing the required safety. Studies regarding the planning and management of traffic flows are also reported. G.R.

**A74-40333 # Basic funds of the maintenance services (Grundfonds der Instandhaltungsbetriebe).** L. Sataeva (Moskovskii Inzhenerno-Ekonomicheskii Institut, Moscow, USSR). *(Grazhdanskaia Aviatsiia,* no. 7, 1972, p. 14, 15.) *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 2, 1973, p. 107-111. In German. (Translation).

It is pointed out that an assignment of priority to the development of the basic production funds which have a direct or an indirect effect on the maintenance process in aerospace technology is indispensable for the enhancement of the effectiveness of the maintenance installations of civil aviation. The structure of the production funds in the maintenance services of civil aviation during the years from 1967 to 1970 is characterized by a great diversity. Detailed information concerning the growth of the various components of the production funds is provided and factors which improve the degree of utilization of the basic production funds are considered. G.R.

**A74-40647 New heavy-haul freight aviation (Une nouvelle aviation de transport lourd).** J. Bertin (Société Bertin et Cie., Plaisir, Yvelines, France). *L'Aéronautique et l'Astronautique,* no. 46, 1974, p. 2-8. In French.

Air Freight today is taken care of with aircraft whose performances are designed to suit passenger transport. Speed increase has led to fly non stop at high altitude, and thus to carry a fuel load higher than the actual payload. For freight however aircraft flying at 200 Knots would be perfectly adapted; they could then fly at low altitude, stop on the way and carry a payload much more important than their fuel capacity. To be economical such aircraft must be large (1000 ton or more) and air cushion landing will become a necessity. Numerous tests effectuated on the Bertin air cushion landing for air-drop platform have been most encouraging. To transpose this technique to aircraft landing is very straight forward. (Author)

**A74-40920 Airport economic planning.** Edited by G. P. Howard (Port Authority of New York and New Jersey, New York, N.Y.). Cambridge, Mass., MIT Press, 1974. 649 p. $27.50.

The entire range of problems associated with airport economics is covered in a sequential collection of articles and speeches dealing with demand determination and forecasting, translation of forecasts into facility requirements, general financing, financial planning and control, revenues and expenses, and economic costs and benefits. Topics include the U.S. air travel market, government data sources, survey programs at Port Authority, market research and forecasting, planning for air cargo development, determinants of general aviation activity, air passenger airport distribution models, determination of average size passenger aircraft at Port Authority, financing of big city airports, the 1970 airport and airways development act, elements of municipal debt financing, bond covenants, airport accounting, management control financial reporting systems, pricing airfield services, the BAA new pricing policy, BAA restructure charges, revenues in the terminal area, lease negotiations, concession revenues, site comparisons, environmental considerations, and airport noise. J.K.K.

**A74-41099 # The significance of the ANS project for Dutch industry (De betekenis van het ANS-project voor de Nederlandse industrie).** J. H. Spaa (Philips' Gloeilampenfabrieken, Eindhoven, Netherlands). *Ruimtevaart,* vol. 23, June 1974, p. 59-69. In Dutch.

The ANS (Dutch astronomical satellite) project is the first substantial research and development project to be undertaken by the Dutch aerospace and electronics industry with government support. The present work attempts to point out the advantages, both economic and technological, which will ensue from this project and the subsequent undertaking of similar projects in the future. A strong argument is the general beneficial effects that government-supported projects in large countries, the U.S., for example, have had on the national economy and the general well-being and progress of industry. P.T.H.

**A74-41396 Establishing airport cost and revenue functions.** R. S. Doganis (Politechnic of Central London, London, England) and G. F. Thompson (Open University, Bletchley, Bucks., England). *Aeronautical Journal,* vol. 78, July 1974, p. 285-304. 10 refs.

The findings of a detailed financial and economic analysis of eighteen of the larger British airports are given. These findings are a tentative step in the building up of a theory of airport economics, a field much neglected by transport economists. The analysis is based on detailed traffic and financial data compiled from questionnaires and as a result of direct visits to all the airports in the sample. In fact, the eighteen airports covered are more than a mere sample, since taken together they account for about 95% of the air transport movements, of the passengers handled and of the freight traffic of all the United Kingdom airports outside the Channel Islands. The financial background, long-run airport cost functions, analysis of airport revenues, airport costs and revenues brought together, and the impact of competition on airport economics are considered. F.R.L.

**A74-42061 * # Cluster systems integration.** C. C. Hagood (NASA, Marshall Space Flight Center, Spacelab Engineering Office, Huntsville, Ala.) and K. P. Timmons (Martin Marietta Aerospace, Denver, Colo.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-107.* 33 p. 30 refs.

The cluster systems integration program of Skylab is reviewed with attention to its hardware, management interfaces, mission requirements control, and baseline planning documentation. The responsibilities of the interdiscipline and intercenter technical working groups and panels participating in the program are discussed. The five phases of the program are identified as Wet and Dry Workshop studies and Skylab Program Specification; requirements synthesis and the start of formal configuration management; compatibility assessment and control; design verification; and prelaunch and mission support operations. It is indicated that the cluster systems integration is a vital key element in the development and implementation of the Skylab space station. V.Z.

**A74-42063 # MSFC Skylab System Safety Program.** E. M. McNail (Martin Marietta Aerospace, Denver, Colo.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-109.* 27 p.

A summary of this program is given, including its background, policy, organization, management, development stages, and implementation. An abbreviated list of elements reflecting the scope of the overall program and a program organization and responsibility chart are provided. Emphasis is placed on system safety as related to the overall systems engineering, integration and management processes. The impact of various phases of the Skylab program on the development and progress of this safety program is noted. The progressive development and refinement of the safety program are discussed. V.Z.

**A74-42079 * #** **Skylab Experiment M516 - Crew Activities/ Maintenance Study.** R. L. Bond (NASA, Johnson Space Center, Spacecraft Design Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-134.* 15 p.

Skylab required daily movement about the interior of a 340 cu m vehicle and the handling and transfer of numerous loose items. Planned and unplanned maintenance tasks were also included in the daily routine of activity. Experiment M516, Crew Activities/ Maintenance Study, involved an investigation of crew activity during routine daily operations. The overall objective was to secure in-flight data relevant to the performance of tasks in the weightless environment. This paper will present an evaluation of man's ability to handle and transport items of various sizes and masses (logistics management) and to make equipment repairs (maintenance). Results and conclusions are based on subjective crew comments, motion-picture film, and television transmissions. (Author)

**A74-42093 * #** **Skylab experiments processing at KSC.** U. R. Barnett (NASA, Kennedy Space Center, Earth Resources Branch, Cape Canaveral, Fla.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-150.* 13 p.

The Skylab was basically a scientific program, and had the physical capacity for a large number of experiments. The number, weight, complexity, and size of these experiments far exceeded that of those on any previous manned space flight. The Apollo Telescope Mount was the most sophisticated and complex device ever to perform intensive studies of the sun above the restrictions imposed by earth's atmosphere. The demands these experiments made on Kennedy Space Center resources were varied and difficult, since each was virtually unique and imposed its own requirements. A management system to handle these responsibilities was devised and implemented, based on KSC experience with the Apollo and other prior programs. (Author)

**A74-42094 * #** **Development innovations for Skylab student experiments.** R. L. Gause (NASA, Marshall Space Flight Center, Materials and Processes Laboratory, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-152.* 15 p.

The Skylab Student Science Program was an effort on the part of NASA and the National Science Teachers Association (NSTA) to provide the youth of America an opportunity to directly participate in space research. Students across the nation submitted proposed experiments which were scientifically evaluated by the NSTA. From the more than three thousand experiments submitted, twenty-five of the most innovative and novel experiments were selected for flight. Many of these required the development of flight hardware in order to perform the experiments aboard Skylab. The requirements placed on the hardware in terms of cost, development time, weight, volume, and crew training represented a unique challenge to the NASA engineers and scientists involved in the design, development, fabrication and testing of this hardware. To meet these stringent requirements required innovative changes in the classic Skylab approach to experiment development. (Author)

**A74-42106 * #** **ATM test and integration.** J. W. Moore and J. R. Mitchell (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-168.* 22 p. 14 refs.

The test and checkout philosophy of the test program for the Skylab ATM module and the overall test flow including in-process, post-manufacturing, vibration, thermal vacuum, and prelaunch checkout activities are described. Capabilities and limitations of the test complex and its use of automation are discussed. Experiences with the organizational principle of using a dedicated test team for all checkout activities are reported. Material on the development of the ATM subsystems, the experimental program and the requirements of the scientific community, and the integration and verification of the complex systems/subsystems of the ATM are presented. The performance of the ATM test program in such areas as alignment, systems and subsystems, contamination control, and experiment operation is evaluated. The conclusions and recommendations resulting from the ATM test program are enumerated. J.K.K.

**A74-42111 * #** **Skylab medical technology utilization.** J. C. Stonesifer (NASA, Johnson Space Center, Bioengineering Systems Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-175.* 19 p.

To perform the extensive medical experimentation on man in a long-term, zero-g environment, new medical measuring and monitoring equipment had to be developed, new techniques in training and operations were required, and new methods of collecting and analyzing the great amounts of medical data were developed. Examples of technology transfers to the public sector resulted from the development of new equipment, methods, techniques, and data. This paper describes several of the examples that stemmed directly from Skylab technology. (Author)

**A74-42422 *** **Helios cooperative solar probe.** F. Unz (Gesellschaft für Weltraumforschung mbH, Porz-Wahn, West Germany) and C. White (NASA, Goddard Space Flight Center, Greenbelt, Md.). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 657-669. 13 refs.

This paper reports on the development of the Helios Program, which has been actively pursued for approximately four years. The spacecraft is designed to carry ten experiments to within 0.3 AU of the sun to measure the interplanetary environment. Details of the design and development phase are reported. (Author)

**A74-42901 #** **Organization, planning and technical description of the Ariane programme.** J. C. Bouillot (Centre National d'Etudes Spatiales, Paris, France). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Raumfahrt Transportsysteme der Zukunft, Porz-Wahn, West Germany, June 27, 28, 1974, Paper 74-048.* 6 p.

The management specifications set-up by CNES for the Ariane program and applied by all contractors and subcontractors are formalized by a set of procedures covering the different aspects of the management: industrial organization; work breakdown structure identifying all the work package in order to clarify the responsibilities of each contractor; technical work coordination leading to a plan for each critical item of the program; and configuration management dealing with problems of design reviews and introduction of modifications. There must also be quality assurance and reliability, work control to follow the work progress and the evolution of expenses, and documentation management. The final objective of Ariane in matter of planning is to reach operational availability at the end of 1980. F.R.L.

**A74-42904** # **Purposes, structure, and results of the ART program (Zielsetzung, Aufbau und Ergebnisse des ART-Programms).** N. Treinies (Gesellschaft für Weltraumforschung mbH, Porz-Wahn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Raumfahrt Transportsysteme der Zukunft, Porz-Wahn, West Germany, June 27, 28, 1974, Paper 74-054.* 35 p. In German.

Description of a program established for the purpose of developing a fully reusable long-range hypersonic flight vehicle. Following an analysis of the management problems involved in achieving cooperative work by various groups in a development program of this nature, noting the need for an ordering scheme in drafting the various plans, the technological problems involved in atmospheric reentry and the system analyses required for the development of a pilot configuration are discussed. Research work emphasizing four different aspects of the program is then described, including the development of advanced methods of calculating three-dimensional flowfields, the further elaboration of the pilot configuration, the development of advanced heat-shielding systems, and the carrying out of preliminary work for free-flight tests. A.B.K.

**A74-42975** # **Airports in the modern world. I (Porty lotnicze w nowoczesnym swiecie. I).** *Technika Lotnicza i Astronautyczna,* vol. 29, July 1974, p. 35-37. In Polish.

The extensive and difficult functions required from an airport are discussed and are juxtaposed to the functions expected from a conventional aerodrome. The role played by the airport as an element of air transportation is examined, and the conditions necessary to ensure efficient operation are outlined. The paper is based on Jacques V. Block's book 'Airports and their environment', published in 1971. V.P.

**A74-43522** **Low cost commercial space traffic operations and the swing station.** K. A. Ehricke (Rockwell International Corp., El Segundo, Calif.). *(International Academy of Astronautics, Cost Reduction in Space Operations Symposium, 3rd, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973.) Raumfahrtforschung,* vol. 18, July-Aug. 1974, p. 173-182. 15 refs.

The increasing number of geosynchronous operations will require a transportation system consisting of efficient interorbital vehicles. Such a system could be provided by a swing station system. The significance of commercial traffic operations in support of geosynchronous operations is discussed along with geospace traffic patterns and swing station traffic operations with an electric spacecraft at the apogee. Details regarding the solar-electric propulsion stage are examined and an alternative to the swing station is considered. G.R.

**A74-43604** **Advancements in the test and evaluation of naval weapon systems.** T. P. Perry and R. J. Warnagieris (U.S. Navy, Naval Missile Center, Point Mugu, Calif.). In: Advancements in flight test engineering; Proceedings of the Fifth Annual Symposium, Anaheim, Calif., August 7-9, 1974. Lancaster, Calif., Society of Flight Test Engineers, 1974, p. 1-77 to 1-89.

Naval Air Systems Command, the responsible agency for research development test and evaluation and procurement of naval aircraft and weapon systems, is in the process of architecting its structure, methodologies, and long-range plans. The authors, employed by a leading test and evaluation (T&E) field activity of the Command, make a case for the role of T&E in these future plans and outline objectives applicable to the T&E community at large. The paper highlights the T&E concepts pioneered by naval aviation, gives examples of current system capabilities which have enhanced the state of the T&E, and provides conceptual suggestions for the future. (Author)

**A74-43605** **The R & D simulator - A 'new' T & E tool.** R. L. Fortenbaugh (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). In: Advancements in flight test engineering; Proceedings of the Fifth Annual Symposium, Anaheim, Calif., August 7-9, 1974. Lancaster, Calif., Society of Flight Test Engineers, 1974, p. 1-91 to 1-108.

A NASA-Ames R & D (research and development) simulator was utilized through the development phase of the F-14A program and on a continuing basis into the T & E (test and evaluation) phase. This utilization has concentrated on development and evaluation of the APC (approach power compensator), AFCS (automatic flight control system), and ACLS (automatic carrier landing system). The importance and success in the use of this simulator during the T & E phase is discussed with respect to accuracy of duplicating and predicting flight test results, pilots' acceptance of the simulator as a valid representation of the real aircraft, and cost effectiveness for reducing flight time while increasing flexibility. The success of this program has led to the adoption of a similar approach for APC, AFCS, and ACLS development for the S-3A aircraft and for reevaluation of the A-7E ACLS capability. (Author)

**A74-43909** **Radio spectrum measurement system - Current applications, experience, results.** A. F. Barghausen (NOAA, Institute for Telecommunication Sciences, Boulder, Colo.) and L. G. Hailey (Executive Office of the President, Office of Telecommunications Policy, Washington, D.C.). In: Electromagnetic Compatibility Symposium, 16th, San Francisco, Calif., July 16-18, 1974, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1974. 6 p.

A transportable automated radio spectrum measurement system is now being employed by the OTP/OT as a part of the program to improve spectrum management processes and procedures within the Federal Government. Measurements to determine actual spectrum usage as compared with assignments, and operational compliance with assignment limitations, are primary output requirements. This paper describes current system applications to meet these requirements, as well as field operational experiences during initial deployment in the Washington, D.C. area. In addition, measurement results are given illustrating their direct use in the Federal spectrum management program. (Author)

**A74-44146** # **The use of APL in the Thomson-CSF group (L'emploi de l'APL dans le Groupe Thomson-CSF).** G. Demars (Thomson-CSF, Direction de l'Informatique, Paris, France) and C. Hubert (Thomson-CSF, Service Etudes Générales, Issy-les-Moulineaux, Hauts-de-Seine, France). *Revue Technique Thomson - CSF,* vol. 6, Mar. 1974, p. 275-285. 15 refs. In French.

Illustration of the utility of the APL language in computer-aided design of complex systems. After briefing citing certain areas of management in which the use of the APL conversational system was found to be very profitable namely, the management of contracts and research projects and budgetary control - three examples of the use of this system in scientific calculations are presented which involve, respectively, the calculation of electrical circuits, the calculation of transfer functions, and the simulation of optical systems. A.B.K.

**A74-44328** # **The ESRO MAROTS programme.** J. A. Vandenkerckhove (ESRO, European Space Research and Technology Centre, Noordwijk, Netherlands). *(British Interplanetary Society, Symposium on Maritime Satellites, London, England, Apr. 18, 1974.) British Interplanetary Society, Journal,* vol. 27, Oct. 1974, p. 735-740.

Description of a program centering around a maritime satellite designed to provide a capability for the acquisition of both experimental data and preoperational experience. The objectives of the MAROTS program include general communications, distress signaling, and position determination. A fundamental feature of the MAROTS satellite is a modular design which includes (1) a service module and (2) a communication module with a payload characterized by a large L-band shaped-beam antenna. MAROTS will be three-axis stabilized and will have a design life in excess of three years. The satellite will be positioned between 10 and 15 W to cover simultaneously most of the Atlantic Ocean, as well as the western part of the Indian Ocean, from the Panama Canal to the Persian Gulf. Its nominal communication capacity during daylight operation will include 12 forward voice/data channels, 18 forward teleprinter and telex channels, one forward access channel, 14 return voice/data channels, 18 return teleprinter and telex channels, and three simplex shore-to-shore channels. A.B.K.

**A74-45001 A design to cost overview.** J. S. Gansler (U.S. Department of Defense, Office of the Assistant Secretary of Defense /Installations and Logistics/, Washington, D.C.) and G. W. Sutherland (U.S. Department of Defense, Office of Defense Research and Engineering, Washington, D.C.). *Defense Management Journal,* vol. 10, Sept. 1974, p. 2-7.

The importance of an application of design to cost principles in defense system programs is discussed along with aspects of commercial practice, life cycle cost considerations and the characteristic features of the Joint Design to Cost Guide published by the Joint Logistic Commanders in October 1973. It is the intention of DOD to apply design to cost principles and concepts to all major defense system programs, as well as to most smaller programs and subsystems. G.R.

**A74-45002 Implementation of the design to cost concept from the contractual point of view.** M. J. Tashjian (U.S. Department of Defense, Office of the Assistant Secretary of Defense /Installations and Logistics/, Washington, D.C.). *Defense Management Journal,* vol. 10, Sept. 1974, p. 8-17.

DOD contracting officers must provide a basic contractual framework which allows successive interactions and trade-offs to ensure the design to cost goal is met. The role of the procurement professionals is an essential and pervasive part of the application of the design to cost concept to assure cost-effective acquisitions of new defense systems. Details concerning the approaches used in implementing the design to cost concept are discussed, taking into account advanced procurement planning, preparation of the request for proposal, contractual coverage, and post-award administration of the contract. G.R.

**A74-45003 Design to cost during the requirements, development and test phases of systems acquisition.** R. R. Shorey and T. H. Ross (U.S. Department of Defense, Office of the Assistant Secretary of Defense /Installations and Logistics/, Washington, D.C.). *Defense Management Journal,* vol. 10, Sept. 1974, p. 18, 23-26.

**A74-45004 Selecting design to cost goals requires realism and flexibility.** R. L. Bidwell (U.S. Department of Defense, Office of the Assistant Secretary of Defense /Installations and Logistics/, Washington, D.C.). *Defense Management Journal,* vol. 10, Sept. 1974, p. 27-31.

The selection of reasonable cost goals is vital to the design to cost process. Approaches to do this are concerned with a determination of the cost per item, the relation of unit costs to actual costs of existing systems, and industrial engineering type estimates. The allocation of cost goals is considered along with a breakdown of cost goals and the use of a feedback mechanism to obtain corrective action wherever it is needed. G.R.

**A74-45133 The German magnetic transportation program.** H. G. Gutberlet (Dornier-System GmbH, Friedrichshafen, West Germany). *(Institute of Electrical and Electronics Engineers, Annual International Magnetics Conference, 12th, Toronto, Canada, May 14-17, 1974.) IEEE Transactions on Magnetics,* vol. MAG-10, Sept. 1974, p. 417-420.

The research project for the development of tracked high-speed transport systems is to provide the basis for a decision regarding the selection of a suitable system for the traffic requirements of the future. Such a decision is expected to be made sometime near the year or in the year 1979. The development of experimental vehicles on the basis of an electromagnetic levitation approach was begun in 1970. It is planned to obtain vehicles using the electromagnetic or electrodynamic levitation principle in 1977. Components developments made in connection with this program are discussed along with the experimental plants and test tracks. G.R.

**A74-45548 # A review of some research relating to controller selection criteria.** B. B. Cobb (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). In: What impacts ATC; Proceedings of the Eighteenth Annual Meeting and Technical Program, Miami Beach, Fla., October 15-18, 1973. Washington, D.C., Air Traffic Control Association, Inc., 1974, p. 43-47.

The variables most useful for the selection of ATC trainees from among medically qualified applicants have been identified as chronological age, performance measures on certain types of aptitude tests, and assessments of previous types and amounts of prior ATC experience, usually attained as military controllers. Variables pertaining to level, recency, or type of education have not been found useful for predicting early training performance or retention-attrition status up to 10 years after entry. G.R.

**A74-46258 Airline ATE applications and technology requirements.** R. G. Huenemann and J. P. Valdez (United Air Lines, Inc., San Francisco, Calif.). In: Institute of Electrical and Electronics Engineers, International Convention and Exposition, New York, N.Y., March 26-29, 1974, Technical Papers. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 13/2 1-13/2 8. 6 refs.

The use of ATE in an airline is almost solely related to the testing of avionic boxes. The avionic boxes are better known as Line Replaceable Units, or LRUs. Airline ATE is used primarily for avionics in 747, DC-10, and L1011 aircraft. ATE marketing problems are considered along with test languages and design questions. Aspects of airline ATE requirements discussed are related to ATE flexibility, interface requirements, and signal processing. G.R.

**A74-46292 Reliability efforts in large European programs for military and commercial aircraft development.** H. Gross (Messerschmitt-Bolkow-Blohm GmbH, Munich, West Germany). *IEEE Transactions on Reliability,* vol. R-23, Aug. 1974, p. 169-173.

**A74-46297 Analyzing the interface of reliability and economics of unmanned satellites.** H. W. von Guerard (Industrieanlagen-Betriebsgesellschaft mbH, Ottobrunn, West Germany). *IEEE Transactions on Reliability,* vol. R-23, Aug. 1974, p. 208-213. 8 refs.

Questions related to the significance of satellite reliability analysis are examined and the concept of marginal utility is introduced. Utility is defined as the value of goods or services to the buyer. Marginal utility is defined as the utility of the last item employed. Graphs are provided to illustrate the concept of reliability suboptimization, using the example of a research satellite. Methods are considered for linking engineering reliability to value assessment data, taking into account the logic of reliability cost effectiveness. The implementation of the considered approaches is illustrated by structuring the logic of reliability analysis in the case of a research satellite featuring three experiments. G.R.

# STAR ENTRIES

**N74-10105#** Naval Aerospace Medical Research Lab., Pensacola, Fla.
**THE PREDICTION OF PILOT PERFORMANCE IN THE F-4 AIRCRAFT**
Richard H. Shannon and Wayne L. Wang 9 Jul. 1973 13 p refs
(MF51524002)
(AD-764866; NAMRL-1186) Avail: NTIS CSCL 05/9

In previous investigations, attempts were made to isolate the most critical skills and procedures within each stage of replacement air group (RAG) training in the F-4 aircraft. For each of the stages analyzed, a small set of items were selected on the basis that they could discriminate among replacement pilots according to their final RAG grade. On the basis of these isolated skills, two fleet evaluation questionnaires were developed to be used by operational F-4 squadron commanders. In addition to ratings on these two rating forms, squadron commanders were asked to report critical incidents. These included such occurrences as accidents, incidents, and wings-pulled. Data obtained from these two forms were used as the criterion measures in the investigation. Selected test scores and flight grades from undergraduate pilot training were used as potential predictors. These were related to the criteria in a series of correlational and regression analyses. A number of significant relationships were obtained among the performance measures. Such results indicated the method used in developing the rating form to be a feasible one. Implications are discussed in terms of potential use for actual assignment of aviators to RAG training in the F-4 aircraft. Author (GRA)

**N74-10167#** Army Strategic Communications Command, Fort Huachuca, Ariz.
**USASTRATCOM DESIRED CAPABILITY LIST**
1 Aug. 1973 41 p refs
(AD-766281) Avail: NTIS CSCL 17/2

The purpose of this document is to serve as an interface tool between USASTRATCOM and the R and D community providing those items and ideas that USASTRATCOM uses. Both government and industry Research and Development could better support STRATCOM if they had a clearer understanding of STRATCOM's needs. This document, The USASTRATCOM Desired Capability List, (DCL) constitutes the assembled, published formal statement of future requirements as currently viewed by the STRATCOM system operator. The DCL is planned to provide an effective tool in forging the communications channel with the research community that should materially assist in the selection of research objectives and aims because each item is generated by a user problem and reviewed and validated by senior communicators. Author (GRA)

**N74-10465*#** New York Univ., N.Y. School of Engineering and Science.
**TRENDS IN THE DEVELOPMENT OF AUTOMATIC TEST EQUIPMENT**
Jack Lustig Jun. 1973 346 p Sponsored in part by NASA
(Contract N00039-68-C-3579; Proj. XF013-17-01; Proj. SETE)
(NASA-CR-135826; AD-765739) Avail: NTIS HC $19.50 CSCL 14/2

The study represents an effort to identify significant trends in the design of automated testing since the middle 1950's. It includes a number of pertinent philosophies of this period and provides some conclusions and recommendations for future automatic test equipment. Incorporated in the report are summations of a selection from twenty five hundred (2500) articles, reports and several hundred patents contained in the files of Project SETE; the results of a meeting at NASA Kennedy Space Flight Center; and a portion of the correspondence resulting from an industrial survey on automatic test equipment. A bibliography has been arranged chronologically to provide the reader with an additional tool for the historical assessment of automatic test equipment. The report is issued in three layers. The foreword represents the first layer and is essentially an introduction to automatic testing. It is prepared for those readers who desire only a brief discussion of the subject. The historical preview is the second layer. It explores in greater detail the ramifications of early efforts to automate testing. It includes a chronological programming sequence history chart plus samples of programming devices related to automatic test equipment. Starting with task objectives the major part of the report is detailed. The main thrust is on important philosophies which played a part in the overall movement of automation in testing. Author (GRA)

**N74-10487#** Oklahoma State Univ., Stillwater. Fluid Power Research Center.
**HYDRAULIC CYLINDER AND SEAL SPECIFICATION STUDY Annual Report, Section 1, 1 Oct. 1970 - 1 Sep. 1972**
Sep. 1972 130 p
(Contracts DAAK02-71-C-0074; DAAK02-72-C-0172)
(AD-757722; OSU-FPRC-2M1) Avail: NTIS CSCL 13/7

The purpose of the OSU-MERDC hydraulic specification program is to develop industrially acceptable test procedures and requirement specifications relative to the performance of hydraulic components and systems to facilitate the military's buy commercial approach. Although the program has been aimed toward components and systems for future 3000 psi operating pressure levels, it was intended that the test procedures be applicable to any pressure level. This report presents a detailed account of the experimental verification part of the hydraulic cylinder and seal studies. It relates the problems encountered as well as the solutions, as reflected in the revised test procedures and specifications. The three components considered in this report are hydraulic cylinders, hydraulic pressure seals, and wiper seals (exclusion devices). Author (GRA)

**N74-10783*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**STUDY OF AIRBORNE SCIENCE EXPERIMENT MANAGEMENT CONCEPTS FOR APPLICATION TO SPACE SHUTTLE. VOLUME 3: APPENDIXES**
Donald R. Mulholland, John O. Reller, Jr., Carr B. Neel, and Louis C. Haughney Aug. 1973 83 p refs
(NASA-TM-X-62289) Avail: NTIS HC $6.25 CSCL 22A

Detailed information is presented concerning specific airborne missions in support of the ASSESS program. These missions are the AIDJEX expeditions, meteor shower expeditions, CAT and atmospheric sampling missions, ocean color expeditions, and the Lear Jet missions. F.O.S.

**N74-10878*** New Mexico Univ., Albuquerque.
**PUBLIC SCIENCE POLICY AND ADMINISTRATION**
Albert H. Rosenthal, ed 1973 337 p refs
(Contract NGL-32-004-042)
(NASA-CR-136019) Copyright. Avail: Issuing Activity HC $12.00 CSCL 05A

Science, the overwhelming concern of our time, is no longer a matter of private research and development but one of public

policy and administration, in which government, industry, foundations, and educational institutions must all work together as never before. Few other single tasks are of such decisive importance to the collective and individual welfare of American citizens as the formulation of public science policy and the administration of scientific programs. Eleven national authorities of varied background in science, education, and government administration contribute their experience and their judgment in an effort to deal with the major aspects of the subject. Their focus is on the meeting of actual problems; they consider the decision making process in both public and public-private organizations. Topics are grouped in three general categories: personnel needs and resources, organizational problems and techniques, and the administrative role in policy leadership.
Author

**N74-10879*#** Tennessee Univ. Space Inst., Tullahoma.
**MANAGEMANT OF NASA'S MAJOR PROJECTS**
Lee B. James Jul. 1973 186 p refs
(Grant NGR-43-001-116)
(NASA-CR-135989) Avail: NTIS HC $11.50 CSCL 05A

Approaches used to manage major projects are studied and the existing documents on NASA management are reviewed. The work consists of: (1) the project manager's role, (2) request for proposal, (3) project plan, (4) management information system, (5) project organizational thinking, (6) management disciplines, (7) important decisions, and (8) low cost approach. T.M.R.

**N74-10895#** Committee on Science and Astronautics (U. S. House).
**OFFICE OF TECHNOLOGY ASSESSMENT: BACKGROUND AND STATUS**
Walter A. Hahn and Rosemary Chalk Washington GPO Aug. 1973 55 p refs Presented to Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 30 Jul. 1973 Based on CRS Multilith No. 73-41 SP Prepared by Library of Congr.
Avail: Comm. on Sci. and Astronaut.

The background and status of the Office of Technology Assessment are presented in a report to the Committee on Science and Astronautics of the U.S. House of Representatives. It is stated that the basic function of the office is to provide early indications of the probable beneficial and adverse implications of the applications of technology and to develop other coordinate information which may assist the Congress. The legislative history leading to the creation of the office is analyzed. The final legislation in the form of the Technology Assessment Act of 1972 is included.
Author

**N74-10984#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**EDUCATIONAL METHODS TEXTBOOKS**
G. L. Petrov 31 Jul. 1973 164 p refs Transl. into ENGLISH from Tr. Politekhn. Inst. (Leningrad), 1966 p 1104
(AD-765580; FTD-MT-24-346-73) Avail: NTIS CSCL 05/9

The training of engineers in welding is achieved in the Soviet Union by following two lines: Equipment and technology, and metallurgy and technology. The Leningrad Polytechnical Institute prepares engineers having a broad background for special training programs.
GRA

**N74-11149*#** Earth Satellite Corp., Washington, D.C.
**APPLICATION OF ERTS-1 DATA TO THE PROTECTION AND MANAGEMENT OF NEW JERSEY'S COASTAL ENVIRONMENT Progress Report, period ending 31 Oct. 1973**
Roland S. Yunghans, Edward B. Feinberg, Frank J. Wobber, Robert L. Mairs, Principal Investigators, Robert T. Macomber, and Dennis Stanczuk 9 Nov. 1973 14 p Prepared for N. J. Dept. of Environ. Protection ERTS
(Contract NAS5-21765)
(E74-10010; NASA-CR-135851) Avail: NTIS HC $3.00 CSCL 08J

The author has identified the following significant results. A Coastal Zone Surveillance Program has been developed in which systematic comparisons of early ERTS-1 images and recently acquired images are regularly made to identify areas where changes have occurred. A methodology for assessing and documenting benefits has been established. Quantification of benefits has been directed toward four candidate areas: shore protection, ocean outfalls, coastal land resources, and offshore waste disposal. A refinement in the change detection analysis procedure has led to greater accuracy in spotting developmental changes in the Coastal Zone. Preliminary conclusions drawn from the Shore Erosion case study indicate that in the northern test area (developed beach) erosion has occurred more often, is generally more severe, and the beach is slower to recover than in the southern test area (natural beach). From these data it appears that it may be possible to define areas most likely to experience further erosion. The assumption of continued erosion in areas that have at one time experienced severe erosion is supported by the simple fact that as a beach narrows wave energy is concentrated on a narrower beach surface. The higher energy condition subsequently results in accelerated erosion.

**N74-11159*#** State of Ohio Dept. of Development, Columbus.
**RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Sep. - Oct. 1973**
David C. Sweet, Principal Investigator Oct. 1973 8 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21782)
(E74-10024; NASA-CR-135865) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-11174*#** Minnesota State Planning Agency, St. Paul.
**LAND USE MANAGEMENT IN MINNESOTA Progress Report, 1 Sep. - 31 Oct. 1973**
Joseph E. Sizer, Principal Investigator 31 Oct. 1973 5 p ERTS
(Contract NAS5-21801)
(E74-10053; NASA-CR-135894) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-11491** General Electric Co., Sunnyvale, Calif. Breeder Reactor Dept.
**GE NUCLEAR DESIGN AND BENCHMARK CRITICAL EXPERIMENT PLAN FOR THE LMFBR DEMONSTRATION PLANT**
H. S. Bailey and S. L. Stewart *In* AEC Natl. Topical Meeting on New Develop. in Reactor Phys. and Shielding, Book 2 1972 p 724-738 refs
(Contract AT(04-3)-189)

Background planning related to the LMFBR demonstration plant design provides the basis for the configuration and experiments planned for ZPPR-3. The specified experimental configurations and plans are summarized and some details of the experimental plan for each of the phases are presented. Development and execution of the detailed experimental program involves specifications of the detailed core loadings and arrangement, auxiliary measurements to provide information to determine experimental accuracies or resolve discrepancies, reduction of the experimental data to a useable form for the reactor designers, and analysis before the fact for planning, during the experimental program and after the program.
Author

**N74-11700#** Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
**TECHNOLOGICAL AND COMMERCIAL DEVELOPMENT TRENDS IN COMMUNICATON SATELLITES [TECHNOLOGISCHE UND KOMMERZIELLE ENTWICKLUNGSTRENDS BEI NACHRICHTENSATELLITEN]**
P. Hartl (DFVLR, Oberpfaffenhofen, West Ger.) and D. E. Koelle 1973 8 p In GERMAN Presented at the DGLR Symp. Nachrichtensatelliten, Stuttgart, 16-17 May 1973
(DGLR-Paper-73-039) Avail: NTIS HC $3.00

A review of the application and the technological and commercial development of communication satellites is presented. The applications include: intercontinental communication (intelsat network), regional communication, tactical and strategical services, aeronautical and maritime traffic control, and direct TV broadcasting. Some trends in technological development are indicated, such as global satellites, three-axis stabilization, frequency bands, and power supply. A prognosis for the commercial development of intercontinental and regional communication is given. ESRO

**N74-11701#** Siemens A.G., Munich (West Germany).
**CONCEPT STUDY OF A TELEVISION BROADCASTING SATELLITE, PREPHASE A. VOLUME 1: SUMMARY Final Report [KONZEPTSTUDIE FUER EINEN FERNSEHRUNDFUNKSATELLITEN, VORPHASE A. SCHLUSSBERICHT BAND 1: ZUSAMMENFASSUNG]**
May 1972 29 p In GERMAN Prepared jointly with Standard Elektrik Lorenz and Messerschmitt-Boelkow-Blohm
(Contract RV-2/1-v-1/71-QH-00-10)
Avail: NTIS HC $3.50

A feasibility study for a television broadcasting satellite is summarized. Four concepts were developed as a result of different requirements for private television sets, and are thus based on different modulation and communication methods. The following items are discussed: communication system, transmitter power and power supply, and satellite antenna attitude control. The proposed schedule and a cost estimate are given for the full project. ESRO

**N74-11749#** Joint Publications Research Service, Arlington, Va.
**ANALYSIS OF TENDENCIES AND FORECAST OF SCIENTIFIC-TECHNICAL PROGRESS**
30 Oct. 1973 353 p refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1966 Presented at the 1st All Union Symp. on the Appl. of Math. Methods and Computer Technl. in Studies of the History of Sci.-Technol. Progr., Kiev, 1966
(JPRS-60402) Avail: NTIS HC $19.75

The proceedings of a symposium on the application of mathematical methods and computer technology in studies of the history of scientific and technical progress are presented. The information is intended for persons engaged in the analysis of the directions and levels of scientific and technological development, for workers of the information-patent services, and for historians of natural science and technology. Some of the subjects discussed are: (1) comparative analysis with the aid of computers, (2) engineering and technical importance of inventions, (3) methods of technological forecasting, (4) methods of evaluation effectiveness of scientological analysis, and (5) computer processing of historical materials.

**N74-11750** Joint Publications Research Service, Arlington, Va.
**APPLICATION OF MATHEMATICAL METHODS AND COMPUTER TECHNOLOGY FOR ANALYSIS OF TRENDS AND FORECASTING OF SCIENTIFIC-TECHNOLOGICAL PROGRESS**
G. M. Dobrov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 1-18 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 5-19

The problems of the history of scientific and technological progress that are being investigated with the aid of new methods are discussed. The associations with other fields such as, natural, industrial, and social sciences, scientific and technological information, patent services, and agencies managing the development of science and technology are described. The updating of problematics is the objective law of the development of the history of natural science and technology. Scientific and industrial progress as a whole and each of its specific manifestations embody the past, present, and future. Historical methodology is considered to be the indispendable prerequisite for the scientific approach to analysis of the problems of scientific and industrial progress. Author

**N74-11751** Joint Publications Research Service, Arlington, Va.
**EXPERIENCE IN THE UTILIZATION OF THE ELECTRONIC DIGITAL COMPUTER FOR HISTORICAL-TECHNOLOGICAL ANALYSIS OF SPECIFIC FORMS OF TECHNOLOGY (THE EXAMPLE OF COAL MINING COMBINES)**
L. P. Smirnov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 19-33 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 23-37

The use of electronic computers for solving series of problems of information retrieval and information logic analysis pertaining to the coal mining industry is discussed. A form of analysis, called the rejected application library on coal mining combines, for historical-technological studies is described. On the basis of analysis of existing coding methods an effective method of recording information about coal mining combines is selected, which makes it possible to solve problems of information retrieval for statistical and logical analysis. Author

**N74-11752** Joint Publications Research Service, Arlington, Va.
**WORLD TECHNOLOGICAL LEVEL AND HOW IT IS DETERMINED**
I. D. Ivanov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 34-39 Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 38-43

The determination of the level of industrial technology on the basis of information obtained from industrial and technical-economic literature, retrospective patent library, standards, specifications, advertisements, and catalogs is discussed. It is characterized by the technical-economic parameters of the newest mass produced products, well received by the market, and also of the latest technology successfully adopted by leading enterprises. This level may be used for comparative analysis of Soviet products, the technology employed or adopted, and also of imported products or technology for the purpose of determining how progressive they are. Author

**N74-11753** Joint Publications Research Service, Arlington, Va.
**ANALYSIS OF THE TREND OF DEVELOPMENT OF SPECIFIC FORMS OF TECHNOLOGY ON THE BASIS OF PATENT SOURCES**
Ye. I. Levin and Yu. V. Yershov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 40-49 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 44-54

The history of development of certain Soviet design decision related to coal mining is presented. The character of change of the number of applications of design decisions concerning combined coal mining machines, with emphasis on certain types of machines, is analyzed. The mechanization of data processing for the purpose of analyzing technological data is discussed. The importance of combined qualitative and quantitative analysis

of patent information, the possibilities for multi-aspective analysis, and adoption of computer methods for historical-scientific data is defined. Author

**N74-11754** Joint Publications Research Service, Arlington, Va.
**ON THE POSSIBILITY OF COMPARATIVE ANALYSIS WITH THE AID OF THE COMPUTER**
E. F. Skorokhodko *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 50-54 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 55-59

The Institute of Cybernetics of the Academy of Science of the Ukrainian SSR has developed several algorithms intended for the solution of certain problems related to analysis and processing of information written in natural languages, in particular for information retrieval. Some of these algorithms may be important for specialists engaged in the development of methods of historical-technological and patent analysis using electronic digital computers. A tool for comparative analysis for the purpose of determining identical and different indices may be constructed on the basis of these algorithms. Author

**N74-11755** Joint Publications Research Service, Arlington, Va.
**THE ENGINEERING-TECHNICAL IMPORTANCE OF INVENTIONS**
V. G. Gmoshinskiy *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 55-68 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 60-71

Methods for conducting engineering-technical evaluations of the retrospective patent library, its systematization according to engineering-technical indices, and the ongoing search for required solutions are presented. The problem of developing criteria for evaluating the technical significance and the promise of each patent individually and of groups of patents that comprise a given branch of classification of patent solutions is analyzed. Numerical methods for determining the engineering-technical significance of inventions are developed. Author

**N74-11756** Joint Publications Research Service, Arlington, Va.
**INVESTIGATION OF TECHNOLOGICAL DEVELOPMENT ACCORDING TO PATENT MATERIALS**
I. Yu. Zborovskiy *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 69-78 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 72-81

The analysis of inventions and patents as a method for determining the technological level of a country is proposed. The characteristics of patents which make this a valid method are described. Analysis of patents and inventions also provides an indication of the trends of technological development. Various types of industry are examined on the basis of pertinent inventions to support the claim for technology evaluation accuracy. Author

**N74-11757** Joint Publications Research Service, Arlington, Va.
**TABULATION OF PATENT DESCRIPTIONS AS A MEANS OF INVESTIGATING THE TRENDS OF SCIENTIFIC-TECHNOLOGICAL PROGRESS**
B. N. Tardov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 79-99 ref Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 82-100

A numerical method for determining the trends of development of scientific-technical progress is proposed. The method is based on the law of accelerated development of science and is founded on classification analysis of the qualitative-quantitative dynamics of patent transactions in the leading industrial countries of the world. The requirements which must be met by any information to be included in the sum of knowledge are described. It is stated that patents meet the specific requirements for the purpose of technology evaluation. Author

**N74-11759** Joint Publications Research Service, Arlington, Va.
**TRENDS IN THE MECHANIZATION OF THE COAL INDUSTRY AND GUARANTEE OF PATENT-ABILITY OF DESIGNS THAT ARE COMPETITIVE ON THE WORLD TECHNOLOGICAL LEVEL**
V. L. Shteynbuk *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 105-112 ref Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 106-113

An analysis of the historical trends in the development of mechanized hydraulic supports for the USSR coal industry is given; the relationships to problems of legal protection, patenting, patent purity, and future requirements in worldwide competition are discussed. It is proposed that computerized analysis of historical and technical experience is included in the processing of technological inventions pertaining to mechanized hydraulic supports. G.G.

**N74-11761** Joint Publications Research Service, Arlington, Va.
**ON SOME METHODS OF TECHNOLOGICAL FORECASTING**
Ye. S. Zharikov and V. A. Lisichkin *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 115-125 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 116-126

The best of forecasting technology are the following three: (1) Analysis of patents, (2) analysis of the promises of scientific research work; and (3)construction of economic-mathematical models of industrial development. It is concluded that the very process of forecasting industrial development can hardly be effective without the combined use of these methods. Author

**N74-11763** Joint Publications Research Service, Arlington, Va.
**INFORMATION RETRIEVAL SYSTEM FOR FINDING AND PROCESSING INFORMATION IN PLANNING ORGANIZATIONS**
L. G. Kazhdan *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 131-137 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 132-137

The importance of documentation, compiled as a result of the activity of planning organizations, for the adoption of scientific and technological achievements in the national economy is emphasized. Computerized information retrieval systems are essential for processing planning documentation data to insure mandatory utilization of stored technical information about the level of industrial development, the socio-economic structure of society, and the history of industry and technology. G.G.

**N74-11766** Joint Publications Research Service, Arlington, Va.
**CODING OF COMPANY NAMES**
B. N. Tardov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 149-155 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 149-154

Computer retrieval and analysis of patent descriptions relevant to company names requires that the numerical code of the firm be the same for all tabulagrams. It is proposed that the first letters of the main words of a company's name are translated into a number for coding. A number code that denotes an abbreviated company name is found by formulating a spectral composition of letters that includes the number of symbols, the letters, the frequency of appearance of a letter at the beginning of the word, actual integral probability, and integral probability in the uniform spectrum. A formula is developed that allows for numerical coding of company names by simple addition of not more than six letters in about 15 seconds by computer. G.G.

**N74-11767** Joint Publications Research Service, Arlington, Va.
**EXPERIENCE IN THE SOLUTION OF SOME PROBLEMS OF GENERAL SCIENTOLOGY USING COMPUTER TECHNOLOGY**
G. M. Dobrov and V. N. Klimenyuk *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 156-176 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 157-177

An analysis is presented of the trends in the growth and changes in the staffs of the scientific community for the Soviet Union. The age structure of scientific personnel, the changes in the proportion/of new doctor candidates of science in basic fields of science, and trends in dissertations are discussed. F.O.S.

**N74-11768** Joint Publications Research Service, Arlington, Va.
**NETWORK SCHEDULE AS A MEANS OF QUANTITATIVE ANALYSIS OF THE COURSE OF SCIENTIFIC-TECHNICAL DEVELOPMENTS**
G. A. Lakhtin *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 177-183 Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 178-184

The network schedule is examined as a basic tool for analyzing the evolution of scientific-technological progress. The principles of the network schedule, the logical elements of operations and events, the analysis of delays, and the determination of costs are discussed. F.O.S.

**N74-11770** Joint Publications Research Service, Arlington, Va.
**SPECIFIC-SOCIOLOGICAL INVESTIGATION OF THE ORGANIZATION OF SCIENTIFIC LABOR**
I. V. Chernov and A. I. Shcherbakov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 196-209 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 197-210

The systematic organization of the labor of scientists is analyzed for industry in a communistic system. The problems studied include: the scientist's choice of profession, determination of the subject for investigations, applications of research results, and resolving conflicts in research institutions. F.O.S.

**N74-11772** Joint Publications Research Service, Arlington, Va.
**LOGIC MEANS OF FILTERING INFORMATION IN SCIENTIFIC RESEARCH**
V. V. Kosolapov *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 215-225 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 215-226

The problem of forecasting scientific discoveries is dealt with. It is theorized that, if unknown phenomena can be predicted on the basis of what is already known, then there are obviously logical rules for changing from the known to the unknown and forecasts become possible. The development of logical multivariant programs for systematizing the creative process and calculating some optimal rules for scientific forecasting of possible discoveries is proposed. Various methods are discussed for analyzing experimental research results with consideration of the filtering phenomena of logical means on information obtained from the experiment. It is concluded that the factor ranking method should be supplemented by objective methods of seeking anomalies between research results and its presumed hypothetical explanations. D.L.G.

**N74-11777** Joint Publications Research Service, Arlington, Va.
**METHODS OF EVALUATING EFFECTIVENESS OF SCIENTOLOGICAL ANALYSIS**
V. V. Borisov, M. K. Luchnik, and A. A. Savelyev *In its* Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 277-284 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 279-286

Attempts were made to determine the effectiveness of scientific activity in relation to individual productivity and creativity. The resulting data are used to facilitate rational financing and performance evaluation of scientific group. E.H.W.

**N74-11784*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
**FOUR CITIES: HIGH TECHNOLOGY FACES URBAN PROBLEMS Interim Report**
James H. Wilson and Harold L. Macomber 14 Sep. 1973 30 p refs Sponsored by NSF
(Contract NAS7-100)
(NASA-CR-136008; JPL-1200-100) Avail: NTIS HC $3.50 CSCL 05K

The Four Cities Program, a pilot demonstration of a new whole-system approach to technology transfer, is discussed. The transfer link, between aerospace engineering and city management, is accomplished directly by pairing a corporation with each of four California cities, assigning a senior staff member as science and technology advisor to each City Manager. Most significant transfers have been in project management and system analysis techniques, though acquisition of new hardware and software has also resulted from the program. Fostering of inter-institutional communications and understanding has been a major outcome of the effort. Author

**N74-11786#** Joint Publications Research Service, Arlington, Va.
**THE STYLE OF SCIENCE, ITS SYNTHESIS, AND PROBLEMS IN THE PLANNING OF SCIENTIFIC PROGRESS**
B. G. Kuznetsov 31 Oct. 1973 15 p Transl. into ENGLISH from Priroda (Moscow), no. 4, 1973 p 38-43
(JPRS-60426) Avail: NTIS HC $3.00

The style is presented of science, its synthesis, and problems in the planning of scientific progress. Author

**N74-11787#** Committee on Science and Astronautics (U. S. House).
**SOLAR-ENERGY FOR HEATING AND COOLING**
Washington GPO 1973 295 p refs Hearings before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 13, 7 and 12 Jun. 1973
Avail: Subcomm. on Energy

A Congressional hearing was conducted to examine the use of solar energy for heating and cooling. Examples of various solar energy conversion systems are illustrated and described. The subjects discussed are: (1) the status of solar energy technology, (2) market factors, (3) technology transfer, and (4) the benefits of using solar energy for heating and cooling buildings. P.N.F.

N74-11790# RAND Corp., Santa Monica, Calif.
**ENERGY DEMAND AND ITS EFFECT ON THE ENVIRONMENT**
D. N. Morris Jul. 1973 28 p
(P-5048) Avail: NTIS HC $3.50

An analysis of the current energy crisis and the possible environmental factors involved in the use of alternate sources of energy to reduce the consumption of fossile fuels is presented. Graphs are developed to show: (1) energy use in the United States, (2) total U.S. crude oil production from 1860 to 2060, (3) consumption of electricity in California, and (4) commercial, residential, and industrial electrical use in California. Measures for conserving electricity are proposed. The estimated national air pollution emission by source in 1969 is shown in table form. Author

N74-11794# Army Construction Engineering Research Lab., Champaign, Ill.
**CONSTRUCTION TIME OVERRUNS**
D. W. Halpin and R. D. Neathammer Aug. 1973 78 p
(DA Proj. 4DM-78012-A-OK1)
(AD-766725; CERL-TR-P-18) Avail: NTIS CSCL 15/5

The actual time required to complete construction on military facilities is often greater than the time contractually specified. There are several reasons for these overruns or time extensions: designer changes/errors, user changes, weather, strikes, late deliveries, etc. These time extensions were studied by examining a sample of contracts throughout CONUS from the time period July 1967 - June 1970. Based on the 221 contracts evaluated it is estimated that for an average contract, an additional 27% of the specified construction time will be allowed as time extensions. Author (GRA)

N74-11797*# Korean Inst. of Science and Technology, Seoul.
**AID/NASA PILOT PROJECT FOR TECHNOLOGY TRANSFER TO A DEVELOPING NATION. REPUBLIC OF KOREA Final Report**
Jun. 1972 191 p refs Sponsored in part by NASA
(Grant PASA-TA(ZA)-7-70)
(NASA-CR-136076; PB-222557/1; CK-17-326) Avail: NTIS HC $11.75 CSCL 05A

The Korea Institute of Science and Technology presents the report as evaluation of an international technology transfer program from the viewpoint of a recipient nation. The program was a pilot study to determine the feasibility of and to establish refined techniques for the transfer of aerospace-developed technology to developing nations. GRA

N74-11799# George Washington Univ., Washington, D.C.
**FEDERAL TECHNOLOGY TRANSFER**
Todd Anuskiewicz Aug. 1973 73 p refs Sponsored by NSF, NTIS, NOL and Am. Univ., Washington, D. C.
(PB-222483/0) Avail: NTIS HC $3.75 CSCL 05A

A survey is presented of current Federal technology transfer and research utilization activities, designed to provide a data-base for a 1973 colloquium on technology transfer sponsored by American University, NTIS and the Navy. Material from eighteen Federal programs with readily identifiable technology transfer or research utilization activities is included. GRA

N74-11800# Boeing Co., Seattle, Wash.
**TECHNOLOGY TRANSFER IN TACOMA, WASHINGTON. THE TOTEM ONE PROGRAM**
William V. Donaldson, A. Frederick Fath, Harvey R. Singleton, and C. Ray Turner Jul. 1973 16 p Presented nd at the 2nd AIAA Urban Technol. Conf., San Francisco, Calif., 24-26 Jul. 1972
(Contract NSF GT-34903)
(PB-222515/9) Avail: NTIS HC $3.00 CSCL 05D

The process by which aerospace technology can be understood and used by city personnel is being tested through the Totem One Technology Transfer Program in Tacoma, Washington. The purposes of bringing aerospace technologists to Tacoma are to determine if aerospace technology can be applied to attain productivity gains in the delivery of municipal services and to find out what techniques can be used which foster the understanding and use of technology in the operation of municipal government. The process report covers results in transit, fire service, and planning departments in the city of Tacoma, with discussions on effectiveness of technology transfer techniques and descriptions of specific applications of technology. GRA

N74-11802# City of Tacoma, City Manager's Office, Wash.
**TOTEM ONE PROGRAM Interim Report, Jul. - Dec. 1972**
Harvey R. Singleton Jan. 1973 24 p
(Grant NSF GT-34903)
(PB-222346/9) Avail: NTIS HC $3.25 CSCL 13B

The report is a first-six-months status report for the Totem One technology transfer program in operation in the city of Tacoma, Washington, designed to record major activities taking place in the program and to outline its accomplished results. Totem One Program is a technology applications program with the objective of improving the productivity of the city in providing services to citizens through the application of technological and management tools. City personnel aer working with aerospace and industrial technologies, and univeristy personnel. GRA

N74-11990# Berkeley Enterprises, Inc., Newtonville, Mass.
**RESEARCH IN COMPUTER-ASSISTED DOCUMENTATION OF NAVY COMPUTER PROGRAMS Final Report, 1 May 1970 - 30 Apr. 1973**
Edmund C. Berkeley 25 Aug. 1973 58 p refs
(Contract N00014-70-C-0225; NR Proj. 049-251)
(AD-766497; Rept-8-230/73-Q20) Avail: NTIS CSCL 09/2

The purpose of the research here reported is to discover and develop methods and principles by means of which a computer program which has little or no documentation can be easily documented by a human programmer with the assistance of a computer. This report describes the subject, purpose, and limitations of this research; reports briefly on the documentation of a sample, complex program called DDT; and describes (partially) computer programs for computer-assisted documentation called SIMULATOR-ANALYZER, AUTOMATIC RELOCATOR, YANK, KNITTING MACHINE, CONCEPT MODULE RECOGNIZER, etc. Author (GRA)

N74-12019# Air Transport Association of America, Washington, D.C.
**THE APRON-TERMINAL COMPLEX: ANALYSIS OF CONCEPTS FOR EVALUATION OF TERMINAL BUILDINGS Final Report, May 1972 - Sep. 1973**
Sep. 1973 157 p refs Prepared in cooperation with Ralph M. Parsons Co., Los Angeles
(Contract DOT-FA72WA-2950)
(FAA-RD-73-82) Avail: NTIS HC $10.00

The principal considerations in the planning of airport apron-terminal areas are described. The apron-terminal area is defined as the area limited by the curb on the landside and the taxiway access to the apron on the airside. The major functional areas of the apron-terminal complex (curb, terminal, connector, and apron) are defined and described. The four principal concepts for apron-terminal complexes (pier, satellite, linear, and transporter) are analyzed and evaluated for suitability to specific airport situations, based primarily upon traffic levels, physical limitations, and station characteristics. The final report presents a consolidation of the conclusions, technical, economic, and operational advantages and limitations; and underlying assumptions related to each apron-terminal area complex concept. Included are tabular and graphic materials to help in evaluating concepts. Author

**N74-12127*#** Bureau of Sport Fisheries and Wildlife, Jamestown, N.D. Northern Prairie Wildlife Research Center.
**APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Progress Report, 1 Sep. - 31 Oct. 1973**
Harvey K. Nelson, Principal Investigator 1 Nov. 1973 4 p ERTS
(NASA Order S-70243-AG-4)
(E74-10039; NASA-CR-135880) Avail: NTIS HC $3.00 CSCL 06C

There are no author-identified significant results in this report.

**N74-12131*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Quarterly Progress Report, 1 Jul. - 31 Oct. 1973**
John W. Hannah, Garland L. Thomas, and Fernando Esparza, Principal Investigators 1 Nov. 1973 10 p ref Prepared in cooperation with Brevard County Planning Dept. EREP
(NASA Order CC-30281-A)
(E74-10064; NASA-TM-X-69470) Avail: NTIS HC $3.00 CSCL 08B

The author has identified the following significant results. Lake Apopka and three lakes downstream of it (Dora, Eustis, and Griffin) are in an advanced state of eutrophication with high algal concentrations. This feature has shown up consistently on ERTS-1 images in the form of a characteristic water color for those lakes. As expected, EREP photographs also show a characteristic color for those lakes. What was not expected is that Lake Griffin shows a clear pattern of this coloration. Personnel familiar with the lake believe that the photograph does, indeed, show an algal bloom. It is reported that the algal concentration is often significantly higher in the southern portion of the lake. What the photograph shows that was not otherwise known is the pattern of the algal bloom. A similar, but less pronounced, effect is seen in Lake Tohopekaliga. Personnel stationed at Kissimmee reported that there was an algal bloom on that lake at the time of the EREP pass and that its extent corresponded approximately to that shown on the photograph. Again, the EREP photograph gives information about the extent of the bloom that could not be obtained practically by sampling. ERTS-1 images give some indication of this algal distribution on Lake Griffin in some cases, but are inconclusive.

**N74-12132*#** California Univ., Berkeley. Space Sciences Lab.
**AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA BASED ON ERTS-1 AND SUPPORTING AIRCRAFT DATA, VOLUME 1 Progress Report**
Robert N. Colwell, Gene A. Thorley, and Robert Burgy, Principal Investigators 31 Jul. 1973 217 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21827)
(E74-10065; NASA-CR-135823; PR-2) Avail: NTIS HC $13.00 CSCL 08F

**N74-12133*#** California Univ., Berkeley. Space Sciences Lab.
**AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA BASED ON ERTS-1 AND SUPPORTING AIRCRAFT DATA, VOLUME 2 Progress Report**
Robert N. Colwell, Gerald Schubert, John E. Estes, Leonard W. Bowden, Vidal Algazi, William E. Wildman, and Gordon L. Huntington, Principal Investigators 31 Jul. 1973 236 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21827)
(E74-10066; NASA-CR-135965) Avail: NTIS HC $14.00 CSCL 08F

There are no author-identified significant results in this report.

**N74-12497*#** Techtran Corp., Glen Burnie, Md.
**THE SPACELAB PROGRAM**
J. P. Causse Washington NASA Nov. 1973 22 p ref Transl. into ENGLISH from Communication presentee au 24eme Congres International d'Astronautique, Bakou, Oct. 1973 11 p
(Contract NASw-2485)
(NASA-TT-F-15205) Avail: NTIS HC $3.25 CSCL 22B

The Spacelab program is discussed. Topics include: project conceptualization, general organization, Spacelab users, shuttle interfaces, crew, models, and configurations. Decisions which must be made in these areas by European governments are also discussed. Author

**N74-12507*#** National Aeronautics and Space Administration, Washington, D.C.
**THE APOLLO SPACECRAFT: A CHRONOLOGY. VOLUME 2: 8 NOVEMBER 1962 - 30 SEPTEMBER 1964**
Mary Louise Morse and Jean Kernahan Bays 1973 290 p refs
(NASA-SP-4009) Avail: NTIS HC $6.50 CSCL 22B

A chronology of the Apollo spacecraft development and production program is presented. The subjects discussed are: (1) defining contractural relations, (2) developing hardware distinctions, and (3) developing software ground rules. Illustrations, drawings, and photographs are used extensively to supplement the technical writing. Descriptions of life support systems, communication equipment, propulsion systems, control devices, and spacecraft components are provided. Author

**N74-12531*#** General Electric Co., Houston, Tex. Space Div.
**CREW INTERFACE SPECIFICATIONS DEVELOPMENT FUNCTIONS, PHASE 3A Final Report**
John G. Carl 10 Oct. 1973 94 p refs
(Contract NAS9-13375)
(NASA-CR-134147) Avail: NTIS HC $6.75 CSCL 22B

The findings and data products developed during the crew interface specification study for inflight maintenance and stowage functions are presented. Guidelines are provided for improving the present progress of defining, controlling, and managing the flight crew requirements. The following data products were developed: (1) description of inflight maintenance management process, (2) specifications for inflight maintenance management requirements, and (3) suggested inflight maintenance data processing reports for logistics management. Author

**N74-12580** Western Electronic Show and Convention, Los Angeles, Calif.
**THE 1973 WESCON TECHNICAL PAPERS, VOLUME 17**
1973 464 p refs Presented at Western Electron. Show and Conv., San Francisco, 11-14 Sep. 1973
Copyright. Avail: Western Periodicals Co., 13000 Raymer Street, North Hollywood, Calif. 91605

Manufacturing technology and marketing aspects of electronic equipment are considered. Data processing systems and mathematical modelling for engineering design criteria, quality control, and management procedures are emphasized.

**N74-12581** Entrepreneur Press, Santa Clara, Calif.
**EVALUATING THE MARKETPLACE**
Donald M. Dible *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 3 p refs

Copyright.

Evaluating the marketplace on a modest budget need not be as difficult as it may seem. Many of the options available to the marketeer for securing marketing information from sources other than the records of his own corporation are considered. Author

**N74-12582** Drossler Research Corp., San Francisco, Calif.
**HOW TO PLAN MARKETING STRATEGY**
Richard A. Drossler *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 5 p refs

Copyright.

An integrated marketing strategy can be a strong competitive advantage by guiding tactical decisions toward a common goal. Suggested are five analytical steps to help develop a powerful competitive marketing strategy. A case history utilizing this approach is presented in a buying business models. Author

**N74-12583** Fairchild Camera and Instrument Corp., Mountain View, Calif.
**SUCCESSFUL MARKETING AND NEW PRODUCT INTRODUCTION**
Frederick M. Hoar *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 3 p

Copyright.

The proper techniques for announcing a new product in the electronics industry encompass press conferences for highest priority products, mailing of news releases, accompanied by photos, to various publications and trade magazines, and advertising strategies that give the product the deserved publicity. G.G.

**N74-12584** Electronic Representatives Association, San Carlos, Calif.
**BUILDING AND MOTIVATING A MANUFACTURER'S REP ORGANIZATION**
Frank Lebell *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 1 p
Copyright.

Representating manufacturers in a self-employed selling capacity-commonly termed rep necessitates functioning as management. Repping calls for being appointed to sell the product lines of various manufacturers according to certain negotiated conditions. The basic and most difficult part of being a rep is the acquisition of suitable lines. In order to acquire suitable lines, one should advertise oneself in trade publications; study ads by manufacturers requiring reps; and attend trade shows, which are excellent sources for obtaining lines. Author

**N74-12585** Stanford Research Inst., Menlo Park, Calif.
**THE POINT-OF-SALE MARKET**
Alan Purchase *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 3
Copyright.

The point-of-sale, or POS market, is considered. In providing perspectives on this market, some thoughts on products and services that various organizations could supply are outlined, and parts of this market that are best left to organizations with the tremendous financial, technical, and marketing resources are indicated. It would be more accurate to refer to these systems as inventory control systems, or sales accounting systems, or credit authorization systems that are really data systems for the retail sales industry. One of the data entry points for this retail sales data system is located where the sales transaction takes place. Author

**N74-12586** American Regitel Corp., Sudbury, Mass.
**POINT-OF-SALE: AN IDEA BECOMES AN INDUSTRY**
Brian H. Clayton *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 4 p
Copyright.

A brief history of the development of the point-of-sale industry is given. Early systems were determined by the background of the designers, and by what was technically possible, more than by the needs of the retailers or what was economically justifiable. As the market has matured, economics has become paramount, and today there is less differentiation between the systems, and considerably more payoff to the user. Author

**N74-12587** Safeway Stores, Inc., Oakland, Calif. Operations Service Div.
**SYSTEMS DESIGN OPPORTUNITIES**
Frederick N. Timm, III *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 4

Copyright.

The opportunities available to the systems designers in the fast growing and dynamic area of point-of-sale equipment have obligations which should be seriously observed by any company entering this field. The size of investment required by the retailers who install point-of-sale systems is substantial and when the mistakes and glamour of the initial installations wear off, the design should be capable of supporting the extras and promises originally provided. Author

**N74-12599** Techexport, Inc., Cambridge, Mass.
**THE AGENT AS A VEHICLE FOR EXPORT MARKETING**
*In* WESCON The 1973 WESON Tech. Papers, Vol. 17 1973 4 p
Copyright.

Various types of agency arrangements that can be used to successfully enter export markets are presented. There are a large number of sales agencies overseas that are also systems companies and even manufacturers. Author

**N74-12600** California State Univ., Long Beach.
**NEEDS AND TRENDS IN MEDICAL ELECTRONICS 1973: SESSION 13 OVERVIEW** c05
Morton D. Schwartz *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 4 p

Copyright.

Today's health care industry, changing patterns in health care, and influence of government on health care are discussed. Future needs and trends for public health programs and care are briefly reviewed. J.A.M.

**N74-12601** University of Southern Calif., Los Angeles. Biomedical Engineering Inst.
**CLINICAL ENGINEERING AND THE MEDICAL INSTRUMENTATION MARKETS** c05
Malcom G. Ridgway *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 5 p refs

Copyright.

Through programs, which are being actively promoted by local hospital associations, and thus promise to spread rapidly, hosptials of all types and sizes within a particular geographical area can obtain access to a range of practical engineering services conveniently and economically. These services include equipment maintenance and calibration and staff instruction programs to ensure that the equipment is used properly and safely. With local professional biomedical engineering assistance, the hospital group establishes its own nonprofit engineering organization and arranges to share among the participating hospitals, the services of both in-house and regional engineering teams. Author

**N74-12616** Bio-Optronics, Inc., Van Nuys, Calif.
**THE MEDICAL INSTRUMENT COMPANY ASSAY: 24 CARAT OR FOOL'S GOLD?**
Harold B. Rose *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 4 p
Copyright.

An introspective reflection is presented of an ex-aerospace and industrial instrumentation engineer's experience in the development of a new medical instrument company. The founding, initial product development, marketing, production, quality control, and financial traumas that are intrinsic in a new company situation are discussed. Author

**N74-12618** University of Southern Calif., Los Angeles.
**CLINICAL ENGINEERING AS A RESOURCE FOR NEW PRODUCT DEVELOPMENT**
George A. Bekey *In* WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 5 p
03-34)
Copyright.

Problems associated with innovation in the biomedical instrumentation industry are discussed. The lack of an organized structure for getting design requirements from the clinical environment to the product developer is highlighted, along with other problems particular to this industry. Various solutions to the problem are discussed, using the development of the heart pacemaker as a prototype. The possible role of a nonprofit Clinical Engineering Institute as a catalyst to aid innovation in the biomedical instrumentation industry is presented. Author

**N74-12665** Oklahoma State Univ., Stillwater.
**INTEGRATED RISK ASSESSMENT AND SCORING IN THE DEPARTMENT OF DEFENSE SOURCE SELECTION PROCESS Ph.D. Thesis**
Everett Lane Thomas, Jr. 1972 315 p
Avail: Univ. Microfilms Order No. 73-15261

The problems associated with evaluating and scoring contractor proposals in the DoD Source Selection process are examined. What effects the minimum documentation and prototype hardware development concepts of the current DoD management philosophy may have on the Source Selection process are determined. The primary objective is to develop an integrated risk assessment and scoring model and procedural methodology for use by the Source Selection Evaluation Board. An initial risk model is developed and applied to the source selection activities for a major aircraft system which employs the current DoD management concepts. The results of a source selection questionnaire are evaluated to investigate the problems associated with the Source Selection evaluation and scoring process. An integrated risk assessment and scoring model is developed to enable source selection officials to obtain a relative measure of the over-all technical risk associated with each contractor proposal. Dissert. Abstr.

