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JPL Bibliography 39-21 describes and indexes the externally distributed technical reporting, released during calendar year 1979, that resulted from scientific and engineering work performed, or managed, by the Jet Propulsion Laboratory. Three classes of publications are included:

(1) JPL Publications

(2) Articles published in the open literature

(3) Articles from bimonthly Deep Space Network (DSN) Progress Report

The publications are indexed by: (1) author, (2) subject, and (3) publication type and number. A descriptive entry appears under the name of each author of each publication; an abstract is included with the entry for the primary (first-listed) author. Unless designated otherwise, all publications listed are unclassified.

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May 15, 1980

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Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

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Foreword

JPL Bibliography 39-21 describes and indexes the externally distributed technical reporting, released during calendar year 1979, that resulted from scientific and engineering work performed, or managed, by the Jet Propulsion Laboratory Three classes of publications are included.

(1) JPL Publications (77-, 78-, 79-series, etc.), in which the information is complete for a specific accomplishment and can be tailored to wide or limited audiences and be presented in an established standard format or special format to meet unique requirements.

(2) Articles published in the open literature.

(3) Articles from the bimonthly *Deep Space Network (DSN) Progress Report* (42-series) Each collection of articles in this class of publication beginning with 42-20 presents a periodical survey of current accomplishments by the Deep Space Network Formerly, each collection of articles was published as a separate volume of Technical Report 32-1526.

Effective January 1977, the "JPL Publication" replaced the Technical Report, Technical Memorandum, and Special Publication. However, the discontinued classes may still appear in future issues of the Bibliography if succeeding volumes or revisions are published in their former series.

The publications are indexed by (1) author, (2) subject, and (3) publication type and number. A descriptive entry appears under the name of each author of each publication, an abstract is included with the entry for the primary (first-listed) author

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A002 Simulation Gravity Modeling to Spacecraft-Tracking Data Analysis and Tracking

R. J Phillips, W. L. Sjogren, E A. Abbott, and S H Zisk (Massachusetts Institute of Technology)

J. Geophys Res, Vol. 83, No B11, pp. 5455–5464, November 10, 1978

For abstract, see Phillips, R J

A003 Gravity Field of Venus· A Preliminary Analysis

R J Phillips, W L Sjogren, E A Abbott, J. C Smith, R N. Wimberly, and C. A Wagner (Goddard Space Flight Center)

Science, Vol 205, pp 93–96, July 6, 1979

For abstract, see Phillips, R J

ADAMS, M.

A004 Evaluation of Cellular Glasses for Solar Mirror Panel Applications

M Giovan and M Adams

JPL Publication 79-61, June 15, 1979

For abstract, see Giovan, M

ADAMS, M. J.

A005 Phobos Encounter Trajectory and Maneuver Design

R. E Diehl, M. J Adams, and E A. Rinderle, Jr

J Guidance Contr, Vol 2, No 2, pp. 123–129, March–April 1979

For abstract, see Diehl, R E

AGRAWAL, P. C.

A006 An Intense Soft High-Latitude X-Ray Source H2156–304 A New BL Lacertae Object?

P C Agrawal and G R Riegler

Astrophys J, Vol 231, pp L25–L29, July 1, 1979

An intense high-latitude soft X-ray source H2156–304 has been detected with the low energy detectors (LEDs) of the HEAO A-2 experiment Two of the error boxes of the HEAO A-3 experiment for this source fall within the error box derived from the LED 1 data One of the error boxes includes a 14th mag starlike object which appears to be a BL Lacertae source The observed peak intensity of the source in the 0 15–2 2 keV interval is 4×10^{-10} ergs cm^{-2} s^{-1} Source intensity variations with time scales of approximately 1 s to 1 day were detected The energy spectrum of the source can be described either by a two-temperature thermal model with temperatures $T_1 = (1\,58 \pm 0\,36) \times 10^6$ K and $T_2 = (1.6 \pm 0\,4) \times 10^7$ K, with an interstellar column density $N_H = (2\,5 \pm 0\,9)$ 10^{20} H cm^{-2}, or by a power law with spectral index $\alpha = -(2\,4 \pm 0\,3)$ and $N_H = (2\,0 \pm 1\,0) \times 10^{20}$ H cm^{-2} The soft X-ray emission mechanism in H2156–304 is briefly discussed, and its characteristics are compared with those of other soft X-ray–emitting BL Lacertae objects

AJELLO, J. M.

A007 Simultaneous H(1216Å) and He(584Å) Observations of the Interstellar Wind by Mariner 10

J M Ajello and N Witt (Universitat Bonn, Germany)

COSPAR Space Research, Vol XIX, pp. 417–420, 1979

In late 1973 and early 1974 the Mariner 10 spacecraft performed four roll calibration maneuvers (RCM) The Ultraviolet Spectrometer (UVS) measured the intensity of both He(584Å) and H(1216Å) emissions from interplanetary gas The data and the observational geometry have been described by Broadfoot and Kumar Analysis of these 4 sets of observations is extremely important since they are the first simultaneous intensity measurements of H and He emissions free of geocoronal contamination to be recorded in one day, thus precluding significant variations in the solar fluxes

A008 Line Shapes for Attachment of Threshold Electrons to SF_6 and $CFCl_3$ Threshold photoelectron (TPSA) studies of Xe, CO, and C_2H_2

J M Ajello and A Chutjian

J Chem Phys, Vol 71, No 3, pp 1079–1087, August 1, 1979

Using the technique of threshold photoelectron spectroscopy by electron attachment (TPSA), the shapes of the threshold electron attachment cross sections for SF_6 and $CFCl_3$ are determined by direct photoionization measurements of the $^2P_{1/2}$ level of Xe^+. The observed TPSA line shape is deconvoluted using a Lorentzian attachment profile with full-width at half-maximum of 30 meV for SF_6 and 25 meV for $CFCl_3$ In addition, TPSA spectra of the ground electronic states of CO^+ and $C_2H_2^+$ are reported In CO^+ the intensity of the threshold spectral features are dominated by autoionization, while for the vibrational features of $C_2H_2^+$ direct photoionization is more important. The two processes (autoionization and direct ionization) are characterized by different TPSA spectral line profiles

A009 A Photoionization Study of Ion Pair Formation From $CFCl_3$

J. M Ajello and P. Rayermann

J Chem Phys, Vol 71, No 3, pp 1512–1513, August 1, 1979

The first observation of ion pair formation from $CFCl_3$ by UV photoionization is reported

ALLEN, F. G.

A010 Effect of Grain Boundaries in Silicon on Minority-Carrier Diffusion Length and Solar-Cell Efficiency

T Daud, K M. Kolıwad, and F. G Allen (University of California, Los Angeles)

Appl Phys Lett, Vol 33, No 12, pp 1009–1011, December 15, 1978

For abstract, see Daud, T

ALLEN, J.

A011 Voyager Support

J. Allen and H Nance

The Deep Space Network Progress Report 42-49 November and December 1978, pp 29–33, February 15, 1979

This is a continuing Deep Space Network report on tracking and data acquisition for Project Voyager This report covers the period from January through May 1978

ALLEN, J. E

A012 Voyager Support

J E Allen and H E Nance

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 19–23, April 15, 1979

This is a continuation of the Deep Space Network Report on Tracking and Data Acquisition for Project Voyager This report covers the period from May 1973 through December 1978

A013 Voyager Support

J E Allen and H E Nance

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 4–13, June 15, 1979

This is a continuation of the Deep Space Network report on tracking and data acquisition for Project Voyager. This report covers the Jupiter encounter period for Voyager 1, from 1 January through March 1979

A014 Voyager Support

J E Allen and H. E. Nance

The Deep Space Network Progress Report 42-53. July and August 1979, pp. 4–9, October 15, 1979

This is a continuation of the Deep Space Network report on tracking and data acquisition for the Voyager project This report covers the post-encounter period for Voyager 1 and the encounter period for Voyager 2, from April 1979 through July 1979

ANDERSON, F. A.

A015 Alternate Propellant Program Phase I Final Report

F A Anderson and W R West

JPL Publication 79-29, July 1, 1979

This report documents the work done by the Caltech-Jet Propulsion Laboratory of NASA for the Marshall Space Flight Center of NASA on a Shuttle Alternate Propellant Program The work was done as a Phase I follow-on effort to a previous Phase O feasibility study. The program was designed to investigate three candidate propellant systems for the Shuttle Booster Sold Rocket Motor (SRM), which would eliminate, or greatly reduce, the amount of HCl produced in the exhaust of the Shuttle SRM. Ammonium nitrate was selected for consideration as the main oxidizer, with ammonium perchlorate and

the nitramine, cyclo-tetramethylene-tetranitramine (HMX), as secondary oxidizers The amount of ammonium perchlorate used was limited to an amount which would produce an exhaust containing no more than 3% HCl

ANDERSON, J D

A016 Application of DSN Spacecraft Tracking Technology to Experimental Gravitation

J D Anderson and F. B Estabrook

J Spacecraft Rockets, Vol 16, No 2, pp 120–125, March–April 1979

Spacecraft tracking technology of the Deep Space Net (DSN) has been used in the past to measure the general relativistic increase in round trip group delay between the Earth and a spacecraft As the DSN technology continues to improve, other gravitational experiments will become possible Two possibilities are discussed in this paper The first concerns the application of solar system dynamics to the testing of general relativity The second involves the detection of VLF gravitational radiation (10^{-1} to 10^{-4} Hz) by means of the Doppler tracking of spacecraft

A017 Radio Science with Voyager 1 at Jupiter. Preliminary Profiles of the Atmosphere and Ionosphere

V R. Eshleman (Stanford University), G L Tyler (Stanford University), G E Wood, G F Lindal, J. D Anderson, G S Levy, and T A Croft (SRI International)

Science, Vol. 204, pp. 976–978, June 1, 1979

For abstract, see Eshleman, V R

ANDERSON, J. W.

A018 Stirling Laboratory Research Engine Survey Report

J. W Anderson and F. W Hoehn

JPL Publication 79-86, September 15, 1979

As one step in expanding the knowledge relative to and accelerating the development of Stirling engines, NASA, through the Jet Propulsion Laboratory (JPL), is sponsoring a program which will lead to a versatile Stirling Laboratory Research Engine (SLRE) An objective of this program is to lay the groundwork for a commercial version of this engine It is important to consider, at an early stage in the engine's development, the needs of the potential users so that the SLRE can support the requirements of educators and researchers in academic, industrial, and government laboratories For this reason, a survey has been performed, the results of which are described in this report

ANDRES, E. M.

A019 X-Band Atmospheric Noise Temperature Data and Statistics at Goldstone, DSS 13, 1977–1978

S. D. Slobin, K B. Wallace, M M Franco, E M Andres, and O V Hester

The Deep Space Network Progress Report 42-52. May and June 1979, pp 108–116, August 15, 1979

For abstract, see Slobin, S D

ANICICH, V.

A020 An Ion Cyclotron Resonance Study of Reactions of Ions With Hydrogen Atoms

Z. Karpas (California Institute of Technology), V Anicich, and W T Huntress, Jr.

J Chem Phys, Vol. 70, No 6, pp 2877–2881, March 15, 1979

For abstract, see Karpas, Z

ANICICH, V G.

A021 An Ion Cyclotron Resonance Study of Reactions of Some Atomic and Simple Polyatomic Ions With Water

Z. Karpas (California Institute of Technology), V G Anicich, and W T. Huntress, Jr

Chem. Phys Lett., Vol. 59, No 1, pp 84–86, November 1, 1978

For abstract, see Karpas, Z

ANSELMO, V. J.

A022 Diagnosis of Cutaneous Thermal Burn Injuries by Multispectral Imaging Analysis

V J Anselmo and B. E. Zawacki (Los Angeles County/USC Medical Center)

JPL Publication 79-34, September 1, 1978

This document is the final report on the burns diagnosis studies conducted by the Jet Propulsion Laboratory for the National Aeronautics and Space Administration The studies utilized image processing technology developed for use in planetary, lunar, and earth surface analysis The work was conducted with the cooperation of the

Los Angeles County/University of Southern California Medical Center and was performed at that facility.

Special photographic or television image analysis is shown to be a potentially useful technique to assist the physician in the early diagnosis of thermal burn injury This report presents a background on the medical and physiological problems of burns and discusses the proposed methodology for burns diagnosis from both the theoretical and clinical points of view The television/computer system constructed to accomplish this analysis is described, and the clinical results are discussed

A023 A Controlled Rate Freeze/Thaw System for Cryopreservation of Biological Materials

V J Anselmo and R. G Harrison

JPL Publication 79-91, June 1, 1979

A system has been constructed which allows programmable temperature-time control for a 5cc sample volume of an arbitrary biological material It also measures the parameters necessary for the determination of the sample volume specific heat and thermal conductivity as a function of temperature, and provides a detailed measurement of the temperature during phase change and a means of calculating the heat of the phase change.

Steady-state and dynamic temperature control is obtained by supplying heat to the sample volume through resistive elements constructed as an integral part of the sample container. For cooling purposes, this container is totally immersed into a cold heat sink Sample volume thermodynamic property data are obtained by measurements of heater power and heat flux through the container walls Using a mixture of dry ice and alcohol at −79°C, the sample volume can be controlled from +40° to −60°C at rates from steady state to ±65°C/min Steady-state temperature precision is better than 0 2°C while the dynamic capability depends on the temperature rate of change as well as the thermal mass of both the sample and the container

Preliminary tests, conducted with distilled water, saline, and red blood cells, showed the feasibility for using the device for extremely accurate temperature control The performance capabilities of the system allow the application of an increased dimension of thermal control to the study of freeze storage of biological materials The system's ability to determine the temperature dependent thermodynamic properties allows a greater understanding of the thermodynamics of freeze damage to biological cells The unique capability in determining phase change and measuring its heat, may lead to a new consideration of the roles of the electrolytes through a more thorough understanding of the solution eutectics and their resulting osmotic pressure histories

Prepared for the Union Carbide Company

ANSPAUGH, B. E.

A024 Characterization of Solar Cells for Space Applications Electrical Characteristics of OCLI 225-Micron MLAR Wraparound Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, T F Miyahira, and R S Weiss

JPL Publication 78-15, Vol. V, April 1, 1979

Electrical characteristics of OCLI 225-micron MLAR wraparound N/P, 2 ohm-cm silicon solar cells are presented in graphical and tabular format as a function of solar illumination intensity, temperature, and 1-MeV electron fluence

A025 Characterization of Solar Cells for Space Applications· Electrical Characteristics of Spectrolab BSF, BSR, Textured, 10 ohm-cm, 50 Micron Advanced OAST Solar Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, R G Downing, T F Miyahira, and R S Weiss

JPL Publication 78-15, Vol VI, June 15, 1979

Electrical characteristics of Spectrolab BSF, BSR, textured, 10 ohm-cm, 50 micron advanced OAST cells are presented in graphical and tabular format as a function of solar illumination intensity, temperature, and 1 MeV electron fluence

A026 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab HEWAC BSF, Textured, 10 ohm-cm, 225 Micron Solar Cells as a Function of Intensity and Temperature

B E. Anspaugh, D M. Beckert, R G Downing, T F Miyahira, and R S Weiss

JPL Publication 78-15, Vol VII, June 15, 1979

Electrical characteristics of Spectrolab HEWAC BSF, textured, 10 ohm-cm, 225 micron solar cells are presented in graphical and tabular format as a function of solar illumination intensity and temperature

A027 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation

B E Anspaugh, D M Beckert, R G Downing, T. F Miyahira, and R S Weiss

JPL Publication 78-15, Vol. VIII, September 1, 1979

Electrical characteristics of Spectrolab textured, back-surface-field back-surface-reflector, 2 × 4 × 0 029 cm

N/P silicon solar cells (K7) are presented in graphical and tabular format as a function of solar illumination intensity, temperature and irradiation

A028 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10 ohm-cm, 300 Micron Cells as a Function of Intensity, Temperature and Irradiation*

B. E Anspaugh, R G Downing, T F. Miyahira, and R S Weiss

JPL Publication 78-15, Vol X, October 1, 1979

Electrical characteristics of Spectrolab, textured, back surface field, 10 ohm-cm, 300 micron N/P silicon solar cells are presented in graphical and tabular format as a function of solar illumination intensity, and temperature

A029 Characterization of Solar Cells for Space Applications: Electrical Characteristics of 2 Ohm-cm, 228 Micron Wraparound Solar Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, D M Beckert, R G. Downing, and R S Weiss

JPL Publication 78-15, Vol XI, January 15, 1980

Electrical characteristics of Spectrolab 2 ohm-cm, 228-micron wraparound N/P silicon solar cells are presented in graphical and tabular format as a function of solar illumination intensity, temperature, and 1 MeV electron irradiation

ANSPAUGH, B. F.

A030 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10-ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation

B F Anspaugh, D M. Beckert, R G Downing, T F. Miyahira, and R. S Weiss

JPL Publication 78-15, Vol. IX, September 15, 1979

Electrical characteristics of Spectrolab textured, back surface field, 10-ohm-cm, 200-micron N/P silicon solar cells are presented in graphical and tabular format as a function of solar illumination intensity, temperature, and irradiation

ARENZ, R. J.

A031 Finite Deformation Behavior of Elastomers: Dependence of Strain Energy Density on Degree of Crosslinking for SBR

K Tsuge (Hokkaido University, Japan), R J. Arenz (Loyola Marymount University), and R F. Landel

Rubber Chem Technol, Vol 51, No 5, pp 948–958, November–December 1978

For abstract, see Tsuge, K

ARMSTRONG, J. W.

A032 Interplanetary Phase Scintillation and the Search for Very Low Frequency Gravitational Radiation

J. W Armstrong, R. Woo, and F B. Estabrook

Astrophys. J, Vol. 230, pp 570–574, June 1, 1979

We report here observations of radio wave phase scintillation, using the Viking spacecraft having an Earth-spacecraft link very similar to that which will be used in very low frequency (VLF) gravitational wave searches The phase power spectrum level varies by seven orders of magnitude as the Sun-Earth-spacecraft (elongation) angle changes from 1 to 175 deg. It is noteworthy that a broad minimum in the S band (2 3 GHz) phase fluctuation occurs in the antisolar direction, the corresponding fractional frequency stability (square root Allan variance) is $\sim 3 \times 10^{-14}$ for 1000 s integration times A simultaneous two-frequency, two-station observation indicates that the contribution to the phase fluctuation from the ionosphere is significant but dominated by the contribution from the interplanetary medium Nondispersive tropospheric scintillation was not detected (upper limit to fractional frequency stability $\sim 5 \times 10^{-14}$) Evidently even observations in the antisolar direction will require higher radio frequencies, phase scintillation calibration, and correlation techniques in the data processing, for detection of gravitational bursts at the anticipated strain amplitude levels $\leq 10^{-15}$

A033 The Polar Ionosphere of Venus Near the Terminator from Early Pioneer Venus Orbiter Radio Occultations

A J. Kliore, R Woo, J W Armstrong, I R. Patel, and T A Croft (SRI International)

Science, Vol 203, pp 765–768, February 23, 1979

For abstract, see Kliore, A J

A034 Measurements of Turbulence in the Venus Atmosphere Deduced from Pioneer Venus Multiprobe Radio Scintillations

R. Woo, J W Armstrong, and W B Kendall (Mark Resources)

Science, Vol 205, pp 87–89, July 6, 1979

For abstract, see Woo, R.

ARP, H.

A035 **Some Properties of the Knots in the M87 Jet**

J. W Sulentic (Hale Observatories), H Arp (Hale Observatories), and J Lorre

Astrophys J., Vol. 233, pp 44–55, October 1, 1979

For abstract, see Sulentic, J W

ARVIDSON, R. E

A036 **One Mars Year: Viking Lander Imaging Observations**

K L. Jones (Planetary Research, Inc),
R. E Arvidson (Washington University),
E A Guinness (Washington University),
S. L Bragg (Washington University),
S D Wall (Langley Research Center),
C E Carlston (Martin Marietta Corporation), and
D G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

For abstract, see Jones, K L

ASH, R. L.

A037 **Feasibility of Rocket Propellant Production on Mars**

R. L Ash, W L Dowler, and G. Varsi

Acta Astronautica, Vol. 5, pp 705–724, 1978

In situ production of rocket propellant to reduce landed mass requirements for Mars return missions has been investigated The analysis has shown that a system which utilizes atmospheric carbon dioxide and soil moisture to produce liquid methane–oxygen propellant requires a landed mass which is less than half the mass of the ascent vehicle it produces

ASSEFI, T.

A038 **Automated Vehicle Guidance Using Discrete Reference Markers**

A R. Johnston, T Assefi, and J Y Lai

IEEE Trans Vehicular Technol, Vol VT-28, No 1, pp 95–106, February 1979

For abstract, see Johnston, A R

ASTLE, L.

A039 **Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes: Second Annual Report, July 1977–July 1978**

J. Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D. Lawson, T. Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D. H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

BACKMAN, D. E.

B001 **Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter**

R J. Terrile, R. W. Capps (University of Hawaii),
D E Backman (University of Hawaii),
E E Becklin (University of Hawaii),
D. P Cruikshank (University of Hawaii),
C A Beichman (University of Hawaii),
R H Brown (University of Hawaii), and
J A Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R J.

BAERWALD, R. K.

B002 **Handbook of Recommended Practices for the Determination of Liquid Monopropellant Rocket Engine Performance**

R A Bjorklund, R S Rogero, and R K Baerwald

JPL Publication 79-32, June 1, 1979

For abstract, see Bjorklund, R. A.

BAHRAMI, K.

B003 **Application of Field-Modulated Generator Systems to Dispersed Solar Thermal Electric Generation**

R Ramakumar and K Bahrami

JPL Publication 79-83, August 15, 1979

For abstract, see Ramakumar, R

BAILEY, A

B004 **Pioneer Venus Multiprobe Entry Mission Support**

B Ryan (Tidbinbilla Deep Space Complex), D Hollingsworth (Tidbinbilla Deep Space Complex), A Bailey (Tidbinbilla Deep Space Complex), and J. Wells (Tidbinbilla Deep Space Complex)

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 24–26, April 15, 1979

For abstract, see Ryan, B

BAKOWSKI, M.

B005 Trapping Effects in Irradiated and Avalanche-Injected MOS Capacitors

M Bakowski, R H Cockrum, N. Zamani, J. Maserjian, and C R Viswanathan (University of California, Los Angeles)

IEEE Trans. Nucl Sci, Vol. NS-25, No 6, pp 1233–1238, December 1978

Avalanche-injection of holes and electrons into nonirradiated and irradiated MOS capacitors, respectively, were used to study hole traps in the Si/SiO_2

The trapping parameters for holes, and for electrons in the presence of trapped holes, were obtained in the range 10^{-14}–10^{-13} cm^2 for oxide thicknesses in the range 200–1000Å A dominant bulk specie is determined to tail off from the Si/SiO_2 interface with a characteristic distance of 150–200Å for dry oxide and approximately 400Å for wet oxide

The electron-injection is shown to be an effective probe of the trapped-hole distribution in the SiO_2 after irradiation The effect of electron compensation of trapped holes during irradiation had been included in the trapping kinetics

C-V shifts and interface state build-up near mid-band after irradiation were found, from irradiation experiments, to follow the same linear dependence on the integrated electron and hole flux crossing the Si/SiO_2 interface

BARBER, B.

B006 The Microprocessor-Based Synthesizer Controller

H Donnelly, M. R Wick, R W Weller, G B Schaaf, B Barber, and M A Stern

The Deep Space Network Progress Report 42-54 September and October 1979, pp 92–103, December 15, 1979

For abstract, see Donnelly, H

BARNES, J.

B007 Viking Orbiter Imaging Observations of Dust in the Martian Atmosphere

G A Briggs, W A Baum (Lowell Observatory), and J Barnes (University of Washington)

J Geophys Res, Vol 84, No B6, 2795–2820, June 10, 1979

For abstract, see Briggs, G A

B008 Seasonal Recession of Mars' South Polar Cap As Seen by Viking

P. B James, G Briggs (NASA Headquarters), J Barnes (University of Washington), and A Spruck (Marquette University)

J Geophys Res, Vol 84, No B6, pp 2889–2922, June 10, 1979

For abstract, see James, P B

BATELAAN, P D.

B009 DSN Water Vapor Radiometer—Tropospheric Range Delay Calibration

S D Slobin and P. D Batelaan

The Deep Space Network Progress Report 42-49 November and December 1978, pp. 136–145, February 15, 1979

For abstract, see Slobin, S D

BATHKER, D.

B010 A Prototype DSN X-S Band Feed DSS 13 Application Status (Third Report)

W Williams, D Nixon, H Reilly, J Withington, and D Bathker

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 51–60, August 15, 1979

For abstract, see Williams, W

BAUER, J. L.

B011 A Review of Composite Material Applications in the Automotive Industry for the Electric and Hybrid Vehicle Annual Report, November 1978

J. L Bauer

JPL Publication 79-51, July 15, 1979

A comprehensive review is made of the state-of-the-art in regard to the use of composite materials for reducing

the structural mass of automobiles Reduction of mass will provide, in addition to other engineering improvements, increased performance/range advantages that are particularly needed in the electric and hybrid vehicle field Problems to be overcome include the attainment of mass production techniques and the prevention of environmental hazards

Prepared for the U S Department of Energy

B012 Manufacturing Methods of a Composite Cell Case for a Ni-Cd Battery

J L Bauer

JPL Publication 79-101, December 15, 1979

Graphite epoxy material for a nickel cadmium battery cell case had previously been evaluated and determined to perform in the simulated environment of the battery Basic manufacturing method refinements were performed to demonstrate production feasibility The various facets of production scale-up, i e., process and tooling development, together with material and process control, have been integrated into a comprehensive manufacturing process that assures production reproducibility and product uniformity Test results substantiate that a battery cell case produced from graphite epoxy pre-impregnated material, utilizing the internal pressure bag fabrication method, is feasible

In addition to improvements in manufacturing processes, the case testing program underwent enhancement in case confinement, environment application, and recording of observations

BAUM, B.

B013 Low-Cost Encapsulation Materials for Terrestrial Solar Cell Modules

E. F Cuddihy, B Baum (Springborn Laboratories, Inc), and P Willis (Springborn Laboratories, Inc)

Solar Energy, Vol 22, pp 389–396, 1979

For abstract, see Cuddihy, E F

BAUM, W. A.

B014 Viking Orbiter Imaging Observations of Dust in the Martian Atmosphere

G A Briggs, W A Baum (Lowell Observatory), and J. Barnes (University of Washington)

J. Geophys Res, Vol 84, No B6, 2795–2820, June 10, 1979

For abstract, see Briggs, G A

BAUMERT, L. D.

B015 Coding for Optical Channels

L D. Baumert (Arizona State University), R. J McEliece (University of Illinois), and H Rumsey, Jr.

The Deep Space Network Progress Report 42-49 November and December 1978, pp 70–77, February 15, 1979

In a recent paper Pierce considered the problem of optical communication from a novel viewpoint, and concluded that performance will likely be limited by issues of coding complexity rather than by thermal noise This paper reviews the model proposed by Pierce and presents some results on the analysis and design of codes for this application

BAYERGO, B

B016 DSS 13 Antenna Monitor System

B Siev and B. Bayergo

The Deep Space Network Progress Report 42-51: March and April 1979, pp 138–140, June 15, 1979

For abstract, see Siev, B

BEAL, R. C.

B017 Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities

F I. Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W. E. Brown, P S DeLeonibus (National Environmental Satellite Service), J W Sherman III (National Environmental Satellite Service), J. F R Gower (Institute of Ocean Sciences, Canada), D. Lichy (U S Army Corps of Engineers), D B Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R A. Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

BECKERT, D. M.

B018 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab HEWAC BSF, Textured, 10 ohm-cm, 225 Micron Solar Cells as a Function of Intensity and Temperature

B. E. Anspaugh, D M Beckert, R G Downing, T. F. Miyahira, and R. S Weiss

JPL Publication 78-15, Vol. VII, June 15, 1979

For abstract, see Anspaugh, B. E

B019 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation

B. E. Anspaugh, D M Beckert, R. G Downing, T. F. Miyahira, and R. S Weiss

JPL Publication 78-15, Vol. VIII, September 1, 1979

For abstract, see Anspaugh, B E

B020 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10-ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation

B. F Anspaugh, D M. Beckert, R G Downing, T F Miyahira, and R S Weiss

JPL Publication 78-15, Vol IX, September 15, 1979

For abstract, see Anspaugh, B F

B021 Characterization of Solar Cells for Space Applications: Electrical Characteristics of 2 Ohm-cm, 228 Micron Wraparound Solar Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, D. M. Beckert, R. G Downing, and R. S. Weiss

JPL Publication 78-15, Vol XI, January 15, 1980

For abstract, see Anspaugh, B E

BECKLIN, E. E.

B022 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R. J Terrile, R W Capps (University of Hawaii), D E Backman (University of Hawaii), E E Becklin (University of Hawaii), D. P Cruikshank (University of Hawaii), C. A Beichman (University of Hawaii), R H. Brown (University of Hawaii), and J A Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R J

BEDNARCZYK, S. M.

B023 Pattern Measurements of a Low-Sidelobe Horn Antenna

M. A Janssen, S M Bednarczyk, S Gulkis, H. W Marlin, and G F Smoot (University of California, Berkeley)

IEEE Trans Anten Prop, Vol. AP-27, No. 4, pp 551–555, July 1979

For abstract, see Janssen, M A.

BEEBE, R F.

B024 Summary of Historical Data Interpretation of the Pioneer and Voyager Cloud Configurations in a Time-Dependent Framework

R. J Terrile and R. F Beebe (New Mexico State University)

Science, Vol 204, pp 948–951, June 1, 1979

For abstract, see Terrile, R J

BEER, R.

B025 Phosphine Absorption in the 5-μm Window of Jupiter

R Beer and F. W Taylor

Icarus, Vol 40, pp 189–192, 1979

Since the original suggestion by Gillett et al it has generally been assumed that the region of partial transparency near 5 μm in Jupiter's atmosphere (the 5-μm window) is bounded by the ν_4 NH_3 at 6 1 μm and the ν_3 CH_4 band at 3 3 μm New measurements of Jupiter and of laboratory phosphine (PH_3) samples show that PH_3 is a significant contributor to the continuum opacity in the window and in fact defines its short-wavelength limit This has important implications for the use of 5-μm observations as a means to probe the deep atmospheric structure of Jupiter. The abundance of PH_3 which results from a comparison of Jovian and laboratory spectra is about 3 to 5 cm-am This is five to eight times less than that found by Larson et al in the same spectral region, but is in good agreement with the result of Tokunaga et al from 10-μm observations

BEICHMAN, C A.

B026 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R. J Terrile, R. W Capps (University of Hawaii),
D E Backman (University of Hawaii),
E E Becklin (University of Hawaii),
D P Cruikshank (University of Hawaii),
C. A Beichman (University of Hawaii),
R H Brown (University of Hawaii), and
J A Westphal (California Institute of Technology)

Science, Vol 204, pp. 1007–1008, June 1, 1979

For abstract, see Terrile, R J

BEJCZY, A K.

B027 Smart Sensors for Smart Hands

A K Bejczy

Preprint 78-1714, AIAA/NASA Conf "Smart" Sensors, Hampton, Va., November 14–16, 1978

Proximity, force-torque, touch and slippage sensors developed or applied by the JPL Teleoperator Project for remote manipulator control are described, including sensor data handling by computers for display and control Examples are quoted showing the significance of these sensors for manual or computer control of manipulators An interesting example is a proximity sensor system implemented for a four-claw JSC end effector and tested at the Shuttle Manipulator Training Facility of JSC New sensing concepts aimed at simplifying the implementation of "Smart Sensors for Smart Hands" in the space environment are discussed

B028 Advanced Teleoperators

A K. Bejczy

Astronaut. Aeronaut, Vol 17, pp. 20–31, May 1979

Advanced teleoperators are discussed, with emphasis on the remote manipulation system designed to perform such actions as grasping, orienting, moving, placing, and inserting objects Geometrical performance dimensions are considered, indicating that a manipulator is limited to three-orders-of-magnitude ratio of workspace extension to positioning accuracy The control system is examined, showing that a manipulative task requires coordination of several joints, with the relationship between the task definers and the joint variables given by complex trigonometrical transformations Control modes developed in the last 30 years are noted, including program-controlled industrial "robots" which can endlessly repeat a fixed sequence of motions without operator intervention, and the sensor-referenced/computer-controlled mode manipulators Advanced proximity sensor systems are taken into account, with emphasis on the applications of the force-torque and slip models The proximity sensor system for the shuttle-size manipulator is described

BENJAUTHRIT, B.

B029 Further Results on Fast Transforms for Decoding Reed-Solomon Codes Over $GF(2^n)$ for $n = 4,5,6,8$

I S Reed (University of Southern California), T. K Truong, R. L Miller, and B. Benjauthrit

The Deep Space Network Progress Report 42-50 January and February 1979, pp 132–155, April 15, 1979

For abstract, see Reed, I S

B030 A Reed-Solomon Decoding Program for Correcting Both Errors and Erasures

R L Miller T. K Truong, B. Benjauthrit, and I S. Reed (University of Southern California)

The Deep Space Network Progress Report 42-53. July and August 1979, pp 102–107, October 15, 1979

For abstract, see Miller, R L

B031 On Decoding of Reed-Solomon Codes Over $GF(32)$ and $GF(64)$ Using the Transform Techniques of Winograd

I. S. Reed (University of Southern California), T K Truong, and B. Benjauthrit

Conf. Rec 1978 Nat Telecommun. Conf., Birmingham, Ala., December 3–6, 1978, pp 20 4.1–20.4.7

For abstract, see Reed, I S

BENTON, W. D.

B032 Recent Developments at JPL in the Application of Image Processing to Astronomy

J J Lorre, W D Benton, and D A Elliott

Proc SPIE, Vol 172, pp 394–402, 1979

For abstract, see Lorre, J J

BERMAN, A. L.

B033 Precise Extraction of Geometrical Dependence from Solar Wind Columnar Turbulence Measurements

A L Berman

The Deep Space Network Progress Report 42-50 January and February 1979, pp 110–118, April 15, 1979

Experimental solar wind columnar turbulence measurements have frequently been modelled as a function of a single geometrical parameter Since columnar turbulence results from the signal path integration of an appropriate source function, hypothesized columnar turbulence models must be cast as a function of two independent geometrical parameters This article quantifies the distortion which results from the attempt to extract and model the functional dependence of experimental columnar turbulence measurements via usage of a single geometrical parameter.

B034 A Reexamination of the Radial Dependence of Weak Interplanetary Scintillation

A L Berman

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 119–123, April 15, 1979

Recent investigations of weak interplanetary scintillation have found strong correlation between the scintillation index m and both in-situ and integrated electron density. A similar measure of solar wind columnar turbulence, doppler phase fluctuation, has been shown to be in excellent correspondence with the signal path integration of a specific, well-established mean electron density model It is thus natural to heuristically inquire whether m might not also correlate with the signal path integration of such an electron density model

This article reexamines the power law radial dependence of m for weak interplanetary scintillation data published by various investigators during the last decade The data are found to be consistent with the signal path integration of a power law electron density model

B035 A Unified Observational Theory for Solar Wind Columnar Turbulence

A L Berman

The Deep Space Network Progress Report, 42-50 January and February 1979, pp. 124–131, April 15, 1979

Solar wind columnar turbulence measurements are possibly the most important tool in probing the solar corona and solar wind, if for no other reason than their abundant availability. Fundamental to the extraction and utilization of the full informational content of such measurements is the confident understanding of the proper relationship between columnar turbulence and the most basic solar wind parameters solar wind velocity and electron density

This article reviews investigations of the primary forms of solar wind columnar turbulence, including Doppler phase fluctuation, spectral broadening, weak interplanetary scintillation, and electron density

B036 The NOCC Radio Science Subsystem—System Performance Validation for the DSN Radio Science and Very Long Baseline Interferometry (VLBI) Systems

A L Berman

The Deep Space Network Progress Report 42-53 July and August 1979, pp 83–92, October 15, 1979

The DSN Radio Science and Very Long Baseline Interferometry (VLBI) Systems are functionally similar in that both are concerned with the recording of the baseband output signals of open-loop receivers on either computer-driven magnetic tape units or high-rate digital magnetic tape recorders In recognition of these similarities, a single Network Operations Control Center (NOCC) subsystem (the NOCC Radio Science Subsystem (NRS)) is being implemented to provide the system performance validation capabilities for both the Radio Science and VLBI Systems

This article provides a functional description of the key characteristics, requirements, and operation of the NOCC Radio Science Subsystem

B037 DSN Radio Science System, Mark III-80

A L. Berman

The Deep Space Network Progress Report 42-54 September and October 1979, pp 4–18, December 15, 1979

This article describes the key characteristics, functional operation, and functional requirements of the DSN Radio Science System, Mark III-80 Particularly emphasized is "medium bandwidth" capability, which will enable support of the Voyager Saturn Ring Experiment in November 1980

B038 Voyager 1979 Update to the Radial and Solar Cycle Variations in the Solar Wind Phase Fluctuation Spectral Index

A L Berman and A D Conteas

The Deep Space Network Progress Report 42-54 September and October 1979, pp. 71–81, December 15, 1979

Of current interest is the value of, and possible variations in, the solar wind phase fluctuation spectral index. This article presents columnar spectral index information that has been extracted from a sizable volume of Voyager 1979 solar conjunction Doppler phase fluctuation data.

The Voyager 1979 results, when compared to similar information derived from the 1976 Helios and Viking and 1978 Voyager solar conjunctions, lead to the following inferences (1) there has been a significant change in the spectral index from 1976 to 1978/1979, (2) there is continuing evidence that favors a slight (positive) correlation between the spectral index and the solar (sunspot) cycle, (3) there is little or no evidence in support of a radial variation of the spectral index Recently, it has been hypothesized that a flattening of the phase fluctuation spectrum occurs near the sun, these data are at a variance with such a hypothesis

BERNSTEIN, R. L.

B039 Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop

R. G Lipes, R L Bernstein (Scripps Institution of Oceanography), V. J Cardone (Oceanweather, Inc.), K B. Katsaros (University of Washington), E. G Njoku, A. L. Riley, D B Ross (Atlantic Oceanic and Meteorological Laboratory), C T Swift (Langley Research Center), and F J. Wentz (Frank J Wentz and Associates)

Science, Vol 204, pp 1415–1417, June 29, 1979

For abstract, see Lipes, R. G.

BICKLER, D. B.

B040 LSA Project Technology Development Update

J V Goldsmith and D B Bickler

JPL Publication 79-26, August 30, 1978

For abstract, see Goldsmith, J V

BIERMAN, G J

B041 Modern Estimation Techniques Applied to Microwave Sensing of the Marine Boundary Layer

G J. Bierman, F J Wentz (Frank J Wentz and Associates), and R G Lipes

Conf. Rec Twelfth Asilomar Conf on Circuits, Systems & Computers, Pacific Grove, Calif, November 6–8, 1978, pp 101–106

Knowledge of the time histories of environmental parameters characterizing the marine boundary layer aids in our understanding of weather, climate, oceanic processes, and earth resources management The Seasat-A satellite carries microwave instruments designed to indirectly measure these environmental parameters Our measurement models, unfortunately, prescribe very nonlinear, functions of the parameters to be estimated Moreover, in situations when it is raining, poor observability compounds the problem of determining environmental parameter estimates from the nonlinear, noisy measurements In this paper we describe methods developed for attacking these problems, later publications will be devoted to the application of spatial correlation models, statistical smoothing to further enhance estimate accuracy, more complete models of the underlying physical processes and analysis of the results of Seasat data processing Our attention in this paper is focused on documenting how estimation techniques, and in particular the square root information filter (SRIF), are used to solve a nonlinear function optimization problem

B042 Filtering and Error Analysis via the UDU^T Covariance Factorization

C L Thornton and G J. Bierman

IEEE Trans Automat Contr., Vol AC-23, No 5, pp 901–907, October 1978

For abstract, see Thornton, C L

B043 A Subroutine Package for Discrete Estimation Problems

G J Bierman

Proc 1978 IEEE Conf Decis. & Contr, San Diego, Calif, January 10–12, 1979, pp 39–44

In this paper we describe a well documented, compactly coded, storage efficient, thoroughly tested, and easy to use set of FORTRAN IV subroutines for use in Kalman filter or least-squares applications The package contains both the UDU^T covariance factorization and the square root information filter algorithms developed at the Jet Propulsion Laboratory Numerical reliability of the algorithms is a key feature of the package

BJORKLUND, R. A.

B044 Handbook of Recommended Practices for the Determination of Liquid Monopropellant Rocket Engine Performance

R A Bjorklund, R S Rogero, and R K Baerwald

JPL Publication 79-32, June 1, 1979

This handbook is intended to serve as a guide for the experienced test engineer in the design, installation, and operation of systems to be used for the direct measurement of those quantities which are of fundamental importance to the determination of monopropellant thruster performance The procedures and defining relations for reducing the measurements to performance parameters are also given

This handbook is composed of six discrete sections pertaining to force and impulse measurement, propellant mass usage and flow measurement, pressure measurement, temperature measurement, exhaust gas composition measurement, and data reduction and performance determination References, appendixes, and glossaries are included with each section as necessary

Prepared for the U S Air Force Rocket Propulsion Laboratory

BLACKWELL, R. J.

B045 Trophic Classification of Selected Colorado Lakes

R. J. Blackwell and D H P. Boland (U S. Environmental Protection Agency)

JPL Publication 78-100, January 1979

Multispectral scanner data, acquired over several Colorado lakes using Landsat-1 and aircraft, were used in conjunction with contact-sensed water quality data to determine the feasibility of assessing lacustrine trophic levels A trophic state index was developed using contact-sensed data for several trophic indicators (chlorophyll *a*, inverse of Secchi disc transparency, conductivity, total phosphorous, total organic nitrogen, algal assay yield) Relationships between the digitally processed multispectral scanner data, several trophic indicators, and the trophic index were examined using a supervised multispectral classification technique and regression techniques Statistically significant correlations exist between spectral bands, several of the trophic indicators (chlorophyll *a*, Secchi disc transparency, total organic nitrogen), and the trophic state index Color-coded photomaps were generated which depict the spectral aspects of trophic state Multispectral scanner data acquired from satellite and aircraft platforms can be used to advantage in lake monitoring and survey programs when amalgamated with contact-sensed data.

Prepared for the U S. Environmental Protection Agency, EPA-600/4-79-005

BLANKENHORN, D. H.

B046 Determinants of Atherosclerosis Progression and Regression

S H Brooks (University of Southern California School of Medicine), D H Le Croissette, D. H. Blankenhorn (University of Southern California School of Medicine)

Arch. Surg, Vol 113, pp 75–79, January 1978

For abstract, see Brooks, S H

BOLAND, D. H. P.

B047 Trophic Classification of Selected Colorado Lakes

R J. Blackwell and D. H. P Boland (U.S Environmental Protection Agency)

JPL Publication 78-100, January 1979

For abstract, see Blackwell, R J

BOND, D. L.

B048 Experience with Fluorine and Its Safe use as a Propellant

D L Bond, M E Guenther, L D Stimpson, L R Toth, and D L Young

JPL Publication 79-64, June 30, 1979

This report is a survey of the extensive industrial experience with fluorine since the early 1940's and the propulsion experience with fluorine or its derivatives with various fuels since the late 1950's. Fluorine is extremely reactive with virtually all other elements, which makes it a good oxidizer but also means it is hazardous to handle Hydrogen fluoride results from the immediate reaction of fluorine with atmospheric moisture in the event of a leak High quality materials, scrupulously clean containers and lines, gaseous fluorine passivation, detailed procedures, and automatic detection devices have led to successful ground testing during recent years These currently well-understood procedures fulfill the safety requirement during ground operations for the handling of fluorinated propulsion systems, and similar procedures will be implemented for use on board the NASA Space Transportation System (commonly called the Shuttle)

BOREHAM, J. F.

B049 Evaluation of the JPL X-Band 32-Element Active Array: Final Report

J. F. Boreham, R. B Postal, and B. L Conroy

JPL Publication 79-69, Rev. 1, August 1, 1979

The report describes a number of tests performed on an X-band 32-element active array developed at JPL under a NASA-sponsored project and evaluated with funding from the U.S Air Force Space and Missile Systems Organization .Antenna pattern characteristics of the array were tested in its standard operating mode as well as several degraded performance modes, including failures of 1, 2, 3, 4, 8, 16, and 31 elements Additionally, the array was characterized with the addition of a metallic shroud, and also characterized versus rf drive level and at a single off-axis electronic beamsteered position Characterization was performed on several of the 3/4-watt, three-stage, X-band solid-state power amplifier modules

The characterization included swept amplitude response, amplitude and phase versus temperature from −20 to +60°C, and intermodulation distortion of selected modules The report includes a description of the array as well as conclusions and recommendations based upon the experience and results achieved in performance of this project

Prepared for the U.S Air Force Space and Missile Systems Organization

BORN, G. H.

B050 Orbit Analysis for SEASAT-A

E. Cutting, G. H Born, and J. C Frautnick

J Astronaut Sci., Vol XXVI, No 4, pp 315–342, October–December 1978

For abstract, see Cutting, E

B051 Seasat Mission Overview

G H Born, J A Dunne, and D B Lame

Science, Vol. 204, pp 1405–1406, June 29, 1979

During some 3 months of orbital operations, Seasat collected a unique set of global synoptic data on ocean winds, waves, temperature, and topography All indications from a preliminary analysis of these data are that most of the mission's proof-of-concept objective—the demonstration of nearly all-weather microwave surveillance of the world's oceans—will be met.

BOUQUET, F. L.

B052 Designer's Guide to Radiation Effects on Materials for Use on Jupiter Fly-bys and Orbiters

F L Bouquet, W. E Price, and
D M Newell (Ford Aerospace)

IEEE Trans. Nucl. Sci, Vol. NS-26, No. 4, pp 4660–4669, August 1979

This paper summarizes the state-of-the-art of the complex field of radiation effects on spacecraft materials It is intended as a guide for designers of systems exposed to damaging electrons and protons The emphasis is on the relative damage levels for the more common materials that may be used Information on the preliminary flux and fluence levels of the yet to be designed Jupiter orbiter, Galileo, is also presented

BOWYER, J. M.

B053 Combustion Response Modeling for Composite Solid Propellants

N S. Cohen (Norman Cohen Professional Services) and J. M. Bowyer

JPL Publication 78-59, June 1, 1978

For abstract, see Cohen, N S

B054 The Effects of Regional Insolation Differences Upon Advanced Solar Thermal Electric Power Plant Performance and Energy Costs

A. F Latta, J. M Bowyer, T Fujita, and
P H Richter

JPL Publication 79-39, March 15, 1979

For abstract, see Latta, A F

BRADLEY, S. P.

B055 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W. Taylor, D J. Diner, L. S Elson,
D J McCleese, J V Martonchik,
J. Delderfield (University of Oxford, England),
S P Bradley (University of Oxford, England),
J T. Schofield (University of Oxford, England),
J C Gille (National Center for Atmospheric Research), and M T. Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp. 65–67, July 6, 1979

For abstract, see Taylor, F W

BRAGG, S. L.

B056 One Mars Year: Viking Lander Imaging Observations

K L Jones (Planetary Research, Inc),
R E Arvidson (Washington University),
E A Guinness (Washington University),
S. L Bragg (Washington University),
S D Wall (Langley Research Center),
C E Carlston (Martin Marietta Corporation), and
D G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

For abstract, see Jones, K. L

BRECKENRIDGE, W. G.

B057 In-Flight Gyro Drift Rate Calibration on the Viking Orbiters

W G. Breckenridge and A J Treder

J Guidance Contr, Vol 1, pp 433–439, November–December 1978

The drift rates of the attitude control gyros on the Viking Orbiters were calibrated several times in flight The process by which these rates were estimated as functions of time is novel for a space flight project, although relatively standard estimation techniques were used The process is described fully and the results obtained from the twelve Viking single-axis gyros are analyzed Although the possibility was explored, no significantly repeatable function of drift rate vs time or temperature was discovered, the overall mean was found to predict drift rate with acceptable accuracy

BRECKINRIDGE, J. B.

B058 Kitt Peak Speckle Camera

J. B Breckinridge, H A McAlister (Georgia State University), and W. G Robinson (Kitt Peak National Observatory)

Appl Opt, Vol. 18, No 7, pp. 1034–1041, April 1, 1979

The speckle camera in regular use at Kitt Peak National Observatory since 1974 is described in detail The design of the atmospheric dispersion compensation prisms, the use of film as a recording medium, the accuracy of double star measurements, and the next generation speckle camera are discussed Photographs of double star speckle patterns with separations from 1 4 sec of arc to 4 7 sec of arc are shown to illustrate the quality of image formation with this camera, the effects of seeing on the patterns, and to illustrate the isoplanatic patch of the atmosphere

BRENKLE, J. P.

B059 The Viking Relativity Experiment

I I Shapiro (Massachusetts Institute of Technology), R D. Reasenberg (Massachusetts Institute of Technology), P. E MacNeil (Massachusetts Institute of Technology), R B Goldstein (Massachusetts Institute of Technology), J P. Brenkle, D L Cain, T Komarek A I. Zygielbaum, W. F Cuddihy (Langley Research Center), and W. H. Michael, Jr (Langley Research Center)

J Geophys Res, Vol 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

B060 Mars Gravity: Additional Resolution From Viking Orbiter I

W L Sjogren, R N Wimberly, D. L Cain, and J P Brenkle

Proc Lunar Planet Sci Conf 9th, 3561–3573, 1978

For abstract, see Sjogren, W L

BRIDGE, H. S

B061 Plasma Observations Near Jupiter: Initial Results from Voyager 1

H S Bridge, et al

Science, Vol 204, pp 987–991, June 1, 1979

Extensive measurements of low-energy positive ions and electrons were made throughout the Jupiter encounter of Voyager 1 The bow shock and magnetopause were crossed several times and distances consistent with variations in the upstream solar wind pressure measured on Voyager 2 During the inbound pass, the number density increased by six orders of magnitude between the innermost magnetopause crossing at ~47 Jupiter radii and near closest approach at ~5 Jupiter radii, the plasma flow during this period was predominantly in the direction of corotation Marked increases in number density were observed twice per planetary rotation, near the magnetic equator Jupiterward of the Io plasma torus, a cold, corotating plasma was observed and the energy/charge spectra show well-resolved, heavy-ion peaks at mass-to-charge ratios $A/Z^* = 8$, 16, 32, and 64

Contributors to this article include

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BRIGGS, G.

B062 Seasonal Recession of Mars' South Polar Cap As Seen by Viking

P. B James, G Briggs (NASA Headquarters), J. Barnes (University of Washington), and A Spruck (Marquette University)

J Geophys. Res, Vol 84, No. B6, pp 2889–2922, June 10, 1979

For abstract, see James, P B

BRIGGS, G. A.

B063 Viking Orbiter Imaging Observations of Dust in the Martian Atmosphere

G A Briggs, W A Baum (Lowell Observatory), and J Barnes (University of Washington)

J Geophys. Res, Vol 84, No. B6, 2795–2820, June 10, 1979

More than 20 local Martian dust clouds and two global dust storms were observed with the Viking orbiter camera Sixteen of the local clouds were imaged in two colors or were observed with other instruments confirming their identification as dust clouds These Viking results are compared with earth-based observations of Martian dust storms and with Mariner 9 data. Most of the dust activity seen by Viking occurred during southern hemisphere spring and early summer, when Mars was near perihelion and insolation was near maximum About half the local clouds occurred near the edge of the southern polar cap, where winds are presumably enhanced by a strong regional temperature gradient The other half occurred mainly in the southern hemisphere near regions where circulation models incorporating topography predict positive vertical velocities Although dust clouds observed from earth show a similar partial correlation with models, some ambiguity exists concerning interpretation of regions near Hellespontus that have spawned the most spectacular Martian dust storms on record

BROADFOOT, A L.

B064 Non-Thermal Hydrogen in the Venus Exosphere: The Ionospheric Source and the Hydrogen Budget

S. Kumar, D M Hunten (University of Arizona), and A L Broadfoot (Kitt Peak National Observatory)

Planet. Space Sci, Vol 26, pp 1063–1075, 1978

For abstract, see Kumar, S

B065 Extreme Ultraviolet Observations from Voyager 1 Encounter with Jupiter

A L Broadfoot, et al

Science, Vol 204, pp 979–982, June 1, 1979

Observations of the optical extreme ultraviolet spectrum of the Jupiter planetary system during the Voyager 1 encounter have revealed previously undetected physical processes of significant proportions Bright emission lines of S III, S IV, and O III indicating an electron temperature of 10^5 K have been identified in preliminary analyses of the Io plasma torus spectrum Strong auroral atomic and molecular hydrogen emissions have been observed in the polar regions of Jupiter near magnetic field lines that map the torus into the atmosphere of Jupiter The observed resonance scattering of solar hydrogen Lyman α by the atmosphere of Jupiter and the solar occultation experiment suggest a hot thermosphere ($\geq$ 1000 K) with a large atomic hydrogen abundance A stellar occultation by Ganymede indicates that its atmosphere is at most an exosphere

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Naval Research Laboratory D. F Strobel

York University J C McConnell

Harvard University A Dalgarno, R Goody, and M B McElroy

BROCKMAN, M. H.

B066 Radio Frequency Carrier Arraying for Near Maximum Carrier Signal-to-Noise Ratio Improvement

M H Brockman

The Deep Space Network Progress Report 42-49 November and December 1978, pp 99–106, February 15, 1979

Radio frequency arraying of several receiving systems provides signal-to-noise ratio improvement relative to a single receiving system This report considers radio frequency carrier arraying which provides near maximum signal-to-noise ratio improvement for carrier reception and demodulation.

B067 DOMSAT CW Transmission Bent Pipe Investigation: Initial Phase Noise Measurements via RCA SATCOM Link

M H Brockman and C E Jones

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 181–188, April 15, 1979

A preliminary investigation of a DOMSAT link using a SATCOM stationary Earth satellite and ground station has provided initial phase noise data for continuous-wave radio frequency transmission which is applicable to a bent pipe technique

BROOKS, S. H.

B068 Determinants of Atherosclerosis Progression and Regression

S H. Brooks (University of Southern California School of Medicine), D. H. Le Croissette, D. H Blankenhorn (University of Southern California School of Medicine)

Arch Surg, Vol 113, pp. 75–79, January 1978

The further development of noninvasive methods of measuring small changes in arterial lesions is required to document the progression and regression of atherosclerosis with various risk factors and treatment programs

BROWN, D. W.

B069 Stability of the Multimegabit Telemetry Carrier Loop

D W Brown

The Deep Space Network Progress Report 42-54 September and October 1979, pp 28–33, December 15, 1979

Basic sampled data loop stability is reviewed, the effect of an additional low-pass filter in the loop is analyzed. Resulting upper bounds on permissible loop bandwidth are established

BROWN, J. W.

B070 Seasat Low-Rate Data System

J. W. Brown, G C Cleven, J C Klose, D B Lame, and C A Yamarone

Science, Vol 204, pp 1407–1408, June 29, 1979

The Seasat low-rate data system is a distributed, nonreal-time, magnetic-tape system for information processing Its function is to apply the necessary calibrations, corrections, and conversions to yield geophysically meaningful products from raw spacecraft telemetry data. It also provides a remotely accessible catalog of satellite data

BROWN, R A.

B071 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V J Cardone (Oceanweather, Inc), R E Coons, A. A Loomis, J E Overland (Pacific Marine Environmental Laboratory), S. Peteherych (Atmospheric Environmental Service), W. J Pierson (City University of New York), P M Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol 204, pp 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

BROWN, R. H.

B072 Significance of Absorption Features in Io's IR Reflectance Spectrum

R. P. Fanale, R. H Brown (University of Hawaii, Honolulu), D P Cruikshank (University of Hawaii, Honolulu), and R N Clake (University of Hawaii, Honolulu)

Nature, Vol 280, No 5725, pp 761– 763, August 30, 1979

For abstract, see Fanale, R P

B073 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R J Terrile, R W Capps (University of Hawaii), D E Backman (University of Hawaii), E E. Becklin (University of Hawaii), D P Cruikshank (University of Hawaii), C A Beichman (University of Hawaii), R H Brown (University of Hawaii), and J A Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R J

BROWN, W. E.

B074 Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities

F I. Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W. E Brown, P. S. DeLeonibus (National Environmental Satellite Service), J W Sherman III (National Environmental Satellite Service), J. F R. Gower (Institute of Ocean Sciences, Canada), D. Lichy (U.S Army Corps of Engineers), D B. Ross (Sea-Air Interaction Laboratory), C L. Rufenach (Wave Propagation Laboratory), and R. A Shuchman (Environmental Research Institute of Michigan)

Science, Vol. 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

BRYAN, M. L.

B075 Bibliography of Geologic Studies Using Imaging Radar

M. L. Bryan

JPL Publication 79-53, July 1, 1979

This bibliography has been prepared for use at the NASA/JPL Radar Geology Workshop held in Snowmass, Colorado, July 16 to 20, 1979. A selection of those papers dealing with geologic applications of imaging radars and that have appeared in the open literature are included Complete abstracts, where available, and additional commentary are included for each of the citations Three previous bibliographies dealing with radar (Bryan, 1973, Carter, 1969, and Dellwig, et al, 1975) have provided the core of this present bibliography One hundred and ninety citations are listed alphabetically by the senior author. An index by National Technical Information Service Citation number is included Several illustrations of L-band radar imagery are also included

B076 Remote Sensing Applications: An Overview

M L Bryan

Geogr. Surv, Vol VIII, No 4, pp. 23–28, October 1979

This paper discusses geographical remote sensing applications In doing so it utilizes the conventional approach to such a discussion, dividing the electromagnetic spectrum into several portions: the visible, infrared, and microwave waves

B077 Mapping of Sea Ice and Measurement of Its Drift Using Aircraft Synthetic Aperture Radar Images

F. Leberl (Technical University, Graz, Austria), M. L. Bryan, C Elachi, T. Farr, and W. Campbell (U.S Geological Survey)

J Geophys. Res, Vol 84, No C4, pp. 1827–1835, April 20, 1979

For abstract, see Leberl, F

BUCHANAN, H R.

B078 S-X 34-Meter Conversion Receiver and Microwave Performance

H R. Buchanan

The Deep Space Network Progress Report 42-50 January and February 1979, pp 219–225, April 15, 1979

The S-X 34-meter conversion provides for upgrading a subnet of three stations to a 34-meter antenna aperture and adding X-band receive capability This subnet will consist of DSSs 12, 42, and 61. Implementation of DSS 12 was completed in October 1978 A description of the conversion as applied to the antenna microwave and receiver subsystems is given Performance requirements and test results are included

BUCK, R. M.

B079 Chorus, Energetic Electrons and Magnetospheric Substorms

B T. Tsurutani, E. J Smith, H I. West, Jr., and R M. Buck

Wave Instabilities in Space Plasmas, pp 55–62, D Reidel Pub. Co., Dordrecht, Holland & Boston, 1979

For abstract, see Tsurutani, B T.

BUNCE, R. C.

B080 An Improvement in Fourier Transform Accuracy

R C Bunce

The Deep Space Network Progress Report 42-53 July and August 1979, pp 155–160, October 15, 1979

Most Fourier transform algorithms, when seeking a single frequency at the sample-time midpoint, simply choose the largest component of the set The error is at least ±0 5 component, and often larger This article describes an addition to such algorithms that reduces the variance error by three-to-one (nominal). The addition achieves this by averaging all components within a predetermined "window," selected as a function of frequency rate, and it is quite easy to mechanize within the existing algorithm.

B081 DSS Receiver Thermal Noise Model Comparisons

R. C Bunce

The Deep Space Network Progress Report 42-53 July and August 1979, pp 161–168, October 15, 1979

DSN receiver thermal noise is a component of the Doppler jitter noise measured during DSN system testing This thermal noise has been modelled theoretically through an evolution of approximations over a period of 20 years The model is required to predict the expected test result. This article compares the two latest and most accurate models in order to determine if changes in the test algorithm are required for desired accuracy. Also introduced is a new and highly simplified model that exhibits differentials of the same order as the more complicated algorithms The study concluded that the three models are indistinguishable within the nominal operating range of the receivers

BURIEZ, J. C.

B082 Equivalent Widths in Spectropolarimetry Can Provide Additional Information on the Atmosphere of Venus

J C. Buriez (Université des Sciences et Techniques de Lille, France),
Y. Fouquart (Université des Sciences et Techniques de Lille, France), and A L Fymat

Astrophys J, Vol 230, pp. 590–596, June 1, 1979

It is demonstrated that the analysis in both intensity and polarization of equivalent widths of strong Venusian absorption lines can provide the most accurate location of the visible cloud top as well as the ratios of scale heights of CO_2 to cloud particles and CO (or other appropriate minor constituents) to CO_2 It is also shown that spectropolarimetric observations at different phase angles can provide a vertical sounding of the upper levels in the cloud Equivalent widths in polarization are measurable on Venus with good infrared detectors, and we predict their value to be approximately a few percent of those in intensity

BURKE, A.

B083 Automotive Technology Projections

M. Dowdy and A Burke

Preprint 79-0021, SAE Congress & Exposition, Detroit, Mich , February 26–March 2, 1979

For abstract, see Dowdy, M

BURKE, J. D.

B084 Energy Conversion at a Lunar Polar Site

J D Burke

Radiation Energy Conversion in Space, AIAA, New York, pp 95–103, 1978

An inhabited lunar outpost can make good use of the peculiar conditions prevailing at the lunar poles It may be possible both to collect sunlight continuously and to reject waste heat continuously to dark space, taking advantage of the fact that the Moon's polar axis is almost normal to the plane of the ecliptic This paper discusses some aspects of energy conversion at the lunar poles (including extraction of useful volatiles which may be found uniquely in natural polar cold traps) and describes some precursor activities which could supply needed knowledge of polar conditions on the Moon

BURNS, J. A

B085 Asteroid Rotation. I. Tabulation and Analysis of Rates, Pole Positions and Shapes

A W Harris and J A Burns (Cornell University)

Icarus, Vol 40, pp 115–144, 1979

For abstract, see Harris, A W

B086 Past Obliquity Oscillations of Mars: The Role of the Tharsis Uplift

W R Ward, J A Burns (Cornell University),
O B. Toon (Ames Research Center)

J. Geophys Res., Vol 84, No. B1, pp 243–259, January 10, 1979

For abstract, see Ward, W R.

BURUM, D. P.

B087 Analysis of Multiple Pulse NMR in Solids. III

D P Burum and W K Rhim

J Chem Phys, Vol 71, No. 2, pp. 944–956, July 15, 1979

A 52-pulse cycle recently introduced in a communication, which has a substantially increased resolving power compared to previously available techniques, is analyzed in detail Also, a new 24-pulse cycle which is essentially equivalent to the 52-pulse cycle in resolving power is introduced These pulse cycles achieve their enhanced resolution compared to the REV-8 cycle by removing the effects of the homonuclear dipolar interaction in solids to higher orders of magnitude without reintroducing any dipolar terms eliminated by REV-8 Principles of pulse

cycle decoupling are introduced which greatly simplify the systematic development of compound multiple pulse cycles Beginning with the 2-pulse solid echo sequence, we show how these principles could have been used in designing the WAHUHA and REV-8 cycles and the 14-pulse cycle recently introduced by Haeberlen We further demonstrate the application of this method by developing several new pulse cycles, such as a 12-pulse cycle equivalent to the 14-pulse cycle, the 24-pulse cycle, and the 52-pulse cycle Finally, proton chemical shift tensor components for several organic solids which were measured using the 52-pulse cycle are reported without detailed discussion

B088 Proton NMR Study of Gypsum, $CaSO_4 \cdot 2H_2O$, Using an Improved Technique for Homonuclear Dipolar Decoupling in Solids

D P Burum and W K Rhim

J. Magnet Reson., Vol 34, pp 241–246, 1979

This paper presents the results of a room-temperature study of proton chemical shift anisotropy in gypsum, carried out using a new pulse sequence for obtaining well-resolved proton spectra.

BUSSION, J

B089 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W. J. Hurd, S C. Wardrip (Goddard Space Flight Center), J. Bussion (Naval Research Laboratory), J. Oaks (Naval Research Laboratory), T McCaskill (Naval Research Laboratory), H. Warren (Bendix Field Engineering Corp), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49. November and December 1978, pp. 64–69, February 15, 1979

For abstract, see Hurd, W J

BUTLER, C. P.

B090 Total Solar Irradiance at Table Mtn, California 1926–77

R. C. Willson and C. P Butler

Solar Energy, Vol. 21, pp 351–352, 1978

For abstract, see Willson, R. C

CAIN, D. L.

C001 Nutation of Mars

R A Lyttleton, D L Cain, and A S. Liu

JPL Publication 79-85, August 15, 1979

For abstract, see Lyttleton, R. A.

C002 The Viking Relativity Experiment

I. I. Shapiro (Massachusetts Institute of Technology), R D. Reasenberg (Massachusetts Institute of Technology), P. E MacNeil (Massachusetts Institute of Technology), R. B. Goldstein (Massachusetts Institute of Technology), J P. Brenkle, D. L Cain, T. Komarek A I Zygielbaum, W F. Cuddihy (Langley Research Center), and W H. Michael, Jr. (Langley Research Center)

J Geophys Res, Vol 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

C003 Mars Gravity Additional Resolution From Viking Orbiter I

W L Sjogren, R. N. Wimberly, D L Cain, and J P. Brenkle

Proc Lunar Planet Sci Conf 9th, 3561–3573, 1978

For abstract, see Sjogren, W L

CALHOUN, H.-W.

C004 Near-Earth Tracking and Data System Support for the Pioneer Venus 1978 Missions

M R. Traxler and H W Calhoun

The Deep Space Network Progress Report 42-50 January and February 1979, pp 27–35, April 15, 1979

For abstract, see Traxler, M R

CAMPBELL, W.

C005 Mapping of Sea Ice and Measurement of Its Drift Using Aircraft Synthetic Aperture Radar Images

F Leberl (Technical University, Graz, Austria), M. L. Bryan, C. Elachi, T. Farr, and W Campbell (U.S Geological Survey)

J Geophys. Res., Vol 84, No. C4, pp 1827–1835, April 20, 1979

For abstract, see Leberl, F

CAPPS, R. W.

C006 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R. J Terrile, R. W Capps (University of Hawaii), D E Backman (University of Hawaii), E E Becklin (University of Hawaii), D P Cruikshank (University of Hawaii), C A Beichman (University of Hawaii), R. H. Brown (University of Hawaii), and J. A Westphal (California Institute of Technology)

Science, Vol. 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R. J

CARDONE, V. J.

C007 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R. A Brown (University of Washington), V J. Cardone (Oceanweather, Inc), R E Coons, A A Loomis, J. E Overland (Pacific Marine Environmental Laboratory), S Peteherych (Atmospheric Environmental Service), W. J. Pierson (City University of New York), P M Woiceshyn, and M. G Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

C008 Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop

R G Lipes, R L Bernstein (Scripps Institution of Oceanography), V J. Cardone (Oceanweather, Inc), K B. Katsaros (University of Washington), E G Njoku, A L Riley, D B. Ross (Atlantic Oceanic and Meteorological Laboratory), C T. Swift (Langley Research Center), and F. J Wentz (Frank J Wentz and Associates)

Science, Vol 204, pp. 1415–1417, June 29, 1979

For abstract, see Lipes, R G

CARLSON, R. W.

C009 Measurement of the Profile and Intensity of the Solar He I λ584-Å Resonance Line

J O Maloy (Melcon System Design Consultants), R W. Carlson, U G Hartmann (Ball Aerospace Systems Division), and D L Judge (University of Southern California)

J. Geophys Res., Vol. 83, No A12, pp 5685–5690, December 1, 1978

For abstract, see Maloy, J. O

CARLSTON, C. E.

C010 One Mars Year Viking Lander Imaging Observations

K L Jones (Planetary Research, Inc), R. E Arvidson (Washington University), E A Guinness (Washington University), S L Bragg (Washington University), S D Wall (Langley Research Center), C. E. Carlston (Martin Marietta Corporation), and D. G Pidek

Science, Vol. 204, pp 799–806, May 25, 1979

For abstract, see Jones, K L.

CARROLL, W. F.

C011 Effects of Space Environment on Composites An Analytical Study of Critical Experimental Parameters

A. Gupta, W F. Carroll, and J. Moacanin

JPL Publication 79-47, July 1, 1979

For abstract, see Gupta, A

CARRUTH, M. R., JR.

C012 Charge-Exchange Plasma Environment for an Ion Drive Spacecraft

H R Kaufman (Colorado State University) and M R Carruth, Jr

JPL Publication 79-90, October 1, 1979

For abstract, see Kaufman, H R

CAUGHEY, T. K.

C013 Nonlinear Ordinary Difference Equations

T K. Caughey (California Institute of Technology)

JPL Publication 79-50, June 1, 1979

This publication is part of a continuing study of future problem areas in structural dynamics of space vehicles, conducted by the author for the Jet Propulsion Laboratory

The motivation for this particular piece of work is the conviction that future space vehicles will be relatively large and flexible, and that active control will be necessary to maintain geometrical configuration While the stresses and strains in these new space vehicles are not

expected to be excessively large, their cumulative effects will cause significant geometrical nonlinearities to appear in the equations of motion, in addition to the nonlinearities caused by material properties Since the only effective tool for the analysis of such large complex structures is the digital computer, it will be necessary to gain a better understanding of the nonlinear ordinary difference equations which result from the time discretization of the semi-discrete equations of motion for such structures

CHA, A. G.

C014 Microwave Delay Characteristics of Cassegrainian Antennas

A G Cha, W V T. Rusch (University of Southern California), and T Y Otoshi

IEEE Trans Anten. Prop, Vol AP-26, No. 6, pp 860–865, November 1978

An approach is presented in which the time an RF signal is delayed in propagating through a Cassegrainian antenna can be determined The approach is based on the recognition that both the group delay (time) and the envelope delay (time) can be obtained from the antenna transfer function Two antenna transfer functions are derived The delay time under various antenna operating conditions is discussed

C015 Aperture Amplitude and Phase Control of Offset Dual Reflectors

V. Galindo-Israel, R. Mittra (University of Illinois), and A G Cha

IEEE Trans Anten Prop, Vol AP-27, No 2, pp 154–164, March 1979

For abstract, see Galindo-Israel, V.

CHAI, K.

C016 Implementation of Natural Frequency Analysis and Optimality Criterion Design

R. Levy and K. Chai

Comput. Struct, Vol. 10, pp 277–282, 1979

For abstract, see Levy, R.

CHAI, V. W.

C017 The Updated Algorithm of the Energy Consumption Program (ECP)—A Computer Model Simulating Heating and Cooling Energy Loads in Buildings

F L. Lansing, D M. Strain, V W. Chai, and S. Higgins

The Deep Space Network Progress Report 42-49 November and December 1978, pp 107–115, February 15, 1979

For abstract, see Lansing, F L

C018 Comparison of Two Total Energy Systems for a Diesel Power Generation Plant

V. W. Chai

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 89–93, August 15, 1979

This article compares the capabilities and limitations, as well as the associated costs for two total energy systems for a diesel power generation plant Both systems utilize waste heat from engine cooling water and waste heat from exhaust gases A pressurized water heat recovery system is simple in nature, requires no engine modifications, but operates at lower temperature ranges On the other hand, a two-phase ebullient system operates the engine at constant temperature, provides higher temperature water or steam to the load, but is more expensive

CHAIKIN, P. M.

C019 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S. K Khanna, S P S Yen, R B Somoano, P M Chaikin (University of California, Los Angeles), C. L. Ma (California Institute of Technology), R. Williams (California Institute of Technology), and S. Samson (California Institute of Technology)

Phys. Rev. B. Condensed Matter, Vol. 19, No 2, pp 655–663, January 15, 1979

For abstract, see Khanna, S. K

CHAMBERLAIN, R. G.

C020 A Normative Price for a Manufactured Product: The SAMICS Methodology

R G Chamberlain

JPL Publication 78-98, Vols I and II, January 15, 1979

The Solar Array Manufacturing Industry Costing Standards (SAMICS) provide standard formats, data, assumptions, and procedures for determining the price a hypothetical solar array manufacturer would have to be able to obtain in the market to realize a specified after-tax

rate of return on equity for a specified level of production

This document presents the methodology and its theoretical background It is contended that the model is sufficiently general to be used in any production-line manufacturing environment

Implementation of this methodology by the Solar Array Manufacturing Industry Simulation computer program (SAMIS III, Release 1) is discussed

Prepared for the Department of Energy, DOE/JPL-1012-79/5, Distribution Category UC-63b

CHANEY, B.

C021 Spectral Signal Indicator Progress Report

B. Chaney, H. Cooper, and B. Crow

The Deep Space Network Progress Report 42-50· January and February 1979, pp 216–218, April 15, 1979

The Spectral Signal Indicator was designed as a receiver acquisition aid for the Pioneer Venus Probe entry in December 1978 A description of the Pioneer Venus SSI operation is given, as well as future implementation plans

CHEETHAM, C. M.

C022 Demonstration of Remote Clock Monitoring by VLBI, With Three Baseline Closure

C. M Cheetham, W J. Hurd, J W. Layland, G A Madrid, and T. P Yunck

The Deep Space Network Progress Report 42-53· July and August 1979, pp 40–53, October 15, 1979

The capability of very long baseline interferometry (VLBI) to monitor the stability of remotely-located hydrogen maser frequency standards has been demonstrated by a series of experiments conducted from September 1978, through January 1979, between Deep Space Stations in Australia, Spain, and California The measured stabilities of the clock systems, over approximately 10-day intervals, were 1 to 3 parts in 10^{13}, with the instabilities due to the oscillators, the clock distribution systems, the receiving system delays, and the VLBI measurement error

Experiments were conducted independently using two different systems (BLOCK 0 and WBDAS) Later comparison shows agreement in the order of 1 part in 10^{13} Closure was demonstrated on three separate occasions to 33, 10, and 13 ns with an error uncertainty of ±42 ns

The results clearly demonstrate the resolution and consistency of VLBI measurements

CHEN, C. J.

C023 Measurement of Induced-Emission Cross Section and Line Broadening of Copper Laser Lines $4p\ ^2P_{3/2}$-$4S\ ^2D_{5/2}$ and $4p\ ^2P_{1/2}$-$4S\ ^2D_{3/2}$

C J. Chen

Phys Rev A. Gen Phys, Vol 18, No 5, pp 2192–2195, November 1978

The induced-emission cross section of the copper laser lines $4p\ ^2P_{3/2}$-$4S\ ^2D_{5/2}$ (5106 Å) and $4p\ ^2P_{1/2}$-$4S\ ^2D_{3/2}$ (5782 Å) have been measured for He and Ne as buffer gases at different pressures by using an amplifier-gain technique The line broadenings are deduced from the experimental data and compared to the values predicted by a pressure-broadening impact theory.

CHEN, C. P.

C024 Fracture Strength of Silicon Solar Cells

C P. Chen

JPL Publication 79-102, October 15, 1979

In an effort to improve the reliability and lower the cost of solar cells, a test program has been developed to determine the nature and source of the flaw controlling the fracture of silicon solar cells and to provide information regarding the mechanical strength of cells

This report contains results obtained in the first phase of a test program to develop improved methods for testing the mechanical strength of cells and to evaluate the fracture strength of typical Czochralski silicon solar cells 76 mm (3 in) in diameter

Significant changes in fracture strengths were found in seven selected in-process wafer-to-cell products from a manufacturer's production line The fracture strength data were described by Weibull statistical analysis and can be interpreted in light of the exterior flaw distribution of the samples

Prepared for the U S Department of Energy, DOE/JPL-1012-32, Distribution Category UC-63b

CHEN, J. C.

C025 Voyager Design and Flight Loads Comparison

J C Chen, J. A Garba, and F. D Day III (Wyle Laboratory)

J Spacecraft Rockets, Vol 16, No. 1, pp. 27–34, January–February 1979

Estimates of flight loads for Voyager 1 and Voyager 2 are summarized These member loads are obtained by using the measured flight accelerations at the launch vehicle/spacecraft interface as forcing functions for the Voyager mathematical model The flight loads are compared to the Voyager design loads obtained from the shock spectra/impedance method and to the loads obtained using space vehicle transient loads analysis Finally, based on these data, an assessment of the shock spectra/impedance loads method used for Voyager is presented

C026 Estimation of Payload Loads Using Rigid-Body Interface Accelerations

J. C. Chen, J. A. Garba, and B. K Wada

J Spacecraft Rockets, Vol 16, No. 2, pp 74–80, March–April 1979

In the design/analysis process of a payload structural system, the accelerations at the payload/launch vehicle interface obtained from a system analysis using a rigid payload are often used as the input forcing function to the elastic payload to obtain structural design loads Such an analysis is at best an approximation, since the elastic coupling effects are neglected This paper develops a method wherein the launch vehicle/rigid payload interface accelerations are modified to account for the payload elasticity The advantage of the proposed method, which is exact to the extent that the physical system can be described by a truncated set of generalized coordinates, is that the complete design/analysis process can be performed within the organization responsible for the payload design The proposed method requires the updating of the system normal modes to account for payload changes, but does not require a complete transient solution using the composite system model The method is applied to a real complex structure, the Viking Spacecraft System The results obtained by this method for Viking are compared with the exact solution obtained by using the system model

CHEN, K. H.

C027 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T. Fujita, R Manvi, E J. Roschke, N. El Gabalawi, G Herrera, T J Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

CHEN, P. S.

C028 Convection Phenomena During the Growth of Sodium Chlorate Crystals From Solution

P. S. Chen (University of Southern California), P J Shlichta, W. R Wilcox (Clarkson College of Technology), and R A Lefever (Ampex Corporation)

J Crystal Growth, Vol 47, pp. 43–60, 1979

Schlieren observations of sodium chlorate crystals suspended in supersaturated solutions showed that, as supersaturation or crystal size increased, the boundary layer on the side faces remained stable while the top boundary layer and emerging plume changed from stable to partially oscillatory, with localized eddies or pulses rising periodically from portions on the top face The transition was a function of the Grashof number Gr_{top} (in which the characteristic length was defined as the area/perimeter of the top face) and the crystal height z, the critical Gr^{*}_{top} being equal to $70 + (17\ mm^{-1})z$. Gr_{top} correlated well with plume width, number of streamlines, eddy density, and plume velocity The oscillation period, however, correlated best with the weight-increase growth rate The mass transfer rate, as measured by the Sherwood number, correlated with Gr_{top} according to the relation $Sh = 0.27\ (Gr_{top})^{1/4}$ The linear growth rate varied as the inverse 1/4 power of the characteristic length and the 5/4 power of the supersaturation The vertical faces grew more rapidly than the horizontal faces, the ratio (1.1 to 1.6) having no apparent correlation with Gr^{*}_{top} but increasing with decreasing supersaturation A rough estimate of boundary layer flow versus growth rate for near-critical stable convection indicated that growth of the side faces depleted over half the excess solute in the boundary layer External impulses initiated transient instabilities and/or oscillations in stable plumes, the threshold impulse energy being a function of Gr^{*}_{top} minus Gr_{top} The duration of the transients increased with impulse energy until a maximum decay time was reached Impulse energies greatly in excess of the threshold value caused transient separation of the boundary layer on the top face or in extreme cases over the entire crystal surface Plume wavering, due to background-induced fluid motion, was observed only at the lowest supersaturations

CHEN, R. Y.

C029 A Maximum Likelihood Convolutional Decoder Model vs Experimental Data Comparison

R Y Chen

The Deep Space Network Progress Report 42-49 November and December 1978, pp 155–159, February 15, 1979

This article describes the comparison of a maximum likelihood convolutional decoder (MCD) prediction model and the actual performance of the MCD at the Madrid Deep Space Station The MCD prediction model is used to develop a subroutine that has been utilized by the Telemetry Analysis Program (TAP) to compute the MCD bit error rate for a given signal-to-noise ratio The results indicate that the TAP can predict quite well compared to the experimental measurements An optimal modulation index also can be found through TAP

CHERNOFF, R. C.

C030 Large Active Retrodirective Arrays for Space Applications

R C Chernoff

IEEE Trans Anten Prop., Vol. AP-27, No 4, pp 489–496, July 1979

An active retrodirective array (ARA) electronically points a microwave beam back at the apparent source of an incident pilot signal Retrodirectivity is the result of the phase conjugation of the pilot signal received by each element of the array The problem of supplying the correct phase reference to the phase conjugation circuit (PCC) associated with each element of the array is solved by "central phasing" By eliminating the need for structural rigidity central phasing confers a decisive advantage on ARA's as large space-borne antennas A new form of central phasing suitable for very large arrays is described ARA's may easily be modified to serve both as transmitting *and* receiving arrays simultaneously ARA's are particularly suitable as solar power satellite antennas because they are inherently failsafe Communication satellites and deep space probes are other suggested applications A new kind of exact frequency-translating PCC is described Such PCC's provide the ARA with input-output isolation and freedom from squint. The pointing errors caused by the radial and transverse components of the ARA's velocity, by the propagation medium, and by multipath are discussed As part of a NASA funded program a two-element ARA breadboard has been built and tested at the Jet Propulsion Lab Its performance is limited primarily by multipath-induced errors

CHRISTENSEN, E. J.

C031 Mars Gravity Field Derived from Viking-1 and Viking-2· The Navigation Results

E J Christensen and B G Williams

J. Guidance Contr, Vol. 2, No 3, pp 179–183, May–June 1979

A Martian gravity field derived from Viking-1 and Viking-2 Doppler tracking data taken during the ≈1500 km altitude phase is compared to models obtained from Mariner-9 The fields compare favorably in the north, but marked disagreements in the south can only be resolved by proper weighting of a priori Mariner-9 data Viking orbiters sense the gravity field in the vicinities of 25°N to 55°N whereas Mariner-9 models are most valid in the vicinity of 25°S The Viking data were reduced to obtain a model of degree and order six in the spherical harmonic expansion of the potential Since this model is restricted to low-degree terms, the technique used here takes advantage of orbital element variations over periods commensurate with the period of the orbit This precludes modeling short-period variations near periapsis which usually require high-degree terms in the potential The model discussed herein was derived from an ensemble of models obtained over two to four revolutions of Doppler data taken during various synchronous and asynchronous phases of the Viking mission A priori Mariner-9 fields were also included in the ensemble in an attempt to apply the requisite constraint on the gravity in the south Short-arc gravity analyses of the low-altitude phase (≈300 km for Viking-1 and ≈800 km for Viking-2) indicate that ensemble sixth degree and order models degrade the gravity field globally, thus, future data reduction incorporating the low-altitude Viking orbits will require higher degree and order models

CHUTJIAN, A.