**N74-12671#** Helsinki Univ. of Technology, Otaniemi (Finland).
**FACTORS AFFECTING DIRECTION OF INNOVATION SYSTEM [INNOVAATIO SYSTEEMIN OHJAUTUMISEEN VAIKUTTAVAT TEKIJAT]**
Markku Nurmi 1973 177 p refs In FINNISH
(Research-Paper-45) Avail: NTIS HC $11.00

This study begins with the hypothesis that technological development in itself is not good or bad, but what is more essential is how the development is directed and how rapid that development is. On this basis, a method is developed by which technological development can be directed on a course desirable to society. Thus, it is essential to know which factors affect the directing of technological development, and how it is possible to cause the development to move in the desired direction with the aid of these factors. An innovation system is created which can be described, e.g., as an instant status of technological development. In other words, when a time factor is added to the innovation system, technological development is recieved. This has been used in Finland as an examination perspective. However, it should be possible, to generalize the results applicable to market-economy countries in general. Author

**N74-12673*#** National Aeronautics and Space Administration, Washington, D.C.
**RESEARCH AND TECHNOLOGY OPERATING PLAN: A SUMMARY FISCAL YEAR 1974**
[1973] 204 p refs
(NASA-TM-X-69456) Avail: NTIS HC $12.25 CSCL 05B

A compilation is presented of the summary portions of RTOPs used for management review and control of research. Citations and abstracts of RTOPs are included. A list is presented of RTOPs which have been changed, completed, or terminated since the last summary. Indexes presented include: subject, technical monitor, responsible NASA organization, and RTOP number. Author

**N74-12668#** , Committee on Science and Astronautics (U. S. House).
**UNIVERSITY ENERGY RESEARCH CENTERS**
Washington GPO 1973 52 p refs Hearing on H.R. 8348 and H.R. 9133 before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 11, 23 Jul. 1973
Avail: NTIS Avail: Subcomm. on Energy

A Congressional hearing is presented concerning the enactment of bills for enlisting the aid of academic researchers in carrying out energy R and D programs. Previous bills and past efforts are cited. The relationship between national laboratories to universities and the relation of either or both to private industry and the Federal Government, and to mission oriented projects associated with power engineering research are discussed. The designation of certain leading institutions and universities in certain fields is also considered. T.M.R.

**N74-12692#** Joint Publications Research Service, Arlington, Va.
**SCIENCE SUPPORT AND MANAGEMENT**
G. M. Dobrov and G. M. Glagoleva 12 Nov. 1973 23 p refs Transl. into ENGLISH from Ekonomika i Organizatsiya Promyshlennogo Proizvodstva (Moscow), no. 3, 1973 p 14-30
(JPRS-60509) Avail: NTIS HC $3.25 CSCL 05A

Articles are presented on the systems approach to science management and on the material and technical support of science. Author

**N74-12693#** Joint Publications Research Service, Arlington, Va.
**MATHEMATICAL METHODS OF OPTIMAL PLANNING DEVELOPMENT AND USE OF ENERGY SYSTEMS**
L. P. Padalko 15 Nov. 1973 209 p refs Transl. into ENGLISH of the book "Matematicheskiye Metody Optimal'nogo Planirovaniya Razvitiya i Ekspluatatsii Energosistem" Minsk, Izdatel' stvo Vysheyshaya Shkola, 1973 199 p
(JPRS-60546) Avail: NTIS HC $12.50

A discussion is given of the bases of mathematical methods of optimal planning and their use for selecting optical solutions in the planning, development, and operation of power supply systems. Author

**N74-12694#** Joint Publications Research Service, Arlington, Va.
**TRANSLATIONS ON EASTERN EUROPE, SCIENTIFIC AFFAIRS, NO. 367**
12 Nov. 1973 34 p refs Transl. into ENGLISH from Bulgarian and Polish articles
(JPRS-60507) Avail: NTIS HC $3.75

An article is reported concerning coordination and subordination systems of nature and society. A description is given of systems divided on the basis of the Marxist doctrine of the socioeconomic formation. Production relations, productive forces, and social relations are discussed along with conflicts in a coordination system. Also presented is an article on the development of RASKO-2, the first Polish designed rocket for cloud seeding. Rocket design and operation are described along with operating characteristics such as rapid firing, operational limits with regard to wind, and reliability. K.M.M.

**N74-12696#** Los Alamos Scientific Lab., N.Mex.
**SOME INTERFACES IN RESOURCE UTILIZATION**
L. P. Reinig [1973] 16 p refs Presented at Symp. on Econ. Develop. vs. Environ. Quality in the Southwest, Lubbock, Tex.,

19-20 Apr. 1973; sponsored by Comm. on Desert and Arid Zone Res. of the Am. Assoc. For the Advan. of Sci.
(Contract W-7405-eng-36)
(LA-UR-73-570; Conf-730440-1) Avail: NTIS HC $3.00

Los Alamos Scientific Laboratory is engaged in programs to explore the ways of extracting useful power from the heat of the earth's crust; to demonstrate the feasibility of superconducting transmission lines; and to develop a rock-melting penetrator, or subterrene, expected to be capable of creating long tunnels in rock. The tunnels, lined with the glass-like melted rock created by passage of the subterrene, might form excellent conduits for underground transmission lines, as well as serving in the exploitation of geothermal energy. A project to exploit the vast underground reservoir of saline water in New Mexico is described. The project TRG is based on desalination by means of geothermal or nuclear energy to furnish New Mexico with water and electric power. NSA

**N74-12731#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), AH-1G 90 DEGREE GEARBOX Interim Report, 1 Jan. 1964 - 30 Jun. 1972**
Sep. 1973 32 p
(AD-767540; USAAVSCOM-TR-73-21) Avail: NTIS CSCL 01/3

The report describes a maintenance analysis of a helicopter rotor gearbox. Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-12732#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), CH-54A MAIN ROTOR PRIMARY SERVO Interim Report, 1 Jan. 1964 - 31 Dec. 1972**
Sep. 1973 30 p refs
(AD-767539; USAAVSCOM-TR-73-22) Avail: NTIS CSCL 01/3

The report describes a maintenance analysis of 2 helicopter main rotor primary servo. The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design, and extensions of time between overhaul of major items. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. GRA

**N74-12780** Arizona State Univ., Tempe.
**A MULTIVARIATE STATISTICAL MODEL TO PREDETERMINE PREFERABLE AIRCRAFT ASSIGNMENTS: A FEASIBILITY STUDY Ph.D. Thesis**
James Alfred Cline 1973 448 p
Avail: Univ. Microfilm Order No. 73-20434

Research was conducted to investigate the feasibility of constructing a model that could be used by the United States Air Force for the early selection of student pilots for assignment to operational aircraft. Such a model would be of value to the Air Force if the current philosophy of generalized Undergraduate Pilot Training were changed to a specialized philosophy. The resutls of the study indicate that it is feasible to construct a selection model for application at the completion of the Primary Phase of Undergraduate Pilot Training, to assign pilots to operational aircraft. The validity of the Air Force Officer Qualification Test as a selection device was questioned. AID is compared to regression analysis as a statistical tool; and, the use of Combat Crew Training grades and Officer Effectiveness Report ratings as criteria measures are also discussed.
Dissert. Abstr.

**N74-12781*#** Michigan Univ., Ann Arbor. Research Center for Group Dynamics.
**A PROGRAM TO REDUCE CORONARY HEART DISEASE RISK BY ALTERING JOB STRESSES Final Report, 1 Aug. 1971 - 30 Sep. 1973 - Ph.D. Thesis**
Douglas Bruce Campbell Sep. 1973 274 p refs
(Grant NGR-23-005-185)
(NASA-CR-132891) Avail: NTIS HC $13.25

This study reports the design, implementation, and evaluation of a program attempting to reduce job stress by improving person-environment fit with respect to job aspects such as work load, responsibility, and interpersonal relationships. In order to assess the effects of the program, measures of both stress and strain were collected at three points in time--just prior to the program, immediately after the program, and three months after completion of the program. Measures of strain included systolic and diastolic blood pressure, determinations of glucose, cholesterol, and uric acid in the plasma, job satisfaction, and job related self-esteem. The findings were interpreted in light of both program incidents within specific experimental groups and general aspects of the program common to the experimental groups. Additional analyses indicated that both good person-environment fit with respect to participation predicts to good fit with respect to other job aspects over a three month interval and that stress causes strain, rather than the reverse. Author

**N74-12861#** Research Inst. of National Defence, Stockholm (Sweden).
**A METHOD FOR MECHANICAL FREQUENCY ALLOTMENT FOR RADIO COMMUNICATION WITHIN THE ICAO EUROPEAN REGION [METOD FOER MASKINELL FREKVENSTILLDELNING FOER RADIOKOMMUNIKATION INOM ICAO EUROPAREGION]**
Lars Bergman Dec. 1971 53 p refs
(FOA-3-A-3753-E2) Avail: NTIS HC $4.75

Three aids for alloting frequencies within the communication band 118 to 136 MHz are considered, namely: A map drawing program, the matrix method and the allotment program. Programs for preparing separation and allotment matrices for the matrix method and also for the allotment program are described.
Author

**N74-12895#** Research Inst. of National Defence, Stockholm (Sweden).
**INTERNATIONAL CONFERENCE ON INFORMATION SCIENCE**
Rolf Gezelius Jan. 1972 22 p refs In SWEDISH Conf. held at Tel Aviv, Israel, 29 Aug. - 3 Sep. 1971
(FOA-3-C-3704-E8) Avail: NTIS HC $3.25

The ten sessions dealt with national and international information systems, information analysis, information economy, the effectivity in recovery of information, education, reprography, commercial information services, system analysis within the sphere of information and operative systems. A brief outline is given of the Israeli organizations for information and the range of documentation. Author

**N74-13042*#** Mississippi State Univ., State College. Dept. of Electrical Engineering.
**STUDY OF THE APPLICATION OF REMOTE SENSING DATA TO LAND USE PLANNING ON THE MISSISSIPPI GULF COAST Progress Report, period ending 30 Nov. 1973**
Frank Ingels, Principal Investigator 5 Dec. 1973 10 p ERTS
(Contract NAS5-21817)

(E74-10115; NASA-CR-136127; PR-6) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-13057*#** Alaska Univ., Palmer.
**IDENTIFICATION OF PHENOLOGICAL STAGES AND VEGETATIVE TYPES FOR LAND USE CLASSIFICATION**
**Bimonthly Progress Report**
Jay D. McKendrick, Principal Investigator 30 Nov. 1973 32 p ERTS
(Contract NAS5-21833)
(E74-10130; NASA-CR-136175; BMPR-8) Avail: NTIS HC $3.75 CSCL 08F

The author has identified the following significant results. Classification of digital data for mapping Alaskan vegetation has been compared to ground truth data and found to have accuracies as high as 90%. These classifications are broad scale types as are currently being used on the Major Ecosystems of Alaska map prepared by the Joint Federal-State Land Use Planning Commission for Alaska. Cost estimates for several options using the ERTS-1 digital data to map the Alaskan land mass at the 1:250,000 scale ranged between $2.17 to $1.49 per square mile.

**N74-13570*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**STUDY OF AIRBORNE SCIENCE EXPERIMENT MANAGEMENT CONCEPTS FOR APPLICATION TO SPACE SHUTTLE. VOLUME 1: EXECUTIVE SUMMARY**
Donald R. Mulholland, John O. Reller, Jr., Carr B. Neel, and Louis C. Haughney Jul. 1973 23 p refs
(NASA-TM-X-62288) Avail: NTIS HC $3.25 CSCL 22C

The management concepts and operating procedures are documented as they apply to the planning of shuttle spacelab operations. Areas discussed include: airborne missions; formulation of missions; management procedures; experimenter involvement; experiment development and performance; data handling; safety procedures; and applications to shuttle spacelab planning. Characteristics of the airborne science experience are listed, and references and figures are included. K.M.M.

**N74-13589*#** TRW Systems Group, Redondo Beach, Calif.
**FUNCTIONAL REQUIREMENTS FOR ONBOARD MANAGEMENT OF SPACE SHUTTLE CONSUMABLES, VOLUME 1**
**Final Report**
P. J. Graf, H. A. Herwig, and L. W. Neel 16 Nov. 1973 107 p refs
(Contract NAS9-12944)
(NASA-CR-134144; TRW-22104-H001-R0-00-Vol-1) Avail: NTIS HC $7.50 CSCL 22B

A study was conducted to determine the functional requirements for onboard management of space shuttle consumables. A generalized consumable management concept was developed for application to advanced spacecraft. The subsystems and related consumables selected for inclusion in the consumables management system are: (1) propulsion, (2) power generation, and (3) environmental and life support. Author

**N74-13590*#** TRW Systems Group, Redondo Beach, Calif.
**FUNCTIONAL REQUIREMENTS FOR ONBOARD MANAGEMENT OF SPACE SHUTTLE CONSUMABLES, VOLUME 2.**
**Final Report**
P. J. Graf, H. A. Herwig, and L. W. Neel 16 Nov. 1973 145 p refs
(Contract NAS9-12944)
(NASA-CR-134145; TRW-22104-H002-R0-00-Vol-2) Avail: NTIS HC $9.25 CSCL 22B

A study was conducted to develop the functional requirements for onboard management of space shuttle consumables. A specific consumables management concept for the space shuttle vehicle was developed and the functional requirements for the onboard portion of the concept were generated. Consumables management is the process of controlling or influencing the usage of expendable materials involved in vehicle subsystem operation. The subsystems considered in the study are: (1) propulsion, (2) power generation, and (3) environmental and life support. Author

**N74-13682#** Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
**SRDS TECHNICAL PROGRAM DOCUMENT, FISCAL YEAR 1974. ENGINEERING AND DEVELOPMENT PROGRAMS**
Jul. 1973 179 p
Avail: NTIS HC $11.00

The technical program document for the fiscal year 1974 engineering and development programs of the Department of Transportation of the Federal Aviation Administration is presented. The program resumes identify the technical objective, approach, milestones scheduled for accomplishment, and requirements. The overall program is discussed under twenty-two categories which include: (1) aircraft safety, (2) air traffic control, (3) airports, and (4) weather services. Author

**N74-13684#** Committee on Appropriations (U. S. House).
**DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, SPACE, SCIENCE, VETERANS, AND CERTAIN OTHER INDEPENDENT AGENCIES APPROPRIATION ACT, 1974**
Washington GPO 26 Oct. 1973 13 p H.R. 8825 enacted into law by the 93d Congr., 26 Oct. 1973
(Pub-Law-93-137) Avail: US Capitol, House Document Room

Congressional legislation concerning appropriations for the Department of Housing and Urban Development is presented. Additional actions to appropriate funds for space, science, veterans, and certain other independent executive agencies, boards, and commissions are included. The specific purposes of the allocated funds are identified and limitations on the expenditure of funds are imposed. Author

**N74-13685#** Committee on Science and Astronautics (U. S. House).
**FIRE PREVENTION AND CONTROL**
Washington GPO 1973 443 p refs Hearings before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 15, 25-26, 31 Jul. and 1-2 Aug. 1973
Avail: Subcomm. on Sci., Res., and Develop.

Congressional hearings concerning legislation for improving fire prevention and control facilities are presented. The legislation provides for the following provisions: (1) creation of a National Fire Academy to conduct research, development, and training in fire prevention and control, (2) authority to make grants to accredited institutions of higher education to pay costs of fire science programs, (3) financial assistance to local fire departments to purchase improved firefighting equipment, and (4) extension of governmental activity in fire prevention research and development. Author

**N74-13686#** Committee on Science and Astronautics (U. S. House).
**SPACE TUG-1973**
Washington GPO 1973 272 p Hearings before Comm. on Sci. and Astronaut., 93D Congr., 1st Sess., No. 16, 5, 7, 8, 10, and 26 Sep. 1973
Avail: Subcomm. on Manned Space Flight

The Subcommittee on Manned Space Flight conducted a series of hearings on the proposed Space Tug for several reasons: (1) the determination and finding of the role of the Space Tug in the Space Shuttle program; (2) the fiscal impact of the Space Tug on the overall Manned Space Flight budget and specifically the Space Shuttle program; (3) the operations impact of the Space Tug on the latest proposed NASA mission model; (4) the operations impact on the projected cost-per-flight of the Space Shuttle (5) the ascertainment of the DOD role in the development and usage of the Space Tug; (6) NASA's and

industry's progress in conceptual design of the Space Tug vehicle. In concert with the above goals, the subcommittee held hearings with NASA, General Dynamics Convair Division, McDonnell Douglas Astronautics Company, Lockheed Missiles & Space Co., Martin Marietta Denver Division, and Grumman Aerospace Corp. As contained in the body of the hearing, NASA presented an overview of the role of the Space Tug program with no conclusion nor recommended approaches at this time. Author

**N74-13687#** National Bureau of Standards, Washington, D.C. Office of International Relations.
**COLLABORATIVE RESEARCH PROGRAM BETWEEN NBS AND INDIAN SCIENTIFIC INSTITUTIONS: SPECIAL FOREIGN CURRENCY PROGRAM, 1973 STATUS Final Report**
H. Steffen Peiser, Michael B. McNeil, and Doris M. Bluebond Nov. 1973 140 p refs
(NBS-TN-798) Avail: SOD HC $1.50 as C13.46:798

To demonstrate the wide use of such grants over the entire program structure of NBS, the grant descriptions are ordered by the elements of that program structure. Comment on the significance and purpose of the NBS/SFCP grant program is presented. Author

**N74-13689*#** George Washington Univ., Washington, D.C.
**US TECHNOLOGY: TRENDS AND POLICY ISSUES**
Michael Boretsky (Dept. of Commerce) Oct. 1973 175 p refs
(Grants NGL-09-010-030; NSF GS-34902)
(NASA-CR-136302; GWPS-Mon-17) Avail: NTIS HC $10.75 CSCL 05A

A broad, factual and systematic analysis of the current state of affairs in U.S. technology is presented with emphasis on the problems it faces, and the Government's posture toward technology. Topics discussed include: current state of U.S. technology, lagging productivity growth, deterioration in the U.S. trade position, the causes of the loss of U.S. technological advantage, and policy issues. F.O.S.

**N74-13691#** Research Inst. of National Defence, Stockholm (Sweden).
**COMMENTS ON FOAP STATEMENTS AND WORKING. BASIS FOR A CASE PRESENTED TO FU69 MEETING, 27 SEPTEMBER 1971 [SYNPUNKTER PA FOA P UPPGIFTER OCH ARBETSFORMER. UNDERLAG FOER FOEREDRAGNING VID FU 69 SAMMANTRAEDE 27.9.71]**
C. G. Jennergren Nov. 1971 28 p refs In SWEDISH
(FOA-P-C-8303-M6) Avail: NTIS HC $3.50

FOA has tried to solve the problem of directing scientific research and the transmission of results by setting up a broad contact area between the investigator and those at working level. The development of methods for long term planning tends towards greater attention being attached to policy forming processes. In this case a consultant group which works at different levels can be meaningful because the better conditions created mean that the information between levels is comprehended in the proper way. Author

**N74-13692#** Research Inst. of National Defence, Stockholm (Sweden).
**SOME COMMENTS ON FOA INVESTIGATION ACTIVITY [SYNPUNKTER PA FOA UTREDNINGSVERKSAMHET]**
P.-O. Nilsson Oct. 1971 19 p In SWEDISH
(FOA-P-C-8296-M6) Avail: NTIS HC $3.00

The role of investigation activities as intermediaries of both the results of scientific research to the consumer and the research for research organizations is considered. Factors of significance for directing future research activities are discussed as a basis for comments on the direction of future research activity. In order to respond to the need of high ambition levels as regards research for defense, the FOA target level for research activities must be high, including an increased share of the technical system analyses and must be compentent to analyze planning and decision problems. Author

**N74-13698#** Naval Postgraduate School, Monterey, Calif.
**ADAPTATION OF SYSTEM X COMPUTER-ASSISTED PROJECT MANAGEMENT EXERCISES FOR USE AT THE NAVAL POSTGRADUATE SCHOOL M.S. Thesis**
Herbert Henry Joseph Nicholson Jun. 1973 115 p refs
(AD-767652) Avail: NTIS CSCL 16/4

System X is a series of project management oriented case studies supported by an interactive time-sharing computer program simulating the analysis and evaluation of a hypothetical surface-to-surface guided missile system acquisition program. The computer-assisted exercises operate from baseline data supplied by a data base, along with system parameters set by the user, in order to compute various deterministic statistics regarding system performance and system costs. The system parameter values may be readily changed and the computations repeated. A desired result may be obtained by repeated iterations of the process. Author (GRA)

**N74-13729#** Little (Arthur D.), Inc., Cambridge, Mass.
**FAILURE ANALYSIS OF HELICOPTER EXTERNAL CARGO-HANDLING SYSTEMS Final Report**
Robert E. Hunt Jun. 1973 168 p refs
(Contract DAAJ02-72-C-0063; DA Proj. 1F1-62203-AA-33)
(AD-767254; ADL-C-74645; USAAMRDL-TR-73-44) Avail: NTIS CSCL 01/3

A study of the failure of helicopter cargo-handling systems was conducted. A data search and compilation were completed from which the external cargo-handling system was defined and the system operation explained. Operational parameters were also defined and explained. Also criteria for assessing failures were established, data sources were cited, a search plan outlined, and failure data and consensus data were retrieved and categorized. The data were taken primarily from cargo helicopters deployed in Vietnam. Their overall utilization, load categories, and rigging materials were determined, and a consensus summary of the cause of specific failures was compiled and documented. A data analysis was conducted with the relationship of failure occurrences and rates determined for specific types of accidents and failures. Predominant causes of failures were analyzed, a cost/value of relationship of cargo dropped established, and projections of the heavy-lift helicopter as a cargo carrier were made. Candidate corrective actions were recommended, with the development of specific corrective actions made, encompassing a collapsible cargo net-pallet concept and an investigation of cargo hook design principles. Author (GRA)

**N74-13751#** Center for Naval Analyses, Arlington, Va.
**AIRCRAFT FORCE PROTECTION MODEL. VOLUME 1: USERS GUIDE TO AFPM**
Steven W. Klein and Thomas H. Thoureen Mar. 1973 151 p refs
(Contract N00014-68-A-0091)
(AD-767946; CNA-Res-Contrib-225) Avail: NTIS CSCL 15/5

The Aircraft Force Projection Model (AFPM) is a FORTRAN model which projects the Navy's aircraft inventory over a ten-year period and attempts to satisfy the operating requirements of a given set of forces with the projected operating inventory. This comparison of operating inventory and force requirements is the characteristic which sets the AFPM apart from most inventory projection models. The AFPM generates useful characteristics of the aircraft inventory such as projections of the age distribution, attrition quantities, pipeline requirements and rework requirements. Author (GRA)

**N74-13908** Computer Aided Design Centre, Cambridge (England).
**ECONOMICS OF CAD: A NEW APPROACH**

A. I. Llewelyn and G. C. Freeman *In* AGARD Computer Aided Design for Electron. Circuits Oct. 1973 10 p refs

The economics of CAD is dependent on the degree to which commonalities can be recognised over a wide application front and embodied into common interactive software and a flexible computer system. The CAD Centre has worked closely with industry over the whole engineering front in order to identify such commonalities, while at the same time keying its development to industrial needs and operating in a commercial environment where the economics of CAD is always in the forefront. The Centre's function and facilities and its method of operation are described. The economic advantages to be gained from the use of a common system developed through experience gained by multi-organization, multi-discipline working are discussed.
Author

**N74-13910** Radio Corp. of America, Moorestown, N.J. Government and Commercial Systems Div.
**RELIABILITY AND COMPUTER AIDED DESIGN**
James G. Smith *In* AGARD Computer Aided Design for Electron. Circuits Oct. 1973 11 p refs

Information is presented to show that an integrated system of design aids raises the level of design assurance and thereby improves reliability. Topics of discussion include: (1) reliability at the expense of design complexity, (2) pertinent attributes of the computer, (3) standard cell automation, (4) the standard cell library, (5) computer aided circuit design, (6) logic simulation and test generation, (7) computer aided printed circuit board design, and (8) backplane wiring design automation. D.L.G.

**N74-13938** International Business Machines Corp., Owego, N.Y.
**ERGONOMIC CONSIDERATIONS OF INFORMATION DISPLAY AND CONTROL FOR DESIGN AUTOMATION SYSTEMS**
William M. Gaddes *In* AGARD Computer Aided Design for Electron. Circuits Oct. 1973 13 p refs

A method is described for ensuring that appropriate considerations be given to the requirements of the intended users during system development. Trends in design automation systems are discussed; particularly with respect to the increased functional integration and interaction of the users with the system, as well as among multiple users. A method is described, based on user-oriented flow diagrams, which is intended to define the user requirements. A description is provided by which these diagrams are used to establish user requirements and to establish a communication link between the users and the system architects. Difficulties that may be expected with regard to user interfaces are listed, and the value of the method for establishing ergonomic design and evaluation criteria, procedural aids and methods, and educational materials is discussed. Author

**N74-14006*#** California Univ., Berkeley. Space Sciences Lab.
**AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES Annual Progress Report**
Robert N. Colwell, C. West Churchman, Robert H. Burgy, Gerald Schubert, John E. Estes, Leonard W. Bowden, R. Algazi, and K. L. Coulson, Principal Investigators 30 Jun. 1973 402 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Grant NGL-05-003-404)
(E74-10136; NASA-CR-136181) Avail: NTIS HC $22.25 CSCL 08F

The University of California has been conducting an investigation which seeks to determine the usefulness of modern remote sensing techniques for studying various components of California's earth resources complex. Most of the work has concentrated on California's water resources, but with some attention being given to other earth resources as well and to the interplay between them and California's water resources.

**N74-14007*** California Univ., Berkeley. Social Sciences Group.
**DEFINITION OF EARTH RESOURCE POLICY AND MANAGEMENT PROBLEMS IN CALIFORNIA**
Robert N. Colwell, C. West Churchman, Principal Investigators, Ida Hoos, and William Gotcher *In its* An Intergrated Study of Earth Resources in the State of California Using Remote Sensing Techniques 30 Jun. 1973 12 p refs ERTS

CSCL 05B

There are no author-identified signficant results in this report.

**N74-14008*** California Univ., Davis. Dept. of Water Science and Engineering.
**USER REQUIREMENTS FOR THE APPLICATION OF REMOTE SENSING IN THE PLANNING AND MANAGEMENT OF WATER RESOURCE SYSTEMS**
Robert N. Colwell, Principal Investigators and Robert H. Burgy *In its* An Integrated Study of Earth Resources in the State of California Using Remote Sensing Techniques 30 Jun. 1973 9 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

CSCL 08H

There are no author-identified significant results in this report.

**N74-14009*** California Univ., Berkeley. Forestry Remote Sensing Lab.
**REMOTE SENSING DATA AS AN AID TO RESOURCE MANAGEMENT IN NORTHERN CALIFORNIA**
Robert N. Colwell, Principal Investigator, Gene A. Thorley, Andrew S. Benson, David M. Carneggie, William C. Draeger, Paul F. Krumpe, Donald T. Lauer, James D. Nichols, Howard O. Thrall, Randall W. Thomas et al *In its* An Integrated Study of Earth Resources in the State of California Using Remote Sensing Techniques 30 Jun. 1973 92 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
CSCL 08B

There are no author-identified significant results in this report.

**N74-14012*** California Univ., Riverside. Dept. of Geography.
**ENVIRONMENTAL MONITORING AND ASSESSMENT IN SOUTHERN CALIFORNIA USING REMOTE SENSING TECHNIQUES**
Robert N. Colwell, Leonard W. Bowden, Principal Investigators, J. B. Bale, C. W. Johnson, J. Viellenave, D. Goehring, P. Wilke, V. Coleman, J. Huning, C. Hutchinson et al *In its* An Integrated Study of Earth Resources in the State of California Using Remote Sensing Techniques 30 Jun. 1973 139 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
CSCL 08B

There are no author-identified significant results in this report.

**N74-14108#** National Oceanic and Atmospheric Administration, Silver Spring, Md. Environmental Data Service.
**INTERNATIONAL DECADE OF OCEAN EXPLORATION,**

**JANUARY 1970 TO JULY 1972 Progress Report**
Jan. 1973 39 p refs
(PB-223331; NSF/IDOE-73-19) Avail: NTIS HC $4.00 CSCL 08J

The report provides the scientific community and other interested persons with information, data inventories, and lists of scientific reports pertinent to ocean exploration. The text is arranged according to the program areas established for IDOE. The appendix contains the National Marine Data Inventory (NAMDI), a computerized summary of reported observations made at sea during the period. The program areas are: Environmental quality environmental forecasting seabed assessment program, and living resources. GRA

**N74-14273** Department of Transportation, Washington, D.C.
**UNITED STATES DEPARTMENT OF TRANSPORTATION RESEARCH PROGRAM FOR HIGH ALTITUDE POLLUTION**
Alan J. Grobecker *In* AGARD Atmospheric Pollution by Aircraft Engines Sep. 1973 13 p refs

A review of a United States program to provide an assessment by 1974 of the impact on man, plants and animals of climatic changes due to perturbations of the upper atmosphere by the propulsion effluents of a world high-altitude aircraft fleet as projected to 1990 is presented. Some physical considerations which must be taken into account in this program are described, including representations: of the stratosphere in its unperturbed state, of the effluents of vehicles expected in 1990, of the perturbed stratosphere of 1990, of the perturbed troposphere of 1990 and 2020, of the effects of climatic changes on the biosphere and of social and economic measures of these biological effects. Author

**N74-14612*** Computer Software Management and Information Center, Athens, Ga.
**NASTRAN DISTRIBUTION THROUGH COSMIC**
Margaret K. Park *In* NASA. Langley Res. Center NASTRAN: Users' Experiences Sep. 1973 p 569-571 refs

CSCL 09B

The NASTRAN program package is one of the most important in terms of size and use in the COSMIC inventory at the University of Georgia. A brief history of the COSMIC facility as it relates to the NASTRAN program package is presented, followed by a discussion of the NASTRAN disseminations. COSMIC, which is the acronym for the Computer Software Management and Information Center, is operated by the University of Georgia's Computer Center under contract to NASA. The purpose of COSMIC is to make available to the public the computer software and documentation developed as part of the NASA program. It is, perhaps, best described as a clearinghouse for the NASA-sponsored computer software, although the functions specified under the contract go much further than simply duplicating the programs and documentation for distribution. A sizeable portion of the workscope involves screening the programs to insure that they are free of syntax errors, that all necessary subroutines are present, and that the documentation includes sufficiently detailed instructions to allow purchasers to install and operate the program or system. Author

**N74-14665** Oklahoma Univ., Norman.
**MANERGY: AN ENERGY MANAGEMENT MODEL OF THE UNITED STATES FOR THE PREDICTION OF ENERGY DEMAND, RESOURCE CONSUMPTION, ENVIRONMENTAL EFFECTS, THE ASSESSMENT OF NEW TECHNOLOGY, AND ENERGY RESOURCE ALTERNATIVES Ph.D. Thesis**
William Woodrow Talley, II 1973 723 p
Avail: Univ. Microfilms Order No. 73-23921

A computerized, systems-analysis model of the United States energy system has been developed and presented in code form. The model was designed for use as a management tool for assessing the consequences of resources and fuel alternatives, environmental controls, and technological advances. The assessment guidelines are presented as resource consumptions, environmental impacts, and balance of payment deficits to the year 2100. The model's capabilities and its inherent flexibility have been demonstrated for a baseline case and several alternatives. The base case was based on current energy use patterns, diversified resource development, projected fuel splits, population and gross national product projections, and reasonable advances in technology. The model has sufficient flexibility to include the results of the many existing and future studies on energy supply and demand. It quantifies the impacts of energy policy decisions into acceptable indices. As such, it has the capability to provide energy management guidelines necessary to make decisions on research and development priorities, legislation and regulations. Dissert. Abstr.

**N74-14667#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
**DFVLR ANNUAL REVIEW, 1972 [DFVLR JAHRESBERICHT 1972]**
1972 477 p refs In GERMAN
Avail: NTIS HC $26.00

The various research activities are reported that were performed by the German Aeronautical and Aerospace Institute during 1972. Topics stretch from aerodynamical engineering aspects to the management of space flight missions.

**N74-14675** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
**AEROTECHNOLOGY IN AVIATION PROBLEMS [LUFTFAHRTTECHNISCHER BEREICH]**
*In its* DFVLR Annual Review, 1972 1972 p 383-401 refs In GERMAN; ENGLISH summary

Scientific-engineering coordination with Federal ministries and industries is provided in planning, accomplishing, and evaluating aviation problems of safety and traffic regulations. This includes supplying of pilots and aircraft for scientific tasks of research and testing. Transl. by G.G.

**N74-14676** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
**RESEARCH IN CHEMICAL ROCKET PROPULSION, SATELLITE ELECTRONICS, AND SPACECRAFT COMMUNICATIONS [BEREICH FUER RAUMFLUGPROJEKTE]**

*In its* DFVLR Annual Review, 1972 1972 p 403-436 refs In GERMAN; ENGLISH summary

Organization and management support is provided for space programs, customer realization of space- and extraterrestrial-flight projects, as well as for launch and operation of spacecraft missions. Testing facilities and ground operation installations are used to evaluate the various space flight projects. Transl. by G.G.

**N74-14677** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
**RESEARCH IN EXTRATERRESTRIAL PHYSICS AND ASTROPHYSICS [ARBEITSGEMEINSCHAFT FUER WELTRAUMFORSCHUNG (014)]**
*In its* DFVLR Annual Review, 1972 1972 p 437-439 refs In GERMAN; ENGLISH summary

The committee for aerospace research is competent for the cooperation in the field of extraterrestrial research performing scientific experiments by means of sounding rockets, satellites or probes, and space flight research assisting in the preparing and performing of experiments. The study group disposes of an office, the tasks of which are the coordination of common activities and the cooperation in the preplanning phase of space flight research missions. Author

**N74-14678#** Committee on Space Research (COSPAR), Paris (France).
**COSPAR INFORAMTION BULLETIN NO. 68, DECEMBER 1973**
Dec. 1973 53 p refs
Avail: NTIS HC $4.75

Past conferences are reported, and scheduled meeting are listed. The memorandum of understanding concerning European-U.S. cooperation, and the data systems test are discussed along with the air mass transformation experiment. The resolution of the second assembly of the Scientific Committee on Problems of the Environment are listed. A list of satellites, and space probes from 27 June to 27 September 1973 is included. F.O.S.

**N74-14680#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**STATE OF THE AEROPSACE INDUSTRY**
Washington GPO 1973 222 p Hearings before Comm. on Aeron. and Space Sci., 93d Congr. 1st Sess., 26-27 Sep. 1973
Avail: Comm. on Aeron. and Space Sci.

The hearings are reported concerning the role of the aerospace industries in the aeronautics and space program. Topics discussed include: technology utilization, aviation financing, recommended investment levels for research and development, a balanced program for the future, and the national aeronautics and space objectives. F.O.S.

**N74-14684#** RAND Corp., Santa Monica, Calif.
**ENERGY POLICY RESEARCH AND THE STATE OF FLORIDA**
William E. Mooz Aug. 1973 17 p Sponsored by NSF and the State of Calif.
(P-5078) Avail: NTIS HC $3.00

A discussion of state energy problems and the research required to support the selection of policies designed to solve them. The example chosen is the State of Florida, in which future energy demands may be in conflict with its unique environment, and the basis for the discussion is Rand's past and present energy work for the National Science Foundation and the State of California. Author

**N74-14686#** Interior Dept., Washington, D.C. Office of Energy Conservation.
**FEDERAL AGENCY ENERGY CONSERVATION Quarterly Report, Jul. - Sep. 1973**
Dec. 1973 13 p ref
(QR-1) Avail: NTIS HC $3.00

On June 29, 1973, the President ordered the Federal government to achieve a 7 percent reduction in its anticipated energy consumption over the succeeding 12 months. While there are more than 80 departments and agencies within the Federal government, nearly all of the energy is consumed by the 11 cabinet departments and five large agencies. The focus of the effort has been in these 16 units. In all, a total of 20.8 percent savings in energy was made when compared to anticipated use during FY 1974. Monetary savings amounted to about $160 million. The Department of Defense is the largest user of energy in the government (86 percent), and it effected the greatest savings, mostly in its diminished use of automotive and aviation fuels. Seven other agencies met or exceeded the goal. Author

**N74-14688#** National Bureau of Standards, Washington, D.C. Inst. for Applied Technology.
**ENERGY CONSERVATION THROUGH EFFECTIVE UTILIZATION**
Charles A. Berg Feb. 1973 55 p refs
(NBSIR-73-102) Avail: NTIS HC $4.75

In two major sectors of the economy (building services and industrial processes), accounting for approximately 75 percent of the total national energy consumption, energy utilization was found to be inefficient. It is estimated that in these two sectors, as much as 25 percent of the energy consumed annually by the nation as a whole may be lost through ineffective practices. Possible reasons for the existence of ineffective utilization are considered, and possible means of improving effectiveness of ultilization are discussed. The levels of effort to promote effective utilization of energy are identified as: (1) the effective use of present fuels in present processes, (2) utilization of presently unused energy sources, and (3) more effective investment of energy in durable and maintainable products. Author

**N74-14690#** Committee on Banking and Currency (U.S. House).
**EPA POLLUTION REGULATIONS AND FUEL SHORTAGE: THE IMPACT ON MASS TRANSIT**
Washington GPO 1973 689 p refs Hearings before Comm. on Banking and Currency, 93d Congr., 1st Sess., 26, 30, and 31 Jul. 1973
Avail: Subcomm. on Urban Mass Transportation

A hearing was held before the Subcommittee on Urban Mass Transportation of the Committee on Banking and Currency of the House of Representatives to discuss the Environmental Protection Agency pollution regulations and the fuel shortage. Specific emphasis was placed on the impact of the fuel shortage on mass transportation and recommendations for improving mass transportation as an energy saving measure. Testimony from representatives of various petroleum companies was presented to show the causes for the current fuel shortages and steps being taken to improve the situation. The effects of the proposals for reducing fuel shortages on the quality of the environment are emphasized. Author

**N74-14692#** Committee on Commerce (U. S. Senate).
**ENERGY RESEARCH AND DEVELOPMENT, 2**
Washington GPO 1973 166 p Hearing on S. 357 before Comm. on Com., 93d Congr., 1st Sess., 1 Mar. 1973
Avail: Comm. on Com.

A Congressional hearing was conducted to establish a Federal power research and development program to increase efficiencies of electric energy production and utilization, reduce environmental impacts, develop new sources of clean energy, and reduce the use of fossil fuels. The various features of the energy bill are: (1) establishment of a Federal Power Research and Development Board, (2) establishment of a trust fund, (3) authorization of a research program, and (4) definition of penalties for failure to comply with the provisions of the act. The report consists primarily of testimony by witnesses concerning the utilization of energy and new energy sources. Author

**N74-14694*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**ANNUAL ADP PLANNING DOCUMENT**
M. Mogilevsky 1 Oct. 1973 39 p
(NASA-TM-X-69298; KSC-GP-421F) Avail: NTIS HC $4.00 CSCL 05A

The Category A computer systems at KSC (A1 and A2) which perform scientific and business/administrative operations are described. This data division is responsible for scientific requirements supporting Saturn, Atlas/Centaur, Titan/Centaur, Titan III, and Delta vehicles, and includes realtime functions, Apollo-Soyuz Test Project (ASTP), and the Space Shuttle. The work is performed chiefly on the GEL-635 (A1) system located in the Central Instrumentation Facility (CIF). The A1 system can perform computations and process data in three modes: (1) real-time critical mode; (2) real-time batch mode; and (3) batch mode. The Division's IBM-360/50 (A2) system, also at the CIF, performs business/administrative data processing such as personnel, procurement, reliability, financial management and payroll,

real-time inventory management, GSE accounting, preventive maintenance, and integrated launch vehicle modification status.
Author

**N74-14696#** Army Construction Engineering Research Lab., Champaign, Ill.
**A DATA-BASED METHODOLOGY FOR SPECIFYING CONSTRUCTION PROJECT DURATIONS**
D. W. Halpin and C. E. DeLong Aug. 1973 25 p refs
(AD-767529; CERL-TR-P-14) Avail: NTIS CSCL 13/2

The report presents a method of determining the construction contract performance times for military construction projects. This method is based on information that is regularly reported as feedback during the execution of a construction contract for military construction, Army projects. By organizing the data from the manpower-utilization feedback reports, a model is formulated and mathematically derived. An example of data reduction is presented, and the results of applying the methodology to these projects are reported. A proposal of implementation of the methodology in U.S. Army Corps of Engineers, district offices is presented.
Author (GRA)

**N74-14850#** Hughes Aircraft Co., Culver City, Calif.
**ECONOMICAL MULTIFACTOR DESIGNS FOR HUMAN FACTORS ENGINEERING EXPERIMENTS**
Charles W. Simon Jun. 1973 191 p refs
(Contract F44620-72-C-0086; AF Proj. 9778)
(AD-767739; HAC-P73-326; AFOSR-73-1702TR) Avail: NTIS CSCL 05/5

Experimental data collection plans are described that permit the study of from five to thirty experimental human factors. The reported plans were selected from those employed in physical science research and were suitable for human factors engineering research. The method of employing these designs is two phase. In the first phase, a large number of potentially critical factors are systematically screened in a way that identifies the more important ones. In the second, functions are obtained that relate the more important quantitative factors to operate performance. Five principles that enable economical miltifactor human factors experiments to be successfully conducted are stated. (Modified author abstract)
GRA

**N74-14922** RAND Corp., Santa Monica, Calif.
**ENHANCING COMPUTER SYSTEM SECURITY**
Dennis Hollingworth Aug. 1973 21 p refs
(P-5064) Avail: NTIS HC $3.25

One of the more significant problems in the information processing industry today is that of protecting sensitive computerized information from unauthorized access. As yet, no technique suggested or implemented appears to offer a complete solution to the problem. An attractive and cost-effective partial solution may reside in a different approach to the problem- of the system/penetrator inter-action is altered via introduction of counter-penetration elements into the system hardware and software.
Author

**N74-14964#** Army Construction Engineering Research Lab., Champaign, Ill.
**TECHNOLOGY FORECASTING: A CASE STUDY OF LONG-TERM REQUIREMENTS FOR RIGID AIRFIELD PAVEMENT SYSTEMS**
William J. Pananos Aug. 1973 55 p refs
(DA Proj. 4A0-62112-A-891)
(AD-767530; CERL-TR-A-19) Avail: NTIS CSCL 01/5

The report presents the in-action example of the Delphi method of technological forcasting, which involves polling expert opinion. Experts in the planning, design, construction, and operation of airfields were polled to develop a forecast of technical capabilities in those areas. The results demonstrate how the wide range of information obtainable from expert opinion can be conveniently presented to planners. An analysis of the convergence of opinion after two rounds of questioning indicates that more than one round may be unnecessary to obtain the subjective type of information discussed in the forecast.
Author (GRA)

**N74-15000*#** Oregon State Univ., Corvallis.
**THE COMPARATIVE EVALUATION OF ERTS-1 IMAGERY FOR RESOURCE INVENTORY IN LAND USE PLANNING Interim Report, Mar. - Aug. 1973**
G. H. Simonson, Principal Investigator, D. P. Paine, R. D. Lawrence, W. T. Pyott, J. H. Herzog, R. J. Murray, J. A. Norgren, J. A. Cornwell, and R. A. Rogers Nov. 1973 110 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Ave., Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21831)
(E74-10196; NASA-CR-136369) Avail: NTIS HC $7.50 CSCL 08B

The author has identified the following significant results. Multidiscipline team interpretation and mapping of resources for Crook County is nearly complete on 1:250,000 scale enlargements of ERTS-1 imagery. Maps of geology, landforms, soils and vegetation-land use are being interpreted to show limitations, suitabilities and geologic hazards for land use planning. Mapping of lineaments and structures from ERTS-1 imagery has shown a number of features not previously mapped in Oregon. A timber inventory of Ochoco National Forest has been made. Inventory of forest clear-cutting practices has been successfully demonstrated with ERTS-1 color composites. Soil tonal differences in fallow fields shown on ERTS-1 correspond with major soil boundaries in loess-mantled terrain. A digital classification system used for discriminating natural vegetation and geologic materials classes has been successful in separation of most major classes around Newberry Cauldera, Mt. Washington and Big Summit Prairie. Computer routines are available for correction of scanner data variations; and for matching scales and coordinates between digital and photographic imagery. Methods of Diazo film color printing of computer classifications and elevation-slope perspective plots with computer are being developed.

**N74-15199#** British Steel Corp., London (England).
**SELECTION AND MONITORING OF ATMOSPHERIC EXPOSURE SITES FOR CORROSION TESTS**
J. F. Stanners Aug. 1973 12 p refs
(PB-223683/4GA; BISRA-CEL/CH/13/70) Avail: NTIS HC $3.00 CSCL 11F

The choice of natural atmospheres for corrosion tests is influenced by practical factors, including accessibility, security of tenure, cost, and freedom from vandalism. But these must not be allowed to outweight the technological and scientific requirements, which are discussed in detail. The variables influencing corrosion or breakdown rates under service conditions must be recognized and the one that predominates in its influence identified. Sulphur pollution, chloride from the sea, pH of rain, metal temperature, time-of-wetness, and solar radiation are discussed. A system is proposed for keeping the number of sites to a minimum.
GRA

**N74-15214#** Geological Survey, Washington, D.C.
**UNITED STATES MINERAL RESOURCES**
Donald A. Brobst, ed. and Walden P Pratt, ed. 1973 722 p refs
(USGS-PP-820; LC-73-600060) Avail: SOD HC $9.15 Domestic Postpaid or $8.50 GPO Bookstore

Exploration and management of mineral sources are assessed for the U.S. potential in comparison with worldwide deposits.

**N74-15216** Geological Survey, Washington, D.C.
**MINERAL RESOURCE ESTIMATES AND PUBLIC POLICY**

V. E. McKelvey *In its* US Mineral Resources 1973 p 9-19 refs

Comprehensive mineral resource estimates are essential for critical examinations of resource adequacy and management. Appraisals of potential mineral resources and their utilizations consider the magnitude of mineral deposits, production costs, definitions of inferred mineral reserves, feasibility of recovery aspects and industrial processing methods. G.G.

**N74-15221** Geological Survey, Washington, D.C.
**ARSENIC**
J. L. Gualtieri *In its* US Mineral Resources 1973 p 51-61 refs

Arsenic is produced as a byproduct and occurs in several types of deposits: enargite bearing copper-zinc-lead deposits, arsenical pyritic copper deposits, native silver and nickel-cobalt arsenide deposits, arsenical gold deposits, arsenic sulfide and arsenic sulfide gold deposits, and arsenical tin deposits. U.S. and world identified resources of arsenic are herein estimated to be 1,300,000 short tons and 17,600,000 short tons, respectively; these resources are more than sufficient to fill projected needs until the year 2000. Hypothetical resources for the United States and the world are estimated at 650,000 short tons and 14,300,000 short tons, respectively. Arsenic can be obtainable from organic shale of marine origin. Author

**N74-15239** Geological Survey, Washington, D.C.
**GEM STONES**
Robert E. Thaden *In its* US Mineral Resources 1973 p 247-250 refs

Gem stones are mineral substances, other than metals, that are attractive enough for use in personal adornment or as small household objects. Diamond, sapphire, ruby, and emerald generally are considered precious stones; all other gem stones generally are considered semi-precious. Neither imitation nor synthetic gems have infringed seriously on the market for natural stones, nor are they likely to do so. Gem stones occur in most of the major geologic environments, but they do not form ore deposits in the normal sense. Since 1935, the mining of gem stones in the United States has been almost entirely a recreational activity of mineral collectors and hobbyists. The annual value of such gem production has risen from half a million dollars in 1952 to nearly $3 million in 1972. Author

**N74-15243** Geological Survey, Washington, D.C.
**HELIUM**
Dwight E. Ward and Arthur P. Pierce *In its* US Mineral Resources 1973 p 285-290 refs

The identified, hypothetical, and speculative resources of helium are reported. The applications of helium in space exploration, industry, and research are discussed. The chemical and physical properties of helium are described. Data are presented to show: (1) helium sales in the United States from 1920 to 1970 and (2) some known deposits of helium in the United States and Canada. Author

**N74-15244** Geological Survey, Washington, D.C.
**IRON**
Harry Klemic, Harold L. James, and G. Donald Eberlein *In its* US Mineral Resources 1973 p 291-306 refs

The identified, hypothetical, and speculative resources of iron are reported. The byproducts and coproducts of iron are described. The geologic environment is analyzed to show the types of iron deposits and quantities. Data are presented to show: (1) U.S. iron ore consumption, production and imports for consumption during the period 1951 to 1971, (2) sources and amounts of iron ore imported to the United States from 1961 to 1971, (3) the value of U.S. imports and exports of iron ore from 1951 to 1971, and (4) iron ore production in the U.S. from 1875 to 1971. Actions for locating additional iron deposits and methods for reducing the environmental impact of iron ore mining are proposed. Author

**N74-15245** Geological Survey, Washington, D.C.
**KYANITE AND RELATED MINERALS**
Gilbert H. Espenshade *In its* US Mineral Resources 1973 p 307-312 refs

Kyanite and related minerals are high-alumina silicates used mainly in the manufacture of refractory linings for metallurgical and other types of furnaces. Domestic production currently exceeds consumption, and considerable tonnages are exported. Enormous resources of these minerals exist in the United States; this should permit the increase in production that will be needed to meet the demand expected during the next 25 years. Production now comes largely from kyanite-quartz deposits in the Southeastern States; kyanite and sillimanite are also recovered as a byproduct from Florida ilmenite sands. Resources of deposits of these two types are very large but make up no more than 5 percent of our total resources. The remaining 95 percent or more is in deposits of micaceous schist and gneiss, mostly in the Appalachian Mountain system and in Idaho. None of these deposits is now being mined, but profitable mining of some may eventually be possible. Author

**N74-15246** Geological Survey, Washington, D.C.
**LEAD**
H. T. Morris, Allen V. Heyl, and Robert B. Hall *In its* US Mineral Resources 1973 p 313-332 refs

The conditional, hypothetical, and speculative resources of lead are reported. The geologic environment of lead is discussed to show the geochemistry, ore mineralogy, and types of deposits. The physical, mechanical, and chemical properties of lead are described. The commerical applications of lead are shown. Data are presented for: (1) production of primary lead in the U.S. from 1830 to 1971, (2) consumption of lead in the U.S. from 1918 to 1971, (3) world mine production of lead in 1969 by countries, and (4) estimate of world reserves of lead by regions or countries. Author

**N74-15247** Geological Survey, Washington, D.C.
**LIGHTWEIGHT AGGREGATES**
A. L. Bush *In its* US Mineral Resources 1973 p 333-355 refs

The United States is adequately supplied with both structural lightweight aggregates (scoria, volcanic cinder, pumice and pumicite, expandable clays, shales and slates, diatomite, expanded blast furnace slag, and fly and bottom ash) and ultralightweight aggregates (expanded perlite, expanded pumicite, and exfoliated vermiculite). The aggregates are low unit value, high place value materials, partly because large quantities are available and partly because normal-weight (sand and gravel) and synthetic aggregates are stiff competition. However, they have high place value, in as much as transportation costs largely determine whether they are used. Recoverable reserves of expanded clays, shales, and slates are equivalent to about half the cumulative output needed through the year 2000. Author

**N74-15248** Geological Survey, Washington, D.C.
**LIMESTONE AND DOLOMITE**
Harold A. Hubbard and George E. Ericksen *In its* US Mineral Resources 1973 p 357-364 refs

Limestone and dolomite are at or near the earth's surface over at least 10 percent of the continental areas, and the resources are extremely large. However, high-purity stone suitable for chemical and metallurgical use is restricted in extent, but its resources are large, also. For uses in which physical properties of the rock are important, as in construction, many kinds of rock can be substituted for limestone and dolomite. For uses in which the chemical properties are important, substitutes are few, generally scarce, and more costly. The largest resources of high-purity limetone and dolomite in the United States are in the central and eastern parts of the country, but details of the distribution of such stone are incompletely known. Consequently,

some potentially valuable deposits are endangered by urban spread and by zoning regulations that restrict or prevent quarrying in populous areas. Author

**N74-15249** Geological Survey, Washington, D.C.
**LITHIUM, CESIUM, AND RUBIDIUM: THE RARE ALKALI METALS**
James J. Norton *In its* US Mineral Resources 1973 p 365-378 refs

Lithium, cesium, and rubidium, though rare in comparison with sodium and potassium, are abundant relative to the apparent commercial need for them. Lithium and cesium both form independent minerals in pegmatites. Lithium production from brines has increased so greatly in recent years that it has taken much of the market away from pegmatitic lithium. Rubidium forms no known independent minerals but exists chiefly as a substitute for potassium, especially in minerals formed late in the crystallization of pegmatites. Most commercial rubidium and some cesium have been obtained as byproducts of processing lepidolite. The world's proved and probable reserves of lithium, most of which are in the United States, are 1,200,000 tons, or about 400 times the 1970 consumption. Additional resources in known lithium regions are about 10 million tons, and even this large figure probably could be increased many times by intensive search throughout the world. Author

**N74-15250** Geological Survey, Washington, D.C.
**MAGNESIAN REFRACTORIES**
Alfred J. Bodenlos and T. P. Thayer *In its* US Mineral Resources 1973 p 379-384 refs

Magnesium-bearing compounds are processed into high-temperature refractories, indispensable as linings in modern steel furnaces; chemicals; and magnesium, the lightest of structural metals. They are derived from minerals, brines, and sea water. Resources from which magnesium-bearing compounds may be recovered range in size from large to practically unlimited and are globally widespread. Identified resources of magnesite throughout the world total 12 billion tons, and those of brucite several million tons. Resources of dolomite, forsterite, and the magnesium-bearing evaporite minerals are enormous; magnesium-bearing brines must constitute a resource of billions of tons; and the resource contained in sea water is practically unlimited. The bulk of magnesium-bearing compounds and the metal are recovered in the United States from sea water, brines, and dolomite, and elsewhere in the world from magnesite. Author

**N74-15251** Geological Survey, Washington, D.C.
**MANGANESE**
John Van H. Dorr, II, Max D. Crittenden, Jr., and Ronald G. Worl *In its* US Mineral Resources 1973 p 385-399 refs

Known minable reserves and known resources of manganese are very large in relation to world consumption but are very irregularly distributed throughout the world. The United States has virtually no domestic reserves and its known resources are both very low grade and refractory to economic concentration. The principal hopes of finding domestic reserves or resources of conventional types may lie in (1) finding the source of the manganese of the Pierre Shale, conceivably buried under Pleistocene sedimentary rocks in central or western Minnesota or adjacent areas; (2) finding another Molango-type deposit by careful analysis of the distribution of manganese in certain miogeosynclinal carbonate rocks; or (3) finding the source of the high manganese concentrations in the Salton Sea brines. Much more promising modes of relieving dependence on foreign sources are by vigorously attempting to perfect techniques of effectively exploiting sea-floor nodules and by dissolving legal impediments to large-scale investment in subsea mining. Author

**N74-15252** Geological Survey, Washington, D.C.
**MERCURY**
E. H. Bailey, A. L. Clark, and R. M. Smith *In its* US Mineral Resources 1973 p 401-414 refs

The identified and speculative resources of mercury are discussed. The commercial applications of mercury are described. Methods for exploiting mercury production are reported. Data are presented to show the following: (1) mercury production and prices from 1850 to 1971, (2) the demand and domestic supply of mercury in the U.S. from 1850 to 1971, (3) uses and consumption of mercury in the U.S., and (4) mercury content of various natural substances. Author

**N74-15253** Geological Survey, Washington, D.C.
**MICA**
Frank G. Lesure *In its* US Mineral Resources 1973 p 415-423 refs

Sheet mica has been an important strategic mineral used in electrical appliances, vacuum tubes, capacitors, and various other electrical and nonelectrical products. The United States has not been self-sufficient in sheet-mica production since before the turn of the 20th century and has imported supplies to meet half to all of its needs, mostly from India, Brazil, and Malagasy Republic. Sheet mica uses are declining with advancing technology and introduction of substitutes. Although the United States has undiscovered and paramarginal resources of sheet mica, the high cost of the necessary hand labor involved in mining and preparation of sheet mica deters exploration, development, or further mining. Average United States scrap-mica production is increasing, but reserves and resources are adequate for foreseeable demand. The United States is self sufficient in flake-mica production and is a net exporter of ground mica. Author

**N74-15254** Geological Survey, Washington, D.C.
**MOLYBDENUM**
R. U. King, D. R. Shawe, and E. M. MacKevett, Jr. *In its* US Mineral Resources 1973 p 425-435 refs

The geochemistry and mineralogy of molybdenum are discussed. The types of molybdenum deposits are described. Methods of prospecting for molybdenum are reported. Data are presented to show the location of molybdenum deposits in the U.S. and the estimated magnitude of world resources of molybdenum. The chemical and physical properties of molybdenum are analyzed. Author

**N74-15255** Geological Survey, Washington, D.C.
**NICKEL**
Henry R. Cornwall *In its* US Mineral Resources 1973 p 437-442 refs

At the present time the free world requirement of nearly 1 billion pounds of nickel per year is supplied from deposits of nickel sulfides, mostly in Canada, and of nickel laterites, mainly in New Caledonia. World resources from these types of deposits are estimated to total 70 million tons (140 billion pounds) of nickel in 7 billion tons of material averaging about 1 percent nickel. An additional 7 billion tons averaging 0.2 percent nickel, or 14 million tons of nickel, is estimated for sulfide deposits in the United States. The 0.2-0.4 percent of nickel universally disseminated in peridotites and serpentinites throughout the world amounts to a figure several orders of magnitude greater than 70 million tons, as does the quantity of nickel contained in deep-sea mangenese nodules; but new technological developments will be required to recover nickel successfully from these two types of occurrence. Author

**N74-15256** Geological Survey, Washington, D.C.
**NIOBIUM (COLUMBIUM) AND TANTALUM**
Raymond L. Parker and John W. Adams *In its* US Mineral Resources 1973 p 443-454 refs

Niobium (columbium) and tantalum have become important metals in modern technology because of their metallurgical, electronic, chemical, and nuclear uses. Both metals occur in nature almost entirely as single isotopes Nb93 and Ta181 and are present in the earth's crust in estimated abundance of 20 ppm (parts per million) and 2 ppm respectively. Niobium and tantalum have strong geochemical coherence and occur together in most rocks and minerals; however, some rock types such as nepheline syenite and carbonatites contain niobium in great preponderance over tantalum. These elements occur in minerals chiefly as oxides and multiple oxides, hydroxides, a few silicates and one borate;

more than 90 mineral species are known. Ore concentrations of niobium and tantalum occur in carbonatites and other rocks of alkalic complexes, certain types of granite, pegmatites, placers, and residual deposits. Author

**N74-15257** Geological Survey, Washington, D.C.
**NUCLEAR FUELS: URANIUM**
Warren I. Finch, Arthur P. Butler, Jr., Frank C. Armstong, and Albert E. Weissenborn *In its* US Mineral Resources 1973 p 456-468 refs

Uranium is an important energy resource, and even though the demand for its use in nuclear-powered electrical generators was only moderate in 1972, near-future needs are expected to be very great. In the United States, large exploitable deposits are found chiefly in sandstone and associated rocks. In other parts of the world, large deposits are mainly in quartz-pebble conglomerate of early Precambrian age and in veins. Domestic resources recoverable at present prices totaled about 273,000 tons of U3O8 at the end of 1971, and the total for all countries reporting resources is about 1.6 million tons of U3O8. These supplies are sufficient to last into the 1980's. Needs beyond 1980 are so great that tremendous efforts in exploration, and research in ore-finding techniques, will be required to discover new recoverable resources. Author

**N74-15258** Geological Survey, Washington, D.C.
**NUCLEAR FUELS: THORIUM**
Mortimer H. Staatz and Jerry C. Olson *In its* US Mineral Resources 1973 p 468-476 refs

Although the current demand for thorium is small, future needs may be large as a fuel for nuclear generators. The occurrence of thorium is widespread, and large deposits are found in beach and fluviatile placers, veins, sedimentary rocks, alkalic igneous rocks, and carbonatities. Thorium has been produced principally from monazite from beach and fluviatile placers, although in the 1950's and early 1960's monazite from a unique vein in South Africa was the chief source. In the early 1970's monazite was recovered principally as a byproduct of titanium or tin mining in India, Brazil, Australia, and Malaysia. A large thorium resource in the conglomerates at the Elliot Lake uranium mines, Canada, could become an important byproduct if demand increases. Thorium resources are not well known because of the small demand, but are sufficient for many years in the future. The development of a variable domestic thorium mining industry is dependent on a large enough increase in demand to exceed the amount obtainable as byproducts from other types of deposits. Author

**N74-15259** Geological Survey, Washington, D.C.
**OIL AND GAS**
T. H. McCulloh *In its* US Mineral Resources 1973 p 477-496 refs

The oil and gas resources of the United States are examined. Organic carbon, hydrocarbons, and producible hydrocarbon accumulations are discussed from the standpoint of distribution and accessibility. All estimates of petroleum and natural gas resources depend upon prior exploration results and are considered unreliable. Changing economic incentives, technologic advances, enlarged prospecting areas, and creative thinking all increase exploration effectiveness. Data are presented to show variations in produced and proven reserves of oil for the U.S. and the world. Author

**N74-15260** Geological Survey, Washington, D.C.
**OIL SHALE**
William C. Culbertson and Janet K. Pitman *In its* US Mineral Resources 1973 p 497-503 refs

Oil shale is a fine-grained sedimentary rock containing organic matter that has the property of yielding substantial amounts of oil when heated in a closed retort (destructive distillation) but that is mostly insoluble in ordinary petroleum solvents. The United States has tremendous quantities of oil shade, principally in the Green River Formation in Colorado, Utah, and Wyoming. These three States contain identified resources of about 1.8 trillion barrels of oil in oil shale that yields an average of 15 or more gallons per ton. However, no oil-shale venture has been a commercial success in the United States in the last 100 years, despite the fact that other countries of the world have for many years burned oil shale as a fuel, or have produced oil or combustible gas from the shale. Author

**N74-15261** Geological Survey, Washington, D.C.
**PEAT**
Cornelia C. Cameron *In its* US Mineral Resources 1973 p 505-513 refs

The physical characteristics of peat that are important to modern uses are related to the geologic and physiographic settings of the deposits. Research on methods of prospecting for peat focuses on establishing geologic controls for the types of peat defined in the classification adopted by the American Society for Testing and Materials in 1969. This new classification is designed principally to characterize different types of peat by means of such physical properties as amount, kind, and size of fibers and quantity of ash. One or more types of peat occur in all but about 8 of the 50 States in magnitudes ranging from hundreds of thousands to tens of billions of tons. The demand for specific physical qualities in peat related to modern uses and to standards for sales is largely responsible for national consumption of more peat than is produced domestically. Author

**N74-15262** Geological Survey, Washington, D.C.
**PHOSPHATE DEPOSITS**
James B. Cathcart and R. A. Gulbrandsen *In its* US Mineral Resources 1973 p 515-525 refs

Phosphorus, an element essential to plant growth, is found in igneous apatite, guano or related deposits, and marine phosphorite. Most of the United States' and the world's reserves and resources are in the marine phosphorite deposits which also account for about 75 percent of the total production. Marine phosphorite deposits, known throughout the world in rocks ranging in age from Precambrian to Holocene, form in basins away from sources of abundant clastic material in warm latitudes in areas of upwelling water. Because most of the sedimentary basins are known and phosphate occurs in many of them, resources are classed as identified or as hypothetical. Speculative resources form only a minor part of the total. However, identified resources of the world are measured in billions of tons of contained phosphorus and hypothetical resources are probably many times as great. Author

**N74-15264** Geological Survey, Washington, D.C.
**PLATINUM-GROUP METALS**
Norman J. Page, Allen L. Clark, George A. Desborough, and Raymond L. Parker *In its* US Mineral Resources 1973 p 537-545 refs

Platinum, palladium, iridium, osmium, rhodium, and ruthenium are the platinum-group metals. Platinum and palladium are the most abundant of this group, but all these metals are essential to modern industry where their applications are based on their catalytic properties, electrical conductivity, and resistance to chemical corrosion, heat, and oxidation. About 1.3 million ounces per year of platinum-group metals are consumed in the United States (1) by electrical manufacturers as electrical contacts in high-precision instruments and insoluble anodes for metallurgical processing; (2) by the chemical industry as catalytic gauze for oxidation of ammonia and the manufacture of nitric acid; (3) in petroleum refining as a catalyst to produce high-octane gasoline; (4) in dental and medical devices; (5) in decorative arts and jewelry; and (6) as spinnerettes used in manufacturing glass and synthetic fibers. Author

**N74-15265** Geological Survey, Washington, D.C.
**RARE-EARTH ELEMENTS**
John W. Adams and Mortimer H. Staatz *In its* US Mineral Resources 1973 p 547-556 refs

The rare-earth metals, which include yttrium and the lanthanides, consist of a group of geochemically related elements that have become of increasing economic interest, largely on the basis of their physical rather than their chemical properties. Their greatest present use is in petroleum-cracking catalysts, but they are also extensively used in the glass and ceramics industries, in iron and steel production, and in the manufacture of electronic devices. Some members of the group are relatively abundant in the earth's crust, but minable concentrations are uncommon. Bastnaesite, a rare-earth fluocarbonate, and monazite, a rare-earth phosphate, are the two important ore minerals. Bastnaesite is mined extensively from carbonatite in California, and monazite is recovered largely from placer deposits in various parts of the world. The rare earths are present in many other minerals, either as essential constituents or as substituted constituents. Author

**N74-15266** Geological Survey, Washington, D.C.
**RHENIUM**
R. U. King *In its* US Mineral Resources 1973 p 557-559 refs

Rhenium, a rare element that has only recently come into significant industrial use, has properties excellently suited for application as a refractory metal, as an alloying element, in high-temperature thermocouples, in electronic components, and as a catalyst in petroleum refining. Rhenium is obtained from molybdenite that is recovered as a byproduct of copper production, and the supply of rhenium, as well as the world resources of rhenium is therefore closely tied in with the world's resources of molybdenum in porphyry copper deposits. Identified U.S. resources of rhenium are estimated to be about 10,000 short tons, and world resources on the order of 30,000 short tons. Although other sources may exist, they are not known to be significant. Author

**N74-15267** Geological Survey, Washington, D.C.
**SAND AND GRAVEL**
Warren Yeend *In its* US Mineral Resources 1973 p 561-565 refs

The extent of the sand and gravel industry in the United States is discussed. Although the U.S. currently produces enough sand and gravel to supply its requirements, it is predicted that by A.D. 2000 the domestic resources accessible at 1968 prices will barely meet the demand. The most important commercial sources of sand and gravel are river channels and glaciated terrain. Marine and lake environments provide a secondary source. Deposits are located by conventional field mapping with the aid of geophysical techniques, such as seismic refraction and reflection and resistivity surveys. Author

**N74-15269** Geological Survey, Washington, D.C.
**SELENIUM**
H. W. Lakin and D. F. Davidson *In its* US Mineral Resources 1973 p 573-576 refs

The present demand for selenium is shown to be less than the amount available as a byproduct from the copper industry. Two factors are identified which may result in a severe shortage of selenium in the U.S. in the future. These include: (1) in situ leaching of copper from its ores which leaves the associated selenium undissolved in the waste rock resulting from the process, and (2) the increasing use of selenium as a soil additive. The latter factor is anticipated to require a minimum of 10 times the present annual production of selenium. Statistics relating to U.S. and world production and consumption of selenium are presented. Resources are identified and estimates of their present yield and future potential are given. Author

**N74-15270** Geological Survey, Washington, D.C.
**SILICA SAND**
Keith B. Ketner *In its* US Mineral Resources 1973 p 577-580 refs

The production and consumption of silica sand in the U.S. and the world are analyzed. It is shown that silica sand formations and the quartz sandstones from which silica sand and silicon are mainly derived are abundantly distributed throughout the United States and the world. Although the use of silica-sand, principally in the glass and metallurgical industries, is rapidly increasing, shortages that might cause heavy reliance on imports are not likely. Problems are caused if urban development preempts the surface over valuable silica sand deposits and if abandoned sandpits are left in a useless condition. Urban planners can solve the first problem by restricting important sand deposits from other long-term uses, and industry can solve the second by contouring the disturbed surface for productive or recreational use. More detailed geologic investigations in urban areas are needed to precisely delineate silica-sand deposits in advance of urban development. Author

**N74-15271** Geological Survey, Washington, D.C.
**SILVER**
Allen V. Heyl, W. E. Hall, Albert E. Weissenborn, H. K. Stager, W. P. Puffett, and Bruce L. Reed *In its* US Mineral Resources 1973 p 581-603 refs

A study of silver resources indicates that a major worldwide imbalance of more than 100 million ounces per year exists between production and consumption. The silver used in photography alone in the United States is greater than our annual production, and most of this silver is not recovered for reuse. The deficit between domestic production and consumption formerly was partly filled by withdrawal from the U.S. Treasury silver reserves, but these reserves are now depleted. Identified resources of silver in the United States comprise an estimated 1,440 million troy ounces economically recoverable at present prices (reserves) and an estimated 750 million ounces in material nearly commercial in grade (conditional resources). Other conditional resources that might become recoverable at significantly higher prices are roughly estimated to be of about the same magnitude as the present reserves. Only about 35 percent of the identified resources is in deposits that would yield silver as the main product; the remaining 65 percent would be recovered as a byproduct. Author

**N74-15272** Geological Survey, Washington, D.C.
**SULFUR**
Alfred J. Bodenlos *In its* US Mineral Resources 1973 p 605-618 refs

A survey on sulfur indicates that reserves are appreciable and resources are vast, not only in the U.S. but in many other parts of the world. Research shows that elemental sulfur is formed as a product of anaerobic bacterial activity wherever both sulfate ions and organic material are abundant; therefore, areas of potential sulfur discovery include anhydrite units in any petroliferous evaporite basins. Most accumulations of petroleum and natural gas high in sulfur content also are found in evaporite basins. Sulfide ores, in contrast, occur in a wide variety of rocks in all parts of the world. Volcanic sulfur occurs mostly in the circum-Pacific belt, but it also has been found in volcanoes extending from the Mediterranean to the Himalaya Mountains. Most countries contain sulfur-bearing accumulations in one form or another, but few contain large deposits of elemental sulfur. The extraction of sulfur from such accumulations in any given country depends largely upon recovery costs. Author

**N74-15273** Geological Survey, Washington, D.C.
**TALC**
C. Ervin Brown *In its* US Mineral Resources 1973 p 619-626 refs

Data pertaining to the production and consumption of talc are presented. It is shown that in 1969 and 1970, total consumption was over a million tons -- double that of 20 years ago. The projected demand for the year 2,000 ranges from 2.28 to 3.36 million tons. Resources of talc are large and should be adequate to meet this demand, although deposits meeting the rigid chemical and physical specifications of some consumer industries are relatively scarce. Although all talc mining districts

contain known reserves and have a good to excellent potential for the discovery of additional reserves, the great bulk of reserves are in New York and Vermont. Most industrial areas of the United States are fairly close to a source of industrial talc, except for the industries of the midcontinent. Areas of metamorphic rocks in Wisconsin and Michigan could contain talc deposits more favorably located for the midcontinent market. Author

**N74-15274** Geological Survey, Washington, D.C.
**TELLURIUM**
D. F. Davidson and H. W. Lakin *In its* US Mineral Resources 1973 p 627-630 refs

Supply and demand studies of tellurium indicate that the present demand for tellurium is less than the amount available as a byproduct from the copper and lead industries. A shortage of tellurium could develop as a result of a change in the processes of recovery of copper from its ores. In-place leaching of copper from its ores leaves the associated tellurium undissolved in the waste rock resulting from the process. Thus, as the use of the leaching process increases at the expense of smelting, the supply of tellurium will decrease. Identified resources of copper in the United States are estimated to contain about 13.5 million pounds of recoverable tellurium. Tellurium may be recovered as a byproduct in burning of coal in huge powerplants, paying in part for environmental improvement. The major resource of tellurium is found in manganese oxide nodules on the ocean floors. Author

**N74-15275** Geological Survey, Washington, D.C.
**THALLIUM**
Keith Robinson *In its* US Mineral Resources 1973 p 631-636 refs

Statistics and related information concerning the production and consumption of thallium are presented. The current uses for thallium are limited, being primarily confined to electronics and metallurgical processing; lesser applications are in glass, explosives, agriculture, and medicine. U.S. and total world identified resources of thallium from zinc, lead, and iron sulfides are estimated at 266 and 1,390 tons respectively. Additional U.S. and total world resources contained in coal ash are 119,000 and 715,000 tons. Identified manganese nodules occurring on the sea floors are estimated to contain 9.9 million tons of thallium. Assuming no unforeseen demand, the world supply of thallium from identified zinc sulfide sources will be exhausted in 43 years at the present rate of consumption, and from all identified sulfide sources in 70 years. Author

**N74-15276** Geological Survey, Washington, D.C.
**TIN**
C. L. Sainsbury and Bruce L. Reed *In its* US Mineral Resources 1973 p 637 refs

Data relating to the production and consumption as well as the uses of tin are reported. The United States consumes almost 30 percent of the free world's annual production of primary tin. Nearly half this amount is used in the manufacture of tinplate, principally for tin cans; the other main uses are in solders, bearing alloys, bronze, chemicals, and coatings other than tinplate. Current U.S. tin production, as a byproduct of molybdenum mining in Colorado, is negligible. The strategic stockpile is sufficient to guarantee against a sudden shortage of primary tin for essential uses, but as the current rate of consumption even this supply would be depleted in a little more than 4 years. Domestic reserves of tin, mainly in Alaska, would provide only about three-fourths of a year's supply, conditional resources about the same, and hypothetical and speculative resources about 2 years' supply; thus, it seems clear that the United States must continue to depend on tin imports for most of its needs. Author

**N74-15277** Geological Survey, Washington, D.C.
**TITANIUM**
Harry Klemic, Sherman P. Marsh, and Margaret Cooper *In its* US Mineral Resources 1973 p 653-665 refs

A survey of titanium production and consumption is presented. Rutile, ilmenite, and titanium slag made from ilmenite are the principal raw materials from which purified titanium products are extracted. The Kroll method, involving reduction of titanium tetrachloride in an inert atmosphere, is used to obtain metallic titanium. The United States is dependent almost entirely upon foreign sources, mostly Australia, for rutile, but has substantial reserves and production of ilmenite. In 1970, U.S. demand for titanium was 490,000 short tons, and annual demand is expected to exceed 1 million short tons by the year 2000. U.S. and world identified resources are estimated to be about 298 million and 2,000 million short tons of TiO2, respectively. Reserves of titanium in the United States in 1970 were estimated to be about 25 million short tons of TiO2, mostly in ilmenite. Author

**N74-15278** Geological Survey, Washington, D.C.
**TUNGSTEN**
S. Warren Hobbs and James E. Elliott *In its* US Mineral Resources 1973 p 667-678 refs

Data are presented pertaining to the production and consumption of tungsten. U.S. tungsten reserves in known deposits or their geologically reasonable extensions are estimated at 15 million short ton units (1 short ton unit = 20 pounds WO3). This is about 6.8 percent of known world reserves, of which approximately 60 percent are in China. Subeconomic resources in identified or geologically plausible deposits in the United States are conservatively estimated to contain two to three times the reserves. Covered areas in the United States probably contain concealed deposits that are comparable in grade and total tonnage to those now known. The United States has the potential for adequate tungsten production into the foreseeable future, provided it is willing to pay the price of essential research, extensive exploration, and the processing of high-cost low-grade ores. Author

**N74-15279** Geological Survey, Washington, D.C.
**VANADIUM**
R. P. Fischer *In its* US Mineral Resources 1973 p 679-688 refs

A survey on the uses, production, and consumption of vanadium is reported. Vanadium is used mainly as an alloy agent in steel. Its domestic consumption increased rapidly during the 1960's, and a growth rate of demand higher than that of any other ferrous mineral has been predicted to the year 2000. Foreign uses, consumption, and predicted requirements have a similar pattern. Predicted domestic requirements to the year 2000 exceed the estimated amount of vanadium available from productive domestic sources by about 300,000 to 400,000 short tons. Domestic resources in magnetic deposits and in carbonaceous shales are adequate to furnish this deficient vanadium, but they can do so only if domestic metallurgical practices are modified or new ones are developed. Foreign reserves in productive titaniferous magnetite deposits and resources in known but unproductive deposits of this type are adequate to satisfy world requirements for vanadium in the foreseeable future. Author

**N74-15280** Geological Survey, Washington, D.C.
**ZEOLITES IN SEDIMENTARY ROCKS**
Richard A. Sheppard *In its* US Mineral Resources 1973 p 689-695 refs

Research indicates that the production of natural zeolites in the United States is currently only several hundred tons per year. The abundance and variety of zeolite deposits in the United States, the unique properties of the zeolites, and the seemingly low cost of mining suggest potential uses in many industrial and agriculture processes. Chemical and structural modifications of the natural materials could further increase their potential. When new markets for zeolites are developed, the United States will not only be self-sufficient but will probably become a major exporter. The total of identified, hypothetical, and speculative resources of zeolites in the United States is conservatively estimated at more than 10 trillion tons. Total resources of zeolites in the rest of the world have not yet really begun to be cataloged. Author

**N74-15281** Geological Survey, Washington, D.C.
**ZINC**
Helmuth Wedow, Jr., Thor H. Kiilsgaard, Allen V. Heyl, and

Robert B. Hall *In its* US Mineral Resources 1973 p 697-711 refs

A survey on the production and consumption of zinc is reported. Today it stands, in tonnage produced, as the fourth most important metal in world trade. About 150 million metric tons has been used since the beginning of the 19th century, and projected growth rates suggest that this amount will more than double by the end of the 20th century. Current annual world production exceeds 5 million metric tons. Of this tonnage the United States produces about 9 percent, but it consumes more than three times the amount it produces. World resource estimates indicate that recoverable identified resources (that is, reserves) are about 235 million metric tons, of which 45 million is in the United States. Total world identified and undiscovered zinc resources are estimated at over 5 billion metric tons, about one-tenth of which is in ores of grade sufficient to be exploitable under existing economic conditions. Author

**N74-15282** Geological Survey, Washington, D.C.
**ZIRCONIUM AND HAFNIUM**
Harry Klemic, David Gottfried, Margaret Cooper, and Sherman P. Marsh *In its* US Mineral Resources 1973 p 713-722 refs

Statistical data and related information on the production and consumption of zirconium and hafnium are presented. Zircon and baddeleyite are the principal sources of zirconium, and hafnium is recovered in extracting reactor-grade zirconium. Zircon and baddeleyite occur as primary minerals in alkaline-rich igneous rocks, but zircon is recovered mainly from titanium-bearing placer sands. The United States is a major producer and consumer of zircon and imports large quantities from Australia, which is the world's largest producer of zircon. Identified resources of zircon in the United States are about 10,800,000 short tons, of which nearly 80 percent is in the Atlantic Coastal States. U.S. production is solely from Florida and Georgia. World identified resources exceed 36 million short tons of zircon equivalent. World production of zirconium concentrates in 1970 was more than 450,000 tons. Of this, the United States used about 30 percent. Current supplies of zircon exceed demand for a few decades. Author

**N74-15385#** Raytheon Co., Wayland, Mass.
**MICROWAVE LANDING SYSTEM (MLS) DEVELOPMENT PLAN AS PROPOSED BY RAYTHEON DURING THE TECHNIQUE ANALYSIS AND CONTRACT DEFINITION PHASE OF THE NATIONAL MLS DEVELOPMENT PROGRAM. VOLUME 5: POST TA/CD PLANS, MANAGEMENT PERFORMANCE**
27 Sep. 1972 310 p refs
(Contract DOT-FA72WA-2803)
(FAA-RD-73-150-5) Avail: NTIS HC $17.50

The proposed methods for conducting a feasibility demonstration, prototype development, and limited production of a microwave landing system are discussed. The plans consist of: (1) test and evaluation, (2) analytical verification, (3) hardware design and fabrication, (4) prototype hardware design and fabrication, and (5) reliability and maintainability. Author

**N74-15386#** Raytheon Co., Wayland, Mass.
**MICROWAVE LANDING SYSTEM (MLS) DEVELOPMENT PLAN AS PROPOSED BY RAYTHEON DURING THE TECHNIQUE ANALYSIS AND CONTRACT DEFINITION PHASE OF THE NATIONAL MLS DEVELOPMENT PROGRAM. VOLUME 6: SUPPORTING STUDIES, APPENDICES D THROUGH N**
27 Sep. 1972 591 p refs
(Contract DOT-FA72WA-2803)
(FAA-RD-73-150-6-App-D-N) Avail: NTIS HC $31.75

Various studies which were conducted during the planning and development of a microwave landing system are presented. The subjects considered include the following: (1) obstacle multipath effects, (2) rough ground effects, (3) refraction, (4) convex runways, and (5) aircraft blockage. A summary of computer simulation results is developed. Circuit development practices and diagrams of subsystem circuits are provided. Author

**N74-15462*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**SERT C PROJECT STUDY**
Jan. 1974 338 p
(NASA-TM-X-71508) Avail: NTIS HC $19.00 CSCL 21C

The SERT C (Space Electric Rocket Test - C) project study defines a spacecraft mission that would demonstrate the technology readiness of ion thruster systems for primary propulsion and station keeping applications. As a low cost precursor, SERT C develops the components and systems required for subsequent Solar Electric Propulsion (SEP) applications. The SERT C mission requirements and preliminary spacecraft and subsystem design are described. Author

**N74-15526*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**THE SPACE SHUTTLE PAYLOAD PLANNING WORKING GROUPS: VOLUME 9: MATERIALS PROCESSING AND SPACE MANUFACTURING Final Report**
May 1973 73 p
(NASA-TM-X-69459) Avail: NTIS HC $5.75 CSCL 22B

The findings and recommendations of the Materials Processing and Space Manufacturing group of the space shuttle payload planning activity are presented. The effects of weightlessness on the levitation processes, mixture stability, and control over heat and mass transport in fluids are considered for investigation. The research and development projects include: (1) metallurgical processes, (2) electronic materials, (3) biological applications, and (4)nonmetallic materials and processes. Additional recommendations are provided concerning the allocation of payload space, acceptance of experiments for flight, flight qualification, and private use of the space shuttle. Author

**N74-15527*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**THE SPACE SHUTTLE PAYLOAD PLANNING WORKING GROUPS. VOLUME 10: SPACE TECHNOLOGY Final Report**
May 1973 96 p
(NASA-TM-X-69457) Avail: NTIS HC $7.00 CSCL 22B

The findings and recommendations of the Space Technology group of the space shuttle payload planning activity are presented. The elements of the space technology program are: (1) long duration exposure facility, (2) advanced technology laboratory, (3) physics and chemistry laboratory, (4) contamination experiments, and (5) laser information/data transmission technology. The space technology mission model is presented in tabular form. The proposed experiments to be conducted by each test facility are described. Recommended approaches for user community interfacing are included. Author

**N74-15546*#** National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio.
**SERT D SPACECRAFT STUDY**
[1974] 233 p
(NASA-TM-X-71494) Avail: NTIS HC $13.75 CSCL 22B

The SERT D (Space Electric Rocket Test - D) study defines a possible spacecraft project that would demonstrate the use of electric ion thrusters for long-term (5 yr) station keeping and attitude control of a synchronous orbit satellite. Other mission objectives included in the study were: station walking to satellite rendezvous and inspection, use of low cost attitude sensing system, use of an advanced solar array orientation and slip ring system, and an ion thruster integrated directly with a solar array power source. The SERT D spacecraft, if launched, will become SERT 3 the third space electric thruster test. Author

**N74-15547*#** National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
**TADPOLE SATELLITE**
Jan. 1974 36 p
(NASA-TM-X-71498; E-7861) Avail: NTIS HC $4.00 CSCL 22B

A low cost synchronous orbit satellite to evaluate small mercury bombardment ion thruster applications is described. The ion thrusters provide the satellite with precise north-south and east-west stationkeeping capabilities. In addition, the thrusters are used to unload the reaction wheels used for attitude control and for other purposes described in the report. The proposed satellite is named TADPOLE. (Technology Application Demonstration Program of Low Energy). Author

**N74-15661#** Interior Dept., Washington, D.C.
**ASSESSMENT OF GEOTHERMAL ENERGY RESOURCES**
Dallas L. Peck 25 Sep. 1972 86 p refs
Avail: NTIS HC $6.50 CSCL 20M

A study was conducted to develop and assessment of the state of the art and to recommend a research program to provide the basis for establishing the proper role of geothermal resources. It is expected that geothermal resources can accomplish the following: (1) provide additional energy to alleviate the Nation's impending storage, (2) water to supplement present supplies, and (3) mineral resources. It was recommended that an expanded program be conducted to assess the magnitude, type, and location of the Nation's geothermal resources and to spur the development of improved technology for discovering, evaluating, and utilizing the resources. The significant accomplishments to be realized by such a program are defined. Author

**N74-15668** Harvard Univ., Cambridge, Mass.
**USING ANALYSIS EFFECTIVELY IN A COMPLEX DECISION PROCESS PLANNING NASA'S PLANETARY PROGRAMS Ph.D. Thesis**
James Addison Walker 1973 310 p
Avail: Univ. Microfilms Order No. 73-27546

Some problems of applying systems analysis techniques to major policy problems imbedded in complex decision processes are illustrated by case studies of attempts to apply such techniques to long range planning for NASA's unmanned planetary exploration program. It is found that most of the analytic efforts adopted relatively formal methodologies and concentrated on analysis of scientific, technological and economic issues of planetary program planning. Such efforts were found to have had little or no impact on policy outcomes, nor have they had much success in gaining acceptance by NASA planners for the analytic techniques used. These cases are compared with planning efforts directed by NASA's Planetary Programs Division in the 1968 - 1970 period which did have a significant impact on policy outcomes. These latter efforts employed analytical techniques of a somewhat less formal variety, but featured careful consideration of the organizational, political and psychological aspects of the surrounding decision process. Dissert. Abstr.

**N74-15671*#** Drexel Univ., Philadelphia, Pa. Center for the Study of Environment.
**RESEARCH AND EDUCATION IN MANAGEMENT OF LARGE-SCALE TECHNICAL PROGRAMS Final Report**
W. W. Hagerty, E. S. Golden, A. J. Pennington, M. Silver, H. H. Annett, G. M. Cadwell, Jr., T. A. Michael, J. A. Orlando, and S. R. Siegal 2 Jun. 1973 196 p refs
(Grant NGL-39-004-020)
(NASA-CR-136563) Avail: NTIS HC $12.00 CSCL 05A

A research effort is reported which was conducted by NASA in conjunction with Drexel University, and which was aimed at an improved understanding of large scale systems technology and management.

**N74-15672*** Drexel Univ., Philadelphia, Pa.
**[NASA/DREXEL PROGRAM]**
*In its* Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 1-62 refs

CSCL 05A

The results are reported of the NASA/Drexel research effort which was conducted in two separate phases. The initial phase stressed exploration of the problem from the point of view of three primary research areas and the building of a multidisciplinary team. The final phase consisted of a clinical demonstration program in which the research associates consulted with the County Executive of New Castle County, Delaware, to aid in solving actual problems confronting the County Government. The three primary research areas of the initial phase are identified as technology, management science, and behavioral science. Five specific projects which made up the research effort are treated separately. A final section contains the conclusions drawn from total research effort as well as from the specific projects. D.L.G.

**N74-15673*** Drexel Inst. of Tech., Philadelphia, Pa.
**BUILD: A COMMUNITY DEVELOPMENT SIMULATION GAME, APPENDIX A**
J. A. Orlando and A. J. Pennington *In* Drexel Univ. Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 63-86 Presented at the 36th Natl. Meeting, Operations Res. Soc. of Am., Miami Beach, Fla., 10-12 Nov. 1969

CSCL 05A

The computer based urban decision-making game BUILD is described. BUILD is aimed at: (1) allowing maximum expression of value positions by participants through resolution of intense, task-oriented conflicts: (2) heuristically gathering information on both the technical and social functioning of the city through feedback from participants: (3) providing community participants with access to technical expertise in urban decision making, and to expose professionals to the value positions of the community: and (4) laying the groundwork for eventual development of an actual policy making tool. A brief description of the roles, sample input/output formats, an initial scenario, and information on accessing the game through a time-sharing system are included. D.L.G.

**N74-15674*** Drexel Inst. of Tech., Philadelphia, Pa.
**THE COMMUNITY DEVELOPMENT WORKSHOP, APPENDIX B**
R. Brill (Node Four Associates, Inc.), E. Gastro (Node Four Associates, Inc.), and A. J. Pennington *In* Drexel Univ. Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 87-97 Presented at the Ann. Meeting of the Environ. Design Res. Assoc., Chapel Hill, N. C., 8-11 Jun. 1969

CSCL 05A

The Community Development Workshop is the name given to a collection of techniques designed to implement participation in the planning process. It is an electric approach, making use of current work in the psychology of groups, mathematical modeling and systems analysis, simulation gaming, and other techniques. An outline is presented for a session of the workshop which indicates some of the psychological techniques employed, i.e. confrontation, synectics, and encounter micro-labs. D.L.G.

**N74-15675*** Drexel Univ., Philadelphia, Pa.
**NASA MANAGEMENT TECHNOLOGY, APPENDIX C**
G. Mason Cadwell, Jr. *In its* Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 98-114 refs

CSCL 05A

The relevant literature is summarized, and management technology is identified which prior research efforts have specified as applicable to other endeavors. Published research categorizes NASA contributions in the theory and practice of management by their experience in evolving and innovating advanced methods of: (1) conceiving, (2) planning, (3) administering, and (4) evaluating large-scale enterprises. Each of these categories is described, defined, and summarized. D.L.G.

**N74-15676*** Drexel Univ., Philadelphia, Pa.
**THE NASA PLANNING PROCESS, APPENDIX D**
H. A. Annett *In its* Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 115-127

CSCL 05A

The planning process is outlined which NASA used in making some fundamental post-Apollo decisions concerning the reuseable space shuttle and the orbiting laboratory. It is suggested that the basic elements and principles of the process, when combined, form a useful planning approach for solving urban problems. These elements and principles are defined along with the basic strengths of the planning model. D.L.G.

**N74-15677*** Drexel Inst. of Tech., Philadelphia, Pa.
**PUBLIC ATTITUDES TOWARD PROGRAMS OF LARGE-SCALE TECHNOLOGICAL CHANGES: SOME REFLECTIONS AND POLICY PRESCRIPTIONS, APPENDIX E**
Arthur B. Shostak *In* Drexel Univ. Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 128-139 refs

CSCL 05A

The question of how ready the public is for the implementation of large-scale programs of technological change is considered. Four vital aspects of the issue are discussed which include: (1) the ways in which the public mis-perceives the change process, (2) the ways in which recent history impacts on public attitudes, (3) the ways in which the public divides among itself, and (4) the fundamentals of public attitudes towards change. It is concluded that nothing is so critical in the 1970's to securing public approval for large-scale planned change projects as is securing the approval by change-agents of the public. D.L.G.

**N74-15678*** Drexel Inst. of Tech., Philadelphia, Pa.
**URBAN SIMULATION AND GAMING: PRELIMINARY EXPERIENCE AND PERSPECTIVES, APPENDIX F**
Arthur B. Shostak *In* Drexel Univ. Res. and Educ. in Management of Large-Scale Tech. Programs 2 Jun. 1973 p 140-154 refs

CSCL 05A

A three-month summer study of gaming, as applied to urban problems, was conducted. The results of the study are presented along with a series of recommendations aimed at guiding the warranted efforts of others to further explore the application of scientific gaming to the solution of some of America's urban problems. Three main topics are considered and are discussed in depth. These include: (1) gaming and urbanology, (2) methodology and lessons, and (3) reforms in the Cities Game. D.L.G.

**N74-15679#** Commission of the European Communities, Brussels (Belgium).
**THE ENERGY SITUATION IN THE COMMUNITY, SITUATION 1972, FORECASTS 1973**
9 Feb. 1973 55 p
Avail: NTIS HC $4.75

An analysis of the world energy situation in 1972 and the outlook for 1973 are presented. The development of an energy policy which would improve the quality of information available concerning energy requirements and problems is discussed. The market situation in 1972 and its consequences are examined for the specific cases of petroleum, coal, gas, electricity, and nuclear energy. Tables, charts, and graphs are included to show consumption rates and predicted consumption of the significant natural resources used for energy conversion. Author

**N74-15683*#** National Association of Schools of Public Affairs and Administration, Washington D.C.
**SCIENCE LEADERSHIP FOR TOMORROW: THE ROLE OF SCHOOLS OF PUBLIC AFFAIRS AND UNIVERSITIES IN MEETING NEEDS OF PUBLIC SCIENCE AGENCIES**
Albert H. Rosenthal (New Mex. Univ.), Robert F. Wilcox (Colo. Univ.), Frank Marini (San Diego State Univ.), and H. Clyde Reeves (Council of State Govt.) Nov. 1973 46 p refs Sponsored by NSF
(Grant NGL-32-004-042)
(NASA-CR-136589; LC-73-90891) Avail: NTIS HC $4.50 CSCL 05A

Recommendations and requirements for the preparation of personnel with some scientific or technological background to enter fields of public policy and administration are reported. University efforts to provide science administration graduate programs are outlined and increased cooperation between government and university resources is outlined. G.G.

**N74-15686#** Committee on Interior and Insular Affairs (U. S. Senate).
**LEGISLATIVE AUTHORITY OF FEDERAL AGENCIES WITH RESPECT TO FUELS AND ENERGY: A STAFF ANALYSIS**
Washington GPO 1973 240 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 1973
Avail: SOD HC $1.65

A Congressional committee report on the authority of Federal agencies with respect to fuels and energy emergency management is presented. It is stated that more than forty Federal departments, agencies, and regulatory commissions affect energy matters. The reorganization and restructuring of these Federal energy activities is a principal concern of the Committee involved in the energy study. A staff analysis is developed to show the statutory authority of Federal agencies and the implementation of that authority in the energy field. The staff analysis is based on a questionnaire which requested the following information: (1) goals and objectives of the energy and (2) a summary of their respective roles within the overall body of Federal fuels and energy policy formulation and implementation. The term Energy Policy is define as all basic legal authority which authorized programs or policies designed to assist, to promote, to regulate, or to impose constraints on the range of alternatives which local, State, Federal, or private descision makers may consider in their effort to meet existing and future energy demands. Author

**N74-15688#** Committee on Interior and Insular Affairs (U. S. Senate).
**SUMMARY OF THE ENERGY CONSERVATION AND DEVELOPMENT RECOMMENDATIONS CONTAINED IN THE FINAL REPORT OF THE NATIONAL COMMISSION ON MATERIALS POLICY, JUNE 1973: A BACKGROUND PAPER**
Washington GPO 1973 35 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., Jun. 1973 Prepared by Library of Congr.
Avail: SOD HC $0.35 Domestic Post Paid or $0.20 GPO Bookstore

A summary of the energy conservation and development recommendations was presented to the U.S. Congress pursuant to Senate Resolution 45. The summary was based on the final report of the National Commission on Materials Policy. The seven functions which are to be served by the national materials policy are defined. The major theme of the report is the need to strike a balance between producing goods and protecting the environment. A second theme is the need for a balance between the supply of materials and the demand for their use by increasing primary materials production. Specific recommendations are submitted for the following: (1) disposition of wastes, (2) development of energy sources, (3) land use, (4) water use, and (5) international aspects of the materials policy. The requirements for science and technology, research and development, and inventories of materials are included. P.N.F.

**N74-15690#** Committee on Interior and Insular Affairs (U. S. Senate).
**ENERGY CONSERVATION, PART 1**
Washington GPO 1973 482 p refs Hearings pursuant to S. Res. 45 before Comm. on Interior and Insular Affairs, 93d

Congr., 1st Sess., 22-23 Mar. 1973
Avail: Comm. on Interior and Insular Affairs

A Congressional hearing on the role of energy conservation in the National energy policy was conducted. The hearing assisted members of Congress and other interested parties in their understanding of the issues inherent in the formulation of a long-term National Energy Policy which assures the continued welfare of the Nation including balance growth safeguarding and enhancing the quality of the environment, and national security. The questions addressed in the hearings were directed toward: (1) the general issue of energy conservation, (2) detailed questions and policy issues, (3) requirements of the transportation sector, (4) requirements of the residential/commercial sector, (5) requirements of the industrial sector, and (6) requirements of the electric utilities. P.N.F.

**N74-15692*#** National Academy of Public Administration, Washington, D.C.
**PROJECT MANAGEMENT IN NASA: THE SYSTEM AND THE MEN**
Robert H. Pontious and Lewis B. Barnes NASA 1973 137 p refs
(Contract NSR-09-046-001)
(NASA-SP-324; LC-73-600068) Avail: NTIS MF $1.45; SOD HC $1.55 CSCL 05A

An analytical description of the NASA project management system is presented with emphasis on the human element. The NASA concept of project management, program managers, and the problems and strengths of the NASA system are discussed. F.O.S.

**N74-15697#** Chase Manhattan Bank, New York. Energy Economics Div.
**OUTLOOK FOR ENERGY IN THE UNITED STATES TO 1985**
John G. Winger, Gerald D. Gunning, John D. Emerson, Richard C. Sparling, and Arthur J. Zraly Jun. 1972 56 p
Avail: NTIS HC $5.00

The energy requirements of various sectors of the U.S. economy are analyzed. Graphs and charts are developed to show previous energy consumption levels and predictions are made for future requirements to 1985. A comparison is made for the amounts of energy in the form of oil, natural gas, coal, water, and nuclear used by various geographical areas of the United States. Tables of data are prepared to show the potential sources of energy, both foreign and domestic. The economic impact of depending on foreign sources for resources is analyzed. Author

**N74-15698#** RAND Corp., Santa Monica, Calif.
**RESIDENTIAL ENERGY USE: AN ECONOMETRIC ANALYSIS**
Kent P. Anderson Oct. 1973 89 p refs
(Grant NSF GI-44)
(R-1297-NSF) Avail: NTIS HC $6.50

The demands of the residential sector of the U.S. economy for energy resources in the form of gas and electricity are discussed. Tables of data are presented to show the various predictions concerning the future price of electricity and natural gas to the consumer. Methods for predicting the future cost of energy resources are explained. The energy requirements for residential use are expressed in mathematical models and the results are tabulated for type of fuel, type of home, and specific use within the home. Author

**N74-15730#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**AN INVESTIGATION OF COST FACTORS RELATING TO CLASS 4 AIRCRAFT MODIFICATIONS M.S. Thesis**
Elvis M. Baker, William H. Burgess, and Albert F. Malkiewicz Aug. 1973 139 p refs
(AD-769195; SLSR-18-73B) Avail: NTIS CSCL 15/5

The emphasis on economic use of resources, and the necessity to justify and account for each dollar spent, has required more research into ways and means of collecting costs of public programs. Aircraft modifications have been the subject of increasing concern, and the Air Force has been criticized for not being able to identify all costs of an aircraft modification. The research is an effort to determine what significant costs are involved in Class 4 aircraft modifications, and which of these have been included in modification approval procedures. Present modification processing procedures habe been presented to enable an understanding of how costs have been collected. GRA

**N74-15733#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**THE IMPACT OF CONVERSION TO THE METRIC MEASUREMENT SYSTEM ON AIRCRAFT MAINTENANCE AT BASE LEVEL M.S. Thesis**
Robert G. Dewey and Wayne A. Mann Aug. 1973 90 p refs
(AD-769186; SLSR-5-73B) Avail: NTIS CSCL 01/3

The conclusions drawn in the thesis indicate that the impact of metric conversion on aircraft maintenance hardware will allow continued use of current shop machinery and servicing equipment with minor modification required in but few cases. The intermix of tools and stock of both dimensions can be accomplished with little difficulty by the user and will require additional storage space throughout the conversion period and for many years thereafter. Technical information will be affected but can assimilate metric in an orderly fashion. GRA

**N74-15743*#** Kanner (Leo) Associates, Redwood City, Calif.
**WIND POWER PLANTS IN RUSSIA**
Th. Sauer Washington NASA Feb. 1974 7 p refs Transl. into ENGLISH from VDI (Ver. Deut. Ing.) Z. (West Germany), v. 81, no. 32, 7 Aug. 1937 p 947-948
(Contract NASw-2481)
(NASA-TT-F-15331) Avail: NTIS HC $3.00 CSCL 10B

Several measures relative to wind power plants have been taken by the Soviet government, and are outlined. The large Balaklava wind power plant is described briefly. The wind power experimental facility in Moscow is illustrated in a diagram and its operation discussed in some detail. Author

**N74-15770*#** Scientific Translation Service, Santa Barbara, Calif.
**SMALL WIND-ELECTRICAL INSTALLATIONS FOR EXPORT**
G. R. Seidel Washington NASA Feb. 1974 11 p refs Transl. into ENGLISH from Elektrotechn. Z. (West German), v. 70, no. 5, May 1949 p 158-160
(Contract NASw-2483)
(NASA-TT-F-15350) Avail: NTIS HC $3.00 CSCL 10B

The design and operational problems are reported that are associated with wind power generating plants similar to the American wind charger. The potential market for such devices is discussed. Author

**N74-15882#** National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
**A STUDY OF SIX UNIVERSITY-BASED INFORMATION SYSTEMS**
Beatrice Marron, Elizabeth Fong, Dennis W. Fife, and Kirk Rankin Jun. 1973 100 p Sponsored by NSF
(NBS-TN-781) Avail: SOD HC $1.25 Domestic Postpaid or $1.00 GPO Bookstore as C13.46:781

A methodology for categorically describing computer-based information systems was developed and applied to six university-based, NSF-supported, systems. The systems under study all operate as retail information centers primarily serving campus communities by accessing large commercially-available data bases using 3rd generation computer configurations. The systems vary

in design philosophy, mode of user service, transferability characteristics, and operational status. A summary matrix is included. Author

**N74-15948#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Zentralabteilung Satellitenbetrieb.
**THE GERMAN SPACE OPERATIONS CENTER AND ITS USE FOR BILATERAL SPACE PROJECTS**
Klaus Wiegand 1973 26 p refs Presented at the 13th European Space Symp., London, 25-27 Jun. 1973
Avail: NTIS HC $3.50

The German Space Operations Center and its facilities are described and a summary is given of experiences during missions of the bilateral projects Azur, Injun, and Aeros. An outlook on planned operations during future Helios and Symphonie missions is given. Author (ESRO)

**N74-15951#** Naval Postgraduate School, Monterey, Calif.
**A NOISE EXPOSURE FORECAST EVALUATION OF THE MONTEREY PENINSULA AIRPORT M.S. Thesis**
Michael Reilly Merickel Sep. 1973 75 p refs
(AD-769814) Avail: NTIS CSCL 01/5

A computer program was used to obtain contours of noise exposure for the Monterey Peninsula Airport. Two scenarios are presented for the present volume of operations and the resulting NEF contours are shown. The same two plots, with a doubled volume of operations, are depicted for a relative comparison. These noise exposure forecasts can be used for noise evaluation and compatible land use planning in the vicinity of an airport. (Modified Author Asbtract) GRA

**N74-16010*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Progress Report, 1 Dec. 1973 - 31 Jan. 1974**
John W. Hannah, Garland L. Thomas, and Ferd Esparza, Principal Investigators 31 Jan. 1974 8 p Prepared in cooperation with Brevard County Planning Dept., Titusville, Fla. ERTS
(Contract NAS5-21847)
(E74-10248; NASA-TM-X-69380) Avail: NTIS HC $3.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-16011*#** Ohio Dept. of Economic and Community Development, Columbus.
**RELEVANCE OF ERTS-1 TO THE STATE OF OHIO Semiannual Progress Report, 1 Jul. - 31 Dec. 1973**
David C. Sweet, Paul G. Pincura, and George E. Wukelic, Principal Investigators 11 Jan. 1974 45 p Prepared in cooperation with Battelle Columbus Labs., Ohio Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21782)
(E74-10250; NASA-CR-136564; SAPR-3) Avail: NTIS HC $4.25 CSCL 08F

The author has identified the following significant results. During the first year of project effort the ability of ERTS-1 imagery to be used for mapping and inventorying strip-mined areas in south eastern Ohio, the potential of using ERTS-1 imagery in water quality and coastal zone management in the Lake Erie region, and the extent that ERTS-1 imagery could contribute to localized (metropolitan/urban), multicounty, and overall state land use needs were experimentally demonstrated and reported as significant project results. Significant research accomplishments were achieved in the technological development of manual and computerized methods to extract multi-feature information as well as singular feature information from ERTS-1 data as is exemplified by the forestry transparency overlay. Fabrication of an image transfer device to superimpose ERTS-1 data onto existing maps and other data sources was also a significant analytical accomplishment.

**N74-16143#** Technische Univ., Berlin (West Germany). Fachbereich Kybernetik.
**COMPARATIVE TECHNOLOGICAL SYSTEMS STUDY ON OUTSIDE DATA PROCESSING FOR THE PRODUCTION WITH NUMERICAL CONTROLLED TOOLING MACHINES Ph.D. Thesis [VERGLEICHENDE SYSTEMTECHNISCHE UNTERSUCHUNGEN DER AEUSSEREN DATENVERARBEITUNG FUER DIE FERTIGUNG NUMERICH GESTEUERTEN WERKZEUGMASCHINEN]**
Murat Dincmen Jul 1972 143 p refs In GERMAN
Avail: NTIS HC $9.25

Investment planning with progressive automatization requires inclusion of external data processing as automatic controlled machining processes increase in conventional production methods. Models for an external digital classification and simulation system are derived that consider: (1) The interdependence between in house and external data processing; (2) material evaluation and information processing times; (3) inclusion of material flow and information flow observations; (4) cost estimates for elements of inhouse and external data processing methods; and (5) descriptions of workpieces and elements of data processes for developing economic realistic investment alternatives.
Transl. by G.G.

**N74-16153#** Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
**INTEGRATED AUTOMISATION OF SEMICONDUCTORS COMPONENTS PRODUCTION LINE**
A. Titli, M. Richetin, J. P. Richard, M. Lemaitre, C. Hernandez, G. Giralt, and D. Esteve 1973 22 p refs Presented at the Intern. Inst. for Appl. Systems Anal. Conf. on Control of Integrated Ind. Systems, Vienna, 1-3 Oct. 1973
Avail: NTIS HC $3.25

The production process is defined more precisely, and a graphic representation is proposed. The principal functions of diagnosis, supervision, and control are introduced into a hierarchical structure. Some methods relative to these different functions are developed. The integration of technical and economic management is briefly described, illustrating different methods.
ESRO

**N74-16312#** Tokyo Metropolitan Research Inst. for Environmental Protection (Japan).
**ELIMINATING POLLUTION AND CREATING A GENERAL EQUILIBRIUM MODEL INCLUDING THE ENVIRONMENT**
T. Nambu and K. Aoki [1973] 9 p
Avail: NTIS HC $3.00

The effect of governmental intervention in eliminating environmental pollution is analyzed by using an equilibrium model, which considers goods, labor, and the life environment. The assistance (subsidies) of the government to production activities in eliminating pollution is discussed along with combatting environmental pollution generated by the concentration of people. F.O.S.

**N74-16513#** Little (Arthur D.), Inc., Cambridge, Mass. Engineering Sciences
**ENERGY CONSERVATION WITH SOLAR CLIMATE CONTROL**
Peter E. Glaser 14 Nov. 1973 9 p Presented to Subcomm. on Energy of the Comm. on Sci. and Astronaut., US House of Representatives, Washington, 14 Nov. 1973
Avail: NTIS HC $3.00

The use of solar energy for climate control is discussed, with emphasis on solar heating and cooling of buildings. Government/industry relations are discussed in terms of taking action and supplying the market for solar climate control systems. The components of these systems are listed. K.M.M.

**N74-16561*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APOLLO EXPERIENCE REPORT: PROBLEM REPORTING AND CORRECTIVE ACTION SYSTEM**
T. J. Adams Washington Feb. 1974 24 p
(NASA-TN-D-7586; JSC-S-384) Avail: NTIS HC $2.75 CSCL 22B

The Apollo spacecraft Problem Reporting and Corrective Action System is presented. The evolution from the early system to the present day system is described. The deficiencies and the actions taken to correct them are noted, as are management controls for both the contractor and NASA. Significant experience gained from the Apollo Problem Reporting and Corrective Action System that may be applicable to future manned spacecraft is presented. Author

**N74-16641** Committee on Interior and Insular Affairs (U. S. Senate).
**A BIBLIOGRAPHY OF NON-TECHNICAL LITERATURE ON ENERGY**
Flora Dean, comp. Washington GPO 1971 104 p refs Presented to Comm. on Interior and Insular Affairs, 92d Congr., 1st Sess., 5 Nov. 1971 Prepared by Library of Congr.
Avail: Comm. on Interior and Insular Affairs

A bibliography of non-technical literature on energy sources and problems was prepared for the Committee on Interior and Insular Affairs of the United States Senate. The reports cover the period of time from 1 July 1969 to 1 July 1971. The subjects covered include the following: (1) national energy goals, (2) energy policy issues, (3) projections for future demands, (4) resource base for all energy sources, (5) management of federally owned resources, (6) production of fuels, (7) transportation of energy and fuels, (8) utilization (including conservation measures), and (9) environmental effects (relation of environmental policy to energy policy). P.N.F.

**N74-16642** Committee on Interior and Insular Affairs (U. S. Senate).
**A BIBLIOGRAPHY OF CONGRESSIONAL PUBLICATIONS ON ENERGY FROM THE 89TH CONGRESS TO 1 JULY 1971**
Dana C. Ellingen, comp. and William E. Towsey, Jr., comp. Washington GPO 1971 63 p refs Presented to Comm. on Interior and Insular Affairs, 92d Congr., 1st Sess., 5 Nov. 1971
Avail: Comm. on Interior and Insular Affairs

A bibliography of Congressional Publications on Energy Resources and Requirements is presented. The documents cover the period of time from 1 January 1965 to 30 June, 1969. The subjects included in the bibliography are: (1) national energy goals, (2) energy policy issues, (3) projections of future demands, (4) resource base for all types of energy sources, (5) management of federally owned resources, (6) production of fuels (including storage), (7) transportation of energy and fuels, (8) utilization (including conservation measures), (9) environmental effects, (10) research and development of resources, and (11) changing and improving regulatory practices. P.N.F.

**N74-16643#** Joint Publications Research Service, Arlington, Va.
**TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 380**
18 Jan. 1974 64 p Transl. into ENGLISH from various Soviet publications
(JPRS-61017) Avail: NTIS HC $5.25

Articles, concerning the development and progress in various theoretical and applied scientific disciplines and technical fields, are presented. Data are also given on the administration, structure, personnel, and research plans of leading East European scientific organizations and institutions.

**N74-16646#** Joint Publications Research Service, Arlington, Va.
**TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 377**
9 Jan. 1974 60 p refs Transl. into ENGLISH from East European Journals
(JPRS-60949) Avail: NTIS HC $5.00

Selected articles are presented concerning the development, administration, structure, personnel, and research plans of leading East European scientific organizations and institutions, and particularly the academies of sciences.

**N74-16649** Joint Publications Research Service, Arlington, Va.
**PRINCIPLES FOR LONG-TERM DEVELOPMENT OF ACADEMY'S RESEARCH NETWORK**
*In its* Transl. into Eastern Europe: Sci. Affairs, no. 377 (JPRS-60949) 9 Jan. 1974 p 6-18 refs Transl. into ENGLISH from Magyar Tudomany (Hungary), no. 9, Sep. 1973 p 557-566

The research network of the Hungarian Academy of Sciences was reviewed and the principles for long-term development were established. These developmental concepts are given and include the following: (1) principal directions of development in the natural sciences, (2) principal directions of development in the social sciences, (3) developmental trends that influence the research network's structure and the research stations' organization, and (4) allocations for development. D.L.G.

**N74-16652** Gonzalez (Richard J.), Houston, Tex.
**FUTURE UNITED STATES POPULATION, ECONOMIC GROWTH, AND ENERGY DEMANDS**
Richard J. Gonzalez *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 1-8

The impact of United States population and economic growth on energy demands is discussed. The need for reasonably rational analyses based on correct information and on realistic assumptions with respect to the future energy requirements is stressed. The subjects considered are: (1) the outlook for U.S. population, (2) the potential for U.S economic growth, (3) probable U.S. energy requirements, and (4) perspective on long term energy problems. The author concludes that the future welfare of mankind requires that energy problems receive the best possible rational study as the basis for intelligent decisions about all policies and actions that affect energy availability, cost, and use. Author

**N74-16653** Stanford Research Inst., Menlo Park, Calif. Energy and Resources Economics.
**GOVERNMENT, POLICIES, NATIONAL OBJECTIVES, AND THE ENERGY INDUSTRIES**
Sherman H. Clark *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 9-27 refs

The requirements for the development of a national policy on energy sources and utilization are discussed. The economic factors which influence the availability of natural gas and petroleum are analyzed. The impact of energy availability on the national goals of economic growth and employment is examined. The most immediate issues to be resolved are identified as oil and gas pricing and the security of the supply of these resources. Tables of data are included to show: (1) free world oil production from 1970 to 1990, (2) energy demands and oil imports from

oil producing and exporting countries, (3) the importance of offshore oil imports, and (4) U.S. energy consumption patterns for 1968. Author

**N74-16654** First National City Bank, New York.
**CAPITAL REQUIREMENTS OF THE ENERGY INDUSTRIES**
Edward Symonds *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 29-37

The economic factors which influence the investments which should be made in developing natural resources for energy purposes are discussed. Capital outlays for the energy industries of the U.S. involving electricity, oil, gas and other are tabulated for 1970 and estimated for 1980. A similar tabulation is presented for nations of the non-Communist world. Energy demands for the U.S. and non-Communist countries from 1960 to 1980 are analyzed. Factors, other than economic which influence the amounts and types of energy available are examined. Author

**N74-16655** Massachusetts Inst. of Tech., Cambridge. Dept. of Economics.
**LONG RUN COST TRENDS: PERSIAN GULF AND UNITED STATES**
M. A. Adelman *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 39-72 refs

The production costs of crude oil and natural gas in the U.S. are compared with those for the Persian Gulf nations. A theory of petroleum production costs is presented to show the relationship between production, development, and exploration of petroleum supplies. The effect of changing sources of reserves on the development costs of new petroleum resources is analyzed. The expected supply from the North Shore Alaska petroleum field is reported. Tables of data are included to show the following: (1) development investment in Persian Gulf petroleum, (2) cost projection of Persian Gulf resources from 1965 to 1969, (3) exploration activity and expenditures in North American petroleum development from 1955 to 1970, and (4) significant discoveries of oil and gas from 1945 to 1964. Author

**N74-16656** Texas Univ., Austin. College of Social and Behavioral Sciences.
**BALANCING THE DEMAND AND SUPPLY OF OIL**
James W. McKie *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 73-90 refs

The economic factors which influence the supply and demand of crude oil in the U.S. are discussed. Estimates are made of the projected availability of petroleum from domestic sources through the year 1980. The availability of petroleum supplies based on the predictions of exploration and development is analyzed. Tables of data are provided to show the following: (1) projections of the oil supply-demand balance from 1980 to 1985, and (2) estimates of domestic U.S. production in 1975, 1980, and 1985. The need for a Federal energy policy is stressed and approaches to such a policy are submitted. Author

**N74-16658** Peabody Coal Co., St. Louis, Mo.
**BALANCING THE DEMAND AND SUPPLY OF COAL**
Thomas M. Lydon *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 107-114

An analysis of coal supplies for energy applications was conducted to determine methods of obtaining a balance between supply and demand. The problems faced by the coal producer and those of the coal user are examined to show the environmental impacts. Methods for meeting the energy shortages through improved coal utilization are proposed. A table is included to show the total demand for U.S. coal (including exports). Author

**N74-16659** Kerr-McGee Corp., Oklahoma City.
**BALANCING THE DEMAND AND SUPPLY OF ELECTRICITY AND NUCLEAR FUELS**
Dean A. McGee *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 115-130 refs

The problem of obtaining a balance between demand and supply of nuclear fuel for electric power generation in the United States to 1985 is discussed. It is stated that the balance will depend on economic rather than geologic considerations. Proven reserves of uranium and the quality of the resource base that offers potential for new discoveries assure that uranium ore deposits available for development and production will be sufficient to meet demand. Projections are made in the growth of the nuclear powered electric energy field. The operation of the nuclear reactors and the nuclear fuel cycle involved in electric power production are described. Charts are included to show the projected utilization of nuclear fuels and the mix of coal, hydro, gas, thermal, and nuclear fuels to the year 2000. Author

**N74-16660** Sun Oil Co., Philadelphia, Pa. Economics and Industry Affairs.
**BALANCING THE DEMAND AND SUPPLY OF OTHER ENERGY FORMS**
James S. Cross *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 131-143

Methods for balancing the demand and supply of various energy forms are discussed. A graphic presentation of the U.S. energy balance for the five year periods beginning in 1970 and extending to 1985 is developed. The economic and environmental factors involved in using hydroelectric, geothermal, synthetic gas, and tar sands for energy sources are examined. Other sources of energy from agricultural products and tidal energy are analyzed. The potential for using more of the energy available from the sun is proposed. Author

**N74-16661** Texas Univ., Austin.
**ENVIRONMENTAL PROTECTION AND LONG RUN SUPPLY OF CRUDE OIL IN THE UNITED STATES**
Stephen L. McDonald *In* Denver Univ. Balancing Supply and Demand for Energy in the US 1972 p 145-158 refs

A study was conducted to determine the effects of energy conversion on the environment. The effects of various types of energy sources were examined and examples of legislation to reduce environmental pollution are presented. The subjects discussed are: (1) protection of the environment and national income, (2) allocation of environmental protection costs, (3) environmental protection problems in the petroleum industry, and (4) progress in developing new environmental protection techniques. Author

**N74-16662#** Committee on Interior and Insular Affairs (U. S. Senate).
**ENERGY EMERGENCY LEGISLATION, PART 1**
Washington GPO 1973 364 p refs Hearing on S. 2589 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 8 Nov. 1973
Avail: SOD HC $2.35

A Congressional hearing concerning emergency energy legislation was conducted. The purpose of the legislation was as follows: (1) to declare by congressional action a nationwide energy emergency, (2) to authorize the president to immediately undertake specific actions to conserve scarce fuels and increase supply, (3) to initiate the development of local, state, national, and international contingency plans, and (4) to assure the continuation of vital public services. P.N.F.

**N74-16663#** Committee on Interior and Insular Affairs (U. S. Senate).
**BLACKSBURG, VIRGINIA, RESEARCH CENTER**
Washington GPO 1973 45 p Hearing on S. 378 Before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 25 Sep. 1973

Avail: Subcomm. on Minerals, Mater. and Fuels

A hearing was conducted before the Congressional Subcommittee on Minerals, Materials, and Fuels concerning the establishment and operation of a research center at Virginia Polytechnic Institute and State University at Blacksburg, Virginia. The purpose of the hearing was to enact legislation to provide a location for a research center now located at the University of Maryland. The lease for the U. of Md. center expires in June 1978 and replacement research facilities will be required. P.N.F.

**N74-16664#** Committee on Interior and Insular Affairs (U. S. Senate).

**FUEL SHORTAGES, PART 1**

Washington GPO 1973 530 p refs Hearings before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 1 Feb. 1973 2 Vol.

Avail: Comm. on Interior and Insular Affairs

A Congressional hearing was conducted to investigate the factors contributing to current shortages of natural gas, residual oil, and other refined products. Testimony from the Senators of various states is submitted to show the extent of the energy crisis and their understanding of the basic causes. Communications from various segments of the economy are included to define the scope of the shortages and the impact on industry, public utilities, and home use. Tables of data are developed to show the resources available and the anticipated problem areas. The actions to be taken by Federal organizations to improve the energy situation are recommended. P.N.F.

**N74-16665#** Committee on Interior and Insular Affairs (U. S. Senate).

**FUEL SHORTAGES, PART 2**

Washington GPO 1973 270 p refs Hearings before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 22 Feb. 1973 2 Vol.

Avail: Comm. on Interior and Insular Affairs, 93d Congr., 1st. Sess., 22 Feb. 1973

**N74-16666#** Committee on Interior and Insular Affairs (U. S. Senate).

**THE EVOLUTION AND DYNAMICS OF NATIONAL GOALS IN THE UNITED STATES**

Franklin P. Huddle Washington GPO 1971 66 p refs Presented to Comm. on Interior and Insular Affairs, 92d Congr., 1st Sess., 16 Aug. 1971 Prepared by Library of Congr.

Avail: Comm. on Interior and Insular Affairs

A Congressional hearing was conducted to examine the evolution and dynamics of the National Goals in the U.S. The study reviews the history of national goal formation beginning with the Preamble to the Constitution of the United States. The process and specifics of national goal formation during several administrations are described. The background information provided by the study is considered useful in identifying the role of the energy policy in the implementation of national goals. The subjects contained in the study are: (1) historical evolution of the goals of the U.S., (2) maturation of early constitutional goals, (3) succession of national goals in the past half-century, (4) the interaction of science and technology with national goals, and (5) recent attempts to chart new goals for America. P.N.F.

**N74-16667#** Committee on Interior and Insular Affairs (U. S. Senate).

**A REVIEW OF ENERGY ISSUES AND THE 91ST CONGRESS**

Washington GPO 29 Jan. 1971 41 p refs Presented to Comm. on Interior and Insular Affairs, 92d Congr., 1st Sess. 15 Dec. 1970 Prepared by Library of Congr.

Avail: Comm. on Interior and Insular Affairs

A review of the energy crisis issues considered by the U.S. Congress was conducted. The purpose of the review is to examine the interrelationships between energy supply, the environment, resource conservation, economic growth, and the attainment of important national goals. The policy issues in the energy field involve the following: (1) oil imports, (2) trans-Alaska pipeline, (3) outer continental shelf, (4) natural gas supply, (5) shortages and movement toward an overall energy policy, (6) electric power generation and transmission, and (7) nuclear energy development and environmental effects. P.N.F.

**N74-16668#** Committee on Interior and Insular Affairs (U. S. Senate).

**COMPACT TO CONSERVE OIL AND GAS**

Washington GPO 1971 30 p Hearing on S. J. Res. 72 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 17 Jun. 1971

Avail: Subcomm. on Minerals, and Fuels

A Congressional hearing concerning an extension of the Interstate Compact to Conserve Oil and Gas was conducted. The purpose of the compact is to prevent physical waste of natural resources within the states which ratify the compact. The states are expected to accomplish the legislation to prevent the following: (1) operation of any oil well with an inefficient gas-oil ratio, (2) drowning with water of any stratum capable of producing oil or gas, or both oil and gas, in paying quantities, (3) avoidable escape into the open air or the wasteful burning of gas from a natural gas well, (4) the creation of unnecessary fire hazards, (5) the drilling, equipping, locating, spacing, or operating a well or wells so as to bring about physical waste of oil or gas, and (6) the inefficient, excessive, or improper use of reservoir energy in producing wells. Author

**N74-16669#** Committee on Interior and Insular Affairs (U. S. Senate).

**FEDERAL ENERGY ORGANIZATION: A STAFF ANALYSIS**

Washington GPO 1973 66 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 5 Mar. 1973

Avail: Comm. on Interior and Insular Affairs

A Congressional staff analysis was prepared to provide information on the significance of energy organization and the present organization structure for handling energy matters. A history of the Federal Energy Organization is provided and the functions in various areas of resources management are defined. The deficiencies in existing Federal Energy Organizations are analyzed. A tabulation of the Federal Energy Agencies is provided. Summaries of proposed Federal reorganization for energy are developed. P.N.F.

**N74-16670#** Committee on Interior and Insular Affairs (U. S. Senate).

**GEOTHERMAL ENERGY RESOURCES AND RESEARCH**

Washington GPO 1972 472 p refs Hearings before Comm. on Interior and Insular Affairs, 92d Congr., 2d Sess., 15 and 22 Jun. 1972

Avail: SOD HC $2.75

A Congressional hearing was conducted to discuss the role of geothermal energy resources in the nation's economy. The proposed costs of research and development projects for geothermal energy exploitation are discussed. The research projects to be conducted are defined. Information is provided on the subjects of: (1) assessment of geothermal energy resources, (2) a theoretical study of geothermal energy extraction, (3) classification of public lands valuable geothermal steam and associated geothermal resources, and (4) environmental impact statement for the geothermal leasing program. P.N.F.

**N74-16678#** Technische Univ., Berlin (West Germany).

**FOUNDATIONS FOR PLANNING OF RESEARCH AND DEVELOPMENT PROCESSES WITH STOCHASTIC NETS Ph.D. Thesis [ANSAETZE ZUR PLANUNG VON FORSCHUNGS- UND ENTWICKLUNGSPROZESSEN MIT STOCHASTISCHEN NETZWERKEN]**

Volker Kerssenfischer 1972 178 p refs In GERMAN

Avail: NTIS HC $11.00

Planning and implementation of a research and development process by stochastic nets requires the definition of basic processes in the overall technological process and systematic formalization and quantization of optimal decision strategies. Stochastic nets for a sequential, parallel, and mixed sequential-parallel develop-

ment processes that use their own components are developed. Systems optimization reduces stochastic nets by estimates for probability of duration and cost of development activities. Time dependence in the optimization for a developing system is demonstrated by comparing a parallel and a sequential research and development process. Transl. by G.G.

**N74-16681#** RAND Corp., Santa Monica, Calif.
**THE ROLES OF GOVERNMENT IN TRANSPORTATION PLANNING**
Laurel V. Roennau Aug. 1973 26 p
(P-5079) Avail: NTIS HC $3.50

Some of the less conventional concerns of the transportation planner are defined and structured, with special emphasis on the function of government. Topics include: the levels of government; conflicting objectives of transportation planning; strategy choices for national planning guidance; R and D investment strategies; and institutional constraints and problems. A matrix of decision-influencing factors is given as a guidline to identifying areas of concern and responsibility. K.M.M.

**N74-16682#** Joint Publications Research Service, Arlington, Va.
**TRANSLATIONS OF SOUTH AND EAST ASIA, NO. 450**
22 Jan. 1974 27 p Transl. into ENGLISH from various South and East Asian periodicals
(JPRS-61035) Avail: NTIS HC $3.50

The status and level of Japanese efforts in the field of scientific research and development planning are considered. Specific methods are discussed for decision making in systems of organizational management. Methods and procedures in planning scientific research and development at the national level and in large corporations are reviewed. Author

**N74-16685#** Yale Univ., New Haven, Conn. Cowles Foundation for Research in Economics.
**SOME OBSERVATIONS ON OPTIMAL ECONOMIC GROWTH AND EXHAUSTIBLE RESOURCES**
Tjalling C. Koopmans 1973 18 p refs Sponsored by NSF and Ford Found.
(Cowles-Foundation-Paper-396) Avail: NTIS HC $3.00

The optimal paths of trading for an exhaustible resource model are compared in terms of consumption. The optimal rate of utilization of exhaustible resources, and the theory of optimum capital growth are discussed. It is concluded that the combination of discounting of future utilities at a positive rate, and the costless storage in nature of the resource prior to extraction leads to an exponential increase in the scarcity price of the resource. F.O.S.

**N74-16686#** Admiralty Surface Weapons Establishment, Portsmouth (England).
**PERT: AN ALGOL 60 COMPUTER PROGRAM**
M. H. A. Smith Feb. 1973 76 p refs
(TR-73-5; BR37352) Avail: NTIS HC $6.00

An ALGOL 60 computer program (for a Marconi-Elliott 900 series computer with paper tape input and output) is presented and described in sufficient detail for someone not experienced in either PERT or computer programming to understand how to make use of it. The program is in current use to analyze network diagrams and to produce the several types of relevant reports required. Particular attention is paid to the practical updating of the network, and to the use of the reports as a valuable medium for communication among members of a project team. An example of its application to the production planning of a hypothetical radar type is detailed. Author (ESRO)

**N74-16687#** European Space Research Organization, Paris (France).
**STATISTICAL-ANALYTICAL COST MODELS FOR DESIGN, DEVELOPMENT AND MANUFACTURE OF SPACECRAFT**
D. E. Koelle (Messerschmitt, Boelkow, Blohm, Ottobrunn, West Ger.) Dec. 1973 103 p refs Transl. into ENGLISH from Raumfahrtforsch. (Stuttgart), v. 6, no. 1, 1972 p 1-14
(ESRO-TT-4) Avail: NTIS HC $7.25

Improved cost formulas are derived for different types of space projects such as research satellites, application satellites, interplanetary spacecraft, launch vehicle stages, rocket engines, and manned space vehicles. The statistically-derived cost formulas for the fabrication and development of space projects, provide the basis for the analytical cost models. By the introduction of a learning factor dependent on mass and production rate, and technical complexity factors, the formulas enable initial cost estimates of space projects to be calculated more accurately. Author (ESRO)

**N74-16688#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**THE AEROSPACE CORPORATION: PAST, PRESENT, AND FUTURE M.S. Thesis**
James Franklin Wheeler Sep. 1973 122 p refs
(AD-768386; GSM/SM/73-26) Avail: NTIS CSCL 05/1

The Aerospace Corporation was created in 1960 to provide General Systems Engineering and Technical Direction services to the U.S. Air Force and its contractors in support of national space and missile programs. As the priorities associated with these programs have changed in the intervening thirteen years, the role of Aerospace has changed considerably. Today, Aerospace is pursuing an active diversification program and has gained de facto independence of its founder and primary sponsor, the U.S. Air Force. The contemporary situation needs close examination by a competent agency to determine if the management concept embodied in Aerospace is still the best way to obtain these services and if national security interests are being served adequately. Author (GRA)

**N74-16690#** Massachusetts Inst. of Tech., Cambridge. Energy Lab.
**MODELING OF ELECTRIC POWER DEMAND GROWTH Final Report**
J. B. Woodard, Jr., M. L. Baughman, and F. C. Schweppe Feb. 1973 20 p refs Presented at MIT Conf. on Energy: Demand, Conservation and Institutional Probl., 12-15 Feb. 1973
(Grant NSF GI-32874)
(PB-224045/5GA; MIT-EL-73-015) Avail: NTIS HC $3.00 CSCL 10B

The paper describes a modeling approach, presently under development, directed at the growth in demand for electric power. The emphasis is to develop a mathematical model which can be used for the analysis of detailed questions, such as: How will changes in air conditioning power demand, electric rate structures, population, etc., affect the daily load shapes (MW vs time) as well as the peak power and the overall electric energy consumption. Detailed answers to these questions are needed for generation planning of capacity and plant mix (nuclear, fossil, and pumped-hydro) as well as for the evaluation of the resulting environmental and economic impacts. These issues require detailed models combining economic models with engineering considerations affecting the dynamics of load behavior. Modeling of this kind can be limited by the data available, and an important aspect of this effort is to identify the data required for a detailed understanding of the load. The approach to be employed is a combination of state dynamic models driven by stochastic processes with economic models. GRA

**N74-16693#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**AN ANALYSIS OF THE ACQUISITION OF THE F-111A SIMULATORS M.S. Thesis**
Billie Jatzen and Gerald J. Schulke Aug. 1973 62 p refs
(AD-769202; SLSR-33-73B) Avail: NTIS CSCL 15/5

The Department of Defense (DOD) is concerned about the effectiveness of acquisitions with midrange dollar values. In order to ascertain the effectiveness of a specific mid-range dollar value acquisition, the F-111 simulator acquisition was studied

and analyzed. The report ascertains the effectiveness of the procurement of the F-111A simulator and comments on the strengths and weaknesses of the acquisition. GRA

**N74-16694#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**A COMPARATIVE ECONOMIC ANALYSIS OF A LIGHTER-THAN-AIR LOGISTICS SYSTEM M.S. Thesis**
Roy D. Hammesfahr and Thomas R. Hawk Aug. 1973 60 p refs
(AD-769205; SLSR-39-73B) Avail: NTIS CSCL 15/5

Lighter-Than-Air (LTA) vehicles have been used since the 18th century for a variety of purposes, including research, surveillance, and personnel and material transportation. Successful, safe operation of airships is thought to be within the range of modern technology. A comparative economic analysis of available surface and air transportation systems is conducted to identify the least expensive system. In addition, an LTA system is proposed with its estimated cost factors and these costs are compared with the costs of the present day systems to see if the airship could meet logistics requirements and do so at a favorably competitive cost. GRA

**N74-16697#** Army War Coll., Carlisle Barracks, Pa.
**THE US ENERGY CRISIS, THE MULTINATIONAL OIL CORPORATIONS AND THEIR RELATIONSHIP TO U.S. FOREIGN POLICY IN THE MIDDLE EAST**
John G. Pappageorge 28 Feb. 1973 59 p refs
(AD-760868) Avail: NTIS CSCL 05/3

America's current energy crisis consists of a growing dependence on foreign oil brought about by a continuing diminution in known domestic petroleum reserves and aggravated by a host of domestic anomalies that cry out for some sort of unified energy policy. Yet any steps taken domestically will have far reaching international effects, particularly in the Middle East. Eight giant corporations (five of them American) discover and pump most of the oil out of the ground in the producing countries. Hence, they have a powerful influence in the Middle East and are a contributing factor in the stability of that politically volatile part of the world. Modified author abstract (GRA)

**N74-16799*** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**NASA PRESENTATION**
Ronald L. Thomas *In its* Wind Energy Conversion Systems Dec. 1973 p 244-253
CSCL 10B

The development of a wind energy system is outlined that supplies reliable energy at a cost competitive with other energy systems. A government directed industry program with strong university support is recommended that includes meteorological studies to estimate wind energy potentials and determines favorable regions and sites for wind power installations. Key phases of the overall program are wind energy conversion systems, meteorological wind studies, energy storage systems, and environmental impact studies. Performance testing with a prototype wind energy conversion and storage system is projected for Fiscal 1977. G.G.

**N74-16929** Office for Scientific and Technical Information, London (England).
**THE ROLE OF OSTI IN INFORMATION RESEARCH AND DEVELOPMENT**
John Gray *In* AGARD New Develop. in Storage, Retrieval and Dissemination of Aerospace Inform. Dec. 1973 3 p

The contribution of OSTI to information research and development in the UK over 8 1/2 years of existence is assessed. It is divided into four main sections - mechanized information systems, information analysis centers, and general research and management research (including library automation). In each section an attempt is made to summarize the main purpose of stimulating and supporting research and the principles that guide support. A concluding section deals briefly with support of research at Aslib and with the reviews of research in selected fields that OSTI has recently launched. Author

**N74-16930** Association of Special Libraries and Information Bureaux, London (England).
**CURRENT ASLIB RESEARCH ON MECHANISM**
B. C. Vickery *In* AGARD New Develop. in Storage, Retrieval and Dissemination of Aerospace Inform. Dec. 1973 2 p refs

An overview is given of the range of mechanization studies being carried out to explore the possibility of producing aerospace science abstracts by computer. Apart from statistical computations, computerized simulation of clerical processing in libraries is studied. The use of machine readable records to generate an index for optical searching and data processing is emphasized. G.G.