C032 Absolute Elastic Differential Electron Scattering Cross Sections in the Intermediate Energy Region. IV CO

H. Tanaka (Sophia University, Japan), S K Srivastava, and A Chutjian

J. Chem Phys., Vol. 69, No 12, pp. 5329–5333, December 15, 1978

For abstract, see Tanaka, H

C033 Line Shapes for Attachment of Threshold Electrons to SF_6 and $CFCl_3$ Threshold photoelectron (TPSA) studies of Xe, CO, and C_2H_2

J M Ajello and A Chutjian

J Chem Phys, Vol. 71, No 3, pp 1079–1087, August 1, 1979

For abstract, see Ajello, J M

C034 Geometries and Focal Properties of Two Electron-Lens Systems Useful in Low-Energy Electron or Ion Scattering

A Chutjian

Rev Sci Instrum, Vol 50, No 3, pp 347–355, March 1979

Geometries and focal properties are given for two types of electron-lens systems commonly needed in electron scattering One is an electron gun which focuses electrons from a thermionic emitter onto a fixed point (target) over a wide range of final energies The other is an electron analyzer system which focuses scattered electrons of variable energy onto a fixed position (e g , the entrance plane of an analyzer) at fixed energy with a zero final beam angle Analyzer-system focusing properties are given for superelastic, elastic, and inelastically-scattered electrons Computer calculations using recent, accurate tube-lens focal properties are used to compute lens voltages, locations and diameters of all pupils and windows, and filling factors and asymptotic rays throughout each lens system Focus voltages as a function of electron energy and energy change are given, and limits of operation of each system discussed Both lens systems have been in routine use for several years, and good agreement has been consistently found between calculated and operating lens voltages

CIMINO, J. B.

C035 Liquid Content of the Lower Clouds of Venus as Determined from Mariner 10 Radio Occultation

A J. Kliore, C Elachi, I R Patel, and J. B. Cimino (California Institute of Technology)

Icarus, Vol. 37, No. 1, pp 51–72, January 1979

For abstract, see Kliore, A J.

C036 Precipitation on Venus' Properties and Possibilities of Detection

J. B. Cimino and C Elachi

J Atmos Sci, Vol. 36, No 7, pp. 1168–1177, July 1979

Mariner 10 occultation measurements have provided evidence of a dense cloud deck in the lower atmosphere of Venus with a peak liquid content of about 1 g m^{-3} This, in conjunction with other measurements (such as turbulence, updrafts and the presence of aerosol) seem to favor the possibility of precipitation on Venus Modeling of droplet growth in the Venusian environment shows that precipitation size drops can be formed over periods of only a few hours, similar to growth rates on Earth The precipitation region, if it exists, would extend from the cloud base at about 50 km to the 38 km level where most of the droplets will have evaporated. Precipitation regions can be detected with a variety of remote sensing radar and radio techniques

CLAKE, R. N.

C037 Significance of Absorption Features in Io's IR Reflectance Spectrum

R. P Fanale, R. H Brown (University of Hawaii, Honolulu), D P Cruikshank (University of Hawaii, Honolulu), and R N. Clake (University of Hawaii, Honolulu)

Nature, Vol. 280, No. 5725, pp 761– 763, August 30, 1979

For abstract, see Fanale, R P

CLARKE, T. C.

C038 Evaluation of Radiation Interference in the Voyager Sun Sensor's Cadmium Sulfied Detector

T C. Clarke and E. L Divita

IEEE Trans Nucl Sci, Vol NS-25, No 6, pp 1324–1328, December 1978

The simulation of radiation interference effects and the results of a radiation interference test on two Voyager Sun Sensor prototype detector assemblies are reported The derivation of test levels and requirements are discussed and show that cobalt 60 gamma radiation is an effective and practical simulator of the ionization dose rate effects induced by high-energy electron flux incident on the spacecraft at a rate of 3 7 × 10^8 e/cm^2 (10 rad(Si)/s) during closest approach to Jupiter The test results provide information that is used to confirm an analytic correlation, and to predict satisfactory performance of a spacecraft Sun sensing device having stringent angular resolution requirements The measured detector response shows that at dose rates incident on the detector elements of 2 rad(Si)/s, which is four times that expected during Jupiter encounter, the radiation-induced angle error is almost an order of magnitude less than that allowed by the acceptance criteria

CLARKE, V. C., JR.

C039 A Mars Airplane...Oh Really?

V. C Clarke, Jr., A Kerem (Developmental Sciences, Inc.), and R. Lewis (Lear Seigler, Inc)

Preprint 79-0067, AIAA Seventeenth Aerosp Sci. Meet , New Orleans, La , January 15–17, 1979

This paper describes the mission design, scientific utilization, and prototypical design of a Mars Airplane As a scientific platform, the airplane provides an excellent means of obtaining data in a resolution range intermediate to surface vehicles and orbiters It has great versatility to perform a variety of missions· conduct aerial surveys, land instrument packages, collect samples, and

perform atmospheric sounding The Mars Airplane has many characteristics of a competition glider on Earth Two versions of the plane, a cruiser, and one with soft landing and takeoff capability, have been designed Maximum range and endurance are 10,000 km and 31 1 hours with a 40-kg payload

CLAYTON, R. M.

C040 Emission Characteristics of a Premix Combustor Fueled With a Simulated Partial-Oxidation Product Gas

R M Clayton

Preprint 79-1322, AIAA/SAE/ASME Fifteenth Joint Propulsion Conf, Las Vegas, Nevada, June 18end20, 1979

A two-stage gas turbine combustor concept employing a very fuel-rich partial oxidation stage is being explored for broadening the combustion margin between ultralow emissions and the lean stability limit Combustion and emission results are presented for a series of experiments where a simulated partial oxidation product gas was used in a premix combustor operated with inlet air state conditions typical of cruise power for high-performance aviation engines (12 atm and 850°F) Ultralow NO_x, CO, and HC emissions and an extended lean burning limit were achieved simultaneously.

CLEVEN, G. C.

C041 Seasat Low-Rate Data System

J W. Brown, G C. Cleven, J C Klose, D. B Lame, and C A Yamarone

Science, Vol. 204, pp 1407–1408, June 29, 1979

For abstract, see Brown, J. W

COCKRUM, R. H.

C042 Trapping Effects in Irradiated and Avalanche-Injected MOS Capacitors

M Bakowski, R. H. Cockrum, N Zamani, J. Maserjian, and C. R Viswanathan (University of California, Los Angeles)

IEEE Trans Nucl Sci, Vol NS-25, No 6, pp 1233–1238, December 1978

For abstract, see Bakowski, M

C043 A Comparison of Gettering Techniques

S Prussin (TRW Semiconductors, Inc), S P Li (California State Polytechnic University, Pomona), and R H Cockrum

Semiconductor Characterization Techniques· Proc Top Conf Characterization Tech Semicond Mater & Devices, Seattle, Wash , May 21–26, 1978, pp 357–365

For abstract, see Prussin, S

COFFEY, M T.

C044 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F W Taylor, D J. Diner, L S Elson, D J McCleese, J. V. Martonchik, J. Delderfield (University of Oxford, England), S P Bradley (University of Oxford, England), J T. Schofield (University of Oxford, England), J. C. Gille (National Center for Atmospheric Research), and M T. Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F. W

COHEN, N. S.

C045 Combustion Response Modeling for Composite Solid Propellants

N. S Cohen (Norman Cohen Professional Services) and J. M Bowyer

JPL Publication 78-59, June 1, 1978

The objective of this program was to develop a computerized mathematical model of the combustion response function of composite solid propellants, with particular attention to the contributions of the solid phase heterogeneity A one-dimensional model was developed which treats the solid phase as alternating layers of AP and binder, with an exothermic melt layer at the surface Solution of the Fourier heat equation in the solid provides temperature and heat flux distributions with space and time The problem is solved by equating the heat flux at the surface to that produced by a suitable model of the gas phase. An approximation of the BDP flame model is utilized to represent the gas phase By the use of several reasonable assumptions, it is found that a significant portion of the problem can be solved in closed form A method is presented by which the model can be applied to tetramodal particle size distributions

A computerized steady-state version of the model was completed, which served to validate the various approximations and lay a foundation for the combustion re-

sponse modeling The combustion response modeling was completed in a form which does not require an iterative solution, and some preliminary results were acquired The model satisfactorily describes the steady state combustion properties, but is deficient in describing the transient combustion response Although an effect of solid phase heterogenity on transient combustion response is predicted by the current model, the effect is so small as to allow it to be neglected in future work It is concluded that some other mechanism associated with the propellant heterogeneity must be incorporated into the theory to account for observed behavior. Potential deficiencies of the current model are identified, as areas for future work are recommended

Prepared for the Air Force Rocket Propulsion Laboratory, AFRPL-TR-78-39

C046 Transient Processes in the Combustion of Nitramine Propellants: Annual Research Progress Report

N. S Cohen and L D. Strand

JPL Publication 78-108, November 1978

A transient combustion model of nitramine propellants is combined with an isentropic compression shock formation model to determine the role of nitramine propellant combustion in DDT, excluding effects associated with propellant structural properties or mechanical behavior The model is derived to represent the closed pipe experiment that is widely used to characterize explosives, except that the combustible material is a monolithic charge rather than compressed powder Although it is argued that mechanical effects are not likely the sole cause of DDT, computations reveal that the transient combustion process cannot by itself produce DDT either by this model Compressibility of the solid at high pressure is the key factor limiting pressure buildups created by the combustion On the other hand, combustion mechanisms which promote pressure buildups are identified and related to propellant formulation variables It is recommended that these mechanisms be included in other models of shock formation and DDT which are being developed elsewhere

Additional combustion instability data for nitramine propellants, continuing work begun last year, are presented Although measured combustion response continues to be low, more data are required to distinguish HMX and active binder component contributions A design for a closed vessel apparatus for experimental studies of high pressure combustion is discussed

Prepared for the United States Air Force

COLE, E. R.

C047 DSN Energy Data Base Preliminary Design

E. R Cole, L O Herrera, and D. M Lascu

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 167–181, June 15, 1979

This article describes the initial design and implementation of a computerized data base created to support the DSN Energy Conservation Project with data relating to energy use at Goldstone Deep Space Communications Complex In addition, it briefly gives the results of development work to date and identifies work currently in progress or in the planning stage

COLLINS, S. A.

C048 Discovery of Currently Active Extraterrestrial Volcanism

L. A. Morabito, S. P. Synnott, P. N. Kupferman, and S A Collins

Science, Vol 204, p 972, June 1, 1979

For abstract, see Morabito, L A

CONROY, B. L.

C049 Evaluation of the JPL X-Band 32-Element Active Array: Final Report

J. F Boreham, R B Postal, and B L Conroy

JPL Publication 79-69, Rev. 1, August 1, 1979

For abstract, see Boreham, J. F

CONTEAS, A. D.

C050 Voyager 1979 Update to the Radial and Solar Cycle Variations in the Solar Wind Phase Fluctuation Spectral Index

A. L. Berman and A D Conteas

The Deep Space Network Progress Report 42-54 September and October 1979, pp 71–81, December 15, 1979

For abstract, see Berman, A L

COONS, R. E

C051 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R. A Brown (University of Washington), V J Cardone (Oceanweather, Inc), R E Coons, A A Loomis, J E. Overland (Pacific Marine Environmental Laboratory), S Peteherych (Atmospheric Environmental Service), W J Pierson (City University of New York), P. M Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

COOPER, H.

C052 Spectral Signal Indicator Progress Report

B Chaney, H Cooper, and B. Crow

The Deep Space Network Progress Report 42-50 January and February 1979, pp 216–218, April 15, 1979

For abstract, see Chaney, B

COSTOGUE, E.

C053 Silicon Materials Outlook Study for 1980–85 Calendar Years

E. Costogue, R Ferber, W. Hasbach, R. Pellin (Consultant, Charlotte, NC), and C. Yaws (Consultant, Beaumont, TX)

JPL Publication 79-110, November 1, 1979

This report summarizes the polycrystalline silicon, single-crystal ingot growing, and wafer slicing plant capacities, and market needs during 1980-1985 The report is limited in that proprietary information retained by the industry could modify the conclusions Technological breakthroughs could take place earlier than anticipated, thereby substantially improving the potential for industry to develop the needed production capacity and to achieve the economic goals of the silicon solar array industry Many plans which are proprietary within each affected company could impact the future silicon availability, but, for the present, it is necessary that any procurement planning consider the potential of a silicon shortfall in 1983 and the period beyond

Prepared for the U S Department of Energy, DOE/JPL-1012-33, Distribution Category UC63b

CRAMER, P., JR.

C054 Diffraction by an Arbitrary Subreflector. GTD Solution

S W. Lee (University of Illinois), P. Cramer, Jr , K Woo, and Y Rahmat-Samii

IEEE Trans. Anten. Prop, Vol. AP-27, No 3, pp 305–316, May 1979

For abstract, see Lee, S W

CROFT, T. A.

C055 The Polar Ionosphere of Venus Near the Terminator from Early Pioneer Venus Orbiter Radio Occultations

A J. Kliore, R. Woo, J. W Armstrong, I. R Patel, and T A Croft (SRI International)

Science, Vol 203, pp 765–768, February 23, 1979

For abstract, see Kliore, A. J

C056 Radio Science with Voyager 1 at Jupiter: Preliminary Profiles of the Atmosphere and Ionosphere

V. R Eshleman (Stanford University), G L. Tyler (Stanford University), G E. Wood, G F Lindal, J D Anderson, G S Levy, and T A Croft (SRI International)

Science, Vol. 204, pp. 976–978, June 1, 1979

For abstract, see Eshleman, V R

CROW, B.

C057 Spectral Signal Indicator Progress Report

B. Chaney, H Cooper, and B Crow

The Deep Space Network Progress Report 42-50. January and February 1979, pp 216–218, April 15, 1979

For abstract, see Chaney, B

CRUIKSHANK, D. P.

C058 Significance of Absorption Features in Io's IR Reflectance Spectrum

R P. Fanale, R. H. Brown (University of Hawaii, Honolulu), D P Cruikshank (University of Hawaii, Honolulu), and R. N. Clake (University of Hawaii, Honolulu)

Nature, Vol. 280, No 5725, pp 761– 763, August 30, 1979

For abstract, see Fanale, R P

C059 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R J Terrile, R. W. Capps (University of Hawaii), D E Backman (University of Hawaii), E E Becklin (University of Hawaii), D. P Cruikshank (University of Hawaii), C A Beichman (University of Hawaii), R H Brown (University of Hawaii), and J. A. Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R J

CUDDIHY, E. F.

C060 Low-Cost Encapsulation Materials for Terrestrial Solar Cell Modules

E. F Cuddihy, B Baum (Springborn Laboratories, Inc), and P Willis (Springborn Laboratories, Inc)

Solar Energy, Vol. 22, pp 389–396, 1979

Solar cell modules must undergo dramatic reductions in cost in order to become economically attractive as practical devices for the production of electricity A federal goal seeks to have, by 1986, an industrial capability of producing solar cell modules at a cost of 50¢ per W (in 1975 dollars) and a service lifetime of 20 yr Today's modules cost more than $11 00 per W, and they have an undefined lifetime Part of the cost reductions must be realized by the encapsulation materials which are used to package, protect, and support the solar cells, electrical interconnects, and other ancillary components It is estimated that to meet a cost goal of 50¢ per W, encapsulation materials, including the structural substrate or superstrate, should cost between $2 70 and $5 00 per m^2 of module area (in 1975 dollars) This article presents the findings of material surveys intended to identify low cost materials which could be functional as encapsulants This article further assesses the prognosis for achieving an encapsulation system at the lower cost goal of $2 70 per m^2, and identifies the technologies which must be advanced or developed to achieve 20-yr life with the lowest costing materials

CUDDIHY, W. F.

C061 The Viking Relativity Experiment

I. I. Shapiro (Massachusetts Institute of Technology), R D. Reasenberg (Massachusetts Institute of Technology), P. E MacNeil (Massachusetts Institute of Technology), R B Goldstein (Massachusetts Institute of Technology), J P Brenkle, D. L Cain, T Komarek A I Zygielbaum, W F Cuddihy (Langley Research Center), and W H. Michael, Jr (Langley Research Center)

J Geophys Res, Vol 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

CUFFEL, R F.

C062 Separation of Core Noise and Jet Noise

S. P. Parthasarathy, R F Cuffel, and P. F Massier

Preprint 79-0589, AIAA Fifth Aeroacoustics Conf , Seattle, Washington, March 12–14, 1979

For abstract, see Parthasarathy, S P

C063 Twin Jet Shielding

S P Parthasarathy, R. F Cuffel, and P F Massier

Preprint 79-0671, AIAA Fifth Aeroacoustics Conf , Seattle, Washington, March 12–14, 1979

For abstract, see Parthasarathy, S P

CUNNINGHAM, R. T.

C064 Computing Region Moments from Boundary Representations

J M Wilf and R T. Cunningham

JPL Publication 79-49, November 1, 1979

For abstract, see Wilf, J. M

C065 Robotic Vision

D. S Williams, J M Wilf, R T Cunningham, and R Eskenazi

Astronaut. Aeronaut, Vol 17, pp 36–41, May 1979

For abstract, see Williams, D S

CUTTING, E.

C066 Orbit Analysis for SEASAT-A

E Cutting, G. H Born, and J C Frautnick

J Astronaut Sci, Vol XXVI, No. 4, pp 315–342, October–December 1978

SEASAT-A is a NASA Earth satellite for measuring global ocean dynamics from space The instruments on the spacecraft will provide data on wave height and direction, surface wind speed and direction, ice fields, ocean surface topography and atmospheric water content This paper is concerned with the orbit analysis for SEASAT-A The first topic is the selection of the orbit which best satisfies the measurement objectives of the various instruments The maintenance of this orbit under drag and other perturbations is also discussed The second topic is precision orbit determination analysis which is required to achieve ocean topography objectives of the mission

DACHEL, P. R.

D001 FTS Maintenance and Calibration at DSS 42/43

P R Dachel and J Wells (Deep Space Station 43, Tidbinbilla)

The Deep Space Network Progress Report 42-49 November and December 1978, pp 146–154, February 15, 1979

An FTS maintenance and calibration task was conducted at DSS 42/43 during August 1978 The objectives of this effort were (1) the routine maintenance and calibration of hydrogen masers, (2) installation and calibration of cesium standards, (3) installation of test equipment for frequency measurement, (4) CRG testing, (5) cabling inspection and repair, (6) checking thermal and magnetic environment of H-maser/cesium room, and (7) calibration of frequency and timing subsystem

D002 An Improved Storage Bulb Mount for DSN Hydrogen Masers

P R Dachel, D. P. Russell, T K. Tucker, and L. B Stratman

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 21–25, August 15, 1979

This article compares the presently used JPL hydrogen maser suspended atomic storage bulb to a new, rigid, single-plane mounted bulb The new bulb incorporates three major design changes (1) mounting design, (2) alterations to the collimator, and (3) decrease in mass These design changes are expected to increase the long-term stability of the frequency standard by reducing its sensitivity to vibration and thermal effects

DAEGES, J

D003 Automatic Filament Warm-Up Controller

J. McCluskey and J. Daeges

The Deep Space Network Progress Report 42-49 November and December 1978, pp 132–135, February 15, 1979

For abstract, see McCluskey, J

DAHLGREN, J. B.

D004 Pointing and Control System Enabling Technology for Future Automated Space Missions

J B Dahlgren

JPL Publication 79-23, December 30, 1978

Future automated space missions present challenging opportunities in the pointing-and-control technology disciplines A NASA-OAST sponsored study, recently completed, identified and assessed the enabling pointing and control system technologies for missions from 1985 to the year 2000 A generic mission set including earth orbiter, planetary, and other missions which predominantly drive the pointing and control requirements was selected for detailed evaluation. Technology candidates identified in the study were prioritized as planning options for future NASA-OAST advanced development programs The primary technology thrusts in each candidate program were cited, and advanced development programs in pointing and control were recommended for the FY80 to FY87 period, based on these technology thrusts

DAILY, M.

D005 Discrimination of Geologic Units in Death Valley Using Dual Frequency and Polarization Imaging Radar Data

M Daily, C Elachi, T Farr, and G Schaber (U S Geological Survey)

Geophys, Res Lett, Vol 5, No 10, pp 889–892, October. 1978

Simultaneous analysis of dual frequency and dual polarization radar imagery of a portion of Death Valley, California has yielded a nearly complete discrimination of surficial geologic units Radar imagery in like polarized L-band (i e, 25 cm wavelength), crosspolarized L-band and like polarized X-band (i e, 3 cm wavelength) were digitally combined and ratioed to enhance the variation in the backscatter cross-section (i e, albedo) of the different geologic units In the case of Death Valley, the variation between the different geologic units is clearly reflected in the surface roughness or particle size These, in turn, have a strong effect on the radar backscatter cross-section.

DAUD, T.

D006 Effect of Grain Boundaries in Silicon on Minority-Carrier Diffusion Length and Solar-Cell Efficiency

T Daud, K M. Kolıwad, and
F G Allen (Universıty of Calıfornıa, Los Angeles)

Appl. Phys Lett, Vol 33, No. 12, pp 1009–1011, December 15, 1978

The spatıal varıatıon of mınorıty-carrıer dıffusıon length ın the vicınity of a grain boundary for a polycrystallıne sılicon sheet has been measured by the use of the EBIC technique The effect of such a varıatıon on solar-cell output has then been computed as a functıon of grain sıze. Calculations show that the cell output drops consıderably for grain size smaller than three tımes the bulk dıffusıon length.

DAVIES, D. W.

D007 The Vertical Distribution of Mars Water Vapor

D W Davıes

J. Geophys. Res., Vol. 84, No. B6, pp 2875–2879, June 10, 1979

Analysıs of observatıons made from the Vıkıng 1 Orbıter ındicates that the water vapor over the Vıkıng 1 landing sıte ıs unıformly mıxed wıth the atmosphere and not concentrated near the surface The analysıs ıncorporates the effects of atmospheric scatterıng and explaıns why previous earth-based observatıons showed a strong dıurnal varıatıon in water content It also explaıns the lack of an early morning fog and removes the necessity of daily exchange of large amounts of water between the surface and the atmosphere A water vapor volume mıxıng ratıo of 1.5×10^{-4} is ınferred for the Vıkıng I sıte ın late summer

DAVIS, E. K.

D008 Voyager Telecommunications: The Broadcast from Jupıter

R. E Edelson, B D. Madsen, E. K Davıs, and
G W. Garrıson

Scıence, Vol. 204, pp. 913–921, June 1, 1979

For abstract, see Edelson, R. E

DAVIS, H. S.

D009 Potentıal for Cogeneration of Heat and Electricity in California Industry—Phase II: Fınal Report

H S Davıs, E Edelson, A K Kashanı, and
M. L. Slonskı

JPL Publıcatıon 78-109, January 1, 1979

The nontechnıcal ıssues of ındustrıal cogeneratıon for 12 Calıfornıa firms are analyzed under three categorıes of ınstıtutıonal settıngs (1) ındustrıal ownershıp wıthout firm sales of power (2) ındustrıal ownershıp wıth firm sales of power, and (3) utılıty or thırd party ownership Institutıonal ıssues are analyzed from the independent vıewpoınts of the prımary partıes of interest the ındustrıal firms, the electrıc utılıtıes and the Calıfornıa Public Utılıtıes Commıssıon Aır quality regulatıons and the agencıes responsıble for theır promulgatıon are examıned, and a lıfe-cycle costıng model ıs used to evaluate the economıc merıts of representatıve conceptual cogeneratıon systems at these sıtes Specific recommendations are made for mıtıgating measures and regulatory actıon relevant to ındustrıal cogeneratıon ın Calıfornıa.

Prepared for the U S Department of Energy

DAY, F. D., III

D010 Voyager Design and Flight Loads Comparison

J. C Chen, J. A Garba, and F. D Day III (Wyle Laboratory)

J Spacecraft Rockets, Vol. 16, No 1, pp 27–34, January–February 1979

For abstract, see Chen, J C

DeCAMPLI, W. M.

D011 Comments on the Venus Rotatıon Pole

W R Ward and W M DeCampli (Calıfornıa Institute of Technology)

Astrophys J., Vol 230, pp L117–L121, June 1, 1979

For abstract, see Ward, W R.

DELDERFIELD, J.

D012 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pıoneer Orbiter

F. W Taylor, D J. Dıner, L S Elson,
D J. McCleese, J V. Martonchık,
J. Delderfield (Universıty of Oxford, England),
S P Bradley (Universıty of Oxford, England),
J T. Schofield (Universıty of Oxford, England),
J C. Gille (Natıonal Center for Atmospheric Research), and M T Coffey (Natıonal Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F. W

DeLEONIBUS, P. S.

D013 Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities

F I. Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W. E Brown, P S. DeLeonibus (National Environmental Satellite Service), J. W. Sherman III (National Environmental Satellite Service), J F. R Gower (Institute of Ocean Sciences, Canada), D Lichy (U S Army Corps of Engineers), D. B Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp. 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

DeMORE, W. B.

D014 Reaction of HO_2 With O_3 and the Effect of Water Vapor on HO_2 Kinetics

W. B DeMore

J. Phys. Chem, Vol 83, pp. 1113–1118, 1979

Photolysis of H_2–O_2–O_3 mixtures at 253 7 nm has been used to measure the ratio $k_1/k_2^{1/2}$ in the temperature range −42 5 to +61 °C, at atmospheric pressure $HO_2 + O_3 \rightarrow OH + 2O_2$ (k_1), $HO_2 + HO_2 \rightarrow H_2O_2 + O_2$ (k_2). The result is $k_1/k_2^{1/2} = 6\,4 \times 10^{-8} \exp(-1220/T)$ $cm^{3/2}$ $s^{-1/2}$, which is in excellent agreement with recent absolute measurements of k_1 and k_2 Addition of water vapor causes a reduction in the measured $k_1/k_2^{1/2}$ The magnitude of the effect is in agreement with the observations of Hamilton showing an increase in k_2 in the presence of water vapor The ratio $k_1/k_2^{1/2}$ was also measured at 25 °C by the photolysis of H_2O–O_2–N_2 mixtures at 184.9 nm The resulting value of $k_1/k_2^{1/2}$ is in good agreement with that obtained from the first type of experiment, when the water vapor effect is taken into account The 184.9-nm experiments also yield information on the rate constant k_{11} $OH + HO_2 \rightarrow H_2O + O_2$ (k_{11}) As in previous experiments by DeMore and Tschuikow-Roux, the results are compatible only with k_{11} values in excess of 10^{-10} cm^3 s^{-1}, which is higher than k_{11} values measured by others in low pressure systems These results suggest a possible dependence of k_{11} on reaction conditions such as pressure

DI CENZO, A.

D015 Weighting in Digital Synthetic Aperture Radar Processing

A Di Cenzo

JPL Publication 79-94, November 15, 1979

Weighting is commonly employed in SAR Processing to reduce the sidelobe response at the expense of peak center response height and mainlobe resolution The weighting effectiveness in digital processing depends not only on the choice of weighting function, but on the fineness of sampling and quantization, on the time bandwidth product, on the quadratic phase error, and on the azimuth antenna pattern This paper reports the results of simulations conducted to uncover the effect of these parameters on azimuth weighting effectiveness In particular, it is shown that multilook capabilities of future SAR systems may obviate the need for consideration of the antenna pattern, and that azimuth time-bandwidth products of over 200 are probably required before the digital results begin to approach the ideal results

DICKINSON, R.

D016 Assessment of 20-kW S-Band Transmitter

R. Dickinson and H Hansen

The Deep Space Network Progress Report 42-51· March and April 1979, pp 186–192, June 15, 1979

The recent performance history of the 20-kW S-Band transmitter, installed at three 64-meter antennas and six 26-meter antennas in the DSN, is reviewed An increasing number of failures and Discrepancy Reports are characteristic of the wearout phase of a failure curve The type of failures are reviewed and four options toward reducing the number and cost of failures are reviewed These are existing (no change), refurbish (replace worn components), redesign (extensive improvement) and replacement (with completely new transmitter).

The options are compared on a ten-year life cycle cost basis using FY77 expenditures for existing equipment as a base It is found that benefits, in terms of reduction of outage time, increase with an increase of expenditure toward improvement. The choice of option to be exercised is dependent upon the amount of outage which is acceptable and, of course, upon funds available

DICKINSON, R. M

D017 DSN VHF Transmitting Array Backup Command Uplink for Voyager 2

R. M. Dickinson

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 189–195, April 15, 1979

As a result of the failure of the Voyager 2 primary S-band receiver and the failed component in the remaining receiver, JPL is evaluating the feasibility and cost of an alternate command uplink in the low VHF band around 40 MHz, by utilizing the planetary radio astronomy experiment receiver aboard the spacecraft The design considerations, tentative specifications and one preliminary mechanization for the requisite ground transmitting facility are presented The magnitude of the transmitting requirement is on the order of 120 dBm EIRP, achievable with a 183-m diameter phase steered beam array with 250-kW output power. Preliminary results of tests conducted to date employing the Stanford 46-m diameter steerable parabolic antenna and 300-kW CW VHF transmitter at 46 72 MHz are reviewed

DIEHL, R E.

D018 Phobos Encounter Trajectory and Maneuver Design

R. E. Diehl, M. J. Adams, and E A Rinderle, Jr

J. Guidance Contr, Vol. 2, No. 2, pp 123–129, March–April 1979

In February 1977, The Viking I Orbiter made repeated flybys of the Martian satellite Phobos at distances near 100 km These close encounters allowed a detailed scientific investigation of the nature and origin of Phobos A sequence of three maneuvers was required to achieve the encounters This paper presents the trajectory analysis performed to accommodate the scientific objectives and the spacecraft propulsive maneuver strategy used to achieve the desired trajectory while satisfying operational constraints The actual maneuvers executed and the resultant Phobos encounter conditions are presented

DILLON, J. W.

D019 Implementation of the DSN VLBI Correlator

J. C Peterson and J W. Dillon

The Deep Space Network Progress Report 42-50 January and February 1979, pp 226–236, April 15, 1979

For abstract, see Peterson, J C

DINER, D. J.

D020 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F W Taylor, D J Diner, L. S Elson, D J McCleese, J V Martonchik, J. Delderfield (University of Oxford, England), S P Bradley (University of Oxford, England), J T Schofield (University of Oxford, England), J C Gille (National Center for Atmospheric Research), and M. T Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F W

DIVITA, E.

D021 Space Augmentation of Military High-Level Waste Disposal

T. English, L Lees, and E Divita

JPL Publication 79-45, May 1, 1979

For abstract, see English, T.

DIVITA, E L.

D022 Evaluation of Radiation Interference in the Voyager Sun Sensor's Cadmium Sulfied Detector

T C Clarke and E L Divita

IEEE Trans Nucl Sci, Vol. NS-25, No 6, pp. 1324–1328, December 1978

For abstract, see Clarke, T C

DIVSALAR, D.

D023 Spectral Characteristics of Convolutionally Coded Digital Signals

D Divsalar and M K Simon

JPL Publication 79-93, August 1, 1979

The power spectral density of the output symbol sequence of a convolutional encoder is computed for two different input symbol stream source models, namely, an NRZ signaling format and a first order Markov source In the former, the two signaling states of the binary waveform are not necessarily assumed to occur with equal probability The effects of alternate symbol inversion on this spectrum are also considered The mathematical results are illustrated with many examples corresponding to optimal performance codes It is demonstrated that only for the case of a purely random input source (e g, NRZ data with equiprobable symbols), and a particular class of codes, is the output spectrum identical to the input spectrum except for a frequency scaling (expansion) by the reciprocal of the code rate. In all other cases, the output spectrum is sufficiently changed relative

to the input spectrum that the commonly quoted statement "a convolutional encoder produces a bandwidth expansion by a factor equal to the reciprocal of the code rate" must be exercised with care

DOMS, P. E

D024 Global Seasonal Variation of Water Vapor on Mars and the Implications for Permafrost

C B Farmer and P E Doms (University of California, Los Angeles)

J Geophys Res, Vol 84, No. B6, pp 2881–2888, June 10, 1979

For abstract, see Farmer, C B

DONNELLY, H.

D025 Multi-Mission Receiver (MMR)

H Donnelly and H Nishimura

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 75–81, August 15, 1979

An introduction to the Multi-Mission Receiver (MMR) is presented The MMR contains occultation receiver channels (OCC) and very long baseline interferometry (VLBI) channels The design considerations, performance, and implementation of the OCC channels are discussed The VLBI channels will be discussed in a subsequent report

D026 The Microprocessor-Based Synthesizer Controller

H Donnelly, M R Wick, R W Weller, G B Schaaf, B Barber, and M A Stern

The Deep Space Network Progress Report 42-54· September and October 1979, pp 92–103, December 15, 1979

The design and implementation plan of a new microprocessor-based controller for the Dana Digiphase Synthesizer is presented Improvements over the present controller, POCA, are discussed including greater operating capability, increased phase control accuracy and the addition of diagnostics

DOWDY, M

D027 Automotive Technology Projections

M Dowdy and A. Burke

Preprint 79-0021, SAE Congress & Exposition, Detroit, Mich , February 26–March 2, 1979

Results of an automotive technology assessment study are presented to provide a basis of comparison for vehicles with alternative power systems Factors considered include fuel economy, exhaust emissions, multifuel capability, advanced materials, and cost/manufacturability for both conventional and advanced alternative power systems

To insure valid comparisons of vehicles with alternative power systems, the concept of an Otto-Engine-Equivalent (OEE) vehicle is utilized Each engine type is sized to provide equivalent vehicle performance Fuel economy projections are made for each engine type considering both the legislated emissions standards (0 4 g/mi HC, 3 4 g/mi CO, 1 0 g/mi NO_x) and possible future emissions requirements (0 4 g/mi NO_x) The sensitivities of the fuel economy projections to factors such as engine torque boundary, rear axle ratio, performance criteria, and engine transient response are discussed

Using the OEE vehicle concept, projected fuel economies of both small and full-sized vehicles with Stirling engines are up to 40 percent better than baseline vehicles with conventional engines Vehicles with Brayton engines show up to a 30 percent better fuel economy than the baseline in full-sized vehicles, but offer little fuel economy advantage in small vehicles Advanced continuous combustion power systems (Brayton and Stirling) offer advantages over the baseline vehicles in the areas of exhaust emissions and multifuel capability, however, their initial costs are projected to be substantially higher

DOWLER, W. L

D028 Feasibility of Rocket Propellant Production on Mars

R L Ash, W L Dowler, and G Varsi

Acta Astronautica, Vol 5, pp. 705–724, 1978

For abstract, see Ash, R L

DOWNING, R. G.

D029 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured, 10 ohm-cm, 50 Micron Advanced OAST Solar Cells as a Function of Intensity, Temperature, and Irradiation

B. E. Anspaugh, R G Downing, T. F Miyahira, and R S Weiss

JPL Publication 78-15, Vol VI, June 15, 1979

For abstract, see Anspaugh, B E

D030 **Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab HEWAC BSF, Textured, 10 ohm-cm, 225 Micron Solar Cells as a Function of Intensity and Temperature**

B. E Anspaugh, D. M Beckert, R. G Downing, T F Miyahira, and R. S Weiss

JPL Publication 78-15, Vol VII, June 15, 1979

For abstract, see Anspaugh, B E

D031 **Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation**

B E Anspaugh, D M. Beckert, R G Downing, T. F Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol VIII, September 1, 1979

For abstract, see Anspaugh, B E

D032 **Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10-ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation**

B F Anspaugh, D M. Beckert, R G Downing, T F Miyahira, and R S Weiss

JPL Publication 78-15, Vol IX, September 15, 1979

For abstract, see Anspaugh, B F

D033 **Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10 ohm-cm, 300 Micron Cells as a Function of Intensity, Temperature and Irradiation**

B E Anspaugh, R G Downing, T F. Miyahira, and R S Weiss

JPL Publication 78-15, Vol X, October 1, 1979

For abstract, see Anspaugh, B E

D034 **Characterization of Solar Cells for Space Applications· Electrical Characteristics of 2 Ohm-cm, 228 Micron Wraparound Solar Cells as a Function of Intensity, Temperature, and Irradiation**

B. E. Anspaugh, D. M Beckert, R G Downing, and R. S. Weiss

JPL Publication 78-15, Vol XI, January 15, 1980

For abstract, see Anspaugh, B E

DOWNS, G .S.

D035 **Integrated Pulse Profiles and Mean Fluxes of 24 Pulsars at 2.388 Gigahertz**

G .S Downs

Astrophys J Suppl. Ser., Vol 40, pp 365–369, June 1979

The integrated pulse profiles presented here are the result of superposing nearly 10^6 pulses received and recorded between 1968 September and 1972 August These profiles compare well with profiles measured in later years at 2 7 GHz in all but one case (PSR 2111+46) The year-to-year stability of the integrated profiles is high Features of the pulsed emission in addition to the main pulse include the interpulse in PSR 0950+08 located 109 ms before the main pulse and containing 0 015 ± 0 0006 as much energy as the main pulse, the interpulse in PSR 1929+10 occurring 111 ms before the main pulse and containing 0.0034 ± 0 0004 as much energy as the main pulse, a broad base of emission in PSR 1911–04 covering 280 deg of pulse longitude, rising linearly to the main pulse and falling linearly after the pulse, a base in PSR 2217+47 covering 360 deg and having the form exp [-(t + 31 5/122], where t is in milliseconds The ratio of the energy in the base to that in the pulse is 0 98 for PSR 1911–04 and 1 5 for PSR 2217+47 All other features in all 24 pulsars are less than 1 2% of the peak flux in the main pulse

DUNNE, J. A.

D036 **Seasat Mission Overview**

G H Born, J. A. Dunne, and D. B Lame

Science, Vol 204, pp 1405–1406, June 29, 1979

For abstract, see Born, G H

DUXBURY, T. C.

D037 **Planetary Geodetic Control Using Satellite Imaging**

T C Duxbury

J Geophys Res, Vol. 84, No B3, pp 1125–1128, March 10, 1979

A new data type for planetary geodetic control using natural satellite imaging is presented Spacecraft images of natural satellites against the planet give a direct tie between inertial space and surface features surrounding the satellite image This technique is expected to offer a factor of 3–10 improvement in accuracy over present geodetic reduction for Mars A specific example using Viking imaging of Phobos against Mars is given

EDELSON, E.

E001 Potential for Cogeneration of Heat and Electricity in California Industry—Phase II: Final Report

H S Davis, E. Edelson, A K Kashani, and M. L. Slonski

JPL Publication 78-109, January 1, 1979

For abstract, see Davis, H S

EDELSON, R. E.

E002 An Observational Program to Search for Radio Signals From Extraterrestrial Intelligence Through the Use of Existing Facilities

R E Edelson

Acta Astronautica, Vol 6, pp 129–143, 1979

Approaches to the detection of radio signals from extraterrestrial intelligence (ETI) have, of necessity, circumscribed the vast parameter space which might be searched Uncertainties in location, frequency, modulation, and reasonable power flux density have drawn arguments for huge antennas and philosophical approaches to frequency selection Yet the observational limits within which ETI signals might await detection are largely undefined The state of the art has advanced so that observations with existing antennas, equipped with modern data processors, can define limits over very broad frequency ranges in reasonable observational times A modest program has been initiated to search for ETI signals from 1 to 25 GHz over 80% of the sky to flux levels from 10^{-19} to 10^{-23} W/m^2

E003 An Experiment Protocol for a Search for Radio Signals of Extraterrestrial Intelligent Origin in the Presence of Man-Made Radio Frequency Sources

R. E. Edelson

Acta Astronautica, Vol. 6, pp 145–162, 1979

The major difficulty encountered in the conduct of a comprehensive search for radio signals of extraterrestrial intelligent origin is the vast range of fundamental parameters that must be examined to make significant inroads on the plausible signal regime This problem is aggravated by the almost certain occurrence of mistaken detections caused by stochastic processes and by man-made radio frequency emissions Each such mistake, unless quickly and unambiguously characterized as a false alarm, will require repetitive observations during the conduct of the program This wasted time will, in effect, reduce the sensitivity achievable in a given search duration This paper examines the implications of false alarms on the search system design, performance, and application and, in particular, on the choice of the data-processing approach We show that, by an approach that limits the requirement for repeated observations, the degradation caused by false detections can be constrained to less than approximately 40%, whereas, without this restriction, the degradation might be severe By modeling the mistaken detections caused by man-made devices as a Poisson process, we can place an upper bound on the probability of false alarms as a function of the detection threshold and of the number of interferors in the hemisphere The understanding developed by these considerations suggests an experiment protocol consisting of a set of sequentially applied criteria to limit the range of parameters that need to be considered in declaring a false alarm, thus decreasing the time required to make this declaration and enhancing the performance of the search.

E004 Voyager Telecommunications. The Broadcast from Jupiter

R E Edelson, B. D. Madsen, E. K Davis, and G. W. Garrison

Science, Vol 204, pp 913–921, June 1, 1979

Sweeping past Jupiter, the Voyager I spacecraft presaged a new era in the exploration of the solar system Not since the TV return from Apollo had a spacecraft returned information of such volume and pictures of such startling clarity Yet this feat was accomplished from a distance 1770 times as great as that of the lunar adventure. The communication system responsible for this remarkable achievement is a compilation of elements ranging from tiny integrated circuits to enormous ground antennas This article seeks to describe the way in which data are returned from these fascinating, faraway bodies and to convey the excitement of the engineering work that supports our scientific endeavors

EL GABALAWI, N.

E005 A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules

E J Roschke, L Wen, H Steele, N El Gabalawi, and J Wang

JPL Publication 79-21, March 1, 1979

For abstract, see Roschke, E J.

E006 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T. Fujita, R Manvi, E J. Roschke, N El Gabalawi, G Herrera, T J. Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

EL-RAHEB, M.