**N74-16931** Transociates Ltd., London (England).
**EDUCATION AND TECHNICAL TRAINING FOR TECHNICAL INFORMATION** **c34**
Felix Liebesny *In* AGARD New Develop. in Storage, Retrieval and Dissemination of Aerospace Inform. Dec. 1973 3 p refs

The educational and training facilities in the United Kingdom for scientific and technical information workers and librarians are outlined with reference to the various levels of professional attainment. The need for the training of teachers in these disciplines is stressed and some mention is made of forecast studies in supply and demand of information workers in the United Kingdom and the OECD countries. Author

**N74-16938** Mullard Research Labs., Salfords (England).
**A RESEARCH WORKER'S VIEW ON THE FUTURE OF AUTOMATIC READING MACHINES**
J. A. Weaver *In* AGARD New Develop. in Storage, Retrieval and Dissemination of Aerospace Inform. Dec. 1973 8 p refs

A general account of the justification for the use of automatic reading machines in a commercial data processing environment is presented. A broad outline of the tasks of the component parts of a reading system is given, together with an indication of how modern reading machines are being made more cost effective than their predecessors. A section is included on the recognition of handprinted material. Future techniques which may increase the capability of reading machines whilst maintaining the current trend towards reducing size and cost are considered. Optical character recognition has been in existence for several years - at a price. It will become very widely used over the next few years as prices fall and data processing managers realize how to use the technique effectively. Author

**N74-16939** Hawker Siddeley Aviation, Ltd., Kingston upon Thames (England).
**ALL CHANGE FOR AERONAUTICS**
John E. Allen *In* AGARD New Develop. in Storage, Retrieval and Dissemination of Aerospace Inform. Dec. 1973 5 p

The continuing patterns of changes in design, methods, subjects, fashion and major frameworks of reference have not only increased the volume of aerospace information but its complexity. The information world has responded to this by evolving more and more sophisticated indexing languages, thesaurus classification and automated retrieval. However, there is no consensus of opinion of a best way to proceed and as time goes on and first and second generation automatic systems come into use it will be increasingly difficult to introduce later methods because of the large capital replacement cost involved in such major changes. Costs of complex information systems

may become an unacceptable proportion of organisational activity. Moreover such complexity and the existence of automatic systems may make too large demands on staff time, leaving less for consideration of the library/user interface. Often, in aircraft design there are similar tendencies - advanced technology may give a somewhat better aircraft but often only at the expense of more cost, complexity, unreliability etc. Good aeroplanes result from good design which is a strict discipline in avoiding unnecessary elaboration, complexity or cost. In this sense a streamlining and avoidance of duplication, unnecessarily elaborate gadgets etc., may be advantageous. Author

**N74-16942#** Space and Missile Systems Organization, Los Angeles Air Force Station, Calif.
**INFORMATION PROCESSING/DATA AUTOMATION IMPLICATIONS OF AIR FORCE COMMAND AND CONTROL REQUIREMENTS IN THE 1980S (CCIP-85). VOLUME 10: CURRENT R AND D (REVISED)**
Oct. 1973 75 p refs Revised
(AD-768979; SAMSO/XRS-71-1R-Vol-10) Avail: NTIS CSCL 09/2

The volume of the CCIP-85 study surveys current and projected technology programs in information processing, both hardware and software, to establish a base line concerning a deficiency analysis of the current programs to meet the CCIP-85 technology requirements. Author (GRA)

**N74-17198#** Cranfield Inst. of Technology (England).
**THE PEG SYSTEM OF PRODUCTION CONTROL USING A VISIBLE RECORD COMPUTER**
P. E. Galgut Oct. 1973 45 p
(Cranfield-M/P-4) Avail: NTIS HC $5.25

The PEG system of production control has been designed to operate on an inexpensive computer (Philips P350 series of Visible Record Computers), so that it is suitable for small and medium sized manufacturing companies, particularly those engaged in batch production. It incorporates an adaptive loading procedure, enabling realistic delivery dates for customers' orders to be determined. Other features of the system include accurate stock recording, the preparation of works order documentation, progress control and the preparation of a Forward Load Report. Author

**N74-17519#** RAND Corp., Santa Monica, Calif.
**TECHNOLOGICAL CHANGE THROUGH PRODUCT IMPROVEMENT IN AIRCRAFT TURBINE ENGINES**
Robert Shishko May 1973 88 p refs
(Contract F44620-73-C-0011; Proj. RAND)
(AD-769911; R-1061-PR) Avail: NTIS CSCL 21/5

An area of R and D activity often as important as new product R and D is R and D directed at improving an existing object, often called product improvement. Multiple regression techniques were used to estimate a multi-dimensional technology tradeoff surface for U.S. aircraft turbine engines. Product-improvement engines embody a higher level of technology than their original versions, but the rate of technological advance is significantly less than the long-run average for new designs. Further, thrust-growth product improvement is subject to diminishing returns with respect to dollar resources. (Modified author abstract) GRA

**N74-17660** Central Electricity Generating Board, London (England).
**ECONOMETRIC MODELS: THEIR APPLICATION TO THE ECONOMIC AND ENERGY SECTORS**
G. G. Kinnane, comp. Dec. 1973 26 p refs
(CE-Bibl-220) Avail: Issuing Activity

A bibliography of abstracts on econometric models and their application to the economy and energy sectors is presented. The bibliography has 101 references. E.H.W.

**N74-17664#** Advisory Group for Aerospace Research and Development, Paris (France).
**DIRECTORY OF RESEARCH ACTIVITIES ON IN-SITU COMPOSITES**
Oct. 1973 21 p refs Prepared by Battelle Columbus Labs.
(AGARD-R-609) Avail: NTIS HC $3.25

A directory of research facilities, laboratories, and corporations conducting research on composite materials is presented. The organizations are identified by the country in which located and the principal respondents are identified. A brief statement concerning the type of research being conducted accompanies each entry where applicable. Author

**N74-17667*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
**A CONTEMPORARY VIEW OF SYSTEMS ENGINEERING**
Ralph F. Miles, Jr. 15 Jan. 1974 23 p
(Contract NAS7-100)
(NASA-CR-136833; JPL-TM-33-667) Avail: NTIS HC $4.25 CSCL 12B

The concept of a 'system' is defined, and the 'systems approach' is discussed. Four contemporary examples of the systems approach are presented: an operations research project, the planning-programming-budgeting system, an information processing system, and aerospace programs. Author

**N74-17681#** Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
**STUDY OF AN AEROSAT SYSTEM: EXAMPLE OF DIVISION OF LABOR [ETUDE D'UN SYSTEME AEROSAT: EXEMPLE DE REPARTITION DU TRAVAIL]**
Claude Skenderoff 1973 15 p In FRENCH Presented at the 13th European Space Symp., London, 25-27 Jun. 1973 Sponsored by ESRO
Avail: NTIS HC $4.00

Aerosat project systems for air traffic control and aircraft communication over the Pacific and Altantic oceans were analyzed. The distribution of work between American and European firms is reported. Technical results obtained and solutions for optimization of the satellite and payload configurations are outlined. ESRO

**N74-17686#** California Univ., Los Angeles. Western Management Science Inst.
**INFORMATION, DECISION AND THE SCIENTIST**
Jacob Marschak Sep. 1973 45 p refs
(Contract N00014-69-A-0200-4005)
(AD-769145; WMSI-Working-Paper-206) Avail: NTIS CSCL 05/1

A decision-theoretical critique of semantic information measure and other suggestions made by students of inductive logic leads to a formal statement of sequence: (1) What problem should I study, (2) What set of mutually exclusive and exhaustive hypotheses shall I test, (3) What kind of evidence shall I use, and (4) What hypothesis shall I accept. (Modified author abstract) GRA

**N74-17687#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**PERSONAL VALUES OF RESEARCH AND DEVELOPMENT PROFESSIONALS AND OPERATIVE GOALS IN RESEARCH AND DEVELOPMENT ORGANIZATIONS: AN IN-DEPTH ANALYSIS OF ONE LABORATORY M.S. Thesis**
Eugene W. Pittenger Dec. 1973 212 p refs

(AD-769190; GSM/SM/73-27) Avail: NTIS CSCL 05/10

Purpose of study was to add to understanding of organizational goals of R-D organizations and of personal value systems of professional personnel in R-D organizations. The approach was to develop a set of value concepts meaningful to R-D professionals, develop a set of goals potentially important to R-D organizations, incorporate value concepts, goals, and demographic variables in a questionnaire, and administer the questionnaire to professional members of the Air Force Cambridge Research Laboratories determine primary orientation of professionals through analysis of ratings given value concepts, and use primary orientation and importance ratings to determine value concepts with behavioral relevance to professionals of the organization, and determine operative goals of the organization; and compare operative goals with formal goals. (Modified author abstract) GRA

**N74-17692#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**PROBLEMS ENCOUNTERED IN IMPLEMENTING DESIGN TO A COST IN MAJOR AIR FORCE WEAPON SYSTEM ACQUISITION PROGRAMS M.S. Thesis**

Stephen A. Hamer Oct. 1973 106 p refs

(AD-769912; GSM/SM/73-11) Avail: NTIS CSCL 05/1

Increasing pressure to reduce defense spending has encouraged new approaches to managing weapon system acquisition and ownership costs. The design to a cost concept is one of the newest approaches to cost reduction in DoD. Design to a cost is the process of controlling cost by treating an established cost target as a parameter of equal importance with system performance. Problems which have been identified as being caused by design to a cost fall in the categories of communication, culture, operation and applicability. (Modified author abstract) GRA

**N74-17779#** Battelle Columbus Labs., Ohio.

**GENERAL AVIATION COST IMPACT STUDY. VOLUME 1: EXECUTIVE SUMMARY Final Report**

J. W. Chadwick, T. W. Hall, E. T. Yeager, and R. W. Cote Jun. 1973 36 p refs

(Contract DOT-FA72WA-3118)

(AD-771603) Avail: NTIS CSCL 01/3

The report in four volumes presents the results of an analysis of the effects of cost changes on general aviation activity. The major objectives of the study were to investigate ownership and operating costs in each segment of general aviation, and to develop methodology for evaluating the cost impact of regulatory changes on general aviation activity. The study effort included compilation of a cost and activity data base, definition of fixed and variable cost centers, determination of cost sensitivity relationships and determination of cost impact relationships. Volume 1 provides a summary of the overall study. (Modified author abstract) GRA

**N74-17780#** Battelle Columbus Labs., Ohio.

**GENERAL AVIATION COST IMPACT STUDY. VOLUME 2: RESEARCH METHODOLOGY Final Report**

J. W. Chadwick, T. W. Hall, E. T. Yeager, and R. W. Cote Jun. 1973 133 p

(Contract DOT-FA72WA-3118)

(AD-771606) Avail: NTIS CSCL 01/3

The report in four volumes presents the results of an analysis of the effects of cost changes on general aviation activity. Volume 2 presents the rationale and methodology used in the analysis. (Modified author abstract) GRA

**N74-17781#** Battelle Columbus Labs., Ohio.

**GENERAL AVIATION COST IMPACT STUDY. VOLUME 3: PLANNING GUIDE Final Report**

J. W. Chadwick, T. W. Hall, E. T. Yeager, and R. W. Cote Jun. 1973 218 p

(Contract DOT-FA72WA-3118)

(AD-771759) Avail: NTIS CSCL 01/3

The report in four volumes presents the results of an analysis of the effects of cost changes on general aviation acitivity. The major objectives of the study were to investigate ownership and operating costs in each segment of general aviation, and to develop methodology for evaluating the cost impact of regulatory changes on general aviation activity. The study effort included compilation of a cost and activity data base, definition of fixed and variable cost centers, determination of cost sensitivity relationships and determination of cost impact relationships. The results are presented in graphical form in Volume 3 of this report to facilitate easy use. (Modified author abstract) GRA

**N74-17800#** Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.

**ENERGY CONSERVATION STRATEGIES**

Marquis R. Seidel, Steven E. Plotkin, and Robert O. Reck Jul. 1973 122 p refs

(PB-224493/7GA; EPA-R5-73-021) Avail: NTIS MF $1.45; SOD HC $1.25 as EP1.23/3-73-021 CSCL 21D

Strategies for reducing national energy demands are examined. It is necessary to find out, for each potential energy saving, how much energy is involved and how costly the alternatives would be. Many users get much of their energy at relatively low prices, and are thus encouraged to waste it; the economist calls this price distortion, a form of market failure. The study analyzes the kinds of market failure which seem to cause the present energy crisis, the kinds of government action which could rectify these failures, and the likely response of the economy to moderate price increases. Numerous actions, some large and some small, would be required to restore a more efficient functioning of the market for energy. In an efficient market, energy price increases of 25% would prompt a halving of the growth of energy demand; through 1990, energy needs would grow 40% rather than the 100% projected at current prices. Author (GRA)

**N74-17801#** California Univ., Riverside. Inst. of Geophysics and Planetary Physics.

**FEASIBILITY STUDY FOR DEVELOPMENT OF HOT-WATER GEOTHERMAL SYSTEMS Final Technical Report**

James B. Combs Mar. 1973 126 p refs

(Grant AF-AFOSR-2393-72; ARPA Order 2184)

(AD-771016; IGPP-UCR-73-18; AFOSR-73-2070TR) Avail: NTIS CSCL 10/2

The investigation has been directed toward a feasibility study for the development of hot-water geothermal systems for potential Department of Defense use as an energy source. The research effort has included the gathering of both scientific and engineering data. The world-wide occurrence of both known and probable sites of hot-water (water-dominated) geothermal systems particularly in relation to United States Department of Defense installations are reviewed and discussed. Included are the geological settings and the types of detection techniques that are necessary to delineate geothermal systems. GRA

**N74-17997*#** Wisconsin Univ., Madison. Environmental Monitoring and Data Acquisition Group.

**EVALUATION OF THE APPLICATION OF ERTS-1 DATA TO THE REGIONAL LAND USE PLANNING PROCESS Progress Report, period ending 1 Feb. 1974**

James L. Clapp, Principal Investigator 1 Feb. 1974 25 p ERTS

(Contract NAS5-21754)

(E74-10315; NASA-CR-136800) Avail: NTIS HC $4.25 CSCL 08B

The author has identified the following significant results. Investigators have concentrated on efforts toward assessing the achievements of the current ERTS-1 research so that significant results could be incorporated into the updated version of their

ERTS-B research proposal. Significant progress was made in the development of operational mechanisms, linking the research community at the University and the operation agencies of the State of Wisconsin. Efforts have been made to finalize a report which is being prepared for the State of Wisconsin Department of Administration, evaluating the applicability of ERTS-1 to the planning needs of the State of Wisconsin. This document is intended to assess the degree of utility of the satellite for providing information which has been designated by state planners as essential to their needs. This effort is considered highly significant to the overall research program since a situation has been created in which a prime potential user of ERTS type data has been given the opportunity to determine the direction of the research.

**N74-18025*#** California Univ., Berkeley. Space Sciences Lab.
**AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES Semiannual Progress Report**
31 Dec. 1973 304 p refs
(Grant NGL-05-003-404)
(NASA-CR-136945) Avail: NTIS HC $18.25

University of California investigations to determine the usefulness of modern remote sensing techniques have concentrated on the water resources of the state. The studies consider in detail the supply, demand, and impact relationships.

**N74-18026*** California Univ., Berkeley.
**INTRODUCTION**
Robert N. Colwell *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 7 p
CSCL 08F

Since May 1970, personnel on several campuses of the University of California have been conducting investigations which seek to determine the usefulness of modern remote sensing techniques for studying various components of California's earth resources complex. Emphasis has been given to California's water resources as exemplified by the Feather River project and other aspects of the California Water Plan. This study is designed to consider in detail the supply, demand, and impact relationships. The specific geographic areas studied are the Feather River drainage in northern California, the Chino-Riverside Basin and Imperial Valley areas in southern California, and selected portions of the west side of San Joaquin Valley in central California. An analysis is also given on how an effective benefit-cost study of remote sensing in relation to California's water resources might best be made. A.L.

**N74-18027*** California Univ., Davis.
**WATER SUPPLY STUDIES**
Robert H. Burgy, Vidal R. Algazi, William C. Draeger, C. W. Churchman, Randall W. Thomas, Donald T. Lauer, Ida Hoos, Paul F. Krumpe, James D. Nichols, and Michael J. Gialdini *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 110 p refs

CSCL 08H

The primary test site for water supply investigations continues to be the Feather River watershed in northeastern California. This test site includes all of the area draining into and including the Oroville Reservoir. The principal effort is to determine the extent to which remote sensing techniques, when properly employed, can provide information useful to those persons concerned with the management and planning of lands and facilities for the production of water, using the Oroville Reservoir and the California Water Project as the focus for the study. In particular, emphasis is being placed on determining the cost effectiveness of information derived through remote sensing as compared with that currently being derived through more conventional means. A.L.

**N74-18028*** California Univ., Riverside.
**WATER DEMAND STUDIES**
L. W. Bowden, J. E. Estes, C. W. Churchman, C. W. Johnson, J. R. Huning, K. Rozelle, J. Hamilton, G. Washburn, L. R. Tinney, and R. R. Thaman *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 71 p refs
CSCL 08H

The areas of focus of the Santa Barbara and Riverside groups in conducting water demand studies are the central and southern California regional test sites, respectively. Within each test site, sub-areas have been selected for use in the making of detailed investigations. Within each of these sub-areas an in-depth evaluation is being made as to the capability of remote sensing systems to provide pertinent data relative to water demand phenomena. These more limited sub-areas are: (1) Kern County and the San Joaquin Basin; (2) Chino-Riverside Basin; and (3) the Imperial Valley. Rational for the selection of these subareas included the following: Much of the previous remote sensing research had been conducted in these areas and therefore a great deal of remote sensing imagery and pertinent ground truth for the areas was already available. A.L.

**N74-18029*** California Univ., Berkeley.
**WATER IMPACT STUDIES**
Robert N. Colwell *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 3 p
CSCL 08H

An investigation has begun into the potential impact of using modern remote sensing techniques as an aid in managing, even on a day-to-day basis, the storage, flow, and delivery of water made available through the California Water Project. It is obvious that the amount of this impact depends upon the extent to which remote sensing is proven to be useful in improving predictions of both the amount of water that will be available and the amount that will be needed. It is also proposed to investigate the potential impact of remote sensing techniques as an aid in monitoring, and perhaps even in directing, changes in land use and life style being brought about through the increased availability of water in central and southern California as a result of the California Water Project. The impact of remote sensing can be of appreciable significance only if: (1) the induced changes are very substantial ones; (2) remote sensing is found, in this context, to be very useful and potentially very cost effective; and (3) resource managers adopt this new technology. Analyses will be conducted of the changing economic bases and the new land use demands resulting from increased water availability in central and southern California. A.L.

**N74-18030*** California Univ., Berkeley. Dept. of Business Administration.
**ON THE FEASIBILITY OF BENEFIT-COST ANALYSIS APPLIED TO REMOTE SENSING PROJECTS Special Study No. 1**
Leonard Merewitz *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 7 p refs
CSCL 05A

The following step-wise procedure for making a benefit-cost analysis of using remote sensing techniques could be used either in the limited context of California water resources, or a context as broad as the making of integrated resource surveys of the entire earth resource complex on a statewide, regional, national, or global basis. (1) Survey all data collection efforts which can be accomplished by remote sensing techniques. (2) Carefully inspect the State of California budget and the Budget of the United States Government to find annual cost of data collection efforts. (3) Decide the extent to which remote sensing can obviate each of the collection efforts. (4) Sum the annual costs of all data collection which can be equivalently accomplished through remote sensing. (5) Decide what additional data could and would be collected through remote sensing. (6) Estimate the value of this information. It is not harmful to do a benefit-cost analysis so long as its severe limitations are recalled and it is supplemented with socio-economic impact studies. Author

N74-18035* California Univ., Berkeley.
**SUMMARY**
R. N. Colwell *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 31 Dec. 1973 20 p
CSCL 05B

University of California activities in the development of remote sensing techniques and their application in the study of water resources within the state are summarized. It is pointed out that the summary is very lengthy due to fact that NASA had requested a dramatic reorientation of the study. For this reason it was felt that the co-investigators and other participants, need a rather detailed and systematic tabulation of the relevant facts that have been uncovered during the period since the reorientation. A.L.

N74-18209# Plastics Technical Evaluation Center, Dover, N.J.
**GOVERNMENT SPECIFICATIONS AND STANDARDS FOR PLASTICS, COVERING DEFENSE ENGINEERING MATERIALS AND APPLICATIONS Final Report**
Norman E. Beach May 1973 16 p Revised Supersedes PLASTEC-N6B
(AD-771008; PLASTEC-N6C; PLASTEC-N6B) Avail: NTIS CSCL 11/9

The report lists the specifications for those plastic materials which are considered to be of interest to engineers concerned with the design, development, production, and handling of defense hardware. Included are the major specifications pertaining to adhesives, resins, molding, extrusion, films, foams, and laminates: sheets, rods, tubes and shapes. MIL, Federal, ASTM, and SAE Aeronautical Material Specifications are included.
Author (GRA)

N74-18271 Joint Publications Research Service, Arlington, Va.
**THE SYSTEM OF OBSERVATIONS FOR THE FIRST WORLDWIDE GARP EXPERIMENT** c13
V. P. Meleshko *In its* Meteorology and Hydrology, No. 11, 1973 (JPRS-61249) 15 Feb. 1974 p 158-169 refs Transl. into ENGLISH from Meteorol. Gidrol. (Moscow), no. 11, 1973 p 108-114

The organization, general description, and composition of the system of observations that has been suggested for the first worldwide GARP (Global Atmospheric Research Program) experiment in 1977 are presented. The subjects discussed are: (1) observation equipment required, (2) numerical experiments to investigate the properties of the observation means, (3) the recommended observation system, and (4) participation of various countries in the experiment. Author

N74-18589 Massachusetts Inst. of Tech., Cambridge.
**REMARKS**
Jay Forrester *In* Mitre Corp. Symp. on Energy, Resources and the Environment, Vol. 1 12 Apr. 1972 p 154-157

The question whether or not the required capital will be available if technology did manage to meet energy and resource shortages, mounting pollution, and food shortages, is considered. Solving this real problem by a computer simulation model demands internal consistency between present assumptions and future expectations in technology, sociology, value structures, and long term versus short term conflicts. G.G.

N74-18590 Hudson Inst., Inc., Croton-on-Hudson, N.Y.
**REMARKS**
Herman Kahn *In* Mitre Corp. Symp. on Energy, Resources and Environment, Vol. 1 12 Apr. 1972 p 157-170

World capital requirements to meet energy and resources shortages in 2100 relative to GNP will be about five to one. In order to maintain this projected growth to the year 2100 an accumulation of about two quadrillion dollars worth of capital is necessary. It is stipulated that capital accumulation of five percent a year does not seem to be a problem for the U.S.A. G.G.

N74-18592 Virginia Univ., Charlottesville.
**NATIONAL ENERGY POLICIES**
Fred Singer *In* Mitre Corp. Symp. on Energy, Resources and the Environment, Vol. 2 13 Apr. 1972 p 2-27

It is stressed that socioeconomic considerations require the development of abundant and low cost energy in a national policy. The energy should be environmental clean and reasonable self-sufficient to insure long term national security. Public policies and regulations and a lead agency are required to assume these responsibilities and to fund the various sources of energy exploration. G.G.

N74-18593 California Univ., Livermore. Lawrence Livermore Lab.
**AN ENERGY ETHIC**
Marvin R. Gustavson *In* Mitre Corp. Symp. on Energy, Resources and the Environment, Vol. 2 13 Apr. 1972 p 28-67

The development of a consensual energy ethic is projected that leads to public agreement as to what is fair in respect to the various aspects of source development. Key issues are: Source development -- particularly of fossile fuel; energy use -- as affected by education, advertising, and legislation; (3) nationalism -- in the national security sense as seen by a citizen of a consuming nation; (4) pollution -- as a negative factor in the quality of life; (5) Federal funding -- as an element of public support; and (6) fusion reactors -- as an example of a possible technological key to abundant energy. G.G.

N74-18595 Mitre Corp., McLean, Va.
**ENVIRONMENTAL ISSUES AND INSTITUTIONAL ARRANGEMENTS**
John F. OLeary *In its* Symp. on Energy, Resources and the Environment, Vol. 2 13 Apr. 1972 p 90-135

A comprehensive set of energy, resource and environmental issues is presented. Some changes to governmental institutions for dealing with the energy crisis are described that encompass pricing, depletion allowances, oil imports, and environmental regulations. G.G.

N74-18596 Harvard Univ., Cambridge, Mass.
**MECHANISMS FOR ACHIEVING CLEANER POWER, PRICES, REGULATIONS**
Marc Roberts *In* Mitre Corp. Symp. on Energy, Resources and the Environment, Vol. 2 13 Apr. 1972 p 136-187

The following three policy mechanisms to achieve cleaner power are appraised: prices, regulation, and direct public provision. It is shown that the resource-environmental-energy linkup at the current level of pollution is due to multiplicative interaction of the amount of output per capita, the number of people, and the amount of pollution per unit output. The need for shifting some of the distribution impact of the projected financing burden from the poor population is emphasized. G.G.

**N74-18617#** Office of Telecommunications, Boulder, Colo.
**OPERATIONS OF OFFICE OF TELECOMMUNICATIONS, INCLUDING TECHNOLOGY, MANAGEMENT, AND POLICY Annual Report, 1 Jul. 1972 - 30 Jun. 1973**
Dec. 1973 56 p refs
(OT-Bull-73-2) Avail: SOD HC $0.60

The mission of the Office of Telecommunication is defined in terms of promoting the economic development, technological advancement, and growth of telecommunication resources. The application of technology, policies, and the management of the federal radio spectrum are discussed. F.O.S.

**N74-18619#** Joint Publications Research Service, Arlington, Va.
**TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 386**
13 Feb. 1974 23 p Transl. into ENGLISH from various Eastern European articles
(JPRS-61213) Avail: NTIS HC $4.25

Articles are presented concerning the development of and progress in the training of computer personnel in Hungary and the state of scientific research in Yugoslavia.

**N74-18621** Joint Publications Research Service, Arlington, Va.
**STATE OF SCIENTIFIC RESEARCH EVALUATED**
S. Dautbegovic *In its* Transl. on Eastern Europe: Sci. Affairs, No. 386 (JPRS-61213) 13 Feb. 1974 p 18-20 Transl. into ENGLISH from Oslobodienie (Saraievo), 30 Jan. 1974 5 p

The present and projected status of scientific research institutes and researchers in Yugoslavia is discussed. The present allocation for science is 1 percent of the national income and a growth to 2.5 per cent in 1985 is projected. Priority areas for funding are discussed. K.M.M.

**N74-18622#** Committee on Interior and Insular Affairs (U. S. Senate).
**ENERGY CONSERVATION AND S. 2176, PART 2**
Washington GPO 1973 845 p refs Hearing on S. 2176 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess.) 1 Aug. 1973
Avail: Comm. on Interior and Insular Affairs

Hearings are reported describing the role of energy conservation in national energy policy. Conservation in transportation, housing, and in the industrial sector are emphasized. Ways to educate consumers to use energy more efficiently especially regarding motor vehicles and home appliances are outlined. S.K.W.

**N74-18627#** RAND Corp., Santa Monica, Calif.
**COMPARISONS OF SOVIET AND US TECHNOLOGY**
Robert Perry Jun. 1973 49 p refs
(Contract F44620-73-C-0011)
(AD-771004; R-827-PR) Avail: NTIS CSCL 05/1

The military sector of Soviet R and D may be more efficient than the civilian sector; and in some respects, particularly in aircraft development, the Soviet military R and D system appears to be more efficient than U.S. military R and D. One consequence is that the U.S.S.R. seems capable of generating more system options at lower costs and presumably with less risk than the U.S. in the present system acquisition environment. A second finding of this study is embodied in the demonstration that the extent of Soviet technological advancement can be ascertained for one specialized regime of military technology--turbine engines, in this instance--and the methodology developed in that demonstration can be applied to several areas of technology. Even if there is uncertainty about some of the underlying data, military goods and services should be expressed in terms that uniformly reflect Soviet rather than U.S. manufacturing methods and input quantities. Author (GRA)

**N74-18631#** Harvard Univ., Boston, Mass. Graduate School of Business Administration.
**THE ADMINISTRATION OF TRANSPORTATION MODELING PROJECTS Ph.D. Thesis**
John W. Drake 31 May 1972 266 p refs
(Contracts DOT-UT-381; DOT-MA-06-0019)
(PB-224846/6GA; UMTA-MA-06-0019-72-1) Avail: NTIS HC $15.50 CSCL 13B

The study examines the way in which modeling projects are administered, concentrating on the interactions between and characteristics of the decision makers and modelers. The objective is to learn which factors correlate with models which are considered useful by decision makers. Over fifty U.S. and European projects were studied, fifteen in detail. Both qualitative and statistical factors of operational use were investigated including recognition of the distinction between the roles of decision maker and analyst, the closeness of backgrounds, complexity of techniques used, the extent to which project included consideration of social, economic and political factors, the degree of bureaucracy in the decision maker's environment and the relative usefulness of European versus U.S. models. GRA

**N74-18634#** Kentucky Univ., Lexington. Coll. of Engineering.
**PROCEEDINGS: ENERGY RESOURCE CONFERENCE (2ND)**
Aug. 1973 59 p Conf. held at Lexington, Ky., 24-25 Oct. 1972
(PB-224750/0GA; UKY-TR-70-73-CEED4) Avail: NTIS HC $5.00 CSCL 10A

Recent available information on the rapidly changing energy resource picture, fuel policies and consumer demands is presented. Papers by knowledgeable government officials and industrial representatives are included. Topics covered include new developments in the extraction of natural gas and crude oil, interfuel conversion (coal to gas and oil, coal to gas by the Lurgi process, SNG and oil), the role of the Federal Government to insure an adequate, reliable energy supply, and the transmission and transportation of energy. GRA

**N74-18695#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), AH-1G MAIN TRANSMISSION ASSY, UNIVERSAL Interim Report, Jan. 1964 - Jul. 1972**
Dec. 1973 32 p
(AD-772983; USAAVSCOM-TR-73-30) Avail: NTIS CSCL 01/3

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-18850#** National Bureau of Standards, Washington, D.C. Computer Systems Engineering Div.
**NETWORK MANAGEMENT SURVEY**
Ira W. Cotton Feb. 1974 91 p refs
(Grant NSF AG-350)
(NBS-TN-805) Avail: SOD HC $1.20 as C13.46:805

The results of a study of management practices in different computer networks are reported. Five networks were chosen as typical of different approaches to network implementation and management: Defense Advanced Research Projects Agency (ARPA) Network, MERIT Network, Triangle Universities Computation Center (TUCC), Oregon State Regional Network and Tymmet, a commercial network. A common format is employed to survey each network. While the report is not intended to be prescriptive, some empirical observations are presented for each topic covered. Author

**N74-18852#** TRW Systems Group, Redondo Beach, Calif.
**SOFTWARE WORKSHOP 1973**
1973 71 p
Avail: NTIS HC $6.75

Problems in computer program developments constitute cost and schedule overruns, inability to meet performance specifications, zero management visibility, and inadequate or nonexistent documentation. Management functions to solve these problems constitute analyses of error sources in evaluating requirements, program design, coding and system execution processes as well as hardware realization. G.G.

**N74-18853#** National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
**GOVERNMENT LOOKS AT PRIVACY AND SECURITY IN COMPUTER SYSTEMS**
Clark R. Renninger, ed. and Dennis K. Branstad, ed. Feb. 1974 47 p refs Conf. held at Gaithersburg, Md., 19-20 Nov. 1973 (NBS-TN-809) Avail: SOD HC $0.85 as C13.46:809

The proceedings of a conference held for the purpose of highlighting the needs and problems of Federal, State and local government in safeguarding individual privacy and protecting confidential data contained in computer systems from loss or misuses are summarized. The origin of governmental problems is discussed in the context of the public's concern for privacy arising out of computer based recordkeeping, the diverse legislative actions now being taken to safequard privacy, the threats to the security of computer based information systems and the technological problems associated with protecting against such threats. Author

**N74-18889*#** Universities Space Research Association, Charlottesville, Va. Lunar Science Inst.
**[SCIENTIFIC AND ADMINISTRATIVE ACTIVITIES AT THE LUNAR SCIENCE INSTITUTE] Semiannual Status Report, 15 Jul. - 31 Dec. 1973**
5 Feb. 1974 43 p refs
(Contract NSR-09-051-001)
(NASA-CR-137081) Avail: NTIS HC $5.25 CSCL 14B

The scientific and administrative activities of the Lunar Science Institute during the period 15 July through 31 December 1973 are reported. The subjects discussed are: (1) contributions of the organization, (2) organization of the staff, (3) administration functions, and (4) scientific and professional meetings held at the institute. Author

**N74-18974*#** General Electric Co., Philadelphia, Pa.
**APPLICATION OF EARTH RESOURCES TECHNOLOGY SATELLITE DATA TO URBAN DEVELOPMENT AND REGIONAL PLANNING: TEST SITE - COUNTY OF LOS ANGELES Progress Report, Jul. - Aug. 1973**
Surendra Raje, Principal Investigator, Richard Economy, Jene McKnight (Los Angeles County Regional Planning Comm.), Monir Sefain (Los Angeles County Regional Planning Comm.), Darryl Goehring (Los Angeles County Regional Planning Comm.), and Gerald Willoughby (OVAAC 8 Intern., Inc.) Sep. 1973 9 p ERTS
(Contract NAS5-21797)
(E74-10365; NASA-CR-137059) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-18987*#** Service de la Carte de la Vegetation CNRS, Toulouse (France).
**MANAGEMENT OF NATURAL RESOURCES THROUGH AUTOMATIC CARTOGRAPHIC INVENTORY Progress Report, Apr. - Dec. 1973**
P.-A. Rey, Yves Gourinard, and Francis Cambou, Principal Investigators Jan. 1974 37 p refs Sponsored by NASA ERTS
(E74-10378; NASA-CR-137163; PR-3) Avail: NTIS HC $5.00 CSCL 08B

The author has identified the following significant results. (1) Accurate recognition of previously known ground features from ERTS-1 imagery has been confirmed and a probable detection range for the major signatures can be given. (2) Unidentified elements, however, must be decoded by means of the equal densitometric value zone method. (3) Determination of these zonings involves an analogical treatment of images using the color equidensity methods (pseudo-color), color composites and especially temporal color composite (repetitive superposition). (4) After this analogical preparation, the digital equidensities can be processed by computer in the four MSS bands, according to a series of transfer operations from imagery and automatic cartography.

**N74-19121** Lockheed Missiles and Space Co., Sunnyvale, Calif.
**SSD TEST BASELINE SUMMARY**
E. E. Ingebretsen *In its* Proc. of Aerospace Testing Seminar 1 Jun. 1973 18 p

The philosophy and development of a test baseline program are discussed. The objective of the program was to develop a standard to be used as a starting point for developing test plans in order to achieve consistency in test requirements for all programs. The baseline document provides for deviations from the basic test plan, when required, and establishes a data base for future revisions. The scope of the test baseline includes qualification and acceptance testing of parts, subassemblies, components, modules, and systems used in aerospace vehicles. The types of tests to be conducted and the test sequence for component acceptance are tabulated. Author

**N74-19122** Lockheed Missiles and Space Co., Sunnyvale, Calif.
**PARTS BASELINE**
W. Geller *In its* Proc. of Aerospace Testing Seminar 1 Jun. 1973 14 p

A baseline test program for reliability analysis and quality control of parts used in aerospace vehicles is described. The test requirements are established for: (1) vendor selection, (2) type standardization, (3) configuration analysis, (4) evaluation testing, (5) process control testing, (6) screening, and (7) destructive physical analysis. The technical features of the selection and testing program are tabulated. Author

**N74-19128** Boeing Co., Seattle, Wash.
**AEROSPACE TEST PLANNING AND CONDUCT DISCIPLINES** **c34**
S. Baber *In* LMSC Proc. of Aerospace Testing Seminar 1 Jun. 1973 11 p

Engineering test disciplines are discussed that can minimize test errors and optimize program technical, schedule, and cost trades. The application of these disciplines is related to a system level spacecraft test. The minimum test preparation activities

required to assure successful test conduct are identified. These test activities include the planning, documentation, hardware, checkout, and readiness review necessary for a flight spacecraft vibration acceptance test. Requirements for unique test control and protection systems, cleanliness, ambient environments, facility support services, safety, data acquisition, and quality control are considered. Author

**N74-19487** Joint Publications Research Service, Arlington, Va.
**ENVIRONMENTAL STUDIES FROM SPACE**
V. S. Vereshchetin *In its* Legal Aspects of Manned Spaceflight and Remote Sensing of the Environment (JPRS-61614) 29 Mar. 1974 p 11-19 refs Transl. into ENGLISH from Sovetskoye Gosudarsto i Pravo (Moscow), no. 1 p 121-124

The regulation of environmental information from remote sensing spacecraft is discussed in terms of the sovereign rights of nations. It is recommended that commercial use of this data not be permitted without a country's knowledge and consent. S.K.W.

**N74-19489#** Committee on Science and Astronautics (U. S. House).
**SPACE SHUTTLE, SPACE TUG, APOLLO-SOYUZ TEST PROJECT - 1974 Status Report**
Washington GPO Feb. 1974 789 p Presented to Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., 1 Mar. 1974
Avail: Subcomm. on Manned Space Flight

A Congressional hearing on the space shuttle, space tug, and Apollo-Soyuz project was conducted. The information was provided by the NASA Manned Space Flight Centers and key industrial contractors involved in the three programs. A review of the cost, performance, and schedules of the three programs is presented. Photographs and maps of the launch facilities and support complexes are included. Illustrations of the various space shuttle concepts, and configurations are shown. P.N.F.

**N74-19512*#** Bendix Corp., Teterboro, N.J. Navigation and Control Div.
**ADVANCED C AND D TECHNIQUES AND APPLICATION STUDY Final Report**
Kenneth Kendall and Carlo Coscia May 1973 126 p
(Contract NAS8-28657)
(NASA-CR-124441) Avail: NTIS HC $9.50 CSCL 22B

A study was conducted to identify a broad base of payload control and display requirements for space missions. The subjects discussed are: (1) functional requirements and allocation analysis, (2) control and display generic device matrix, (3) control functional requirements, and (4) display functional requirements. Specific applications of payload control and display requirements for various disciplines are defined. Author

**N74-19586#** Federal Power Commission, Washington, D.C. Planning and Development Div.
**NATURAL GAS SUPPLY IN THE DECADE OF THE SEVENTIES**
Gordon K. Zareski Mar. 1973 19 p refs Presented at the 74th Natl. Meeting of the Am. Inst. of Chem. Engr., New Orleans, 13 Mar. 1973
Avail: NTIS HC $4.00

The energy situation with respect to natural gas as an energy source was studied. Factors which contributed to the current shortage of natural gas supplied are analyzed. Federal actions to develop the policies necessary to increase the supply of natural gas and to encourage optimum use of this energy source are reported. Possible future sources of natural gas to supplement the shortage are identified. Tables, maps, and graphs are included to show the natural gas supply. P.N.F.

**N74-19587#** Federal Power Commission, Washington, D.C. Analysis and Procedures Div.
**NATURAL GAS AVAILABILITY: PRESENT AND FUTURE**
Gordon K. Zareski May 1972 13 p Presented at Symp. on Gaseous Fueled Vehicles and the Environ., Washington, D. C., 24-26 May 1972
Avail: NTIS HC $4.00

An analysis of the availability of natural gas and gas reserves in the United States is presented. The actual and projected demand for gas during the 1950 to 1990 time period is analyzed. Historical trends in natural gas production and reserve additions are illustrated. A graph of the annual demand for natural gas is plotted to show the levels of domestic productive capacity with annual reserve additions of 30, 25, and 20 trillion cubic feet. P.N.F.

**N74-19596** National Center of Scientific and Technological Information, Tel Aviv (Israel).
**CURRENT RESEARCH AND DEVELOPMENT PROJECTS IN ISRAEL 1972: NATURAL SCIENCES AND TECHNOLOGY, VOLUME 1: MAIN TABLES**
C. Keren, ed. and P. Wollman, ed. Apr. 1973 471 p
Copyright Avail: Issuing Activity

An index of research projects conducted by a research facility in Israel during 1972 is presented. The register of current research provides a means of locating individual expertise in specific fields. The index also provides statistical data on the activities of the population it deals with, their institutional adherence, trends of investment in research and development, and other data needed for formulation of science policy. The procedures used in data collection and processing are explained. The classification system used for the index is defined. Author

**N74-19597** National Center of Scientific and Technological Information, Tel Aviv (Israel).
**CURRENT RESEARCH AND DEVELOPMENT PROJECTS IN ISRAEL 1972: NATURAL SCIENCES AND TECHNOLOGY, VOLUME 2: INDEXES**
C. Keren, ed. and P. Wollman, ed. Apr. 1973 375 p
Copyright. Avail: Issuing Activity

**N74-19603#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**NASA'S EQUAL EMPLOYMENT OPPORTUNITY PROGRAM**
Washington GPO 1974 101 p refs Hearing before Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 24 Jan. 1974
Avail: SOD HC $1.10

NASA's efforts to increase minority and female representation in its work force are discussed. Problems encountered in complying with EEO standards and solutions to these problems are discussed. S.K.W.

**N74-19604#** Committee on Science and Astronautics (U. S. House).
**H.R. 11864: SOLAR HEATING AND COOLING DEMONSTRATION ACT OF 1974. BACKGROUND AND LEGISLATIVE HISTORY**
Washington GPO Feb. 1974 306 p refs Presented to Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., Feb. 1974
Avail: NTIS Avail: Subcomm. on Energy

The responses are reported of selected Federal agencies to requests, by the Committee, for information on current research in areas of solar energy. The nature of ongoing solar energy research, funding levels, and recommended areas for development are discussed. The legislative history of solar energy for heating and cooling, H.R. 11864 is included. F.O.S.

**N74-19608#** Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
**REPORT ON CURRENT RESEARCH AT THE INSTITUTO DE PESQUISAS ESPACIAIS**
Sep. 1972 17 p refs Presented at 4th Intern. Symp. on Equatorial Aeronomy, Ibadan, Nigeria, 4-11 Sep. 1972
(INPE-235-RI/033) Avail: NTIS HC $4.00

The activities and responsibilities of a research facility in Brazil, South America are reported. The subjects investigated by the facility are as follows: (1) satellite communications, (2) remote sensing, (3) meteorology, (4) systems analysis, (5) geodesy, (6) extraterrestrial radiation, and (7) geomagnetism. A list of publications resulting from the research projects is provided.
P.N.F.

**N74-19610#** Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
**SUMMARY OF SPACE ACTIVITIES IN BRAZIL**
1973 136 p refs Presented at COSPAR Plenary Meeting, Konstanz, West Germany, 1973.
(INPE-334-LAFE) Avail: NTIS HC $10.00

Summaries of research activities in space, natural resources, technology transference, and communications are presented. The coordination and planning of these projects are also discussed.
S.K.W.

**N74-19611#** Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
**URBAN STUDIES**
Suzanne Palocz Aug. 1972 102 p refs
(INPE-231-RI/030) Avail: NTIS HC $8.25

Systems methods are applied to urban problems. By utilizing this method one can synthetize new urban developments. The analysis of established cities can be more readily done by the systems approach. Special emphasis is placed on introducing modern management principles to the field of urban design. The utilization of data collecting computer and image processing techniques is shown.
Author

**N74-19614#** Geological Survey, Washington, D.C.
**ENERGY RESOURCES OF THE UNITED STATES**
P. K. Theobald, S. P. Schweinfurth, and D. C. Duncan 1972 30 p refs
(Circ-650) Avail: NTIS HC $4.50

Diagrams present the U.S. Geological Survey estimates of the United States resources of coal, petroleum liquids, natural gas, uranium, geothermal energy, and oil from oil shale. The short text accompanying each diagram outlines the method of estimation or the source of the estimate and defines the characteristics of each estimate. Where appropriate, comparisons with other estimates are also given.
Author

**N74-19615#** Mitre Corp., McLean, Va.
**ENERGY, RESOURCES AND THE ENVIRONMENT: A SET OF PRESENTATIONS**
Richard S. Greeley Jun. 1973 79 p Presented at the US Inform. Agency Exhibit on Progr. and the Environ., Poland Intern. Trade Fair, Lodz, 18-22 Jun. 1973
(M73-61) Avail: NTIS HC $7.00

The fuel resources available to the world are described, including solar, nuclear fusion, nuclear fission, geothermal, tidal, hydro, and fossil energy sources. These resources are compared with estimated fuel consumption rates in the future. Solar, fusion, and fission with breeding are shown to represent essentially infinite energy sources. Methods are described for improving the efficiency and economy in the ways we use fuels. Savings of 10-15% appear possible in the near term. An energy ethic is described which involves changes to government regulations and tax policies and other institutions to promote efficiency and conservation in the use of fuels. The technology of advanced energy systems is described including automobile engines, mass transit systems, pollution control devices, fuel cells, and magnetohydrodynamic production of electricity. The need for a vigorous, international research and development program is discussed to provide assurance for continued supplies of clean, abundant energy.
Author

**N74-19617#** Committee on Commerce (U. S. Senate).
**COUNCIL ON ENERGY POLICY**
Washington GPO 1973 225 p refs Hearings on S. 70 and S. 419 before Comm. on Com., 93d Congr., 1st Sess., 7-8 Feb. 1973
Avail: Comm. on Com.

Hearings on the establishment of a national energy resources advisory board are presented. Measures to coordinate energy policies and improve management of energy resources are outlined.
S.K.W.

**N74-19618#** Committee on Interior and Insular Affairs (U. S. Senate).
**THE GASOLINE SHORTAGE: A NATIONAL PERSPECTIVE**
David M. Lindahl Washington GPO 1973 98 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 19 Jun. 1973 Prepared by Library of Congr.
Avail: Comm. on Interior and Insular Affairs

An overview is presented of factors contributing to the gasoline shortage, the extent of the shortage, and its impact on the country. Emphasis is placed upon problems of supply and demand and remedial actions taken to alleviate the problem.
Author

**N74-19619#** European Atomic Energy Community, Ispra (Italy).
**[PROGRESS IN REACTOR PROGRAMS AND NUCLEAR, PHYSICS, AND ELECTRONICS STUDIES] Annual Report**
Oct. 1973 480 p refs
(EUR-5060) Avail: NTIS HC $27.00

Research projects conducted at the Joint Research Center of Ispra, Italy during 1972 are presented. The subjects discussed are: (1) a fast breeder program, (2) reactor safety program, (3) gas cooled reactor development, (4) nuclear materials, and (5) protection of the environment. Specific projects conducted by the various divisions of the facility are reported to show the nature of the support provided for nuclear reactor development and operation.
P.N.F.

**N74-19622#** National Science Foundation, Washington, D.C.
**GUIDE TO PROGRAMS, FISCAL YEAR 1974**
1974 91 p
Avail: SOD HC $1.25

The assistance programs supported by the National Science Foundation during fiscal year 1974 are reported. The program listings describe the principal characteristics and basic purpose of each activity, eligibility requirements, closing dates (when applicable), and the address from which more detailed information, brochures, or application forms may be obtained. The scope of the subjects supported by the organization and the procedures for obtaining foundation support are described.
Author

**N74-19626#** Advisory Group for Aerospace Research and Development, Paris (France).
**SEMI-AUTOMATIC INDEXING: STATE OF THE ART**
H. Fangmeyer (EURATOM, Ispra) Feb. 1974 26 p refs
(AGARDograph-179; AGARD-AG-179) Avail: NTIS HC $4.50

The state of the art of semiautomatic indexing for information retrieval systems is discussed in the following areas: (1) semiautomatic derivative indexing; (2) machine-aided assignment indexing (including automatic assignment indexing techniques based on previously created manual or semiautomatic indexing aids); and (3) semiautomatic dictionary construction. Semiautom-

atic indexing is divided into conversational and symbiotic indexing in order to distinguish between indexing by continuous contact with the computer and indexing by integration of the computer in the indexing process for the purpose of performing certain clerical tasks. Author

**N74-19627#** National Bureau of Standards, Washington, D.C. Systems and Software Div.
**A MECHANIZED INFORMATION SERVICES CATALOG**
Beatrice Marron, Elizabeth Fong, and Dennis Fife Feb. 1974 56 p refs
(Grant NSF CA-68)
(NBS-TN-814) Avail: SOD HC $0.90 as C13.46:814

A catalog of currently available information sources and services is discussed. Information from recent surveys of machine-readable, commercially-available bibliographic data bases, and the various current awareness, batch retrospective, and interactive retrospective services which can access them, were correlated and converted into a machine-readable data base. A prototype searching capability was established on an operational interactive retrieval system. Reasons for establishing the catalog and the choice of the initial information are detailed and the prototype implementation is described. Sample queries are included, as well as a to-date listing of the catalog. Author

**N74-19629#** Stanford Research Inst., Menlo Park, Calif.
**MEETING CALIFORNIA'S ENERGY REQUIREMENTS, 1975-2000**
May 1973 412 p refs Sponsored by Los Angeles Dept. of Water and Power, Pacific Gas and Elec. Co., Sacramento Municipal Utility District, San Diego Gas and Elec. Co., and Southern Calif. Edison Co.
(SRI Proj. ECC-2355)
Avail: NTIS HC $23.75

A study was conducted to determine various aspects of the present and future energy requirements for the State of California. The specific objectives of the study are as follows: (1) to assess the economic framework and related demand for energy, (2) to determine means for altering the projected demand pattern, requirements for implementing each of these demands, and appraisal of their significance, (3) to analyze the future supply from each source of energy and the factors affecting availability and use, and (4) to predict probable future trends in price.
Author

**N74-19691#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), CH-47A ROTARY WING HEAD FWD Interim Report, Jan. 1964 - Jul. 1973**
Jan. 1974 24 p
(AD-773718; USAAVSCOM-TR-73-32) Avail: NTIS CSCL 01/3

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. GRA

**N74-19699#** City of St. Louis, Mo.
**ENERGY RECOVERY FROM WASTE: SOLID WASTE AS SUPPLEMENTARY FUEL IN POWER PLANT BOILERS Interim Report**
Robert A. Lowe 1973 29 p refs
(Grant EPA-S-802255)
(SW-36d.ii; IR-2) Avail: SOD HC $0.40

The process of converting municipal solid waste into energy for power plant boilers is described. The process involves collecting the waste from residential areas, grinding the material, and air-classifying the shredded wastes to find the light combustible fraction. Magnetic metals are recovered from the heavier, mostly noncombustible, wastes. Other topics of discussion include: the processing system and its operation; boiler modification and operating experience; air pollution considerations; markets; and economics. K.M.M.

**N74-19712#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), CH-47A ALTERNATING GENERATOR Interim Report, Jan. 1964 - Jul. 1973**
Jan. 1974 24 p
(AD-773720; USAAVSCOM-TR-73-33) Avail: NTIS CSCL 01/3

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. GRA

**N74-19755*#** Exotech Systems, Inc., Falls Church, Va.
**SCIENTIFIC AND TECHNICAL SERVICES DIRECTED TOWARD THE DEVELOPMENT OF PLANETARY QUARANTINE MEASURES FOR AUTOMATED SPACECRAFT Final Report**
31 Mar. 1974 76 p
(Contract NASw-2503)
(NASA-CR-138001) Avail: NTIS HC $7.00 CSCL 06M

The work is reported, which was performed in the specific tasks of the Planetary Quarantine research program for developing parameter specifications of unmanned scientific missions to the planets. The effort was directed principally toward the advancement of the quarantine technology, applicable to all future missions to planets of biological interest. The emphasis of the research was on coordinated evaluation, analysis, documentation, and presentation of PQ requirements for flight projects such as Viking and Pioneer. F.O.S.

**N74-19827*#** Aerospace Corp., El Segundo, Calif. Systems Planning Div.
**DORMAN COMPUTER PROGRAM (STUDY 2.5). VOLUME 1: EXECUTIVE SUMMARY Final Report**
L. T. Stricker 15 Sep. 1973 16 p
(Contract NASw-2472)
(NASA-CR-137368; ATR-74(7335)-1-Vol-1) Avail: NTIS HC $4.00 CSCL 09B

The DORCA Applications study has been directed at development of a data bank management computer program identified as DORMAN. Because of the size of the DORCA data files and the manipulations required on that data to support analyses with the DORCA program, automated data techniques to replace time-consuming manual input generation are required. The Dynamic Operations Requirements and Cost Analysis (DORCA) program was developed for use by NASA in planning future space programs. Both programs are designed for implementation on the UNIVAC 1108 computing system. The purpose of this Executive Summary Report is to define for the NASA management the basic functions of the DORMAN program and its capabilities. Author

**N74-19877** Joint Publications Research Service, Arlington, Va.
**REMOTE CONTROL SYSTEMS**
Antoni Pach *In its* Transl. on Eastern Europe Sci. Affairs, No. 393 (JPRS-61413) 6 Mar. 1974 p 102-122 refs Transl. into ENGLISH from Arch. Automat. Telemech. (Warsaw), v. 18, no. 2, 1973 p 209-225

Systems of telemechanics or remote control systems are discussed. Depending on the type of information transmitted, telemechanics is divided into: (1) telemanagement (remote management), (2) telemetry (remote measurement), (3) telecontrol (remote control or remote signalling), and (4) teleregulation (remote regulation). The development and application of telemechanical systems in the electric power industry, the gas industry, and the railroad system are reported. Author

**N74-19878** Joint Publications Research Service, Arlington, Va.
**POLISH EDUCATION IN THE FIELD OF AUTOMATION SCIENCE**
Henryk J. Leskiewicz *In its* Transl. on Eastern Europe Sci. Affairs, No. 393 (JPRS-61413) 6 Mar. 1974 p 123-150 Transl. into ENGLISH from Arch. Automat. Telemech. (Warsaw), v. 18, no. 2, 1973 p 227-249

The technical revolution brought about by automation of productive processes is gradually reaching every country. Any acceleration in the transition to the new techniques which this revolution implies, sooner or later has a positive effect. The tasks of the educational system in accelerating this revolution can be summarized as: (1) popularization of automation science; (2) on-the-job training of mid-level technical personnel to master the field of automation science; (3) introducing all higher-level technical personnel in all specialties to the problems of automation science and the opportunities offered by its introduction; (4) training various types of specialists in automation science at the higher levels of education; (5) doctoral-level training of automation scientists, and (6) stimulating habilitation studies in this field. Author

**N74-19898#** Environmental Protection Agency, Arlington, Va. Task Group 1
**LEGAL AND INSTITUTIONAL ANALYSIS OF AIRCRAFT AND AIRPORT NOISE AND APPORTIONMENT OF AUTHORITY BETWEEN FEDERAL, STATE, AND LOCAL GOVERNMENTS Final Report**
Elizabeth Cuadra 27 Jul. 1973 413 p refs
(PB-225149/4GA; EPA-NTID-73.2) Avail: NTIS HC $8.25 CSCL 01E

Data pertinent to legal and institutional analysis of aircraft and airport noise and apportionment of authority between Federal, State, and local governments are presented. The report is an interpretation of such data by the task group chairperson responsible for this specific report. It does not necessarily reflect the official views of EPA and does not constitute a standard, specification, or regulation. Author (GRA)

**N74-19975#** Interior Dept., Washington, D.C.
**FINAL ENVIRONMENTAL STATEMENT FOR THE GEOTHERMAL LEASING PROGRAM. VOLUME 2: LEASING OF GEOTHERMAL RESOURCES IN THREE CALIFORNIA AREAS**
1973 517 p refs 4 Vol.
Avail: SOD HC $5.85

Individual environmental statements are presented for the leasing of federally owned geothermal resources for development in three specific areas: (1) Clear Lake geysers; (2) Mono Lake-Long Valley; and (3) Imperial Valley. Also included is a summary of comments and responses relative to the draft environmental impact statement issued in 1971. Author

**N74-19976#** Interior Dept., Washington, D.C.
**FINAL ENVIRONMENTAL STATEMENT FOR THE GEOTHERMAL LEASING PROGRAM. VOLUME 3: PROPOSED GEOTHERMAL LEASING AND OPERATING REGULATIONS**
1973 697 p refs 4 Vol.
Avail: SOD HC $5.60

Proposed leasing and operating regulations to implement the Geothermal Steam Act are presented. Included are a study comparing vapor dominated hydrothermal systems with hot water systems, and a classification of public lands valuable for geothermal steam and associated geothermal resources. G.G.

**N74-19977#** Interior Dept., Washington, D.C.
**FINAL ENVIRONMENTAL STATEMENT FOR THE GEOTHERMAL LEASING PROGRAM. VOLUME 4: COMMENTS ON DRAFT IMPACT STATEMENT AND PROPOSED REGULATIONS**
1973 726 p refs 4 Vol.
Avail: SOD HC $5.65

Comments received from Federal, State, local, and individual interests on the leasing and operating regulations, the draft environmental impact statement for the Geothermal Leasing Program, and the supplement to the draft statement are presented. Author

**N74-20001#** Earth Satellite Corp., Washington, D.C.
**EVALUATION OF ECONOMIC, ENVIRONMENTAL AND SOCIAL COSTS AND BENEFITS OF FUTURE EARTH RESOURCES SURVEY SATELLITE SYSTEMS Quarterly Progress Report, May - Jul. 1973**
10 Aug. 1973 322 p refs
(Contract DI-14-08-0001-13519)
(PB-226036/2GA; USGS-DO-73-014; QPR-2) Avail: NTIS HC $18.25 CSCL 08F

A case study in agriculture crop acreage estimation was initiated and preliminary efforts were made to define resources, rangeland management, and land use planning. Progress to date leads to these observations: The ERTS-1 experimental results thus far represent relatively few data points. Applications of high potential benefits often depend on the redesign of a complex management information system to convert information extracted from ERS data into the form used in management decisions. Benefit measurement techniques appear to present fewer problems than experimental results or the management information models. The case studies defined to date vary substantially in their breadth of coverage. GRA

**N74-20305** National Bureau of Standards, Washington, D.C.
**ON THE INFORMATION IN A MICROPHOTOGRAPH**
C. S. McCamy *In its* Precision Meas. and Calibration, Vol. 10 Nov. 1973 p 470-476 refs Repr. from Appl. Opt., v. 4, Apr. 1965 p 405-411

The information concentration of a legible microphotograph made at a reduction ratio of 1200 is computed to be over 2 x 1 million bits/ sq mm. Reasons are adduced for using a mosaic of squares having sides equal to the reciprocal of the resolving power, each being capable of assuming one of two density ranges, as a model of a high contrast material for the computation of information capacity. It follows that the information capacity is equal to the square of the resolving power. This relation gives values of information capacity in good accord with the values computed by the Jones theory. The information capacity of a Kodak high resolution plate is computed to be 3.25 x 1 million bits/sq mm. That the product of reduction ratio times quality index equals the product of resolving power times the height of the lower case in type to be copied is verified at the high reduction ratio, and this relationship is considered useful for engineering computations involving the copying of commonly used styles of type. Author

**N74-20471*#** Dudley Observatory, Albany, N.Y.
**ASTRONOMICAL ACTIVITIES OF THE APOLLO ORBITAL SCIENCE PHOTOGRAPHIC TEAM Final Technical Report**
Robert D. Mercer 31 Jan. 1974 89 p

(Grant NGR-33-011-031)
(NASA-CR-137376) Avail: NTIS HC $7.50 CSCL 03A

A partial accounting of Apollo Orbital Science Photographic Team (APST) work is presented as reported by one of its members who provided scientific recommendations for, guidance in, and reviews of photography in astronomy. Background on the formation of the team and its functions and management are discussed. It is concluded that the APST clearly performed the overall objective for which it was established - to improve the scientific value of the Apollo lunar missions. Specific reasons for this success are given. Author

**N74-20609*** + National Aeronautics and Space Administration, Washington, D.C.
**NASA-PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY (CUMULATIVE ISSUE). SECTION 1: ABSTRACTS**
Jan. 1974 756 p refs
(NASA-SP-7039(04)-Sect-1) Avail: NTIS HC $9.00 CSCL 05B

This bibliography lists 2594 NASA patents and applications for patents introduced into the NASA scientific and technical information system between May 1969 and December 1973. The publication is issued in two sections: (1) abstracts and (2) Indexes. Each entry in the Abstract section consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or application for patent. The index section contains five indexes -- subject, inventor, source, number, and accession number. Author

**N74-20610*** + National Aeronautics and Space Administration, Washington, D.C.
**NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY (CUMULATIVE ISSUE). SECTION 2: INDEXES**
Jan. 1974 446 p refs
(NASA-SP-7039(04)-Sect-2) Avail: NTIS HC $4.50 CSCL 05B

For abstract, see N74-20609.

**N74-20612#** Committee on Science and Astronautics (U. S. House).
**AUTHORIZING APPROPRIATIONS TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**
Teague Washington GPO 1974 178 p Rept. to accompany H.R. 13998 presented by the Comm on Sci. and Astronaut. to the Comm. of the Whole House on the State of the Union, 93d Congr., 2d Sess., 10 Apr. 1974
Avail: US Capitol, House Document Room

The hearings on authorization of appropriations to NASA are presented. Cost analyses for fiscal year 1975 are presented for research and development programs, construction of facilities, and program management. S.K.W.

**N74-20616#** Interior Dept., Washington, D.C.
**FINAL ENVIRONMENTAL STATEMENT FOR THE GEOTHERMAL LEASING PROGRAM. VOLUME 1: PROMULGATION OF LEASING AND OPERATING REGULATIONS**
1973 485 p refs 4 Vol.
Avail: SOD HC $4.20

Public lands potentially available for geothermal leasing are described. These include principally: (1) public, withdrawn, and acquired lands administered by the Secretary of the Interior; (2) national forests and other lands administered by the Forest Service, Department of Agriculture; and (3) lands containing a reservation to the United States of the geothermal resources. These lands total 638 million acres. The most promising geothermal resource areas are located predominantly in the 11 western States and Alaska. Included in this proposed action are: (1) the promulgation of leasing and operating regulations pursuant to which the program would be administered; and (2) the leasing of federally owned geothermal resources for development in three specific areas: (a) Clear Lake-Geysers; (b) Mono Lake-Long Valley; and (c) Imperial Valley, all in California. Author

**N74-20617#** Arkansas Univ., Fayetteville. Dept. of Physics.
**ENERGY IN THE NEAR TERM**
Otto Henry Zinke 21 Jun. 1973 57 p refs Sponsored by Dept. of Commerce and Ford Found.
Avail: NTIS HC $6.00

The dependence of the United States on petroleum as a primary energy source is discussed. Data are presented which outline energy consumption and production estimates. Techniques which would reduce energy consumption are outlined. Correlations are made between energy consumption and employment. S.K.W.

**N74-20619#** Bureau of Mines, Bartlesville, Okla. Enegry Research Center.
**ENERGY PROGRAM, 1972**
Bill Linville and John D. Spencer 1973 115 p refs
(BM-IC-8612) Avail: NTIS HC $8.75

Major areas of research by the Bureau of Mines in 1972 for the development of new and improved efficient methods of conservation and utilization for petroleum and natural gas, oil shale, and coal are described. The major objective of the energy research program was to develop the technology for the wise development and use of the nation's energy resources as clean fuels at a reasonable and competitive cost. Emphasis was placed on studies of methods of stimulating production from oil and gas reservoirs. Studies of the fracturing systems of reservoir rocks and oil recovery by water or gas flooding are included. Author

**N74-20631#** Forecasting International Ltd., Arlington, Va.
**DEVELOPMENT OF A TECHNOLOGY ASSESSMENT AND ADVANCED TECHNOLOGY TRANSFER PROGRAM FOR THE DEPARTMENT OF THE ARMY, PART 1 Final Report**
Marvin J. Cetron and Lewis Roepcke 1 Jun. 1973 88 p refs
(Contract DAHC19-72-C-0031)
(AD-772087) Avail: NTIS CSCL 05/1

The study has two primary purposes: to develop a management planning tool for the Department of the Army and to evaluate specific innovations by means of it. This tool, described and demonstrated herein, can be used to make continuous assessments of the potential impacts of alternative Army research programs--including impacts both on the Army itself and on the physical and social environment with which the Army interacts. The kinds of programs which can be assessed include a wide range of possible technological, administrative, and institutional innovations. GRA

**N74-20681#** RAND Corp., Santa Monica, Calif.
**A DASSAULT DOSSIER: AIRCRAFT ACQUISITION IN FRANCE**
Robert Perry Sep. 1973 42 p refs Sponsored by AF
(AD-774598; R-1148-PR) Avail: NTIS CSCL 01/3

The report is concerned with Avions Marcel Dassault-Breguet, generally held to be one of the most efficient aircraft development and production firms in the western world. Its purpose is to examine and evaluate the policies, strategies, operating practices, and external relationships that appear to be responsible for that reputation and for the achievements that underlie it. A principal object of the study is to identify those Dassault attributes that might beneficially be adapted to an American setting and to estimate the feasibility of so doing. GRA

**N74-20871#** Lincoln Lab., Mass. Inst. of Tech., Lexington.
**REVIEW OF HIGH-RELIABILITY PROCUREMENT PRAC-**

**TICES IN THE SEMICONDUCTOR INDUSTRY**
Alan G. Stanley 11 Jan. 1974 36 p refs
(Contract F19628-73-C-0002)
(AD-773833; TN-1974-2; ESD-TR-74-11) Avail: NTIS CSCL 09/1

High-reliability procurement practices in the semiconductor industry have been reviewed in the light of Lincoln Laboratory experience over the past two years. The merits and drawbacks of different types of product assurance methods and specification systems are described. A different kind of procurement method is proposed, in which devices are obtained from the vendors in wafer form on the basis of stringent wafer acceptance tests and subsequently processed on a controlled line under strict quality control conditions including in-process quality control tests, positive lot control and exhaustive screens. Author (GRA)

**N74-20953*#** Ecosystems International, Inc., Gambrills, Md.
**THE PRACTICAL UTILIZATION OF REMOTE SENSING TECHNOLOGY FOR THE MANAGEMENT AND CONSERVATION OF NATURAL RESOURCES. PART 1: CROP FORECASTING**
Peter A. Castruccio and Harry L. Loats, Jr. Mar. 1974 64 p refs Sponsored by NASA ERTS
(E74-10425; NASA-CR-137351) Avail: NTIS HC $6.25 CSCL 02C

There are no author-identified significant results in this report.

**N74-21277#** World Meteorological Organization, Geneva (Switzerland).
**REPORT OF THE FIFTH SESSION OF THE TROPICAL EXPERIMENT BOARD Global Atmospheric Research Program**
1974 62 p Conf. held at Geneva, 3-7 Dec. 1973 Prepared jointly with Intern. Council of Sci. Unions
(GARP-Spec-Rept-11) Avail: NTIS HC $6.25; WMO, Geneva

The conclusions of the fifth session of the Tropical Experiment Board for the Global Atmospheric Research program are presented. The five scientific subprograms of GATE are reviewed; approval was given for the broad outlines of various operational plans aimed at achieving the scientific objectives. Attention was also given to the problem of processing and archiving the large amount of data which will be produced. ESRO

**N74-21281#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**AUTOMATED OPERATIONAL PROCESSING OF METEOROLOGICAL INFORMATION AT THE HYDROMETEOROLOGICAL CENTER OF THE USSR**
S. L. Belousov, Yu. I. Cherkasov, B. G. Buravtsev, and A. K. Artanova 7 Jan. 1974 23 p refs Transl. into ENGLISH from Tr v Vsesoyuznogo Meteorol. Sezda, Sekts. Prognoza Pogody (USSR), v. 2, 1972 p 19-29
(AD-773298; FTD-MT-24-232-74) Avail: NTIS CSCL 04/2

The automated processing system is described and consists of the following stages: (1) the reception, primary processing, and storage of initial information; (2) the compiling of reports and the calculating of analyses and forecasts in accordance with the Regional Meteorological Center Program; and (3) the calculation of analyses and forecasts in accordance with the World-Wide Meteorological Center Program. D.L.G.

**N74-21296#** Mitre Corp., McLean, Va.
**FEASIBILITY STUDY FOR AUTOMATING THE FAA CENTRAL ALTITUDE RESERVATION FACILITY Final Report**
Gerald K. Mueller Dec. 1973 64 p
(Contract DOT-FA69NS-162)
(AD-774680; MTR-6416; FAA-EM-74-6) Avail: NTIS CSCL 01/2

The report documents a study of the Central Altitude Reservation Facility (CARF) of the Federal Aviation Administration. CARF has the responsibility for approving airspace reservations for missions that in general could not be accomplished without a reservation. The study was undertaken to determine whether the use of automation techniques could improve the efficiency and accuracy of the CARF operations in a cost effective manner, and to evaluate the impact of implementing CARF automation via the proposed Air Traffic Service Headquarters Computer.
Author (GRA)

**N74-21399*#** National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
**THE EXPERIMENTAL CLEAN COMBUSTOR PROGRAM: DESCRIPTION AND STATUS**
Richard W. Niedzwiecki and Robert E. Jones 1974 16 p refs Presented at the Air Transport Meeting, Dallas, 30 Apr. - 2 May 1974; Sponsored by SAE
(NASA-TM-X-71547; E-7956) Avail: NTIS HC $4.00 CSCL 21E

The objectives, program plan, schedule, pollution and performance goals, program approaches to pollution reduction, and status of the project are presented. Advanced supersonic transport and combustion noise programs are also discussed. The phases of the program consist of the following: (1) screening of low pollutant combustors, (2) refinement of the best combustors, and (3) engine demonstration of the best combustors. It is stated that all combustor designs investigated appear capable of achieving the idle pollutant goals with additional development effort. Author

**N74-21603*#** Denver Research Inst., Colo. Industrial Economics Div.
**A CASE STUDY IN TECHNOLOGY UTILIZATION: INDUSTRIAL PRODUCTS AND PRACTICES**
Feb. 1973 61 p refs
(Contract NASw-2362)
(NASA-CR-137985) Avail: NTIS HC $6.25 CSCL 05A

In pursuit of such missions as Apollo, the National Aeronautics and Space Administration has called into being unique equipment that obviously has little direct application beyond the achievement of mission objectives. Yet, to assume that further direct application of space program hardware is somehow a measure of the industrial benefits accruing to the nation is to misunderstand how the creation of new technology affects modern industrial capability. This document presents a profile of the significant ways in which technological developments in response to aerospace mission requirements have been coupled into industrial practice, with the result being that improved products and processes are now being utilized to benefit the nation.
Author

**N74-21605#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**NASA AUTHORIZATION FOR FISCAL YEAR 1975, PART 1**
Washington GPO 1974 538 p refs Hearings on S. 2955 before Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 5, 26 and Feb. 1974
Avail: Comm. on Aeron. and Space Sci.