E007 Homogeneous Vortex Model for Liquid Slosh in Spinning Spherical Tanks

M. El-Raheb and P. Wagner

JPL Publication 79-99, November 15, 1979

The problem of forced fluid sloshing in a partially filled spinning spherical tank is solved numerically using the finite element method The governing equations include Coriolis acceleration, empirical fluid damping and spatially homogeneous vorticity first introduced by Pfeiffer An exponential instability similar to flutter is detected in the present simulation for fill ratios below 50% This instability appears in the model as a result of the homogeneous vortex assumption since the free slosh equations are neutrally stable in the Liapunov sense

ELACHI, C.

E008 Discrimination of Geologic Units in Death Valley Using Dual Frequency and Polarization Imaging Radar Data

M Daily, C Elachi, T Farr, and G Schaber (U S Geological Survey)

Geophys, Res Lett, Vol 5, No 10, pp. 889–892, October 1978

For abstract, see Daily, M.

E009 Imaging Radar Observations of Askja Caldera, Iceland

M C. Malin, D. Evans, and C. Elachi

Geophys Res Lett, Vol 5, No 11, pp 931–934, November 1978

For abstract, see Malin, M. C

E010 Liquid Content of the Lower Clouds of Venus as Determined from Mariner 10 Radio Occultation

A J Kliore, C Elachi, I R Patel, and J. B. Cimino (California Institute of Technology)

Icarus, Vol 37, No. 1, pp 51–72, January 1979

For abstract, see Kliore, A J

E011 Wave Tilt Sounding of a Linearly Inhomogeneous Layered Half-Space

L Warne, D. Evans, and C Elachi

IEEE Trans. Anten Prop, Vol. AP-27, No. 3, pp 417–422, May 1979

For abstract, see Warne, L

E012 Precipitation on Venus Properties and Possibilities of Detection

J. B Cimino and C Elachi

J Atmos Sci, Vol 36, No 7, pp. 1168–1177, July 1979

For abstract, see Cimino, J B

E013 Mapping of Sea Ice and Measurement of Its Drift Using Aircraft Synthetic Aperture Radar Images

F. Leberl (Technical University, Graz, Austria), M. L Bryan, C Elachi, T Farr, and W Campbell (U S Geological Survey)

J Geophys Res, Vol 84, No C4, pp 1827–1835, April 20, 1979

For abstract, see Leberl, F

ELLEMAN, D. D.

E014 Drop Dynamics in Space

T. G Wang, M M Saffren, and D. D Elleman

Materials Sciences in Space with Application to Space Processing, AIAA, New York, pp. 151–172, 1977

For abstract, see Wang, T G

ELLIOTT, D. A.

E015 Recent Developments at JPL in the Application of Image Processing to Astronomy

J J Lorre, W D Benton, and D A Elliott

Proc SPIE, Vol 172, pp. 394–402, 1979

For abstract, see Lorre, J J

ELLIS, J.

E016 LS47′ A DSN Station Location Set Compatible With JPL Development Ephemeris DE108

J. Ellis

The Deep Space Network Progress Report 42-49 November and December 1978, pp 86–98, February 15, 1979

An updated DSN station location set, LS47, is presented which is compatible with JPL Development Ephemeris DE108. Analytic procedures for linearly correcting station spin axis and longitude estimates for an ephemeris update based on Brouwer-Clemence Set III parameters are briefly discussed The validity of this technique is demonstrated by a comparison of a linearly corrected

solution with one explicitly determined by reprocessing the data. A mission data base, including Viking 1 and 2 encounter data, is first used to obtain an updated DE96 compatible station location solution, LS46, which in turn is adjusted to form the DE108 solution, LS47 Improved station Z-heights are estimated by using available very long baseline interferometry (VLBI) data. Spin axis differences between LS46 and LS47 are relatively insignificant, however, the ephemeris change introduces a -0.8×10^{-5} degree rotation in the DE96 longitude ephemeris

ELSON, L. S

E017 A Diagnostic Model of the Mean Circulation of the Upper Atmosphere of Venus Using Remote Temperature Soundings

L. S Elson

Geophys Astrophys Fluid Dyn, Vol 10, pp 319–323, 1978

This work describes the development of a diagnostic model designed to deduce characteristics of the mean circulation of a portion of the upper atmosphere of Venus The model will use remotely sensed, global scale temperatures and solves momentum and mass flux equations The solutions are dependent on externally specified, and inexactly known parameters

E018 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F W. Taylor, D J. Diner, L S Elson, D. J McCleese, J V Martonchik, J Delderfield (University of Oxford, England), S. P Bradley (University of Oxford, England), J T Schofield (University of Oxford, England), J C Gille (National Center for Atmospheric Research), and M. T Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F W

ENGLISH, T.

E019 Space Augmentation of Military High-Level Waste Disposal

T English, L Lees, and E Divita

JPL Publication 79-45, May 1, 1979

This report summarizes the results of a research project focusing on the technological, environmental, and institutional limiting factors associated with space disposal of selected components of military high level waste The remaining components of the waste are assumed to be disposed of on Earth

ESCOBAL, P. R.

E020 Multibaseline. A Precision Ground Based Geodetic Measurement Technique

P. R Escobal

J. Astronaut Sci, Vol XXVI, No. 3, pp 235–256, July–September, 1978

A geometric measurement system called Multibaseline which is a fallout from recent space technology, is introduced The system can be used to determine three-dimensional interstation coordinates in areas of geodetic interest, e g , in earthquake hazard zones It is shown that station inplane coordinates can always be determined to subcentimeter accuracy using one- or two-color geodolites as the fundamental measuring devices For moderate topographic relief, about 75 meters, it is demonstrated that a two-color geodolite can be used to determine station out-of-plane coordinates to accuracies of one centimeter over baselines extending from 1 to 5 kilometers It is shown that in a given station constellation only one station needs to be substantially out of the plane in order to permit determination of the remaining near inplane coordinates Some preliminary numerical results are discussed and then a realistic simulation of the Palmdale, California geodimeter network is presented The equivalence between a static multilateration system and the multibaseline system is established For terrain possessed of virtually no topographic relief, i e , less than 75 meters in 10 km, the concept of hybrid multilateration is introduced for use in a backup system Finally a discussion on extending local networks to wider monitoring grids is presented and the conclusions reached herein are summarized The numerical results obtained in this paper are only indicative of the power of the multibaseline concept and serve only to illustrate the sensitivities which might be expected

ESHLEMAN, V. R.

E021 Radio Science with Voyager 1 at Jupiter. Preliminary Profiles of the Atmosphere and Ionosphere

V R Eshleman (Stanford University), G L Tyler (Stanford University), G E Wood, G F. Lindal, J. D. Anderson, G S Levy, and T. A Croft (SRI International)

Science, Vol 204, pp 976–978, June 1, 1979

A preliminary profile of the atmosphere of Jupiter in the South Equatorial Belt shows (1) the tropopause occurring

at a pressure level of 100 millibars and temperature of about 113 K, (ii) a higher warm inversion layer at about the 35-millibar level, and (iii) a lower-altitude constant lapse rate matching the adiabatic value of about 2 K per kilometer, with the temperature reaching 150 K at the 600-millibar level. Preliminary afternoon and predawn ionospheric profiles at 12 deg south latitude and near the equator, respectively, have topside plasma scale heights of 590 kilometers changing to 960 kilometers above an altitude of 3500 kilometers for the dayside, and about 960 kilometers at all measured heights above the peak for the nightside The higher value of scale height corresponds to a plasma temperature of 1100 K under the assumption of a plasma of protons and electrons in ambipolar diffusive equilibrium The peak electron concentration in the upper ionosphere is approximately 2×10^5 per cubic centimeter for the dayside and about a factor of 10 less for the nightside These peaks occur at altitudes of 1600 and 2300 kilometers, respectively Continuing analyses are expected to extend and refine these results, and to be used to investigate other regions and phenomena

ESKENAZI, R.

E022 Low-Level Processing for Real-Time Image Analysis

R Eskenazi and J M. Wilf

JPL Publication 79-79, September 1, 1979

This paper describes a system that detects object outlines in television images in real-time A high-speed pipeline processor transforms the raw image into an edge map and a microprocessor, which is integrated into the system, clusters the edges and represents them as chain codes Image statistics, useful for higher level tasks such as pattern recognition, are computed by the microprocessor Peak intensity and peak gradient values are extracted within a programmable window and are used for iris and focus control

The algorithms implemented in hardware and the pipeline processor architecture are described The strategy for partitioning functions in the pipeline was chosen to make the implementation modular The microprocessor interface allows flexible and adaptive control of the feature extraction process.

The software algorithms for clustering edge segments, creating chain codes, and computing image statistics are also discussed Finally, a strategy for real-time image analysis that uses this system is given.

E023 Robotic Vision

D. S. Williams, J. M Wilf, R T Cunningham, and R Eskenazi

Astronaut. Aeronaut, Vol 17, pp. 36–41, May 1979

For abstract, see Williams, D S

ESTABROOK, F. B.

E024 Interplanetary Phase Scintillation and the Search for Very Low Frequency Gravitational Radiation

J. W Armstrong, R Woo, and F. B. Estabrook

Astrophys J, Vol 230, pp. 570–574, June 1, 1979

For abstract, see Armstrong, J W.

E025 Application of DSN Spacecraft Tracking Technology to Experimental Gravitation

J D Anderson and F B Estabrook

J. Spacecraft Rockets, Vol 16, No 2, pp 120–125, March–April 1979

For abstract, see Anderson, J D

ETCHEGARAY-RAMIREZ, M. I.

E026 Thorium Concentrations in the Lunar Surface. II. Deconvolution Modeling and Its Application to the Regions of Aristarchus and Mare Smythii

E L Haines, M. I. Etchegaray-Ramirez, and A E. Metzger

Proc Lunar Planet Sci Conf 9th, pp 2985–3013, 1978

For abstract, see Haines, E L

EVANS, D

E027 Imaging Radar Observations of Askja Caldera, Iceland

M C Malin, D Evans, and C Elachi

Geophys Res Lett, Vol 5, No 11, pp 931–934, November 1978

For abstract, see Malin, M C

E028 Wave Tilt Sounding of a Linearly Inhomogeneous Layered Half-Space

L Warne, D Evans, and C Elachi

IEEE Trans Anten Prop, Vol. AP-27, No 3, pp 417–422, May 1979

For abstract, see Warne, L

EVANS, D. D.

E029 A Point Target Model for the Synthetic Aperture Radar Detection of Ships and Ice Conditions During a Swell

D D Evans

IEEE Trans Anten. Prop, Vol AP-27, No 1, pp. 30–34, January 1979

A running swell affects the synthetic aperture radar (SAR) imagery of ships, smaller icebergs, and other floating objects because the target's signal is no longer matched with the azimuth processor This effect is analyzed analytically and numerically for the case of conventional image processing

EVANS, R. H.

E030 DSN Ground Communications Facility

R. H. Evans

The Deep Space Network Progress Report 42-49. November and December 1978, pp 19–28, February 15, 1979

A functional description of the GCF and its relationships with other elements of the DSN and NASCOM is presented together with development objectives and goals and comments on implementation activities in support of flight projects

EWING, J.

E031 Performance Prediction Evaluation of Ceramic Materials in Point-Focusing Solar Receivers

J. Ewing and J. Zwissler

JPL Publication 79-58, June 1, 1979

A Performance Prediction Model was adapted to evaluate the use of ceramic materials in solar receivers for point-focusing distributed applications TPS system requirements were determined including the receiver operating environment (such as concentrator performance and environmental/natural occurrences) and system operating parameters for various engine types Preliminary receiver designs evolve from these system requirements Specific receiver designs evaluated in this report to determine material functional requirements include the NRL solchem converter/heat exchanger, MIT/LL ceramic dome, Black and Veatch/EPRI ceramic tube receiver, and the Sanders honeycomb matrix Brayton receiver

This report covers the first phase of a continuing task of evaluation and reporting on high temperature ceramics for solar thermal receiver applications Subsequent reports will develop the Performance Prediction Model in more detail and provide data on its use in the several high temperature receiver and reactor designs planned for or under development

Prepared for the U S Department of Energy, DOE/JPL-1060-23, Distribution Category UC-62

FAHNESTOCK, R. J.

F001 Radio Astronomy

R. J. Fahnestock and R. M Taylor

The Deep Space Network Progress Report 42-53 July and August 1979, pp 21–23, October 15, 1979

Since 1967 radio astronomers have used the Deep Space Network (DSN) 26- and 64-meter diameter antenna stations to investigate the Moon, planets, pulsars, and radio galaxies to study the effects of solar corona on radio signals, and to observe radio emissions from X-ray sources Very Long Baseline Interferometry (VLBI) techniques have been used for high-resolution studies of quasars, suspected black holes, and other radio sources The high-power transmitter capability of the Goldstone 64-meter antenna has been used for radar-ranging to the planets in support of various planetary space missions and for the study of comets and asteroids The overseas facilities in Spain and Australia have been used, on a noninterference basis with space mission operations, by host country radio astronomers The background for the DSN support, past performance, and current plans for continued support of these activities are discussed Various experiments of the past year are identified and summarized.

FANALE, R. P.

F002 Significance of Absorption Features in Io's IR Reflectance Spectrum

R P Fanale, R H Brown (University of Hawaii, Honolulu), D P. Cruikshank (University of Hawaii, Honolulu), and R N Clake (University of Hawaii, Honolulu)

Nature, Vol 280, No. 5725, pp 761– 763, August 30, 1979

Absorption features in Io's reflectance spectrum suggest that frozen SO_2 molecules are present on the surface of Io as free frost, this may have important implications for Io's atmosphere

FANELLI, N.

F003 Voyager Mission Support

N. Fanelli and H Nance

The Deep Space Network Progress Report 42-54 September and October 1979, pp 19–23, December 15, 1979

This is a continuation of the Deep Space Network report on tracking and data acquisition for Project Voyager. This report covers the postencounter period for Voyager 2 and the Saturn cruise period for Voyager 1, August-September 1979

FARMER, C. B.

F004 Global Seasonal Variation of Water Vapor on Mars and the Implications for Permafrost

C B. Farmer and P E Doms (University of California, Los Angeles)

J Geophys Res, Vol. 84, No B6, pp 2881–2888, June 10, 1979

Observations of the global distribution and seasonal variation of the Martian atmospheric water vapor have been made from the Viking orbiters for a continuous period covering a complete Martian year. The seasonal dependence of the latitude distribution of the column abundance of vapor is consistent with a model in which the vapor is in equilibrium with the regolith at polar and mid-latitudes The results are consistent with there being a permanent reservoir of water ice buried at a depth of 10 cm to 1 m at all latitudes poleward of 40 deg. The behavior of the vapor in the summer hemisphere suggests an annual net transport of the vapor phase from the southern to the northern hemisphere, with deposition of ice of thickness on the order of a few milligrams per square centimeter in the northern polar latitudes The hemispheric asymmetry is the result of the propagation of the global dust storms originating in the south

FARR, T.

F005 Discrimination of Geologic Units in Death Valley Using Dual Frequency and Polarization Imaging Radar Data

M. Daily, C. Elachi, T. Farr, and G Schaber (U S. Geological Survey)

Geophys, Res Lett, Vol 5, No 10, pp 889–892, October 1978

For abstract, see Daily, M

F006 Mapping of Sea Ice and Measurement of Its Drift Using Aircraft Synthetic Aperture Radar Images

F. Leberl (Technical University, Graz, Austria), M L Bryan, C Elachi, T Farr, and W Campbell (U S Geological Survey)

J Geophys. Res, Vol. 84, No C4, pp 1827–1835, April 20, 1979

For abstract, see Leberl, F

FEDORS, R F.

F007 Compatibility of Elastomers in Alternate Jet Fuels

S H. Kalfayan, R. F Fedors, and W. W Reilly

JPL Publication 79-28, June 1, 1979

For abstract, see Kalfayan, S H

F008 A Method of Estimating Self-Diffusion Coefficients in Liquids

R F. Fedors

AIChE J, Vol. 25, No 1, pp 200–201, January 1979

This paper discusses an equation suitable for estimating self-diffusion coefficients for a wide range of liquids, and demonstrates a test for that equation

F009 A Method to Estimate Critical Volumes

R F Fedors

AIChE J, Vol 25, No. 1, p. 202, January 1979

Among the important correlating parameters used for the estimation of thermodynamic properties of substances via the corresponding states-type-of approach is the volume at the critical temperature V_c. This paper discusses several proposed methods for estimating V_c while using only the chemical structure of a given substance as input

F010 Ultrathin Films as Photomechanical Transducers

M N Sarbolouki and R F Fedors

J Polym. Sci Polym. Lett, Vol 17, 629–633, 1979

For abstract, see Sarbolouki, M N

F011 A Universal Reduced Glass Transition Temperature for Liquids

R F. Fedors

J Polym Sci Polym Lett, Vol 17, pp 719–722, 1979

A glass transition temperature exhibited by low-molecular-weight liquids under certain conditions is discussed

F012 **A Relationship Between Maximum Packing of Particles and Particle Size**

R F Fedors

Powder Technol, Vol. 22, pp 71–76, 1979

Experimental data indicate that the volume fraction of particles in a packed bed (i e, maximum packing) depends on particle size One explanation for this is based on the idea that particle adhesion is the primary factor In this paper, however, it is shown that entrainment and immobilization of liquid by the particles can also account for the facts

FEINBERG, A

F013 **Decision Analysis for Evaluating and Ranking Small Solar Thermal Power System Technologies: A Brief Introduction to Multiattribute Decision Analysis**

A Feinberg and R F. Miles, Jr.

JPL Publication 79-12, Vol I, June 1, 1978

Multiattribute decision analysis is a methodology for providing information to a decision maker for comparing and selecting between complex alternatives This report presents a brief introduction to the principal concepts of the Keeney and Raiffa approach to multiattribute decision analysis The Report presents the concepts of decision alternatives, outcomes, objectives, attributes and their states, attribute utility functions, and the necessary independence properties for the attribute states to be aggregated into a numerical representation of the preferences of the decision maker for the outcomes and the decision alternatives

Prepared for the U S Department of Energy, DOE/JPL-1060-15, Distribution Category UC-62

FEINSTEIN, S. P.

F014 **Feasibility of Automated Dropsize Distributions From Holographic Data Using Digital Image Processing Techniques**

S. P. Feinstein and M A Girard

Preprint 79-0297, AIAA Seventeenth Aerosp Sci Meet, New Orleans, La., January 15–17, 1979

An automated technique for measuring particle diameters and their spatial coordinates from holographic reconstructions is being developed Preliminary tests on actual cold-flow holograms of impinging jets indicate that a suitable discriminant algorithm consists of a Fourier-Gaussian noise filter and a contour thresholding technique This process identifies circular as well as noncircular objects The desired objects (in this case, circular or possibly ellipsoidal) are then selected automatically from the above set and stored with their parametric representations From this data, dropsize distributions as a function of spatial coordinates can be generated and combustion effects due to hardware and/or physical variables studied

FELDMAN, W. C.

F015 **Relation Between Superheating and Superacceleration of Helium in the Solar Wind**

M M Neugebauer and W C Feldman (Los Alamos Scientific Laboratory)

Solar Phys, Vol 63, pp 201–205, 1979

For abstract, see Neugebauer, M M

FERBER, R

F016 **Silicon Materials Outlook Study for 1980–85 Calendar Years**

E. Costogue, R. Ferber, W Hasbach, R Pellin (Consultant, Charlotte, NC), and C Yaws (Consultant, Beaumont, TX)

JPL Publication 79-110, November 1, 1979

For abstract, see Costogue, E

FILLIUS, R. W.

F017 **Compression of Jupiter's Magnetosphere by the Solar Wind**

E. J Smith, R. W. Fillius (University of California, San Diego), and J H Wolfe (Ames Research Center)

J. Geophys Res, Vol 83, No A10, pp 4733–4742, October 1, 1978

For abstract, see Smith, E J.

FITZGERALD, D. J.

F018 **Plume Characterization of a One-Millipound Solid Teflon Pulsed Plasma Thruster**

L. C Pless, L K. Rudolph, and D. J Fitzgerald

JPL Publication 78-96, October 1978

For abstract, see Pless, L C

FLANAGAN, F. M.

F019 **Tracking and Data Systems Support for the Helios Project DSN Support of Project Helios May 1976 Through June 1977**

P S Goodwin, W. N. Jensen, and F M. Flanagan

Technical Memorandum 33-752, Vol III, March 1, 1979

For abstract, see Goodwin, P. S

FOUQUART, Y.

F020 Equivalent Widths in Spectropolarimetry Can Provide Additional Information on the Atmosphere of Venus

J. C Buriez (Université des Sciences et Techniques de Lille, France), Y. Fouquart (Université des Sciences et Techniques de Lille, France), and A L. Fymat

Astrophys J., Vol. 230, pp. 590–596, June 1, 1979

For abstract, see Buriez, J C

FRANCO, M. M.

F021 X-Band Atmospheric Noise Temperature Data and Statistics at Goldstone, DSS 13, 1977–1978

S D Slobin, K B. Wallace, M M Franco, E M Andres, and O V Hester

The Deep Space Network Progress Report 42-52. May and June 1979, pp 108–116, August 15, 1979

For abstract, see Slobin, S. D

FRANK, H. A.

F022 Primary Lithium Battery Technology and Its Application to NASA Missions

H A. Frank

JPL Publication 79-6, February 15, 1979

A description is given of the components, overall cell reactions, and performance characteristics (where established) of promising new ambient-temperature lithium primary systems based on the Li-V_2O_5, Li-SO_2, Li-CF, and Li-$SOCl_2$ couples

Developmental status of these systems is described in regard to availability and uncertainties in the areas of safety and selected performance characteristics

The new lithium systems are shown to exhibit three unique characteristics which make them more attractive than existing primary systems. First, they are lightweight and compact, and deliver up to 600 W-hr/Kg and 1 W-hr/cm^3, respectively Second, they have the potential of long active wet lives to periods of 10 years Third, they can operate over a broad temperature range of −54°C to 74°C By comparison, the best existing primary battery, the silver-zinc battery a) delivers about 25% of the above gravimetric and volumetric energy densities, b) exhibits a maximum wet life of about 1 to 2 years, and c) operates effectively over a temperature range of 10°C to 70°C

Studies have shown that use of lithium batteries would enhance a variety of missions and applications by decreasing power system weight and thereby increasing payload weight In addition, the lithium batteries could enhance cost effectiveness of the missions

FRAUTNICK, J. C.

F023 Orbit Analysis for SEASAT-A

E Cutting, G H. Born, and J. C Frautnick

J Astronaut Sci, Vol. XXVI, No 4, pp 315–342, October–December 1978

For abstract, see Cutting, E

FREILEY, A. J.

F024 Radio Frequency Performance of DSS 14 64-m Antenna at X-Band Using a Dual Hybrid Mode Feed

A J Freiley

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 140–132, October 15, 1979

The 64-meter antenna X-band at DSS 14 was evaluated to determine the performance with the new dual hybrid mode feed The peak system efficiency increased from 42 0 to 45 6 percent resulting in a 0 36 dB increase in antenna gain The new measured gain is 71 6 dB Antenna pointing, beamwidth, optimum subreflector focusing, and operating system temperature were unchanged from the previous feed Some evidence of antenna aging is apparent (from the 1973 measurements reported earlier) both in peak gain and in the pointing angle at which the peak occurs

FRENCH, J. R.

F025 New Concepts for Mercury Orbiter Missions

J. R French, J. R Stuart, and B Zeldin

J Spacecraft Rockets, Vol 16, No 1, pp 35–41, January–February 1979

The next logical step in the exploration of Mercury is an orbiter mission A conflict exists between those in the field of planetary sciences who desire a mission with a low circular orbit, and scientists in the fields and particles disciplines, who generally prefer a highly elliptical

spacecraft orbit The thermal environment imposed by the Sun and planet render the low orbit intolerable for spacecraft using previous thermal control methods A thermal control concept and a spacecraft mission concept have been developed which resolve these problems and promise a scientifically significant mission for the mid-1980s

FRENCH, K. R.

F026 Cooling Tower Water Conditioning Study

M. F Humphrey and K R French

JPL Publication 79-104, December 15, 1979

For abstract, see Humphrey, M F

FRIEDMAN, L.

F027 Plausible Inference: A Multi-Valued Logic for Problem Solving

L Friedman

JPL Publication 79-11, March 1, 1979

A new logic is developed which permits continuously variable strength of belief in the truth of assertions Four inference rules result, instead of the two of formal logic, with formal logic as a limiting case Quantification of belief is defined using the methods introduced by Shortliffe and Buchanan Propagation of belief to linked assertions results from dependency-based techniques of truth maintenance so that local consistency is achieved or contradiction discovered in problem solving Rules for combining, confirming, or disconfirming beliefs are given, and several heuristics are suggested that apply to revising already formed beliefs in the light of new evidence The strength of belief that results in such revisions based on conflicting evidence appears to be a highly subjective phenomenon Nevertheless, certain quantification rules appear to reflect an orderliness in the subjectivity Several examples of reasoning by Plausible Inference (PI) are given, including a legal example and one from robot learning Propagation of belief takes place in directions forbidden in formal logic and this results in conclusions becoming possible for a given set of assertions that are not reachable by formal logic

FUJITA, T.

F028 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T Fujita, R. Manvi, E J. Roschke, N. El Gabalawi, G Herrera, T. J. Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

Advanced technologies applicable to solar thermal electric power systems in the 1990–2000 time-frame are delineated for power applications that fulfill a wide spectrum of small power needs with primary emphasis on power ratings <10 MWe Techno-economic projections of power system characteristics (energy and capital costs as a function of capacity factor) are made based on development of identified promising technologies These projections are used as the basis for comparing technology development options and combinations of these options to determine developmental directions offering potential for significant improvements

The key characteristic of advanced technology systems is an efficient low-cost solar energy collection while achieving high temperatures for efficient energy conversion Two-axis tracking systems such as the central receiver or power tower concept and distributed parabolic dish receivers possess this characteristic For these two basic concepts, advanced technologies including, e g , conversion systems such as Stirling engines, Brayton/Rankine combined cycles and storage/transport concepts encompassing liquid metals, and reversible-reaction chemical systems are considered In addition to techno-economic aspects, technologies are also judged in terms of factors such as developmental risk, relative reliability, and probability of success

Improvements accruing to projected advanced technology systems are measured with respect to current (or pre-1985) steam-Rankine systems, as represented by the central receiver pilot plant being constructed near Barstow, California. These improvements, for both central receivers and parabolic dish systems, indicate that pursuit of advanced technology across a broad front can result in post-1985 solar thermal systems having the potential of approaching the goal of competitiveness with conventional power systems, i e , capital costs of $600 kWe and energy costs of 50 mills/kWe-hr (1977 dollars).

Prepared for the U S Department of Energy, DOE/JPL-1060-4, Distribution Category UC-62

F029 The Effects of Regional Insolation Differences Upon Advanced Solar Thermal Electric Power Plant Performance and Energy Costs

A. F Latta, J. M Bowyer, T. Fujita, and P H Richter

JPL Publication 79-39, March 15, 1979

For abstract, see Latta, A. F.

FYMAT, A L

F030 Analytical Inversions in Remote Sensing of Particle Size Distributions. 2. Angular and Spectral Scattering in Diffraction Approximations

A L Fymat

Appl Opt, Vol. 17, No. 11, pp. 1677–1678, June 1, 1978

Consideration is given to analytical inversions in the remote sensing of particle size distributions, noting multispectral extinctions in anomalous diffraction approximation and angular and spectral scattering in diffraction approximation A closed-form analytical inverse solution is derived in order to reconstruct the size distribution of atmospheric aerosols The anomalous diffraction approximation to Mie's solution is used to describe the particles Experimental data yield the geometrical area of aerosol polydispersion Size distribution is thus found from a set of multispectral extinction measurements In terms of the angular and spectral scattering of light in a narrow forward cone, it is shown that an analytical inverse solution may also be found for the Fraunhofer approximation to the Kirchhoff diffraction, and for an improved expression of this approximation due to Penndorf (1962) and Shifrin-Punina (1968)

F031 Determination of Moments of the Size Distribution Function in Scattering by Polydispersions: A Comment

A L. Fymat

Appl. Opt, Vol 17, No 22, pp 3516–3517, November 15,. 1978

This paper demonstrates that in the anomalous diffraction approximation which can adequately describe transparent particles it is only sufficient to extract the geometrical area of the polydispersion, and that this quantity (now presumed to be known) together with the experimental data can be inverted analytically to provide the unknown size distribution, without further knowledge of the particle number density

F032 Analytical Inversions in Remote Sensing of Particle Size Distributions. 3: Angular and Spectral Scattering in the Rayleigh-Gans-Born Approximation for Particles of Various Geometrical Shapes

A L. Fymat

Appl. Opt, Vol. 18, No. 1, pp 126–130, January 1, 1979

Analytical inverse formulas are provided for reconstructing the size distribution of particulates whose scattering patterns can be adequately described by the Rayleigh-Gans-Born (or Shifrin) approximation The formulas hold for arbitrary polarization states at incidence and scattering of light and for angular or spectral measurements The particle shapes considered are spheres, spherical shells, thin disks (which may be randomly oriented), and thin rods Circular cylinders and ellipsoids can also be encompassed by our formulas if these particles are described in terms of equivalent spheres having the same volume

F033 Equivalent Widths in Spectropolarimetry Can Provide Additional Information on the Atmosphere of Venus

J. C. Buriez (Université des Sciences et Techniques de Lille, France), Y Fouquart (Université des Sciences et Techniques de Lille, France), and A L Fymat

Astrophys J, Vol 230, pp 590–596, June 1, 1979

For abstract, see Buriez, J. C

GALE, G.

G001 Estimated Displacements for the VLBI Reference Point of the DSS 13 26-m Antenna

H McGinness, G Gale, and R Levy

The Deep Space Network Progress Report 42-50 January and February 1979, pp 36–51, April 15, 1979

For abstract, see McGinness, H

GALINDO-ISRAEL, V.

G002 Aperture Amplitude and Phase Control of Offset Dual Reflectors

V. Galindo-Israel, R Mittra (University of Illinois), and A G. Cha

IEEE Trans Anten. Prop, Vol AP-27, No 2, pp 154–164, March 1979

The dual-shaped reflector synthesis problem was first solved by Galindo and Kinber in the early 1950's for the circularly symmetric-shaped reflectors Given an arbitrary feed pattern, it was shown that the surfaces required to transform this feed pattern by geometrical optics into any specified phase and amplitude pattern in the specified output aperture are found by the integration of two simultaneous nonlinear *ordinary* differential equations For the offset noncoaxial geometry, however, it is shown that the equations found by this method are *partial* differential equations which, in general, do not form a *total* differential. Hence the exact solution to this problem is generally not possible It is also shown, however, that for many important problems the partial differential equations form a *nearly* total differential It thus

becomes possible to generate a smooth subreflector by integration of the differential equations and then synthesize a main reflector which gives an exact solution for the specified aperture phase distribution The resultant energy (or amplitude) distribution in the output aperture as well as the output aperture periphery are then approximately the specified values A representative group of important solutions are presented which illustrate the very good quality that frequently results by this synthesis method This includes high gain, low sidelobe, near-field Cassegrain, and different (f/D) ratio reflector systems

G003 An Efficient Technique for the Computation of Vector Secondary Patterns of Offset Paraboloid Reflectors

R. Mittra (University of Illinois), Y Rahmat-Samii, V Galindo-Israel, and R. Norman

IEEE Trans Anten Prop, Vol AP-27, No 3, pp 294–304, May 1979

For abstract, see Mittra, R.

GALITZEN, M. J.

G004 The Symbol Synchronizer Assembly

M J. Galitzen

The Deep Space Network Progress Report 42-50 January and February 1979, pp 237–242, April 15, 1979

The Symbol Synchronizer Assembly improvement effort is directed at three goals to increase the maintainability, operability and reliability within the analog-to-digital conversion portion of the SSA's phase lock loop and telemetry data extraction channels In achieving these goals we propose to replace obsolete, nonmaintainable and unreliable electronic and mechanical devices with readily available electronic equipment of modular solid state design

GAMMELL, P. M.

G005 Swept Frequency Ultrasonic Measurements of Tissue Characteristics

P. M Gammell, J. A Roseboro, R C Heyser, D. H Le Croissette, and R L Wilson (University of Southern California)

Proc Thirtieth Annu Conf on Eng in Med & Bio, Los Angeles, Calif, November 5–9, 1977, p 229

There is a considerable effort now being undertaken by a number of research teams to measure the ultrasonic properties of soft tissue This information is being sought in an endeavor to devise an instrument capable of distinguishing between normal and pathological tissue noninvasively This paper describes the work of one research team that is concentrating its efforts on measurements of the attenuation and velocity of ultrasound over 1 to 10 MHz.

G006 Wideband Transducer for Tissue Characterization

P. M Gammell and D. H. Le Croissette

Ultrasonics, Vol 16, No. 5, pp 233–234, September 1978

Measurement of the ultrasonic properties of tissues over the frequency range of 1 to 10 MHz has recently become an area of active interest The ultrasonic transducer is usually the limiting factor in the performance of the system in these measurements This paper discusses such transducers as used to measure the frequency dependence of attenuation of soft tissue

G007 Temperature and Frequency Dependence of Ultrasonic Attenuation in Selected Tissues

P. M Gammell, D H. Le Croissette, and R. C. Heyser

Ultrasound Med Biol, Vol 5, pp 269– 277, 1979

Ultrasonic attenuation over the frequency range of 1 5–10 MHz has been measured as a function of temperature for porcine liver, backfat, kidney and spleen as well as for a single specimen of human liver The attenuation in these excised specimens increases nearly linearly with frequency Over the temperature range of approximately 4°–37°C the attenuation decreases with increasing temperature for most soft tissue studied

GARBA, J. A.

G008 Voyager Design and Flight Loads Comparison

J C Chen, J. A Garba, and F D Day III (Wyle Laboratory)

J. Spacecraft Rockets, Vol 16, No 1, pp. 27–34, January–February 1979

For abstract, see Chen, J C

G009 Estimation of Payload Loads Using Rigid-Body Interface Accelerations

J C Chen, J A Garba, and B K. Wada

J. Spacecraft Rockets, Vol 16, No 2, pp 74–80, March–April 1979

For abstract, see Chen, J C

GARRISON, G. W.

G010 Voyager Telecommunications: The Broadcast from Jupiter

R E Edelson, B. D. Madsen, E. K Davis, and G W Garrison

Science, Vol. 204, pp 913–921, June 1, 1979

For abstract, see Edelson, R. E

GARY, B. L.

G011 Interpretation of Ground-Based Microwave Measurements of the Moon Using a Detailed Regolith Properties Model

B L. Gary and S J. Keihm (Lamont-Doherty Geological Observatory)

Proc Lunar Planet Sci. Conf. 9th, pp. 2885–2900, 1978

A detailed model for the regolith's thermophysical and microwave properties has been used for the interpretation of ground-based measurements of the moon's microwave brightness temperature variation with lunar phase and changes during eclipses The ground-based measurements consist of a distillation of the best previously published data, combined with some crucial new lunation variation observations at 2 8, 6.0 and 13 1 cm The many parameters in the regolith properties model were assigned values based on a careful review of Apollo *in situ* and laboratory sample measurements of thermophysical and electrical properties It is noteworthy that these parameter values provide excellent agreement with both the lunation and eclipse data in the 1 mm to 3 cm wavelength region In the 3 to 13 cm region, however, an unexpected difference exists between the predicted and observed microwave lunation variations, in the sense that the regolith appears to contain an extra component of loss for the propagation of microwaves at these longer wavelengths It is our interpretation that we have detected the presence of a wavelength-dependent component of scattering This is the first identification of scattering using passive microwave data The scattering could be due to the stratification of dielectric properties, the presence of buried rock chips, or an effect related to the monotonic rise of dielectric constant with depth Future studies are needed to investigate the relative importance of these 3 scattering mechanisms

GATZ, E. C.

G012 DSN Telemetry System Mark III-77

E. C. Gatz

The Deep Space Network Progress Report 42-49: November and December 1978, pp 4–10, February 15, 1979

This article provides a description of the DSN Telemetry System, Mark III-77, and the recent improvements Telemetry functions and performance are identified

GAUSE, K. A.

G013 Solar Mesosphere Explorer Mission

J. R Stuart and K A Gause (University of Colorado)

Preprint 79-0054, AIAA Seventeenth Aerosp. Sci Meet , New Orleans, La , January 15–17, 1979

For abstract, see Stuart, J R

GILLE, J. C.

G014 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W Taylor, D. J. Diner, L. S. Elson, D J. McCleese, J. V. Martonchik, J. Delderfield (University of Oxford, England), S P. Bradley (University of Oxford, England), J. T Schofield (University of Oxford, England), J. C. Gille (National Center for Atmospheric Research), and M T. Coffey (National Center for Atmospheric Research)

Science, Vol. 205, pp: 65–67, July 6, 1979

For abstract, see Taylor, F W

GILLETTE, R L

G015 Viking Continuation Mission Support

R L Gillette

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 14–18, June 15, 1979

This report covers the period from 1 September 1978 through 31 March 1979 It reports on DSN support of Viking Spacecraft activities during the period and continues reporting on DSN Viking Command and Tracking support

GILMAN, D.

G016 The Galactic Gamma-Ray Flux in the 0.06–5 MeV Range

D Gilman, A E Metzger, R H Parker, and J I Trombka (Goddard Space Flight Center)

Astrophys J, Vol. 229, pp 753–761, April 15, 1979

By using the Apollo 16 spacecraft as an occulter, the Apollo gamma-ray spectrometer (AGRS) obtained information on the spectrum and angular distribution of flux from the galactic plane. The energy range of observation was 60 keV to 5 MeV The results show emission from the Crab nebula, Cyg X-1, and in the galactic plane extending ±60 deg in galactic longitude about the galactic center. Taken with observation of Haymes *et al.*, Wheaton, and Imhof and Nakano, the spectrum of galactic emission near 1 MeV over this range of longitudes is in agreement with hard X-ray observations of the galactic central regions, suggesting that an ensemble of point sources is responsible A simple power-law connection between the hard X-ray range and the 100 MeV range is not permitted Apollo 16 upper limits to the cosmic 4 4 MeV line flux imply that the ratio of line strength to continuum emission for the region observed by Haymes *et al* is higher than the galactic average

GIOVAN, M.

G017 Evaluation of Cellular Glasses for Solar Mirror Panel Applications

M. Giovan and M Adams

JPL Publication 79-61, June 15, 1979

An analytic technique is developed to compare the structural and environmental performance of various materials considered for backing of second surface glass solar mirrors Metals, ceramics, dense molded plastics, foamed plastics, forest products, and plastic laminates are surveyed. Cellular glass is determined to be a prime candidate due to its low cost, high stiffness-to-weight ratio, thermal expansion match to mirror glass, evident minimal environmental impact, and chemical and dimensional stability under conditions of use While applications could employ this material as a foam core or compressive member of a composite material system, the present analysis addresses the bulk material only, allowing a basis for simple extrapolations

The current state of the art and anticipated developments in cellular glass technology are discussed Material properties are correlated to design requirements using a Weibull weakest link statistical method appropriate for describing the behavior of such brittle materials A mathematical model is presented which suggests a design approach which allows minimization of life cycle cost, given adequate information for a specific application, this would permit high confidence estimates of the cost/performance factor

A mechanical and environmental testing program is outlined, designed to provide a material property basis for development of cellular glass hardware, together with a methodology for collecting the lifetime predictive data required by the mathematical treatment provided herein

Preliminary material property data for measurements is given Microstructure of several cellular materials is shown, and sensitivity of cellular glass to freeze-thaw degradation and to slow crack growth is discussed The effect of surface coating is addressed Conventional manufacturing refinements are considered which, while not generally applied as yet to cellular glass, nevertheless lend themselves readily to this material They are tentatively seen as promising to answer design needs even using present cellular glass chemistry, for a high performance, low environmental impact, medium cost solar mirror system

Prepared for the U.S Department of Energy, DOE/JPL-1060-24, Distribution Category UC-62

GIRARD, M. A.

G018 Feasibility of Automated Dropsize Distributions From Holographic Data Using Digital Image Processing Techniques

S. P. Feinstein and M. A Girard

Preprint 79-0297, AIAA Seventeenth Aerosp. Sci. Meet, New Orleans, La, January 15–17, 1979

For abstract, see Feinstein, S P.

GOLDFINGER, A.

G019 X-3060 Klystron Design Improvement Program Status

A. Goldfinger (Varian Associates, Inc.) and M A Gregg

The Deep Space Network Progress Report 42-50. January and February 1979, pp 196–205, April 15, 1979

The X-3060 klystron, a 100 kW continuous wave amplifier klystron, was introduced in the DSN in 1965 Questions have arisen since its introduction regarding its field performance record but its operational performance has been difficult to assess An early design defect was corrected in 1974 by rebuilding all tubes with an improved potted heater design and only one failure has been recorded since that time However, due to early "start up" failures, age of the present units, and efforts to establish the most reliable performance possible, a study program was begun to evaluate the klystron design This article describes the results of Phase I (Study Definition) and Phase II (Design Improvement) of a four-phase program Phase I revealed certain weaknesses and design features that conflict with ultrareliable klystron performance. Phase II has produced a new paper design that over-

comes the deficiencies and unreliable features shown by the Phase I effort

GOLDSMITH, J. V.

G020 LSA Project Technology Development Update

J. V Goldsmith and D B Bickler

JPL Publication 79-26, August 30, 1978

This document presents copies of the viewgraphs and a condensation of the comments by John V Goldsmith and Donald B Bickler of the LSA Project at its 10th Project Integration Meeting, August 16 and 17, 1978, at Caltech University, Pasadena, California. Their presentations focus on the state of the technology aimed at achieving the $500/kW goal by 1986

Prepared for the U S Department of Energy, DOE/JPL-1012-7, Distribution Category UC-63b

GOLDSTEIN, B. E.