The Congressional hearings on the NASA authorization for Fiscal Year 1975 are presented. The hearings concern appropriation of funds for research and development, construction of facilities, and program management. The projects discussed include: (1) aircraft noise abatement research, (2) civil and military short haul aircraft, (3) civil and military long haul aircraft, (4)

highly maneuverable aircraft technology, (5) aeronautics fuel conservation, (6) exploration of space, and (7) energy technology for civilian needs. P.N.F.

**N74-21606#** Committee on Science and Astronautics (U. S. House).
**NASA AUTHORIZATION, 1975, PART 2**
Washington GPO 1974 1146 p refs Hearings on H.R. 12689 (superseded by H.R. 13998) before Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 25, 19-21 and 26-27 Feb. and 5-6 Mar. 1974
Avail: Subcomm. on Manned Space Flight

**N74-21610#** Advisory Group for Aerospace Research and Development, Paris (France).
**AGARD ANNUAL MEETING, 1973**
Dec. 1973 68 p refs In ENGLISH; partly in FRENCH Conf. held at Athens, 13 Sep. 1973
Avail: NTIS HC $6.50
Conference papers are presented which relate to: (1) research and development activities in Greece, and (2) the use of science and technology to meet military requirements at reduced costs.

**N74-21611** Advisory Group for Aerospace Research and Development, Paris (France).
**RESEARCH AND DEVELOPMENT ACTIVITIES IN GREECE**
S. N. Moraitis (Hellenic Air Force) *In its* AGARD Ann. Meeting, 1973 Dec. 1973 p 8-13

An overview is presented of the distribution of research efforts in Greece according to the areas of activity and expenditures. Tables are given which illustrate the following: (1) the activities which contributed to the formation of the national income for the years 1970 through 1972, and secondly the forecasts for 1987; (2) the country's gross domestic asset formation per field of productive activity; (3) electric power exploitation as achieved by the Public Power Corporation; (4) the structure of domestic asset formation in the industrial enterprises for four categories of products; (5) distribution of expenditures for types of research and the percent of the gross national product represented by the total research expenditure; and (6) the financing of research and development according to the performing agency for the current five year program which runs from 1973 to 1977.
D.L.G.

**N74-21620#** Committee on Interior and Insular Affairs (U. S. Senate).
**CONSERVATION OF ENERGY**
Washington GPO 1972 121 p refs Presented to Comm. on Interior and Insular Affairs, 92d Congr., 2d Sess., 1 Aug. 1972 Prepared by Library of Congr.
Avail: SOD HC $0.50
The following topics relating to the conservation of energy resources are discussed. (1) The dependence of the United States on foreign supplies of oil and gas, and the extent to which energy conservation can provide greater national security through the reduction of imports. (2) The economic and technical feasibility of extending the use of available fuel reserves over a longer period of time through more efficient use of production and controls. (3) The consequences of a comprehensive federal program for energy conservation, considering the fact that existing policy is based on the premise that federal and state regulations should encourage industry to meet whatever demands are created in the marketplace. (4) The extent to which advances in finding new energy sources, i.e., solar, breeder, or controlled thermonuclear, will lessen the need for energy conservation. Author

**N74-21624#** Joint Economic Committee (U. S. Congress).
**THE GASOLINE AND FUEL OIL SHORTAGE From the Subcommittee on Consumer Economics**
Washington GPO 1973 295 p refs Hearings before Joint Econ. Comm., 93d Congr., 1st Sess., 1-2 May and 2 Jun. 1973
(GPO-99-740) Avail: SOD HC $2.00
A Congressional hearing on the gasoline and fuel oil shortage is presented. The impact of the shortages on the overall economy of the nation is analyzed. The outlook for the fuel situation in the period 1972 through 1975 is examined. Methods for correcting the fuel shortage are proposed. The government policy with respect to resources management and fuel allocations is discussed. The economic condition and operating problems of various gasoline and oil companies are reported by selected representatives from these companies. P.N.F.

**N74-21672#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), CH-47A HYDRAULIC SERVOCYLINDER Interim Report, 1 Jan. 1964 - 1 Jul. 1973**
Feb. 1974 22 p refs
(AD-775449; USAAVSCOM-TR-74-10) Avail: NTIS CSCL 01/3
Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change in items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From the data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program areas. Author (GRA)

**N74-21685*#** Heliotek, Sylmar, Calif.
**STUDY TERRESTRIAL APPLICATIONS OF SOLAR CELL POWERED SYSTEMS Final Report**
Jerry W. Ravin Sep. 1973 134 p
(Contract NAS3-16828)
(NASA-CR-134512) Avail: NTIS HC $9.75 CSCL 10A
Terrestrial applications of solar cells and design systems are considered for those applications that show the most promise for becoming practical and accepted by users within the next five years. The study includes the definition, categorization, evaluation and screening of the most attractive potential terrestrial applications for solar cells. Potential markets are initially grouped and categorized in a general sense and are weighted in priority by their business volume, present and future. From a categorized list including marine, transportation, security, communication, meteorological and others, 66 potential solar cell applications have been cataloged. A methodology was formulated to include the criteria for evaluation and screening. The evaluation process covers all parts and components of the complete system required for each application and gives consideration to all factors, such as engineering, economic, production, marketing and other factors that may have an influence on the acceptance of the system.
Author

**N74-21730#** School of Aerospace Medicine, Brooks AFB, Tex.
**RECENT ADVANCES IN OPERATIONAL AEROSPACE MEDICINE Aeromedical Review**
Royce Moser, Jr. Jan. 1974 24 p refs
(AD-774118; SAM-Review-1-74; SAM-TR-74-3) Avail: NTIS CSCL 06/5
The review provides Air Force flight surgeons information regarding recent advances in operational aerospace medicine.

Material was selected for inclusion which deals with the more common problems confronting practicing flight surgeons. The review discusses advances in the administrative, clinical, research, environmental health, and education areas of aerospace medicine. It represents one aspect of continuing education in aerospace medicine for the flight surgeon. Author (GRA)

**N74-21765#** California Univ., Irvine.
**BIOCYBERNETICS: AN INTERACTIVE MAN-MACHINE INTERFACE Annual Technical Report, 1 Jan. - 31 Dec. 1973**
R. F. Thompson and T. J. Taylor 20 Feb. 1974 45 p refs
(Contract DAHC15-72-C-0121; ARPA Order 1001)
(AD-774987) Avail: NTIS CSCL 05/8

The research reported involves the detection of human bioelectric phenomena that have been made analogues of ongoing cognitive processes and the utilization of these phenomena to control and/or communicate with external devices. The technique is applicable to situations requiring rapid human intervention in the control of complex systems operation. The major advantage of this project is the virtually automatic control of systems by the trained subject. GRA

**N74-21766#** Educational Testing Service, Princeton, N.J.
**DEVELOPMENT AND VALIDITY OF A VOCATIONAL AND OCCUPATIONAL INTEREST INVENTORY**
Gary J. Echternacht, Richard R. Reilly, and Patty J. McCaffrey Dec. 1973 81 p refs
(Contract F41609-72-C-0030; ILIR Proj. 00-12)
(AD-774573; AFHRL-TR-73-38) Avail: NTIS CSCL 05/9

Over 3,100 airmen and 300 recruits in basic training returned interest inventories, termed the Vocational and Occupational Interest Choice Examination (VOICE). Items forming the inventory were primarily generated by examining job analyses in relation to the airman classification structure. Both a priori and occupational scales were developed based on responses obtained by mail inventory administration of airmen who indicated satisfaction with their career fields. Scales were developed on half-samples and a cross-validation technique employed. A comparison was made, in order to assess validity, of the number of individuals correctly predicted to be members of a service career field or men-in-general using the scales versus the number of individuals one would expect to correctly predict without use of the scales. Scale weights developed in one half-sample were applied to responses obtained in the other half-sample in the above comparison. (Modified author abstract) GRA

**N74-21775*#** Techtran Corp., Glen Burnie, Md.
**IMPROVEMENTS APPLIED TO METHODS OF PREPARING INORGANIC AEROGELS**
J. T. Stanislas, J. Teichner, A. N. Gilbert, and A. Nicolaon Washington NASA Dec. 1973 13 p Transl. into ENGLISH from French Patent no. 130417 (30 Nov. 1969) 7 p
(Contract NASw-2485)
(NASA-TT-F-14791) Avail: NTIS HC $4.00 CSCL 07B

Methods for preparation of inorganic aerogels, especially of the silica variety, gels in which the dispersion medium is a gas or a vapor are discussed. Methods described were designed to enable speed in production, reduction of costs, and more diverse uses for aerogels. Author

**N74-21874#** Rantec Corp., Calabasas, Calif.
**FABRICATION TECHNIQUES AND PRINCIPLES FOR FLAT PLATE ANTENNAS Final Report, May - Aug. 1972**
Sep. 1973 32 p refs
(Contract DOT-TSC-390)
(PB-225865/5GA; DOT-TSC-NHTSA-73-7; DOT-HS-800969) Avail: NTIS HC $3.00 CSCL 09E

The report documents the fabrication techniques and principles selected to produce one and ten million flat plate antennas per year. An engineering analysis of the reliability, electrical integrity, and repeatability is made, and a cost analysis summary is included for a production run of both one and ten million units per year. finally, a technical discussion of the maximum RF frequency to which these fabrication techniques can be extended without performance degradation and/or major cost increase is included. GRA

**N74-21912#** Decision Systems Associates, Inc., Rockville, Md.
**UNITED STATES AIR FORCE TRAINING LINE SIMULATOR Final Report**
Franz Nauta and Michael B. Pierce Dec. 1973 52 p refs
(Contract F41609-70-C-0047; AF Proj. 6323)
(AD-774572; AFHRL-TR-73-61) Avail: NTIS CSCL 05/9

The report describes the technical aspects and potential applications of a computer-based model simulating the flow of airmen through basic training and entry-level technical training. This report gives an extensive description of input control cards and files necessary for an application of the Airman Training Line Simulator Model. The objective of this Training Line Simulator is to assess the impacts of alternative recruit classification and training policies under a wide variety of assumptions regarding the quality of recruits and entry-level training parameters. Parameters accommodated by the model include mandatory course prerequisities, attrition and setback rates, class schedules and quotas, and a host of individual airman attributes. The model evaluates the impacts of training parameter changes by determining the maximum percent fills of training quotas, the size of the waiting lines for technical training courses, student-instructor ratios and the numbers of setbacks, attritions and unassigned basic training graduates. The Training Line Simulator is an entity simulation model with imbedded optimizations to achieve optimal fill of training quotas. The model employs an asynchronous as opposed to incremental projection methodology to achieve execution efficiencies. (Modified author abstract) GRA

**N74-21973*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Progress Report, 1 Oct. 1973 - 31 Mar. 1974**
John W. Hannah, Garland L. Thomas, and Ferd Esparza, Principal Investigators 31 Mar. 1974 27 p refs Prepared in cooperation with Brevard County Planning Dept., Titusville, Fla. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21847)
(E74-10448; NASA-TM-X-70152) Avail: NTIS HC $4.50 CSCL 08B

There are no author-identified significant results in this report.

**N74-21978*#** Corps of Engineers, Waltham, Mass.
**ERTS-1 DATA USER INVESTIGATION OF THE USE OF ERTS IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION Progress Report, 14 Dec. 1973 - 14 Feb. 1974**
Saul Cooper and Paul Bock, Principal Investigators 22 Apr. 1974 3 p ERTS
(NASA Order S-70256-AG)
(E74-10453; NASA-CR-137442) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

**N74-22007*#** Ohio Dept. of Economic and Community Development, Columbus.
**RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Jan. - Feb. 1974**
David C. Sweet, Principal Investigator Feb. 1974 14 p Prepared for Battelle Columbus Labs. ERTS

(Contracts NAS5-21782; BCL-72-17/G-1793)
(E74-10483; NASA-CR-136879) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

**N74-22070#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Extraterrestrische Sensortechnik.
**STUDY FOR A GEOSCIENTIFIC AIRCRAFT MEASUREMENT PROGRAM [STUDIE FUER EIN ERDWISSENSCHAFTLICHES FLUGZEUG-MESSPROGRAMM]**
A. Rossbach and M. Schroeder Feb. 1973 125 p In GERMAN
Avail: NTIS HC $9.25

A German program for geoscientific aircraft measurements, including oceanography, geophysics, water pollution, sediment transport, meteorology, vegetation and ecology, is proposed. The scientific program and the areas to be surveyed are discussed. The choice of remote sensors and the requirements for processing the data measured are considered. The choice of the measuring aircraft and the flight plans are explained. Remote sensing projects in other European countries are discussed briefly, and project management considerations are given. ESRO

**N74-22154#** Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Mecanique.
**DESIGN OF A CLASSIFICATION SCHEME FOR MECHANICAL PARTS CENTERED ON FABRICATION GROUP TECHNOLOGY [IMPLANTATION D'UN SYSTEME DE CLASSIFICATION DE PIECES AXE SUR LA FABRICATION TECHNOLOGIE DE GROUPES]**
Jacques Peters (Louvain Univ., Belgium), Willy DuMong, and Marc Dieperinck Jan. 1974 137 p refs In FRENCH Sponsored by the Inst. pour l'Encour. de la Rech. Sci. dans l'Ind. et l'Agr.
(CRIF-MC-49) Avail: NTIS HC $10.00

A classification scheme for mechanical pieces and drawings for production workshops is presented. The encoding system is described based on the OPITZ classification scheme. Its implementation in three workshops is discussed. The information management required is detailed with regard to the information matrices associated with machine tools performance capability. Applications to the choice of a machine tool for a given task is reported together with blueprint classifications. Time aspects are considered in relation to group technology for task preparation, worksheet writing, and work duration estimation. ESRO

**N74-22251#** RAND Corp., Santa Monica, Calif.
**A SURVEY OF SOLUTION CONCEPTS FOR MAJORITY RULE GAMES**
Robert Shishko Jan. 1974 34 p refs Revised
(P-5169-Rev) Avail: NTIS HC $4.75

Game-theoretic solution concepts applicable to n-person majority rule games are presented. An n-person cooperative game, (N, v), is called a C-game if it can be adequately represented by its characteristic function, v. Side payments are permitted if an infinitely divisible store of value can be transferred between players before or after the game is played. Finally, utility is said to be transferable if the transfer of the story of value causes the recipient's utility to change at a constant marginal rate proportional to the amount transferred. Author

**N74-22327#** National Academy of Sciences - National Research Council, Washington, D.C.
**PHYSICS IN PERSPECTIVE. VOLUME 2, PART C: STATISTICAL DATA (AUXILIARY MATERIAL COLLECTED BY THE STAFF AND SOME MEMBERS OF THE DATA PANEL)**
1973 325 p refs
(AD-772540) Avail: NTIS CSCL 05/1

Contents: Manpower data; Data on funding and costs; Data on the literature of physics; Index of data; Selected tables from the physics portion of the national register of scientific and technical personnel; Allocation of national register specialties to physics subfields. GRA

**N74-22506*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APOLLO EXPERIENCE REPORT THE COMMAND AND SERVICE MODULE MILESTONE REVIEW PROCESS**
Harmon L. Brendle and James A. York Washington Mar. 1974 111 p
(NASA-TN-D-7599; JSC-S-389) Avail: NTIS HC $4.50 CSCL 22B

The sequence of the command and service module milestone review process is given, and the Customer Acceptance Readiness Review and Flight Readiness Review plans are presented. Contents of the System Summary Acceptance Documents for the two formal spacecraft reviews are detailed, and supplemental data required for presentation to the review boards are listed. Typical forms, correspondence, supporting documentation, and minutes of a board meeting are included. Author

**N74-22576#** Naval Weapons Center, China Lake, Calif.
**APPLICATION OF COMBUSTION INSTABILITY RESEARCH**
E. W. Price Jan. 1974 27 p
(AD-775289; NWC-TP-5603) Avail: NTIS CSCL 21/2

Combustion instability is described in both technical terms and in terms of problems posed in development programs and what constitutes solution of the problems. The nature of research results and impediments to application are described (both technical and administrative impediments). Successful applications of research are described, applications ranging from advance recognition of high risk situations to problem diagnosis, fix and quality control in development and production motors. Finally, problems and recommendations regarding future research and application are described, including both technical and management (system planning) aspects of the problem. Author (GRA)

**N74-22580** California Inst. of Tech., Pasadena. Environmental Quality Lab.
**STATE POWER PLANT SITING: A SKETCH OF THE MAIN FEATURES OF A POSSIBLE APPROACH**
James E. Krier, Lester Lees, and Daniel Dawes Feb. 1973 46 p refs
(EQL-Memo-4) Copyright. Avail: Issuing Activity

Work on various phases of power plant technology and siting was done within the Environmental Quality Laboratory (EQL) at the California Institute of Technology. The role of institutional aspects of the siting process is emphasized. Major outlines of one possible approach to power plant siting for the state are discussed. The approach to the siting plan is outlined with emphasis on the decision process involved in siting. The role of judicial review is discussed. State laws relating to the siting process are reviewed. A time line which summarizes the approach to the siting problem is presented. Author

**N74-22582** California Inst. of Tech., Pasadena. Environmental Quality Lab.
**OUTLINE OF AN APPROACH TO MANAGEMENT STANDARDS**
Kenneth Heitner and James E. Krier (Calif. Univ., Los Angeles) Jan. 1974 18 p
(Grant NSF GI-29726)
(EQL-Memo-13) Copyright. Avail: Issuing Activity

Management standards used as an approach to air quality nationwide are examined. The management concept is based on technical, economical, and social feasibility. Attempts will be made to reach a certain goal through a series of specified time phase steps. Each step would set a target date by which there must be achieved substantial percentage reductions in the number of days per year on which long term ambient air quality goal is violated, reducing this figure by the ultimate target date to no days of violation annually. Author

**N74-22591*#** Tennessee Univ., Knoxville. Center for Business and Economic Research.
**MEASURING AND MINIMIZING THE SOCIAL COST OF ENVIRONMENTAL POLLUTION Partial Final Report**
Harold W. Henry 29 Jan. 1973 86 p
(Grant NGR-43-001-021)
(NASA-CR-138118) Avail: NTIS HC $7.50 CSCL 05K

The various impacts to the environmental protection movement on the largest corporations in several industries which had the most serious pollution problem are discussed. The purpose was to examine the impacts from the point of view of top corporation managers so that a broader perspective could be provided for all concerned parties- citizens, environmentalists, legislators, governmental administrators and agency personnel, scientists, engineers, and other industrial managers Author

**N74-22595#** RAND Corp., Santa Monica, Calif.
**ENERGY ALTERNATIVES FOR CALIFORNIA: THE CURRENT CRISIS. 2: CONSERVATION OF ENERGY**
Ronald D. Doctor Dec. 1973 34 p refs
(P-5156) Avail: NTIS HC $4.75

Methods for enacting energy conservation in California are discussed. Estimates are made of potential energy savings in the industrial, commercial, residential, and transportation sectors. It is recommended that the state government assume a more active role in allocating resources with particular attention to geographic and socioeconomic factors. S.K.W.

**N74-22596#** RAND Corp., Santa Monica, Calif.
**ENERGY ALTERNATIVES FOR CALIFORNIA: THE CURRENT CRISIS. 3: ALLOCATION OF SCARCE SUPPLIES**
Richard H. Ball Dec. 1973 21 p refs
(P-5157) Avail: NTIS HC $4.25

Projected allocations of scarce energy supplies for California are discussed. The state economy was divided into residential, commercial, industrial, and transportation sectors. Energy supplies discussed are: petroleum, electricity, natural gas, coal, and wood. Energy demand profiles are projected based on figures for demand in 1973. The role of government in allocating energy resources is discussed. S. K. W.

**N74-22598#** RAND Corp., Santa Monica, Calif.
**THE POLICY EFFECTS ANALYSIS METHOD: A SYSTEM DYNAMICS SIMULATION STUDY OF THE DEFENSE FUEL SUPPLY SYSTEM**
James D. Steele Nov. 1973 18 p refs Presented at Conf. of the Operations Res. Soc. of Am., San Diego, Calif., 12-14 Nov. 1973
(P-5129) Avail: NTIS HC $4.00

A computerized simulation of military procurement policy for jet fuels and aviation gasoline is presented. The analysis is used to evaluate the effects of procurement policy on military operations. The effect of international and domestic energy policies on procurement is also discussed. S.K.W.

**N74-22601#** National Science Foundation, Washington, D.C. Office of Science Information Service.
**THE GROWTH OF SCIENTIFIC AND TECHNICAL INFORMATION: A CHALLENGE**
J. Georges Anderla (Paris Univ.) Jan. 1974 68 p refs
Avail: NTIS HC $6.50

Using a number of forecasting techniques, it is concluded that the volume, complexity, and growth rates of scientific and technical information have been grossly underestimated. By the middle part of the next decade it is estimated that the annual output of scientific and technical information may reach 12-14 million unduplicated items, compared to 2 million items now produced annually. By this reckoning the recent slowdown in the U.S. Production of scientific and technical information is more than offset by acceleration in the growth rates of such information throughout the rest of the world. Arguments that the sheer volume of this material will absolutely necessitate the use of sophisticated electronic information processing systems, and predictions that the present industry/service-dominated economy and society will be replaced by a new social order and structure which will be information oriented are presented. Reaction to this presentation was centered upon the definitional aspects of STI. Noting a lack of agreement on definition, it is concluded that the classification of information by categories is useful for analytical purposes; but for policy decisions, information must be treated as an entity. Author

**N74-22607#** RAND Corp., Santa Monica, Calif.
**R AND D MANAGEMENT: METHODS USED BY FEDERAL AGENCIES**
John G. Wirt, Arnold J. Lieberman, and Roger E. Levien Jan. 1974 278 p refs
(Contract HEW-OS-72-88)
(R-1156-HEW) Avail: NTIS HC $17.00

Methods are described which selected Federal agencies use to manage three major types of R and D: fundamental research to gain knowledge about basic natural phenomena; practice-oriented R and D to produce knowledge and products directly useful in practice; and programmatic R and D to solve important national problems in a comparatively short period of time. Included in the descriptions of the methods are (1) the procedures used for program management; (2) the organization of R and D activities within the various federal agencies; and (3) the staffing plans used to support R and D management. Author

**N74-22616#** Eurosat S.A., Geneva (Switzerland).
**MANAGEMENT OF THE SPACE SEGMENT OF APPLICATION SATELLITE SYSTEMS**
Sep. 1973 32 p
Avail: NTIS HC $4.75

The various fields of space applications in which Europe has shown an interest are briefly outlined. A methodical presentation of the various functions which are implied in the development and deployment of a satellite system destined to become operational, is made. These include technical-operational control of satellites, initiation of production and acceptance of replacement satellites, launching and orbit positioning of replacement satellites, and adaptation of existing ground facilities to the evolution of user's requirements. The role and preparation of Eurosat is also discussed. ESRO

**N74-22618#** Office of Naval Research, London (England).
**RESEARCH AND DEVELOPMENT AT THE ROYAL AIRCRAFT ESTABLISHMENT (RAE) AT FARNSBOROUGH AND BEDFORD, ENGLAND (RAE OPEN DAYS, 6-9 JUNE 1973)**
Alfred E. Victor 15 Oct. 1973 14 p refs
(AD-774375; ONRL-R-27-73) Avail: NTIS CSCL 05/2

The Royal Aircraft Establishment has a public exhibition about every four years to display the research and development done there. A brief description of a number of the current projects that are being worked on is given to acquaint the United States research and development community with the RAE's main fields of interest, which possibly may stimulate bilateral dialogue leading to future cooperative efforts. Research is reported in the following areas: aeronautics, avionics, computing and data handling, electronic techniques and instrumentation, human factors in aircraft operation, materials, and weapons systems. GRA

**N74-22621#** Army Engineer Waterways Experiment Station, Vicksburg, Miss.
**APPLICATION OF REMOTE SENSORS TO ARMY FACILITY MANAGEMENT Final Report**
Lewis E. Link, Jr. and John H. Shamburger Feb. 1974 172 p refs
(DA Proj. 4A6-62707-A-890)
(AD-775407; AEWES-TR-M-74-2) Avail: NTIS CSCL 15/5

A study was conducted to determine the feasibility of applying remote sensing techniques to Army needs for data in environmental monitoring, resource management, and master planning at multipurpose military installations in the continental United States. The environmental data requirements for these purposes were defined, and a general assessment was made of the applicability of current photographic, thermal infrared, and microwave imaging systems to obtain these data. Aerial photographic techniques were found to be the ones most generally applicable to acquisition of data relevant to basic environmental conditions. Prototype products, consisting of maps of basic environmental conditions, cultural features, and land use were produced from aerial photography of Fort Belvoir, Virginia, and a surrounding area. (Modified author abstract) GRA

**N74-22622#** Air Force Academy, Colo.
**PROJECT POL (PETROLEUM, OIL, AND LUBRICANTS): OPTIMIZING PROCUREMENT OF AVIATION FUELS OR DEFENSE SUPPLY AGENCY Final Report**
Larry M. Austin and William W. Hogan Jan. 1974 93 p refs
(AD-775053; USAFA-TR-74-2) Avail: NTIS CSCL 15/5

Defense Department requirements for aviation fuels are met with purchases made in the usual competitive bidding environment. This large-scale contract bidding and selection problem is modeled as a mixed integer linear program with a special structure. The solution of this large optimization problem is approached via an algorithm employing decomposition and implicit enumeration techniques which exploit the special structure of the underlying formulation. Computational results are discussed, and a FORTRAN computer program which implements the basic algorithm (POLKA) is exhibited. Author (GRA)

**N74-22632#** Comptroller General of the United States, Washington, D.C.
**PROBLEMS IN MANAGING THE DEVELOPMENT OF AIRCRAFT ENGINES, DEPARTMENT OF DEFENSE**
[1973] 37 p refs
(B-179166) Avail: NTIS MF $1.45; US General Accounting Office, Room 4522, 441 G Street, N. W., Washington, D. C. 20548 HC $1.00

A study was made of the contractural and procurement procedures followed by the Department of Defense in obtaining aircraft engines. The management of the development and modification activities is analyzed. Deficiencies in the present system are reported and recomendations are made for an improved procedure. Author

**N74-22790#** Human Resources Research Organization, Alexandria, Va.
**UH-1 HELICOPTER MECHANIC (MOS 67N20) JOB DESCRIPTION SURVEY BACKGROUND, TRAINING, AND GENERAL MAINTENANCE ACTIVITIES**
Russel E. Schulz, Barbara K. Fitzgerald, and Wallace W. Prophet Dec. 1973 203 p refs
(Contract DAHC19-73-C-0004; DA Proj. 2Q0-62107-A-745)
(AD-775390; HumRRO-TR-73-33) Avail: NTIS CSCL 05/9

The report describes the planning, conduct, analysis, and results of a worldwide survey of the maintenance activities of over 5,000 UH-1 helicopter mechanics, MOS 67N20. It describes methods and techniques used in developing the survey questionnaire and a job description inventory covering more than 1,400 helicopter maintenance tasks, administration of the survey by mail and by research teams in the field, and extraction and analysis of survey results. The report provides a broad profile of UH-1 maintenance personnel, their training and background, and a description of the UH-1 mechanic's general job activities. Data concerning performance of the 1,400+ maintenance tasks are presented in a companion report. Author (GRA)

**N74-22834#** Ecole Nationale d'Ingenieurs de Constructions Aeronautiques, Toulouse (France). Div. Electronique 2.
**PORTABLE TERMINAL FOR DATA ACQUISITION USING A CASSETTE RECORDER [TERMINAL PORTABLE DE SAISIE DE DONNEES UTILISANT UN ENREGISTREUR A CASSETTE]**
Jean Feton, Michel Naveaux, and Yves Sagot 1973 89 p In FRENCH
Avail: NTIS HC $7.50

The implementation of a portable terminal for management system data acquisition using an audio cassette recorder and audio coupler for computer dial up is presented. Various subsystems are detailed with regard to keyboard, visualization, cassette motor, acoustic coupler, buffer memory, modem, bit synchronization, and power supplies. Various problems are dicsussed with regard to the reception circuit of the audio coupler, the synchronization of the series-parallel conversion, the rotation variation of the cassette motor, and the address counter optimization. An economic analysis is dealt with and estimates of the overall costs are given. ESRO

**N74-22949*#** California State Office of Science and Technology, Sacramento.
**USE OF ERTS-A, SKYLAB, AND SUPPORTING AIRCRAFT TO ENHANCE RESOURCE MANAGEMENT Final Report**
A. Earl Davis, David H. Adams, Barry Brown, Edward D. Ehlers, Gilbert W. Fraga, W. Ward Henderson, John W. Heslep, Gordon F. Snow, and Paul L. Clifton, Principal Investigators 30 Nov. 1973 17 p ERTS
(Contract NAS5-21832)
(E74-10498; NASA-CR-136903) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-23016** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
**SPECIAL TEST AND HARDWARE EQUIPMENT AT THE DFVLR MOBILE RAKETENBASIS**
D. Joneleit *In* ESRO European Sounding-Rocket and Related Res. at High Latitudes Nov. 1973 p 291-293

The attitude control systems test laboratory is described. Emphasis is placed on the mobility of equipment needed to check out and test such systems. Current activities in recovery systems and engineering of special payload subsystems are also briefly discussed. ESRO

N74-23072# United Nations Development Program.
**CARBONIZATION AND HYDROGENATION OF COAL**
1973 146 p refs
(ID/86) Avail: NTIS MF $1.45; United Nations, Sales Section, New York or Geneva HC $3.00, Sales No.: E.72.II.B.26

Coal treatment processes are described in relation to their economic and utilitarian viability in developing countries. Carbonization, hydrogenation, and the Fischer-Tropsch gasification processes for making oils, chemicals, and gas from coal are described along with plant layouts. The processes are compared on the basis of product properties and uses, and the internal and external economic factors associated with production. Capital investment manpower, coal reserves, and market considerations are discussed, and the developing countries for which coal treatment industries might be suited are listed.
A.A.D.

N74-23180 Joint Publications Research Service, Arlington, Va.
**AT THE MAIN ADMINISTRATION OF THE HYDROMETEOROLOGICAL SERVICE**
V. Zakharov *In its* Meteorol. and Hydrol., No. 2, 1974 (JPRS-61869) 30 Apr. 1974 p 158-159 refs Transl. into ENGLISH from Meteorol. i Gidrolog. (Moscow), no. 2 1974 p 118

The plan of scientific research and experimental design projects of the Hydrometeorological Service for 1974 is briefly reviewed.
Author

N74-23397*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APOLLO EXPERIENCE REPORT: FLIGHT-CONTROL DATA NEEDS, TERMINAL DISPLAY DEVICES, AND GROUND SYSTEM CONFIGURATION REQUIREMENTS**
Richard A. Hoover Washington May 1974 13 p
(NASA-TN-D-7685; JSC-S-396) Avail: NTIS HC $3.00 CSCL 22D

The development of flight-control facilities for the Apollo program is reviewed from the viewpoint of the user organization. These facilities are treated in three categories: data systems, ground-based display and control systems, and configuration management. The effects of certain Apollo program factors on the selection, sizing, and configuration management of these systems are discussed. Recommendations are made regarding improvement of the systems and the reduction of system sensitivity to the program factors.
Author

N74-23480*# Louisiana State Univ., New Orleans. Div. of Business and Economic Research.
**APPLICATIONS OF SATURN/APOLLO AUTOMATED DATA SYSTEM CAPABILITIES TO PROBLEMS AND ENVIRONMENTAL IMPACTS OF URBAN TRANSPORTATION Final Report, 6 Oct. - 30 Nov. 1973**
Gordon A. Saussy 4 Feb. 1974 7 p
(Contract NAS8-28955)
(NASA-CR-120216) Avail: NTIS HC $4.00 CSCL 13F

The work plan to achieve the objectives of this project is presented. Tasks discussed include ground truth, remotely sensed data, and the correlation of ground truth and the remotely sensed data.
F.O.S.

N74-23487# Committee on Government Operations (U. S. Senate).
**STAFF STUDY OF THE OVERSIGHT AND EFFICIENCY OF EXECUTIVE AGENCIES WITH RESPECT TO THE PETROLEUM INDUSTRY, ESPECIALLY AS IT RELATES TO RECENT FUEL SHORTAGES**
Washington GPO 8 Nov. 1973 115 p refs Prepared for the Permanent Subcomm. on Investigations, 93d Congr., 1st Sess., 8 Nov. 1973
(GPO-23-764) Avail: SOD $1.00

Policies of the Federal government are discussed as they relate to managing the oil import program, providing adequate supplies of crude oil for processing by refineries, overseeing operations and domestic refineries needed to meet demand, and maintaining a climate for the necessary expansion of domestic refinery capacity required to meet demand for gasoline and distillate fuel oil. A compilation of relevant facts accumulated from various sources is presented to serve as background for public hearings on oversight of the executive branch with respect to the petroleum industry, especially as it relates to recent fuel shortages.
Author

N74-23494# Advisory Group for Aerospace Research and Development, Paris (France).
**THE 1971 AGARD ANNUAL MEETING**
Dec. 1971 78 p Meeting held at Nord-Torpa, Norway, 8 Sep. 1971
Avail: NTIS HC $7.00

The conference held in Nord-Torpa, Norway, 8 September 1971 is reported. The theme of the First Plenary Session was Norwegian Industrial and Defense Research Development, and the theme of the second session was Status and Trends in International Aerospace Cooperation. The presentation of each speaker is included.
Author

N74-23495# Advisory Group for Aerospace Research and Development, Paris (France).
**INTERNATIONAL CONFERENCE MANAGEMENT**
George Zinnemann Jan. 1972 18 p Revised
Avail: NTIS HC $4.00

Some guidelines are presented for individuals involved in managing and participating in international conferences. The material is divided into four sections, each of particular significance to the project officer, the host organization, the meeting chairman, and the speakers, respectively.
D.L.G.

N74-23496# Advisory Group for Aerospace Research and Development, Paris (France).
**DIRECTOR'S ANNUAL REPORT TO THE NORTH ATLANTIC MILITARY COMMITTEE, 1971**
Mar. 1972 82 p
Avail: NTIS HC $7.25

The report has been prepared in the context of the total AGARD 1971 Technical Program which is carried out by the AGARD Panels, the Consultant and Exchange Program, and the Military Committee Studies Program. The achievements are reported in terms of: (1) the meeting which were held to bring together the leading personalities of the NATO nations in a particular field of science and technology for the common benefit of the NATO community; (2) the AGARD Series publication which were distributed and/or initiated as a result of these meetings for the purpose of assisting member nations in the effective use of their research and development capabilities; (3) the personnel that planned for and participated in the total program, and (4) the budget that supported this stimulus to the advances in the aerospace sciences relevant to strengthening the common defense posture. The Appendix contains the detailed program of the individual activities.
Author

N74-23497# Advisory Group for Aerospace Research and Development, Paris (France).
**AGARD HANDBOOK (INCLUDING AGARD BY-LAWS)**
Sep. 1972 31 p Revised
Avail: NTIS HC $4.75

A handbook which presents an overview of the AGARD organizational structure is presented. Topics include historical background, military studies program, panels and publications. The bylaws of AGARD are presented for reference purposes.
S.K.W.

**N74-23507#** Committee on Science and Astronautics (U. S. House).
**NASA AUTHORIZATION, 1975, PART 1**
Washington GPO 1974 308 p Hearings on H.R. 12689 (superseded by H.R. 13998) before Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 25, 21 Mar. 1974 4 Vol.
(GPO-31-372) Avail: Comm. on Sci. and Astronaut.

Hearings on NASA appropriations for fiscal year 1975 are presented with an economic analysis of budget procedures. Research programs and management policies are outlined. Topics discussed include technology utilization, EEO programs, facility design, and satellite solar power systems. Procurement analysis for 1973 is also included. S.K.W.

**N74-23508#** Committee on Science and Astronautics (U. S. House).
**NASA AUTHORIZATION, 1975, PART 4**
Washington GPO 1974 730 p Hearings on H.R. 12689 (Superseded by H.R. 13998) before Comm. on Sci. and Astronaut., 93d Congr. 2d Sess., No. 25, 5-7, 12-14 and 20 Mar. 1974 4 Vol.
(GPO-31-022) Avail: Subcomm. on Aeron. and Space Technol.

For abstract, see N74-23507.

**N74-23526#** Texas Univ., Austin. Lyndon B. Johnson School of Public Affairs.
**PROCEEDINGS OF THE URBAN TECHNOLOGY SEMINAR Final Report**
1973 144 p refs Seminar held at Austin, Tex., 30 Apr. - 3 May 1972
(Grant NSF GT-33702)
(PB-226064/4; LC-73-620193) Avail: NTIS HC $9.25 CSCL 13B

The document contains the formal presentations given during the Urban Technology Seminar held on the campus of the University of Texas at Austin, April 30 to May 3, 1972. The conference was planned and conducted by the Office of Conferences and Training of the Lyndon B. Johnson's School of Public Affairs as one of a series of conferences, seminars and training programs to serve the continuing education needs of government and to promote an exchange of views and ideas among participating government officials, academicians, and other participants from both the public and private sectors of American life. GRA

**N74-25605#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS). CH-47A ROTARY WING BLADE Interim Report, Jan. 1964 - Jul. 1973**
Mar. 1974 23 p
(AD-776419; USAAVSCOM-TR-74-15) Avail: NTIS CSCL 01/3

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. GRA

**N74-25606#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS). CH-47A SYNCHRONIZER SHAFT ASSEMBLY Interim Report, Jan. 1964 - Jul. 1973**
Mar. 1974 22 p refs
(AD-776418; USAAVSCOM-TR-74-14) Avail: NTIS CSCL 01/3

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-25620#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**SOLAR HEATING AND COOLING**
Washington GPO 1974 277 p refs Hearing on S. 2658 and H.R. 11864 before Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 25 Feb. 1974
(GPO-29-939) Avail: Comm. on Aeron. and Space Sci.

A Congressional hearing was conducted to investigate the use of solar energy to help alleviate the energy shortage. The bill under consideration would direct NASA in cooperation with other Federal agencies, to develop a commercial demonstration of the technology of solar heating and for the technology of combined solar heating and cooling. Testimony is provided by several scientists and technologists concerning the methods of using solar energy. Examples of solar energy conversion systems are provided. A cost analysis of the project was made. P.N.F.

**N74-25712#** Logistics Management Inst., Washington, D.C.
**REVIEW OF THE MANAGEMENT STRUCTURE AND ACQUISITION PLAN OF THE SANGUINE SYSTEM**
Mar. 1974 27 p refs
(Contract SD-321)
(AD-776257; LMI-7411) Avail: NTIS CSCL 17/2

The report reviews recommendations made in an earlier study (LMI Task 69-18) to determine if any changes to those recommendations were advisable or necessary in light of changes in the SANGUINE System and DoD policies since that earlier report was issued. The report concludes that the earlier recommendations should be changed by virtue of funding constraints which have recently been placed on SANGUINE as well as the development of SANGUINE as a project within the Special Communications (SPECOM) Project Office of the Naval Electronic (NAVELEX) Systems Command since the earlier report was issued. The major recommendations which are made relate to the retention by the Navy of the option to break out the facilities portion of SANGUINE for competitive solicitation and award during the production phase and the location of the SANGUINE Project Office within the SPECOM organization of NAVELEX. Author (GRA)

**N74-25840*#** Environmental Research Inst. of Michigan, Ann Arbor.
**RECENT ADVANCEMENTS IN INFORMATION EXTRACTION METHODOLOGY AND HARDWARE FOR EARTH RESOURCES SURVEY SYSTEMS**
F. J. Thomson, Principal Investigator and J. D. Erickson [1974] 8 p refs ERTS
(Contracts NAS5-21783; NAS1-11979; NAS9-9784; Grant NGR-23-005-552; Contract DAAK02-73-C-0438)
(E74-10515; NASA-CR-138265; ERIM-193300-46-S) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

**N74-25844*#** Tri-State Regional Planning Commission, New York.

**INVESTIGATION OF SKYLAB IMAGERY FOR REGIONAL PLANNING Quarterly Progress Report, 22 Aug. - 31 Dec. 1973**
William Harting, Principal Investigator 31 Dec. 1973 1 p EREP
(Contract NAS9-13266)
(E74-10522; NASA-CR-138271; QPR-2) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-26152#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**G-200 BEARING: AN ANALYSIS CONCERNING THE RELIABILITY OF AN INEXPENSIVE PART AND ITS EFFECT ON DEPOT LEVEL REPAIR COATS M.S. Thesis**
John W. Burt and Robert T. Benbow Jan. 1974 109 p refs
(AD-775691; SLSR-13-74A) Avail: NTIS CSCL 17/7

Little management attention has been paid to inexpensive parts critical to the operation of defense weapons systems that incur large maintenance costs. This Costly Replacement of Inexpensive Parts (CRIP) concept was analyzed in one instance; the G-200 gyroscope bearin - of the LN-12 platform. The CRIP concept was supported in the case of the G-200 bearings. These precision instrument bearings did in fact represent an inexpensive part ($38 each) that was critical to the effectiveness of an aircraft's inertial guidance system and generated high replacement costs when failures occurred. GRA

**N74-26239#** Bonner and Moore Associates, Inc., Houston, Tex.
**PROJECTED AVAILABILITY OF MOTOR GASOLINE AND DISTILLATE FUELS, 1975 - 1985 Final Report**
15 Jan. 1974 108 p
(Contract DAAD05-73-C-0558; DA Proj. 1T6-62611-A-106)
(AD-775859; RGH-042) Avail: NTIS CSCL 21/4

The project involved the preparation of forecasts for raw materials availability and product demands for the U.S. refining industry through 1985 and the construction of a mathematical model of the industry. The major objective was to conduct an economic projection of the availability and compositional trends for automotive gasolines and distillate fuels during the next decade. Four major product demand forecasts (scenarios) were prepared and used to examine the industry. Additionally, the availabilities of jet and diesel fuels were examined in 1985 under two alternate premises. Author (GRA)

**N74-26243#** Naval Civil Engineering Lab., Port Hueneme, Calif.
**SUBSTITUTION OF JP-5 AVIATION FUEL FOR DF-2 DIESEL UNDER FIELD CONDITIONS**
John S. Williams Feb. 1974 10 p refs
(AD-777047; NCEL-TN-1333) Avail: NTIS CSCL 21/4

The report covers the work done to determine whether JP-5 aviation turbine fuel is a suitable substitute for DF-2 diesel fuel in the heavy equipment of the Naval Construction Force wodn such equipment is deployed on a large construction project. (Modified author abstract) GRA

**N74-26338*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB AIRLOCK MODULE, VOLUME 2 Final Report**
Apr. 1974 652 p refs
(NASA-TM-X-64810-Vol-2) Avail: NTIS HC $11.00 CSCL 22B

System design and performance of the Skylab Airlock Module and Payload Shroud are presented for the communication and caution and warning systems. Crew station and storage, crew trainers, experiment: ground support equipment, and system support activities are also reviewed. Other areas documented include the reliability and safety programs, test philosophy, engineering project management, and mission operations support. K.M.M.

**N74-26410#** Committee on Government Operations (U. S. House).
**ECONOMY AND EFFICIENCY OF INTERNATIONAL AIR TRAVEL BY GOVERNMENT OFFICIALS**
Washington GPO 1973 72 p Hearings before Comm. on Govt. Operations, 93d Congr., 1st Sess., 23 May 1973
(GPO-21-118) Avail: Subcomm. on Govt. Inform.

A Congressional hearing was conducted to hear testimony that the Government has been subjected to unjust discrimination in rates charged its nondefense passengers for international air transportation. Action to resolve the problem was reported which involves the cooperation of the U.S. air transportation industry, the various civil agencies of Government, and the CAB. The plan is described whereby chartered aircraft will be utilized in a system of reimbursement plus profit for the services provided. A.A.D.

**N74-26413*#** General Dynamics/Convair, San Diego, Calif.
**AIRLINE RETURN-ON-INVESTMENT MODEL FOR TECHNOLOGY EVALUATION Final Report**
May 1974 87 p
(Contract NAS1-11343)
(NASA-CR-132382) Avail: NTIS HC $7.50 CSCL 05C

This report presents the derivation, description, and operating instructions for a computer program (TEKVAL) which measures the economic value of advanced technology features applied to long range commercial passenger aircraft. The program consists of three modules; and airplane sizing routine, a direct operating cost routine, and an airline return-on-investment routine. These modules are linked such that they may be operated sequentially or individually, with one routine generating the input for the next or with the option of externally specifying the input for either of the economic routines. A very simple airplane sizing technique was previously developed, based on the Brequet range equation. For this program, that sizing technique has been greatly expanded and combined with the formerly separate DOC and ROI programs to produce TEKVAL. Author

**N74-26416#** National Science Foundation, Washington, D.C.
**NATIONAL PATTERNS OF R AND D RESOURCES: 2 FUNDS AND MANPOWER IN THE UNITED STATES, 1953 - 1974**
Feb. 1974 35 p refs
(NSF-74-304) Avail: SOD HC $1.00

The data contained in this report are based primarily on a series of periodic National Science Foundation surveys on research and development resources in the United States. This study shows the pattern of allocation of R and D funds and manpower among the four sectors of the economy - Federal Government, industry, universities and colleges, and other nonprofit institutions. The R and D funds series presented provide the data not only for total research and development but also for basic research, applied research, and development, and cover the period from 1953-74. Time series data on R and D scientific and engineering manpower employed by each sector begin with 1954. Author

**N74-26420#** Naval Postgraduate School, Monterey, Calif.
**NEEDS AND CHALLENGES IN EDUCATION FOR AIRCRAFT DESIGN**
Ulrich Haupt Nov. 1973 150 p refs
(AD-775938; NPS-57HP73121A) Avail: NTIS CSCL 05/9

A brief review of recent developments in engineering education leads to basic reflections about the importance of design education. Aircraft design is singled out as a field where demands on design are particularly high and urgent. Basic needs are determined.

Additional challenges posed by engineering technology, continuing studies, liberal-technical education, and new concepts of professionalism are discussed. An overall perspective is developed which foresees a dynamic evolutionary process and indicates that much initiative should originate on the faculty level while guidance should be provided on a policy-making level.
Author (GRA)

**N74-26421#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**ORGANIZATION AND PLANNING OF PRODUCTION AT AIRCRAFT ENGINE-BUILDING PLANTS**
V. I. Tikhomirov and F. I. Paramonov 14 Jan. 1974 642 p refs Transl. into ENGLISH of the book "Organizatsiya i Planirovanie Proizvodstva na Aviadvigatele-Stroitelnykh Zavodakh" Moscow, Machine Building Publishing House, 1972 p 1-448
(FTD Proj. T74-01-67)
(AD-775780; FTD-MT-24-499-73) Avail: NTIS CSCL 21/5

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

**N74-26487#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**AN ANALYTICAL APPROACH TO OPTIMIZING AIRFRAME PRODUCTION COSTS AS A FUNCTION OF PRODUCTION RATE M.S. Thesis**
Peter F. Fazio and Stephen H. Russell Jan. 1974 177 p refs
(AD-775698; SLSR-30-74A) Avail: NTIS CSCL 01/3

The objective of the research is to analyze all elements of airframe production cost in terms of their sensitivity to production rate and to identify a methodology which will optimize the rate of production with respect to total airframe costs for a fixed procurement quantity. GRA

**N74-26489#** LTV Aerospace Corp., Dallas, Tex. Vought Systems Div.
**LIMIT CRITERIA FOR LOW COST AIRFRAME CONCEPTS Final Report, May - Nov. 1973**
S. H. Yarbrough Oct. 1973 109 p refs
(Contract F33615-73-C-3126; AF Proj. 1368)
(AD-777572; Rept-2-57110/3R-3126; AFFDL-TR-73-140)
Avail: NTIS CSCL 01/3

The report presents the results of a study program which evaluated the primary cost factors of selected airframe baseline components and alternate designs compatible with low cost concepts. The data from this study is compiled and presented in a ready reference format defined as the Limit Criteria. Six A-7D aircraft components representing the characteristic stress types were selected as the baseline designs, then a minimum of two or more alternate designs were selected for each component. The baseline and alternates were analyzed and estimated on the basis of strength, stiffness, fracture toughness, weight and cost. Weight and cost of the design variations was plotted on a Cost/Weight/Value Diagram of each component for direct comparison of current design results. (Modified author abstract) GRA

**N74-26526*#** Southwest Research Inst., San Antonio, Tex.
**SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Final Report, 25 Aug. 1972 - 15 Nov. 1973**
David F. Culclasure, John L. Sigmon, and Jean M. Carter 5 Nov. 1973 297 p refs
(Contract NASw-1867; SwRI Proj. 13-2538)
(NASA-CR-138502) Avail: NTIS HC $17.00 CSCL 06C

The activities are reported of the NASA Biomedical Applications Team at Southwest Research Institute between 25 August, 1972 and 15 November, 1973. The program background and methodology are discussed along with the technology applications, and biomedical community impacts. F.O.S.

**N74-26687#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
**A COMPUTER SIMULATION OF A BASE TELECOMMUNICATION CENTER M.S. Thesis**
William E. Glaesemann and Robert J. Robinson Jan. 1974 249 p refs
(AD-776783; SLSR-8-74A) Avail: NTIS CSCL 17/2

The purpose of the study was to examine the use of computer simulation as an analytical aid in the management of a Base Telecommunications Center. The report discusses the communications system in general and the Base Telecommunications Center in specifics. The management areas in which a computer simulation might be helpful are discussed. The nature of the populations of the variables and the problems used to define the boundaries of the system being modeled are presented and examined. The message processing times are used as a significant measure of performance in a Telecommunication Center. The simulation output is compared to the output of the WPAFB Base Telecommunications Center and the differences are discussed. The simulation output is examined to determine its usefulness in determining the effect of different types of equipment, shift schedules, and system changes. The possibility of using a simulation to determine minimum requirements in terms of personnel and equipment was examined. (Modified author abstract) GRA

**N74-26817*** Naval Fleet Missile Systems, Corona, Calif. Analysis and Evaluation Group.
**GOVERNMENT-INDUSTRY DATA EXCHANGE PROGRAM (GIDEP)**
Edwin T. Richards *In* NBS The Role of Cavitation in Mech. Failures Apr. 1974 p 166-170

CSCL 05B

The Government-Industry Data Exchange Program (GIDEP) was originated in 1959 by the Army, Navy, and Air Force Ballistic Missile Agencies. Known at that time as IDEP--Interservice Data Exchange Program--its intent was to eliminate duplicate testing of parts and components by disseminating pertinent test data among Department of Defense contractors and various government agencies. In 1966 both the National Aeronautics and Space Administration and the Canadian Military Electronics Standards Agency (CAMESA) recognized the value of the data provided by the program and became participants. Today, GIDEP provides the interchange of specialized technical data to all the military services, participating government contractors and numerous government agencies such as the Atomic Energy Commission, Federal Aviation Administration, Defense Supply Agency, and the Small Business Administration. Author

**N74-26881** Joint Publications Research Service, Arlington, Va.
**THE 125TH ANNIVERSARY OF THE MAIN GEOPHYSICAL OBSERVATORY IM. A. I. VOYEYKOV**
Ye. P. Borisenkov *In its* Meteorol. and Hydrol., No. 3, 1974 (JPRS-62052) 22 May 1974 p 1-7 Transl. into ENGLISH

from Meteorol. Gidrol. (Moscow), no. 3 1974 p 3-8

The history of the development of the Main Geophysical Observatory in the Soviet Union is discussed. The organization of meteorological and magnetic observations prior to and following the establishment of the laboratory are identified. The actions of the Soviet Government in approving and financing the laboratory are explained. Important fields of research presently conducted by the laboratory are reported. Author

**N74-26914#** Environmental Protection Agency, Washington, D.C.
**STRATEGIC ENVIRONMENTAL ASSESSMENT SYSTEM (SEAS): A RESEARCH PROJECT**
Stanley M. Greenfield May 1973 72 p Presented at the Natl. Conf. on Managing the Environ., Washington, D. C., 14-15 May 1973
Avail: NTIS HC $6.75

The concept of long range, comprehensive environmental planning is presented in a report of SEAS current activities and goals. The need for strategic assessment and what it involves in terms of man-machine capabilities is described. The SEAS development program is outlined, and project objectives, system components, and policy making applications are discussed.
A.A.D.

**N74-26982#** National Bureau of Standards, Washington, D.C.
**REPORT OF THE 58th NATIONAL CONFERENCE ON WEIGHTS AND MEASURES, 1973**
Sandra J. Wilson, ed. and Richard N. Smith, ed. May 1974 210 p Conf. held at Minneapolis, 22-27 Jul. 1973
(NBS-SP-391; LC-26-27766) Avail: SOD HC $2.50 as C13.10:391

The test of addresses presented to the conference attended by state, county, and city weights and measures officials, the Federal Government, and business, industry, and consumer organizations are reported. Topics included: (1) universal product code in the grocery industry; (2) digital designs in weighing systems; (3) gasoline measurement and marketing; (4) postal weighing; (5) management assistance for weights and measures progress; and (6) new approaches in weights and measures operations especially in consumer affairs. The reports of standing committees are also included. A.A.D.

**N74-26983#** Committee on Science and Astronautics (U. S. House).
**METRIC CONVERSION ACT OF 1973**
Teague Washington GPO 23 Oct. 1973 22 p ref Report to accompany H.R. 11035 presented by the Comm. on Sci. and Astronaut. to the Comm. of the Whole House on the State of the Union, 93d Congr., 1st Sess., 23 Oct. 1973
(H-Rept-93-604; GPO-99-081) Avail: US Capitol, House Document Room

Congressional action was taken to declare a national policy of converting to the metric system in the United States and to establish a National Conversion Board to coordinate the voluntary conversion to the metric system over a period of ten years. The composition and functions of the National Metric Conversion Board are explained. The legislative history of the bill is discussed. The rationale for enacting the bill is analyzed. A cost analysis of the conversion plan over a period of five years is developed.
Author

**N74-27300#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), AH-1G GAS TURBINE ENGINE (T53-L-13B) Interim Report, 1 Jan. 1964 - 1 Jul. 1973**
Apr. 1974 22 p
(AD-776939; USAAVSCOM-TR-74-20) Avail: NTIS CSCL 21/5

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. GRA

**N74-27335*#** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
**AN ALGORITHM FOR A GENERAL CLASS OF ROUTING PROBLEMS DERIVED FROM HUYGENS' PRINCIPLE**
Lee M. Avis and George R. Young Washington Jun. 1974 19 p refs
(NASA-TN-D-7580; L-9342) Avail: NTIS HC $3.00 CSCL 09B

If a set of N points or nodes with a nonnegative cost associated with each ordered pair is known, it is desired to find a path from one given node to another given node which minimizes the cost sum. An algorithm is presented which yields a global minimum solution after at most N - 1 iterations or on a typical large third-generation computer, after 1 hour of computation time for a 10,000-node problem. The rapid-access data storage capacity demanded by the algorithm is approximately 3N words for costs read in from slow-access storage or 2N words for calculable costs. The time-storage requirements of the algorithm known to the authors. When the problem is viewed as a discretized optimal control problem, after N-1 iterations, an optimal control or node transition is established for each of the N nodes or states; thus, the algorithm can be applied to situations were there may be errors in the control that necessitate a closed loop control that necessitate a closed loop control philosophy.
Author

**N74-27353#** Hermann Oberth-Gesellschaft, Gesellschaft zur Foerderung der Erforschung und Erschliessung des Weltraums e. V., Hannover (West Germany).
**INDUSTRIAL EVOLUTION AND REVOLUTION IN THE CISLUNAR SPACE, 1980 - 2010 [INDUSTRIELLE EVOLUTION UND REVOLUTION IM GEOLUNAREN RAUM 1980-2010]**
Krafft A. Ehricke (North American Rockwell, Downey, Calif.) 1973 52 p refs In GERMAN Presented at the 21st Aeronautics Meeting of the Hermann-Oberth Ges., Garmisch-Partenkirchen, West Ger., Sep. 1972
(Astronaut-FB-32; SD-72-SA-0173) Avail: NTIS HC $5.75

The industrial evolution and revolution in geolunar space after 1900 is discussed. Topics include industrial ecology of the open world, growth by extraterrestrial industrialization, and space industry. Energy supply from space, notably electricity generation in space, energy supply by solar rays (the Soletta concept), electricity generation on earth, and worldwide distribution through relay stations in space, is dealt with. ESRO

**N74-27382*#** Hughes Aircraft Co., El Segundo, Calif.
**SYSTEM DESIGN OF THE PIONEER VENUS SPACECRAFT. VOLUME 12: INTERNATIONAL COOPERATION Final Report**
R. S. Kelly Jul. 1973 16 p refs 15 Vol.
(Contract NAS2-7250)
(NASA-CR-137499) Avail: NTIS HC $4.00 CSCL 22B

A spectrum of plans has been prepared to illustrate the range of practical sharing possibilities available so as to assist Ames Research Center (ARC) and European Space Research Organization (ESRO) in selection of a program meeting mutual

goals. Five plans are described showing increased participation by ESRO WITH ascending plan number. Each of these has sharing properties fulfilling particular requirements such as available ESRO budget level, extent of ESRO program responsobility, matching particular ESRO capability, and cost saving to ARC through sharing. All plans apply to orbiter sharing only. A sharing plan based on the model Plan 4 may offer the most attractive division of Pioneer Venus between ARC and ESRO. This plan allows ESRO to bear primary responsibility for the orbiter and to avoid an extensive financial burden. Savings to ARC are commensurate with ARC loss of program control. Duplication of effort is avoided by using orbiter subsystems that are common to the probe bus and orbiter. Author

N74-27384*# Hughes Aircraft Co., El Segundo, Calif.
**SYSTEM DESIGN OF THE PIONEER VENUS SPACECRAFT. VOLUME 14: TEST PLANNING TRADES Final Report**
C. D. Pedretti et al Jul. 1973 40 p refs 15 Vol.
(Contract NAS2-7250)
(NASA-CR-137501) Avail: NTIS HC $5.00 CSCL 22B

Pioneer Venus system test plans and trade studies which were first published as Study Tasks (References 1 through 5) are reviewed. The plan and trade studies are presented in a condensed form. Greater detail may be found in the referenced study tasks if desired. All significant conclusions and plan outlines of the original studies are, presented. Author

N74-27439# Joint Committee on Defense Production (U. S. Congress).
**TWENTY-THIRD ANNUAL REPORT OF THE ACTIVITIES OF THE JOINT COMMITTEE ON DEFENSE PRODUCTION, CONGRESS OF THE UNITED STATES, WITH MATERIAL ON MOBILIZATION FROM DEPARTMENTS AND AGENCIES, PART 1**
John Sparkman Washington GPO 1974 599 p refs Presented to the 93d Congr., 2d Sess., 5 Feb. 1974
(S-Rept-93-683-Pt-1) avail: US Capitol, Senate Document Room

The progress achieved in the execution and administration of the programs authorized under the Defense Production Act are reviewed. The joint Committee report includes information on energy contained in stockpile of materials, energy resources, U.S. dependence on foreign sources for metals and materials, reduction of stockpile objectives and proposed sale of materials, total Government inventories, future cash requirements, and upgrading of strategic and critical materials. Mobilization activities reports by the Office of Emergency Preparedness and 35 Federal departments and agencies are also presented. A.A.D.

N74-27440# Joint Committee on Defense Production (U. S. Congress).
**TWENTY-THIRD ANNUAL REPORT OF THE ACTIVITIES OF THE JOINT COMMITTEE ON DEFENSE PRODUCTION, CONGRESS OF THE UNITED STATES, WITH MATERIAL ON MOBILIZATION FROM DEPARTMENTS AND AGENCIES, PART 2**
John Sparkman Washington GPO 1974 630 p refs Presented to the 93d Congr., 2d Sess., 5 Feb. 1974
(S-93-683-Pt-2) Avail: US Capitol, Senate Document Room

N74-27441# Committee on Appropriations (U. S. House).
**DEPARTMENT OF DEFENSE APPROPRIATIONS FOR 1974. PART 5: OPERATION AND MAINTENANCE (EXCEPT RESERVE FORCES AND DEFENSE AGENCIES)**
Washington GPO 1973 1825 p refs Hearings before Comm. on Appropriations, 93d Congr., 1st Sess., Jul. - Aug. 1973
(GPO-22-550) Avail: Subcomm. on Dept. of Defense

A Congressional hearing was held to present testimony on an increased FY 1974 budget request for DOD operations and maintenance activities. Major overall program increases are reported and key statistics for the following general areas are presented: (1) activity indicators; (2) financial obligations and outlays; (3) civilian personnel; (4) travel expenses; (5) Headquarters operation and administration; (6) aircraft inventories and utilization; (7) aircraft overhaul; (8) real property management; (9) telecommunication; and (10) dependents overseas education. Additional specific programs and requirements are presented for the Air Force, Army, Marine Corps, and Navy concerning such operations as logistic support, automatic data processing, medical programs, all-volunteer considerations, base operations, etc. Revolving and management funds are also discussed. A.A.D.

N74-27442# Committee on Government Operations (U. S. House).
**ENERGY REORGANIZATION ACT OF 1973**
Washington GPO 1973 427 p Hearings on H.R. 11510 before Comm. on Govt. Operations, 93d Congr., 1st Sess., 27-29 Nov. 1973
(GPO-25-108) Avail: Subcomm. on Legislation and Military Operations

Congressional hearings were conducted to reorganize and consolidate certain functions of the Federal Government in a new energy research and development administration and in a nuclear energy commission in order to promote more efficient management of such functions. The organization and functions of the organization are explained. Testimony is provided by selected witnesses to show the current level of effort in energy management and the expected benefits to be derived from the new organization. Author

N74-27443# Committee on Government Operations (U. S. House).
**FEDERAL ENERGY ADMINISTRATION**
Washington GPO 1973 307 p Hearings on H.R. 11793 before Comm. on Govt. Operations, 93d Congr., 1st Sess., 10-11 Dec. 1973
(GPO-26-725) Avail: Subcomm. on Legislation and Military Operations

Congressional legislation to reorganize and consolidate certain functions of the Federal Government in a new Federal Energy Administration is proposed. The organization and functions of the various offices are explained. Testimony from recognized experts in the energy field is reported to show the extent of the problem and their reactions to the government proposal. Author

N74-27444# Committee on Interstate and Foreign Commerce (U. S. House).
**ENERGY EMERGENCY ACT**
Washington GPO 1973 541 p Hearings on H.R. 11031, H.R. 11450, H.R. 11202, H.R. 11505, and H.R. 11509 before Comm. on Interstate and Foreign Com., 93d Congr., 1st Sess., 14, 15, 27, and 28 Nov. 1973
(GPO-26-038) Avail: Comm. on Interstate and Foreign Com.