G021 A Model of the Variability of the Venus Ionopause Altitude

R S Wolff, B E Goldstein, and S. Kumar

Geophys Res. Lett, Vol 6, No. 5, pp. 353–356, May 1979

For abstract, see Wolff, R S

G022 Moon-Magnetosphere Interaction and Estimates of Possible Lunar Core Size

B. E Goldstein

J Geophys. Res., Vol. 83, No. A11, pp 5269–5275, November 1, 1978

Measurements of the magnetic field induced in the moon while the moon is in the earth's geomagnetic tail lobes have been used to estimate lunar interior magnetic permeability and electrical conductivity and, in particular, to determine constraints on the size of a possible lunar core. We show here that the core size estimates are negligibly affected by currents due to a directed plasma flux toward the moon Specifically, a theory for the compression of an induced lunar dipole by an incoming sub-Alfvenic flux of cold plasma is presented for the time independent case where the external magnetic field, induced dipole moment, and plasma velocity vector are all aligned When the incoming flow travels at 83% of the Alfven speed, the change in the global dipole moment is no more than 5%, while higher order moments increase from zero to 10% of the amplitude of the dipole Consequently, at very long time periods, effects due to the inertia of an incoming flow of cold plasma can be ignored if care is taken to exclude periods of unusually high plasma density from the data base used for obtaining lunar magnetic permeability and core size estimates Additionally, we show how a recently derived theory for time dependent fluctuations in a stationary plasma can be modified to include the effects of incoming plasma flux, and we discuss how this theory is related to the approximation that we have used

G023 Lunar Interaction With the Solar Wind Effects on Lunar Electrical Conductivity Estimates

B. E. Goldstein

Proc Lunar Planet Sci Conf 9th, pp 3093–3112, 1978

The lunar electromagnetic response measured at very low frequencies while the moon is in the solar wind has been used to determine interior electrical conductivity at great depth and to obtain limits on the size of possible lunar core Recently, observational evidence has been presented for enhanced magnetic field fluctuations in the East-West direction for low frequencies at the Apollo 12 site, and it has been suggested that the enhanced fields could be explained by diamagnetic fringing of fields from the tail cavity We develop a theory in which compression of the magnetic field in the lunar tail cavity caused by inflowing plasma at the lunar limbs and in the lunar wake bends the magnetic field in the lunar interior and thereby alters the tangential component of magnetic field observed on the dayside surface This theory, which imposes the boundary condition that the induced fields cannot penetrate into the upstream solar wind, strongly indicates that the proposed cavity fringing can not explain the enhanced East-West fluctuations Predicted fringing fields in the North-South direction are large enough to cause a very serious overestimate of lunar core size as estimated from solar wind data In fact, a direct application of the theory to the data would indicate that no core of any significant size could be present However, there are serious sources of systematic error observed in the data that have not yet been satisfactorily explained (East-West enhancement, anomalies in certain data sets) or have not been taken into account in the analysis (plasma compression of local magnetic fields) Such uncertainties suggest that any conclusion as to lunar electrical properties at depths greater than 1000 to 1200 km are at present unjustified We proposed that the East-West fluctuations might be due to diamagnetic currents caused by lunar surface photoelectrons in the lunar terminator region Ways to determine and eliminate the sources of error are mentioned The paper is organized so that those interested only in lunar interior electrical conductivity (as opposed to plasma physics) need read only brief portions

GOLDSTEIN, R.

G024 Fiber Optic Rotation Sensor (FORS) Laboratory Performance Evaluation

R Goldstein and W C Goss

Opt Eng, Vol. 18, No 4, pp 381–383, July–August 1979

A single axis rotation sensor, utilizing a 200 m single mode optical fiber in a 30 cm diameter coil has been constructed and tested in the laboratory A HeNe laser is the light source for the Sagnac interferometer-mode sensor The outputs of Si detectors viewing two complementary interference patterns are electronically differenced to obtain a rotation dependent signal Linear response over a rotation rate range of about 10^{-4} to 10^{-1} rad s^{-1} was obtained

GOLDSTEIN, R. B.

G025 The Viking Relativity Experiment

I. I. Shapiro (Massachusetts Institute of Technology), R D Reasenberg (Massachusetts Institute of Technology), P E MacNeil (Massachusetts Institute of Technology), R. B Goldstein (Massachusetts Institute of Technology), J. P Brenkle, D L Cain, T Komarek A I. Zygielbaum, W F. Cuddihy (Langley Research Center), and W H Michael, Jr. (Langley Research Center)

J Geophys. Res, Vol. 82, No 28, pp. 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

GONZALEZ, F. I.

G026 Seasat Synthetic Aperture Radar· Ocean Wave Detection Capabilities

F. I. Gonzalez (Pacific Marine Environmental Laboratory), R. C. Beal (Johns Hopkins University), W E Brown, P. S DeLeonibus (National Environmental Satellite Service), J. W. Sherman III (National Environmental Satellite Service), J F. R Gower (Institute of Ocean Sciences, Canada), D Lichy (U S Army Corps of Engineers), D. B. Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R. A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

A preliminary assessment has been made of the capability of the Seasat synthetic aperture radar to detect ocean waves Comparison with surface and aircraft measurements from five passes of the satellite over the Gulf of Alaska indicates agreement to within about ±15 percent in wavelength and about ±25 deg in wave direction These results apply to waves 100 to 250 meters in length, propagating in a direction predominantly across the satellite track, in sea states with significant wave height ($H_{1/3}$) in a range of 2 to 3 5 meters .

GOODWIN, P. S.

G027 Tracking and Data Systems Support for the Helios Project. DSN Support of Project Helios May 1976 Through June 1977

P S Goodwin, W. N. Jensen, and F M. Flanagan

Technical Memorandum 33-752, Vol. III, March 1, 1979

This volume of Technical Memorandum 33-752 describes the Deep Space Network's support of the extended missions of Helios-1 and Helios-2 during the interval from May 1976 through June 1977. Spacecraft extended mission coverage does not generally carry a high priority, but Helios has been fortunate in that a combination of separated viewperiods and unique utilization of the STDN Goldstone antenna have provided a considerable amount of additional science data return: particularly at key times such a perihelion and/or solar occultation

GOSS, W. C.

G028 Fiber Optic Rotation Sensor (FORS) Laboratory Performance Evaluation

R. Goldstein and W C Goss

Opt Eng., Vol. 18, No 4, pp 381–383, July–August 1979

For abstract, see Goldstein, R.

GOWER, J. F. R.

G029 Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities

F. I. Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W E Brown, P. S. DeLeonibus (National Environmental Satellite Service), J. W. Sherman III (National Environmental Satellite Service), J F. R Gower (Institute of Ocean Sciences, Canada), D. Lichy (U S Army Corps of Engineers), D B. Ross (Sea-Air Interaction Laboratory), C. L Rufenach (Wave Propagation Laboratory), and R. A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

GREEN, W. B.

G030 Color Enhancement of Landsat Agricultural Imagery. Final Report for the JPL LACIE Image Processing Support Task

D. P. Madura, J. M. Soha, W. B. Green, D. B Wherry, and S D Lewis

JPL Publication 78-102, December 15, 1978

For abstract, see Madura, D P

G031 Digital Techniques for Processing Landsat Imagery

W B Green

Information Technology 78 Proc 3rd Jerusalem Conf. Inform Tech., Jerusalem, Israel, August 6–9, 1978, pp 605–621

The Landsat satellites currently provide repetitive multispectral imagery of the Earth's surface Images in hard copy and digital formats are used for a wide variety of applications, including agriculture, geology, land use analyses, and others This paper describes the basic digital techniques used to process Landsat imagery, and the VICAR Image processing software system that is available to the user community through the COSMIC computer program distribution center sponsored by NASA

. There are two basic types of computer image processing Subjective processing is performed to improve the display of information for the human observer Examples of subjective processing include contrast enhancement, pseudocolor display and band ratioing Quantitative processing is based on predefined mathematical models, examples include classification based on multispectral signatures of different areas within a given scene, and geometric transformation of imagery into standard mapping projections

This paper describes a variety of subjective and quantitative techniques routinely used in processing Landsat imagery

GREENBERGER, H. J.

G032 Approximate Maximum Likelihood Decoding of Block Codes

H J. Greenberger

JPL Publication 78-107, February 15, 1979

Approximate maximum likelihood decoding algorithms, based upon selecting a small set of candidate code words with the aid of the estimated probability of error of each received symbol, can give performance close to optimum with a reasonable amount of computation By combining the best features of various algorithms and taking care to perform each step as efficiently as possible, a decoding scheme was developed which can decode codes which have better performance than those in use today and yet not require an unreasonable amount of computation The discussion of the details and tradeoffs of presently known efficient optimum and near optimum decoding algorithms leads, naturally, to the one which embodies the best features of all of them

GREENBERGER, J. J.

G033 An Efficient Soft Decision Decoding Algorithm for Block Codes

J. J Greenberger

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 106–109, April 15, 1979

Nonoptimum decoding algorithms, which select a small set of candidate code words to be correlated with the received vector, can approach the performance of maximum likelihood decoders even at low signal-to-noise ratios A decoding scheme based upon the best features of previously known algorithms of this type has been developed that can decode codes which have better performance than those in use today and yet not require an unreasonable amount of computation

GREENHALL, C. A.

G034 Some Effects of Quantization on a Noiseless Phase-Locked Loop

C A Greenhall

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 58–66, June 15, 1979

If the VCO of a phase-locked receiver is to be replaced by a digitally programmed synthesizer, the phase error signal must be sampled and quantized. We investigate effects of quantizing after the loop filter (frequency quantization) or before (phase error quantization) Constant Doppler or Doppler rate noiseless inputs are assumed The main result gives the phase jitter due to frequency quantization for a Doppler-rate input By itself, however, frequency quantization is impractical because it makes the loop dynamic range too small

G035 Quick-Look Decoding Schemes for DSN Convolutional Codes

C A Greenhall and R L Miller

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 162–166, June 15, 1979

The Galileo project will be tracked both by the Tracking and Data Relay Satellite System (TDRSS) and the DSN, whose (7, 1/2) convolutional codes differ in the order of the two symbols in each pair. To resolve this problem, we propose quick-look decoding of the TDRSS data Quick-look decoding schemes requiring only simple shift registers are given for the DSN (7, 1/2) and (7, 1/3) convolutional codes These schemes can be used when the communication channel is known to be virtually error free. The schemes not only decode the data, but can also detect symbol errors and the lack of node synchronization.

G036 Internal Noise of a Phase-Locked Receiver With a Loop-Controlled Synthesizer

C A Greenhall

The Deep Space Network Progress Report 42-52. May and June 1979, pp. 41–50, August 15, 1979

We propose a local oscillator design that uses a digitally programmed frequency synthesizer instead of an analog VCO The integral of the synthesizer input, the "digital phase," is a convenient measure of integrated doppler We examine the internal noise of such a receiver At high carrier margin, the local oscillator phase noise equals that of the Block IV receiver, about 2 deg rms at S-band, whereas the digital phase noise is about 0 5 deg rms

G037 Design of a Quick-Look Decoder for the DSN (7,1/2) Convolutional Code

C. A Greenhall and R L Miller

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 93–101, October 15, 1979

In a previous article, the authors showed that the DSN (7,1/2) convolutional code could be decoded by a simple "quick-look" method that requires only two shift registers of length 7 for the incoming hard-quantized channel symbols Such a decoder is being developed for Project Galileo to circumvent an incompatibility between the DSN and the Tracking and Data Relay Staellite System (TDRSS), whose versions of the (7,1/2) code differ in the order of the symbols in each pair. Because signal-to-noise ratios are high during the near-Earth phase of the Galileo mission, quick-look decoding is feasible The present article derives design parameters and performance figures for the three functions of the decoder acquisition of node synchronization, generation of the decoded bits, and estimation of channel quality

GREGG, M. A.

G038 X-3060 Klystron Design Improvement Program Status

A Goldfinger (Varian Associates, Inc.) and M. A. Gregg

The Deep Space Network Progress Report 42-50. January and February 1979, pp 196–205, April 15, 1979

For abstract, see Goldfinger, A

GRIFFITH, J. S.

G039 Environmental Testing of Block II Solar Cell Modules

J. S Griffith

JPL Publication 79-5, January 1, 1979

The results of environmental tests of Block II solar modules are described Block II was the second large scale procurement of silicon solar cell modules made by the JPL Low-cost Solar Array Project with deliveries in 1977 and early 1978 The results of testing showed that the Block II modules were greatly improved over Block I modules In several cases it was shown that design improvements were needed to reduce environmental test degradation. These improvements were incorporated during this production run

Prepared for the U S Department of Energy, DOE/JPL-1012-79/7, Distribution Category UC-63b

G040 Environmental Testing of Block III Solar Cell Modules, Part I: Qualification Testing of Standard Production Modules

J S Griffith

JPL Publication 79-96, September 1, 1979

This report describes the results of qualification tests of Block III solar modules Block III was the third large-scale procurement of silicon solar cell modules made by the JPL Low-cost Solar Array Project, the qualification modules were delivered in 1978 Block III modules continue to show improvements over Block I and Block II modules Cell cracking and delamination are less prevalent, and interconnect problems and electrical degradation from environmental testing are now rare

Prepared for the U S Department of Energy, DOE/JPL-1012-30, Distribution Category UC-63b

GRISWOLD, T. W.

G041 Test Chips in Reliability Assurance

T W. Griswold and J Maserjian

Digest of Papers 1978 Government Microcircuit Appl Conf, Monterey, Calif, November 14–16, 1978, pp. 398–401

Test chips have been used since the beginning of integrated-circuit technology for development and maintenance of processes and for tuning of device parameters, but they are not used in routine procurement procedures to any significant extent. This paper discusses the development of routine procedures for the use of test chips in formal reliability assurance procedures, and the possibilities and problems involved in an arms-length evaluation of a production process, with no in-plant monitoring and with no special procedures imposed on the factory. Also included are preliminary figures and their interpretation of a limited test-chip evaluation of an Air Force Materials Laboratory/RCA program for megarad-hard metal gate CMOS

G042 Test Chips in LSI Reliability Assurance

T W Griswold

Reliability Phys 1978 16th Annu Proc, San Diego, Calif, April 18–20, 1978, p 88

This paper discusses the use of test chips in the reliability evaluation of LSI circuits

GRUNTHANER, F. J.

G043 Experimental Observations of the Chemistry of the SiO_2/Si Interface

F. J. Grunthaner and J. Maserjian

IEEE Trans. Nucl. Sci, Vol NS-24, No. 6, pp. 2108–2112, December 1977

Changes in silicon surface preparation prior to thermal oxidation are shown to leave a signature by altering the final SiO_2/Si interface structure Surface analytical techniques, including XPS, static SIMS, ion milling, and newly developed wet-chemical profiling procedures are used to obtain detailed information on the chemical structure of the interface The oxides are shown to be essentially SiO_2 down to a narrow transitional interface layer (3–7 Å) A number of discrete chemical species are observed in this interface layer, including different silicon bonds (e g, C–, OH–, H–) and a range of oxidation states of silicon (0 → +4) The effect of surface preparation and the observed chemical species are correlated with oxide growth rate, surface-state density, and flatband shifts after irradiation

G044 Chemical Structure of the Transitional Region of the SiO_2/Si Interface

F. J Grunthaner and J. Maserjian

Physics of SiO_2 and Its Interfaces· Proc Int Top Conf Phys SiO_2 & Its Interfaces, Yorktown Heights, N Y, March 22–24, 1978, pp. 389–395

XPS and chemical depth profiling are used to determine the chemical structure of the SiO_2/Si interface The transitional layer is approximately one monolayer thick and consists of Si(I), Si(II), and Si(III) states A strained region of SiO_2 exists near the interface (10–40 Å thick) and can be modeled by a distribution of 3, 5, and 7 membered tetrahedral rings while the bulk is best modeled by 6, 4, and 8 membered rings Theory and experiment are correlated to develop this model structure based on the local chemical environment

G045 High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure: Application to Amorphous SiO_2 and the Si-SiO_2 Interface

F J Grunthaner, P J Grunthaner, R P Vasquez, B. F Lewis, J. Maserjian, and A Madhukar (University of Southern California)

Phys Rev Lett, Vol 43, No 22, pp. 1683–1686, November 26, 1979

The chemical structure of thin SiO_2 films and SiO_2-Si interfaces has been investigated using high-resolution X-ray photoelectron spectroscopy. The data are consistent with a continuous random network of four-, six-, seven-, and eight-member rings of SiO_4 tetrahedra joined together by bridging oxygens This distribution changes substantially within 30 Å of the SiO_2-Si interface The near-interface region is comprised of Si_2O_3, SiO, and Si_2O This structure is interpreted by means of a structure-induced–charge-transfer model

GRUNTHANER, P. J

G046 High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure: Application to Amorphous SiO_2 and the Si-SiO_2 Interface

F J Grunthaner, P J Grunthaner, R P. Vasquez, B F. Lewis, J Maserjian, and A Madhukar (University of Southern California)

Phys Rev Lett, Vol. 43, No 22, pp 1683–1686, November 26, 1979

For abstract, see Grunthaner, F J

GUENTHER, M. E.

G047 Experience with Fluorine and Its Safe use as a Propellant

D. L Bond, M. E. Guenther, L D Stimpson, L R Toth, and D L. Young

JPL Publication 79-64, June 30, 1979

For abstract, see Bond, D L

GUINNESS, E. A.

G048 One Mars Year. Viking Lander Imaging Observations

K L Jones (Planetary Research, Inc), R. E Arvidson (Washington University), E A Guinness (Washington University), S L Bragg (Washington University), S D Wall (Langley Research Center), C. E. Carlston (Martin Marietta Corporation), and D. G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

For abstract, see Jones, K L

GULKIS, S.

G049 Pattern Measurements of a Low-Sidelobe Horn Antenna

M A Janssen, S M Bednarczyk, S Gulkis, H W Marlin, and G F Smoot (University of California, Berkeley)

IEEE Trans Anten Prop, Vol AP-27, No. 4, pp 551–555, July 1979

For abstract, see Janssen, M A

GUPTA, A.

G050 Effects of Space Environment on Composites: An Analytical Study of Critical Experimental Parameters

A Gupta, W. F Carroll, and J Moacanin

JPL Publication 79-47, July 1, 1979

Uncertainty in the effect of space radiation on polymer matrix composites is a key obstacle to the cost-effective design and reliability of future large space vehicles Development of fundamental understanding and experimental data necessary to overcome this obstacle will require a comprehensive experimental program and may require major expenditures for fabrication and/or modification of test facilities

Laboratory duplication of the space environment within reasonable cost and time constraints is impractical Hence, space simulation "compromises" must be made in developing test facilities and optimized test strategies But the effect of the compromises must be accounted for in a quantifiable manner in order to achieve valid accelerations and/or extrapolations of laboratory data.

A generalized methodology, developed and currently in use at JPL, was used to develop an analytical model for effects of high-energy electrons as well as for interactions between electron and ultraviolet (UV) effects Chemical kinetics concepts were applied in defining quantifiable parameters, the need for determining short-lived transient species and their concentration was demonstrated Certain general conclusions regarding test facility requirements and testing strategy follow

The results demonstrate a systematic and cost-effective means of addressing the issues and show qualitative, and in some cases, quantitative, applicable relationships between space radiation and simulation parameters An equally important result is identification of critical initial experiments necessary to further clarify the relationships

G051 Reactor for Simulation and Acceleration of Solar Ultraviolet Damage

E Laue and A Gupta

JPL Publication 79-92, September 21, 1979

For abstract, see Laue, E

G052 Solid State Photochemistry of Polycarbonates

A Gupta, A Rembaum, and J Moacanin

Macromolecules, Vol 11, pp 1285–1288, November–December 1978

The mechanism and the quantum yield of the photochemical Fries rearrangement of *Lexan* in the solid state is markedly different from that in other media In the homogeneous amorphous phase it is a concerted process proceeding either from the $\pi^* \leftarrow n$ singlet, in which case it must be subjected to considerable self-quenching, or from a triplet The rate of chain scission as a function of

irradiation period was measured and a mechanism was proposed for energy transfer processes

HAINES, E. L.

H001 Thorium Concentrations in the Lunar Surface. II: Deconvolution Modeling and Its Application to the Regions of Aristarchus and Mare Smythii

E L. Haines, M. I Etchegaray-Ramirez, and A E. Metzger

Proc. Lunar Planet. Sci Conf 9th, pp 2985–3013, 1978

The broad angular response of detection which characterized the Apollo gamma-ray spectrometer resulted in a loss of spatial resolution and some of the contrast in determining surface concentrations within lunar regions small compared to the field of view A deconvolution technique has been developed which removes much of this instrumental effect, thereby improving both spatial resolution and accuracy at the cost of a loss in precision.

Geometric models of regional thorium concentration are convoluted through the response function of the instrument to yield a predicted distribution which is compared with the observed data field for quality of fit Application to areas which include Aristarchus and Mare Smythii confirm some geologic relationships and fail to support others The level of 13 ppm found at the Aristarchus ejecta blanket is evidence for medium-K Fra Mauro basalt as a major rock component in the crust under Oceanus Procellarum

Starting with the results of modeling the Mare Smythii region, the predominance of mare basalt and anorthositic rock types over the observed portion of the lunar eastern nearside has been confirmed through the identification of a strong inverse correlation between Al and Th At the same time, local regions of 3–4 ppm Th have been found in the highlands southwest and northeast of Mare Smythii, evidence that highland volcanism has taken place in the eastern as well as the western portion of the moon

HALBERSTAM, I.

H002 A Model of the Planetary Boundary Layer Over a Snow Surface

I. Halberstam and R Melendez

Boundary-Layer Meteorol, Vol. 16, pp 431–452, 1979

A model of the planetary boundary layer over a snow surface has been developed. It contains the vertical heat exchange processes due to radiation, conduction, and atmospheric turbulence Parametrization of the boundary layer is based on similarity functions developed by Hoffert and Sud (1976), which involve a dimensionless variable, ζ, dependent on boundary-layer height and a localized Monin–Obukhov length. The model also contains the atmospheric surface layer and the snowpack itself, where snowmelt and snow evaporation are calculated

The results indicate a strong dependence of surface temperatures, especially at night, on the bursts of turbulence which result from the frictional damping of surface-layer winds during periods of high stability, as described by Businger (1973). The model also shows the cooling and drying effect of the snow on the atmosphere, which may be the mechanism for air mass transformation in sub-Arctic regions

HALL, R. A.

H003 Hydrogen-Fueled Postal Vehicle Performance Evaluation

R A. Hall

JPL Publication 79-55, June 15, 1979

A hydrogen-fueled postal delivery vehicle has been evaluated by the Jet Propulsion Laboratory for the U S Department of Energy and the U S Postal Service (USPS) The vehicle was modified for USPS by the Billings Energy Corporation This report describes the test vehicle, the tests performed, the fueling technique, the test results, and discusses observed vehicle limitations The evaluation was based on the vehicle's fuel consumption, range, and emissions These data were obtained while operating the vehicle over a defined Postal Service Driving Cycle and the 1975 Urban Driving Cycle The vehicle's fuel consumption was 0 366 pounds of hydrogen per mile over the postal driving cycle and 0 22 pounds of hydrogen per mile over the Urban Driving Cycle These data correspond to 6 2 and 10 6 mpg equivalent gasoline mileage for the two driving cycles, respectively The vehicle's range was 24 2 miles while being operated on the postal driving cycle Vehicle emissions were measured over the Urban Driving Cycle HC and CO emissions were quite low, as would be expected The oxides of nitrogen were found to be 4.86 gm/mi, a value which is well above the current Federal and California standards

The discussion of vehicle limitations includes comments about the excessive engine flashbacks, inadequate acceleration capability, the engine air/fuel ratio, the water injection system, and the cab temperature Some of the other concerns discussed are safety considerations, iron-titanium hydride observed in the fuel system, evidence of water in the engine rocker cover, and the vehicle maintenance required during the evaluation.

Prepared for the U S Department of Energy and the U S Postal Service

HAM, N. C.

H004 Frequency Down-Converters as Applied to VLBI

N. C. Ham

The Deep Space Network Progress Report 42-53 July and August 1979, pp 74–82, October 15,1979

The frequency conversion of a received radio frequency spectrum, from an extragalactic radio source down to video-band frequencies to facilitate data recording or transmission, is quite difficult A special converter permits this down-conversion while rejecting image-noise "fold over," however, careful design is required to minimize error contribution to the received information One possible solution is through the use of combination analog and digital circuitry

HANEL, R.

H005 Infrared Observations of the Jovian System from Voyager 1

R. Hanel, et al.

Science, Vol 204, pp 972–976, June 1, 1979

The infrared spectroscopy and radiometry investigation has obtained spectra of Jupiter and its satellites between approximately 180 and 2500 cm^{-1} with a spectral resolution of 4 3 cm^{-1}. The Jupiter spectra show clear evidence of H_2, CH_4, C_2H_2, C_2H_6, CH_3D, NH_3, PH_3, H_2O, and GeH_4. A helium concentration of 0 11 ± 0 03 by volume is obtained. Meridional temperature cross sections show considerable structure At high latitudes, the stratosphere is warmer in the north than in the south The upper troposphere and lower stratosphere are locally cold over the Great Red Spot Amalthea is warmer than expected. Considerable thermal structure is observed on Io, including a relatively hot region in the vicinity of a volcanic feature

Contributors to this article include

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HANSEN, H.

H006 Assessment of 20-kW S-Band Transmitter

R. Dickinson and H Hansen

The Deep Space Network Progress Report 42-51. March and April 1979, pp 186–192, June 15, 1979

For abstract, see Dickinson, R

HARRIS, A W.

H007 Asteroid Rotation: I. Tabulation and Analysis of Rates, Pole Positions and Shapes

A W Harris and J A Burns (Cornell University)

Icarus, Vol. 40, pp. 115–144, 1979

Data are presented for the 182 asteroids whose rotational properties are available in the literature Plots are provided for the asteroid rotational frequency and lightcurve amplitude versus asteroid size, the latter is determined using standard methods if data are available but otherwise is estimated from asteroid albedos, selected depending on taxonomic type or orbital position A linear least-squares fit to all the data shows that the asteroid rotational frequency increases with decreasing size, confirming McAdoo and Burns' result, this is demonstrated to be primarily caused by relatively more small non-C than C asteroids in our sample, coupled with a slower mean rotation rate for C asteroids than non-C asteroids In terms of the collisional theory of Harris, this means that the C's are less dense than the other minor planets Any slight tendency for smaller asteroids to spin faster, even within a taxonomic type, could be due to selection effects, our data are not extensive enough to determine whether the very smallest spin especially fast The minor planets of our survey become more irregular at smaller sizes, disputing the conclusions of Bowell, Degewij, and Degewij et al , based on other, perhaps more complete, data, selection effects may account for this disagreement Shapes do not appear to depend on taxonomic type The dispersion of asteroid rotation rates from the mean is found to be in excellent agreement with a three-dimensional Maxwellian distribution, such as would be developed in a collisionally evolved system The rotation axes, therefore, appear to be randomly oriented in space Rotation pole positions are also tabulated and calculated to likely be constant in space over the extent of past observation Observers are encouraged to measure the rotational properties of faint objects and asteroids of unusual taxonomic types, and to carry out long-time studies of asteroids which over short periods do not seem to vary.

HARRISON, R. G.

H008 A Controlled Rate Freeze/Thaw System for Cryopreservation of Biological Materials

V J. Anselmo and R G Harrison

JPL Publication 79-91, June 1, 1979

For abstract, see Anselmo, V J.

HARTMANN, U. G.

H009 Measurement of the Profile and Intensity of the Solar He I λ584-Å Resonance Line

J O. Maloy (Melcon System Design Consultants), R W Carlson, U. G Hartmann (Ball Aerospace Systems Division), and D L Judge (University of Southern California)

J Geophys Res, Vol 83, No A12, pp. 5685–5690, December 1, 1978

For abstract, see Maloy, J. O

HARTOP, R.

H010 Microwave Time Delays in the DSN 34- and 64-Meter Antennas

R Hartop

The Deep Space Network Progress Report 42-51 March and April 1979, pp 183–185, June 15, 1979

The microwave configurations at the 34- and 64-m stations have changed in the past year due to new equipments To maintain time delay data logs, new calculations have been made where necessary of both the microwave component delays and the antenna air path delays for each type of antenna

H011 New X-Band Antenna Feeds for the DSN 64-Meter Stations

R. Hartop

The Deep Space Network Progress Report 42-52. May and June 1979, pp. 71–74, August 15, 1979

New X-band antenna feed assemblies with dual-polarization capability are being implemented in the DSN 64-meter stations Together with dual X-band travelling wave masers, they permit the simultaneous reception of right- and left-hand circular polarization from the Voyager spacecraft The new feed also includes a dual hybrid mode feedhorn which increases the antenna gain by 0.36 dB over the present feedhorn

HARVEY, S.

H012 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes: Second Annual Report, July 1977–July 1978

J. Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D Lawson, T. Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S. Harvey (Utah Biological Test Laboratory), and D. H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

HASBACH, W.

H013 Silicon Materials Outlook Study for 1980–85 Calendar Years

E Costogue, R. Ferber, W Hasbach, R. Pellin (Consultant, Charlotte, NC), and C Yaws (Consultant, Beaumont, TX)

JPL Publication 79-110, November 1, 1979

For abstract, see Costogue, E

HASSELMANN, K.

H014 Nonlinear and Linear Bottom Interaction Effects in Shallow Water

O Shemdin, K Hasselmann (Max-Planck-Institut fur Meteorologie), S. V. Hsiao, and K Herterich (Max-Planck-Institut fur Meteorologie)

Turbulent Fluxes Through the Sea Surface, Wave Dynamics, and Prediction, Plenum Publishing Corp, New York, 1978; pp. 347–372

For abstract, see Shemdin, O

HERRERA, G.

H015 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T. Fujita, R. Manvi, E J Roschke, N El Gabalawi, G Herrera, T J Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

HERRERA, L O.

H016 DSN Energy Data Base Preliminary Design

E R Cole, L O Herrera, and D. M Lascu

The Deep Space Network Progress Report 42-51 March and April 1979, pp 167–181, June 15, 1979

For abstract, see Cole, E R

HERRMAN, D. T., JR.

H017 DSN Test and Training System, Mark III-77

D T Herrman, Jr.

The Deep Space Network Progress Report 42-50 January and February 1979, pp 7–18, April 15, 1979

Implementation of the DSN Test and Training System, Mark III-77, throughout the network has been completed The Mark III-77 system, as configured, has supported testing and training for the Voyager and Pioneer Venus 1978 missions and all other ongoing, inflight missions Multimission functions of the system will provide some capabilities for initial DSN Test and Training preparations for the Galileo Project DSN Test and Training System capabilities include functions performed in the Deep Space Stations, Ground Communications Facility, and Network Operations Control Center

HERSEY, D. R.

H018 Interim Radio Spectrum Surveillance Station

D R. Hersey

The Deep Space Network Progress Report 42-52 May and June 1979, pp 99–107, August 15, 1979

Radio frequency interference at NASA's deep space stations has become a serious problem A radio spectrum surveillance capability at these stations is needed to determine the sources of interference so that preventative measures can be taken The first phase of a program to develop this capability was the development of a low-cost surveillance station now in operation at the Goldstone Deep Space Communication Complex near Barstow, California. This interim surveillance station is described and findings from the use of this equipment are presented

HERTERICH, K.

H019 Nonlinear and Linear Bottom Interaction Effects in Shallow Water

O. Shemdin, K Hasselmann (Max-Planck-Institut fur Meteorologie), S V Hsiao, and K Herterich (Max-Planck-Institut fur Meteorologie)

Turbulent Fluxes Through the Sea Surface, Wave Dynamics, and Prediction, Plenum Publishing Corp, New York, 1978, pp 347–372

For abstract, see Shemdin, O

HESTER, O. V.

H020 X-Band Atmospheric Noise Temperature Data and Statistics at Goldstone, DSS 13, 1977–1978

S D Slobin, K B Wallace, M M Franco, E M Andres, and O V Hester

The Deep Space Network Progress Report 42-52 May and June 1979, pp 108–116, August 15, 1979

For abstract, see Slobin, S D

HEYSER, R. C.

H021 Swept Frequency Ultrasonic Measurements of Tissue Characteristics

P M Gammell, J A Roseboro, R C Heyser, D. H Le Croissette, and R L Wilson (University of Southern California)

Proc Thirtieth Annu. Conf on Eng in Med & Bio, Los Angeles, Calif, November 5–9, 1977, p 229

For abstract, see Gammell, P M

H022 Temperature and Frequency Dependence of Ultrasonic Attenuation in Selected Tissues

P M Gammell, D. H. Le Croissette, and R C Heyser

Ultrasound Med Biol, Vol 5, pp 269– 277, 1979

For abstract, see Gammell, P. M

HIETZKE, W.

H023 Ramp Time Synchronization

W Hietzke

Radio Sci, Vol 14, No. 4, pp. 695–699, July–August 1979

A new method of intercontinental clock synchronziation has been developed and proposed for possible use by NASA's Deep Space Network (DSN), using a two-way/three-way radio link with a spacecraft. Analysis of preliminary data indicates that the real-time method has an uncertainty of 0 6 μs, and it is very likely that further work will decrease the uncertainty Also, the method is compatible with a variety of non-real-time analysis tech-

niques, which may reduce the uncertainty down to the tens of nanosecond range

HIGA, W.

H024 Projected State-of-the-Art for Frequency Standards for the DSN in the 1982–1990 Time Frame

W Higa and R. Sydnor

The Deep Space Network Progress Report 42-53: July and August 1979, pp 54–61, October 15, 1979

A study has been made of frequency standards that are potentially useful to the DSN in the 1980s A combination of several devices that have inherently good performance over different averaging time regimes is recommended This combination consists of a quartz oscillator for short-term, either a quartz oscillator or active hydrogen maser for medium-term, and a passive hydrogen maser or cesium standard for long-term stability

HIGGINS, S.

H025 The Updated Algorithm of the Energy Consumption Program (ECP)—A Computer Model Simulating Heating and Cooling Energy Loads in Buildings

F. L. Lansing, D M Strain, V W Chai, and S Higgins

The Deep Space Network Progress Report 42-49: November and December 1978, pp. 107–115, February 15, 1979

For abstract, see Lansing, F. L

HINKLEY, E. D.

H026 Infrared Transmission at the 3.39 μm Helium–Neon Laser Wavelength in Liquid-Core Quartz Fibers

A K. Majumdar, E D Hinkley, and R T Menzies

IEEE J Quantum Electron., Vol QE-15, No. 6, pp 408–410, June 1979

For abstract, see Majumdar, A. K

H027 Laser Spectroscopic Detection of Air Pollutants

E D. Hinkley

Proc SPIE, Vol. 158, pp 134–136, 1978

During the past several years laser techniques for spectroscopic detection of trace atmospheric species have been proposed, developed, and implemented in field-demonstration programs The spectral region utilized has ranged from the near ultraviolet to the mid-infrared Measurements have been performed at ground level and above to the upper atmosphere The operating principles have included direct absorption, resonance scattering, resonance fluorescence, and Raman scattering This paper concentrates on the application of absorption spectroscopy to the detection of molecular pollutants, stressing some of the important properties of long-path and laser-radar systems

HOEHN, F. W.

H028 Stirling Laboratory Research Engine Survey Report

J. W. Anderson and F. W. Hoehn

JPL Publication 79-86, September 15, 1979

For abstract, see Anderson, J. W

HOLBECK, H. J.

H029 Siting Issues for Solar Thermal Power Plants With Small Community Applications

H J. Holbeck and S J Ireland

JPL Publication 78-75, Rev 1 February 1, 1979

Technologies for solar thermal plants are being developed to provide energy alternatives for the future. Implementation of these plants requires consideration of siting issues as well as power system technology While many conventional siting considerations are applicable, there are also a set of unique siting issues for solar thermal plants Early experimental plants will have special siting considerations

This report considers the siting issues associated with small, dispersed solar thermal power plants for utility/small community applications of less than 10 MWe Some specific requirements refer to the first engineering experiment for the Small Power Systems Applications (SPSA) Project

The first two sections of the report provide background for the subsequent issue discussions The introductory section describes the SPSA Project and the requirements for the first engineering experiment and gives the objectives and scope for the report as a whole A brief overview of solar thermal technologies is followed by a discussion of some technology options

The siting issues themselves are discussed in the remainder of the report in three categories (1) system resource requirements, (2) environmental effects of the system, and (3) potential impact of the plant on the environment Within these categories, specific issues are discussed in a qualitative manner Examples of limiting factors for some issues are taken from studies of other solar systems

The report has been revised primarily to reflect the current program plan for Engineering Experiment #1 (EE1) and to incorporate technology information from the EE1 Phase 1 system definition studies

Prepared for the Department of Energy, DOE/JPL-1060-78/2, REV 1, Distribution Category UC-62

HOLLINGSWORTH, D.

H030 Pioneer Venus Multiprobe Entry Mission Support

B Ryan (Tidbinbilla Deep Space Complex), D. Hollingsworth (Tidbinbilla Deep Space Complex), A Bailey (Tidbinbilla Deep Space Complex), and J Wells (Tidbinbilla Deep Space Complex)

The Deep Space Network Progress Report 42-50· January and February 1979, pp. 24–26, April 15, 1979

For abstract, see Ryan, B

HOLMES, J. K

H031 Stability Analysis of the Multimegabit Telemetry Demodulator/Detector Design

J. K Holmes

The Deep Space Network Progress Report 42-51. March and April 1979, pp 31–38, June 15, 1979

Stability of the multimegabit telemetry digital Costas loop is considered It is shown that the present design is stable with about 35 2 dB gain margin, and therefore is quite stable This paper considers the bandpass filter implementation of the data filters

H032 Pre-A/D Filter and AGC Requirements for Multimegabit Telemetry Data Detection

J K Holmes

The Deep Space Network Progress Report 42-51 March and April 1979, pp 39–46, June 15, 1979

This article presents a candidate pre-A/D filter bandwidth versus data rate design for the Multimegabit Telemetry Demodulator/Detector, which is based on considerations of A/D bias, quantization errors, and automatic gain control (AGC) effects, as well as the deleterious effects of filtering

Two methods of gain control of the input level to the A/D converter are considered The first method uses a particular value of gain, according to which bandwidth is selected The second method uses a second narrowband noncoherent AGC (in the LPF bandwidth) to attempt to keep the A/D input level constant This second method reduces the BER degradation slightly but appears to be more difficult to implement

HONG, S. D.

H033 Viscoelastic Properties of Entangled Polymers: Ternary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), S S. Shyu (University of California, Berkeley), M. Shen (University of California, Berkeley), S D. Hong, and J Moacanin

J Appl Phys, Vol 50, No 10, pp. 6077–6082, October 1979

For abstract, see Soong, D

H034 Viscoelastic Properties of Entangled Polymer. IV. Binary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), M Shen (University of California, Berkeley), and S D Hong

J. Rheol, Vol 23, No. 3, pp 301–322, 1979

For abstract, see Soong, D

HOUSEMAN, J

H035 Methanol Decomposition Bottoming Cycle for IC Engines

G` Purohit and J Houseman

Preprint 79-0427, SAE Congress & Exposition, Detroit, Mich , February 26–March 2, 1979

For abstract, see Purohit, G.

HOWE, T. W.

H036 Pioneer Venus 1978 Mission Support

T W Howe

The Deep Space Network Progress Report 42-51 March and April 1979, pp 19–30, June 15, 1979

This article reports on the Deep Space Network support of the Pioneer Venus Mission `It describes the Orbiter's Venus Orbit Insertion, Multiprobe Entry, and Orbiter Occultation Experiment support

HSIAO, S. V.

H037 Nonlinear and Linear Bottom Interaction Effects in Shallow Water

O Shemdin, K Hasselmann (Max-Planck-Institut fur Meteorologie), S V. Hsiao, and K Herterich (Max-Planck-Institut fur Meteorologie)

Turbulent Fluxes Through the Sea Surface, Wave Dynamics, and Prediction, Plenum Publishing Corp, New York, 1978, pp 347–372

For abstract, see Shemdin, O

HUMPHREY, M. F

H038 Cooling Tower Water Conditioning Study

M F Humphrey and K. R French

JPL Publication 79-104, December 15, 1979

Successful elimination of cooling tower treatment chemicals has been accomplished at JPL Three towers have functioned for long periods of time with ozone as the only treatment for the water The water in the systems has been reused as much as thirty (30) times (cylces of concentration) without deleterious effects to the heat exchangers Actual system blow-down was eliminated and the only makeup water added was that required to replace the evaporation and mist entrainment losses. Minimum water savings alone are approximately 75 1 1/kg/year (18,000 gal/ton/year) Cost estimates indicate that a savings of 55 percent was obtained on the JPL systems using ozone (This amounts to a cost savings of approximately $0 024/kg/yr ($22 00/ton/year) including labor.)

A major problem experienced in the use of ozone for cooling tower applications was the difficulty of accurate concentration measurements The ability to control the operational characteristics relies on easily and accurately determined concentration levels Present methods of detection are subject to inaccuracies because of interfering materials and the rapid destruction of the ozone

HUNT, G. E.