Congressional hearings on an emergency energy act to give the President extraordinary powers to cope with the energy crisis are presented. The bill provides the President and State and local governments the power to develop contingency plans for reducing petroleum consumption, and assuring the continuation of vital public services in the event of emergency fuel shortages or severe dislocations in the nation's fuel distribution system, and for other purposes. Mandatory Federal actions to be taken to alleviate fuel shortages are described. Testimony of selected witnesses is reported to show the expected advantages of such action. Author

N74-27445# Committee on Aeronautical and Space Sciences (U. S. Senate).
**NASA AUTHORIZATION FOR FISCAL YEAR 1975 An Act to Authorize Appropriations to NASA for Research and Development, Construction of Facilities, and Research and Program Management, and for other Purposes**
Frank E. Moss Washington NASA 1974 137 p refs Rept. to accompany H. R. 13998 presented by the Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 6 May 1974
(S-Rept-93-818; GPO-29-156) Avail: US Capitol, Senate Document Room

Congressional action on the fiscal year 1975 budget request for NASA is presented. The major portions of the request are for research and development, construction of facilities, and research and program management. The specific projects are identified and the funding for each project is established. Space and aeronautics programs of various departments and agencies of the government which coordinate with NASA are examined. The hearings consisted of testimony from witnesses within and without the government. Author

**N74-27447#** RAND Corp., Santa Monica, Calif.
**ENERGY ALTERNATIVES FOR CALIFORNIA: THE CURRENT CRISIS. 4: REGULATORY ASPECTS OF ENERGY POLICY**
William R. Harris Jan. 1974 19 p refs
(P-5158) Avail: NTIS HC $4.00

A study on energy alternatives for the State of California was conducted. The study contains the following considerations: (1) sources and uses of energy for California, (2) conservation of energy, (3) planning for fuel shortages and other energy emergencies, and (4) Federal-State interactions on energy policy. Emphasis is placed on short range solutions to immediate problems resulting from Arab oil export policies and the resultant impact on the availability of required sources of power in California. Author

**N74-27451#** Joint Publications Research Service, Arlington, Va.
**GENERAL MEETING OF USSR ACADEMY OF SCIENCES**
5 Jun. 1974 12 p Transl. into ENGLISH from Sots. Industriya (Moscow), 6 Mar. 1974
(JPRS-62172) Avail: NTIS HC $4.00

The report contains speeches by the President of the U.S.S.R. Academy of Sciences, M. V. Keldysh and the Acting Scientific Secretary of the Presidium of the U.S.S.R. Academy of Sciences G. K. Skryabin to the annual meeting of the academy. Past accomplishments of the organization are discussed and future plans for scientific research are examined. Author

**N74-27452#** Joint Publications Research Service, Arlington, Va.
**REGIONAL PROBLEMS OF SCIENTIFIC, TECHNICAL PROGRESS**
N. N. Nekrasov and V. I. Duzhenkov 3 Jun. 1974 19 p refs Transl. into ENGLISH from Priroda (Moscow), no. 2, 1974 p 2-9
(JPRS-62140) Avail: NTIS HC $4.00

The report contains an examination of the rational distribution of the country's scientific potential according to economic regions. The charateristics of the regions of the U.S.S.R. which determine the type of scientific activity to be conducted are analyzed. It is concluded that proper distribution of the country's scientific potential according to economic regions will make it possible to solve the most important scientific problems connected with natural wealth and for raising the standard of living in the U.S.S.R. Author

**N74-27453*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**AN EVALUATION OF CONTRACTOR PROJECTED AND ACTUAL COSTS**
Kent A. Kwiatkowski and Charles Buffalano Washington Jun. 1974 16 p ref
(NASA-TN-D-7644; D-7644; G-7407) Avail: NTIS HC $3.00 CSCL 05C

GSFC contractors with cost-plus contracts provide cost estimates for each of the next four quarters on a quarterly basis. Actual expenditures over a two-year period were compared to the estimates, and the data were sorted in different ways to answer several questions and give quantification to observations, such as how much does the accuracy of estimates degrade as they are made further into the future? Are estimates made for small dollar amounts more accurate than for large dollar estimates? Other government agencies and private companies with cost-plus contracts may be interested in this analysis as potential methods of contract management for their organizations. It provides them with the different methods one organization is beginning to use to control costs. Author

**N74-27454#** Committee on Government Operations (U. S. House).
**DRAFT OF PROPOSED LEGISLATION TO PROMOTE MORE EFFECTIVE MANAGEMENT OF CERTAIN RELATED FUNCTIONS OF THE EXECUTIVE BRANCH Communication from the President of the United States**
Washington GPO 1973 83 p refs Presented to Comm. on Govt. Operations, 93d Congr., 1st Sess., 29 Jun. 1973
(H-Doc-93-119; GPO-83-011) Avail: US Capitol, House Document Room

Congressional action to draft a proposed legislation to promote more effective management of certain related functions of the Executive Branch was conducted. The proposal involves reorganizing and consolidating those functions in a new department of energy and natural resources. Also considered in a new energy research and development administration. The interrelated operations of the energy administration with other governmental functions are examined. Author

**N74-27456*#** Stanford Research Inst., Huntsville, Ala.
**DEVELOPMENT OF METHODOLOGIES AND PROCEDURES FOR IDENTIFYING STS USERS AND USES Final Report**
J. L. Archer, N. A. Beauchamp, and D. C. MacMichael 20 Jun. 1974 178 p refs
(Contract NAS8-30533)
(NASA-CR-120258; SRI-H-4-165) Avail: NTIS HC $12.00 CSCL 05B

A study was conducted to identify new uses and users of the new Space Transporation System (STS) within the domestic government sector. The study develops a series of analytical techniques and well-defined functions structured as an integrated planning process to assure efficient and meaningful use of the STS. The purpose of the study is to provide NASA with the following functions: (1) to realize efficient and economic use of the STS and other NASA capabilities, (2) to identify new users and uses of the STS, (3) to contribute to organized planning activities for both current and future programs, and (4) to air in analyzing uses of NASA's overall capabilities. Author

**N74-27457#** Advisory Group for Aerospace Research and Development, Paris (France).
**HOW TO OBTAIN INFORMATION IN DIFFERENT FIELDS OF SCIENCE AND TECHNOLOGY: A USER'S GUIDE**
May 1974 120 p refs
(AGARD-LS-69) Avail: NTIS HC $9.00

The principles of information systems are outlined that provide storage, retrieval, and dissemination of technical information to

**N74-27460** Farbwerke Hoechst A.G., Frankfurt (West Germany).
**INTERNATIONAL MEDICAL INFORMATION SYSTEMS**
Georg E. Unger *In* AGARD How to Obtain Inform. in Different Fields of Sci. and Technol. May 1974 7 p

The flood of information especially in medical sciences can with no means, and especially not with the well known conventional means, be accomplished today. Even the creation of localized medical information systems can not cover the demands the medical profession is bringing forward. With the use of computers new ways are opened. Various methods have been developed in order to analyze, organize and evaluate the present voluminous flood of information. Communication between existing printed information and the medical profession in all fields of this science is considered. A new automated on-line terminal oriented storage and information retrieval system is discussed on a worldwide international basis. Author

**N74-27461** Rome Air Development Center, Griffiss AFB, N.Y.
**FEDERAL INFORMATION SYSTEMS**
Fred S. Dyer *In* AGARD How to Obtain Inform. in Different Fields of Sci. and Technol. May 1974 10 p refs

The Federal Technical Information System is the Federal coordinator and distributor of U.S. Government sponsored research and analytical reports to the general public. Inputting or participating with this repository are a number of other Government repositories that are responsible for performing functions parallel to NTIS for the communities they serve and in some cases they also manage the classified/limited portions of their respective collections. Author

**N74-27462** Pittsburgh Univ., Pa. Knowledge Availability Systems Center.
**THE NASA REGIONAL DISSEMINATION CENTER**
Edmond Howie *In* AGARD How to Obtain Inform. in Different Fields of Sci. and Technol. May 1974 7 p

An overview is presented of the Knowledge Availability Systems Center and its role as a National Aeronautics and Space Administration Regional Dissemination Center. Particular emphasis is placed on the marketing, technical analysis, technical operations and engineering consultation functions of the center as they relate to user exploitation of its mechanized information resources. Author

**N74-27464** Syracuse Univ., N.Y.
**ENVIRONMENTAL INFORMATION SYSTEMS**
Marta L. Dosa *In* AGARD How to Obtain Inform. in Different Fields of Sci. and Technol. May 1974 18 p refs

Research, academic and popular trends in the environmental fields and characteristics of information users, resources and systems, are explored. The multidisciplinary nature of environmental information is analyzed. The following operational definition is used: Ecology provides an inclusive and consistent structure for perceiving the world and accounts for the behavior of man within the world structure. Systems yielding environmental information are categorized as problem centered or discipline oriented. Author

**N74-27465#** Select Committee on Small Business (U. S. House).
**PHASE 4OIL REGULATIONS AND PETROLEUM MARKETING PROBLEMS**
Washington GPO 1973 584 p refs Hearings before Select Comm. on Small Business, 93d Congr., 1st Sess., 18 Sep. and 23-24 Oct. 1973
(GPO-24-574) Avail: Subcomm. on Activities of Regulatory Agencies

A Congressional hearing was conducted to examine the petroleum products marketing problems of small businesses. The government regulations and procedures for controlling petroleum supplies are examined. The cost control actions are analyzed to determine their impact on the petroleum distributors. Statistical analyses of the petroleum industry are included in the form of tables and graphs to show the supply and demand aspects of the problem. Author

**N74-27466#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**REPORT ON THE PRODUCTION PROGRAM OF THE AEROSPACE INDUSTRY IN 1972-1976**
20 Feb. 1974 60 p Transl. into ENGLISH from Japan Aviation Ind. Assoc. Rept. (Japan), 31 Mar. 1973 p 1-51
(AD-776112; FTD-HC-23-810-74) Avail: NTIS CSCL 05/3

The aviation industry of Japan was re-established in 1952, and the industry is being developed slowly but steadily in both qualitative and quantitative aspects. The object of this study is to estimate and analyze the production scale and items required to deal with in the next five years, as references for industrial management and national policy implementation. GRA

**N74-27523*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**GENERAL SURVEY OF SOLID-WASTE MANAGEMENT**
Terrence G. Reese and Richard C. Wadle May 1974 36 p refs
(NASA-TM-X-58133; JSC-08696) Avail: NTIS HC $3.25 CSCL 06I

Potential ways of providing solid-waste management for a building complex serviced by a modular integrated utility system (MIUS) were explored. Literature surveys were conducted to investigate both conventional and unusual systems to serve this purpose. The advantages and disadvantages of the systems most compatible with MIUS are discussed. Author

**N74-27526#** Committee on Government Operations (U. S. House).
**CONSERVATION AND EFFICIENT USE OF ENERGY, PART 3**
Washington GPO 1973 698 p refs Hearings before Comm. on Govt. Operations and Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 11 Jul. 1973 Prepared in cooperation with Comm. on Sci. and Astronaut. 4 Vol.
(GPO-24-682) Avail: Subcomm. on Conservation and Natural Resources

The overall aspects of the energy production-transmission-consumption system are considered and related environmental issues are stressed. An energy conservation policy is advocated that combines the efforts of government, industry, and private citizens. G.G.

**N74-27532#** Commission of the European Communities, Brussels (Belgium).
**PROBLEMS, RESOURCES AND NECESSARY PROGRESS IN COMMUNITY ENERGY POLICY 1975 - 1985**
[1974] 54 p refs
Avail: NTIS HC $5.75

Demand prospects and future supply situations for principle sources of primary energy are considered in this descriptive synthesis of the essential problems of energy policy which will be encountered between now and 1985. Available policy options are identified and their individual consequences are evaluated. Author

**N74-27533#** Commission of the European Communities, Brussels (Belgium).
**PROSPECTS OF PRIMARY ENERGY DEMAND IN THE COMMUNITY (1975 - 1980 - 1985)**
[1974] 121 p refs
Avail: NTIS HC $9.25

Trends in the energy demand during the years 1960 to 1970 are analyzed and used to project future energy requirements up to 1985. The effects of various economic parameters on this trend analysis are considered in deriving long term consumption aspects. G.G.

**N74-27712** Joint Publications Research Service, Arlington, Va.
**READING LIST ON QUALITY CONTROL PROBLEMS**
N. P. Stepanov *In its* Microcircuits and Field Transistors (JPRS-62192) 7 Jun. 1974 p 27-31 refs Transl. into ENGLISH from Elektron. Tekhn. (Moscow), no. 5, 1972 p 109-111

The practical and economic aspects of quality control in the development of industrial products are considered. G.G.

**N74-27806*#** Cornell Univ., Ithaca, N.Y.
**CORNELL UNIVERSITY REMOTE SENSING PROGRAM Semiannual Status Report, 1 Dec. 1973 - 31 May 1974**
Ta Liang, Donald J. Belcher, and Arthur J. McNair Jun. 1974 115 p refs
(Contract NGL-33-010-171)
(NASA-CR-138749) Avail: NTIS HC $8.75 CSCL 05B

The major activities of the program staff from December 1, 1973 to May 31, 1974 are reported and include: (1) communication and instruction; (2) data and facilities; (3) research completed; (4) research in progress; (5) selected correspondence; (6) grant sponsored travel; and (7) seminars and newsletters. Detailed information and maps are given for the following selected projects: (1) ERTS mapping of waterways in the Tug Hill region of New York State; (2) photo-archeological investigation of Great Gully, New York; and (3) evaluation of selected highway impacts using aerial photography. A.A.D.

**N74-28030** American Petroleum Inst., New York.
**FUTURE ENERGY SUPPLY: APPROACHES AND OPTIONS**
Wilson M. Laird *In* Bur. of Mines Technol. and Use of Lignite 1972 p 105-111

Domestic gas and oil deliverability should reach a peak about 1974. Use of coal will be severely restricted by air quality standards. At present the only method to fill the energy gap is by increased imports of foreign oil. If no action is taken, the nation will be dependent for a major share of its energy supply upon sources over which there can be little control. If such dependence is the result of a conscious, studied policy decision with full understanding of the consequences, the situation may be acceptable. A national energy policy should be formulated with a clear understanding of all facets including environmental considerations. An organization for formulating and articulating the policy is necessary. A strong team effort of government and industry is important to integrate and activate a national energy policy. Author

**N74-28169*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 1: PLASMA PROBES, WAKES, AND SHEATHS WORKING GROUP**
Mar. 1974 44 p refs 3 Vol.
(NASA-TM-X-64856-Vol-1) Avail: NTIS HC $3.25 CSCL 20I

It is shown in this report that a comprehensive in-situ study of All aspects of the entire zone of disturbance caused by a body in a flowing plasma are studied resulting in a large number of requirements on the shuttle-PPEPL facility. A large amount of necessary in-situ observation can be obtained by adopting appropriate modes of performing the experiments. Requirements are indicated for worthwhile studies, of some aspects of the problems, which can be carried out effectively while imposing relatively few constraints on the early missions. Considerations for the desired growth and improvement of the PPEPL to facilitate more complete studies in later missions are also discussed. Author

**N74-28170*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 2: WAVE EXPERIMENTS WORKING GROUP**
Mar. 1974 52 p 3 Vol.
(NASA-TM-X-64856-Vol-2) Avail: NTIS HC $3.75 CSCL 20I

The area of wave experiments for the PPEPL is considered in broad terms. It was found that most experiments in this area can be classified typically by a few generalized experiments. These experiment possibilities are discussed in terms of advantages, disadvantages, and probable areas for future investigation. It was concluded that the areas where wave experiments have the most promise are wave sources, wave propagation, and nonlinear interactions and should be implemented in that order. It was recommended that the PPEPL facility remain sufficiently flexible to handle new ideas as they appear, and a continuing effort should be made to solicit new ideas and approaches. It was also felt that detailed investigations should begin as soon as possible in the areas of antennas, both conventional and particle types, and wave-particle interaction experiments. Author

**N74-28171*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**REPORT OF THE PLASMA PHYSICS AND ENVIRONMENTAL PERTURBATION LABORATORY (PPEPL) WORKING GROUPS. VOLUME 3: MAGNETOSPHERIC EXPERIMENTS WORKING GROUP**
Mar. 1974 70 p refs 3 Vol.
(NASA-TM-X-64856-Vol-3) Avail: NTIS HC $3.75 CSCL 20I

A number of general studies that were proposed for the PPEPL-shuttle program are considered in qualitative detail from both the theoretical and practical points of view. The selection of experimental programs was restricted to those which may be considered active as opposed to refinements of the passive observational programs done previously. It is concluded that, while these new studies were scientifically worthwhile and could be performed in principle, in most cases insufficient attention was paid to the practical details of the experiments. Several specific areas of study, stressing in particular the practical feasibility of the proposed experiments, are recommended. In addition, recommendations are made for further theoretical study, where appropriate. Author

**N74-28316*#** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
**AN ANALYTICAL STUDY OF THE INTERACTION OF TECHNOLOGICAL AND ADMINISTRATIVE DECISION-MAKING IN THE DEFINING OF MARS PROJECT VIKING Ph.D. Thesis - Union College**
James Francis McNulty Jun. 1974 566 p
(NASA-TM-X-70208) Avail: NTIS HC $31.50 CSCL 22A

An analysis of the history and background of the Mars Project Viking is presented. The organization and functions of the engineering group responsible for the project are defined. The design and configuration of the proposed space vehicle are examined. Illustrations and tables of data are provided to complete the coverage of the project. Author

**N74-28324*#** TRW Systems, Cape Canaveral, Fla.
**OPERATIONAL CONCEPTS FOR SELECTED SORTIE MISSIONS: EXECUTIVE SUMMARY Technical Report, Aug. 1973 - Jun. 1974**
V. A. Dulock, Jr. Jun. 1974 36 p refs
(Contract NAS10-8395)
(NASA-CR-138753; TRW-24981-F006-R1-00) Avail: NTIS HC $5.00 CSCL 22B

An executive summary is presented of a Spacelab concept study conducted from August 1973 to June 1974. Background information and a summary of study conclusions are given. Specific data are reported for the quick-reaction carrier concept, software and mission integration, configuration management, documentation, equipment pool, and integration alternatives. A forecast of the impact of a second launch site, mission feasibility, and space availability for the Spacelab are also discussed. A.A.D.

**N74-28327*#** Battelle Columbus Labs., Ohio.
**SPACE SHUTTLE TRANSPORTATION SYSTEM TECHNIQUES FOR USER/USE DEVELOPMENT Final Report**
Paul J. Gripshover 30 Jun. 1974 103 p
(Contract NAS8-30529)
(NASA-CR-120259) Avail: NTIS HC $8.25 CSCL 22B

The problem of obtaining new uses for the Shuttle Transportation System (STS) was treated in the same way marketing problems are handled by industrial organizations. Techniques used by industry to obtain new ideas and customers were evaluated and analyzed for their relevance to the STS. Marketing barrier-data were used to develop strategy which called for a middleman organization to assist NASA in achieving its objectives. The importance of prompt initiation of the recommended strategy was established. Author

**N74-28332*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB ORBITAL WORKSHOP, VOLUME 5**
May 1974 450 p refs 5 Vol.
(NASA-TM-X-64813-Vol-5) Avail: NTIS HC $9.00 CSCL 22B

The various programs involved in the development of the Skylab Orbital Workshop are discussed. The subjects considered include the following: (1) reliability program, (2) system safety program, (3) testing program, (4) engineering program management, (5) mission operations support, and (6) aerospace applications. Author

**N74-28344*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**SYSTEM SAFETY CHECKLIST SKYLAB PROGRAM REPORT**
Earl M. McNail 30 May 1974 75 p Prepared in cooperation with Martin Marietta Aerospace, Denver
(Contract NAS8-24000)
(NASA-TM-X-64850) Avail: NTIS HC $3.75 CSCL 13L

Design criteria statement applicable to a wide variety of flight systems, experiments and other payloads, associated ground support equipment and facility support systems are presented. The document reflects a composite of experience gained throughout the aerospace industry prior to Skylab and additional experience gained during the Skylab Program. It has been prepared to provide current and future program organizations with a broad source of safety-related design criteria and to suggest methods for systematic and progressive application of the criteria beginning with preliminary development of design requirements and specifications. Recognizing the users obligation to shape the checklist to his particular needs, a summary of the historical background, rationale, objectives, development and implementation approach, and benefits based on Skylab experience has been included. Author

**N74-28442*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**THE PROJECT MANAGEMENT ROLE IN SAFETY**
R. C. Callaway Jun. 1974 31 p refs Revised Previously announced as N73-28937
(NASA-TM-X-64764) Avail: NTIS HC $3.25 CSCL 13L

Techniques to be utilized by project management in planning, implementation, and administration of a project safety program are presented. Safety functional responsibilities are classified into the categories of safety management and safety engineering. The emphasis is on the safety management role, and how safety activities are to be integrated throughout the project and made visible in the work breakdown structure and cost accounting and reporting. Visibility into systematic identification and control of hazards are discussed. Author

**N74-28443*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
**CALIFORNIA FOUR CITIES PROGRAM, 1971 - 1973**
H. L. Macomber and James H. Wilson 15 May 1974 44 p refs
(Contract NAS7-100)
(NASA-CR-138768; JPL-SP-43-4) Avail: NTIS HC $5.25 CSCL 05K

A pilot project in aerospace-to-urban technology application is reported. Companies assigned senior engineering professionals to serve as Science and Technology Advisors to participating city governments. Technical support was provided by the companies and JPL. The cities, Anaheim, Fresno, Pasadena, and San Hose, California, provided the working environment and general service support. Each city/company team developed and carried out one or more technical or management pilot projects together with a number of less formalized technology efforts and studies. An account and evaluation is provided of the initial two-year phase of the program. Author

**N74-28446*#** General Electric Co., Philadelphia, Pa. Space Div.
**STUDY FOR IDENTIFICATION OF BENEFICIAL USES OF SPACE (BUS) (PHASE 2). VOLUME 1: EXECUTIVE SUMMARY Final Report**
1 Nov. 1973 19 p ref
(Contract NAS8-28179)
(NASA-CR-120285; DOC-73SD4281-Vol-1) Avail: NTIS HC $4.00 CSCL 05A

A study was conducted to analyze the benefits to the world which can be realized from space manufacturing processes. The study envisaged the use of the space shuttle and manned space stations for the purpose. For each proposed operation a data base and rationale were established for those processes or portions of processes which would be improved by performance in the orbital environment. The four experiments which were recommended for the initial investigation are identified. The procedures for conducting the weightless manufacturing processes are outline. Author

**N74-28447*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.
**STUDY FOR IDENTIFICATION OF BENEFICIAL USES OF SPACE (BUS). VOLUME 2: TECHNICAL REPORT. BOOK 1: SECTIONS 1 THROUGH 4 Final Report on Phase 2, Dec. 1972 - Dec. 1973**
1 Nov. 1973 256 p refs 2 Vol.
(Contract NAS8-28179)
(NASA-CR-120286; DOC-73SD4281-Vol-2-Bk-1) Avail: NTIS HC $16.00 CSCL 05A

Consolidated information is presented for the study whose purpose was to identify products, processes, and services to be produced in future spacecraft environments for direct utilization on earth. Discussion of methodology for selecting from among potential space processing approaches, definition of requirements for experiments and tests needed to acquire sufficient knowledge for proof testing of selected processes, formulation of research and development schedules to achieve proof testing, and documentation of the decision processes involved in the programs are presented. Technology and programmatics are reported for the following select studies: (1) surface acoustic wave components; (2) transparent oxides; (3) high purity tungsten X-ray targets; and (4) high specificity isoenzymes. A.A.D.

**N74-28449#** Committee on Banking, Housing and Urban Affairs (U.S. Senate).
**RETAIL PRICING OF PETROLEUM PRODUCTS**
Washington GPO 1973 99 p Hearings on S. 2415, S. 2400, and S. 2453 before Comm. on Banking, Housing and Urban Affairs, 93d Congr., 1st Sess., 9 Oct. 1973
(GPO-23-614) Avail: Comm. on Banking, Housing and Urban Affairs

A Congressional hearing was conducted to consider the retail pricing of petroleum products. The specific purposes of the the hearing were: (1) to amend the Economic Stabilization Act of 1970 to permit the passthrough of certain cost increases, (2) to amend the Economic Stabilization Act of 1970 to adjust ceiling prices applicable to certain petroleum products and to permit retailers to pass through the increased costs, and (3) to amend the Economic Stabilization Act with regard to the authority conferred by Section 203 with respect to petroleum products. The findings of the committee are based on the testimony of selected witnesses with experience in the petroleum market. P.N.F.

**N74-28450#** Committee on Armed Services (U. S. Senate).
**NAVAL PETROLEUM RESERVE NUMBERED 1, ELK HILLS, CALIFORNIA**
Washington GPO 1973 114 p refs Hearing on S.J. Res. 176 before Comm. on Armed Services, 93d Congr., 1st Sess., 10-11 Dec. 1973
(GPO-25-650) Avail: Subcomm. on Natl. Stockpile and Naval Petrol. Reserve

A Congressional hearing was conducted to consider a resolution which would authorize production of petroleum from the Elk Hills Naval Petroleum Reserve for national defense purposes and to provide for further exploration of the reserve. The nature of the petroleum shortage in the U.S. is examined. The capacity of the petroleum reserve to alleviate the situation is evaluated. Restrictions on the exploitation of the reserves are defined. The findings of the committee are based mainly on the testimony of selected witnesses who are knowledgeable of the crude oil situation. P.N.F.

**N74-28451#** Select Committee on Small Business (U. S. House).
**THE TECHNOLOGY UTILIZATION PROGRAM OF THE SMALL BUSINESS ADMINISTRATION**
Washington GPO 1973 21 p Presented by the Select Comm. on Small Business to the Comm. of the Whole House on the State of the Union, 93d Congr., 1st Sess., 10 Aug. 1973
(H-Rept-93-450; GPO-99-006) Avail: US Capitol, House Document Room

The achievements and significance of the Small Business Administration (SBA) in obtaining technology transfers for small business concerns is reviewed in preface to a Congressional recommendation that the SBA Technology Utilization Program be reinstated. The continuation and possible expansion of the program is urged in a committee resolution and recommendations are outlined to aid the SBA in resuming its technology transfer activities. A.A.D.

**N74-28453#** Committee on Finance (U. S. Senate).
**PROFITABILITY OF DOMESTIC ENERGY COMPANY OPERATIONS**
Washington GPO 1974 222 p refs Hearings before Comm. on Finance, 93d Congr., 2d Sess., 13-14 Feb. 1974
(GPO-28-572) Avail: Comm. on Finance

A Congressional hearing was conducted to present testimony relating to the problem for excess or windfall profits in the oil industry. Tax legislation proposals are emphasized. Information is presented by private firms and by petroleum trade associations, and the topics include the following: (1) percent of U.S. production by medium and small companies; (2) petroleum exploration and development expenditures; (3) profitability ratios; (4) sources of U.S. sales of petroleum products and foreign investments; (5) imports of crude oil and refine products; (6) gasoline and residual fuel consumption; (7) return on petroleum shareholders equity; and (8) earning growth and return calculations. Recommendations are made for the formulation of tax and price policies as well as effective government/industry roles in the management of the energy market. A.A.D.

**N74-28455#** National Academy of Engineering, Washington, D.C. Committee on Technology Transfer and Utilization.
**TECHNOLOGY TRANSFER AND UTILIZATION: RECOMMENDATIONS FOR REDIRECTING THE EMPHASIS AND CORRECTING THE IMBALANCE Final Report**
Feb. 1974 34 p refs
(Grant NSF C-310)
(PB-232123; NAE-COTTU-74) Avail: NTIS HC $4.75

A study to identify Federal agencies conducting programs directed toward technology transfer and utilization; determine and describe the methods used in programs, evaluate the effectiveness of methods, assess the extent these methods have been evaluated; and recommend policies for NSF and Federal government consideration. It was found that technology developed by federally funded programs since World War II has not resulted in widespread secondary applications of technology. An imbalance was found between the emphasis on collection, processing, and dissemination of technological information and the stimulation of secondary uses of technology. It is recommended the federal government redirect the emphasis and correct the imbalance by increasing funding for application, adaptation and utilization to at least the same level as that expended for information collection and dissemination. Other recommendations are made. Author

**N74-28462*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**A MARKOVIAN MODEL FOR ASSESSMENT OF PERSONNEL HIRING PLANS**
Lawrence G. Katz Washington Jun. 1974 17 p refs
(NASA-TN-D-7640; G-7410) Avail: NTIS HC $3.00 CSCL 05C

As a result of the current economic environment, many organizations are having to operate with fewer resources. In the manpower area, these constraints have forced organizations to operate within well-defined hiring plans. Exceeding personnel ceilings is in most cases an intolerable situation. A mathematical model, based on the theory of Markov processes, is presented which can be used to assess the chances of success of personnel hiring plans. The model considers a plan to be successful if the final population size, at the end of the planning period, lies within a range specified by management. Although this model was developed to assess personnel hiring plans at the Goddard Space Flight Center, it is directly applicable wherever personnel hiring plans are used. Author

**N74-28463#** Bureau of Mines, Washington, D.C. Div. of Fossil Fuels.
**SALES OF FUEL OIL AND KEROSINE IN 1972**
10 Oct. 1973 14 p
Avail: NTIS HC $4.00

Domestic sales of distillate fuel oils, residual fuel oils, and kerosine in thousands of barrels are presented and compared to sales volume in 1971. Data are arranged by fuel type, intended uses, and state and year in which the transactions were made. A.A.D.

**N74-28464#** Bureau of Mines, Washington, D.C. Div. of Fossil Fuels.
**WORLD NATURAL GAS: 1972**
29 Apr. 1974 10 p
Avail: NTIS HC $4.00

Both gross and marketed production volumes in million cubic feet are presented for all countries engaged in the natural gas industry. World trade volumes in billion cubic feet are also shown by year and importing country. A brief account of natural gas trends in domestic production and international trade is included. A.A.D.

**N74-28465#** Atomic Energy Commission, Washington, D.C.
**NATION'S ENERGY FUTURE Report to the President of the United States**
Dixy Lee Ray 1 Dec. 1973 182 p
(WASH-1281) Avail: NTIS MF $1.45; SOD HC $1.95

This report, developed under the general guidance of the Energy Policy Office, is in response to the directive of the President on June 29, 1973, to the Chairman of the Atomic Energy Commission to review Federal and private energy R and D and to recommend an integrated program for the Nation. The report recommends: (1) a national energy R and D program, (2) a five-year, $10 billion Federal energy R and D program, and (3) the FY 1975 Federal budget for energy R and D. The recommended program, based on what is now known, is both necessary and sufficient to maximize energy R and D's contribution to the Nation's energy goals; even so, 1985 is the earliest date by which self-sufficiency can reasonably be expected. By 1980, the recommended program can reduce oil imports to half those currently projected; other extraordinary measures will be required to displace the other half. NSA

**N74-28470#** Environmental Protection Agency, Washington, D.C. Office of Research and Development.
**EXPRO-74: A LISTING OF EXTRAMURAL PROJECTS TO BE FUNDED IN FISCAL YEAR 1974**
Nov. 1973 278 p
(PB-229297/7) Avail: NTIS HC $17.00 CSCL 13B

The Environmental Protection Agency's Office of Research and Development (OR and D) conducts and supports research, development, and demonstration efforts on a wide variety of

subjects primarily related to pollution sources and effects, environmental sciences and pollution control technology. The purpose of EXPRO is two-fold: to acquaint the research and development community with general guidelines for working with the Environmental Protection Agency's Office of Research and Development under grant or contract support, and to make publically available a list of specific grant and contract tasks which OR and D plans to fund during Fiscal Year. GRA

**N74-28534** Massachusetts Univ., Amherst.
**A PLANNING METHODOLOGY FOR THE ANALYSIS AND DESIGN OF WIND-POWER SYSTEMS Ph.D. Thesis**
Ismael Gerardo Dambolena 1974 156 p
Avail: Univ. Microfilms Order No. 74-15005

A computer model is developed which evaluates the economics of offshore wind-power systems and simulates the behavior of alternate designs. Wind-powered generators either satisfy consumer demand directly or produce hydrogen by the electrolysis of water. The hydrogen can later be transformed back into electricity by fuel cells. Using the characteristics of the system components as input parameters, the model simulates system performance over time using historical or computer-generated wind-speed and demand data. Various statistics associated with the energy produced and costs are used to evaluate and compare alternative systems. Dissert. Abstr.

**N74-28537*#** Denver Research Inst., Colo. Industrial Economics Div.
**APPLICATIONS OF AEROSPACE TECHNOLOGY IN THE ELECTRIC POWER INDUSTRY**
Aug. 1973 116 p refs
(Contract NASw-2362)
(NASA-CR-138947) Avail: NTIS HC $9.00 CSCL 10B

An overview of the electric power industry, selected NASA contributions to progress in the industry, linkages affecting the transfer and diffusion of technology, and, finally, a perspective on technology transfer issues are presented. Author

**N74-28538#** Mitre Corp., McLean, Va.
**PROPOSED PROGRAM AND BUDGET FOR PHOTOVOLTAIC SYSTEMS**
Frank R. Eldridge Feb. 1974 147 p
(Contract NSF C-831; Proj. 2950)
(MTR-6613; NSF/RA/N-73-111) Avail: NTIS HC $10.50

A study of the NSF 5-year Solar Energy Research Program is presented. The goals, suggested approach, funding, phasing, basis for funding estimates and task priorities are described, that would be conducted during the course of the proposed program for photovoltaic systems. This proposed program was designed to demonstrate, by basic and applied research and proof-of-concept experiments, the technical feasibility, economic viability, environmental impact, sociological desirability, institutional constraints, and potential utilization of photovoltaic systems that would derive replenishable energy from the sun to help satisfy future U.S. energy needs. Author

**N74-28540#** MITRE Corp., Washington, D.C.
**DISSEMINATION AND UTILIZATION OF SOLAR ENERGY RESEARCH RESULTS**
Dec. 1973 67 p refs
(Contract NSF C-831; Proj. 2950)
(MTR-6544; NSF/RA/N-73-3) Avail: NTIS HC $6.50

Recommendations have been made for establishing groups within, or reporting to, the NSF Solar Energy Program Office, and initiating activities for the dissemination and utilization of solar energy research results. The primary recommendations include establishing an Advisory Commission and an information office reporting to the Program Director, and constructing visitor centers on the sites of each Proof of Concept Experiment. Training courses and public education would be conducted at each center following successful operation of the POCE system. Author

**N74-28578** Joint Publications Research Service, Arlington, Va.
**PSYCHOPHARMACOLOGICAL REGULATION OF INTERPERSONALITY RELATIONSHIPS IN A GROUP (EXPERIMENTAL INVESTIGATION)**
M. A. Novikov, A. A. Gerasimovich, G. V. Izosimov, T. V. Novikova, and F. N. Uskov *In its* Space Biol. and Aerospace Med., Vol. 8, No. 3, 1974 (JPRS-62553) 24 Jul. 1974 p 63-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 8, no. 3, 1974 p 39-43

The influence of psychopharmacological preparations (aminasine, haloperidole, phenamine) on the distribution of functional duties within a group is studied by evaluating stability of habits and tactics, verbal communicability and the level of conflict tension, the psychological cost of group and individual activity, as well as empathic perception of the partner. It is shown that intra-group personality interactions can be controlled using psychopharmacological preparations. Author

**N74-28635** Technische Hochschule, Darmstadt (West Germany). Inst. fuer Arbeitswissenschaft.
**STATISTICAL PLANNING OF ERGONOMIC EXPERIMENTS. POSSIBILITIES AND USEFULNESS [STATISTISCHE PLANUNG ERGONOMISCHER EXPERIMENTE - MOEGLICHKEITEN UND NUTZEN]**
Holger Luczak *In* DGLR tech. for Man-Machine-Invest. 1974 p 7-23 refs In GERMAN; ENGLISH summary

Three types of ergonomic experiments are distinguished according to the number of independent variables. Objectives and content of experimental design are explained. For the design of ceteris-paribus-experiments, the maximization of homogeneity of experimental conditions, the control and elimination of the experimental error by randomized blocks, Latin and Greek-Latin squares, and the minimization of the number of experiments by sequential analysis are proposed. Deterministic and stochastic methods for optimum conditions determination of several experimental parameters, with respect to a response function, are mentioned. Author (ESRO)

**N74-28685#** National Bureau of Standards, Washington, D.C. Systems and Software Div.
**CONTROLLED ACCESSIBILITY WORKSHOP REPORT Final Report, Dec. 1972**
Susan K. Reed, ed., Dennis K. Branstad, ed., P. S. Browne, C. G. Maple, W. H. Murray, and C. Weissman May 1974 89 p refs Presented at the NBS/ACM Workshop on Controlled Accessibility, Rancho Sante Fe, Calif., 10-13 Dec. 1972
(NBS-TN-827; LC-74-600078) Avail: SOD HC $1.25 as C13.46:827

Access controls, audit, EDP management controls, identification, and measurements were discussed. The members, goals, and reports for each of the preceeding catagories were also presented. Author

**N74-28697#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**COMPUTER-ASSISTED DESIGNING OF DATA-PROCESSING SYSTEMS WITH THE SEIS 1 SIMULATOR OF REAL-TIME INFORMATION SYSTEMS**
Gerhard Saeltzer 2 Apr. 1974 15 p refs Transl. into ENGLISH from Rechentechnik Datenverarbeitung (East Germany), v. 10, no. 7, Jul. 1973 p 5-10
(FTD Proj. T74-05-12)
(AD-777649; FTD-HC-23-1562-74) Avail: NTIS CSCL 09/2

On the basis of comprehensive analyses of present and future production processes, a real time information system was developed for the operative control and design of the rapidly changing production processes in a production plant. The control measures in the operative control of the production processes are triggered by events in the production process. Data which are subject to random laws appropriate for the actual production process correspond to such events. An initial concept for the component system to be used (29 data-input and 29 data-output units, 3 control units with associated transfer lines, 1 central unit R 21 with direct access memory and operational system) and the application program system (10 programs for the control and guidance of the production process) is available. The central unit is used in the multiprogramming operating mode; the real time programs are run in hierarchical sequence within a clearly defined core memory range over other programs. Author (GRA)

**N74-28733*#** Logistics Management Inst., Washington, D.C.
**SUPPLY SUPPORT OF NASA TRACKING NETWORKS**
Feb. 1973 82 p
(Contract NASw-2306)
(NASA-CR-138832) Avail: NTIS HC $7.25 CSCL 22D

The extent which supply support for Jet Propulsion Laboratory's Deep Space Network and Goddard Space Flight Center's Space Flight Tracking and Data Network should be consolidated is considered along with the identification of opportunities for improvements in each of the supply systems without regard to consolidation. There is a considerable amount of commonality between the items in the stock catalogs at the two network depots, 58% for federal stock number items and 30% overall. The workload at the DSIF Supply Depot (DSD) is small (less than 20%) compared to the Network Logistics Depot (NLD). A number of important benefits in supply support would result from a consolidation of DSD into NLD. LMI found that a consolidation as is, without any changes in inventory management techniques, would reduce annual operating costs by from $208,000 to $358,000. However, if the consolidation were coupled with a change to use of economic order quantities, the annual operating cost reduction would range from $930,000 to $1,078,000. Author

**N74-28736*#** Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
**[FACILITY RESEARCH CAPABILITIES AT LOUISIANA STATE UNIVERSITY] Final Report, 1 Sep. 1971 - 31 Aug. 1974**
C. A. Whitehurst Aug. 1974 19 p
(Grant NGL-19-001-097)
(NASA-CR-138884) Avail: NTIS HC $4.00 CSCL 14B

Efforts of LSU are reported to develop research capabilities for supporting the NASA Mississippi Test Facility. Research activities reported include remote sensing technology and salt water encroachment. M.C.F.

**N74-28802*** + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 1: OBSERVATION ID**
23 Jul. 1973 502 p
(NASA-TM-X-70134) Avail: NTIS HC $28.25; EROS Data Center, Sioux Falls, S. D., 57198 HC $1.25 CSCL 05B

A catalog cantaining data pertaining to the imagery acquired by the Earth Resources Technology Satellite (ERTS) from its date of launch, July 23, 1972 through the first year of activity is presented. The catalog supersedes the previous catalog which supplied data available through May 1973. Two listings of the imagery are included: (1) an observation identifications listing and (2) a listing of the imagery based on geographical location, the coordinate listing. Author

**N74-28803*** + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 2: OSERVATION ID**
23 Jul. 1973 501 p
(NASA-TM-X-70133) Avail: NTIS HC $28.25; EROS Data Center, Sioux Falls, S. D. 57198 HC $1.25 CSCL 05B

**N74-28804*** + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 3: COORDINATE LISTING, REVISION**
23 Jul. 1973 516 p
(NASA-TM-X-70132) Avail: NTIS HC $29.00; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

**N74-28805*** + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 4: COORDINATE LISTING, REVISION**
23 Jul. 1973 515 p
(NASA-TM-X-70136) Avail: NTIS HC $28.75; EROS Data Center, Sioux Falls, S.D. 57198 HC $1.25 CSCL 05B

**N74-28809*#** Ohio Dept. of Economic and Community Development, Columbus.
**RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Mar. - Apr. 1974**
David C. Sweet, Principal Investigator Apr. 1974 23 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21782)
(E74-10553; NASA-CR-138443) Avail: NTIS HC $4.25 CSCL 08F

There are no author-identified significant results in this report.

**N74-28862*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Quarterly Progress Report, 1 Feb. - 30 Apr. 1974**
John W. Hannah, Garland L. Thomas, and Fernando Esparza, Principal Investigators 30 Apr. 1974 17 p refs Prepared in cooperation with Brevard County Planning Dept., Titusville, Fla. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(NASA Order CC-30281-A)
(E74-10623; NASA-TM-X-70206) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

**N74-29065** Joint Publications Research Service, Arlington, Va.
**SYSTEM OF EFFECTIVENESS INDEXES OF SCIENTIFIC RESEARCH WORK IN THE METEOROLOGICAL PROFILE**
N. Z. Pinus, B. I. Sakhnev, and V. I. Chernysh *In its* Meteorology and Hydrol. no. 4, 1974 (JPRS-62306) 24 Jun. 1974 p 115-132 refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 86-96

A study was made of the role of various factors determining the performance of scientific research work. On the basis of a systematic analysis, the analytical parametric scheme of indexes and the normative base permitting quantitative evaluation of the effectiveness of the scientific research work in all stages of the research are proposed. Author

**N74-29164#** Oak Ridge National Lab., Tenn.
**ENGINEERING AND MANAGEMENT ASPECTS OF THE ORMAK PROGRAM**
M. Roberts 1973 11 p refs Presented at the 5th Symp. on Eng. Probl. of Fusion Res., Princeton, New Jersey, 6 Nov. 1973 Sponsored by AEC
(Conf-731114-41) Avail: NTIS HC $3.00

A review of the ORMAK program is given. The review briefly covers the engineering development of the ORMAK program in terms of injection research, high-field ORMAK, ORMAK F/Bx, magnet development, and liner surface development. Management requirements of the ORMAK program are also discussed. NSA

**N74-29247*#** Science Applications, Inc., Rolling Meadows, Ill.
**ADVANCED PLANETARY ANALYSES Annual Report, 1 Feb. 1973 - 31 Jan. 1974**
31 Jan. 1974 43 p
(Contract NASw-2494)
(NASA-CR-138829; SAI-120-A1) Avail: NTIS HC $5.25 CSCL 03B

The results are summarized of research accomplished during this period concerning planetary mission planning are summarized. The tasks reported include the cost estimations research, planetary missions handbook, and advanced planning activities. F.O.S.

**N74-29294*#** Linguistic Systems, Inc., Cambridge, Mass.
**DEVELOPMENT OF ROCKET CONSTRUCTION AND ASTRONAUTICS IN THE USSR**
V. P. Glushko Washington NASA Apr. 1974 73 p refs Transl. into ENGLISH of the book "Razvitiye Raketostroyeniya i Kosmonavtiki v SSSR" Moscow, Novosti News Agency Press, 1973 p 1-95
(Contract NASw-2482)
(NASA-TT-F-15378) Avail: NTIS HC $6.75 CSCL 22B

The book discusses the development of rocket construction and astronautics in the U.S.S.R. beginning with early research. The work of Russians in the field and Soviet institutes involved in rocket research are exhaustively reviewed. Basic discoveries of different types of rockets are presented, together with data on Soviet space probes. Author

**N74-29341#** Committee on Appropriations (U. S. House).
**HUD-SPACE-SCIENCE-VETERANS APPROPRIATIONS FOR 1975: PART 5: TESTIMONY OF MEMBERS OF CONGRESS AND OTHER INTERESTED INDIVIDUALS AND ORGANIZATIONS**
Washington GPO 1974 494 p refs Hearings before Comm. on Appropriations, 93d Congr., 2d Sess., 7-8 May 1974
(GPO-34-205) Avail: Subcomm. on HUD-Space-Sci.-Veterans

A Congressional hearing was conducted to determine additional Federal appropriations for: (1) Housing and Urban Development (HUD), (2) the National Science Foundation, and (3) the Veterans Administration. Testimony by selected witnesses is presented to show the needs of the various organization for funds to continue their operations. The projects conducted by the organizations and the proposed programs are explained. Financial requirements for the organization are presented in table form to show the extent of the funding requirements. Author

**N74-29343#** Library of Congress, Washington, D.C. Environmental Policy Div.
**SOME SIMPLE CALCULATIONS TO SUGGEST THE EFFECTS OF SIX NATIONAL POLICIES UPON USE AND SUPPLY OF ENERGY**
Warren H. Donnelly 11 Mar. 1974 18 p ref
(TP-360; Rept-74-13-EP) Avail: NTIS HC $4.00

Policy options for total national energy use and supply from domestic and imported sources are considered. Estimated balances for the years 1970, 1975, 1980, and 1985 for domestic and imported energy supplies are presented to illustrate the use that can be made of single energy models, and to test the major implications of any policies that may be proposed. Synthetic fuel production is considered in the analysis of a policy based on energy independence. Best and worst energy supply situations are also calculated as an additional aid in policy decision making. A.A.D.

**N74-29346#** Committee on Public Works (U. S. House).
**TO CONSERVE ENERGY ON THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS**
Washington GPO 1973 97 p refs Hearing on H.R. 11372 on Comm. on Public Works, 93d Congr., 1st Sess., 27 Nov. 1973
(GPO-25-702) Avail: Subcomm. on Energy

A Congressional hearing was conducted to investigate means of conserving energy on the interstate and defense highway systems. The legislation was concerned with establishing a maximum speed limit on any highway on the United States, territories, and possessions. The Secretary of Transportation was given authority to impose the lower speed limits after consulting with the Governor of the jurisdiction involved. Author

**N74-29347#** Committee on Public Works (U. S. House).
**ARCHITECTURAL GUIDELINES TO PROMOTE EFFICIENT ENERGY USE**
Washington GPO 1973 38 p Hearing on H.R. 11714 before Comm. on Public Works, 93d Congr., 1st Sess., 11 Dec. 1973
(GPO-28-428) Avail: Comm. on Public Works

A Congressional hearing was conducted to provide for the development of improved design lighting, insulation, and architectural standards to promote efficient energy use in residential, commercial, and industrial buildings. The administrator of the General Services Administration in cooperation with the Secretary of Defense, the Secretary of Housing and Urban Development, and the National Bureau of Standards is authorized to carry out the provisions of the legislation. Testimony regarding the need for such action and the benefits to be derived was provided by selected witnesses. Author

**N74-29363#** European Space Research and Technology Center, Noordwijk (Netherlands).
**NETWORKING: AN ESSENTIAL ELEMENT IN PROGRAMME MANAGEMENT**
Hellmuth Gehriger 1974 16 p refs Presented at the Ann. Gen. Meeting of Internet UK, London, 7 May 1974
Avail: NTIS HC $4.00

The possibility of integrating networking into a comprehensive management plan is exemplified for a project. At an early stage, the project is divided into suitable segments, and then a project cost plan is developed. Monitoring and control during project execution is explained. ESRO

**N74-29364#** National Academy of Sciences - National Research Council, Washington, D.C. Board on Science and Technology for International Development.
**MEETING THE CHALLENGE OF INDUSTRIALIZATION: A FEASIBILITY STUDY FOR AN INTERNATIONAL INDUSTRIALIZATION INSTITUTE**
Aug. 1973 145 p refs
(Contract AID/CSD-2584)
(PB-228348/9; LC-73-11740) Avail: NTIS HC $4.75 CSCL 05C

The report advances the concept of an independent, interdisciplinary research institute to illuminate new policy options confronting all nations. The study was made by an ad hoc advisory panel of the National Academy of Sciences, in consulation with leaders concerned with economic development from developed and developing countries. GRA

**N74-29404#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**HANDBOOK FOR THE AVIATION REAR SPECIALIST**
A. G. Blok, V. K. Buzunov, S. B. Neroslev, and I. Ya. Skorkin 10 Apr. 1974 548 p refs Transl. into ENGLISH from the book "Spravochnik Spetsealista Tyla Aviatsii" USSR, 1972 p 5-499
(AD-779172; FTD-MT-24-604-73) Avail: NTIS CSCL 01/3
A handbook for military specialists involved in rear provisioning of aviation units and their subdivisions is presented. The handbook is also useful for managerial, technical, and engineering personnel and for specialists in ground based logistic services of civil and official government aviation. Some of the subjects discussed are: (1) operational maintenance of airfields; (2) airfield provisioning; and (3) technical support of flights. Data are presented which reflect the peculiarities of solving military logistics problems. Author

**N74-29408#** Army Aviation Systems Command, St. Louis, Mo.
**EXECUTIVE SUMMARY REPORT ON QUALITY AND COMMAND PROGRAM ASSESSMENTS Final Report**
May 1974 60 p
(AD-779518; USAAVSCOM-TR-74-25) Avail: NTIS CSCL 01/3
The purpose of the executive summary is to supplement the management summary report. The quality and command program assessment portion of this report is designed to provide an overall picture of quality on aircraft or components. The report assesses quality-related problems experienced in the field by the user as well as quality problems occurring at the Army plant activities, and their impact on delivery schedules to the user. Quality and command program assessments are covered in this report. MDS assessment and comparative fleet evaluations, command statistics and problem summary, are covered in a companion report. Author (GRA)

**N74-29409#** Army Aviation Systems Command, St. Louis, Mo.
**EXECUTIVE SUMMARY REPORT ON CH-54A ASSESSMENT AND COMPARATIVE FLEET EVALUATIONS Final Report**
May 1974 95 p
(AD-779517; USAAVSCOM-TR-74-24) Avail: NTIS CSCL 01/3
The purpose of the executive summary is to supplement the management summary report. It is an overview and summarization of the material contained therein. The parameters presented provide management perspective of the CH-54A fleet, in addition to comparative fleet evaluations. Various presentations of RAM related parameters give the present system posture of the CH-54A fleet. MDS assessment and comparative fleet evaluations are covered in this report. Quality and command program assessments and the command statistics and problem summary are the other reports which make up the total executive summary for the CH-54A. Author (GRA)

**N74-29459*#** Essex Corp., Alexandria, Va.
**MANIPULATOR SYSTEM MAN-MACHINE INTERFACE EVALUATION PROGRAM**
Thomas B. Malone, Mark Kirkpatrick, and Nicholas L. Shields Jan. 1974 102 p
(Contract NAS8-28298)
(NASA-CR-120218; H-4-3) Avail: NTIS HC $8.25 CSCL 05H
Application and requirements for remote manipulator systems for future space missions were investigated. A manipulator evaluation program was established to study the effects of various systems parameters on operator performance of tasks necessary for remotely manned missions. The program and laboratory facilities are described. Evaluation criteria and philosophy are discussed. E.J.O.

**N74-29530#** Technische Hochschule, Darmstadt (West Germany).
**COMPUTERIZED PROCESSING TREND MODEL FOR THE STANDARDIZED SIMULATION, ANALYSIS, AND CONTROL OF REAL SYSTEMS Ph.D. Thesis [TRENDMODELL ZUR STANDARDISIERTEN NACHBILDUNG, ANALYSE UND FUEHRUNG REALER SYSTEME UNTER VERWENDUNG VON PROZESSRECHNERN]**
Mohamed Shahata 1973 206 p refs In GERMAN
Avail: NTIS HC $13.50
A standardized technical control concept for on-line analysis and management of industrial processes is developed. Modern control principles as well as practical aspects of real processes and calculation techniques are considered in modelling and analyzing the real process. Transl. by G.G.

**N74-29531#** Arbeitsgemeinschaft fuer Datenverarb- eitung, Vienna (Austria).
**THE 4TH INTERNATIONAL CONGRESS ON DATA PROCESSING IN EUROPE [4. INTERNATIONALER KONGRESS "DATENVERARBEITUNG IM EUROPAISCHEN RAUM"]**
26 Oct. 1973 558 p refs In ENGLISH and GERMAN Conf. held at Innsbruck, 22-25 Oct. 1973
Avail: NTIS HC $31.00
Conference papers consider the various aspects of computer utilization in industrial processes and the economic effects and social impact of automatic information processes in production engineering. Transl. by G.G.

**N74-29541#** Leeds Univ. (England). Operational Research Unit.
**OPTIMAL PROJECT SCHEDULING UNDER MULTIPLE RESOURCE CONSTRAINTS**
Allan Humphreys and Thierry Scheurer May 1973 67 p refs (Rept-19) Avail: NTIS HC $6.50
A new dynamic programming type algorithm for optimal project scheduling under multiple resource constraints is presented. This procedure belongs to a class of algorithms whose common features are initially described in a unified approach. This common approach makes it possible to relate some important characteristics of the new algorithm to the corresponding characteristics of another algorithm in the same class, much more closely than could be done otherwise. Some of the results obtained so far from this comparison are given and proved. Author

**N74-29551#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
**PROBLEMS AND BASIC STAGES IN THE DESIGNING OF SYSTEMS FOR AUTOMATION OF EXPERIMENTS**
V. M. Vegipko 17 Apr. 1974 24 p refs Transl. into ENGLISH from Upravlyayushchie Sistemy Mashiny (USSR), no. 1, Sep. -Oct. 1972 p 71-78
(AD-778518; FTD-MT-24-542-74) Avail: NTIS CSCL 09/2
Systems for automation of experiments are analyzed and problems occurring in the design of such systems are discussed. E.J.O.

**N74-29609#** Environmental Protection Agency, Research Triangle Park, N.C.
**[DESIGN AND OPERATION OF NATIONAL ENVIRONMENTAL RESEARCH CENTER] Annual Report, 1972**
Jun. 1973 85 p
Avail: NTIS HC $7.25

The mission, history, organization, and activities of the center are discussed. The Community Health and Environmental Surveillance System and the Regional Pollution Study are emphasized. Individual laboratories of the center are described in detail. E.J.O.

**N74-30102#** Lincoln Lab., Mass. Inst. of Tech., Lexington.
**PROVISIONAL DATA LINK INTERFACE STANDARD FOR THE DABS TRANSPONDER Project Report**
G. V. Colby, P. H. Robeck, and J. D. Welch 25 Apr. 1974 23 p refs
(Contract DOT-FA72WAI-261; FAA Proj. 034-241-012)
(AD-778144; ATC-34; FAA-RD-74-64) Avail: NTIS CSCL 17/7

The document specifies provisional data link interface standards for the DABS transponder. It describes the function, timing, and electrical properties of the signals flowing to and from both the Standard Message Interface and the Extended Length Message Interface. Author (GRA)

**N74-30103#** Lincoln Lab., Mass. Inst. of Tech., Lexington.
**PROVISIONAL MESSAGE FORMATS FOR THE DABS/NAS INTERFACE**
D. Reiner and H. F. Vandevenne 25 Apr. 1974 41 p refs
(Contract DOT-FA72WAI-261)
(AD-778450; ATC-33; FAA-RD-74-63) Avail: NTIS CSCL 17/7

The document defines formats for messages which are to be transmitted between Discrete address Beacon System (DABS) and National Airspace System (NAS) facilities (en route or terminal). These messages include one-way Surveillance Reports to NAS and two-way Communications Messages. The latter support data link functions between NAS and DABS-equipped aircraft, as well as aiding in the monitoring and control of DABS sensors. These message formats will be used in the design and construction of interface equipment and ground data links for prototype system test and evaluation at NAFEC during Phase II of the DABS Development Program; and, with modifications resulting from this test and evaluation effort, will form the basis for the operational implementation of DABS. Author (GRA)

**N74-30300*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB LESSONS LEARNED**
Jul. 1974 74 p
(NASA-TM-X-64860) Avail: NTIS HC $3.75 CSCL 22C

Key lessons learned during the Skylab Program that could have impact on on-going and future programs are presented. They present early and sometimes subjective opinions; however, they give insights into key areas of concern. These experiences from a complex space program management and space flight serve as an early assessment to provide the most advantage to programs underway. References to other more detailed reports are provided. Author

**N74-30305*#** North American Rockwell Corp., Downey, Calif. Space Div.
**SPACE SHUTTLE PHASE B. VOLUME 2: TECHNICAL SUMMARY Final Report**
15 Mar. 1972 134 p
(Contract NAS9-10960)
(NASA-CR-134353; MSC-03332-Vol-2) Avail: NTIS HC $9.75 CSCL 22B

A summary of the research in the space shuttle program is presented. Funding constraints, booster requirements, abort modes, launch configurations, environment impact, and test facility impacts are discussed. F.O.S.

**N74-30308*#** Grumman Aerospace Corp., Bethpage, N.Y.
**SPACE SHUTTLE SYSTEM PROGRAM DEFINITION. VOLUME 1: EXECUTIVE SUMMARY Final Report**
15 Mar. 1972 49 p
(Contract NAS9-11160)
(NASA-CR-134338; MSC-03824-Vol-1; B-35-43; RP-33) Avail: NTIS HC $5.50 CSCL 22B

A study for the selection of a low cost shuttle system for design and development was conducted. The objective of the final study was to examine and penetrate the major technical and cost issues affecting the choice of the following: (1) liquid propulsion recoverable or solid propulsion recoverable booster, (2) parallel burn/parallel mount or series burn/tandem mount configurations, and (3) payload weight and payload bay size of the orbiter. The matrix of program options which were considered in the study is developed. Author

**N74-30379*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**A MANAGEMENT INFORMATION SYSTEM MODEL FOR PROGRAM MANAGEMENT Ph.D. Thesis - Oklahoma State Univ.**
David Leon Shipman 28 Jul. 1972 85 p refs
(NASA-TM-X-70230) Avail: NTIS HC $7.25 CSCL 05B

The development of a model to simulate the information system of a program management type of organization is reported. The model statistically determines the following parameters: type of messages, destinations, delivery durations, type processing, processing durations, communication channels, outgoing messages, and priorites. The total management information system of the program management organization is considered, including formal and informal information flows and both facilities and equipment. The model is written in General Purpose System Simulation 2 computer programming language for use on the Univac 1108, Executive 8 computer. The model is simulated on a daily basis and collects queue and resource utilization statistics for each decision point. The statistics are then used by management to evaluate proposed resource allocations, to evaluate proposed changes to the system, and to identify potential problem areas. The model employs both empirical and theoretical distributions which are adjusted to simulate the information flow being studied. Author

**N74-30384#** Federal Power Commission, Washington, D.C.
**GUIDELINES FOR ENERGY CONSERVATION FOR IMMEDIATE IMPLEMENTATION; SMALL BUSINESS AND LIGHT INDUSTRIES**
Feb. 1974 25 p
(FPC/OCE/1) Avail: NTIS HC $4.25

Short term measures to improve the efficiency of fuel utilization by small business concerns and light industry are recommended for particular use during the energy crisis of the Winter of 1974. A course of action is considered that implements the following: (1) control of plant space heating; (2) maintenance and adjustment of combustion equipment; (3) adoption of effective process controls; and (4) modification and upgrading of existing equipment. Detailed guidelines are presented which contain information on the specific item to be improved or modified, how energy conservation for that item is attained, how long it will take to implement the measure, and the estimated energy savings involved. A list of professional resources is included to aid management in finding qualified assistance for initiating their own effective energy conservation program. A.A.D.

**N74-30386#** Committee on Finance (U. S. Senate).
**ENERGY WINDFALL PROFITS**

Washington GPO 1974 131 p Hearings on Section 110 of S. 2589 before Comm. on Finance, 93d Congr., 2d Sess., 22-23 Jan. 1974
(GPO-28-102) Avail: Comm. on Finance

Testimony relevant to Congressional considerations of a proposal to tax excess or windfall profits in the energy sector is presented. The problems of administration of such a bill, including development of regulations, rulings, and litigation guidelines, are discussed. Corporate management procedures with respect to compliance with the proposed bill are also considered. A definition of income subject to windfall profits tax is submitted, and general debate includes a discussion of Internal Revenue Service precedents, the probable impact on gasoline and fuel allocations, and the world oil supplies issue. The possibility that a profits tax would discourage domestic energy production is also discussed. A.A.D.

**N74-30388#** Committee on Appropriations (U. S. House).
**DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, SPACE, SCIENCE, VETERANS, AND CERTAIN OTHER INDEPENDENT AGENCIES APPROPRIATION BILL, 1975**
Boland Washington GPO 1974 44 p Rept. to accompany H.R. 15572 presented by the Comm. on Appropriations at the 93d Congr., 2d sess., 21 Jun. 1974
(H-Rept-93-1139; GPO-99-006) Avail: US Capitol, Senate Document Room

The committee report to the house is presented. The appropriations for 1974, and the budget estimates for 1975 are discussed for housing, disaster relief, mortages, NASA, and Veterans Administration. F.O.S.

**N74-30392*#** Boston Coll., Chestnut Hill, Mass. Management Inst.
**DETERMINANTS OF PROJECT SUCCESS**
David Charles Murphy, Bruce N. Baker, and Dalmar Fisher 1974 178 p refs
(Grant NGR-22-003-028)
(NASA-CR-139407) Avail: NTIS HC $12.00 CSCL 05A

The interactions of numerous project characteristics, with particular reference to project performance, were studied. Determinants of success are identified along with the accompanying implications for client organization, parent organization, project organization, and future research. Variables are selected which are found to have the greatest impact on project outcome, and the methodology and analytic techniques to be employed in identification of those variables are discussed. A.A.D.

**N74-30397#** Atomic Energy of Canada Ltd., Chalk River (Ontario).
**CHEMISTRY AND MATERIALS DIVISION Progress Report, 1 Jul. - 30 Sep. 1973**
Nov. 1973 113 p refs
(AECL-4671; PR-CMA-26) Avail: AEC Depository Libraries HC $7.75; Atomic Energy of Can., Ltd., Chalk River $2.00

Progress by the following organizations is reported: solid state science branch, general chemistry branch, physical chemistry branch, materials science branch, McMaster Univ., B. C. Univ., Ottawa Univ., Western Ontario Univ., and Guelph Univ. Separate abstracts were reported for the branches. Significant results reported by the universities include: creep of Zr; thermal desorption of H2 from Pt; current-potential relations of Pt electrodes and additive effects (cyanoguanidine, urea); H/D separation factor at Pt in aqueous urea; oxidation-resistant coatings for Zr alloys; positron studies of recovery of Ni and other metals; and positron lifetime spectra of Co. Author (NSA)

**N74-30398#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
**A MULTI-PROJECT SCHEDULING PROGRAM FOR THE 4950TH TEST WING M.S. Thesis**
David R. Shearin and Ronald E. Smith Feb. 1974 128 p refs
(AD-778874; GSA/SM/74-11) Avail: NTIS CSCL 15/5

The study is an attempt to develop a multi-project computer scheduling program for the 4950th Test Wing at Wright-Patterson AFB, Ohio. An investigation of the test wing was made to gather information needed to model the flight testing operation. The model uses preliminary planning estimates of manpower and time along with priority rankings as inputs to the computer program. The wing is modeled as a complex system of single line multiple server queues, and the computer is programmed in the GPSS language. The standard GPSS computer output can be used to determine probable project completion dates, resource utilization and efficient allocation, and the effects of various priority decisions. (Modified author abstract) GRA

**N74-30402#** Massachusetts Inst. of Tech., Cambridge. Energy Lab.
**TESTIMONY BEFORE THE SUBCOMMITTEE ON ENERGY OF THE COMMITTEE ON SCIENCE AND ASTRONAUTICS, HOUSE OF REPRESENTATIVES**
David C. White 23 Jul. 1973 8 p
(Grant NSF GI-32874)
(PB-227885/1; NSF-RA/N-73-048) Avail: NTIS HC $4.00 CSCL 10A

Recommendations were made that House Bills H.R. 8348 and H.R. 9133 be modified and amplified to include the following general operational features (1) specific ties to mission-oriented agencies such as the proposed ERDA with line item funding for long term core programs of research and special funding for facility development; (2) special authority to involve industry in R and D programs through both joint funding and cooperative programs to assure rapid reduction of research to practice and effective transfer to the industrial sector; (3) the establishment of a limited number of major research laboratories to supplement the National Laboratories with a clear mission for each; and (4) high level government and industry overview committees that will maintain funding and enhance a strong independent management of the research facility. GRA

**N74-30451#** Wyoming Univ., Laramie. Water Resources Research Inst.
**COAL-ENERGY DEVELOPMENT IN THE NORTHERN GREAT PLAINS**
Jack R. Davidson Oct. 1973 137 p Prepared in cooperation with North Dakota State Univ. and Montana State Univ., Bozeman Sponsored by the Office of Water Resources Research
(PB-231560/4; OWRR-B-024-WYO(1); W74-07056) Avail: NTIS HC $4.75 CSCL 13B

The growth demand for clean energy has focused attention on western coals, particularly the extensive lignite and subbituminous deposits in the Northern Great Plains. The Fort Union Powder River Coal beds, which underlie a large part of northern Wyoming, southeastern Montana and western North Dakota offer the greatest potential for development, because of the vast quantities of coal which can be strip mined. The U.S. Government has undertaken to assess coal/energy development problems through the Northern Great Plains Resources Program (NGPRP). The Water Resource Research Institutes of the three-state area, together with the Office of Water Resources Research, undertook the following tasks; to determine the study needs, to inventory current research efforts and to assess their potential contribution, to establish the priorities for study as seen by the decision makers in the three states, and to assess the capacity of the region's scientists to carry out the needed studies. Eight categories for study were identified; trace elements; atmospheric effects; surface resources (including reclamation); coal resources and mining techniques; water (including water quality); economic and social issues; institutional and legal issues; and technology development. GRA

**N74-30490*#** Technology, Inc., Houston, Tex. Life Sciences Div.

**SKYLAB FOOD SYSTEM LABORATORY SUPPORT Final Report, 1 May 1972 - 30 Jun. 1974**
Dennis Sanford 30 Jun. 1974 65 p
(Contract NAS9-12926)
(NASA-CR-134380) Avail: NTIS HC $6.25 CSCL 06H

A summary of support activities performed to ensure the quality and reliability of the Skylab food system design is reported. The qualification test program was conducted to verify crew compartment compatibility, and to certify compliance of the food system with nutrition, preparation, and container requirements. Preflight storage requirements and handling procedures were also determined. Information on Skylab food items was compiled including matters pertaining to serving size, preparation information, and mineral, calorie, and protein content. Accessory hardware and the engraving of food utensils were also considered, and a stowage and orientation list was constructed which takes into account menu use sequences, menu items, and hardware stowage restrictions. A food inventory system was established and food thermal storage tests were conducted. Problems and comments pertaining to specific food items carried onboard the Skylab Workshop were compiled. A.A.D.

**N74-30492*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE/FOOD SYSTEM STUDY. VOLUME 2, APPENDIX A: ACTIVE HEATING SYSTEM-SCREENING ANALYSIS. APPENDIX B: RECONSTITUTED FOOD HEATING TECHNIQUES ANALYSIS Final Report**
[1974] 170 p
(Contract NAS9-13138)
(NASA-CR-134375) Avail: NTIS HC $11.50 CSCL 06H

Technical data are presented which were used to evaluate active heating methods to be incorporated into the space shuttle food system design, and also to evaluate the relative merits and penalties associated with various approaches to the heating of rehydrated food during space flight. Equipment heating candidates were subject to a preliminary screening performed by a selection rationale process which considered the following parameters: (1) gravitational effect; (2) safety; (3) operability; (4) system compatibility; (5) serviceability; (6) crew acceptability; (7) crew time; (8) development risk; and (9) operating cost. A hot air oven, electrically heated food tray, and microwave oven were selected for further consideration and analysis. Passive, semi-active, and active food preparation approaches were also studied in an effort to determine the optimum method for heating rehydrated food. Potential complexity, cost, vehicle impact penalties, and palatability were considered in the analysis. A summary of the study results is provided along with cost estimates for each of the potential sytems A.A.D.

**N74-30493*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE/FOOD SYSTEM. VOLUME 2, APPENDIX C: FOOD COOLING TECHNIQUES ANALYSIS. APPENDIX D: PACKAGE AND STOWAGE: ALTERNATE CONCEPTS ANALYSIS**
[1974] 151 p
(Contract NAS9-13138)
(NASA-CR-134376) Avail: NTIS HC $10.75 CSCL 06H

The relative penalties associated with various techniques for providing an onboard cold environment for storage of perishable food items, and for the development of packaging and vehicle stowage parameters were investigated in terms of the overall food system design analysis of space shuttle. The degrees of capability for maintaining both a 40 F to 45 F refrigerated temperature and a 0 F and 20 F frozen environment were assessed for the following cooling techniques: (1) phase change (heat sink) concept; (2) thermoelectric concept; (3) vapor cycle concept; and (4) expendable ammonia concept. The parameters considered in the analysis were weight, volume, and spacecraft power restrictions. Data were also produced for packaging and vehicle stowage parameters which are compatible with vehicle weight and volume specifications. Certain assumptions were made for food packaging sizes based on previously generated space shuttle menus. The results of the study are shown, along with the range of meal choices considered. A.A.D.

**N74-30494*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE/FOOD SYSTEM STUDY. VOLUME 2, APPENDIX F: FLIGHT FOOD AND PRIMARY PACKAGING Final Report**
[1974] 252 p
(Contract NAS9-13138)
(NASA-CR-134378) Avail: NTIS HC $15.75 CSCL 06H

The analysis and selection of food items and primary packaging, the development of menus, the nutritional analysis of diet, and the analyses of alternate food mixes and contingency foods is reported in terms of the overall food system design for space shuttle flight. Stowage weights and cubic volumes associated with each alternate mix were also evaluated. Author

**N74-30495*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE/FOOD SYSTEM STUDY. VOLUME 2, APPENDIX G: GROUND SUPPORT SYSTEM ANALYSIS. APPENDIX H: GALLEY FUNCTIONAL DETAILS ANALYSIS**
[1974] 60 p
(Contract NAS9-13138)
(NASA-CR-134379) Avail: NTIS HC $6.00 CSCL 06H

The capabilities for preflight feeding of flight personnel and the supply and control of the space shuttle flight food system were investigated to determine ground support requirements; and the functional details of an onboard food system galley are shown in photographic mockups. The elements which were identified as necessary to the efficient accomplishment of ground support functions include the following: (1) administration; (2) dietetics; (3) analytical laboratories; (4) flight food warehouse; (5) stowage module assembly area; (6) launch site module storage area; (7) alert crew restaurant and disperse crew galleys; (8) ground food warehouse; (9) manufacturing facilities; (10) transport; and (11) computer support. Each element is discussed according to the design criteria of minimum cost, maximum flexibility, reliability, and efficiency consistent with space shuttle requirements. The galley mockup overview illustrates the initial operation configuration, food stowage locations, meal assembly and serving trays, meal preparation configuration, serving, trash management, and the logistics of handling and cleanup equipment. A.A.D.

**N74-30705*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**THIRD EARTH RESOURCES TECHNOLOGY SATELLITE-1 SYMPOSIUM. VOLUME 1: TECHNICAL PRESENTATIONS, SECTION A**
Stanley C. Freden, comp., Enrico P. Mercanti, comp., and Margaret A. Becker, comp. Washington 1974 992 p refs Symp. held at Washington, D. C., 10-14 Dec. 1973
(NASA-SP-351-Vol-1-Sect-A) Avail: NTIS MF $1.45; SOD HC $16.80 per set of sections A and B CSCL 05B

Papers presented at the Third Symposium on Significant Results Obtained from the first Earth Resources Technology Satellite covered the areas of: agriculture, forestry, range resources, land use, mapping, mineral resources, geological structure, landform surveys, water resources, marine resources, environment surveys, and interpretation techniques.

**N74-30731*** Minnesota Univ., Minneapolis.
**ERTS-1 ROLE IN LAND MANAGEMENT AND PLANNING IN MINNESOTA**
Joseph E. Sizer (Minn. State Planning Agency) and Dwight Brown *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A. 1974 p 341-350

(Paper-L3) CSCL 08B

Research on applications of ERTS-1 imagery to land use has focused on evaluating the ability of ERTS-1 imagery to update and refine the detail of land use information in the Minnesota Land Management Information System. Work has been directed toward defining the capabilities of the ERTS-1 system to provide information about surface cover by identifying forest, water, and wetland resources; urban and agricultural development: and testing and evaluating data input and output procedures. As capabilities were developed, meetings were held with administrators and resource information users from various agencies of government to identify their information needs. A full scale systems test for several selected pilot areas in the state is nearly complete. Users have been identified for each test area and they have been instrumental in identifying data requirements and analysis needs for administrative purposes. Users have both rural and urban orientations and provide a basis for evaluation of the results. Author

**N74-30733*** Dartmouth Coll., Hanover, N.H. Project in Remote Sensing.
**EVALUATION OF ERTS-1 DATA FOR ACQUIRING LAND USE DATA OF NORTHERN MEGALOPOLIS**
Robert B. Simpson, David T. Lindgren, and William D. Goldstein *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 371-381

(Paper-L5) CSCL 08B
State planners are increasingly becoming interested in ERTS as a possible method for acquiring land use data. An important consideration to them is whether ERTS can provide such data at a savings in both time and money over alternative systems. A preliminary evaluation of ERTS as a planning tool is given. Author

**N74-30735*** Geological Survey, Washington, D.C. Geographic Applications Program.
**CHANGE IN LAND USE IN THE PHOENIX (1:250,000) QUADRANGLE, ARIZONA BETWEEN 1970 AND 1973: ERTS AS AN AID IN A NATIONWIDE PROGRAM FOR MAPPING GENERAL LAND USE**
John L. Place *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 393-423

(Paper-L7) CSCL 08B
Changes in land use between 1970 and 1973 in the Phoenix (1:250,000 scale) Quadrangle in Arizona have been mapped using only the images from ERTS-1, tending to verify the utility of a standard land use classification system proposed for use with ERTS images. Types of changes detected have been: (1) new residential development of former cropland and rangeland; (2) new cropland from the desert; and (3) new reservoir fill-up. The seasonal changing of vegetation patterns in ERTS has complemented air photos in delimiting the boundaries of some land use types. ERTS images, in combination with other sources of information, can assist in mapping the generalized land use of the fifty states by the standard 1:250,000 quadrangles. Several states are already working cooperatively in this type of mapping. Author

**N74-30736*** Wisconsin Univ., Madison. Environmental Monitoring and Data Acquisition Group.
**THE APPLICATION OF ERTS-1 DATA TO THE LAND USE PLANNING PROCESS**
James L. Clapp, Ralph W. Kiefer, Edward L. Kuhlmey, and Bernard J. Niemann, Jr. *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 425-438

(Paper-L8) CSCL 08B
Land resource data has been extracted on a percent of cell basis from ERTS imagery, RB-57 color infrared imagery and best available conventional sources for a 10,000 square kilometer test area in eastern Wisconsin. First, the data from the three sources is compared on a spatial basis for a 300 square kilometer portion of the test area. For those land resource variables associated with cover, ERTS derived resource data compared favorably with both the RB-57 and conventional data. Second, the effect of the data source on land use decisions is examined. Three interstate highway corridors are located through the same region based upon data extracted from each of the three sources. A policy of preserving natural environmental systems was used as a basis for the corridors selection in each case. The resulting three corridors compare favorably. Author

**N74-30740*** New Jersey Dept. of Environmental Protection, Trenton.
**IMPACT OF ERTS-1 IMAGES ON MANAGEMENT OF NEW JERSEY'S COASTAL ZONE**
Edward B. Feinberg, Roland S. Yunghans, JoAnn Stitt, and Robert L. Mairs (Earth Satellite Corp., Washington, D. C.) *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 497-503
(Paper-L12) CSCL 08B
The thrust of New Jersey's ERTS investigation is development of procedures for operational use of ERTS-1 data by the Department of Environmental Protection in the management of the State's coastal zone. Four major areas of concern were investigated: detection of land use changes in the coastal zone; monitoring of offshore waste disposal; siting of ocean outfalls; and allocation of funds for shore protection. ERTS imagery was not useful for shore protection purposes; it was of limited practical value in the evaluation of offshore waste disposal and ocean outfall siting. However, ERTS imagery shows great promise for operational detection of land use changes in the coastal zone. Some constraints for practical change detection have been identified. Author

**N74-30741*** Geological Survey, Reston, Va. Geographic Applications Program.
**CARETS: AN EXPERIMENTAL REGIONAL INFORMATION SYSTEM USING ERTS DATA**
Robert H. Alexander *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 505-522 refs

(Paper-L13) CSCL 08F
The U. S. Geological Survey CARETS (Central Atlantic Regional Ecological Test Site)/ERTS investigation is testing the applicability of ERTS data as input to an environmental information system for a multi-state mid-Atlantic region surrounding the Chesapeake and Delaware Bays. The information system framework encompasses a flow of information through several stages from sensor to user, and involving evaluation and feedback from several potential users. Basic assumptions of the CARETS project model are that there is a measurable environmental impact associated with land use and land use change as determined with remote sensor data, and that the ERTS derived land use data sets, when properly calibrated, may thus provide regional planners and administrators with a shortcut to an understanding of the environmental changes that are going on in their regions. Author

**N74-30747*** Wyoming Univ., Laramie. Dept. of Geology.
**APPLICATION OF THE ERTS SYSTEM TO THE STUDY OF WYOMING RESOURCES WITH EMPHASIS ON THE USE OF BASIC DATA PRODUCTS**
Robert S. Houston, Ronald W. Marrs, Roy M. Breckenridge, and D. L. Blackstone, Jr. *In* NASA. Goddard Space Flight Center 3d ERTS-1 Symp., Vol. 1, Sect. A 1974 p 595-619 refs

(Paper-G1) CSCL 08G
Many potential users of ERTS data products and other aircraft and satellite imagery are limited to visual methods of analyses of these products. Illustrations are presented from Wyoming

studies that have employed these standard data products for a variety of geologic and related studies. Possible economic applications of these studies are summarized. Studies include regional geologic mapping for updating and correcting existing maps and to supplement incomplete regional mapping; illustrations of the value of seasonal images in geologic mapping; specialized mapping of such features as sand dunes, playa lakes, lineaments, glacial features, regional facies changes, and their possible economic value; and multilevel sensing as an aid in mineral exploration. Examples of cooperative studies involving botanists, plant scientists, and geologists for the preparation of maps of surface resources that can be used by planners and for environmental impact studies are given. Author

**N74-30774*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**THIRD EARTH RESOURCES TECHNOLOGY SATELLITE-1 SYMPOSIUM. VOLUME 1: TECHNICAL PRESENTATIONS, SECTION B**
Stanley C. Freden, comp., Enrico P. Mercanti, comp., and Margaret A. Becker, comp. Washington 1974 936 p refs Symp. held at Washington, D. C., 10-14 Dec. 1973
(NASA-SP-351-Vol-1-Sect-B) Avail: NTIS MF $1.45; SOD HC $16.80 per set of sections A and B CSCL 05B

**N74-30964*#** National Aeronautics and Space Administration, Washington, D.C.
**MACHINE TOOLS AND FIXTURES: A COMPILATION Technology Utilization**
[1974] 27 p
(NASA-SP-5910(05)) Avail: NTIS HC $1.00 CSCL 13I
Innovations developed by NASA, AEC, and their contractors concerning tools, adaptors, jigs, and fixtures useful in machining a wide variety of materials are presented. A.L.

**N74-31087#** RAND Corp., Santa Monica, Calif.
**SAN DIEGO CLEAN AIR PROJECT: SUMMARY REPORT**
Bruce F. Goeller et al Dec. 1973 144 p refs Sponsored by San Diego County and EPA
(R-1362-SD) Avail: NTIS HC $10.25
The San Diego Clean Air Project was undertaken to analyze alternative air pollution control strategies in terms of their various environmental, transportational, economic, and distributional impacts on San Diego, and to identify the most promising strategy for implementation. An overall strategy for the region, termed a mixed strategy, combines three types of pure strategy: (1) fixed-source controls (including aircraft because their significant emissions occur at or near airports); (2) retrofit devices and inspection/maintenance policies for light-duty motor vehicles; and (3) transportation management. A screening process was employed to compare prospective pure and mixed strategies as to their cost effectiveness and efficiency in reducing emissions, primarily of reactive hydrocarbons, the most serious pollutant in San Diego County. Nominal, medium, and maximal fixed-source control strategies are identified along with 28 possible retrofit strategies. Tentative decisions are reported and the problems in planning and implemantation of the project are outlined. Author

**N74-31093#** RAND Corp., Santa Monica, Calif.
**SAN DIEGO CLEAN AIR PROJECT: EXECUTIVE SUMMARY**
Bruce F. Goeller et al Dec. 1973 19 p Sponsored by San Diego County and EPA
(R-1362/1-SD) Avail: NTIS HC $4.00

A final summary of the planning stage of the San Diego Clean Air Project is presented which decribes the methodology used to obtain a feasible pollution control program which represents a balanced combination of pure and mixed strategies. A screening process was employed to create models for evaluation and implementation of the following: (1) fixed-source controls (including aircraft); (2) retrofit devices and inspection/maintenance policies for light-duty motor vehicles; and (3) transportation management. Tentative decisions are reported and the problems in planning and implementation of the project are discussed.
Autho

**N74-31330*#** North American Rockwell Corp., Downey, Calif. Space Div.
**SPACE SHUTTLE PHASE B. VOLUME 1: EXECUTIVE SUMMARY Final Report**
15 Mar. 1972 32 p
(Contract NAS9-10960)
(NASA-CR-134352; SD-72-SH-0012-1-Vol-1; MSC-03332-Vol-1) Avail: NTIS HC $4.75 CSCL 22B
A study was conducted to identify the differences among total system concepts of space shuttle configurations. Emphasis was placed on concepts that lead to selection of a system that performs the missions within budget and schedule constraints. The spectrum of launch vehicle configurations is illustrated. An inboard profile of the spacecraft is presented to show the interior arrangement of the major subsystems. The performance prediction of the spacecraft during specified portions of the mission is analyzed. A cost comparison of the various concepts is included. Author

**N74-31334*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB APOLLO TELESCOPE MOUNT**
A. R. Morse 28 Jun. 1974 429 p
(NASA-TM-X-64811) Avail: NTIS HC $9.00 CSCL 22B
A technical history and management critique of the Skylab Apollo Telescope Mount (ATM) from initial conception through the design, manufacturing, testing and prelaunch phases is presented. A mission performance summary provides a general overview of the ATM's achievements in relationship to its design goals. Recommendations and conclusions applicable to hardware design, test program philosophy and performance, and program management techniques for the ATM with potential application to future programs are also discussed. Author

**N74-31338#** Rockwell International Corp., Canoga Park, Calif.
**SPACE SHUTTLE: AN OPPORTUNITY FOR UNIVERSITY RESEARCH**
[1974] 8 p
Avail: NTIS HC $4.00
The advantages of using the space shuttle as a carrier of university experiments are discussed in terms of cost benefits, length and frequency of flights, multiplicity of payload capabilities, and direct onboard experimental control. A typical university research experiment is described as an example of the uses versus the alternatives of space shuttle flight, and typical problem areas are identified which would lend themselves successfully to shuttle operations. The direct implications of cooperation for both the university and for the space shuttle program are defined. A.A.D.

**N74-31339#** Rockwell International Corp., Canoga Park, Calif.
**SPACE SHUTTLE: THE TIMING IS RIGHT**
[1971] 16 p
Avail: NTIS HC $4.00
The capabilities provided by the space shuttle program are interpreted within the larger realms of societal needs and

technological evolution. The missions most applicable to this interpretation are identified and include the following: (1) information transmission via shuttle-delivered and maintained satellite networks; (2) earth resources surveillance; (3) launch support for an earth services satellite network; and (4) the shuttle-compatible power relay satellite system for efficient global power transmission and distribution. Certain direct contributions of space shuttle operations to the economic posture of the U.S. in world trade are also discussed. Space shuttle capabilities are seen as instrumental to national growth and problem solving for the next two decades. A.A.D.

**N74-31391*#** Southeastern State Coll., Durant, Okla. Technology Use Studies Center.
**TECHNOLOGY UTILIZATION IN A NON-URBAN REGION: FURTHER IMPACT AND TECHNIQUE OF THE TECHNOLOGY USE STUDIES CENTER Final Report**
C. Henry Gold, A. M. Moore, Bill Dodd, and Velma Dittmar Jun. 1974 82 p
(Contract NASw-2512)
(NASA-CR-139565) Avail: NTIS HC $7.25 CSCL 05A

Updated information pertaining to clients who receive and use information disseminated by the Technology Use Studies Center (TUSC) is reported. Charts are provided which indicate TUSC's performance in information dissemination and technical assistance in terms of quantities of searches accomplished during several contract years. The faculty information service is described, along with details of cooperation with other agencies. Specific searches are listed according to subject, client, and client location, and a measure of client response to services provided is indicated by the included selection of transfer and impact reports. The impetus behind the formation of the general aviation news letter is also described. A.A.D.

**N74-31393#** Environmental Protection Agency, Washington, D.C.
**A STATEMENT OF POLICY FOR IMPLEMENTING THE REQUIREMENTS OF THE 1972 FEDERAL WATER POLLUTION CONTROL ACT AMMENDMENTS AND CERTAIN REQUIREMENTS OF THE 1972 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT Water Quality Strategy Paper**
15 Mar. 1974 90 p
Avail: NTIS HC $7.50

Near and long range views are presented for water pollution control. Goals are projected for FY-75 along with a broader perspective for 1983. Water quality standards and toxic effluent standards are described with program and management planning for water pollution control. M.C.F.

**N74-31394#** Committee on Appropriations (U. S. House).
**SPECIAL ENERGY RESEARCH AND DEVELOPMENT APPROPRIATIONS BILL FOR 1975. PART 1: DEPARTMENT OF THE INTERIOR**
Washington GPO 1974 977 p refs Hearings before Subcomm. of the Comm. on Appropriations, 93d Congr., 2d Sess., 11 Feb. 1974, 4 Mar. 1974, 5 Mar. 1974
(GPO-29-514) Avail: Subcomm. on the Dept. of the Interior and related agencies

An overview of energy programs within the Department of Interior was presented in a Congressional hearing called to hear testimony on the Trans-Alaska Pipeline, development of the Outer Continental Shelf, remote sensing of mineral resources, and research in the efficient extraction, conversion, and use of geothermal energy, oil shale, coal, and natural gas. Short term considerations, intermediate tasks, and long term strategy are discussed for the Federal Energy Office, Geological Survey, Office of Coal Research, and the Bureau of Mines. Budget figures, specific programs, management structure, and contracts are described for each organization, and rationales are given for each of their various contributions towards a unified national program in energy research and development. Fuel allocation, foreign trade, market considerations, oil and gas programs, and energy conservation and analysis are discussed in light of current and expected per capita energy demand in the U.S. strip mining, mine health and safety, and mine waste management are also considered along with debate concerning possible adjustment of the Federal Energy Budget. A.A.D.

**N74-31396#** Committee on Appropriations (U. S. Senate).
**DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT; SPACE, SCIENCE, VETERANS, AND CERTAIN OTHER INDEPENDENT AGENCIES APPROPRIATIONS BILL, 1975**
William Proxmire Washington GPO 15 Aug. 1974 55 p Rept. to accompany H. R. 15572 presented by the Comm. on Appropriations at the 93d Congr., 2d Sess., 15 Aug. 1974
(S-Rept-93-1091; GPO-38-010) Avail: US Capitol, Senate Document Room

A report is presented from the Committee recommending a budget for the Department of Housing and Urban Development, the National Aeronautical and Space Adminstration, the National Science Foundation, the Veterans Administration and eight other independent agencies. M.C.F.

**N74-31397#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**TECHNOLOGY RESOURCES SURVEY AND APPLICATIONS ACT**
Washington GPO 1974 159 p Hearings on S. 2495 before Comm. on Aeronaut. and Space Sci. and the Comm. on Commerce, 93d Congr., 2d Sess., 11 Mar., 21 Mar. 1974 Prepared in cooperation with Comm. on Commerce (U. S. Senate)
(GPO-32-205) Avail: SOD HC $1.40

A Congressional hearing was conducted concerning legislation to provide for more effective utilization of the scientific and technological resources of the United States in the solution of critical domestic problems. The organization and functions of a Federal Council for Science and Technology are discussed. The establishment of an Office of Technology Application within the National Aeronautics and Space Administration is recommended. The organization, functions, and funding of the Office of Technology Application are reported. Author

**N74-31407#** Naval Research Lab., Washington, D.C.
**REPORT OF NRL PROGRESS**
Sep. 1973 94 p refs
(PB-229392/6) Avail: NTIS HC $3.75 CSCL 05B

Activities of the Naval Research Lab are reported for its use as a central information computer facility. Scientific programs include: acoustics, chemistry, communication sciences, ocean technology, and nuclear and atomic physics. M.C.F.

**N74-31408#** Transportation Systems Center, Cambridge, Mass.
**FREIGHT TRANSPORTATION INFORMATION SYSTEMS AND THEIR IMPLICATIONS FOR R AND D POLICY Final Report, Jan. - Oct. 1972**
Kenneth F. Troup Mar. 1974 86 p refs
(PB-231049/8; DOT-TSC-OST-73-10) Avail: NTIS HC $4.00 CSCL 13F

The current use of computerized management information and control systems in intercity freight transportation is examined.

Each of the four modes (railroad, motor carrier, maritime and air cargo industries) is investigated. In each case, computer information systems can help improve the operational efficiency of the mode and provide management (and regulators) with more accurate data for decision making. The intermodal data standard and exchange problem is also discussed. Appropriate recommendations for DOT research and development policy are made. These include development of a national railroad management system, development of terminal control systems for railroad yards and intermodal terminals, support to development of a maritime industry information system and increased effort in the area of data facilitation. GRA

**N74-31458#** Advisory Group for Aerospace Research and Development, Paris (France).
**AIRCRAFT DESIGN INTEGRATION AND OPTIMIZATION, VOLUME 1**
Jun. 1974 347 p refs In ENGLISH; partly in FRENCH Conf. held at Florence, Italy, 1-4 Oct. 1973
(AGARD-CP-147-Vol-1) Avail: NTIS HC $20.50

The proceedings of a conference on aircraft design integration and optimization are presented. The subjects discussed include the following: (1) the preliminary design process and its impact on cost, (2) methods and approaches for balancing requirements, capabilities, and costs in aircraft design, (3) analysis, optimization, and validation testing techniques, and (4) the integration of subsystems and application of new technology.

**N74-31459** Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
**THE ROLE OF PRELIMINARY DESIGN IN REDUCING DEVELOPMENT, PRODUCTION AND OPERATIONAL COSTS OF AIRCRAFT SYSTEMS**
William E. Lamar *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 7 p

Methods for reducing the development, production, and operational costs of aircraft systems through preliminary design procedures are discussed. The manner in which the preliminary design process is conducted is analyzed. The critical program decisions which are made on the basis of the preliminary design process are identified. The preliminary process is further defined to show the application for assessing the payoff of technical innovations and emerging technologies on system capabilities. Diagrams are provided to show the preliminary design flow chart, system program phases, preliminary design process uses, and cost reduction methodologies. Author

**N74-31460** General Dynamics/Fort Worth, Tex.
**PRELIMINARY DESIGN ASPECTS OF DESIGN-TO-COST FOR THE YF-16 PROTOTYPE FIGHTER**
William C. Dietz *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 16 p

Methods for reducing the development costs of the YF-16 aircraft are discussed. The YF-16 prototype aircraft was conceived and is being developed as a low-cost, exceptionally high-maneuvering-performance fighter aircraft. To meet the cost/performance objectives, a number of advanced technology features, including vortex lift, variable wing camber, wing/body blending, relaxed static stability/fly-by-wire, and high-performance normal-shock inlet, were optimized and integrated during the preliminary design phase. The basic design concept was to apply these advanced technologies in a way, first, to produce a small-size aircraft and, second to achieve simplicity - both of these design objectives having a direct beneficial effect on the development, acquisition, and life-cycle cost. The resulting configuration is predicted to meet all program cost/performance objectives. Author

**N74-31461** Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
**ECONOMIC ASPECTS OF PROTOTYPING**
Erich Rutzen *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 5 p refs

The cost aspects and schedule implications involved in a prototype development concept are compared with standardized development philosophies. The time scales of the total system development program and the time scales of the prototype development program are illustrated. The procedures involved in conducting a comparative cost analysis are reported. Diagrams are included to show the budget requirements, accumulated costs at program milestones, specifications uncertainties, and the confidence factor. Organizational charts for the total system development concept and the prototype development concept are also compared. Author

**N74-31462** Douglas Aircraft Co., Inc., Long Beach, Calif.
**CREATIVE ADVANCED DESIGN: A KEY TO REDUCED LIFE-CYCLE COSTS**
Richard E. Black and John A. Stern *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 13 p refs

Advanced design decisions with an impact upon the life cycle costs of aircraft systems are discussed. The impact of advanced design decisions commences during the detail design and development phases, continues into the production phase and becomes a dominant factor during the operational life of the aircraft system. Even for a well defined mission there are many factors bearing on costs that must be considered during the advanced design phase. Several of these have been selected for examination: (1) the number of engines to be used, (2) selection of equipment and systems, (3) the simplification of design, (4) the materials to be used, and (5) the level of avionics sophistication. These advanced design decisions cannot be made solely from a technical or cost standpoint, but must consider the operational environment in which the aircraft system will function as well as the demands of the market place. There are strong indications that the more intense the advanced design effort the lower will be the detailed design, manufacturing and development costs as well as life cycle costs. During the advanced design phase, it is extremely important that the critical wind-tunnel tests be performed to avoid costly redesign after the detailed design drawings have been released. The contribution that creative Advanced Design makes to the development of effective aircraft systems has greatly increased as the result of rising costs. Errors in judgement are now more costly than ever before. Author

**N74-31463** Office National d'Etudes et de Recherches Aeronautiques, Paris (France).
**CRITICAL ANALYSES AND LABORATORY RESEARCH WORK AT THE STAGE OF AIRCRAFT PRELIMINARY DESIGN**
Claude Lievens and Philippe Poisson-Quinton *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 26 p ref In FRENCH; ENGLISH summary

The requirements to be met by a research laboratory in preparation for the preliminary design phase of sophisticated aircraft development are analyzed. It is stated that the research center must forecast the main trends of aeronautical techniques in order to provide the government services and the constructors with a maximum of information. The required actions of the government technical services are defined to include: (1) generation of preliminary studies for contractor use, (2) to begin basic research studies, (3) to identify technical risks, and (4) to monitor the progress of works under development and reorient the effort where required. Author

**N74-31464*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
**COMPUTERIZED PRELIMINARY DESIGN AT THE EARLY**

**STAGES OF VEHICLE DEFINITION**
Thomas J. Gregory *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 8 p refs

CSCL 01B

The conceptual and preliminary design processes are used to provide information regarding the feasibility and selection of various approaches to aircraft mission requirements. Decisions influenced by this information often have enormous cost implications at the later stages of the development process and during vehicle operation, yet the resources expended during the early phases are usually relatively small and distributed over several alternate approaches. The information provided during these early conceptual and preliminary design phases needs to be credible and complete, even though it must be generated with limited resources. Criteria for acceptance of early design information, modern methods of providing it and suggestions for defining adequate levels of resources to accomplish the objectives of the activity are described. Specific examples of the most difficult type of early design studies, which are those requiring significant undeveloped technology, are used to discuss these points. The examples include design studies and cost estimates of liquid hydrogen fueled aircraft, oblique winged aircraft, and remotely piloted vehicles. Author

**N74-31465** Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
**PRELIMINARY DESIGN TECHNIQUES FOR UNMANNED, REMOTE PILOTED VEHICLES**
R. Staufenbiel and H. Schmidtlein *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 14 p (For

The steps involved in the design of remotely piloted vehicles are discussed. Specific areas of concern are: (1) combat tactics, (2) weaponry, (3) sensors, (4) payload and range, (5) guidance and control, and (6) maintainability, storability, and vulnerability. The characteristics of a typical RPV are analyzed to provide an example of the important factors which are involved in the design procedure. Author

**N74-31466** Hawker Siddeley Aviation, Ltd., Hatfield (England).
**AN APPROACH TO DESIGN INTEGRATION**
Anthony W. Bishop and Alan N. Page *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 16 p refs

The nature of an aircraft design team and the techniques to be integrated into the organization to improve design efficiency are discussed. The structure and implementation of new techniques which have been applied to the preliminary stages of design in Hawker Siddeley Aviation are stressed. Block diagrams are developed to show the data base ,nechanism, the interaction between applications programs and the data base, and the flow of typical project study activities. The costs and benefits of the system of design are analyzed. Author

**N74-31467** Boeing Commercial Airplane Co., Seattle, Wash.
**DESIGN EVOLUTION OF THE BOEING 2707-300 SUPERSONIC TRANSPORT. PART 1: CONFIGURATION DEVELOPMENT, AERODYNAMICS, PROPULSION, AND STRUCTURES**
W. C. Swan *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 18 p

The design activities involved in developing the Boeing 2707 supersonic transport aircraft are discussed. The history of the design activity is presented to show areas where failure and/or misconception occurred due to insufficient knowledge and to show how the shortcomings were corrected or avoided in subsequent configuration evaluations. Emphasis is placed on selected areas where preliminary design tools could be improved. The various design configurations are illustrated and their technical features are analyzed. The structural design features of various components are described and illustrated. The operational objectives on which the preliminary planning was based are defined. The functions of specific segments of the organization are reported. Author

**N74-31468** Boeing Commercial Airplane Co., Seattle, Wash.
**DESIGN EVOLUTION OF THE BOEING 2707-300 SUPERSONIC TRANSPORT. PART 2: DESIGN IMPACT OF HANDLING QUALITIES CRITERIA, FLIGHT CONTROL SYSTEM CONCEPTS, AND AEROELASTIC EFFECTS ON STABILITY AND CONTROL**
W. T. Kehrer *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 10 p

The intensive efforts undertaken to develop an economically competitive SST are discussed. New design approaches in the areas of airplane longitudinal control and stability and flight control systems design were developed. Extensive research work was conducted to push the state of the art as hard as possible in the development of handling qualities criteria and in the design evolution of the stability augmentation system. The end product was a control-configured vehicle employing multiple redundant electronic stability augmentation systems to meet design requirements for both normal handling qualities and minimum-safe handling qualities. This design approach contributed substantial gains in range/payload capability over that attainable through the conventional approach that inhibits airplane design through the requirement to provide inherent aerodynamic stability. Throughout all of the design development work the effects of structural aeroelastics on aircraft stability and control played a major role in configuration design decisions. The complex engineering work involved in the aeroelastic analyses paced the configuration development design cycles and contributed substantially to the total engineering costs. The experience gained in these areas has identified the need for improved quality, automated aeroelastic analysis methods to speed the design development work and reduce the engineering costs and design risks. Author

**N74-31469** British Aircraft Corp., Preston (England). Military Aircraft Div.
**RECENT EXPERIENCE FROM BAC AIRCRAFT FOR NATO**
P. J. Midgley *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 10 p ref

An analysis of trends in total cost of ownership of combat aircraft was developed. The life cycle cost analysis is related to the Air Force budget and ways are considered in which the rising costs of Air Force operations may be alleviated. The subjects discussed include the following: (1) Air Force budget trends, (2) the procurement process, (3) life cycle costs, (4) launch and acquisition costs, (5) development philosophy, (6) operating costs, and (7) training costs. Charts, graphs, and diagrams are included to illustrate the contents of the text. Author

**N74-31470** Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
**THE F-15 DESIGN CONSIDERATIONS**
Harry E. Rifenbark and Richard D. Highet *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 11 p

The major design considerations of the F-15 air superiority aircraft are traced from the initial requirements, through the design, and into the flight testing. Selection of the overall configuration is discussed with particular emphasis on the wing, inlet, and secondary power design. The ground and flight test programs are briefly reviewed. Author

**N74-31471** Dornier-System G.m.b.H., Friedrichshafen (West Germany).
**SYSTEM ANALYSIS FOR A BATTLE-FIELD AIR SUPERIORITY FIGHTER PROJECT WITH RESPECT TO MINIMUM COST**
Johannes Spintzyk *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 14 p refs

The battle-field air superiority fighter is an air defense aircraft with the function to gain and to hold air superiority over the combat area for limited time and limited operational area. For

given budget the fleet effectiveness can be optimized by reducing the price of the aircraft thus allowing for a higher number of aircraft. Mainly a low cost design can be achieved by minimizing the take-off weight. Design philosophy is to adjust range, payload and equipment to absolute necessary requirements thus arriving to a simple design, but not to compromise air combat capability. For the evaluation of different solutions a method is discussed which shows the role of aircraft characteristics with respect to air combat and which can be used in the preliminary design phases. In the present paper, the influence of mission and design parameters of range, combat time, wing loading and thrust/weight ratio on take-off weight, system cost and air combat effectiveness for the battle-field air superiority fighter is shown. Different versions of a battle-field air superiority fighter are presented and comparative results shown. Author

**N74-31472** Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
**THE B-1 BOMBER: CONCEPT TO HARDWARE**
Robert J. Patton *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 10 p

The development of the B-1 bomber aircraft is traced from the initial conceptual studies to the hardware production. The interaction of the B-1 requirements and advanced technology is emphasized. The preliminary design process is examined and the hardware product is compared with earlier designs. The lessons learned from the analysis are summarized. The mission of the B-1 aircraft is defined and specific operational requirements are considered to show the rationale of design decisions. Author

**N74-31473** Boeing Aerospace Co., Seattle, Wash. Aeronautical and Information Systems Div.
**DESIGN OF VERY LARGE AIRPLANES FOR LEAST SYSTEM COST**
Robert B. Brown *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 6 p

An analysis was conducted to determine the design and development techniques for large aircraft which would result in the least system cost. The effects of program and total life cycle costs are examined to show the effects on starting new aircraft development. Methods for designing an aircraft to maintain low cost are described and illustrated. Specific examples of aircraft designed for various missions are investigated to show the various approaches which were taken to keep down development costs. Author

**N74-31474*** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
**INTEGRATED, COMPUTER AIDED DESIGN OF AIRCRAFT**
R. R. Heldenfels *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 12 p refs

CSCL 01B

The design process for conceptual, preliminary, and detailed design of aircraft is discussed with emphasis on structural design. Problems with current procedures are identified and improvements possible with an optimum man-computer team using integrated, disciplinary computer programs are indicated. Progress toward this goal in aerospace and other industries is reviewed, including NASA investigations of the potential development of Integrated Programs for Aerospace-Vehicle Design (IPAD). The benefits expected from IPAD lead to the conclusion that increased use of the computer by a man-computer team that integrates all pertinent disciplines can create aircraft designs better, faster, and cheaper. Author

**N74-31475** Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).
**PROJECT WEIGHT PREDICTION BASED ON ADVANCED STATISTICAL METHODS**
Wolfgang Schneider *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 20 p

A survey of the possibilities of mathematical statistics for engineering evaluation of reliable data sets for design weight estimates of first level accuracy was conducted. Based on a form of regression analysis, several statements which are adapted for finding weight prediction formulas are described. The two principle statements are: (1) constraint regression for development formulas which give physically interpretable weight trends, using methods of quadratic optimization and (2) nonlinear regression statements which are solved by using iterative computer routines. Practical examples to show the possibilities of applying statistical evaluations are included. Author

**N74-31476** Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
**POTENTIAL PAYOFF OF NEW AERODYNAMIC PREDICTION METHODS**
Richard H. Klepinger and Robert Weissman *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 17 p refs

The trade studies and design compromises to optimize the aircraft configuration for specific purposes are discussed. Typical problems involved in the aircraft design process are examined. Illustrations are provided to show the performance improvement which resulted from design modifications to various aircraft. Methods for accurately predicting the performance of an aircraft prior to flight test are reported. Design criteria based on lateral-directional static stability have been developed to reveal possible problems relative to departure characteristics and spin susceptibility. It is stated that the application of three dimensional aerodynamic analysis methods and spin prevention criteria early in the development of a new aircraft may be the key to better design optimization and improved integration of the components. Author

**N74-31477** Royal Aircraft Establishment, Farnborough (England).
**INITIAL-DESIGN OPTIMISATION ON CIVIL AND MILITARY AIRCRAFT**
D. L. I. Kirkpatrick and M. J. Larcombe *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 18 p refs

The development of a computer program which can optimize the preliminary design of a subsonic, swept-wing, jet transport aircraft is discussed. The program can be used to assess rapidly the effects on the optimum design of changes in the specified performance or of advances in aerodynamic, structural, or engine technology. Compound optimization functions, including several of the aircraft characteristics, with different weighting factors can be used to produce designs in which large improvements in some characteristics have been obtained with small penalties in others. Author

**N74-31479** Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).
**DESIGN OPTIMIZATION OF THE VAK 191B AND ITS EVALUATION BASED ON RESULTS FROM THE HARDWARE REALISATION AND TEST DATA**
Rolf Riccius and Bernhard Wolf *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 19 p refs

The design optimization procedure for the VAK 191B fighter aircraft is discussed. The procedure of design optimization is evaluated based on the results obtained from ground and flight tests. The emphasis in the original planning was placed on aircraft performance. The results of the tradeoff studies in combination with point design studies are reported. The different approaches to the power plant selection are defined. The rationale behind the final selection of the aerodynamic configuration is explained. Author

**N74-31481** Boeing Co., Wichita, Kans.
**INTRODUCTION OF CCV TECHNOLOGY INTO AIRPLANE DESIGN**
Richard B. Holloway *In* AGARD Aircraft Design Integration

and Optimization, Vol. 1 Jun. 1974 16 p refs

The control configured vehicle (CCV) aircraft design process is compared with conventional design procedures. The CCV procedure capitalizes on the potential of considering advanced flight control concepts during the initial parametric studies and trades. Formulation of the parametric aircraft can also be altered by the CCV approach, since traditional empirical design procedures no longer necessarily apply. CCV studies indicate that the most significant performance improvements are achieved in the following functions: (1) augmented stability, (2) gust load alleviation, (3) maneuver load control, (4) fatigue reduction, (5) ride control, and (6) flutter mode control. Author

**N74-31482** Lockheed-Georgia Co., Marietta.
**AVIONIC FLIGHT CONTROL SUBSYSTEM DESIGN AND INTEGRATION IN THE C-5 AIRPLANE**
W. Elton Adams *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 12 p

The preliminary design process influence on the C-5 avionic flight control system development, production, and operational cost is discussed. The design decisions made during the preliminary design phase relative to the stability augmentation systems illustrate the extent of the impact on the design, test, manufacture, and installation of the avionic systems. These decisions lie mainly in the areas of mission success capability, airplane safety, reliability, survivability, and human factor characteristics and, for the illustrative stability augmentation systems, the aircraft's handling qualities. The design processes, including the subsystem integration with the airframe and with other functional subsystems, influenced the cost of the C-5 program. Experience gained from this program may lead to improvements in preliminary design decision making procedures. Author

**N74-31483** Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
**ADVANCEMENTS IN FUTURE FIGHTER AIRCRAFT**
Wolfgang Herbst *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 7 p refs

An analysis of advanced design technology as applied to future fighter aircraft was conducted. The following conclusions were reached: (1) a new aircraft development can be justified if the performance of the new aircraft exceeds that of the old by 15 to 20 percent, (2) foreseeable technological air frame advances, such as CCV and composites, do not justify the development of new weapon systems, per se, (3) refent engine technology advances allows a performance improvement which will justify new aircraft design, and (4) foreseeable air frame advances will pay off if applied to new aircraft development. Author

**N74-31484** Ministry of Defence, London (England).
**ESTIMATION OF PROGRAMMES AND COSTS FOR MILITARY AIRCRAFT**
J. C. Morrall *In* AGARD Aircraft Design Integration and Optimization, Vol. 1 Jun. 1974 14 p

The purposes, history and methods of budgetary estimation for military aircraft development programs conducted by the United Kingdom are discussed. The derivation of the methods are analyzed using the airframe as the main example. The use of the timescale, resources, and cost estimating techniques to provide cost trade-offs for different aircraft operational capabilities is demonstrated. The main purposes served by the budgetary estimate are: (1) planning and funding, (2) project selection, appraisal, and approval, and (3) assessment of future loading on the aircraft industry for aerospace policy decisions. Author

**N74-31579*#** Essex Corp., Alexandria, Va.
**ROLE OF MAN IN FLIGHT EXPERIMENT PAYLOADS, PHASE 1, APPENDICES 1 AND 2**
Thomas B. Malone and Mark Kirkpatrick 5 Jul. 1974 212 p
(Contract NAS8-29917)
(NASA-CR-120398-APP-1-2) Avail: NTIS HC $13.75 CSCL 05E

The individual task durations are calculated in a series of time line realization problems, and a functional requirements data collection technique, designed to accommodate the data requirements for Spacelab payloads, is presented. A.A.D.

**N74-31651** Johns Hopkins Univ., Baltimore, Md.
**PERSPECTIVES ON QUALITY SOFTWARE**
S. Rao Kosaraju and Henry F. Ledgard *In* NBS Concepts in Quality Software Design Aug. 1974 p 1-17

A brief background provides motivation for studies in software quality. Some factors which influence software manufacture are mentioned, and measures which might quantify concepts of software quality are proposed. Several approaches to establishing program correctness receive attention. Observations on software production management are included. Author

**N74-31661#** Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
**PHOTOGRAPHIC EXPERIMENT DATA REDUCTION: PROCESSING SYSTEM CONFIGURATION [DEPOUILLEMENT DES EXPERIENCES PHOTOGRAPHIQUES: CONFIGURATION DU SYSTEME DE TRAITEMENT]**
A. Rabearivelo [1973] 14 p In FRENCH
(CALC-10-72) Avail: NTIS HC $4.00

A discussion of the technical requirements for the photographic data processing system to be installed at the French Laboratory of Spatial Astronomy is presented. Various alternatives are proposed with regard to microphotometer, pilot unit and keyboard, buffer memory, interfaces, storage medium, processing speed, and I/O devices. ESRO

**N74-31662#** Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
**PHOTOGRAPHIC EXPERIMENT DATA REDUCTION. ACQUISITION SYSTEM [DEPOUILLEMENT DES EXPERIENCES PHOTOGRAPHIQUES: SYSTEME D'ACQUISITION]**
A. Rabearivelo 30 Nov. 1972 8 p In FRENCH
(CALC-11-72) Avail: NTIS HC $4.00

A discussion on economics, budgeting, and priorities for the photographic data processing system at the French Laboratory of Spatial Astronomy, is presented. The needs of the FAUST experiment and the Skylab program experiment S183 are, compared, and various solutions are proposed. ESRO

**N74-31861*#** South Dakota State Univ., Brookings. Remote Sensing Institute.
**REMOTE SENSING FOR EVALUATING POST-DISASTER DAMAGE CONDITIONS: THE PIERRE, SOUTH DAKOTA TORNADO, 23 JULY 1973**
Alvin E. Rusche and Victor I. Myers Aug. 1974 15 p refs
(Grant NGL-42-003-007)
(NASA-CR-13962; SDSV-RSI-74-2) Avail: NTIS HC $4.00 CSCL 02C

Remote sensing data obtained from aerial reconnaissance of tornado damage to the city of Pierre, South Dakota on July 23, 1973 was evaluated to determine its value as a decision making and management tool in post-disaster restoration activities. The imaging techniques used are briefly discussed, and both aerial and closeup color photographs are provided which were used in the evaluation. The immediate advantages of the data are identified as a 'quick-look' assessment, and a list is given which outlines the additional advantages for which positive rescue and cleanup action may be initiated. Hail and flood damage evaluation, and remote sensing of crop damage due to insect of disease infestation is also briefly described. A.A.D.

**N74-32055*#** Linguistic Systems, Inc., Cambridge, Mass.
**ON THE ATLANTIC TROPICAL EXPERIMENT (GATE) SYNOPTIC-SCALE SUBPROGRAM**
Ye. M. Dobryshman Washington NASA Aug. 1974 18 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 106-111
(Contract NASw-2482)
(NASA-TT-F-15695) Avail: NTIS HC $4.00 CSCL 04B

The research is reported concerning the processes of synoptic scale in the tropical regions. The development of a numerical model of tropical circulation to study the interaction of atmospheric processes is discussed along with the analysis of processes by synoptic methods. F.O.S.

**N74-32286*#** Aerospace Corp., El Segundo, Calif. Systems Engineering Operations.
**SPACE SHUTTLE/PAYLOAD INTERFACE ANALYSIS. VOLUME 4: BUSINESS RISK AND VALUE OF OPERATIONS IN SPACE (BRAVO). PART 1: SUMMARY Final Report**
15 Feb. 1974 14 p refs
(Contract NASw-2472)
(NASA-CR-139591; ATR-74(7334)-1-Vol-4-Pt-1) Avail: NTIS HC $4.00 CSCL 22B

Background information is provided which emphasizes the philosophy behind analytical techniques used in the business risk and value of operations in space (BRAVO) study. The focus of the summary is on the general approach, operation of the procedures, and the status of the study.
Author

**N74-32287*#** Aerospace Corp., El Segundo, Calif. Advanced Vehicle Systems Directorate.
**SPACE SHUTTLE/PAYLOAD INTERFACE ANALYSIS. (STUDY 2.4) VOLUME 4: BUSINESS RISK AND VALUE OF OPERATIONS IN SPACE (BRAVO). PART 2: USER'S MANUAL Final Report**
15 Feb. 1974 263 p
(Contract NASw-2472)
(NASA-CR-139590; ATR-74(7334)-1-Vol-4-Pt-2) Avail: NTIS HC $16.25 CSCL 22B

The BRAVO User's Manual is presented which describes the BRAVO methodology in terms of step-by-step procedures, so that it may be used as a tool for a team of analysts performing cost effectiveness analyses on potential future space applications. BRAVO requires a relatively general set of input information and a relatively small expenditure of resources.
Author

**N74-32288*#** Aerospace Corp., El Segundo, Calif. Advanced Vehicle Systems Directorate.
**SPACE SHUTTLE/PAYLOAD INTERFACE ANALYSIS. VOLUME 4: BUSINESS RISK AND VALUE OF OPERATIONS IN SPACE (BRAVO). PART 3: WORKBOOK Final Report**
15 Feb. 1974 74 p
(Contract NASw-2472)
(NASA-CR-139592; ATR-74(7334)-1-Vol-4-Pt-3) Avail: NTIS HC $6.75 CSCL 22B

A collection of blank worksheets for use on each BRAVO problem to be analyzed is supplied, for the purposes of recording the inputs for the BRAVO analysis, working out the definition of mission equipment, recording inputs to the satellite synthesis computer program, estimating satellite earth station costs, costing terrestrial systems, and cost effectiveness calculations. The group of analysts working BRAVO will normally use a set of worksheets on each problem, however, the workbook pages are of sufficiently good quality that the user can duplicate them, if more worksheet blanks are required than supplied.
Author

**N74-32289*#** Aerospace Corp., El Segundo, Calif. Systems Engineering Operations.
**OPERATIONS ANALYSIS (STUDY 2.1): PAYLOAD DESIGNS FOR SPACE SERVICING**
R. R. Wolfe 30 Jun. 1974 262 p refs
(Contract NASw-2575)
(NASA-CR-139588; ATR-74(7341)-3) Avail: NTIS HC $16.25 CSCL 22A

Potential modes of operating in space in the space shuttle era are documented. The October 1973 NASA Mission Model provides a definition of various NASA and non-DOD automated payload configurations when employed in an expendable mode. The model also specifies a launch schedule for initial deployment of payloads as well as for subsequent replacements at periodic cycles. This model and its associated payload definitions serve as a foundation for the data presented in this report. The reference model has been revised to reflect automated space servicing of payloads as an operational concept instead of the existing expendable approach. The indication is that the bulk of a payload's subsystems and mission equipment require no support over the lifetime of the program. However, failure of a single unit could result in loss of the mission objectives. When space servicing is employed, the approach is to replace only that unit causing the anomaly. This concept affords an opportunity to standardize space replacable units, as well as to reduce the expense of logistics support, by allowing multiple servicing on any single upper stage/shuttle flight. Author

**N74-32311*#** TRW Systems Group, Redondo Beach, Calif.
**SYSTEMS DESIGN STUDY OF THE PIONEER VENUS SPACECRAFT. VOLUME 2. PRELIMINARY PROGRAM DEVELOPMENT PLAN Final Report**
29 Jul. 1973 211 p
(Contract NAS2-7249)
(NASA-CR-137511; TRW-2291-6012-RU-00) Avail: NTIS HC $13.75 CSCL 22A

The preliminary development plan for the Pioneer Venus program is presented. This preliminary plan treats only developmental aspects that would have a significant effect on program cost. These significant development areas were: master program schedule planning; test planning - both unit and system testing for probes/orbiter/ probe bus; ground support equipment; performance assurance; and science integration Various test planning options and test method techniques were evaluated in terms of achieving a low-cost program without degrading mission performance or system reliability. The approaches studied and the methodology of the selected approach are defined.
Author

**N74-32315*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB PROGRAM ENGINEERING AND INTEGRATION**
Jul. 1974 472 p refs
(NASA-TM-X-64808) Avail: NTIS HC $9.25 CSCL 22B

A technical history and managerial critique of the MSFC role in the Skylab program is presented. The George C. Marshall Space Flight Center had primary hardware development responsibility for the Saturn Workshop Modules and many of the designated experiments in addition to the system integration responsibility for the entire Skylab Orbital Cluster. The report also includes recommendations and conclusions applicable to hardware design, test program philosophy and performance, and program management techniques with potential application to future programs. Author

**N74-32316*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**MSFC SKYLAB CREW SYSTEMS MISSION EVALUATION**
Aug. 1974 384 p
(NASA-TM-X-64825) Avail: NTIS HC $8.25 CSCL 22B

**N74-32383** National Petroleum Council, Washington, D.C.
**EMERGENCY PREPAREDNESS FOR INTERRUPTION OF PETROLEUM IMPORTS INTO THE UNITED STATES Interim Report**
Jul. 1973 60 p refs
Copyright. Avail: Issuing Activity

A study and analysis of possible emergency supplements to or alternatives for imported oil, natural gas liquids, and petroleum products in the event of an interruption of these imports. The areas of the study which are significant include evaluations of savings through petroleum use curtailment which might be realized through voluntary and mandatory measures, estimates of emergency oil production volumes, and evaluations of the feasibility and cost of providing emergency standby petroleum supplies by storage or by restriction of domestic production. The various conditions to be met by the energy crisis and the policies to be followed are analyzed. Author

**N74-32384** National Petroleum Council, Washington, D.C.
**EMERGENCY PREPAREDNESS FOR INTERRUPTION OF PETROLEUM IMPORTS INTO THE UNITED STATES. A SUPPLEMENTAL INTERIM REPORT OF THE NATIONAL PETROLEUM COUNCIL**
15 Nov. 1973 63 p
Copyright. Avail: Issuing Activity

A study was conducted to assist government and industry in efforts to alleviate the effect of energy interruption and to cope with the current energy crisis. A history of the factors leading to the energy crisis is provided as background data. Tables of data are provided to show the demand and availability of various energy sources. It is stated that the U.S. must develop an energy self-sufficiency which will not allow the Nation to be vulnerable to an imports interruption. Domestic energy resources are more than adequate to meet this goal, but a national program must be initiated to develop them. Only through a coherent and cohesive National Energy Policy can the U.S. avoid a repetition of the inconvenience and hardship caused by the fuel embargo. Author

**N74-32385** National Petroleum Council, Washington, D.C.
**EMERGENCY PREPAREDNESS FOR INTERRUPTION OF PETROLEUM IMPORTS INTO THE UNITED STATES. SUPPLEMENTAL PAPERS TO INTERIM REPORT OF 15 NOVEMBER 1973**
21 Dec. 1973 141 p refs
Copyright. Avail: Issuing Activity

A study was conducted to analyze the impact of the energy shortages and to determine steps to be taken to alleviate the effects on the U.S. economy. The subjects considered include the following: (1) crude oil supply and transportation, (2) emergency oil and gas production, (3) fuel convertibility and alternate energy sources, and (4) energy use curtailment. Tables of data are provided to show resource availability and future production capabilities for selected energy sources. Author

**N74-32386*#** Evaluation Technologies, Inc., Arlington, Va.
**THE DESIGN, DEVELOPMENT, AND PRESENTATION OF A PILOT SEMINAR CALLED TECHNOLOGY AND OPPORTUNITY: A NEW APPROACH FOR MINORITY BUSINESS Final Report**
24 Jun. 1974 168 p
(Contract NASw-2642)
(NASA-CR-139641) Avail: NTIS HC $11.50 CSCL 05C

A seminar program is reported that furthers the transfer of NASA technology to the minority community and assists in the commercial development of marketable products and manufacturing capabilities. G.G.

**N74-32390#** Joint Committee on Defense Production (U. S. Congress).
**ACTIVITIES OF THE JOINT COMMITTEE ON DEFENSE PRODUCTION WITH MATERIAL ON MOBILIZATION FROM DEPARTMENTS AND AGENCIES, PART 1 Twenty-Third Annual Report of the Joint Comm. on Defense Production to the Congress of the United States**
John Sparkman Washington GPO 7 Feb. 1974 588 p refs Presented to the 93d Congr. of the United States, 2d Sess., 5 Feb. 1974
(S-93-683; GPO-23-827) Avail: US Capitol, Senate Document Room

The text of a report to Congress is presented which fulfills the responsibility of the Joint Committee on Defense Production to make a continuous study of the programs authorized by the Defense Production Act, and to review the progress achieved in the execution and administration of these programs, including preparedness measures for future emergencies. Department reports are provided by USDA, DOC, DOD, HEW, HUD, DOI, the Department of Justice, and the Department of Labor. Each individual report outlines current work and future objectives, along with appraisals of resources, funds, and organizational management. A comprehensive report by the Office of Emergency Preparedness includes an assessment of role and readiness of the Federal Government, state and local obligations, crisis management, industrial mobilization planning, and support functions. The formal report of the Joint Committee discusses the following: (1) energy contained in stockpile of materials; (2) energy resources and oil priority; (3) proposed sale of materials; (4) priorities and allocations such as aluminum, copper, steel, and nickel set-asides; (5) estimated future cash requirements, (6) upgrading of strategic and critical materials; (7) guaranteed loans; (8) small business; and (9) military contract awards. A.A.D.

**N74-32392#** Joint Economic Committee (U. S. Congress).
**THE 1975 BUDGET: AN ADVANCE LOOK**
Richard Kaufman, Douglas Lee, Courtney Slater, and Nancy Teeters Washington GPO 27 Dec. 1973 37 p refs A staff study presented to the Subcomm. on Priorities and Economy in Govt., 93d Congr., 1st Sess., 20 Dec. 1973
(GPO-26-216) Avail: SOD HC $0.40

A study was conducted to provide members of Congress and Congressional Committees with information concerning the formation of the 1975 budget. The study was assembled from public sources and defines certain policy options with respect to the 1975 budget is outlined as a basis of decision. The expenditure baseline for 1975 is developed. The subjects discussed include the following: (1) budget receipts and the economic impact of the 1975 budget, (2) tax changes and program cuts as sources of additional funds, (3) new program initiatives, and (4) energy-related taxes and expenditures. Author

**N74-32393#** Joint Economic Committee (U. S. Congress).
**NATIONAL PRIORITIES AND THE BUDGETARY PROCESS**
Washington GPO 1974 159 p refs Hearings before Subcomm. on Priorities and Economy in Govt., 93d Congr., 1st Sess., 25, 26, 27 Apr. 1973
(GPO-96-679) Avail: SOD HC $1.40

Congressional hearings on the budgetary aspects of the Fiscal 1975 Federal Budget were conducted. The purposes of the budgetary hearings are defined as: (1) communicating to the administration information about Congress' attitudes toward the shape and size of the budget for the year ahead, (2) focusing public opinion at an early date on the issues that will be taised by the President's budget, and (3) reinforcing the discipline on the Congress to think ahead in making current choices. The hearings consisted primarily of testimony from selected witnesses and members of the committee. P.N.F.

**N74-32394#** Committee on Aeronautical and Space Sciences (U. S. Senate).
**NASA AUTHORIZATION FOR FISCAL YEAR 1975. PART 4: INDEX**
Washington GPO 1974 136 p Hearings on S. 2955 before Comm. on Aeron. and Space Sci., 93d Congr., 2d Sess., 1974
(GPO-36-527) Avail: Comm. on Aeronaut. and Space Sci.

Congressional hearings on the authorization of appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and research and

program management are presented. Financial requirements of the various NASA programs are defined and the data to support the requirements are provided by selected witnesses. P.N.F.

**N74-32395#** Committee on Science and Astronautics (U. S. House).
**NASA AUTHORIZATION, 1975, PARTS 1, 2, 3, AND 4 OF INDEX**
Washington GPO 1974 648 p Index for hearings on H.R. 12689 before Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., 1974 H.R. 12689 (superseded by H.R. 13998)
(GPO-38-444) Avail: Comm. on Sci. and Astronaut.

An index of the names of persons and places involved in the NASA authorization for fiscal year 1975 is presented. The index is used in conjunction with parts 1, 2, 3, and 4 of the proceedings of the House of Representatives. P.N.F.

**N74-32398#** Advisory Group for Aerospace Research and Development, Paris (France).
**TECHNICAL PROGRAM, 1975**
Jul. 1974 34 p
(AGARD-Bul-74-2) Avail: NTIS HC $4.75

The program that was approved by the AGARD National Delegates Board is reported. Section 1 includes a chronological listing of the meetings tentatively scheduled to take place during 1975 and Section 2 portrays a detailed description of the individual panel programs, the consultant and exchange program, and the military committee studies program. The total budget required to support the proposed 1975 AGARD technical program is presented. Author

**N74-32400*#** TRW Systems, Houston, Tex.
**SPACE SHUTTLE PROGRAM: SHUTTLE AVIONICS INTEGRATION LABORATORY. VOLUME 7: LOGISTICS MANAGEMENT PLAN**
1974 17 p refs 9 Vol.
(Contract NAS9-13834)
(NASA-CR-134363; JSC-08663-Vol-7) Avail: NTIS HC $4.00 CSCL 05A

The logistics management plan for the shuttle avionics integration laboratory defines the organization, disciplines, and methodology for managing and controlling logistics support. Those elements requiring management include maintainability and reliability, maintenance planning, support and test equipment, supply support, transportation and handling, technical data, facilities, personnel and training, funding, and management data. Author

**N74-32401*#** Alabama Univ., Huntsville.
**THE SATURN MANAGEMENT CONCEPT**
Roger E. Bilstein 1 Jun. 1974 76 p refs
(Grant NGT-01-002-080)
(NASA-CR-129029) Avail: NTIS HC $4.00 CSCL 05A

Management of the Saturn launch vehicles was an evolutionary process, requiring constant interaction between NASA Headquarters, the Marshall Space Flight Center (particularly the Saturn 5 Program Office), and the various prime contractors. Successful Saturn management was a blend of the decades of experience of the von Braun team, management concepts from the Army, Navy, Air Force, and Government, and private industry. The Saturn 5 Program Office shared a unique relationship with the Apollo Program Office at NASA Headquarters. Much of the success of the Saturn 5 Program Office was based on its painstaking attention to detail, emphasis on individual responsibilities (backed up by comprehensive program element plans and management matrices), and a high degree of visibility as embodied in the Program Control Center. Author

**N74-32403#** Committee on Appropriations (U. S. Senate).
**DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, SPACE, SCIENCE, VETERANS, AND CERTAIN OTHER INDEPENDENT AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1975. PART 1: PAGES 1-821**
Washington GPO 1974 850 p refs Hearings on H.R. 15572 before Subcomm. of the Comm. on Appropriations, 93d Congr., 2d Sess., 11 Jan. 1974
(GPO-27-909) Avail: Comm. on Appropriations

A Congressional hearing was conducted to inform the Committee on Appropriations Subcommittee of the rationale behind the NASA budget request for fiscal year 1975, with testimony focusing upon NASA project plans and operating budget, and in particular, on the status of NASA's equal opportunity programs, especially in relation to the dismissal of Mrs. Ruth Bates Harris, the Deputy Director of the NASA Equal Opportunity Office. Full budget summaries are provided with breakdowns by office, installation, and project. Space shuttle is emphasized as a program requiring special attention by the Committee. Other budget hearings included in the report are for the following agencies and boards: (1) Selective Service System; (2) Federal Home Loan Bank Board; (3) Veterans Administration; and (4) the Renegotiation Board. A.A.D.

**N74-32404*#** Grumman Aerospace Corp., Bethpage, N.Y.
**OPERATIONS PLANNING SIMULATION: MODEL STUDY Final Report**
23 May 1974 161 p
(Contract NAS8-30302)
(NASA-CR-120429; SU-OPS-RP-74-0001) Avail: NTIS HC $11.25 CSCL 05A

The use of simulation modeling for the identification of system sensitivities to internal and external forces and variables is discussed. The technique provides a means of exploring alternate system procedures and processes, so that these alternatives may be considered on a mutually comparative basis permitting the selection of a mode or modes of operation which have potential advantages to the system user and the operator. These advantages are measurements is system efficiency are: (1) the ability to meet specific schedules for operations, mission or mission readiness requirements or performance standards and (2) to accomplish the objectives within cost effective limits. Author

**N74-32425** LTV Aerospace Corp., Dallas, Tex.
**MODERN ENGINEERING METHODS IN AIRCRAFT PRELIMINARY DESIGN**
W. W. Huff, Jr. *In* AGARD Prelim. Aircraft Design Jun. 1974 16 p refs

The impact of computer technology on modern engineering methods for the preliminary design of aircraft is discussed. Large capacity digital computer systems and their peripheral equipments provide the opportunity to bring all significant technical and managerial disciplines together in an integrated program. Most design synthesis computer programs are constructed in a modular fashion, which are controlled by the technical disciplines responsible for the state-of-the-art in each particular area. In general, these disciplines will apply the input data at a level of detail consistent with the phase of the preliminary design process. The phases of preliminary design which are considered are: (1) program definition, (2) concept formulation, and (3) contract definition. Author

**N74-32426** General Dynamics/Fort Worth, Tex. Convair Aerospace Div.
**THE TEAM LEADER'S ROLE IN DESIGN TO COST PRELIMINARY DESIGN**
Lyman C. Josephs, III *In* AGARD Prelim. Aircraft Design Jun. 1974 9 p

The organization and functions of a typical Air Force weapon systems office involved in aircraft development are discussed. Emphasis is placed on the YF-16 aircraft program. The management approach of the office is described. The contract requirements to accomplish the objectives for the prototype program are

defined. Charts are developed to show the schedule for the YF-16 prototype program and the total budget cost versus actual expenditures are shown. The configuration changes which occurred since approval of the contract are discussed to show the effects on expenses and weapon system development. Author

**N74-32457#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), OH-6A MAIN ROTOR HUB Interim Report, 1 Jan. 1964 - 1 Jul. 1973**
Jun. 1974 23 p
(AD-781507; USAAVSCOM-TR-74-29) Avail: NTIS CSCL 01/3

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distribution can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-32490#** Mitre Corp., McLean, Va.
**SOLAR ENERGY RESEARCH PROGRAM ALTERNATIVES. PROPOSED RESEARCH TASKS, COSTS AND SCHEDULES FOR THE NATIONAL SCIENCE FOUNDATION FIVE-YEAR SOLAR ENERGY RESEARCH PROGRAM Final Report**
Dec. 1973 149 p
(Contract NSFC-831)
(PB-231141/3; MTR-6516; NSF-RA/N-73-111B) Avail: NTIS HC $4.75 CSCL 10A

Research Directorate Office of Systems Integration and Analysis. This document provides two alternative research plans, including task schedules and costs, for each of eight program elements: Heating and Cooling of Buildings, Process Heat, Thermal-Electric Energy Conversion, Photovoltaic Energy Conversion, Ocean Thermal Systems, Wind Energy Systems, Utilization of Organic Materials, and Common Applications. The two alternatives are (1) a set of research tasks considered to be the minimum necessary to bring about the widespred utilization of solar energy and (2) an accelerated plan to achieve more rapid utilization, with a higher degree of confidence and reduced technical risk. Author (GRA)

**N74-32491#** Mitre Corp., McLean, Va.
**DISSEMINATION AND UTILIZATION OF SOLAR ENERGY RESEARCH RESULTS Final Report**
Richard S. Greeley Dec. 1973 69 p refs
(Contract NSF C-831)
(PB-231144/7; MTR-6544; NSD-RA/N-73-111D) Avail: NTIS HC $3.75 CSCL 10A

Thirty recommendations have been made for establishing groups within or reporting to the NSF Solar Energy Program Office and initiating activities for the dissemination and utilization of solar energy research results. The primary recommendations include establishing an Advisory Commission and an information office reporting to the Program Director and constructing visitor centers on the sites of each Proof of Concept Experiment. Training courses and public education would be conducted at each center following successful operation of the POCE system. (Modified author abstract) GRA

**N74-32531*#** General Electric Co., Houston, Tex. Space Div.
**BIOMEDICAL PROGRAMS OPERATIONS PLANS Final Report**
H. F. Walbrecher 30 Aug. 1974 193 p
(Contract NAS9-11037)
(NASA-CR-140223) Avail: NTIS HC $12.75 CSCL 06D

Operational guidelines for the space shuttle life sciences payloads are presented. An operational assessment of the medical experimental altitude test for Skylab, and Skylab life sciences documentation are discussed along with the operations posture and collection of space shuttle operational planning data. F.O.S.

**N74-32548*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE FOOD SYSTEM STUDY. VOLUME 1: SYSTEM DESIGN REPORT Final Report**
[1974] 104 p refs
(Contract NAS9-13138)
(NASA-CR-134374) Avail: NTIS HC $8.25 CSCL 06H

Data were assembled which define the optimum food system to support the space shuttle program, and which provide sufficient engineering data to support necessary requests for proposals towards final development and installment of the system. The study approach used is outlined, along with technical data and sketches for each functional area. Logistic support analysis, system assurance, and recommendations and conclusions based on the study results are also presented. Author

**N74-32565#** Atomic Energy Commission, Washington, D.C. Div. of Waste Management and Transportation.
**HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES**
May 1974 94 p refs
(WASH-1297) Avail: NTIS HC $5.45

A summary of a comprehensive overview study of potential alternatives for long term management of high level radioactive waste is presented. The concepts studied included disposal in geologic formations, disposal in seabeds, disposal in ice caps, disposal into space, and elimination by transmutation. NSA

**N74-32609#** Los Alamos Scientific Lab., N.Mex.
**COMPUTER GENERATED MOVIES: ANOTHER DIMENSION IN MAN-MACHINE COMMUNICATIONS**
R. L. Elliott, S. R. Orr, and E. C. Pequette [1974] 3 p Presented at 2d AEC Sci. Computer Inform. Exchange Meeting, New York, 2 May 1974
(LA-UR-74-500; Conf-740512-1) Avail: NTIS HC $4.00

A typical hydrodynamic physics program may run up to 20 hours on a CDC 7600 computer and generate up to a billion numbers. The biggest problem facing the users of these programs is simply comprehending what has been calculated. Stacks of computer listings are typical outputs but serve as a poor communication medium. Static pictures are much better than listings but are limited to two dimensions. Through the use of movies, one adds a third dimension to the communication process. The evolution of computer generated movies and the techniques now in use are described. Author (NSA)

**N74-32715*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**TECHNOLOGY EVALUATION OF CONTROL/MONITORING SYSTEMS FOR MIUS APPLICATION**
L. Marion Pringle, Jr. Aug. 1974 65 p
(NASA-TM-X-58135; JSC-08973) Avail: NTIS HC $3.75 CSCL 09C

Potential ways of providing control and monitoring for the Modular Integrated Utility System (MIUS) program are elaborated.

Control and monitoring hardware and operational systems are described. The requirements for the MIUS program and the development requirements are discussed. Author

**N74-32805*#** Caspan Corp., Houston, Tex.
**SCREENING, CATALOGING AND INDEXING OF EARTH RESOURCE AIRCRAFT MISSIONS Final Report**
Sep. 1974 8 p
(Contract NAS9-13604)
(NASA-CR-140239) Avail: NTIS HC $4.00 CSCL 05B

Data obtained from 30 earth resources aircraft missions, flown between September 1, 1973 and September 1, 1974, were screened, cataloged, and indexed using microfilm copy. The manhours required for completing the task are presented, and problems encountered during the project are reported. It is concluded that a cataloging and indexing report of remote sensor data can be prepared on a timely basis for a relatively low cost from microfilm. Recommendations are given in order to further facilitate the task. A.A.D.

**N74-32922** Comptroller General of the United States, Washington, D.C.
**NUMERICALLY CONTROLLED INDUSTRIAL EQUIPMENT: PROGRESS AND PROBLEMS Report to the Congress**
24 Sep. 1974 69 p refs
(B-140389) Avail: US General Accounting Office, Room 4522, 441 G Street, N. W., Washington, D. C. 20548 $1.00

The Government Accounting Office (GAO) conducted a survey of the military services and two contractor plants to identify areas where numerical control can increase productivity. The items of industrial equipment which are considered to be numerically controlled (NC) are identified. It was determined that advancement of NC may be limited because users are confronted with many different NC systems and different standards. Some of the subjects discussed are: (1) the role of the Department of Defense in developing NC, (2) systems for identifying a need for NC, (3) planning for specific NC equipment, and (4) management of NC machines in use. Author

**N74-33119#** Lincoln Lab., Mass. Inst. of Tech., Lexington.
**ATC SURVEILLANCE/COMMUNICATION ANALYSIS AND PLANNING Quarterly Technical Summary, 1 Sep. - 30 Nov. 1973**
1 Dec. 1973 26 p refs
(Contracts DOT-FA72WAI-242; F19628-73-C-0002)
(AD-775313; FAA-RD-73-207) Avail: NTIS HC $4.50

Activities of the Air Traffic Control Surveillance/Communication Analysis and Planning project are reported. Excellent results have been obtained in detecting aircraft imbedded in heavy clutter using coherent S-band radar coupled to a specially programmed, wide dynamic range, digital signal processor. Performance tests of the Airborne Beacon Interference Locator (ABIL), Transponder Performance Analyzer (TPA) and the E-scan (Electrically scanned antenna) were also conducted. Author

**N74-33243#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), OH-6A GAS TURBINE ENGINE (T63-A-5A) Interim Report, 1 Jan. 1964 - 1 Jul. 1973**
Jun. 1974 21 p refs
(AD-781506; USAAVSCOM-TR-74-30) Avail: NTIS CSCL 21/5

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From these data, removal distribution can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-33270#** Technische Univ., Berlin (West Germany).
**INSTITUTE FOR SPACE FLIGHT TECHNOLOGY, 10 YEARS, 1963 - 1972, EXPERIENCES AND ACCOUNTING REPORT [INSTITUT FUER RAUMFAHRTTECHNIK, ERFAHRUNGS UND RECHENSCHAFTS BERICHT]**
H. H. Koelle Dec. 1972 77 p refs In GERMAN
(TUB-IR-1972/3) Avail: NTIS HC $7.00

After a general review of the institute's activities, lists of lecture programs and the various research projects are reported. Transl. by G.G.