H039 Thermal Infrared Properties of the Martian Atmosphere· 1. Global Behavior at 7, 9, 11, and 20 μm

T Z. Martin (University of California, Los Angeles), A R. Peterfreund (Arizona State University), E D Miner, H. H Kieffer (U.S Geological Survey), and G E Hunt (University College London, London, England)

J Geophys Res, Vol 84, No B6, pp 2830–2842, June 10, 1979

For abstract, see Martin, T Z

HUNTEN, D. M.

H040 Non-Thermal Hydrogen in the Venus Exosphere. The Ionospheric Source and the Hydrogen Budget

S Kumar, D M Hunten (University of Arizona), and A L. Broadfoot (Kitt Peak National Observatory)

Planet Space Sci, Vol. 26, pp 1063–1075, 1978

For abstract, see Kumar, S

HUNTER, J. A.

H041 Orbiting Deep Space Relay Station· Final Report—Requirement Determination

J A Hunter

JPL Publication 79-30, Vol 1, April 1, 1979

This three volume report describes the deep space communications requirements of the post-1985 time frame and presents the Orbiting Deep Space Relay Station (ODSRS) as an option for meeting these requirements It is concluded that, under current conditions, the ODSRS is not yet cost competitive with Earth based stations to increase DSN telemetry performance It is also concluded that the ODSRS has significant advantages over a ground station, and these are sufficient to maintain it as a future option These advantages include the ability to track a spacecraft 24 hours per day with ground stations located only in the USA, the ability to operate at higher frequencies that would be attenuated by Earth's atmosphere, and the potential for building very large structures without the constraints of Earth's gravity Future technology development to reduce the cost of the ODSRS and orbital operations and a need for its unique capabilities are expected to make the ODSRS attractive for implementation as an element of the long-term future DSN

H042 Orbiting Deep Space Relay Station Study Final Report: Conceptual Design

J. A Hunter

JPL Publication 79-30, Vol II, June 15, 1979

This three-volume report describes the deep space communications requirements of the post-1985 time frame and presents the Orbiting Deep Space Relay Station (ODSRS) as an option for meeting these requirements It is concluded that, under current conditions, the ODSRS is not yet cost-competitive with Earth-based stations to increase DSN telemetry performance It is also concluded that the ODSRS has significant advantages over a ground station, and these are sufficient to maintain it as a future option These advantages include the ability to track a spacecraft 24 hours per day with ground stations

located only in the USA, the ability to operate at higher frequencies than would be attenuated by Earth's atmosphere, and the potential for building very large structures without the constraints of Earth's gravity Future technology development to reduce the cost of the ODSRS and orbital operations and a need for its unique capabilities are expected to make the ODSRS attractive for implementation as an element of the long-term future DSN

H043 Orbiting Deep Space Relay Station Study Final Report Implementation Plan

J A Hunter

JPL Publication 79-30, Vol III, June 15, 1979

This three-volume report describes the deep space communications requirements of the post-1985 time frame and presents the Orbiting Deep Space Relay Station (ODSRS) as an option for meeting these requirements It is concluded that, under current conditions, the ODSRS is not yet cost-competitive with Earth-based stations to increase DSN telemetry performance It is also concluded that the ODSRS has significant advantages over a ground station, and these are sufficient to maintain it as a future option These advantages include the ability to track a spacecraft 24 hours per day with ground stations located only in the USA, the ability to operate at higher frequencies than would be attenuated by Earth's atmosphere, and the potential for building very large structures without the constraints of Earth's gravity. Future technology development to reduce the cost of the ODSRS and orbital operations and a need for its unique capabilities are expected to make the ODSRS attractive for implementation as an element of the long-term future DSN

HUNTRESS, W. T., JR.

H044 The Synthesis of Complex Molecules in Interstellar Clouds

W T. Huntress, Jr. and G F Mitchell

Astrophys J, Vol 231, pp. 456–467, July 15, 1979

Smith and Adams have recently proposed that radiative association reactions can proceed rapidly at the low temperatures found in interstellar clouds We propose radiative association reactions of CH_3^+, CH_3O^+, CH_3CO^+, CH_5^+, HCO^+, NO^+, and H_2CN^+, and several bimolecular reactions of CH_3^+, $C_2H_2^+$, and NH_3^+, which, if they occur at the low temperatures of interstellar molecular clouds, can effectively synthesize a large number of the more complex interstellar species including CH_4, NH_3, CH_3OH, CH_2O, CH_2CO, CH_3CHO, CH_3CH_2OH, CH_3OCH_3, CH_3OOCH, CH_2NH, CH_3NH_2, CH_3CN, HCOOH, HNCO, NH_2CN, CH_3C_2H, and HNO. New laboratory data are required in order to verify that these species can be synthesized by the proposed reactions It appears, however, that gas-phase ion chemistry may indeed be capable of synthesizing the most complex of interstellar molecules

H045 Interstellar Synthesis of the Cyanopolyynes and Related Molecules

G F. Mitchell, W. T Huntress, Jr., and S S. Prasad

Astrophys J., Vol. 233, pp. 102–108, October 1, 1979

For abstract, see Mitchell, G F.

H046 An Ion Cyclotron Resonance Study of Reactions of Some Atomic and Simple Polyatomic Ions With Water

Z Karpas (California Institute of Technology), V G Anicich, and W T Huntress, Jr.

Chem. Phys Lett, Vol. 59, No 1, pp 84–86, November 1, 1978

For abstract, see Karpas, Z

H047 Reactions of OH^+ and H_2O^+ Ions With Some Diatomic and Simple Polyatomic Molecules

Z Karpas (California Institute of Technology) and W T. Huntress, Jr.

Chem Phys Lett, Vol 59, No 1, pp. 87–89, November 1, 1978

For abstract, see Karpas, Z

H048 An Ion Cyclotron Resonance Study of Reactions of Ions With Hydrogen Atoms

Z. Karpas (California Institute of Technology), V Anicich, and W T. Huntress, Jr.

J Chem. Phys, Vol 70, No. 6, pp 2877–2881, March 15, 1979

For abstract, see Karpas, Z

H049 Long Chain Carbon Molecules and Diffuse Interstellar Lines

G F Mitchell and W T Huntress, Jr

Nature, Vol 278, No 5706, pp 722–723, April 19, 1979

For abstract, see Mitchell, G F

HURD, W. J.

H050 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W J. Hurd, S. C. Wardrip (Goddard Space Flight Center), J. Bussion (Naval Research Laboratory), J Oaks (Naval Research Laboratory), T McCaskill (Naval Research Laboratory), H. Warren (Bendix Field Engineering Corp), and G. Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49 November and December 1978, pp 64–69, February 15, 1979

The intercontinental clock synchronization capabilities of Very Long Baseline Interferometry (VLBI) and the Navigation Technology Satellite (NTS) were compared in May 1978 by using both methods to synchronize the cesium clocks at the NASA Deep Space Net complexes at Madrid, Spain, and Goldstone, California. The VLBI experiments used the Wideband VLBI Data Acquisition System developed at the NASA Jet Propulsion Laboratory The Navigation Technology Satellites, which were designed and built by the Naval Research Laboratory, were used with NTS Timing Receivers developed by the Goddard Space Flight Center The two methods agreed at about the one-half microsecond level The VLBI system also obtained long-term stability information on the HP5061A-004 cesium standards by measuring $\Delta T/T$ over four 3- to 4-day intervals, obtaining stability estimates of $(1 \pm 1) \times 10^{-13}$ for the combined timing systems

H051 Demonstration of Remote Clock Monitoring by VLBI, With Three Baseline Closure

C. M Cheetham, W. J. Hurd, J. W. Layland, G A. Madrid, and T P Yunck

The Deep Space Network Progress Report 42-53 July and August 1979, pp 40–53, October 15, 1979

For abstract, see Cheetham, C M.

HYNES, J. T.

H052 Molecular Rotation and Reorientation Microscopic and Hydrodynamic Contributions

J. T Hynes (University of Colorado), R Kapral (University of Toronto), and M Weinberg

J. Chem. Phys, Vol, 29, No 6, pp 2725–2733, September 15, 1978

The relative roles of microscopic and hydrodynamic contributions to molecular rotation and reorientation are examined within the framework of the microscopic boundary layer theory recently proposed by the authors The theory is applied to rough spheres, for which computer simulation data are available, and to experimental results on spherical top molecules Attention is focused on rotational diffusion constants, the kappa parameter introduced by Kivelson *et al*, and orientational relaxation times It is shown that, while collective effects are present and often nonnegligible, the motion of small molecules is dominated by its microscopic aspects Experimental trends which can incorrectly suggest dominance by hydrodynamic contributions are discussed in some detail Finally, the transition to the regime where collective effects are dominant is considered

INGHAM, J. D.

I001 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W A Mueller, S H. Kalfayan, W W Reilly, A H Yavrouian, I D Mosesman, and J. D. Ingham

JPL Publication 79-40, May 15, 1979

For abstract, see Mueller, W. A.

I002 Smoke Properties of Highly Filled Ethylene-Propylene-Diene Terpolymer Rubbers

M Mosesman and J D. Ingham

Rubber Chem Technol., Vol 51, No 5, pp 970–976, November–December 1978

For abstract, see Mosesman, M

IRELAND, S. J.

I003 Siting Issues for Solar Thermal Power Plants With Small Community Applications

H J. Holbeck and S. J Ireland

JPL Publication 78-75, Rev 1 February 1, 1979

For abstract, see Holbeck, H. J.

IRVINE, A. P.

I004 The DSN Programming System

A P Irvine

The Deep Space Network Progress Report 42-50: January and February 1979, pp. 4–6, April 15, 1979

This article describes the DSN Programming System and its current status A recapitulation of the System's description is included as well as major near-term milestones, plans, and some realized benefits

JACOBSON, A. S.

J001 A Possible Line Feature at 73 keV From the Crab Nebula

J. C Ling, W. A Mahoney, J. B Willett, and A S Jacobson

Astrophys J, Vol 231, No 3, Part 1, pp. 896–905, August 1, 1979

For abstract, see Ling, J C.

JACOBSON, R. A.

J002 Navigation Capability for an Ion Drive Rendezvous with Halley's Comet

C. L Thornton and R A Jacobson

J Astronaut Sci, Vol XXVI, No. 3, pp 197–210, July–September, 1978

For abstract, see Thornton, C L.

JAMES, P. B.

J003 Seasonal Recession of Mars' South Polar Cap As Seen by Viking

P B. James, G Briggs (NASA Headquarters), J. Barnes (University of Washington), and A Spruck (Marquette University)

J. Geophys Res, Vol 84, No. B6, pp. 2889–2922, June 10, 1979

The spring-summer retreat of the south polar cap of Mars is portrayed in photomosaics obtained by Viking Orbiter 2 during 1977 Comparisons of these data to Mariner 9 photos and to the record of telescopic observations attest that the polar retreat viewed by Viking was significantly slower than those previously reported A global dust storm which occurred at an unusually early season may have affected this retarded recession by introducing dust into the atmosphere of Mars which modified the polar energy balance through scattering of incident radiation The composition of the south residual cap cannot be unambiguously determined at this time, however, some data suggest that CO_2 or clathrate survived the entire summer viewed by Viking

JANSSEN, M. A

J004 Interferometric Observations of the Quiet Sun at 8 Millimeter Wavelength

M A Janssen, E T Olsen, and K. R Lang (Tufts University)

Astrophys J, Vol 228, pp 616–623, March 1, 1979

The quiet Sun was observed with an interferometer operating at 8 3 mm wavelength and 30 sec resolution. We find that a small-scale brightness structure exists on the Sun which produces a strong, variable signal when observed by an interferometer Previous observers have obtained similar results at comparable wavelengths and angular resolutions, and it is evident from these and the present results that such small-scale structure is a characteristic feature of the quiet Sun's surface We conclude from our observations that this structure as seen at 30 sec resolution is stable or quasi-stable and that the predominant 10 to 30 minute time variations in our observed signal are caused by changes in the interferometer fringe pattern across this structure Variations that are weaker and more rapid may indicate intrinsic time variability in elements of this structure, but the data are contaminated at this level by other instrumental effects For example, antenna pointing variations occurring normally during observation of a greatly extended pattern of sources can, in some cases, account for these weaker variations The unambiguous detection of intrinsic time variability is inherently difficult when a single interferometer is used at this resolution.

J005 Pattern Measurements of a Low-Sidelobe Horn Antenna

M. A Janssen, S M. Bednarczyk, S Gulkis, H W Marlin, and G F. Smoot (University of California, Berkeley)

IEEE Trans Anten. Prop, Vol AP-27, No 4, pp 551–555, July 1979

The power pattern of a corrugated horn antenna designed for low sidelobes was measured to levels 90 dB below the main beam maximum in both the *E*- and *H*-planes The measured patterns were found to be in good agreement with theoretical predictions

JENSEN, S.

J006 Elastic and Inelastic (5^1D, 6^1P) Electron Scattering Cross Sections for Barium

S Jensen (University of California, Riverside), D Register, and S Trajmar

J Phys B· At Mol Phys, Vol 11, No. 13, pp. 2367–2376, 1978

Electron scattering by Ba atoms has been studied in a beam–beam configuration Momentum-transfer and differential and integral cross sections for elastic scattering and for the excitation of the 5s5d ^{1}D and 6s6p ^{1}P states have been determined at impact energies of 20, 30, 40, 60, 80, and 100 eV in the 3° to 130° angular range

JENSEN, W. N.

J007 Tracking and Data Systems Support for the Helios Project: DSN Support of Project Helios May 1976 Through June 1977

P. S Goodwin, W. N. Jensen, and F M. Flanagan

Technical Memorandum 33-752, Vol III, March 1, 1979

For abstract, see Goodwin, P S

J008 Helios Mission Support

W. N. Jensen and J C Nash

The Deep Space Network Progress Report 42-49. November and December 1978, pp 43–44, February 15, 1979

This article reports on activities of the DSN Network Operations Organization in support of the Helios Project from 15 October through 15 December 1978

JEPSEN, P. L.

J009 Dynamic Feature Analysis for Voyager at the Image Processing Laboratory

G M Yagi, J J. Lorre, and P. L. Jepsen

Conf Atmos Environ of Aerospace Syst & Appl Meteorol., New York, N Y, November 14–16, 1978, Preprint Volume, pp 110–117

For abstract, see Yagi, G. M

JET PROPULSION LABORATORY

J010 Thermal Power Systems Point-Focusing Distributed Receiver Technology Project—Annual Technical Report, Fiscal Year 1978 Executive Summary

Jet Propulsion Laboratory

JPL Publication 79-1, Vol I, February 15, 1979

Thermal or electrical power from the sun's radiated energy through Point-Focusing Distributed Receiver Technology is the goal of this project. The energy thus produced must be technically, as well as economically, competitive with other energy sources This project is to support the industrial development of the required technology to achieve the above stated goal Solar energy is concentrated by either a reflecting surface or a lense to a receiver where it is transferred to a working liquid or gas Receiver temperatures are in the 1000 to 2000°F range Conceptual design studies are expected to identify power conversion units with a viable place in the solar energy future Rankine and Brayton cycle engines are currently under investigation This report details JPL accomplishments with point-focusing technology in FY 1978

Prepared for the U S Department of Energy, DOE/JPL-1060-7, Distribution Category UC-62

J011 Thermal Power Systems Point-Focusing Distributed Receiver Technology Project—Annual Technical Report, Fiscal Year 1978: Detailed Report

Jet Propulsion Laboratory

JPL Publication 79-1, Vol II, March 15, 1979

Thermal or electrical power from the sun's radiated energy through Point-Focusing Distributed Receiver technology is the goal of this Project The energy thus produced must be economically competitive with other sources This Project supports the industrial development of technology and hardware for extracting energy from solar power to achieve the stated goal Present studies are working to concentrate the solar energy through mirrors or lenses, to a working fluid or gas, and through a power converter change it to an energy source useful to man. Rankine-cycle and Brayton-cycle engines are currently being developed as the most promising energy converters for our near future needs This report details accomplishments on point-focusing technology in FY 1978

Prepared for the U.S Department of Energy, DOE/JPL-1060-7, Distribution Category UC-62

J012 Thermal Storage Applications Workshop

Jet Propulsion Laboratory

JPL Publication 79-8, Vols. I and II, February 15, 1979

On February 14 and 15, 1978, a workshop on solar power development and thermal and thermochemical energy storage technology was held at Golden, Colorado The meeting was sponsored by the United States Department of Energy and organized by the Jet Propulsion Laboratory. These proceedings contain the record of this workshop They are divided into two volumes Volume I presents an analysis and condensation of information discussed in round-table plenary sessions, and also contains the executive summary, workshop agenda, and list

of workshop participants Volume II consists of the papers presented at the workshop, as submitted

Prepared for the U S Department of Energy, DOE/JPL-1060-12, Distribution Category UC-62

J013 Bioconversion Study Conducted by JPL

Jet Propulsion Laboratory

JPL Publication 79-9, November 15, 1978

The Jet Propulsion Laboratory of the California Institute of Technology conducted a study of bioconversion as a means of identifying the role of biomass for meeting the nation's energy fuel and chemical requirements and the role and means for JPL-Caltech involvement in bioconversion The study was directed and carried out by an interdisciplinary group of JPL and Caltech scientists and engineers and included a comprehensive review of the state of biomass technology through an extensive review of literature sources, and interviews with organizations and authorities active in the field of bioconversion The bioconversion study included the following categories biomass sources, chemicals from biomass, thermochemical conversion of biomass to fuels, biological conversion of biomass to fuels and chemicals, and basic bioconversion sciences General conclusions of the study were that biomass promises to be a significant alternate energy source and that JPL-Caltech have an important role in this technology. A detailed review is included of the bioconversion fields cited with specific conclusions and recommendations for future research and development and overall biomass system engineering and economic studies.

J014 LSA (Low-Cost Solar Array) Project Project Quarterly Report 8, for the Period January 1978–March 1978

Jet Propulsion Laboratory

JPL Publication 79-14

This report describes progress made by the Low-Cost Silicon Solar Array Project during the period January through March 1978 It includes task reports on silicon material processing, large-area silicon sheet development, encapsulation materials testing and development, Project engineering and operations, and manufacturing techniques, plus the steps taken to integrate these efforts

Prepared for the Department of Energy, DOE/JPL-1012-2, Distribution Category UC-63b

J015 LSA (Low-Cost Solar Array) Project. Project Quarterly Report 9, for the Period April 1978–June 1978

Jet Propulsion Laboratory

JPL Publication 79-15

This report describes progress made by the Low-Cost Solar Array Project during the period April through June 1978 It includes reports on silicon material processing, large-area silicon sheet development, encapsulation materials testing and development, Project engineering and operations activities, and manufacturing techniques, plus the steps taken to integrate these efforts

Prepared for the Department of Energy, DOE/JPL-1012-3, Distribution Category UC-63b

J016 LSA (Low-Cost Solar Array) Project: Project Quarterly Report 10, for the Period July 1978–September 1978

Jet Propulsion Laboratory

Jet Publication 79-16

This report describes progress made by the Low-Cost Solar Array Project during the period July through September 1978 It includes reports on silicon material processing, large-area silicon sheet development, encapsulation materials testing and development, Project engineering and operations activities, and manufacturing techniques, plus the steps taken to integrate these efforts

Prepared for the Department of Energy, DOE/JPL-1012-4, Distribution Category UC-63b

J017 Jet Propulsion Laboratory 1978 Annual Report

Jet Propulsion Laboratory

JPL Publication 79-20, June 1979

A description of work accomplished under Contract NAS 7-100 between the California Institute of Technology and the National Aeronautics and Space Administration for the period January 1 through December 31, 1978

J018 Thermal Power Systems Advanced Solar Thermal Technology Project· Advanced Subsystems Development—Second Semi-Annual Progress Report, April 1, 1978 to October 1, 1978

Jet Propulsion Laboratory

JPL Publication 79-24, November 15, 1978

This document summarizes the results of the work performed by the Advanced Subsystems Development Task of the Advanced Solar Thermal Technology Project The activities described were carried out by the Jet Propulsion Laboratory, California Institute of Technology and the Lewis Research Center for the U S Department of Energy during the period beginning in April 1978 and ending in October 1978

During this reporting period, the concept design for a small (less than 10 MWe) solar thermal electric generat-

ing plant was completed using projected 1985 technology The systems requirements were defined and specified The components, including an engineering prototype for one 15 kWe module of the generating plant, were conceptually designed

The present emphasis for achieving cost reduction goals centers on improving conversion efficiency and reducing the cost of key components

Prepared for the U S Department of Energy, DOE/JPL-1060-6, Distribution Category UC-62

J019 Chemical Kinetic and Photochemical Data for Use in Stratospheric Modelling. Evaluation Number 2, NASA Panel for Data Evaluation

Jet Propulsion Laboratory

JPL Publication 79-27, April 15, 1979

An evaluated set of rate constants and photochemical cross sections has been compiled for use in modelling stratospheric processes The data are primarily relevant to the ozone layer, and its possible perturbation by anthropogenic activities The evaluation is current to approximately January, 1979

J020 Proceedings of the Distribution Automation and Control Working Group

Jet Propulsion Laboratory

JPL Publication 79-35, Vols. I and II, March 1979

This document presents results of the Working Group Meeting for Distribution Automation and Control (DAC) on the Electric Power System held on November 20-22, 1978 at Baltimore, Maryland The meeting was sponsored by the Department of Energy, Division of Electric Energy Systems Its purpose was to bring together some members of the electric utility community so that they might reach a common understanding on (1) key issues and uncertainties to be resolved, (2) the existing state of the art, and (3) specific requirements for further RD&D in the area of DAC The meeting consisted of several presentations and working sessions The statements and recommendations formulated by the group on various topics are presented The document consists of two volumes Volume I, the Executive Summary, and Volume II, the detailed Proceedings

Prepared for the U S Department of Energy

J021 Small Power Systems Applications Project—Annual Technical Report· Executive Summary, Fiscal Year 1978

Jet Propulsion Laboratory

JPL Publication 79-43, Vol I, January 15, 1979

This report, Volume I, is a summary of the SPSA Annual Technical Report It covers Small Power Systems Applications activities for FY 1978 Studies were conducted to address current small power system technology as applied to power plants up to 10 MWe in size Markets for small power systems were characterized and cost goals were established for the project

Candidate power plant system design concepts were selected for evaluation and preliminary performance and cost assessments were made Economic studies were conducted at JPL and under contract to Burns & McDonnell Breakeven capital costs were determined for leading contenders among the candidate systems

An applications study was made of the potential use of small power systems in providing part of the demand for pumping power by the extensive aqueduct system of California, estimated to be 1000 MWe by 1985

Criteria and methodologies were developed for application to the ranking of candidate power plant system design concepts

Experimental power plants concepts of 1 MWe rating were studied by three contractors as a Phase I effort leading toward the definition of a power plant configuration for subsequent detail design, construction, testing and evaluation as Engineering Experiment No 1 (EE No 1) Site selection criteria and ground rules for the solicitation of EE No 1 site participation proposals by DOE were developed

Prepared for the U S Department of Energy, DOE/JPL-1060-9, Distribution Category UC-62

J022 Small Power Systems Applications Project—Annual Technical Report Detailed Report, Fiscal Year 1978

Jet Propulsion Laboratory

JPL Publication 79-43, Vol II, January 15, 1979

This report, Volume II, is the Annual Technical Report of the SPSA Project. It covers Small Power Systems Applications activities for FY 1978 Studies were conducted to address current small power system technology as applied to power plants up to 10 MWe in size Markets for small power systems were characterized and cost goals were established for the project

Candidate power plant system design concepts were selected for evaluation and preliminary performance and cost assessments were made Economic studies were conducted at JPL and under contract to Burns & McDonnell Breakeven capital costs were determined for leading contenders among the candidate systems

An applications study was made of the potential use of small power systems in providing part of the demand for

pumping power by the extensive aqueduct system of California, estimated to be 1000 MWe by 1985

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Prepared for the U S Department of Energy, DOE/JPL-1060-9, Distribution Category UC-62.

J023 Data Base Management Systems Panel Workshop: Executive Summary

Jet Propulsion Laboratory

JPL Publication 79-70, August 1, 1979

An executive summary of the discussions of the first workshop for a panel on Data Base Management Systems (DBMS) for space-acquired and associated data is presented The panel was concerned with investigating the full range of DBMS needs, which include acquiring, managing, storing, archiving, accessing and dissemination of data for an application Recommendations were made to NASA regarding the future development and support of DBMS technology The discussions further brought up existing bottlenecks in NASA DBMS operations, expected developments in the field of remote sensing, communications, and computer science, and presented an overview of existing conditions and expected problems The requirements for a proposed spatial information system and characteristics of a comprehensive browse facility for NASA earth observations applications were discussed

J024 Planetary Data System Requirements: Multi-Mission Radio Science Requirements for the 1978 to 1988 Era

Jet Propulsion Laboratory

JPL Publication 79-74, October 1, 1979

The functional and performance requirements for support of multi-mission radio science are established The classes of radio science investigation are described and the needed data is discussed This document is for a sliding ten year period and will be iterated as the mission set evolves

J025 Advanced Subsystems Development Third Semiannual Progress Report, October 1, 1978 to April 1, 1979

Jet Propulsion Laboratory

JPL Publication 79-107, August 15, 1979

This document summarizes the results of the work performed by the Advanced Subsystems Development Task of the Advanced Solar Thermal Technology Project The activities described were managed by the Jet Propulsion Laboratory, California Institute of Technology and the Lewis Research Center for the U S Department of Energy during the period beginning in October 1978 and ending in April 1979

During this reporting period, preliminary design for a prototype small (20 kWe) solar thermal electric generating unit was completed, consisting of several subsystems The concentrator and the receiver collect solar energy and a thermal buffer storage with a transport system is used to provide a partially smoothed heat input to the Stirling engine A fossil-fuel combustor is included in the receiver designs to permit operation with partial or no solar insolation (hybrid) The engine converts the heat input into mechanical action that powers a generator. To obtain electric power on a large scale, multiple solar modules will be required to operate in parallel. The small solar electric power plant used as a baseline design will provide electricity at remote sites and small communities

During this period the Advanced Subsystem Development Task joined with contractors to implement development of a directly coupled solar receiver, a heat pipe solar receiver with thermal energy storage, kinematic Stirling engines, and advanced solar concentrator components Organizations involved in the task now include the General Electric Co, Mechanical Technology, Inc, Fairchild/Stratos Div, Acurex Corp, United Stirling (Sweden), academic consultants at the University of Pennsylvania and at Oklahoma State University, the NASA Lewis Research Center, and the Jet Propulsion Laboratory.

Prepared for the U S Department of Energy, DOE/JPL-1060-20, Distribution Category UC-62b.

JOHNSON, T. V.

J026 Albedo Distribution on Io's Surface

D. B Nash and T. V. Johnson

Icarus, Vol 38, pp 69–74, 1979

For abstract, see Nash, D B

JOHNSTON, A R.

J027 Effect of Temperature on Optical Fiber Transmission

W F. Yeung and A R. Johnston

Appl Opt, Vol 17, NO 23, pp 3703–3705, December 1, 1978

For abstract, see Yeung, W F

J028 Automated Vehicle Guidance Using Discrete Reference Markers

A R. Johnston, T. Assefi, and J Y Lai

IEEE Trans Vehicular Technol, Vol VT-28, No 1, pp 95–106, February 1979

Techniques for providing steering control for an automated vehicle using discrete reference markers fixed to the road surface are investigated analytically Either optical or magnetic approaches can be used for the sensor, which generates a measurement of the lateral offset of the vehicle path at each marker to form the basic data for steering control Possible mechanizations of sensor and controller are outlined Techniques for handling certain anomalous conditions, such as a missing marker, or loss of acquisition, and special maneuvers, such as u-turns and switching, are briefly discussed A general analysis of the vehicle dynamics and the discrete control system is presented using the state variable formulation Noise in both the sensor measurements and in the steering servo are accounted for. An optimal controller is simulated on a general purpose computer, and the resulting plots of vehicle path are presented Parameters representing a small multipassenger tram were selected, and the simulation runs show response to an erroneous sensor measurement and acquisition following large initial path errors.

JONES, C. E.

J029 DOMSAT CW Transmission Bent Pipe Investigation: Initial Phase Noise Measurements via RCA SATCOM Link

M H Brockman and C E Jones

The Deep Space Network Progress Report 42-50 January and February 1979, pp 181–188, April 15, 1979

For abstract, see Brockman, M H

JONES, K L.

J030 One Mars Year. Viking Lander Imaging Observations

K L Jones (Planetary Research, Inc),
R E Arvidson (Washington University),
E A Guinness (Washington University),
S L Bragg (Washington University),
S D Wall (Langley Research Center),
C E. Carlston (Martin Marietta Corporation), and
D. G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

Throughout the first complete Mars year during which they were on the planet, the imaging systems aboard the two Viking landers documented a variety of surface changes Surface condensates, consisting of both solid H_2O and CO_2, formed at the Viking 2 lander site during the winter Additional observations suggest that surface erosion rates due to dust redistribution may be substantially less than those predicted on the basis of pre-Viking observations

JONES, W. L.

J031 Seasat Scatterometer. Results of the Gulf of Alaska Workshop

W L Jones, et al

Science, Vol. 204, pp. 1413–1415, June 29, 1979

The Seasat microwave scatterometer was designed to measure, globally and in nearly all weather, wind speed to an accuracy of ±2 meters per second and wind direction to ±20 deg in two swaths 500 kilometers wide on either side of the spacecraft For two operating modes in rain-free conditions, a limited number of comparisons to high-quality surface truth indicates that these specifications may have been met.

Contributors to this article include

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City University of New York: W J. Pherson

Frank J. Wentz and Associates F J Wentz

University of California, Los Angeles M G. Wurtele

JUDGE, D. L.

J032 Measurement of the Profile and Intensity of the Solar He I λ584-Å Resonance Line

J O. Maloy (Melcon System Design Consultants), R. W Carlson, U G Hartmann (Ball Aerospace Systems Division), and D L Judge (University of Southern California)

J Geophys Res, Vol 83, No. A12, pp 5685–5690, December 1, 1978

For abstract, see Maloy, J O

KAELBLE, D. H.

K001 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes: Second Annual Report, July 1977–July 1978

J. Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D. Lawson, T Terranova, A Yavrouian, L. Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D. H. Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

KAHLE, A B.

K002 Processing of Multispectral Thermal IR Data for Geologic Applications

A B Kahle, D P. Madura, and J M Soha

JPL Publication 79-89, November 15, 1979

Multispectral thermal IR data were acquired with NASA's Bendix 24-channel scanner flown in an aircraft over the E Tintic Utah mining district These digital image data required extensive computer processing in order to put the information into a format useful for a geologic photo-interpreter Simple enhancement procedures were not sufficient to reveal the total information content because the data were highly correlated in all channels The data were shown to be dominated by temperature variations across the scene, while we were interested in the much more subtle spectral variations between the different rock types In this paper we discuss the image processing techniques employed to analyze these data

The first step was to create a view-angle-corrected image from each tape to evaluate data quality and select the area of interest Next, following the work of Vincent and Thomson (1972), ratio images were produced for each pair of adjacent wavelength channels, and a color ratio composite created To quantify the data further, onboard sensor calibration and an atmospheric model utilizing Salt Lake City radiosonde data were used to determine the surface brightness temperature from the 11-12 micrometer channel This surface brightness temperature, combined with the calibration and atmospheric model, was then used to create emissivity images for each of the remaining wavelength channels A color ratio composite of three emissivity images provided improved separation but was not fully satisfactory, due in part to increased noise Finally a principal component transformation, followed by a Gaussian stretch, followed by an inverse transformation to the original axes achieved satisfactory separation of many of the major rock types This procedure was invoked for both the raw radiance data and the emissivity images While both revealed about the same amount of rock-type information, the former was judged to be much easier to interpret because the topographic information intrinsic in the temperature was still contained in the final product

KALFAYAN, S. H.

K003 Compatibility of Elastomers in Alternate Jet Fuels

S H Kalfayan, R F. Fedors, and W. W Reilly

JPL Publication 79-28, June 1, 1979

The compatibility of elastomeric compositions of known resistance to aircraft fuels was tested for potential use in Jet A type fuels obtainable from alternate sources, such as coal Since such fuels were not available at the time, synthetic alternate fuels were prepared by adding tetralin to a petroleum based Jet A type fuel to simulate coal derived fuels which are expected to contain higher amounts of aromatic and hydroaromatic hydrocarbons The elastomeric compounds tested were based on butadiene-acrylonitrile rubber (NBR), a castable Thiokol polysulfide rubber (T), and a castable fluorosilicone rubber (FVMQ) Batches of various cross-link densities of these rubbers were made and their chemical stress relaxation behavior in fuel, air, and nitrogen, their swelling properties, and response to mechanical testing were determined The object was to understand the nature of the chemical changes that take place in these elastomer compositions on aging and to be able to make approximate estimates of their service life from the data obtained

Prepared for the NASA Lewis Research Center

K004 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W A Mueller, S H Kalfayan, W. W Reilly, A H Yavrouian, I D. Mosesman, and J. D. Ingham

JPL Publication 79-40, May 15, 1979

For abstract, see Mueller, W. A.

KAPRAL, R.

K005 Molecular Rotation and Reorientation: Microscopic and Hydrodynamic Contributions

J T. Hynes (University of Colorado),
R Kapral (University of Toronto), and
M Weinberg

J Chem Phys, Vol, 29, No 6, pp. 2725–2733, September 15, 1978

For abstract, see Hynes, J. T.

KARPAS, Z.

K006 An Ion Cyclotron Resonance Study of Reactions of Some Atomic and Simple Polyatomic Ions With Water

Z Karpas (California Institute of Technology),
V G. Anicich, and W T. Huntress, Jr

Chem. Phys Lett, Vol. 59, No 1, pp 84–86, November 1, 1978

Reactions of various positive ions with water vapor were studied by ion cyclotron resonance mass spectrometric techniques Rate constants and product distributions were determined for reactions of the ions Ar^+, Co^+, N_2^+, and CO_2^+, CH_2^+, and CH_4^+, CH_2Cl^+, HCO^+, H_2CO^+, H_2COH^+, H_2S^+ and HS^+ The results obtained in this work are compared with earlier reported data where available.

K007 Reactions of OH^+ and H_2O^+ Ions With Some Diatomic and Simple Polyatomic Molecules

Z Karpas (California Institute of Technology) and
W T. Huntress, Jr

Chem Phys. Lett, Vol. 59, No 1, pp 87–89, November 1, 1978

The rate constants and product distributions of the reactions of OH^+ and H_2O^+ with some diatomic and simple polyatomic molecules were studied by ion cyclotron resonance (ICR) mass spectrometric techniques Reaction rates with CO, NO, O_2, N_2, CO_2, H_2S, N_2O, H_2CO, CH_4 and CD_4 were measured Charge transfer and proton transfer were generally observed in cases for which the reaction channel is exothermic, but processes involving rearrangement were not found

K008 An Ion Cyclotron Resonance Study of Reactions of Ions With Hydrogen Atoms

Z Karpas (California Institute of Technology),
V. Anicich, and W T. Huntress, Jr.

J Chem. Phys., Vol. 70, No. 6, pp 2877–2881, March 15, 1979

Reactions of H_2^+, HeH^+, and CO_2^+ ions with hydrogen atoms, and the reactions of D_2^+, CO_2^+, CO^+, N_2^+, and HCN^+ with deuterium atoms, were studied using ion cyclotron resonance techniques These reactions proceed predominantly via a charge transfer mechanism The rate constants measured are 6 4, 9 1, 1 1, 5.0, 0 84, 0 90, 1 2, and 0 37 $\times$ 10^{-10} cm^3/sec, respectively Hydrogen ions of the types CH_n^+ and $C_2H_n^+$, where n = 2–4, do not react with H or D atoms

KASHANI, A. K.

K009 Potential for Cogeneration of Heat and Electricity in California Industry—Phase II: Final Report

H S Davis, E. Edelson, A K Kashani, and
M. L Slonski

JPL Publication 78-109, January 1, 1979

For abstract, see Davis, H S

KATOW, M. S.

K010 Minimizing the RMS Surface Distortions from Gravity Loadings of the 34-m HA-DEC Antenna for Deep Space Missions

M. S. Katow

The Deep Space Network Progress Report 42-52 May and June 1979, pp 94–98, August 15, 1979

The computer analysis of the 34-m HA-DEC antenna by the IDEAS program provided the rms distortions of the surface panels support points for full gravity loadings in the three directions of the basic coordinate system of the computer model The rms distortions for the gravity vector not in line with any of the three basic directions were solved and contour plotted starting from three surface panels setting declination angle By inspections of the plots, it was concluded that the setting or rigging angle of minus 15 degrees declination minimized the rms distortions for sky coverage of plus or minus 22 declination angles to 10 degrees of ground mask

KATSAROS, K. B.

K011 Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop

R. G. Lipes, R. L. Bernstein (Scripps Institution of Oceanography), V J Cardone (Oceanweather, Inc.), K B Katsaros (University of Washington), E. G. Njoku, A L. Riley, D. B Ross (Atlantic Oceanic and Meteorological Laboratory), C T. Swift (Langley Research Center), and F J. Wentz (Frank J. Wentz and Associates)

Science, Vol 204, pp. 1415–1417, June 29, 1979

For abstract, see Lipes, R. G

KAUFMAN, H. R.

K012 Charge-Exchange Plasma Environment for an Ion Drive Spacecraft

H R. Kaufman (Colorado State University) and M. R Carruth, Jr

JPL Publication 79-90, October 1, 1979

It is necessary to have an understanding of the charge-exchange plasma environment around a spacecraft that uses mercury ion thrusters for propulsion so that the interactions between this environment and the spacecraft can be determined A model is reviewed which describes the propagation of the mercury charge-exchange plasma and extended to describe the flow of the molybdenum component of the charge-exchange plasma The uncertainties in the models for various conditions are discussed throughout this report Such topics as current drain to the solar array, charge-exchange plasma material deposition, and the effects of space plasma on the charge-exchange plasma propagation are addressed

KAULA, W. M

K013 A Tidal Theory for the Origin of the Solar Nebula

M Kobrick and W. M Kaula (University of California, Los Angeles)

Moon and Planets, Vol 20, pp 61–101, 1979

For abstract, see Kobrick, M

KEIHM, S. J.

K014 Interpretation of Ground-Based Microwave Measurements of the Moon Using a Detailed Regolith Properties Model

B L Gary and S J. Keihm (Lamont-Doherty Geological Observatory)

Proc Lunar Planet. Sci. Conf 9th, pp 2885–2900, 1978

For abstract, see Gary, B L

KENDALL, W. B.

K015 Measurements of Turbulence in the Venus Atmosphere Deduced from Pioneer Venus Multiprobe Radio Scintillations

R. Woo, J. W Armstrong, and W B. Kendall (Mark Resources)

Science, Vol. 205, pp. 87–89, July 6, 1979

For abstract, see Woo, R

KEREM, A.

K016 A Mars Airplane...Oh Really?

V C Clarke, Jr., A Kerem (Developmental Sciences, Inc), and R. Lewis (Lear Seigler, Inc)

Preprint 79-0067, AIAA Seventeenth Aerosp Sci Meet., New Orleans, La., January 15–17, 1979

For abstract, see Clarke, V. C , Jr

KEYSER, L. F.

K017 Absolute Rate Constant and Temperature Dependence of the Reaction Between Hydrogen (^2S) Atoms and Ozone

L F Keyser

J. Phys Chem., Vol 83, No 6, pp 645–648, 1979

The absolute rate constant of the reaction H (^2S) + O_3 → OH($X^2\Pi$, $v \leq 9$) + O_2 was determined between 196 and 424 K using the discharge flow resonance fluorescence technique The experiments were carried out under pseudo-first-order conditions with ozone in large excess Ozone concentrations were determined by UV photometry both up- and downstream of the reaction zone The rate constant results are best fitted by the following Arrhenius expression k (cm^3 molecule^{-1} s^{-1}) = (1 50 ± 0 18) × 10^{-10} exp(−499 ± 32/T), 196 ≤ T ≤ 424 K Addition of vibrational quenchers to the reaction mixture showed that secondary reactions of vibrationary excited OH are not important under the conditions used The present results are compared with earlier measurements of this rate constant

KHANNA, S. K.

K018 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S K Khanna, S P S Yen, R. B Somoano, P M Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R. Williams (California Institute of Technology), and S Samson (California Institute of Technology)

Phys Rev B Condensed Matter, Vol. 19, No 2, pp 655–663, January 15, 1979

Bis(tetrathiatetracene)triiodide [$(TTT)_2I_3$] is a quasi-one-dimensional organic metal consisting of segregated stacks of tetrathiatetracene (TTT) cation radicals and polyiodide chains The TTT and iodine (I) sublattices are incommensurate with respect to each other, and the iodine lattice exhibits considerable disorder In this paper, we report measurements of the conductivity and thermoelectric power of single crystals of TTT_2I_3 in which the degree of disorder is varied The disorder is modified by crystallization processes and is characterized by x-ray studies $(TTT)_2I_3$ exhibits metallic behavior at high temperatures ($100\ K < T < 300\ K$) even in the presence of considerable disorder Below 100 K, $(TTT)_2I_3$ undergoes a broad metal-nonmetal transition. The effects of disorder on this transition and on the low-temperature transport properties are discussed The present results are compared with data on $(TTT)_2I_3$ taken by other investigators

KIEFFER, H. H.

K019 Thermal Infrared Properties of the Martian Atmosphere. 1. Global Behavior at 7, 9, 11, and 20 μm

T Z. Martin (University of California, Los Angeles), A R. Peterfreund (Arizona State University), E D. Miner, H. H. Kieffer (U.S Geological Survey), and G E Hunt (University College London, London, England)

J Geophys Res, Vol 84, No B6, pp 2830–2842, June 10, 1979

For abstract, see Martin, T Z

KLEINE, H.

K020 Software Design and Documentation Language

H Kleine

JPL Publication 77-24, Rev 1, August 1, 1979

The objective of the Software Design and Documentation Language (SDDL) is to provide an effective communications medium to support the design and documentation of complex software applications This objective is met by providing (1) a processor which can convert design specifications into an intelligible, informative machine-reproducible document, (2) a design and documentation language with forms and syntax that are simple, unrestrictive, and communicative, and (3) methodology for effective use of the language and processor

The SDDL processor is written in the SIMSCRIPT II programming language and has been implemented on the UNIVAC 1108, the IBM 360/370, and Control Data machines

KLIORE, A. J.

K021 Liquid Content of the Lower Clouds of Venus as Determined from Mariner 10 Radio Occultation

A J Kliore, C Elachi, I R Patel, and J B. Cimino (California Institute of Technology)

Icarus, Vol 37, No. 1, pp 51–72, January 1979

S-band (13 06-cm) and X-band (3 56-cm) radio occultation data obtained during the flyby of Venus by Mariner 10 on February 5, 1974 were analyzed to obtain the effects of dispersive microwave absorption by the clouds of Venus The received power profiles were first corrected for the effects of refraction in the atmosphere of Venus, programmed changes in the pointing direction of the high-gain antenna, and limit-cycle motion of the spacecraft attitude control system The resulting excess attenuation profiles presumably due to cloud absorption have been inverted discretely to obtain profiles of absorption coefficient at the two wavelengths The ratios of the absorptivities are consistent with a sulfuric acid–water mixture as the constituent of the absorbing clouds, having a sulfuric acid concentration of 75 ± 25% Three absorption peaks are evident in the profiles at altitudes of 68, 60, and 48 km With a sulfuric acid concentration of 75%, the upper cloud has a peak liquid content of 0 08 g/m^3, and an integrated content of 0 024 g/cm^2, which corresponds roughly to terrestrial stratus or altostratus clouds The major absorption layer has a peak of 1 1 g/m^3 at an altitude of 48 km, with an integrated content of 0 5 g/cm^2, similar to that of terrestrial cumulus and cumulonimbus clouds The absorption ratios for the middle cloud at 60 km are not consistent with a sulfuric acid–water mixture

K022 The Polar Ionosphere of Venus Near the Terminator from Early Pioneer Venus Orbiter Radio Occultations

A J. Kliore, R. Woo, J W. Armstrong, I R Patel, and T. A. Croft (SRI International)

Science, Vol 203, pp 765–768, February 23, 1979

Fourteen profiles of electron density in the ionosphere of Venus were obtained by the dual-frequency radio occultation method with the Pioneer Venus orbiter between 5 and 30 December 1978 The solar zenith angles for these

measurements were between about 85 deg and 92 deg, and the latitudes ranged from about 81 deg to 88 deg (ecliptic north). In addition to the expected decrease in peak electron density from about 1.5×10^5 to 0.5×10^5 per cubic centimeter with increasing solar zenith angle, a region of almost constant electron density above about 250 kilometers was observed. The ionopause height varies from about 300 to 700 kilometers and seems to be influenced by diurnal changes in solar wind conditions. The structures of the profiles are consistent with models in which O_2^+ dominates near the ionization peak and is replaced by O^+ at higher altitudes.

KLOSE, J. C.

K023 Seasat Low-Rate Data System

J. W. Brown, G. C. Cleven, J. C. Klose, D. B. Lame, and C. A. Yamarone

Science, Vol. 204, pp. 1407–1408, June 29, 1979

For abstract, see Brown, J. W.

KOBRICK, M.

K024 A Tidal Theory for the Origin of the Solar Nebula

M. Kobrick and W. M. Kaula (University of California, Los Angeles)

Moon and Planets, Vol. 20, pp. 61–101, 1979

There are two angular momentum (AM) problems associated with the formation of stars in general and the solar system in particular. The first is how to dispose of the AM possessed by turbulent protostellar clouds. Two-dimensional calculations of the gravitational infall of rotating gas clouds by several authors now indicate that stars are formed in groups or clusters rather than as single entities. Added evidence comes from observation of probable regions of star formation and young clusters, plus the fact that most stars are presently members of binaries or other multiples. Thus the first problem is solved by postulating the fragmentation of massive clouds with most of the AM ending up in the relative orbits. These clusters are notoriously unstable and evolve with the ejection of single stars like the Sun.

The second problem is the uneven distribution of AM with mass in the solar system. It turns out that the collapse time for the majority of the infalling material is comparable to the time necessary for significant dynamical interaction of the protostellar fragment with its neighbors. It is found here through calculations utilizing very simplified numerical models that the last few tens of percent of infalling material can easily have sufficient AM transferred to it by the tidal action of passing protostars to form a solar nebula and ensure alignment of the solar spin. The most important parameter is the degree of central condensation: fragments without several tenths of a solar mass in a central core tend to be torn apart by encounters, or at least stimulated into binary fission. A stabilizing central mass maintains its identity and acquires a rotating envelope of material.

KOH, J. L.

K025 Deep Space Network Feasibility Study of Terminating Southern California Edison Electrical Service to Goldstone

J. L. Koh

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 169–175, October 15, 1979

A preliminary study on cost comparison of purchased power versus generated power for the Goldstone Deep Space Communications Complex (GDSCC) shows that there are economic incentives to generate the A-C power requirements for the complex. The justification can only be sustained if the waste heat from the cooling water and/or exhaust systems is recovered for reuse.

KOLBLY, R. B.

K026 Evaluation of the VA-876P Klystron for the 20-kW X-Band Uplink Transmitter

R. B. Kolbly

The Deep Space Network Progress Report 42-54 September and October 1979, pp. 41–50, December 15, 1979

Initial evaluation test results of the proposed 20-kW X-band uplink klystron are presented. Operating parameters are compared with the existing DSN 20-kW S-band klystrons. Measured differential RF phase sensitivities vs operating parameter changes are exhibited.

KOLIWAD, K. M.

K027 Effect of Grain Boundaries in Silicon on Minority-Carrier Diffusion Length and Solar-Cell Efficiency

T. Daud, K. M. Koliwad, and F. G. Allen (University of California, Los Angeles)

Appl. Phys. Lett., Vol. 33, No. 12, pp. 1009–1011, December 15, 1978

For abstract, see Daud, T.

KOMAREK, T.

K028 The Viking Relativity Experiment

I. I Shapiro (Massachusetts Institute of Technology), R. D. Reasenberg (Massachusetts Institute of Technology), P. E. MacNeil (Massachusetts Institute of Technology), R B. Goldstein (Massachusetts Institute of Technology), J P. Brenkle, D L Cain, T. Komarek A I Zygielbaum, W. F Cuddihy (Langley Research Center), and W. H Michael, Jr. (Langley Research Center)

J Geophys Res, Vol. 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

KUMAR, S

K029 A Model of the Variability of the Venus Ionopause Altitude

R. S. Wolff, B E Goldstein, and S Kumar

Geophys Res Lett, Vol 6, No. 5, pp 353–356, May 1979

For abstract, see Wolff, R. S.

K030 The Stability of an SO_2 Atmosphere on Io

S Kumar

Nature, Vol 280, No. 5725, pp. 758–760, August 30, 1979

Measurements of Io's volcanism and the plasma torus suggest that SO_2 is a major constituent of its atmosphere

K031 Non-Thermal Hydrogen in the Venus Exosphere: The Ionospheric Source and the Hydrogen Budget

S. Kumar, D. M Hunten (University of Arizona), and A L Broadfoot (Kitt Peak National Observatory)

Planet Space Sci, Vol. 26, pp 1063–1075, 1978

A non-thermal or "hot" Venus corona of H atoms has been observed by Mariners 5 and 10 and Venera 9 Of the sources investigated, reaction of H_2 with ionospheric O^+ is still the strongest. It can explain the smaller densities but falls somewhat short of the largest (from Mariner 5). The subsequent recombination of OH^+, supplemented by solar-wind processes, may give an escape flux of 10^7 atoms cm^{-2} s^{-1} The low density of thermal H atoms on the day side has previously been attributed to either a large eddy diffusion coefficient or an escape flux tenfold greater than this We support an alternative mechanism, suggested by Hartle and Mayr· the hydrogen is swept to the nightside by strong thermospheric winds This process is analogous to the "Johnson pump" for the terrestrial winter helium bulge Large nightside bulges of H and H_2 are predicted, the night/day density ratio is estimated to be as large as 100 for each.

KUO, T. J.

K032 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T Fujita, R Manvi, E J. Roschke, N. El Gabalawi, G Herrera, T. J Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

KUPFERMAN, P. N.

K033 Discovery of Currently Active Extraterrestrial Volcanism

L A Morabito, S P Synnott, P. N Kupferman, and S A Collins

Science, Vol 204, p 972, June 1, 1979

For abstract, see Morabito, L A.

KUPISZEWSKI, A

K034 The Gyrotron: A High-Frequency Microwave Amplifier

A Kupiszewski

The Deep Space Network Progress Report 42-52 May and June 1979, pp 8–12, August 15, 1979

The purpose of this article is to introduce a proposed microwave amplifier mechanism for future generations of millimeter high-power uplinks to spacecraft and planetary radar transmitters Basic electron-electromagnetic field interaction theory for RF power gain is explained, and the starting point for general analytical methods leading to detailed design results is presented

K035 A Point Design for a Gyrotron Traveling Wave Tube Amplifier

A Kupiszewski

The Deep Space Network Progress Report 42-53 July and August 1979, pp 33–39, October 15, 1979

The purpose of this article is to present a point design for a gyro-TWT amplifier Steps for deriving the growth rate are explained and design results presented Parameters for some support equipment are given and consequences of potential design parameter changes are examined

K036 An Examination of Ancillary Equipment for a Proposed 34.3 GHz High Power Gyrotron TWT Amplifier

A Kupiszewski

The Deep Space Network Progress Report 42-54 September and October 1979, pp 34–40, December 15, 1979

A short review of gyrotron developments and applications is given with attention to both theory and experiments Parameters for a point design for a gyrotron TWT amplifier described in a previous article are listed again, and a detailed examination of ancillary equipment is made with emphasis on the availability of high voltage and handling facilities at Goldstone. A safety-interlock tree for insuring longer tube life under operating conditions is proposed, and a sequence for turn on/off of the proposed tube is given. In addition, reasoning for the expectation of multimode output is presented

KURTZ, D. W.

K037 Aerodynamic Characteristics of Sixteen Electric, Hybrid, and Subcompact Vehicles

D. W Kurtz

JPL Publication 79-59, June 30, 1979

This report presents an elementary electric and hybrid vehicle aerodynamic data base and describes how it was developed Sixteen electric, hybrid, and subcompact production vehicles were tested in the Lockheed-Georgia low-speed wind tunnel Zero-yaw drag coefficients ranged from a high of 0 58 for a boxey delivery van and an open roadster to a low of about 0 34 for a current four-passenger prototype automobile which was designed with aerodynamics as an integrated parameter Vehicles were tested at yaw angles up to 40 degrees and a wind weighting analysis is presented which yields a vehicle's effective drag coefficient as a function of wind velocity and driving cycle Other parameters investigated included the effects of windows open and closed, radiators open and sealed, and pop-up headlights

Complex six-component force and moment data are presented in both tabular and graphical formats Only limited commentary is offered since, by its very nature, a data base should consist of unrefined reference material

A justification for pursuing efficient aerodynamic design of EHVs is presented which demonstrates the partitioning of the road energy requirement and the dependence of range upon the aerodynamic drag component over an electric vehicle driving cycle

Establishing this data base is one required element of a larger task, the purpose of which is to develop an aerodynamic design guide for use by the EHV industry

Prepared for the U S Department of Energy.

KWAN, Y. Y.

K038 The Interacting States of an Asymmetric Top Molecule XY_2 of the Group C_{2v} Application to Five Interacting States (101), (021), (120), (200), and (002) of $H_2{}^{16}O$

Y. Y Kwan

J Mol Spectros, Vol. 71, pp. 260–280, 1978

A computer program which can fit simultaneously the energy levels of any number of interacting vibrational states for an asymmetric top molecule XY_2 of the group C_{2v} has been developed Interactions up to fourth-order terms in the Hamiltonian, including three kinds of Fermi-type interaction and three kinds of Coriolis-type interaction have been taken into account in the computer program The part of the Hamiltonian which is diagonal in the vibrational quantum numbers is a Watson-type Hamiltonian with a maximum of 29 parameters

This program has been applied to the five interacting states (101), (021), (120), (200), and (002) of $H_2{}^{16}O$ Three hundred ninety-six observed energy levels of these states were fitted simultaneously using 96 effective parameters The fit was satisfactory, with 85% of the levels reproduced within 40×10^{-3} cm^{-1}. A large fourth-order effect of the Darling–Dennison resonance interaction between the states (200) and (002) has been found in the fit.

LAI, J. Y.

L001 Automated Vehicle Guidance Using Discrete Reference Markers

A. R Johnston, T Assefi, and J. Y. Lai

IEEE Trans Vehicular Technol, Vol VT-28, No 1, pp 95–106, February 1979

For abstract, see Johnston, A. R.

LAME, D. B.

L002 Seasat Mission Overview

G H Born, J. A Dunne, and D B. Lame

Science, Vol 204, pp 1405–1406, June 29, 1979

For abstract, see Born, G. H

L003 Seasat Low-Rate Data System

J W. Brown, G C. Cleven, J. C. Klose, D. B Lame, and C A Yamarone

Science, Vol 204, pp 1407–1408, June 29, 1979

For abstract, see Brown, J W.

LANDEL, R. F.

L004 Finite Deformation Behavior of Elastomers: Dependence of Strain Energy Density on Degree of Crosslinking for SBR

K. Tsuge (Hokkaido University, Japan), R. J Arenz (Loyola Marymount University), and R. F Landel

Rubber Chem. Technol, Vol 51, No 5, pp 948–958, November–December 1978

For abstract, see Tsuge, K

LANE, A. L.

L005 Voyager 1 Encounter with the Jovian System

E C Stone (California Institute of Technology) and A. L. Lane

Science, Vol. 204, pp 945–948, June 1, 1979

For abstract, see Stone, E C

LANG, K R.

L006 Interferometric Observations of the Quiet Sun at 8 Millimeter Wavelength

M A Janssen, E. T. Olsen, and K R Lang (Tufts University)

Astrophys. J, Vol 228, pp. 616–623, March 1, 1979

For abstract, see Janssen, M A

LANSING, F. L.

L007 Thermal Power Systems Advanced Solar Thermal Technology Project—HEAP. Heat Energy Analysis Program, a Computer Model Simulating Solar Receivers

F L Lansing

JPL Publication 79-3, January 15, 1979

Thermal design of solar receivers is commonly accomplished via approximate models, where the receiver is treated as an isothermal box with lumped quantities of heat losses to the surroundings by radiation, conduction, and convection.

These approximate models, though adequate for preliminary design purposes, are not detailed enough to distinguish between different receiver designs, or to predict transient performance under variable solar flux, ambient temperatures, etc A computer code has been written for this purpose and is given the name "HEAP", an acronym for Heat Energy Analysis Program HEAP has a basic structure that fits a general heat transfer problem, but with specific features that are custom-made for solar receivers The code is written in MBASIC computer language

This document explains the detailed methodology followed in solving the heat transfer problem, and includes a program flow chart, an explanation of input and output tables, and an example of the simulation of a cavity-type solar receiver

Prepared for the U.S Department of Energy, DOE/JPL-1060-13, Distribution Category UC-62

L008 The Updated Algorithm of the Energy Consumption Program (ECP)—A Computer Model Simulating Heating and Cooling Energy Loads in Buildings

F L Lansing, D M Strain, V W Chai, and S Higgins

The Deep Space Network Progress Report 42-49· November and December 1978, pp 107–115, February 15, 1979

The Energy Consumption Computer Program (ECP) was developed to simulate building heating and cooling loads and compute thermal and electric energy consumption and cost This article reports on the new additional algorithms and modifications made in an effort to widen the areas of application The program structure has been rewritten accordingly to refine and advance the building model and to further reduce the processing time and cost The program is noted for its very low cost and ease of use compared to other available codes The accuracy of computations is not sacrificed however, since the results are expected to lie within ±10% of actual energy meter readings

L009 A Two-Dimensional Thermal Analysis of a New High-Performance Tubular Solar Collector

F. L Lansing and C S Yung

The Deep Space Network Progress Report 42-49· November and December 1978, pp 116–131, February 15, 1979

This article is the first of two which describe and analyze the thermal performance of the new General Electric vacuum tube solar collector. The assumptions and mathematical modeling are presented The problem is reduced to the formulation of two simultaneous linear differential equations characterizing the collector thermal behavior After applying the boundary conditions, a general solution is obtained which is found similar to the

general Hottel, Whillier, and Bliss form but with a complex flow factor

L010 Computerized Simulation and Parameterization of a New High-Performance Tubular Solar Collector

F L Lansing and C S Yung

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 161–180, April 15, 1979

This work is the second of two reports describing the thermal analysis, computerized performance, simulation and performance sensitivity of the new General Electric vacuum tube solar collector The collector is considered a potential candidate for future DSN solar heating and cooling applications The first report presented details of the two-dimensional thermal model of the solar collector at steady state In this report, the second phase of the study is presented to include the computer simulation and the performance parameterization Comparison of the simulated performance with the manufacturer's test data showed good agreement at wide ranges of operating conditions The effects of nine major design and performance variables on the performance sensitivity were presented The results of this parameterization study were supportive in detecting the areas of design modifications for performance optimization.

L011 Damping of Temperature Fluctuations Using Porous Matrices

F L Lansing

The Deep Space Network Progress Report 42-54· September and October 1979, pp. 104–113, December 15, 1979

This article examines the concept of utilizing the thermal attenuation characteristics of porous matrices and their thermal flywheel effect in damping the air temperature fluctuations for highly temperature-sensitive applications The mathematical formulation of the problem in a dimensionless form is presented together with the relevant boundary conditions The periodic temperature solution at a given matrix section has shown that the amplitude will be reduced by a logarithmic decrement and that the temperature cycle possesses a phase angle lag which depends on various flow and material properties, as well as the frequency of the temperature fluctuations The effect of different material properties for porous matrix selection was examined by a numerical example

LASCU, D. M.

L012 DSN Energy Data Base Preliminary Design

E R Cole, L. O. Herrera, and D. M Lascu

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 167–181, June 15, 1979

For abstract, see Cole, E R

LATTA, A. F.

L013 The Effects of Regional Insolation Differences Upon Advanced Solar Thermal Electric Power Plant Performance and Energy Costs

A F Latta, J M Bowyer, T Fujita, and P H Richter

JPL Publication 79-39, March 15, 1979

This study determines the performance and cost of four 10 MWe advanced solar thermal electric power plants sited in various regions of the continental United States Each region has different insolation characteristics which result in varying collector field areas, plant performance, capital costs and energy costs

In the context of advanced technology, the solar plants are conceptualized to begin commercial operation in the year 2000 It is assumed that major subsystem performance will have improved substantially as compared to that of pilot plants currently operating or under construction The net average annual system efficiency is therefore roughly twice that of current solar thermal electric power plant designs Similarly, capital costs reflecting goals based on high-volume mass production that are considered to be appropriate for the year 2000 have been used These costs, which are approximately an order of magnitude below the costs of current experimental projects, are believed to be achievable as a result of the anticipated sizeable solar penetration into the energy market in the 1990–2000 timeframe

The paraboloidal dish, central receiver, cylindrical parabolic trough, and compound parabolic concentrators comprise the advanced collector concepts studied All concepts exhibit their best performance when sited in regional areas such as the sunbelt where the annual insolation is high. The regional variation in solar plant performance has been assessed in relation to the expected rise in the future cost of residential and commercial electricity supplied by conventional utility power systems in the same regions

The report contains a discussion of the regional insolation data base, a description of the solar systems performance and costs, and a presentation of a range for the forecast cost of conventional electricity by region and nationally over the next several decades

Prepared for the U S Department of Energy, DOE/JPL-1060-17, Distribution Category UC-62

LAU, K. Y.

L014 **A Voltage-Controlled Optical Radio Frequency-Phase Shifter**

K Y Lau

The Deep Space Network Progress Report 42-53 July and August 1979, pp 24–32, October 15, 1979

The problem of stabilizing an optical-fiber link, in which an RF-modulated optical wave is used for frequency standard transmission, is investigated in this article Higher reliability is expected if RF phase-shifting, phase error detection, etc , can be done directly on the modulated optical signal In the following pages, a variable optical phase shifter for the above purpose is proposed, and its properties are illustrated

LAUDENSLAGER, J. B.

L015 **Ion-Molecule Processes in Lasers**

J B Laudenslager

Kinetics of Ion-Molecule Reactions, Plenum Publishing Corp , New York, pp. 405–436, 1979

This paper discusses high pressure lasers with reference to the electron-beam and fast-discharge technologies which make them possible, and discusses laser excitation methods as a means of understanding the ion chemistry occurring in various laser systems

LAUE, E

L016 **Reactor for Simulation and Acceleration of Solar Ultraviolet Damage**

E Laue and A. Gupta

JPL Publication 79-92, September 21, 1979

An environmental test chamber providing acceleration of UV radiation and precise temperature control (±1°C) has been designed, constructed and tested This chamber allows acceleration of solar ultraviolet up to 30 suns while maintaining temperature of the absorbing surface at 30°C–60°C This test chamber utilizes a filtered medium pressure mercury arc as the source of radiation, and a combination of selenium radiometer and silicon radiometer to monitor solar ultraviolet (295–340 nm) and total radiant power output, respectively

Details of design and construction and operational procedures are presented along with typical test data

Prepared for the U S Department of Energy, DOE/JPL 1012-31

LAWSON, D.

L017 **Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes Second Annual Report, July 1977–July 1978**

J Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D Lawson, T Terranova, A. Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

LAWSON, D. D.

L018 **Methods for Calculation of Engineering Parameters for Gas Separation**

D. D. Lawson

JPL Publication 79-46, October 1, 1979

A group additivity method has been generated which makes it possible to estimate, from the structural formulas alone, the energy of vaporization and the molar volume at 25°C of many nonpolar organic liquids From these two parameters and appropriate thermodynamic relations it is then possible to predict the vapor pressure of the liquid phase, and the solubility of various gases in nonpolar organic liquids It is also possible to use the data to evaluate organic and some inorganic liquids for use in gas-separation stages or liquids as heat exchange fluids in prospective thermochemical cycles for hydrogen production

Prepared for the U S Department of Energy

L019 **Potential Heat Exchange Fluids for use in Sulfuric Acid Vaporizers**

D. D. Lawson and G R. Petersen

JPL Publication 79 81, October 1, 1979

A series of liquids have been screened as candidate heat exchange fluids for service in thermochemical cycles for hydrogen production that involve direct contact of the fluid with sulfuric acid and vaporization of the acid The required chemical and physical criteria of the liquids are described and the results of some preliminary high temperature test data are presented

Prepared for the U S Department of Energy.

LAY, R.

L020 **Radio Frequency Carrier Arraying**

R Lay

The Deep Space Network Progress Report 42-50 January and February 1979, pp 206–215, April 15, 1979

Carrier arraying of receiving systems provides an improvement in the signal-to-noise ratio relative to a single receiving system Measurements using arrays of up to four receiving systems have been conducted to verify the predicted signal-to-noise ratio improvement The measured signal-to-noise ratio improvement agrees with the predicted within 0 2 dB

LAYLAND, J W.

L021 Extrapolated UT1 Effect on VLBI Clock Sync

J. W Layland and B V H Saxberg

The Deep Space Network Progress Report 42-50 January and February 1979, pp 56–59, April 15, 1979

In this article we calculate the two-sample Allen Variance of the extrapolated UT1 numbers, and use this calculation to infer its effect on DSN clock stability measures obtained via VLBI clock synchronization For measurement time $T < 300$ s, or $T > 3$ days, the error in UT1 and its variations do not seriously degrade the stability measurement relative to anticipated variations in the clocks themselves

L022 Receiver Design Concepts for ΔVLBI and Differential One-Way Range

J W Layland

The Deep Space Network Progress Report 42-50 January and February 1979, pp 60–67, April 15, 1979

This report describes three alternative structures for the receiving instrument for wideband spacecraft ΔVLBI or differential one-way range navigation It does not contain a fully definitive analysis of this subject Rather, it is intended to introduce to the reader ways of thinking about the ΔVLBI instrument that are more closely related to a conventional spacecraft instrument than to a radio-science VLBI instrument

L023 On Improved Ranging—II

J W. Layland and A I Zygielbaum

The Deep Space Network Progress Report 42-50 January and February 1979, pp 68–73, April 15, 1979

This is the second in a series of articles intended to develop a road map for future developments in two-way range instrumentation In the first article, we presented a rationale and experimental evidence for improvements to ranging which seem to be achievable through reasonably minor changes to the tracking station In this article, we develop a heuristic overview of the principal systematic error sources for ranging, and some of the remedies for them Our principal recommendations are for wider system and range-code bandwidths, and for simplification of the precision-defining form of the range code

L024 Demonstration of Remote Clock Monitoring by VLBI, With Three Baseline Closure

C M Cheetham, W. J Hurd, J W Layland, G. A. Madrid, and T. P Yunck

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 40–53, October 15, 1979

For abstract, see Cheetham, C M

LE CROISSETTE, D. H.

L025 Determinants of Atherosclerosis Progression and Regression

S H Brooks (University of Southern California School of Medicine), D H Le Croissette, D H Blankenhorn (University of Southern California School of Medicine)

Arch Surg., Vol. 113, pp. 75–79, January 1978

For abstract, see Brooks, S H

L026 Swept Frequency Ultrasonic Measurements of Tissue Characteristics

P M Gammell, J A Roseboro, R C. Heyser, D H Le Croissette, and R L Wilson (University of Southern California)

Proc Thirtieth Annu Conf. on Eng in Med & Bio, Los Angeles, Calif, November 5–9, 1977, p 229

For abstract, see Gammell, P M

L027 Wideband Transducer for Tissue Characterization

P M Gammell and D. H. Le Croissette

Ultrasonics, Vol 16, No 5, pp 233–234, September 1978

For abstract, see Gammell, P M

L028 Temperature and Frequency Dependence of Ultrasonic Attenuation in Selected Tissues

P M Gammell, D. H. Le Croissette, and R C Heyser

Ultrasound Med Biol, Vol 5, pp. 269- 277, 1979

For abstract, see Gammell, P M

LEBERL, F.

L029 Mapping of Sea Ice and Measurement of Its Drift Using Aircraft Synthetic Aperture Radar Images

F Leberl (Technical University, Graz, Austria), M L Bryan, C. Elachi, T. Farr, and W. Campbell (U S Geological Survey)

J. Geophys. Res, Vol 84, No. C4, pp 1827–1835, April 20, 1979

Side-looking radar images of Arctic sea ice were obtained as part of the Arctic Ice Dynamics Joint Experiment. Repetitive coverages of a test site in the Arctic were used to measure sea ice drift, employing single images and blocks of overlapping radar image strips, the images were used in conjunction with data from the aircraft inertial navigation and altimeter Also, independently measured, accurate positions of a number of ground control points were available Initial tests of the method were carried out with repeated coverages of a land area on the Alaska coast (Prudhoe). Absolute accuracies achieved were essentially limited by the accuracy of the inertial navigation data. Errors of drift measurements were found to be about ±2 5 km Relative accuracy is higher, its limits are set by the radar image geometry and the definition of identical features in sequential images The drift of adjacent ice features with respect to one another could be determined with errors of less than ±0 2 km.

LEBERL, F. W

L030 Accuracy Aspects of Stereo Side-Looking Radar

F W. Leberl

JPL Publication 79-17, March 1, 1979

A study has been performed on accuracy aspects of stereo side-looking radar The geometry of the radar stereo model and factors affecting visual radar stereo perception are reviewed This is then employed to define limits to the vertical exaggeration factor of stereo radar and to compare it to that of camera photography.

Radar stereo model accuracies are analyzed with respect to coordinate errors caused by errors of radar sensor position and of range, and with respect to errors of coordinate differences, i e, cross-track distances and height differences

LEE, S. W.

L031 Diffraction by an Arbitrary Subreflector GTD Solution

S W Lee (University of Illinois), P Cramer, Jr, K Woo, and Y Rahmat-Samii

IEEE Trans Anten Prop, Vol. AP-27, No. 3, pp 305–316, May 1979

The high-frequency asymptotic solution of diffraction by a conducting subreflector is studied By using Keller's geometrical theory of diffraction and the newly developed uniform asymptotic theory of diffraction, the scattered field is determined up to and including terms of order $k^{-1/2}$ relative to the incident field The key feature of the present work is that the surface of the subreflector is completely arbitrary In fact, it is only necessary to specify the surface at a set of discrete points over a random net Our computer program will fit those points by cubic spline functions and calculate the necessary geometrical parameters of the subreflector In a companion paper by Y Rahmat-Samii, R. Mittra, and V Galindo-Israel, the scattered field from the subreflector is used to calculate the secondary pattern of an arbitrarily shaped reflector by a series expansion method Thus, in these two papers, it is hoped that we have developed a "universal" computer program that can analyze most dual-reflector antennas currently conceivable It should also be added that our method of calculation is extremely numerically efficient In many cases, it is one order of magnitude faster than the conventional integration method based on physical optics

LEES, L.

L032 Space Augmentation of Military High-Level Waste Disposal

T English, L. Lees, and E Divita

JPL Publication 79-45, May 1, 1979

For abstract, see English, T

LEFEVER, R. A.

L033 Convection Phenomena During the Growth of Sodium Chlorate Crystals From Solution

P. S Chen (University of Southern California), P. J Shlichta, W. R Wilcox (Clarkson College of Technology), and R A Lefever (Ampex Corporation)

J Crystal Growth, Vol. 47, pp. 43–60, 1979

For abstract, see Chen, P S

LEOVY, C. B.

L034 Thermal Tides and Martian Dust Storms: Direct Evidence for Coupling

C. B. Leovy (University of Washington) and R W Zurek

J. Geophys Res, Vol 84, No. B6, pp 2956–2968, June 10, 1979

Observations of surface pressure oscillations at the Viking 1 and Viking 2 lander sites on Mars indicate that the thermally driven global atmospheric tides were closely coupled to the dust content of the Martian atmosphere, especially during northern fall and winter, when two successive global dust storms occurred The onset of each of these global storms was marked by substantial, nearly simultaneous increases in the dust opacity and in the range of the daily surface pressure variation observed at both lander sites Although both the diurnal and semidiurnal tidal surface pressure components were amplified at Lander 1 during the onset of a global dust storm, the semidiurnal component was greatly enhanced in relation to the diurnal tide Semidiurnal wind components were prominent at both lander sites during the height of the global dust storm We have attempted to interpret these observations using simplified dynamical models In particular, the semidiurnal wind component can be successfully related to the observed surface pressure variation using a simplified model of a semidiurnally forced Ekman boundary layer On the other hand, a classical atmospheric tidal model shows that the preferential enhancement of the semidiurnal surface pressure oscillation at Lander 1 can be produced by a tidal heating distribution which places most of the heating (per unit mass) above 10-km altitude Furthermore, when a dust storm expands to global scale, it does so rather quickly, and the total atmospheric heating at the peak of the dust storm can represent more than 50% of the available insolation. The Viking observations suggest that a number of mechanisms are important for the generation and decay of these episodic Martian global dust storms

LEU, M. T.

L035 Rate Constant for the Reaction BrO + NO → Br + NO_2

M. T Leu

Chem Phys. Lett., Vol 61, No 2, pp 275–279, February 15, 1979

The rate constant for the reaction BrO + NO → Br + NO_2 has been determined over the temperature range 230 K to 425 K in a discharge flow system using a mass spectrometer as a detector Results, expressed in the Arrhenius form $k_1 = (7\,11 \pm 0\,23) \times 10^{-12} \exp[(296 \pm 10)/T]$ cm^3 s^{-1}, are compared with previous measurements

L036 Rate Constants for the Reactions of OH With ClO, Cl_2, and Cl_2O at 298K

M T. Leu and C L Lin

Geophys Res Lett, Vol 6, No. 6, pp 425–428, June 1979

The rate constants for the reactions of OH with ClO, Cl_2, and Cl_2O at 298 K have been determined in a discharge flow system using resonance fluorescence detection The results are $(9.1 \pm 1\,3) \times 10^{-12}$, $(5\,5 \pm 0\,3) \times 10^{-14}$, and $(6\,5 \pm 0\,5) \times 10^{-12}$ (all in units of cm^3 s^{-1}), respectively In the reaction of OH and ClO the reaction product HO_2 has been detected indirectly, and a lower limit of 65% has been established for the OH + ClO → HO_2 + Cl channel

L037 Rate Constant for the Reaction HO_2 + NO → OH + NO_2

M T Leu

J Chem Phys, Vol 70, No 4, pp 1662–1666, February 15, 1979

The rate constant for the reaction HO_2 + NO → OH + NO_2 has been determined over the temperature range 270 to 425 K in a discharge flow/mass spectrometer/resonance fluorescence apparatus Results, expressed in the Arrhenius form $k_1 = (5\,7_{-0\,4}{}^{+5\,6}) \times 10^{-12} \exp[(130 \pm 270)/T]$ cm^3 sec^{-1}, are compared with previous measurements

LEVITT, B. K.

L038 Carrier Tracking Loop Performance in the Presence of Strong CW Interference

B K Levitt

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 130–137, June 15, 1979

In a coherent data link, narrow-band radio frequency interference (RFI) near the carrier frequency can degrade the link performance by impacting the carrier tracking loop behavior and producing a partial or complete loss of coherence If the RFI is strong enough, this effect can occur even though the frequency of the interference lies well beyond the carrier tracking loop bandwidth In 1973, F Bruno and A. Blanchard independently performed similar analyses of the response of a phase-locked loop (PLL) to a continuous wave (CW) interferer, and derived conditions under which the loop dropped carrier lock and tracked the interference instead This paper compares the contributions of these two analysts, and

extends Bruno's closed form approximation for the loop phase error This result is applied in a subsequent article to the general problem of coherent detection of residual and suppressed carrier telemetry in the presence of strong CW interference

LEVY, G. S.

L039 Radio Science with Voyager 1 at Jupiter Preliminary Profiles of the Atmosphere and Ionosphere

V. R Eshleman (Stanford University), G. L Tyler (Stanford University), G. E. Wood, G F. Lindal, J D Anderson, G S Levy, and T. A. Croft (SRI International)

Science, Vol 204, pp 976–978, June 1, 1979

For abstract, see Eshleman, V R

LEVY, J.

L040 Polyglutaraldehyde: A New Reagent for Coupling Proteins to Microspheres and for Labeling Cell-Surface Receptors

A Rembaum, S. Margel (Weizmann Institute, Israel), and J. Levy (University of California, Los Angeles)

J Immunol Methods, Vol 24, pp 239–250, 1978

For abstract, see Rembaum, A

LEVY, R.

L041 Estimated Displacements for the VLBI Reference Point of the DSS 13 26-m Antenna

H. McGinness, G Gale, and R. Levy

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 36–51, April 15, 1979

For abstract, see McGinness, H.

L042 Implementation of Natural Frequency Analysis and Optimality Criterion Design

R Levy and K. Chai

Comput. Struct, Vol 10, pp 277–282, 1979

A review of methods to compute the lower-frequency modes within a medium- to large-capacity computer design program indicates advantages for the simultaneous iteration method For computer design, the computational advantages are further enhanced by more rapid convergence when using eigenvectors from prior design cycles The optimality criterion design algorithms are summarized for the problem of minimum structural weight with constrained frequency and for the dual problem of constrained weight with maximum frequency The capability to design for natural frequency requires only minor coding modifications within an existing computer program that can perform design for static loading A simple sample application problem shows agreement with a known theoretical result. Another example shows effective results for a structure of practical complexity within reasonable computing times A summary contains recommendations for continuing research

LEWIS, B. F.

L043 High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure Application to Amorphous SiO_2 and the Si-SiO_2 Interface

F J Grunthaner, P J Grunthaner, R P Vasquez, B F Lewis, J Maserjian, and A. Madhukar (University of Southern California)

Phys. Rev. Lett, Vol 43, No 22, pp. 1683–1686, November 26, 1979

For abstract, see Grunthaner, F J

LEWIS, R.

L044 A Mars Airplane...Oh Really?

V C Clarke, Jr, A Kerem (Developmental Sciences, Inc), and R. Lewis (Lear Seigler, Inc)

Preprint 79-0067, AIAA Seventeenth Aerosp. Sci Meet, New Orleans, La, January 15–17, 1979

For abstract, see Clarke, V C, Jr

LEWIS, S. D.

L045 Color Enhancement of Landsat Agricultural Imagery. Final Report for the JPL LACIE Image Processing Support Task

D P. Madura, J M. Soha, W B Green, D B. Wherry, and S D Lewis

JPL Publication 78-102, December 15, 1978

For abstract, see Madura, D P

LI, S. P.

L046 Model for MOS Field-Time-Dependent Breakdown

S P Li, S Prussin, and J Maserjian

Reliability Phys 1978. 16th. Annu. Proc, San Diego, Calif, April 18–20, 1978, pp 132–136

A quantitative model for MOS breakdown is derived and correlated with experiments The data were obtained by enhancing the effect of ion emission on breakdown through controlled ion-implantation damage prior to gate oxidation in an otherwise normal and clean MOS process

L047 A Comparison of Gettering Techniques

S Prussin (TRW Semiconductors, Inc.), S P Li (California State Polytechnic University, Pomona), and R H Cockrum

Semiconductor Characterization Techniques· Proc Top Conf. Characterization Tech Semicond Mater & Devices, Seattle, Wash., May 21–26, 1978, pp 357–365

For abstract, see Prussin, S

LICHY, D.

L048 Seasat Synthetic Aperture Radar. Ocean Wave Detection Capabilities

F I Gonzalez (Pacific Marine Environmental Laboratory), R C. Beal (Johns Hopkins University), W E Brown, P S DeLeonibus (National Environmental Satellite Service), J W Sherman III (National Environmental Satellite Service), J F. R Gower (Institute of Ocean Sciences, Canada), D. Lichy (U.S. Army Corps of Engineers), D B Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R. A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

LIESKE, J. H.

L049 Precession Matrix Based on IAU (1976) System of Astronomical Constants

J H Lieske

Astron. Astrophys., Vol. 73, pp 282–284, 1979

At its XVIth General Assembly held in Grenoble in 1976, the International Astronomical Union (IAU) adopted a new value for the speed of general precession in longitude, and it adopted a new basic epoch for future almanacs and ephemerides This paper develops numerical values of the precession parameters and of the precession matrix which enable one to precess to from J2000 0

LIM, L.

L050 Unattended Operations Software System Design Progress Report

L Lim

The Deep Space Network Progress Report 42-50 January and February 1979, pp 78–84, April 15, 1979

A small MBASIC[tm] program called ORGNIZE has been developed to assist the software designer in the organization of MDS PL/M programming modules It provides a logical way to distribute the various programming procedures in the proper module The program also provides a consolidated listing of any procedure call and a summary of all procedures used by any procedure call

LIN, C. L.

L051 Rate Constants for the Reactions of OH With ClO, Cl_2, and Cl_2O at 298K

M T Leu and C L Lin

Geophys Res. Lett, Vol 6, No. 6, pp 425–428, June 1979

For abstract, see Leu, M T

LINDAL, G. F.

L052 Radio Science with Voyager 1 at Jupiter: Preliminary Profiles of the Atmosphere and Ionosphere

V. R Eshleman (Stanford University), G L Tyler (Stanford University), G E Wood, G F Lindal, J D Anderson, G S. Levy, and T A Croft (SRI International)

Science, Vol 204, pp 976–978, June 1, 1979

For abstract, see Eshleman, V R.

LING, J. C.

L053 A Possible Line Feature at 73 keV From the Crab Nebula

J C Ling, W A Mahoney, J B Willett, and A S Jacobson

Astrophys J, Vol 231, No 3, Part 1, pp 896–905, August 1, 1979

This paper presents evidence for a possible line feature at 73 keV from the Crab Nebula The experiment was conducted with a balloon-borne high-resolution γ-ray spectrometer on June 10, 1974 over Palestine, Texas The intensity and the width of the line derived from the

fitting of these data are $(3.8 \pm 0.9) \times 10^{-3}$ photons $(cm^2 s)^{-1}$ and less than 4.9 keV FWHM, respectively. The line is superposed on a power-law continuum of $11.2\ E^{-2.16}$ photons $(cm^2\ keV)^{-1}$ in the energy range from 53 to 300 keV, which is consistent with other measurements of the Crab Nebula spectrum.

LIPES, R. G.

L054 Modern Estimation Techniques Applied to Microwave Sensing of the Marine Boundary Layer

G. J. Bierman, F. J. Wentz (Frank J. Wentz and Associates), and R. G. Lipes

Conf. Rec. Twelfth Asilomar Conf. on Circuits, Systems & Computers, Pacific Grove, Calif., November 6–8, 1978, pp. 101–106.

For abstract, see Bierman, G. J.

L055 Seasat Scanning Multichannel Microwave Radiometer. Results of the Gulf of Alaska Workshop

R. G. Lipes, R. L. Bernstein (Scripps Institution of Oceanography), V. J. Cardone (Oceanweather, Inc.), K. B. Katsaros (University of Washington), E. G. Njoku, A. L. Riley, D. B. Ross (Atlantic Oceanic and Meteorological Laboratory), C. T. Swift (Langley Research Center), and F. J. Wentz (Frank J. Wentz and Associates)

Science, Vol. 204, pp. 1415–1417, June 29, 1979.