**N74-33355#** Laboratoire Central de Telecommunications, Paris (France).
**FEASIBILITY STUDY OF AN UPSTREAM LINK AT 30 GHz FOR A DIRECT TELEVISION DISTRIBUTION SATELLITE Final Report [ETUDE DE FAISABILITE D'UNE LIAISON MONTANTE A 30 GHz POUR UN SATELLITE DE DIFFUSION DIRECTE DE TELEVISION]**
15 Feb. 1974 172 p refs In FRENCH
(Contract ESRO-SC/573-HQ)
(PL-603.355; ESRO-CR(P)-413) Avail: NTIS HC $11.75

A television system for direct broadcast using a geostationary satellite is presented. The recommended up link uses frequency modulation at 30 GHz and makes use of some ten earth stations emitting into one of the four available satellite channels. Wave propagation problems are detailed together with the power budget. The satellite receiver and ground station are discussed with regard to economics and reliability. Alternative configurations are reviewed with an assessment of the merits for the recommended one. A program for technological development is outlined. ESRO

**N74-33397*#** Stanford Research Inst., Menlo Park, Calif.
**TECHNOLOGY TRANSFER-TRANSPORTATION Semiannual Report, 15 Aug. 1973 - 15 Feb. 1974**
Tom Anyos, Ruth Lizak, and James Wilhelm Mar. 1974 44 p refs
(Contract NASw-2455; SRI Proj. PYU-2201)
(NASA-CR-140049; SAR-2) Avail: NTIS HC $5.25 CSCL 13F

Problems in the public transportation industry and refining methods for decreasing the time gap between the development and the marketing of new technology are counsidered. Eight NASA innovations are either being adapted for use on highways, railways, or rapid transit, or are already entering the marketplace. Chronologies for three of these programs are provided. Author

**N74-33408#** Joint Committee on Defense Production (U. S. Congress).
**ANNUAL REPORT OF THE ACTIVITIES OF THE JOINT COMMITTEE ON DEFENSE PRODUCTION WITH MATERIAL ON MOBILIZATION FROM DEPARTMENTS AND AGENCIES, PART 2**

Washington GPO 7 Feb. 1974 631 p refs Twenty-third Annual Report of the activities of the Joint Comm. on Defense Production, 93d Congr., 1st Sess., 5 Feb. 1974
(S-93-683; GPO-23-827; AR-23) Avail: US Capitol, Senate Document Room

Strategic stockpiling objectives of materials for mobilization are reviewed and other stockpiling operations, including the acquisition of materials from abroad and the disposal of stockpile surplusses, are elaborated. G.G.

**N74-33413*#** Little (Arthur D.), Inc., Cambridge, Mass.
**AN APPROACH TO DEVELOPING THE MARKET FOR SPACE SHUTTLE PAYLOADS: BUSINESS/PUBLIC POLICY ISSUES AND INTERNATIONAL MARKETING CONSIDERATIONS Final Report**
William A. W. Krebs 31 Aug. 1974 76 p refs
(Contract NAS8-30739)
(NASA-CR-120420) Avail: NTIS HC $7.00 CSCL 05C

The business and public policies were assessed that were determined to be important for NASA to consider in the design of a program for stimulating use of the space transportation system (STS) among potential users in the U.S. private sector and in foreign countries, in preparation for operations of the space shuttle in the early 1980's. Salient factors related to international cooperation in space are identified for special consideration in the development of user potential of the STS. Author

**N74-33421#** Pennsylvania State Univ., University Park. Transportation and Traffic Safety Center.
**MANAGERIAL RESOURCES AND PERSONNEL PRACTICES IN URBAN MASS TRANSPORTATION**
Ray A. Mundy and John C. Spychalski Nov. 1973 321 p Sponsored by DOT
(PB-231433/4; TTSC-7317; UMTA-PA-11-0010-73-1) Avail: NTIS HC $7.25 CSCL 05I

The primary purpose of this project was to identify and evaluate policies, practices and other conditions relating to the supply of managerial personnel in the urban mass transit industry. The supply, conducted during 1972-1973, sought to provide information concerning the following: an inventory of management, technical, and supervisory personnel in the industry; a current profile of management and technical personnel; a summary of personnel practices and training methods now being used in the industry; an assessment of manpower demand and supply in the industry by administrative levels; and a review of the roles of UMTA, universities and the industry in improving the training of personnel in the transit industry with respect to training methods, course contents, level of support for trainees and related matters. GRA

**N74-33423#** Air Force Systems Command, Washington, D.C.
**AIR FORCE SYSTEMS COMMAND RESEARCH OBJECTIVES**
1 Apr. 1974 234 p refs
(AD-781376; AFSC-TR-74-01) Avail: NTIS CSCL 14/2

Desired objectives are given for Air Force research activities in support of seven technology areas. Author (GRA)

**N74-33494#** Atomic Energy Commission, Washington, D.C.
**GEOTHERMAL ENERGY PROGRAM**
13 Nov. 1973 192 p
(WASH-1281-8) Avail: NTIS HC $12.75 CSCL 10A

Only one resource type is presently being used to produce power in the U.S.-dry steam generating 400 MWe at the Geysers near Santa Rosa, California. Six other types are potentially available for economic energy recovery. The program plan calls for a government budgetary obligation of $40 million during FY-75 coupled with an industrial commitment of $11.7 million. The five year budgetary obligations are estimated to be $185 million for the government and $60 million for industry. The complete five year plan plus the balance-to-complete funds is presented. Author (NSA)

**N74-33495#** Atomic Energy Commission, Washington, D.C.
**ADVANCED METHODS OF OIL AND GAS PRODUCTION FROM FOSSIL FUELS Subpanel Report 7 used in Preparing the AEC Chairmans Report to the President**
E. H. Fleming 13 Nov. 1973 138 p
(WASH-1281-7) Avail: NTIS HC $9.50

Four subprograms and objectives for in situ coal gasification and recovery of oil and gas from tar sands and heavy oils are: (1) oil recovery from fluid injection, demonstrating optimum applications of existing and improved methods for some 60 billion barrels now technologically but not economically recoverable, and an additional 60 billion barrels not now technologically recoverable; (2) oil and gas from stimulating tight formations using nuclear explosives, large volume hydraulic fractures, and chemical explosives; (3) oil from oil shale by developing appropriate fracturing techniques and processing methods; and (4) oil and gas from advanced drilling technology. The predicted results of the contribution of each subprogram to production levels by 1985 and 1995 are presented, and the comparative roles of government and industry are briefly discussed. NSA

**N74-33496#** Atomic Energy Commission, Washington, D.C.
**END-USE ENERGY CONSERVATION**
J. H. Gibbons 27 Oct. 1973 226 p
(WASH-1281-12) Avail: NTIS HC $14.50

Opportunities for effective convervation of energy in the end-use sectors are considered. Major increases in efficiency can be attained through improvement of end-use technologies, better materials resource management, substitution of time and materials for energy, and alteration of lifestyles. In developing the program, end-use was divided into three main sectors (transportation, buildings, and industry) in order to inventory the opportunities for saving energy and to define mechanisms for allocating R and D resources. For technical reasons two more research sectors were added (integrated utility systems, and cross-sectoral studies). Additional factors that must be considered in determining research priorities include growth rate, role of federal versus private resources, and the extent of research opportunities. The minimum program developed by the panel is estimated to ensure a 15% savings before 2000. (LMT) NSA

**N74-33497#** Atomic Energy Commission, Washington, D.C.
**ENERGY SYSTEMS ANALYSIS**
S. Gage 27 Oct. 1973 184 p
(WASH-1281-16) Avail: NTIS HC $12.25 CSCL 10A

The establishment of those mechanisms in the Federal Government is considered that would provide for both ongoing planning and management functions based on comprehensive energy systems analyses and research programs to provide the fundamental knowledge and tools required for those analyses. Specifically, it is recommended that the energy system analysis be composed of the following five elements: (1) energy data base and system modeling; (2) technology assessment of emerging energy systems; (3) social technologies and energy systems; (4) systematic analysis of alternative energy futures; and (5) strategic management and evaluation of energy R and D programs. Author (NSA)

**N74-33513#** Naval Postgraduate School, Monterey, Calif.
**ON THE SUPPLY AND DEMAND FOR ENERGY M.S. Thesis**
Fariborz Golshani Javadi Jun. 1974 83 p refs
(AD-782322) Avail: NTIS CSCL 10/1

A review of the world energy consumption is given and it is shown that there is a strong relationship between economic growth and energy consumption. A comprehensive analytical model capable of evaluating the impact of energy related decisions

is developed. The model is descriptive of exploration, extraction, storage, import, and processing of energy resources and takes into account the relationship between these aspects of energy production and the market prices of energy resources. GRA

**N74-33581#** Maryland Univ., College Park. Dept. of Psychology.
**SOME RELATIONSHIPS AMONG AND BETWEEN MEASURES OF EMPLOYEE PERCEPTIONS AND OTHER INDICES OF ORGANIZATION EFFECTIVENESS**
Benjamin Sneider and Robert A. Snyder May 1974 45 p refs
(Contract N00014-67-A-0239-0025; NR Proj. 151-350)
(AD-781888; RR-5) Avail: NTIS CSCL 05/10

Relationships with respect to two measures of job satisfaction and one of organizational climate, among seven production and turnover indices of organizational effectiveness, and between the two sets of measures were investigated in 50 life insurance agencies. Climate and satisfaction measures are correlated. People appear to agree more on the climate of their agency than they do on their satisfaction. Agency effectiveness is related to gross agency size, satisfaction and retention. Implications of these data for research on climate and satisfaction as well as organizational change are discussed. (Modified author abstract) GRA

**N74-33582#** Hawaii Univ., Honolulu. PEACESAT Project.
**PACIFIC SATELLITE HEALTH INFORMATION STUDY Final Report, May 1972 - Aug. 1973**
John Bystrom May 1974 151 p refs
(Contract HS-72-4706)
(PB-232367/3; LHNCBC-74-05) Avail: NTIS HC $4.75 CSCL 06E

The Pacific satellite health information project was developed to assist development of effective medical and health information transfer. The following results are reported: (1) A study environment was developed in the Pacific, and committees were formed for health information and evaluation; (2) Studies were completed on medical communication requirements, health care status and status of libraries in the U.S. and related areas of the Pacific; (3) Demonstration satellite ground terminals were constructed; (4) Biomedical data transmission tests were undertaken using the voice grade satellite circuit; (5) and pilot demonstrations of satellite communications were made. GRA

**N74-33585*#** Pillsbury Mills, Inc., Minneapolis, Minn.
**SPACE SHUTTLE/FOOD SYSTEM STUDY. VOLUME 2, APPENDIX E: ALTERNATE FLIGHT SYSTEMS ANALYSIS [1974] 94 p**
(Contract NAS9-13138)
(NASA-CR-134377) Avail: NTIS HC $7.75 CSCL 06H

The functional requirements of stowage, preparation, serving, consumption, and cleanup were applied to each of the five food mixes selected for study in terms of the overall design of the space shuttle food system. The analysis led to a definition of performance requirements for each food mix, along with a definition of equipment to meet those requirements. Weight and volume data for all five systems, in terms of food and packaging, support equipment, and galley installation penalties, are presented. Author

**N74-33683** Air Force Dept., Washington, D.C. Federal Computer Performance Evaluation and Simulation Center.
**GETTING STARTED IN COMPUTER PERFORMANCE EVALUATION**
Philip J. Kiviat and Michael F. Morris *In* NBS Computer Performance Evaluation Sep. 1974 p 5-13

The circumstances which indicate the necessity for a computer evaluation program are defined. The principal reason for conducting a computer evaluation program is the addition of another set of applications to an operating computer system. The selection and organization of the team of personnel to conduct the evaluation are discussed. The procedures for conducting the evaluation are explained to include: (1) project administration, (2) project management, (3) learning techniques, (4) a flow chart for evaluation, and (5) special considerations and financial aspects. Author

**N74-33684** Mitre Corp., McLean, Va.
**A METHODOLOGY FOR PERFORMANCE MEASUREMENT**
Daniel M. Venese *In* NBS Computer Performance Evaluation Sep. 1974 p 15-22 refs

A methodology for conducting computer system performance evaluations is presented. The underlying assumptions of the evaluation methodology are identified. The aim of the methodology is to account for the significant factors that affect a performance evaluation effort. Specific problems associated with software and hardware are examined. The development and application of a test hypothesis for insuring complete evaluation are explained. Author

**N74-33685** Boeing Computer Services, Inc., Seattle, Wash.
**USE OF SMF DATA FOR PERFORMANCE ANALYSIS AND RESOURCE ACCOUNTING ON IBM LARGE SCALE COMPUTERS**
R. E. Betz *In* NBS Computer Performance Evaluation Sep. 1974 p 23-32 refs

Hardware and software techniques used in measuring the performance of computer systems are discussed. The SARA (Systems Analysis and Resource Accounting) system is discussed and its applications are defined. The operational concepts of SARA are explained. Typical SARA studies are analyzed. Results of computer evaluation tests are examined and the conclusions resulting from the tests are reported. Author

**N74-33686** Army Management Systems Support Agency, Washington, D.C.
**USING SMF AND TFLOW FOR PERFORMANCE ENHANCEMENT**
J. M. Graves *In* NBS Computer Performance Evaluation Sep. 1974 p 33-36

The computer operations of the U.S. Army Management Systems Support Agency are described. The tools used to evaluate the computer systems are identified as: (1) hardware monitors (DYNAPROBE and XRAY) and (2) software monitor (CUE). The reports that are used to provide systems analysis are defined and their applications are explained. The benefits resulting from the use of the designated programs and reports are analyzed. Author

**N74-33689** Mitre Corp., Bedford, Mass.
**REPORT ON FIPS TASK GROUP 13 WORKLOAD DEFINITION AND BENCHMARKING**
David W. Lambert *In* NBS Computer Performance Evaluation Sep. 1974 p 49-53

Benchmark testing, or benchmarking, one of several methods for measuring the performance of computer systems, is the method used in the selection of computer systems and services by the Federal Government. However, present benchmarking techniques not only have a number of known technical deficiencies, but they also represent a significant expense to both the Federal Government and the computer manufacturers involved. Federal Information Processing Standards Task Group 13 has been established to provide a forum and central information exchange on benchmark programs, data methodology, and problems. The program of work and preliminary findings of Task Group 13 are presented in this paper. The issue of application programs versus synthetic programs within the selection environment is discussed. Significant technical problem areas requiring continuing research and experimentation are identified. Author

**N74-33690** Army Computer System Command, Fort Belvoir, Va.
**PERFORMANCE MEASUREMENT AT USACSC**
Richard Castle *In* NBS Computer Performance Evaluation Sep. 1974 p 55-62

The design, development, programming, installation, maintenance, and improvement of a U.S. Army multicommand automatic data processing information systems are discussed. The multicommand automatic data processing information systems satisfy the information requirements for as many as 41 identical data processing installations located world-wide. The systems include both management data systems and tactical data systems. Methods for conducting performance measurement to reduce system program run time, configuration performance measurement, and identification of hardware and software bottlenecks caused by program changes or added workload from newly fielded positions are analyzed. Author

**N74-33691** Air Force Dept., Washington, D.C. Federal Computer Performance Evaluation and Simulation Center.
**A COMPUTER DESIGN FOR MEASUREMENT: THE MONITOR REGISTER CONCEPT**
Donald R. Deese *In* NBS Computer Performance Evaluation Sep. 1974 p 63-72

The application of the monitor register concept for evaluating computer system performance is discussed. The operational problems involving hardware monitors are identified. Implementation of the monitor register concept for the Trident submarine program is examined to show the following: (1) fire control system software performance, (2) performance measurement of the Trident basic processor, and (3) use of the data available at the monitor register. Author

**N74-33692** Marine Corps, Washington, D.C.
**THE USE OF SIMULATION IN THE SOLUTION OF HARDWARE ALLOCATION PROBLEMS**
W. Andrew Hesser *In* NBS Computer Performance Evaluation Sep. 1974 p 73-79

The steps taken to provide redistribution of U.S. Marine Corps owned computer hardware to five major installations are discussed. All simulation models involved were created directly from hardware monitor data. The problem to be solved by the redistribution of the computer capabilities are identified. The organization and functions of the computer services at the various installations are explained. The steps taken following the evaluation and the specific recommendations for implementing the proposed changes are reported. Author

**N74-33693** RAND Corp., Santa Monica, Calif.
**HUMAN FACTORS IN COMPUTER PERFORMANCE ANALYSES**
A. C. Shetler *In* NBS Computer Performance Evaluation Sep. 1974 p 81-84 refs

The effects of human factors during experimental planning, test execution, and data analysis for computer performance evaluation are considered. A computer performance experiment using the normal system environment requires that an analyzer be aware if the human problems associated with testing hypotheses. The five considerations are identified as: (1) ensuring participant awareness, (2) defining the measures, (3) testing the objectivity, (4) validating the environment, and (5) using multiple criteria. Author

**N74-33694** Performance Development Corp., Trenton, N.J.
**DOLLAR EFFECTIVENESS EVALUATION OF COMPUTING SYSTEMS**
Leo J. Cohen *In* NBS Computer Performance Evaluation Sep. 1974 p 85-97 ref

The dimensions for performing a technical evaluation of a computer system are defined as: (1) CPU-seconds, (2) byte seconds, and CPU-minute. The development of a method for creating a dollar evaluation that is related to the configuration as a capacity and to the use of the capacity by loads in all equipment categories is discussed. The approach adopted is the development of the concept of dollar use of the various configuration equipments relative to the dollar capacity that these equipments make available. The use of dollars concept is obtained from observed measures of technical performance, and the method conjoins these various measures into a set of dollar related measures of overall performance. Author

**N74-33695** Army Materiel Command, St. Louis, Mo.
**COMPUTER SCHEDULING IN AN MVT ENVIRONMENT**
Daniel A. Verbois *In* NBS Computer Performance Evaluation Sep. 1974 p 99-106

A computer program is described which helps to eliminate many of the problems associated with scheduling of the U.S. Army Material Command Commodity Command Standard System. The operation of the Automated Production Scheduler is explained. The reports which are generated by the Automated Production Scheduler are identified. The advantages and disadvantages of automatic scheduling are analyzed. A primary advantage of the automated scheduler is the capability to update the scheduling data base with actual history data. Author

**N74-33696** Bell Telephone Labs., Inc., New Brunswick, N.J.
**PERFORMANCE EVALUATION OF TIME SHARING SYSTEMS**
T. W. Potter *In* NBS Computer Performance Evaluation Sep. 1974 p 107-114

Techniques for evaluating the performance of time sharing computing systems are described. Reasonable synthetic jobs are created that represent the user workload. The synthetic jobs are then used in benchmarks under experimental design to obtain response curves. The response curves aid in determining under which load conditions the time-sharing system will degrade beyond acceptance and the most cost-effective method of upgrading. This information combined with a reasonable growth study keeps the time-sharing system from severe performance degradation. Author

**N74-33697** Naval Weapons Lab., Dahlgren, Va.
**A CASE STUDY IN MONITORING THE CDC 6700: A MULTI-PROGRAMMING, MULTI-PROCESSING, MULTI-MODE SYSTEM**
Dennis M. Conti *In* NBS Computer Performance Evaluation Sep. 1974 p 115-118

A case study of an effort to monitor the performance of the CDC 6700 computer is presented. The goals, approach, and future plans of the monitoring effort are outlined. The benefits accrued from the study are analyzed. Several software monitors are described, together with some proposed hardware monitoring configurations. Author

**N74-33698** Air Force Dept., Washington, D.C. Federal Computer Performance Evaluation and Simulation Center.
**FEDSIM STATUS REPORT**
Michael F. Morris and Philip J. Kiviat *In* NBS Computer Performance Evaluation Sep. 1974 p 119-122

The organization and functions of a Federal computer performance evaluation and simulation center are discussed. The organization provides consultant services throughout the Federal Government to improve the performance of computer systems, both existing and proposed, on a fully cost-recoverable basis. Specific accomplishments of the organization are tabulated. Diagrams of the organization, agency relationships, resources, and procedures are provided. Author

**N74-33699** Naval Postgraduate School, Monterey, Calif.
**DATA ANALYSIS TECHNIQUES APPLIED TO PERFORMANCE MEASUREMENT DATA**
G. P. Learmonth *In* NBS Computer Performance Evaluation Sep. 1974 p 123-126 refs

A survey is presented of the pertinent topics of statistical analysis as they relate to computer system performance measurement and evaluation. Two approaches to computer performance valuation are defined as: (1) the analytic modelling approach and (2) the empirical measurement and evaluation approach. The use of benchmarking as a controlled experiment

technique is described. On-line measurement and simulation processes for computer evaluation are considered. Author

**N74-33700** Naval Postgraduate School, Monterey, Calif.
**A SIMULATION MODEL OF AN AUTODIN AUTOMATIC SWITCHING CENTER COMMUNICATIONS DATA PROCESSOR**
Robert B. McManus *In* NBS Computer Performance Evaluation Sep. 1974 p 127-136 refs

A network description is presented which focuses on the CDP in order to show the operation of the AUTODIN as a whole and how the CDP fits into the overall picture. The simulation program construction is described to include the more important restrictions involved. Conclusions concerning the AUTODIN as a result of the experiments conducted using the model are included. Author

**N74-33703*#** Rockwell International Corp., Downey, Calif. Space Div.
**SPACE SHUTTLE PROGRAM INFORMATION CONTROL AND RETRIEVAL SYSTEM FEASIBILITY STUDY REPORT**
C. P. Lingle Nov. 1973 52 p
(Contract NAS9-14000)
(NASA-CR-140280; SD-73-SH-0067) Avail: NTIS HC $5.75 CSCL 09D

The feasibility of having a common information management network for space shuttle data, is studied. Identified are the information types required, sources and users of the information, and existing techniques for acquiring, storing and retrieving the data. The study concluded that a decentralized system is feasible, and described a recommended development plan for it. Author

**N74-33774#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany).
**WINDTUNNELS [WINDKANAELE]**
W. Wyborny 1973 90 p In GERMAN
Avail: NTIS HC $7.50

The organization and functions of a research facility for aeronautical studies are discussed. Emphasis is placed on the five types of wind tunnels operated by the facility. The tunnels are identified as: (1) subsonic wind tunnels, (2) trans and supersonic wind tunnels, (3) hypersonic wind tunnels, (4) low density and high enthalpy wind tunnels, and (5) cascade flow wind tunnels. The apparatus installed in the tunnels and the capabilities of the tunnels are described. The main fields of research and testing conducted in each tunnel is defined. Author

**N74-33896#** World Meteorological Organization, Geneva (Switzerland).
**A GARP ATLANTIC TROPICAL EXPERIMENT (GATE) INTERNATIONAL OPERATIONS PLAN. PART 2: SHIP OPERATIONS**
Y. V. Tarbeev and S. R. Petersen Feb. 1974 237 p Prepared jointly with Intern. Council of Sci. Unions
(GATE-10-Pt-2) Avail: NTIS HC $15.00; WMO, Geneva

The ship operations plan of GATE, which coordinates the various scientific and operational aspects of the participating ships and also determines their position and role in the achievement of the main experiment objectives, is described. The observation schedule and procedures, intercomparisons at sea, data records and communication facilities are also discussed. ESRO

**N74-33898#** World Meteorological Organization, Geneva (Switzerland).
**REPORT OF THE NINTH SESSION OF THE JOINT ORGANIZING COMMITTEE FOR GARP**
Jan. 1974 98 p Conf. held at Canberra, Australia, 8-12 Jan. 1974 Prepared jointly with Intern. Council of Sci. Unions
Avail: NTIS HC $8.00; WMO, Geneva

Following the chairman's report, summaries were presented of the numerical experimentation program, the GARP Atlantic Tropical Experiment, the Global Experiment, and other related programs. The organization of future work was also discussed. ESRO

**N74-33901#** World Meteorological Organization, Geneva (Switzerland).
**THE GARP ATLANTIC TROPICAL EXPERIMENT (GATE) INTERNATIONAL OPERATIONS PLAN. PART 5: TELECOMMUNICATIONS**
Apr. 1974 220 p Prepared jointly with Intern. Council of Sci. Unions
(GATE-12-Pt-5) Avail: NTIS HC $14.00; WMO, Geneva

The telecommunications plan of GATE is described. All GATE observing platforms including ships, aircraft, buoys, and ground stations will communicate with each other through different telecommunication centers in accordance with this plan. The organization, procedures, and schedules for the transmission and reception of the different information needed during the duration of GATE is described. The GATE telecommunications manual is also included. ESRO

**N74-33902#** World Meteorological Organization, Geneva (Switzerland).
**THE INTERNATIONAL DATA MANAGEMENT PLAN FOR THE GARP ATLANTIC TROPICAL EXPERIMENT. PART 1: GENERAL DESCRIPTION OF THE GATE DATA MANAGEMENT SCHEME AND ITS SPECIFICATION**
T. C. DeLaMoriniere Apr. 1974 234 p Prepared jointly with Intern. Council of Sci. Unions
(GATE-13-PT-1) Avail: NTIS HC $14.75; WMO, Geneva

The descriptions, definitions and general specifications for the international aspects of GATE data management are given, the objectives of which are to assemble an international data set for GATE and to assist in making it available to scientific users. ESRO

**N74-34118#** World Meteorological Organization, Geneva (Switzerland).
**REPORT OF THE SIXTH SESSION OF THE TROPICAL EXPERIMENT BOARD Global Atmospheric Research Program**
Apr. 1974 43 p Prepared jointly with Intern. Council of Sci. Unions
(GARP-Spec-Rept-12) Avail: NTIS HC $5.25; WMO, Geneva

Following a general status report of the Tropical Experiment Board for the GARP Atlantic Tropic Experiment (GATE), the final platform commitments and operational plans (support aircraft, telecommunications, ship) were discussed. The status of the World Weather Watch and exchange of scientific personnel were noted and a report on the NAVAID wind finding system was presented. The data management and scientific subprograms were briefly summarized and post-GATE activities discussed. ESRO

**N74-34168#** Oak Ridge National Lab., Tenn.
**MATERIALS INFORMATION IN THE RADIATION SHIELDING INFORMATION CENTER**
B. F. Maskewitz, D. K. Trubey, and R. W. Roussin Apr. 1974 10 p refs Presented at Materials Information Programs Meeting, Gaithersburg, Md., 16 Apr. 1974 Sponsored by AEC
(Conf-740424-2) Avail: NTIS HC $4.00

The Radiation Shielding Information Center (RSIC), serves the shielding community by collecting, organizing, processing, evaluating, packaging, and disseminating information mainly related to reactor and weapons radiation. The scope includes the physics of interaction of radiation with matter, radiation production, transport and energy deposition, radiation detectors

and measurements, engineering design techniques, shielding materials properties, computer codes useful in research and design, and shielding data compilations. This information is analyzed, evaluated, synthesized, and repackaged in a form more authoritative, timely, and useful. Promoting exchange and improvement of nuclear data, computer codes, and radiation transport information, RSIC provides strong support for the technology areas of its sponsors. Author (NSA)

**N74-34310*#** General Dynamics/Convair, San Diego, Calif.
**LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 1: EXECUTIVE SUMMARY**
Aug. 1974 53 p 4 Vol.
(Contract NAS8-30288)
(NASA-CR-120451; CASD-NAS-74-046-Vol-1) Avail: NTIS HC $5.75 CSCL 22A

The definition and integration tasks involved in the development of design concepts for a carry-on laboratory (COL), to be compatible with Spacelab operations, were divided into the following study areas: (1) identification of research and equipment requirements of the COL; (2) development of a number of conceptual layouts for COL based on the defined research of final conceptual designs; and (3) development of COL planning information for definition of COL/Spacelab interface data, cost data, and program cost schedules, including design drawings of a selected COL to permit fabrication of a functional breadboard. Author

**N74-34311*#** General Dynamics/Convair, San Diego, Calif.
**LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 2: REQUIREMENTS, DESIGN, AND PLANNING STUDIES FOR THE CARRY-ON LABORATORIES**
Aug. 1974 168 p refs 4 Vol.
(Contract NAS8-30288)
(NASA-CR-120452; CASD-NAS-74-046-Vol-2) Avail: NTIS HC $11.50 CSCL 22A

The task phase concerned with the requirements, design, and planning studies for the carry-on laboratory (COL) began with a definition of biomedical research areas and candidate research equipment, and then went on to develop conceptual layouts for COL which were each evaluated in order to arrive at a final conceptual design. Each step in this design/evaluation process concerned itself with man/systems integration research and hardware, and life support and protective systems research and equipment selection. COL integration studies were also conducted and include attention to electrical power and data management requirements, operational considerations, and shuttle/Spacelab interface specifications. A COL program schedule was compiled, and a cost analysis was finalized which takes into account work breakdown, annual funding, and cost reduction guidelines. A.A.D.

**N74-34312*#** General Dynamics/Convair, San Diego, Calif.
**LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 3: PRELIMINARY EQUIPMENT ITEM SPECIFICATION CATALOG FOR THE CARRY-ON LABORATORIES**
Aug. 1974 159 p 4 Vol.
(Contract NAS8-30288)
(NASA-CR-120453; CASD-NAS-74-046-Vol-3) Avail: NTIS HC $11.00 CSCL 22A

All general purpose equipment items contained in the final carry-on laboratory (COL) design concepts are described in terms of specific requirements identified for COL use, hardware status, and technical parameters such as weight, volume, power, range, and precision. Estimated costs for each item are given, along with projected development times. A.A.D.

**N74-34313*#** General Dynamics/Convair, San Diego, Calif.
**LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 4: APPENDIX, COSTS, AND DATA MANAGEMENT REQUIREMENTS OF THE DEDICATED 30-DAY LABORATORY**
Aug. 1974 92 p refs 4 Vol.
(Contract NAS8-30288)
(NASA-CR-120454; CASD-NAS-74-046-Vol-4) Avail: NTIS HC $7.75 CSCL 22A

The results of the updated 30-day life sciences dedicated laboratory scheduling and costing activities are documented, and the 'low cost' methodology used to establish individual equipment item costs is explained in terms of its allowances for equipment that is commerical off-the-shelf, modified commercial, and laboratory prototype; a method which significantly lowers program costs. The costs generated include estimates for non-recurring development, recurring production, and recurring operations costs. A cost for a biomedical emphasis laboratory and a Delta cost to provide a bioscience and technology laboratory were also generated. All cost reported are commensurate with the design and schedule definitions available. Author

**N74-34318*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
**APOLLO EXPERIENCE REPORT: APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE DATA PROCESSING SYSTEM**
Roy L. Eason Washington Sep. 1974 15 p
(NASA-TN-D-7781; JSC-S-402) Avail: NTIS HC $3.00 CSCL 09B

Apollo Program experience in the processing of scientific data from the Apollo lunar surface experiments package, in which computers and associated hardware and software were used, is summarized. The facility developed for the preprocessing of the lunar science data is described, as are several computer facilities and programs used by the Principal Investigators. The handling, processing, and analyzing of lunar science data and the interface with the Principal Investigators are discussed. Pertinent problems that arose in the development of the data processing schemes are discussed so that future programs may benefit from the solutions to the problems. The evolution of the data processing techniques for lunar science data related to recommendations for future programs of this type. Author

**N74-34327*#** TRW Systems Group, Redondo Beach, Calif.
**SPACE PROCESSING APPLICATIONS PAYLOAD EQUIPMENT STUDY. VOLUME 1: EXECUTIVE SUMMARY**
R. L. Hammel Aug. 1974 45 p refs 3 Vol.
(Contract NAS8-28938)
(NASA-CR-120341; TRW-22886-6033-RU-00-Vol-1) Avail: NTIS HC $5.25 CSCL 22B

A study was conducted to derive and collect payload information on the anticipated space processing payload requirements for the Spacelab and space shuttle orbiter planning activities. The six objectives generated by the study are defined. Concepts and requirements for space processing payloads to accommodate the performance of the shuttle-supported research phase are analyzed. Diagrams and tables of data are developed to show the experiments involved, the power requirements, and the payloads for shared missions. Author

**N74-34328*#** TRW Systems Group, Redondo Beach, Calif.
**SPACE PROCESSING APPLICATIONS PAYLOAD EQUIPMENT STUDY. VOLUME 2A: EXPERIMENT REQUIREMENTS**
A. G. Smith and W. T. Anderson, Jr. Jul. 1974 78 p refs 3 Vol.
(Contract NAS8-28938)
(NASA-CR-120342; TRW-22886-6034-RU-00-Vol-2A) Avail: NTIS HC $7.00 CSCL 22B

An analysis of the space processing applications payload equipment was conducted. The primary objective was to perform a review and an update of the space processing activity research equipment requirements and specifications that were derived in the first study. The analysis is based on the six major experimental classes of: (1) biological applications, (2) chemical processes in fluids, (3) crystal growth, (4) glass technology, (5) metallurgical processes, and (6) physical processes in fluids. Tables of data

are prepared to show the functional requirements for the areas of investigation. Author

**N74-34349#** Societe Nationale Industrielle Aerospatiale, Cannes (France).
**LOUVRES FOR SATELLITE THERMAL CONTROL**
P. Croiset and L. Leroy Paris ESRO Dec. 1973 110 p refs In FRENCH; ENGLISH summary
(Contract ESTEC-1190/70)
(ESRO-CR-208) Avail: NTIS HC $8.50

Design, development, and qualification testing of a louver array for active satellite thermal control was carried out. Performance predictions for the array were established by means of computer programs and then verified experimentally on a mockup and on a prototype. The system behavior in the launching environment was verified by mechanical and acoustic tests. Author (ESRO)

**N74-34420#** Commerce Dept., Washington, D.C.
**ANNUAL REPORT OF THE SECRETARY OF COMMERCE, FISCAL YEAR ENDING 30 JUNE 1973**
14 Mar. 1974 94 p
Avail: SOD HC $1.30

The finances and activities of the Department of Commerce are outlined. Reported are managerial details, economic and scientific developments for industry and business, and ocean shipping data. G.G.

**N74-34423#** Committee on the Judiciary (U. S. Senate).
**COMPETITION IN THE ENERGY INDUSTRY**
Washington GPO 1974 408 p refs Hearings before Subcomm. on Antitrust and Monopoly of the Comm. on the Judiciary (Pursuant to S. Res. 56, Section 4, Gasoline and Fuel Oil), 93d Congr., 1st Sess., 8, 11 and 12 Jun.; 11 and 27 Jul. 1973
(GPO-24-334) Avail: SOD HC $3.00

A Congressional investigation was conducted to determine the situation within the petroleum industry and the competition which exists between various segments of the gasoline and fuel oil production facilities. Testimony was submitted by selected representatives of the industries involved to show the manner of operation and the impact of the oil crisis. Examples of legislation to control and promote improvements in the gasoline and fuel oil industries are provided. Projections concerning increasing energy requirements and possible areas of shortage are analyzed. Author

**N74-34427#** RAND Corp., Santa Monica, Calif.
**THE STAR METHODOLOGY FOR SHORT-HAUL TRANSPORTATION: TRANSPORTATION SYSTEM IMPACT ASSESSMENT**
L. G. Chesler and B. F. Goeller Dec. 1973 77 p refs
(Contract DOT-TSI-363)
(R-1359-DOT) Avail: NTIS HC $7.00

This is a summary of a series of nine reports documenting the STAR methodology developed for performing R and D policy analysis studies of short-haul (50 to 500 miles) passenger transportation systems. The methodology, which allows comparison of air and ground modes, was developed to help analyzed the following range of impacts for alternative transportation systems. (1) service impacts - door-to-door time and cost, passenger volumes, passengers diverted from existing facilities. (2) financial impacts - system investments, operator profit and taxes, operating costs, annual subsidy required. (3) economic impacts - changes in regional income and employment as a result of system construction. (4) community impacts - the amount of land taken, the number of households displaced, the number of households exposed to excessive noise, the amount of energy consumed, the changes in the amount of air pollution emissions. (5) social impacts - the distribution of benefits and disbenefits by social group, including the fraction of travelers in high-, medium-, and low-income groups; the proportion of business and nonbusiness travelers; the fraction of those exposed to excessive noise by race and income group. Author

**N74-34428#** Committee on Finance (U. S. Senate).
**FISCAL POLICY AND THE ENERGY CRISIS, PART 1**
Washington GPO 1973 583 p refs Hearings before the Subcomm. on Energy of Comm. on Finance, 93d Congr., 1st Sess., 27, 28 and 29 Nov. 1973
(GPO-25-047) Avail: SOD HC $4.05

The formation of a financial base for a total energy policy whose scope includes both measures for reducing present energy consumption habits, and research support for the development of new sources of energy in order to relieve the U. S. of its almost complete dependence on fossil fuel, was the subject of a series of hearings before Congress. Both public and private sector measures are discussed, including the establishment of a national energy trust fund supported by a tax on energy consumption, the creation of incentives for the production of energy by private industry, and a variable import levy on foreign energy to protect and encourage domestic investment in energy technology. A.A.D.

**N74-34429#** Committee on Finance (U. S. Senate).
**FISCAL POLICY AND THE ENERGY CRISIS, PART 2, APPENDIXES TO PART 1**
Washington GPO 1973 338 p refs Hearings before Subcomm. on Energy of Comm. on Finance, 93d Congr., 1st Sess., 27, 28 and 29 Nov. 1973
(GPO-25-047) Avail: SOD HC $2.40

Planning criteria relative to a national research, development, testing, and evaluation program directed to the enhanced recovery of crude oil and natural gas was submitted during discussions before Congress of fiscal policy and the energy crisis. A definition of the energy problem is provided which considers the implications of the crisis on the national economy and balance of payments, fiscal incentives on the supply side and fiscal disincentives on the demand side, as well as U. S. trade policy concerning importation and exportation of energy resources. Federal energy research and development funding is also outlined. A.A.D.

**N74-34430#** Committee on Finance (U. S. Senate).
**FISCAL POLICY AND THE ENERGY CRISIS, PART 3**
Washington GPO 1974 440 p refs Hearings on S. 2806 before Subcomm. on Energy of Comm. on Finance, 93d Congr., 1st and 2d Sess., 27, 28 and 29 Nov 1973; 23, 24, 25, 28 and 29 Jan. 1974
(GPO-28-243) Avail: SOD HC $3.15

The removal of price controls over the energy sector and the regulation of natural gas prices, as well as tax measures aimed at increasing energy supplies, decreasing residential energy consumption, and discouraging excess profits was the focus of a Congressional hearing whose purpose was to discuss fiscal policy in relation to the crisis. Energy reserves and the production of energy on nonpublic lands are discussed, along with proposed administration of a trust fund to support energy research and development. A.A.D.

**N74-34431#** Committee on Finance (U. S. Senate).
**FISCAL POLICY AND THE ENERGY CRISIS, PART 4**
Washington GPO 1974 547 p refs Hearings on S. 2806 before Subcomm. on Energy of Comm. on Finance, 93d Congr., 1st and 2d Sess., 27, 28 and 29 Nov. 1973; 23, 24, 25, 28 and 29 Jan. 1974
(GPO-28-243) Avail: SOD HC $4.45

Safety procedures are described which pertain to the use of nuclear materials for energy production, and information is presented regarding the development of coal gasification projects by the U. S. gas industry, for the purpose of informing Congress of ongoing energy research and development efforts to be considered in the formation of a total national energy policy based on fiscal responsibility. U. S. policy towards the Organization

of Petroleum Exporting Countries cartel is reviewed, and both commercial and natural resources are considered in an effort to evaluate the chances for American energy-sufficiency before 1985. Data which illustrate oil company profitability are provided, and the impact of solar energy applications on the economics of energy supply and demand is discussed. The range of fiscal proposals aimed at the alleviation of the energy crisis are assessed both by commercial and governmental interests. A.A.D.

**N74-34436#** Naval Postgraduate School, Monterey, Calif.
**LOCKHEED AIRCRAFT CORPORATION CASE STUDIES IN MANAGEMENT M.S. Thesis**
Landon G. Cox, Jr. Jun. 1974 40 p refs
(AD-781865) Avail: NTIS CSCL 05/1

Although the Lockheed Aircraft Corporation emerged from World War II with a reputation as one of the leading U. S. manufacturers of military and civilian aircraft, by 1971 Lockheed had amassed debts of over $700 million and claimed it would be forced into bankruptcy unless federal loan guarantees were granted to its creditors. The report consists of three independent case studies intended for use in the management curriculum in courses on general management but have other financial overtones. (Modified author abstract) GRA

**N74-34439#** Abcor, Inc., Cambridge, Mass. Walden Research Div.
**DEVELOPMENT OF A METHODOLOGY TO ALLOCATE LIQUID FOSSIL FUEL CONSUMPTION BY COUNTY Final Report, Feb. 1973 - Mar. 1974**
Josette C. Goldish, Franklin D. Trowt, John R. Ehrenfeld, Khee M. Chng, and Richard Stockdale Mar. 1974 139 p refs
(Contract EPA-68-02-1067)
(PB-232209/7; EPA-450/3-74-021) Avail: NTIS HC $10.00 CSCL 13B

Methods were developed for the routine determination of distillate and residual oil consumption by industrial, commercial, and residential consumers, as well as for gasoline and diesel fuel consumed by light and heavy duty motor vehicles. The resulting data are allocated to counties for input and storage in the National Emissions Data System (NEDS) area source format. In addition, seasonal fluctuations of fuel oil use by consumer category and geographic region, and references for determining sulfur content of fuel oils on a county basis, were analyzed. The report summarizes the methodologies that were developed and describes the computer processing techniques for reporting the data. GRA

**N74-34440#** Harvard Univ., Cambridge, Mass.
**TASSIM: A TRANSPORTATION AND AIR SHED SIMULATION MODEL. VOLUME 1: CASE STUDY OF THE BOSTON REGION Final Report, 1 Apr. 1973 - 31 May 1974**
Gregory K. Ingram and Gary R. Fauth May 1974 107 p refs
(Contract DOT-OS-30099)
(PB-232933/2; DOT-OS-30099-5) Avail: NTIS HC $4.50 CSCL 13B

The TASSIM model integrates an urban transportation planning model, vehicle emission factors and simple air diffusion models in a simulation framework that can be used to analyze the air quality effects of transportation policies. The model is spatially disaggregated, and it is compatible with data sources available in many metropolitan areas. This volume briefly describes the structure of the model and then analyzes several model applications that simulate for Boston the air quality effects of transportation control land use, and stationary source policies. The transportation control policies are evaluated in a cost effectiveness framework. The final sections consider possible extensions of the model and outline the model's computational aspects. GRA

**N74-34443#** Army Aviation Systems Command, St. Louis, Mo. Systems Analysis Office.
**COST EFFECTIVENESS MODEL 1: PROTOTYPE SELECTION AND TRADE-OFFICE ANALYSES**
M. Zaki El-Sabban May 1974 22 p refs
(AD-781947; AMSAV-D-74-14; USAAVSCOM-TR-74-23) Avail: NTIS CSCL 01/3

The report presents a methodology that would guide a Product/Project Manager in making an informed selection from among several single prototype aircraft, based upon cost and effectiveness considerations. Measures of effectiveness are defined and a cost-effectiveness index (effectiveness per dollar) is determined and recommended as a basis for selection. A numerical example is presented, demonstrating the application of this model. Author (GRA)

**N74-34516#** Office of the Assistant for Study Support, Kirtland AFB, N.Mex.
**MODELS AND METHODOLOGY FOR LIFE CYCLE COST AND TEST AND EVALUATION ANALYSIS Final Report**
Richard H. Anderson, Thomas E. Dixon, Robert F. Couch, Jr., and William H. Newhart, Jr. Jul. 1973 160 p refs
(AD-782182; OAS-TR-73-6) Avail: NTIS CSCL 01/3

This report documents various models and methodology which were developed during the course of some analytical studies on life cycle cost and test and evaluation. These studies were conducted by the Office of the Assistant for Study Support (OAS) at the request of DCS/Development Plans, Headquarters AFSC. The objectives of the study were to: Investigate the present methods of subsystem reliability specification and identify limitations associated with these methods; investigate new and innovative techniques for subsystem reliability management and identify benefits to be derived in terms of higher performance/lower costs; and, develop models and methodology applicable to life cycle cost and test and evaluation analyses. (Modified author abstract) GRA

**N74-34519#** Bell Helicopter Co., Fort Worth, Tex.
**R/M DATA ANALYSIS OF THE UH-1/AH-1 TAIL ROTOR SYSTEM Final Report**
George E. Knudsen and Patricia V. Carr Apr. 1974 384 p
(Contract DAAJ02-72-C-0028; DA Proj. 1F1-62205-A-11)
(AD-782858; USAAMRDL-TR-74-11) Avail: NTIS CSCL 01/3

The report provides reliability, maintainability, and cost analysis of historical data reported on the UH-1/AH-1 tail rotor subsystems. The objectives of this analysis are to develop benchmark maintenance and logistic support data for the design of future helicopter anti-torque systems and to put into better perspective the cost of tail-rotor-system-associated mishaps. (Modified author abstract) GRA

**N74-34526#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), OH-6A TAIL ROTOR TRANSMISSION ASSEMBLY Interim Report, 1 Jan. 1964 - 1 Jul. 1973**
Jul. 1974 22 p refs
(AD-782926; USAAVSCOM-TR-74-34) Avail: NTIS CSCL 01/3

The report is designed to illustrate cost savings which would result from specific efforts in the areas of product improvement in quality and design. For the purpose of this study the cost savings produced in the area of product improvement are based on total elimination of a certain failure mode or modes. Appropriate modes are chosen because of their proportion of the total removals or their proportion in combination with other similar modes. These eliminated removals are then assumed to follow the distribution of the remaining removal modes. The actual cost savings are determined from the increase in the mean time to removal based on the new removal distributions. The data used and methods involved are described. GRA

**N74-34543#** Committee on Science and Astronautics (U. S. House).
**ENERGY FROM OIL SHALE: TECHNICAL, ENVIRONMENTAL, ECONOMIC, LEGISLATIVE, AND POLICY ASPECTS OF AN UNDEVELOPED ENERGY SOURCE**
Washington GPO Nov. 1973 71 p refs Rept. Prepared for Subcomm. on Energy of Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 30 Nov. 1973 Prepared by the Library of Congr., Sci. Policy Res. Div.
(GPO-25-572) Avail: Subcomm. on Energy

Current economic analyses indicate that the processing of oil shale is within or near the range of economic feasibility. Environmental acceptability remains to be tested on a large-scale basis. Advances in environmental control technologies, for example, revegetation and chemical processing of effluents, are said to reduce some of the harmful environmental impacts resulting from development of this resource. This paper discusses proposed legislation concerned with the development of oil shale which would establish a cooperative Government-industry corporation to construct models of an oil shale processing plant to demonstrate the economic feasibility and environmental acceptability of different technological methods, and, if deemed feasible, construct a commercial sized plant. Author

**N74-34544#** Committee on Public Works (U. S. Senate).
**THE FUEL SHORTAGE AND THE CLEAN AIR ACT**
Washington GPO 1973 113 p Hearing on S. 2680 before Subcomm. on Air and Water Pollution of Comm. on Public Works, 93d Congr., 1st Sess., 12 Nov. 1973
(GPO-25-885) Avail: Subcomm. on Air and Water Pollution

Variances from clean air requirements are requested to deal with the fuel shortage for a limited duration. Changes in the clean air act implementation plans are intended to give affected utilities and industries the necessary time to install available stack gas emission controls. G.G.

**N74-34552#** Army Aviation Systems Command, St. Louis, Mo.
**MAJOR ITEM SPECIAL STUDY (MISS), CH-47A AUXILIARY POWER UNIT (T62-T-2A) Interim Report, 1 Jan. 1964 - 1 Jan. 1973**
Jul. 1974 20 p refs
(AD-782927; USAAVSCOM-TR-74-35) Avail: NTIS CSCL 01/3

Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distribution can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

**N74-34630#** National Bureau of Standards, Washington, D.C. Systems and Software Div.
**REPORT ON PLANNING SESSION ON SOFTWARE ENGINEERING HANDBOOK**
Selden L. Stewart, ed. Nov. 1974 18 p
(NBS Proj. 6401129)
(NBS-TN-832; LC-74-600091) Avail: SOD HC $0.70 as C13.46:832

The need, coverage, and audience for a proposed software engineering handbook are discussed. Author

**N74-34673*#** National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
**KSC MAINTENANCE CAPABILITY (LABORATORIES AND SHOPS)**
5 Sep. 1974 105 p
(NASA-TM-X-70380; KSC-GP-1037) Avail: NTIS HC $8.25 CSCL 14B

A summary of laboratory and shop facilities at Kennedy Space Center that are available to provide a baseline to the offline maintenance requirements for the space shuttle program is provided. Author

**N74-34680#** Advisory Group for Aerospace Research and Development, Paris (France).
**THE NEED FOR A LARGE TRANSONIC WINDTUNNEL IN EUROPE. SECOND REPORT OF THE LARGE WINDTUNNELS WORKING GROUP**
Aug. 1974 46 p refs
(AGARD-AR-70) Avail: NTIS HC $5.50

The Second Report of the Large Windtunnels Working Group of the AGARD Fluid Dynamics Panel is presented. The group confined its further considerations to the need for and definitions of a large transonic windtunnel in Europe. The engineering studies on the proposed four options for the tunnel drive system are reviewed; engineering of all four appears to be feasible but at higher cost than anticipated. The Group still cannot recommend a preferred option technical grounds, but recommends that following further work a selection should be made before the end of 1975. The program of further work necessary to provide the information needed for selection of a preferred option is defined, together with recommendations on how it should be shared between National Programs and on indepedent Technical Project Group, with coordination as required by the MiniLaWs Group of the Fluid Dynamics Panel. It is concluded that the reasons given on the need for a large European transonic windtunnel still apply, and no change is required in the standard specification of the windtunnel. Author

**N74-34685#** Pereira (William L.) Associates, Corona del Mar, Calif.
**DULLES URBAN CENTER CONCEPTS**
Ronald D. Allum, Gregory D. Billingham, Frank Dimster, Chuck Grein, and Larry J. Hurlbut 1 Aug. 1973 132 p refs
(Contract DOT-FA72WA-2279)
(AD-777991) Avail: NTIS CSCL 13/2

The report presents a multidisciplinary study to determine the feasibility of developing a unique urban center to be located in the vicinity of the Dulles International Airport property, utilizing transportation, urbanization and aviation concepts developed in the planning concepts study. The investigation includes alternative programs, locations and land uses, vehicular circulation and parking concepts, pedestrian circulation, economic objectives and analyses, building types, massing, volume, site studies, methods of financing, operation, ownership and the role of government agencies, as well as the private sector. GRA

**N74-34734*#** Imperial Government of Iran, Tehran.
**AN EVALUATION OF THE UTILITY OF ERTS-1 DATA FOR MAPPING AND DEVELOPING NATURAL RESOURCES OF IRAN Final Report**
K. Ebtehadj, Principal Investigator Jul. 1974 211 p refs Sponsored by NASA Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(E74-10758; NASA-CR-139998) Avail: NTIS HC $13.75 CSCL 08B

The author has identified the following significant results. Results are reported in structural mapping leading to tectonic interpretation; in surficial deposits mapping; in analysis of salt diapirism in southwest Iran; in updating and correcting existing hydrological maps; in monitoring fluctuations of water in some

intermittent lakes; in the delineation of wetland areas and the study of fluvial suspended load of the head of the Persian Gulf in relation to the fishing industry; in exercises in soil mapping; in range and agricultural surveys and inventory using multistage sampling methods, and in the computer analysis of ERTS-1 digital tapes for urban land use. The completion of a 1:1,000,000 false color photomosaic of Iran is also discussed.

**N74-34827#** Geodynamics Committee, Washington, D.C.
**US PROGRAM FOR THE GEODYNAMICS PROJECT: SCOPE AND OBJECTIVES**
Nov. 1973 238 p
(PB-232662/7; ISBN-0-309-02211-8) Avail: NTIS MF $2.25; National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., Washington, D. C. 20418 HC $3.25 CSCL 08G

The Geodynamics Project spanning the year 1971-1979 is an international program and intensive effort to study the basic mechanism of earth deformation. Now the report is available for the benefit of all those involved in geoscience at any level. It sets forth the background of the program, states why geodynamics studies are timely, reviews the objectives of the U.S. program, describes the scientific scope of geodynamics problems, and suggests the kinds of research that should be pursued toward solution of these problems. The focus of the proposed U.S. Program is on the plate-tectonics model because its ability to explain and predict appears to be greater than any previous or alternative model. GRA

**N74-35020** Environmental Protection Agency, Washington, D.C.
**INTRODUCTORY REMARKS TO WORKSHOP ON APPLICATIONS OF MODELING AND USERS NEEDS**
Kay H. Jones *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 4th Meeting of the Expert Panel on Air Pollution Modeling 30 May 1973 10 p

A probe was made of the central problem area in the modeler-user relationship - the communications gap. It was determined that the main problem is the user's lack of confidence in the modeler and his output. Several suggestions were made to help eliminate this problem and an effort was made to acquaint the user with the modeling process as a means of increasing his confidence in the finished product. E.H.W.

**N74-35025** Ministerium fuer Arbeit, Gesundheit und Soziales, Dusseldorf (West Germany).
**COLOGNE EMISSIONS INVENTORY**
Werner Figgen, ed. *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 4th Meeting of the Expert Panel on Air Pollution Modeling 30 May 1973 47 p

The cologne pilot scheme for establishing an inventory of atmospheric pollutants is discussed. Inventory data cover pollution from domestic heating, vehicles, and industrial sources. Pollution sources are classified according to geographical position and the conditions affecting their emissions: dimension of the source, quantity and temperature of waste gases, nature and quantity of pollution material, and frequency and duration of emission. Inventory data are stored in an electronic data processing system. Author

**N74-35198*#** Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
**DESIGN STUDY OF RL10 DERIVATIVES. VOLUME 3, PART 2: OPERATIONAL AND FLIGHT SUPPORT PLAN Final Report**
W. C. Shubert 15 Dec. 1973 122 p
(Contract NAS8-28989)
(NASA-CR-120148; FR-6011-Vol-3-Pt-2) Avail: NTIS HC $9.25 CSCL 21H

Transportation requirements are considered during the engine design layout reviews and maintenance engineering analyses. Where designs cannot be influenced to avoid transportation problems, the transportation representative is advised of the problems permitting remedies early in the program. The transportation representative will monitor and be involved in the shipment of development engine and GSE hardware between FRDC and vehicle manufacturing plant and thereby will be provided an early evaluation of the transportation plans, methods and procedures to be used in the space tug support program. Unanticipated problems discovered in the shipment of development hardware will be known early enough to permit changes in packaging designs and transportation plans before the start of production hardware and engine shipments. All conventional transport media can be used for the movement of space tug engines. However, truck transport is recommended for ready availability, variety of routes, short transit time, and low cost. Author

**N74-35265*#** Alabama Univ., Huntsville.
**IDENTIFICATION AND EVALUATION OF EDUCATIONAL USES AND USERS FOR THE STS. EDUCATIONAL PLANNING FOR UTILIZATION OF SPACE SHUTTLE ED-PLUSS Final Research Report**
Harry A. Engle and David L. Christensen Sep. 1974 131 p refs
(Contract NAS8-30737)
(NASA-CR-120514) Avail: NTIS HC $9.75 CSCL 22A

A planning and feasibility study to identify and document a methodology needed to incorporate educational programs into future missions and operations of the space transportation system was conducted. Six tasks were identified and accomplished during the study. The task statements are as follows: (1) potential user identification, (2) a review of space education programs, (3) development of methodology for user involvement, (4) methods to encourage user awareness, (5) compilation of follow-on ideas, and (6) response to NASA questions. Specific recommendations for improving the educational coverage of space activities are provided. Author

**N74-35279*#** Rockwell International Corp., Downey, Calif. Space Div.
**FRACTURE CONTROL METHODS FOR SPACE VEHICLES. VOLUME 1: FRACTURE CONTROL DESIGN METHODS Contractor Report, Jun. 1972 - Mar. 1974**
A. F. Liu Aug. 1974 226 p refs 3 Vol.
(Contract NAS3-16765)
(NASA-CR-134596; SD73-SH-0171-1-Vol-1) Avail: NTIS HC $14.50 CSCL 22B

A systematic approach for applying methods for fracture control in the structural components of space vehicles consists of four major steps. The first step is to define the primary load-carrying structural elements and the type of load, environment, and design stress levels acting upon them. The second step is to identify the potential fracture-critical parts by means of a selection logic flow diagram. The third step is to evaluate the safe-life and fail-safe capabilities of the specified part. The last step in the sequence is to apply the control procedures that will prevent damage to the fracture-critical parts. The fracture control methods discussed include fatigue design and analysis methods, methods for preventing crack-like defects, fracture mechanics analysis methods, and nondestructive evaluation methods. An example problem is presented for evaluation of the safe-crack-growth capability of the space shuttle crew compartment skin structure. Author

**N74-35280*#** Rockwell International Corp., Downey, Calif. Space Div.
**FRACTURE CONTROL METHODS FOR SPACE VEHICLES.**

**VOLUME 2: ASSESSMENT OF FRACTURE MECHANICS TECHNOLOGY FOR SPACE SHUTTLE APPLICATIONS**
**Contractor Report, Jun. 1972 - Mar. 1974**
R. M. Ehret Aug. 1974 209 p refs 3 Vol.
(Contract NAS3-16765)
(NASA-CR-134597; SD73-SH-0171-2-Vol-2) Avail: NTIS HC $13.50 CSCL 22B

The concepts explored in a state of the art review of those engineering fracture mechanics considered most applicable to the space shuttle vehicle include fracture toughness, precritical flaw growth, failure mechanisms, inspection methods (including proof test logic), and crack growth predictive analysis techniques. Author

**N74-35281*#** Rockwell International Corp., Downey, Calif. Space Div.
**FRACTURE CONTROL METHODS FOR SPACE VEHICLES. VOLUME 3: SPACE SHUTTLE CONFIGURATIONS**
**Contractor Report, Jun. 1972 - Mar. 1974**
A. F. Liu and E. J. Mulcahy Aug. 1974 235 p refs 3 Vol.
(Contract NAS3-16765)
(NASA-CR-134598; SD73-SH-0171-3-Vol-3) Avail: NTIS HC $14.75 CSCL 22B

Engineering drawings are presented which represent the culmination of research efforts towards a space shuttle configuration with adequate fracture control properties. A.A.D.

**N74-35286*#** Aerospace Corp., El Segundo, Calif. Systems Planning Div.
**PAYLOAD DESIGN REQUIREMENTS ANALYSIS (STUDY 2.2). VOLUME 3. GUIDELINE ANALYSIS Final Report**
T. Shiokari 5 Oct. 1973 469 p refs
(Contract NASw-2472)
(NASA-CR-140585; ATR-74(7332)-1-Vol-3) Avail: NTIS HC $26.50 CSCL 22B

Payloads to be launched on the space shuttle/space tug/sortie lab combinations are discussed. The payloads are of four types: (1) expendable, (2) ground refurbishable, (3) on-orbit maintainable, and (4) sortie. Economic comparisons are limited to the four types of payloads described. Additional system guidelines were developed by analyzing two payloads parameterically and demonstrating the results on an example satellite. In addition to analyzing the selected guidelines, emphasis was placed on providing economic tradeoff data and identifying payload parameters influencing the low cost approaches. Author

**N74-35332*** + National Aeronautics and Space Administration, Washington, D.C.
**SIGNIFICANT NASA INVENTIONS: AVAILABLE FOR LICENSING IN FOREIGN COUNTRIES**
1974 81 p refs
(NASA-SP-7038(02)) Avail: NTIS Avail: SOD HC $0.19 CSCL 13I

Abstracts of NASA-owned inventions, which have been made available for patent licensing in foreign countries are presented. F.O.S.

**N74-35333#** Committee on Government Operations (U. S. Senate).
**CURRENT ENERGY SHORTAGES OVERSIGHT SERIES (THE MAJOR OIL COMPANIES), PART 2**
Washington GPO 1974 166 p ref Hearings pursuant to Section 4, S. Res. 46 before Subcomm. on Investigations of Comm. on Govt. Operations, 93d Congr., 2d Sess., 21 Jan. 1974
(GPO-28-575-PT-2) Avail: SOD HC $1.50

The role of the domestic oil industry in dealing with the energy crisis was questioned in a Congressional hearing convened to gather information on the effects of oil import quotas, as well as to hear reliable data concerning charges that major oil companies have intended to eliminate price competition, and are hoarding production, to force both the adoption of new tax subsidies and the revocation of environmental laws. The positions of the major oil interests are represented both by direct testimony, and by response to a questionnaire designed to reflect projected and actual supply/demand balances and crude oil imports for the period 1971 through 1974. A.A.D.

**N74-35335#** Committee on Interior and Insular Affairs (U. S. Senate).
**ENERGY INFORMATION ACT. PART 3: APPENDIX**
Washington GPO 1974 453 p refs Hearings on S. 2782 before Comm. on Interior and Insular Affairs, 93d Congr., 2d Sess., 15 Feb. 1974
(GPO-29-910) Avail: Comm. on Interior and Insular Affairs

Data were submitted to Congress which are relevant to a proposed bill for the establishment of a national energy information system, and for the authorization of the Department of the Interior to undertake an inventory of U.S. energy resources on public lands. The results of a national gas reserves study are provided, and a computerized decision making system designed to integrate social, economic, and environmental processes is proposed. A similar energy-based information classification system is also discussed. A.A.D.

**N74-35336#** Committee on Government Operations (U. S. Senate).
**CURRENT ENERGY SHORTAGES OVERSIGHT SERIES (THE MAJOR OIL COMPANIES), PART 4**
Washington GPO 1974 145 p Hearings pursuant to Section 4, S. Res. 46 before Subcomm. on Investigations of Comm. on Govt. Operations, 93d Congr., 2d Sess., 23 Jan. 1974
(GPO-28-575-PT-4) Avail: SOD HC $1.40

Summaries of negotiations between major U.S. oil companies and Middle Eastern governments during the period from 1964 to 1974 were presented in a hearing before Congress which attempted to identify possible irregular procedures in foreign trade which may have contributed to the current energy crisis. The oil companies also submitted complete accounts of their inventories during the embargo period, and provided estimates of recoverable U.S. crude oil and natural gas reserves for 1973 and 1974. A.A.D.

**N74-35337#** Committee on Government Operations (U. S. Senate).
**CURRENT ENERGY SHORTAGES OVERSIGHT SERIES (THE FEDERAL ENERGY OFFICE), PART 5**
Washington GPO 1974 96 p Hearings pursuant to Section 4, S. Res. 46 before Subcomm. on Investigations of Comm. on Govt. Operations, 93d Congr., 1st Sess., 25 Jan. 1974
(GPO-29-547) Avail: SOD HC $1.00

The activities reported to Congress by the Federal Energy Office (FEO) include: (1) the formulation of a fivefold approach to energy policy; (2) the gathering of energy data from current information sources; (3) the development of computer based national energy information systems with comprehensive reporting systems; (4) public disclosure of up to date indicators of energy supply outlook and suggestions for conservation; and (5) the sponsorship of energy-related legislation. The interaction of the FEO with major oil companies, state agencies, and other Federal departments is discussed with specific examples. A.A.D.

**N74-35338#** RAND Corp., Santa Monica, Calif.
**GUIDING URBAN GROWTH: POLICY ISSUES AND DEMOGRAPHIC CONSTRAINTS**
Peter A. Morrison May 1974 18 p refs
(P-5212) Avail: NTIS HC $4.00

Five aspects of the migration process related to demographic change and constraints are considered: (1) the concentration of migratory growth in only a few metropolitan areas; (2) migration's apparently one-sided economic wisdom, arising out of the weakness of economic push; (3) the potential for return migration, which derives from latent migratory predispositions coupled

with new sources of retirement income; (4) wide local variations among metropolitan areas in the rate of migratory circulation; and (5) the intensifying phenomenon of urban population decline. Author

**N74-35340#** Environmental Protection Agency, Washington, D.C.
**USER'S MANUAL FOR COLMIS: A COLLECTION MANAGEMENT INFORMATION SYSTEM FOR SOLID WASTE MANAGEMENT, VOLUME 1**
1974 107 p
(SW-57C-Vol-1) Avail: NTIS HC $8.50

A computer program is presented for residential solid waste collection activities for environmental improvement. The program provides definite information on the operational aspects of collection and the costs involved in providing the source. It is also shown that the program is a planning and evaluating tool, providing specific data determining a fair day's work. M.C.F.

**N74-35344#** Committee on Interior and Insular Affairs (U. S. House).
**NATIONAL ENERGY RESEARCH**
Washington GPO 1974 587 p refs Hearings on H.R. 6602 and related bills before Subcomm. on the Environment of Comm. on Interior and Insular Affairs, 93d Congr., 16 and 23 May 1973; 13 Jun. 1973; 10 Dec. 1973; 18 Dec. 1973; 31 Jan. 1974; 1 and 19 Feb. 1974
Avail: Subcomm. on the Environment

A Congressional hearing was conducted concerning National energy research problems. Bills were proposed to establish a National program for research, development, and demonstration of fuels and energy technologies, and for the coordination and financial supplementation of Federal energy research and development. The provisions of the National Energy Research and Development Policy Act of 1973 are explained. The powers, functions, and controls exercised by various Federal agencies for improved use of fuel resources are explained. Author

**N74-35355#** Committee on Government Operations (U. S. Senate).
**CURRENT ENERGY SHORTAGES OVERSIGHT SERIES (THE MAJOR OIL COMPANIES), PART 3**
Washington GPO 1974 179 p Hearings persuant to Section 4, S. Res. 46 before Subcomm. on Investigations of Comm. on Govt. Operations, 93d Congr., 2d Sess., 22 Jan. 1974
R(GPO-28-575-PT-3) Avail: Subcomm. on Investigations

Statistical data which reflect net sales, capital expenditures, and gross production of crude oil and natural gas liquids by the major oil companies were presented before a Congressional inquiry whose purpose was to determine whether profits and cash earnings were within a fair margin. Prospects for U.S. energy self-sufficiency through new sources of oil were also explored, and the impact of oil import interruptions on the GNP was assessed. A.A.D.

**N74-35356#** Environmental Protection Agency, Washington, D.C.
**USERS MANUAL FOR COLMIS: A COLLECTION MANAGEMENT INFORMATION SYSTEM FOR SOLID WASTE MANAGEMENT, VOLUME 2**
1974 372 p
(SW-58C-Vol-2) Avail: NTIS HC $21.75

Flow charts are presented for the systems analyst and data processor. The program is written in FORTRAN 4 language and is structured for an IBM 360/370 computer system. A sample problem is given to insure the proper functioning of the program on the user's equipment. M.C.F.

**N74-35358*#** Old Dominion Univ., Norfolk, Va.
**URBAN TRANSPORTATION: PERSPECTIVES ON MOBILITY AND CHOICE**
Michael Z. Sincoff, ed., Jarir S. Dajani, ed., George R. Arnold, John W. Bird, Curtis M. Brooks, ed., William E. Cobb, James E. Cross, Larry F. Darby, Norman H. Erb, John C. Ficht et al [1974] 196 p refs
(Grant NGT-47-003-028)
(NASA-CR-140584) Avail: NTIS HC $13.00 CSCL 13F

A study of urban transportation systems are presented characterized by intensive scrutiny of many ideas, philosophies, and academic perspectives. This report is intended to communicate some dimensions of the urban transportation problem to the general public. M.C.F.

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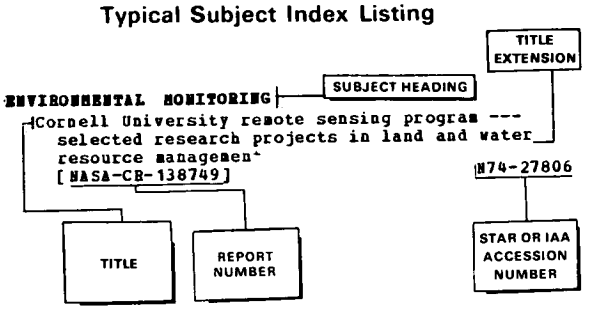


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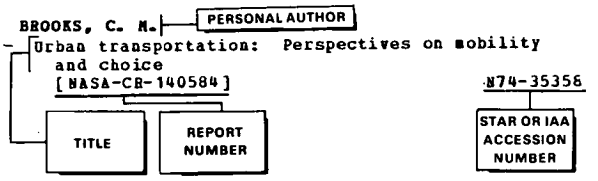


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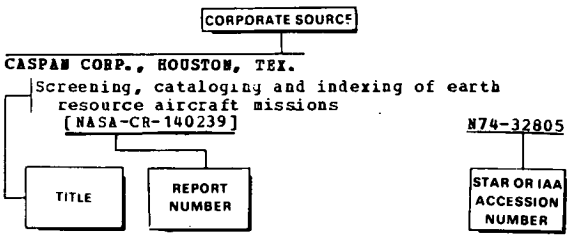


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[AD-775053] N74-22622

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