The scanning multichannel microwave radiometer results for the Gulf of Alaska Seasat Experiment Workshop are quite encouraging, especially in view of the immaturity of the data-processing algorithms. For open ocean, rain-free cells of highest-quality surface truth wind determinations exhibit standard deviations of 3 meters per second about a bias of 1.5 meters per second. The sea-surface temperature shows a standard deviation of approximately 1.5°C about a bias of 3° to 5°C under a variety of changing meteorological conditions.

LIU, A. S.

L056 Nutation of Mars

R. A. Lyttleton, D. L. Cain, and A. S. Liu

JPL Publication 79-85, August 15, 1979.

For abstract, see Lyttleton, R. A.

LOOMIS, A. A.

L057 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J. C. Wilkerson (National Environmental Satellite Service), R. A. Brown (University of Washington), V. J. Cardone (Oceanweather, Inc.), R. E. Coons, A. A. Loomis, J. E. Overland (Pacific Marine Environmental Laboratory), S. Peteherych (Atmospheric Environmental Service), W. J. Pierson (City University of New York), P. M. Woiceshyn, and M. G. Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp. 1408–1410, June 29, 1979.

For abstract, see Wilkerson, J. C.

LORDEN, G.

L058 Initial Economic and Operations Data Base for DSS 13 Automation Test

D. S. Remer and G. Lorden (California Institute of Technology)

The Deep Space Network Progress Report 42-49, November and December 1978, pp. 78–85, February 15, 1979.

For abstract, see Remer, D. S.

L059 Mathematical Model for Preventive Maintenance Scheduling

G. Lorden (California Institute of Technology) and D. S. Remer

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 144–149, June 15, 1979.

A model is formulated to describe the effect of the time interval chosen for preventive maintenance upon the frequency of failure and frequency of total maintenance (preventive and corrective). Trade-offs between these two frequencies are determined by computation of an optimal interval in the case where the failure distribution is known. For unknown distributions, an adaptive statistical technique is developed that converges to an optimal preventive maintenance interval. A numerical illustration is given.

L060 Preliminary Maintenance Experience for DSS 13 Unattended Operations Demonstration

D. S. Remer and G. Lorden (California Institute of Technology)

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 150–155, June 15, 1979.

For abstract, see Remer, D. S.

LOREMAN, J.

L061 S-Band Ultralow-Noise Traveling-Wave Maser

D Trowbridge and J Loreman

The Deep Space Network Progress Report 42-53 July and August 1979, pp 148–154, October 15, 1979

For abstract, see Trowbridge, D

LORRE, J.

L062 Some Properties of the Knots in the M87 Jet

J. W. Sulentic (Hale Observatories), H. Arp (Hale Observatories), and J Lorre

Astrophys J, Vol. 233, pp 44–55, October 1, 1979

For abstract, see Sulentic, J W

LORRE, J. J

L063 Dynamic Feature Analysis for Voyager at the Image Processing Laboratory

G M Yagi, J J Lorre, and P L Jepsen

Conf. Atmos. Environ. of Aerospace Syst & Appl Meteorol, New York, N Y, November 14–16, 1978, Preprint Volume, pp 110–117

For abstract, see Yagi, G. M.

L064 Recent Developments at JPL in the Application of Image Processing to Astronomy

J. J. Lorre, W D Benton, and D. A Elliott

Proc SPIE, Vol. 172, pp 394–402, 1979

Four recently developed applications of image processing to astronomy are presented along with illustrative examples These applications consist of automated location and analysis of star and galaxy images, geometric and radiometric decalibration of vidicon spectra, display of multiband radio images, generation of high resolution polarization direction and magnitude maps from images

LOW, P. W.

L065 Radio Frequency Interference Effects of Continuous Wave Signals on Telemetry Data: Part II

P. W Low

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 204–215, June 15, 1979

In a previous report (DSN Progress Report 42-40), the results of the first series of radio frequency interference tests and an empirical telemetry bit SNR degradation model derived for a fixed telemetry data rate and a fixed telemetry data power were presented

In this report, Part II, the results of a second series of radio frequency interference tests and the derived telemetry bit SNR degradation model, which includes the telemetry data rate and the telemetry data power as independent variables for characterizing the continuous wave interference effects on telemetry data, are presented This generalized telemetry bit SNR degradation model has been implemented in the second version of the Deep Space Interference Prediction software

LU VALLE, J.

L066 DSN CONSCAN—A Vector Nomenclature and Method for Determining Parameter Values

T Taylor and J. Lu Valle

The Deep Space Network Progress Report 42-53. July and August 1979, pp 113–122, October 15, 1979

For abstract, see Taylor, T

LUTES, G.

L067 A Transmission Line Phase Stabilizer

G Lutes

The Deep Space Network Progress Report 42-51 March and April 1979, pp 67–73, June 15, 1979

To meet the phase stability requirements of certain experiments performed with the Deep Space Network, transmission lines carrying reference signals must be stabilized to reduce changes in their electrical length due to mechanical movement or changes in ambient temperature A transmission line phase stabilizer being developed at JPL to perform this function is described in this article

LYTTLETON, R. A.

L068 Nutation of Mars

R A Lyttleton, D L Cain, and A S Liu

JPL Publication 79-85, August 15, 1979

The mathematical theory of the nutation of Mars is derived by classical rigid-body dynamics The effect of

nutation is to produce a 26-m maximum horizontal amplitude oscillation (at the surface of Mars) with a period of half a Martian year This effect should be detectable in the Viking Lander data

L069 The Ramsey Phase-Change Hypothesis

R. A Lyttleton

Moon and Planets, Vol. 19, pp. 425–442, 1978

The series of papers by the late W H Ramsey developing on a mathematical and physical basis the phase-change theory of the terrestrial core are summarized, and the numerous remarkable successes of the theory in accounting for hitherto unexplained properties of the interior of the Earth are emphasized Subsequent attack on the problem by a different approach, based on established seismic data, confirmed independently the correctness of the general Ramsey-theory, and enabled it to be developed in numerical detail to demonstrate the precise nature of the evolution of the Earth This treatment shows that through radioactive heating the Earth, starting in all-solid form, develops conditions at its center suitable for the change of phase to take place, and there then occurs the sudden Ramsey-collapse involving formation within a matter of minutes of a metallic liquid core of "large" radius (in fact of 2042 km radius and just over 6% of the mass of the Earth) With further increase of temperature at the core-mantle boundary, evolution proceeds continuously along a stable series of configurations of increasing core-mass and core-radius, and *decreasing* overall surface-radius A steadily decreasing moment-of-inertia accompanies the general contraction of the planet and at a rate in close agreement with that required by the intrinsic accelerative component of the angular velocity of the Earth revealed by the ancient-eclipse data The total decrease of surface-radius since the initial sudden collapse has been by about 300 km, which involves a reduction of surface-area by some 50×10^6 km^2, and a redistribution by means of folding and thrusting of about 160×10^9 km^3 of outer-layers material, values quite adequate to account for some twenty separate periods of mountain-building during the age of the Earth The iron-core hypothesis has nothing to offer by way of solution of any of these problems, and must be assigned negligible weight in comparison with the phase-change hypothesis.

MA, C L.

M001 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S. K Khanna, S P. S Yen, R. B Somoano, P M Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R. Williams (California Institute of Technology), and S. Samson (California Institute of Technology)

Phys Rev B. Condensed Matter, Vol 19, No 2, pp 655–663, January 15, 1979

For abstract, see Khanna, S K

MacNEIL, P. E.

M002 The Viking Relativity Experiment

I. I Shapiro (Massachusetts Institute of Technology), R D. Reasenberg (Massachusetts Institute of Technology), P E MacNeil (Massachusetts Institute of Technology), R B Goldstein (Massachusetts Institute of Technology), J. P Brenkle, D. L Cain, T Komarek A I Zygielbaum, W F Cuddihy (Langley Research Center), and W H Michael, Jr. (Langley Research Center)

J Geophys Res, Vol 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

MADHUKAR, A.

M003 High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure Application to Amorphous SiO_2 and the Si-SiO_2 Interface

F. J Grunthaner, P. J Grunthaner, R. P Vasquez, B F Lewis, J Maserjian, and A Madhukar (University of Southern California)

Phys Rev. Lett, Vol 43, No. 22, pp 1683–1686, November 26, 1979

For abstract, see Grunthaner, F J

MADRID, G. A

M004 Demonstration of Remote Clock Monitoring by VLBI, With Three Baseline Closure

C. M Cheetham, W. J. Hurd, J. W Layland, G A Madrid, and T P Yunck

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 40–53, October 15, 1979

For abstract, see Cheetham, C M

MADSEN, B. D.

M005 Voyager Telecommunications: The Broadcast from Jupiter

R E Edelson, B D Madsen, E K Davis, and G W Garrison

Science, Vol 204, pp 913–921, June 1, 1979

For abstract, see Edelson, R. E

MADURA, D. P.

M006 Color Enhancement of Landsat Agricultural Imagery: Final Report for the JPL LACIE Image Processing Support Task

D. P Madura, J M Soha, W B Green, D. B Wherry, and S D Lewis

JPL Publication 78-102, December 15, 1978

The purpose of this study is to determine if multispectral image processing techniques developed at the Jet Propulsion Laboratory's Image Processing Laboratory (IPL) for mineral exploration applications could be beneficially applied to the analysis of LACIE agricultural data Landsat multispectral imagery provides the main source of data for both applications

M007 Processing of Multispectral Thermal IR Data for Geologic Applications

A. B Kahle, D P Madura, and J M. Soha

JPL Publication 79-89, November 15, 1979

For abstract, see Kahle, A B

MAHONEY, W. A.

M008 A Possible Line Feature at 73 keV From the Crab Nebula

J C. Ling, W. A Mahoney, J. B Willett, and A S Jacobson

Astrophys J, Vol 231, No. 3, Part 1, pp. 896–905, August 1, 1979

For abstract, see Ling, J. C

MAJUMDAR, A. K.

M009 Infrared Transmission at the 3 39 μm Helium–Neon Laser Wavelength in Liquid-Core Quartz Fibers

A K Majumdar, E. D Hinkley, and R. T Menzies

IEEE J Quantum Electron, Vol. QE-15, No 6, pp 408–410, June 1979

Measurement of optical transmission loss at the 3 39 μm line of an He–Ne laser in a tetrachloroethylene (C_2Cl_4)–filled fused-quartz fiber is reported The loss is found to be 56 dB/km at this wavelength

M010 Higher-Order Skewness and Excess Coefficients of Some Probability Distributions Applicable to Optical Propagation Phenomena

A. K Majumdar

J Opt Soc Amer, Vol 69, No 1, pp. 199– 202, January 1979

Expressions are derived for higher-order skewness and excess coefficients using central moments and cumulants up to 8th order. These coefficients are then calculated for three probability distributions (i) Log-normal, (ii) Rice-Nakagami, and (iii) Gamma distributions Curves are given to show the variation of skewness with excess coefficients for these distributions These curves are independent of the particular distribution parameters. This method is useful for studying fluctuating phenomena, which obey non-Gaussian statistics

MALIN, M. C.

M011 Imaging Radar Observations of Askja Caldera, Iceland

M C Malin, D Evans, and C. Elachi

Geophys Res Lett, Vol 5, No 11, pp 931–934, November 1978

Surface roughness of nine radar backscatter units in the Askja Caldera region of Iceland was examined in computer-enhanced like- and cross-polarized radar images A field survey of the caldera was then used to check the accuracy of the preliminary analysis There was good agreement between predicted surface roughness of backscatter units and surface roughness observed in the field In some cases, variations could be correlated with previously mapped geologic units

M012 Surfaces of Mercury and the Moon: Effects of Resolution and Lighting Conditions on the Discrimination of Volcanic Features

M. C Malin

Proc Lunar Planet Sci Conf 9th, pp 3395–3409, 1978

Owing to resolution and illumination conditions, Mariner 10 images of Mercury are not significantly better than earth-based telescopic images of the moon Only a few of the lunar volcanic features recognized on orbiter images

are visible from Earth, and they are domes and clusters of domes visible only at sun elevation angles lower than 10 to 15 deg In view of the limited coverage at low sun angles, it is not surprising that possible volcanic landforms on Mercury are rarely seen Two domes, similar to the lunar domes Gruithuisen Gamma and Delta and Hansteen Alpha, are cited as possible evidence of mercurian volcanism

MALOY, J. O.

M013 Measurement of the Profile and Intensity of the Solar He I λ584-Å Resonance Line

J O Maloy (Melcon System Design Consultants), R W. Carlson, U. G Hartmann (Ball Aerospace Systems Division), and D. L. Judge (University of Southern California)

J. Geophys. Res, Vol. 83, No. A12, pp. 5685–5690, December 1, 1978

The intensity and profile of the helium resonance line at 584 Å from the entire disc of the sun was investigated by using a rocket-borne helium-filled spectrometer and a curve of growth technique. The line profile was found to be accurately represented by a gaussian profile with full width at half maximum of 122 10 mÅ, while the integrated intensity was measured to be $(2\,6 \pm 1\,3) \times 10^9$ photons s^{-1} cm^{-2} at solar activity levels of $F_{10\,7} = 90\,8 \times 10^{-22}$ m^{-2} Hz^{-1} and $Rz = 27$ The measured line width is in good agreement with previous spectrographic measurements, but the integrated intensity is larger than most previous photoelectric measurements However, the derived line center flux of $(2\,0 \pm 1\,0) \times 10^{10}$ photons s^{-1} cm^{-2} $Å^{-1}$ is in good agreement with values inferred from airglow measurements

MANVI, R.

M014 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T. Fujita, R Manvi, E J. Roschke, N. El Gabalawi, G Herrera, T. J Kuo, and K. H. Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

MARGEL, S

M015 Design of Polymeric Immunomicrospheres for Cell Labelling and Cell Separation

A Rembaum and S. Margel

Brit. Polym J, Vol 10, pp 275–280, December 1978

For abstract, see Rembaum, A.

M016 Polyglutaraldehyde: A New Reagent for Coupling Proteins to Microspheres and for Labeling Cell-Surface Receptors

A. Rembaum, S Margel (Weizmann Institute, Israel), and J. Levy (University of California, Los Angeles)

J. Immunol Methods, Vol. 24, pp 239–250, 1978

For abstract, see Rembaum, A

MARGOLIS, J. S.

M017 A Determination of Jovian Ammonia Abundance Based on a 2 μm Spectrum

S. Sarangi (Physical Research Laboratory, Navrangpura Ahmedabad, India) and J S. Margolis

Icarus, Vol 36, pp 330–333, 1978

For abstract, see Sarangi, S

MARKS, R. A.

M018 Seasat Visible and Infrared Radiometer

E P. McClain (National Environmental Satellite Service) and R A Marks

Science, Vol 204, pp 1421–1424, June 29, 1979

For abstract, see McClain, E P.

MARLIN, H. W.

M019 Pattern Measurements of a Low-Sidelobe Horn Antenna

M. A Janssen, S. M Bednarczyk, S. Gulkis, H W Marlin, and G. F Smoot (University of California, Berkeley)

IEEE Trans Anten Prop, Vol. AP-27, No 4, pp 551–555, July 1979

For abstract, see Janssen, M. A.

MARSH, H. E.

M020 Modeling of Polymer Networks for Application to Solid Propellant Formulating

H. E. Marsh

JPL Publication 79-10, June 15, 1979

As part of the Solid Propellant Chemistry Program, research was conducted over a period of years aimed at the development of methods for predicting the network structural characteristics formed by the curing of pourable elastomers This report summarizes the results of this work It emphasizes the logic which was applied in the development of mathematical models

For simple systems (those which contain only one kind of branching component), models have been developed and verified which, from a few simple measurements of composition and extent of reaction, predict the conditions necessary for incipient gelation, and for the postgel state, the fraction of gel and sol and the cross-link density. Cross-link density is a factor in modulus A parameter representing the length of effective chains can be calculated from these models also This parameter has not been verified, however, it correlates with extensibility A distribution of pendent chains, according to length, representing the noneffective branching in the network is also predicted by the models

A universal approach for modeling has been developed and has been verified by comparison with other methods in application to a complex system

Several applications of network models to practical problems are described briefly

MARTIN, K. E

M021 Analysis of Long-Term Ionizing Radiation Effects in Bipolar Transistors

A G Stanley and K E Martin

Radiat Phys Chem, Vol 12, pp 133–142, 1978

For abstract, see Stanley, A G

MARTIN, T. Z

M022 Thermal Infrared Properties of the Martian Atmosphere· 1 Global Behavior at 7, 9, 11, and 20 μm

T. Z. Martin (University of California, Los Angeles), A R Peterfreund (Arizona State University), E D Miner, H. H Kieffer (U.S Geological Survey), and G E Hunt (University College London, London, England)

J Geophys Res, Vol 84, No B6, pp 2830–2842, June 10, 1979

Infrared observations of Mars by the Viking infrared thermal mapper (IRTM) are presented for both conditions of a relatively clear and a dust-laden atmosphere The 7-, 9-, 11-, and 20-μm bands of the IRTM respond differently to radiation emitted through and by a dusty atmosphere, permitting characterization of the global atmospheric state, monitoring of secular changes, and derivation of optical depth information Surface temperature behavior is found to be greatly modified by the diminution of insolation and thermal blanketing resulting from global dust storms Brightness temperature at 7 μm (T_7) is employed to estimate surface temperatures in the presence of dust absorption The difference T_7-T_9 is strongly indicative of airborne dust when thermal contrast exists between the surface and atmosphere The diurnal behavior of T_7-T_9 reveals changes in that contrast, the sign of the differential reverses as the surface, warmer than the atmosphere in daytime, becomes cooler than the atmosphere at night IRTM observations of local areas at varying emission angle yield optical depths indicative of global trends Two global dust storms in 1977 produced large optical depth changes, at 9 μm the optical depth became as large as 2 0

MARTONCHIK, J. V.

M023 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W Taylor, D J. Diner, L. S. Elson, D J McCleese, J V. Martonchik, J. Delderfield (University of Oxford, England), S P Bradley (University of Oxford, England), J. T Schofield (University of Oxford, England), J C Gille (National Center for Atmospheric Research), and M T. Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F W

MASERJIAN, J

M024 Test Chips in Reliability Assurance

T W. Griswold and J Maserjian

Digest of Papers. 1978 Government Microcircuit Appl. Conf., Monterey, Calif, November 14–16, 1978, pp. 398–401

For abstract, see Griswold, T W

M025 Experimental Observations of the Chemistry of the SiO_2/Si Interface

F J Grunthaner and J Maserjian

IEEE Trans. Nucl Sci, Vol. NS-24, No. 6, pp 2108–2112, December 1977

For abstract, see Grunthaner, F J.

M026 Trapping Effects in Irradiated and Avalanche-Injected MOS Capacitors

M Bakowski, R H Cockrum, N Zamani, J. Maserjian, and C R Viswanathan (University of California, Los Angeles)

IEEE Trans Nucl Sci, Vol NS-25, No 6, pp 1233–1238, December 1978

For abstract, see Bakowski, M

M027 Chemical Structure of the Transitional Region of the SiO_2/Si Interface

F. J Grunthaner and J Maserjian

Physics of SiO_2 and Its Interfaces· Proc Int Top Conf Phys. SiO_2 & Its Interfaces, Yorktown Heights, N.Y, March 22–24, 1978, pp 389–395

For abstract, see Grunthaner, F J

M028 Lateral Nonuniformities (LNU) of Oxide and Interface State Charge

N. Zamani and J. Maserjian

Physics of SiO_2 and Its Interfaces. Proc Int Top Conf. Phys SiO_2 & Its Interfaces, Yorktown Heights, N.Y., March 22–24, 1978, pp 443–448

For abstract, see Zamani, N.

M029 High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure. Application to Amorphous SiO_2 and the Si-SiO_2 Interface

F. J Grunthaner, P J. Grunthaner, R. P. Vasquez, B F Lewis, J. Maserjian, and A Madhukar (University of Southern California)

Phys Rev Lett., Vol 43, No. 22, pp. 1683–1686, November 26, 1979

For abstract, see Grunthaner, F J

M030 Model for MOS Field-Time-Dependent Breakdown

S. P. Li, S Prussin, and J. Maserjian

Reliability Phys 1978· 16th Annu Proc, San Diego, Calif, April 18–20, 1978, pp. 132–136

For abstract, see Li, S P

MASON, P.

M031 Design of a Superfluid Helium Dewar for the IRAS Telescope

A R. Urbach (Ball Aerospace Systems Division), J. Vorreiter (Ames Research Center), and P Mason

Proc Seventh Int Cryog. Eng. Conf., London, United Kingdom, July 4–7, 1978, pp 126–133

For abstract, see Urbach, A. R

MASON, P. V.

M032 Potential Scientific Uses of Cryogenics in Space in the Temperature Range From 1 mK to 10 K

E. Tward (University of Regina, Canada) and P V. Mason

Applications of Closed-Cycle Cryocoolers to Small Superconducting Devices Conf Proc, Nat Bur Stand, Boulder, Col, October 3–4, 1977, pp. 227–241

For abstract, see Tward, E

M033 Evaluation of Porous-Plug Liquid Separators for Space Superfluid Helium Systems

D. Petrac and P V. Mason

Proc Seventh Int Cryog Eng Conf, London, United Kingdom, July 4–7, 1978, pp. 120–125

For abstract, see Petrac, D.

MASSEY, J. L

M034 Comparison of Phase Modulation Systems

J. L. Massey

The Deep Space Network Progress Report 42-49 November and December 1978, pp 57–63, February 15, 1979

Comparison of the energy-to-noise ratio necessary to obtain a given modulation bit error probability has indicated that three-phase modulation is about 0 75 dB superior to four-phase It is shown that this apparent superiority results entirely from the greater bandwidth required by the three-phase system for the same bit transmission rate Two further comparison criteria are proposed, which are based on the cut-off rate R_0 of the discrete channel created by the modulation system For the criterion which constrains both the bandwidth and transmitted power, it is shown that four-phase modulation is always superior to three-phase modulation. The conclusion is that three-phase modulation offers no practical advantage over four-phase modulation

M035 A Generalization of Binary Minimum Shift Keying and Staggered Quadriphase Shift Keying Modulation

J L Massey

C-2

The Deep Space Network Progress Report 42-52. May and June 1979, pp 26–40, August 15, 1979

A generalized modulation scheme, which includes minimum shift keying (MSK) and staggered quadriphase shift keying (SQPSK) as special cases, is analyzed The general modulator can be realized as a one-input, two-output sequence transducer whose outputs select the carrier signal for each baud. This form of the modulator has the practical advantage of not requiring any RF filtering since there is no actual mixing of the carriers with the modulating signals

It is shown that the optimum demodulator (whether hard-decision or soft-decision) always can make its decisions from the received waveform over two bauds when the interference is additive white Gaussian noise, thus generalizing a well-known result for hard-decision demodulation of MSK and SQPSK signals The power spectra of MSK and SQPSK signals are derived to isolate the role played by coherency between the modulating signals and the carriers

MASSIER, P. F.

M036 Effect of Angle of Attack on Cavity Flow Oscillations

V. Sarohia and P F. Massier

JPL Publication 79-19, October 1978

For abstract, see Sarohia, V.

M037 Separation of Core Noise and Jet Noise

S. P Parthasarathy, R F Cuffel, and P. F Massier

Preprint 79-0589, AIAA Fifth Aeroacoustics Conf., Seattle, Washington, March 12–14, 1979

For abstract, see Parthasarathy, S P

M038 Twin Jet Shielding

S P. Parthasarathy, R F. Cuffel, and P F Massier

Preprint 79-0671, AIAA Fifth Aeroacoustics Conf, Seattle, Washington, March 12–14, 1979

For abstract, see Parthasarathy, S. P

M039 Experimental Results of Large-Scale Structures in Jet Flows and Their Relation to Jet Noise Production

V Sarohia and P F Massier

AIAA J, Vol. 16, No 8, pp 831–835, August 1978

For abstract, see Sarohia, V

McALISTER, H. A.

M040 Kitt Peak Speckle Camera

J B Breckinridge, H. A McAlister (Georgia State University), and W G Robinson (Kitt Peak National Observatory)

Appl. Opt, Vol 18, No 7, pp 1034–1041, April 1, 1979

For abstract, see Breckinridge, J B

McCASKILL, T.

M041 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W. J Hurd, S C Wardrip (Goddard Space Flight Center), J Bussion (Naval Research Laboratory), J. Oaks (Naval Research Laboratory), T. McCaskill (Naval Research Laboratory), H Warren (Bendix Field Engineering Corp.), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49 November and December 1978, pp. 64–69, February 15, 1979

For abstract, see Hurd, W. J.

McCLAIN, E. P.

M042 Seasat Visible and Infrared Radiometer

E P. McClain (National Environmental Satellite Service) and R A Marks

Science, Vol 204, pp 1421–1424, June 29, 1979

Visual and infrared images produced by the Seasat visible and infrared radiometer (VIRR) are adequate for the identification of cloud, land, and water features A statistical comparison of VIRR-derived sea-surface temperatures in a cloud-free region with a National Oceanic and Atmospheric Administration analysis based on various surface measurements taken in the same region showed agreement to ±1 7 K root-mean-square

McCLEESE, D. J.

M043 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W Taylor, D J. Diner, L S Elson, D J McCleese, J. V. Martonchik, J Delderfield (University of Oxford, England), S P. Bradley (University of Oxford, England), J T. Schofield (University of Oxford, England), J. C. Gille (National Center for Atmospheric Research), and M. T Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F. W.

McCLURE, J. P.

M044 Wideband Data Error Rates

J. P. McClure

The Deep Space Network Progress Report 42-50 January and February 1979, pp 156–160, April 15, 1979

Data on the error and outage characteristics of the Ground Communications Facility's wideband data circuits have been gathered and analyzed Most error blocks occur one at a time, whereas missing blocks are grouped into strings (outages) having a median length of about 10 blocks

McCLUSKEY, J.

M045 Automatic Filament Warm-Up Controller

J. McCluskey and J. Daeges

The Deep Space Network Progress Report 42-49 November and December 1978, pp 132–135, February 15, 1979

As part of the unattended operations objective of the DSN deep space stations, this filament controller serves as a step between manual operation of the station and complete computer control Formerly, the operator was required to devote five to fifteen minutes of his time just to properly warm up the filaments on the klystrons of the high power transmitters The filament controller reduces the operator's duty to a one-step command and is future-compatible with various forms of computer control

McELIECE, R. J.

M046 Coding for Optical Channels

L D Baumert (Arizona State University), R J McEliece (University of Illinois), and H. Rumsey, Jr

The Deep Space Network Progress Report 42-49. November and December 1978, pp 70–77, February 15, 1979

For abstract, see Baumert, L D

M047 A Note on Digital Signatures

R J McEliece

The Deep Space Network Progress Report 42-50 January and February 1979, pp 95–96, April 15, 1979

This article demonstrates the fact that any one-way function can be used to generate unforgeable digital signatures in a conceptually simple and easily implementable manner

M048 The Constantin-Rao Construction for Binary Asymmetric Error-Correcting Codes

R J McEliece and E R. Rodemich

The Deep Space Network Progress Report 42-51 March and April 1979, pp 124–129, June 15, 1979

Recently Constantin and Rao gave an ingenious construction for a class of binary codes capable of correcting a single asymmetric error In this article we shall give a complete analysis of the size of these codes

M049 Coding for Optical Channels With Photon-Counting

R. J. McEliece and L R Welch

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 61–66, August 15, 1979

We study the problem of coding for Pierce's recent model for optical communication We conclude that for any positive rate ρ (measured in nats per photon), the best code of length n has an error probability bounded by an exponentially decaying function of n, we exhibit explicit practical schemes for $\rho \leq \sim 1$, and give evidence that $\rho \approx 1$ may be the "practical limit" for optical communication

M050 The R_0-Parameter for Optical Communication Using Photon Counting

R J. McEliece

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 62–65, October 15, 1979

We show that even under ideal conditions (no thermal noise or dark current, continuously-variable intensity lasers, perfectly accurate photon counters), R_0 is, at most, one nat per photon in optical systems which use photon counting techniques Since even under less ideal circum-

stances channel capacity is infinite, this is a surprising and in some ways disappointing result

McGINNESS, H.

M051 Estimated Displacements for the VLBI Reference Point of the DSS 13 26-m Antenna

H McGinness, G Gale, and R. Levy

The Deep Space Network Progress Report 42-50. January and February 1979, pp. 36–51, April 15, 1979

It is shown that the displacement of the defined reference point caused by bearing runout, temperature change, and wind loading, under expected environmental conditions, will not exceed a few millimeters

M052 Antenna Azimuth Bearing Model Experiment

H McGinness

The Deep Space Network Progress Report 42-53 July and August 1979, pp 123–131, October 15, 1979

A reduced scale model of an antenna wheel and track azimuth bearing indicates that its prototype would have a long life and require little maintenance

McNAMARA, R. P.

M053 A Variable-Frequency Driver-Microwave Transient Regression Rate Measurement System

L D Strand and R P McNamara (Kirk-Mayer, Inc)

Experimental Diagnostics in Combustion of Solids, AIAA, New York, pp. 155–172, 1978

For abstract, see Strand, L D.

MEHTA, P. K.

M054 A Study of the Influence of Oil Saturation on the 64-Meter Antenna Hydrostatic Bearing Grout

H. P Phillips, A A. Riewe, M. Polivka (University of California, Berkeley), and
P K. Mehta (University of California, Berkeley)

The Deep Space Network Progress Report 42-54 September and October 1979, pp. 62–70, December 15, 1979

For abstract, see Phillips, H P

MELENDEZ, R.

M055 A Model of the Planetary Boundary Layer Over a Snow Surface

I. Halberstam and R Melendez

Boundary-Layer Meteorol, Vol 16, pp. 431–452, 1979

For abstract, see Halberstam, I

MENZIES, R T.

M056 Infrared Transmission at the 3.39 μm Helium–Neon Laser Wavelength in Liquid-Core Quartz Fibers

A K Majumdar, E D Hinkley, and R T Menzies

IEEE J Quantum Electron, Vol QE-15, No. 6, pp 408–410, June 1979

For abstract, see Majumdar, A K

METZGER, A. E.

M057 The Galactic Gamma-Ray Flux in the 0.06–5 MeV Range

D Gilman, A E Metzger, R H Parker, and J I. Trombka (Goddard Space Flight Center)

Astrophys J, Vol 229, pp 753–761, April 15, 1979

For abstract, see Gilman, D

M058 Thorium Concentrations in the Lunar Surface. II. Deconvolution Modeling and Its Application to the Regions of Aristarchus and Mare Smythii

E L Haines, M I Etchegaray-Ramirez, and A E Metzger

Proc Lunar Planet Sci. Conf. 9th, pp 2985–3013, 1978

For abstract, see Haines, E L

MICHAEL, W. H., JR.

M059 The Viking Relativity Experiment

I I. Shapiro (Massachusetts Institute of Technology), R. D. Reasenberg (Massachusetts Institute of Technology),
P E MacNeil (Massachusetts Institute of Technology), R B. Goldstein (Massachusetts Institute of Technology), J P. Brenkle, D. L Cain, T Komarek A I Zygielbaum,
W. F. Cuddihy (Langley Research Center), and
W. H Michael, Jr (Langley Research Center)

J Geophys. Res, Vol. 82, No 28, pp 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

MILENKOVIC, P. H.

M060 Recovering the Spectrum of a Narrow-band Process From Syncopated Samples

P. H Milenkovic

The Deep Space Network Progress Report 42-51· March and April 1979, pp. 47–50, June 15, 1979

Losslessly sampling a band-limited narrow-band process at an average rate equal to the Nyquist rate may require a nonuniform sampling strategy. One such strategy is phase quadrature sampling, in which a process of bandwidth B is sampled at rate B in each of two channels where the two channels are $\pi/2$ out of phase at frequency B Phase quadrature sampling is a special case of syncopated sampling, where the phase between channels is fixed but arbitrary A simple method for recovering the spectrum of the input process from syncopated samples is derived The derivation indicates what values of phase between channels result in lossless sampling

MILES, R. F., JR.

M061 Decision Analysis for Evaluating and Ranking Small Solar Thermal Power System Technologies: A Brief Introduction to Multiattribute Decision Analysis

A. Feinberg and R F. Miles, Jr.

JPL Publication 79-12, Vol I, June 1, 1978

For abstract, see Feinberg, A.

MILLER, R. B.

M062 Pioneer Venus 1978 Mission Support: DLBI Wind Measurement Experiment End-to-End System Test Phase

R B. Miller

The Deep Space Network Progress Report 42-49· November and December 1978, pp 34–42, February 15, 1979

The ten months of end-to-end system checkout for the Differential Long Base Interferometry (DLBI) Wind Measurement Experiment for the Pioneer Venus Mission are described

M063 Pioneer 11 Saturn Encounter Mission Support

R. B Miller_

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 4–7, August 15, 1979

The Pioneer 11 spacecraft flew by the planet Saturn in August and September 1979. The Pioneer 11 Saturn encounter activities are described, followed by the DSN plans for supporting the event

M064 Pioneer 11 Saturn Encounter Mission Support

R. B Miller

The Deep Space Network Progress Report 42-54. September and October 1979, pp. 24–27, December 15, 1979

Pioneer 11 spacecraft flew by the planet Saturn in August and September 1979 The DSN performance during the support of the first Saturn encounter is described

MILLER, R L.

M065 Further Results on Fast Transforms for Decoding Reed-Solomon Codes Over $GF(2^n)$ for $n = 4,5,6,8$

I. S. Reed (University of Southern California), T K Truong, R L Miller, and B Benjauthrit

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 132–155, April 15, 1979

For abstract, see Reed, I S

M066 Quick-Look Decoding Schemes for DSN Convolutional Codes

C. A Greenhall and R. L Miller

The Deep Space Network Progress Report 42-51. March and April 1979, pp 162–166, June 15, 1979

For abstract, see Greenhall, C A

M067 A Fast Technique for Computing Syndromes of BCH and RS Codes

I. S. Reed (University of Southern California), T K Truong, and R L Miller

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 67–70, August 15, 1979

For abstract, see Reed, I S

M068 Design of a Quick-Look Decoder for the DSN (7,1/2) Convolutional Code

C. A Greenhall and R L Miller

The Deep Space Network Progress Report 42-53. July and August 1979, pp 93–101, October 15, 1979

For abstract, see Greenhall, C A.

M069 A Reed-Solomon Decoding Program for Correcting Both Errors and Erasures

R. L. Miller T. K Truong, B. Benjauthrit, and I S Reed (University of Southern California)

The Deep Space Network Progress Report 42-53. July and August 1979, pp. 102–107, October 15, 1979

This article discusses the software implementation of a simplified algorithm for decoding errors and erasures of Reed-Solomon (R-S) code words using the techniques of finite field transforms and continued fractions In particular, random code words from the (255, 223, 33) R-S code over $GF(2^8)$ are corrupted by random error and erasure patterns, and decoded whenever theoretically possible A matrix of execution times of this decoder under varying sets of errors and erasure patterns is also included This matrix demonstrates the relative amounts of time required for decoding different error and erasure patterns, as well as the correctness of the algorithms and the software implementation.

M070 An Efficient Program for Decoding the (255,223) Reed-Solomon Code Over $GF(2^8)$ With Both Errors and Erasures, Using Transform Decoding

R L Miller, T. K. Truong, and I. S. Reed

The Deep Space Network Progress Report 42-54. September and October 1979, pp 82–91, December 15, 1979

To decode a (255,223) Reed-Solomon code over $GF(2^8)$, a fast Fourier-like transform over $GF(2^8)$ has been developed to compute the syndromes and the error-erasure vectors of the transmitted code words. This new simplified transform decoder is implemented in a program on a digital computer. The (255,223) Reed-Solomon code over $GF(2^8)$ is a NASA standard for concatenation with a convolutional code In a simulation, random code words were corrupted by random error and erasure patterns, and decoded whenever theoretically possible A matrix of execution times for this new transform decoder under varying sets of errors and erasure patterns is included in the paper. This matrix demonstrates that the speed of the new decoder is between 3 and 7 times faster than the standard R-S decoder, developed previously by NASA.

M071 Generalized BCH Codes

R L Miller

Inform Contr., Vol 40, No 1, pp. 61–75, January 1979

A new class of error-correcting codes, which generalizes the BCH codes and the polynomial codes of Goethals is constructed. These new codes have associated designed distances, which give lower bounds for their error-correcting capability We also give a new construction of orthogonal idempotents, and hence of minimal ideals, in any semisimple commutative algebra.

M072 Minimal Codes in Abelian Group Algebras

R L Miller

J Combin Theor, Vol 26, No. 2, pp. 166–178, March 1979

This paper shows that two minimal codes in a particular group algebra have the same (Hamming) weight distribution if and only if there exists an automorphism whose linear extension to that group algebra maps one minimal code onto the other

MINER, E. D.

M073 Thermal Infrared Properties of the Martian Atmosphere· 1. Global Behavior at 7, 9, 11, and 20 μm

T Z. Martin (University of California, Los Angeles), A. R Peterfreund (Arizona State University), E D Miner, H H Kieffer (U S Geological Survey), and G E Hunt (University College London, London, England)

J Geophys Res., Vol 84, No B6, pp. 2830–2842, June 10, 1979

For abstract, see Martin, T. Z

MITCHELL, G. F.

M074 The Synthesis of Complex Molecules in Interstellar Clouds

W T Huntress, Jr. and G F Mitchell

Astrophys. J., Vol. 231, pp. 456–467, July 15, 1979

For abstract, see Huntress, W T , Jr

M075 Interstellar Synthesis of the Cyanopolyynes and Related Molecules

G F Mitchell, W T. Huntress, Jr., and S S Prasad

Astrophys J, Vol 233, pp. 102–108, October 1, 1979

The cyanopolyynes HC_2CN, HC_4CN, HC_6CN, and HC_8CN, and the molecules CH_3CHCN and CH_3CH_2CN, have recently been detected in the interstellar medium We show that the observed abundances of these molecules can be obtained by gas-phase formation pathways if the reaction of H_2CN^+ with C_2H_2 is rapid at low interstellar temperatures The molecules CH_2CHCN and C_3N may be formed also by the reactions of H_2CN^+ with C_2H_2, and CH_3CH_2CN may be formed by reaction of H_2CN^+ with C_2H_4

M076 Long Chain Carbon Molecules and Diffuse Interstellar Lines

G F. Mitchell and W T. Huntress, Jr.

Nature, Vol 278, No 5706, pp 722–723, April 19, 1979

An estimate of the abundances of chain hydrocarbon molecules expected in dense interstellar clouds as a result of gas-phase chemistry alone supports the hypothesis that the long chain molecules are responsible for the diffuse interstellar lines seen in the optical spectra of stars lying behind fairly low-density interstellar clouds In particular, it is shown that the equilibrium abundances of the long chain carbon molecules may remain quite high even for molecules with as many as 11 carbon states

MITTRA, R.

M077 Aperture Amplitude and Phase Control of Offset Dual Reflectors

V Galindo-Israel, R. Mittra (University of Illinois), and A. G. Cha

IEEE Trans Anten Prop, Vol AP-27, No. 2, pp 154–164, March 1979

For abstract, see Galindo-Israel, V.

M078 An Efficient Technique for the Computation of Vector Secondary Patterns of Offset Paraboloid Reflectors

R Mittra (University of Illinois), Y Rahmat-Samii, V. Galindo-Israel, and R. Norman

IEEE Trans. Anten Prop, Vol. AP-27, No 3, pp 294–304, May 1979

A series approach for the rapid computation of the vector secondary pattern of offset paraboloid reflectors wherein the feed is displaced is presented We show that the Jacobi polynomial series method, which has been demonstrated to provide an efficient means for evaluating the radiation integral of symmetric paraboloid reflectors, can be extended to the case of an offset paraboloid without compromising the ease or speed of computation The analysis leading to the series formula is also useful for deriving an analytic expression for the optimum scan plane for the displacement of the feed Representative numerical results illustrating the application of the method and the properties of the offset paraboloid are presented

MIYAHIRA, T. F.

M079 Characterization of Solar Cells for Space Applications: Electrical Characteristics of OCLI 225-Micron MLAR Wraparound Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, T. F. Miyahira, and R S Weiss

JPL Publication 78-15, Vol V, April 1, 1979

For abstract, see Anspaugh, B. E

M080 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured, 10 ohm-cm, 50 Micron Advanced OAST Solar Cells as a Function of Intensity, Temperature, and Irradiation

B. E. Anspaugh, R. G Downing, T F. Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol VI, June 15, 1979

For abstract, see Anspaugh, B. E

M081 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab HEWAC BSF, Textured, 10 ohm-cm, 225 Micron Solar Cells as a Function of Intensity and Temperature

B. E. Anspaugh, D M. Beckert, R. G Downing, T. F Miyahira, and R S Weiss

JPL Publication 78-15, Vol VII, June 15, 1979

For abstract, see Anspaugh, B E

M082 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation

B E Anspaugh, D. M Beckert, R G Downing, T F. Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol VIII, September 1, 1979

For abstract, see Anspaugh, B E

M083 Characterization of Solar Cells for Space Applications Electrical Characteristics of Spectrolab BSF, Textured, 10-ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation

B F. Anspaugh, D M Beckert, R G Downing, T F. Miyahira, and R S Weiss

JPL Publication 78-15, Vol IX, September 15, 1979

For abstract, see Anspaugh, B F

M084 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10 ohm-cm, 300 Micron Cells as a Function of Intensity, Temperature and Irradiation

B E Anspaugh, R G Downing, T. F Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol. X, October 1, 1979

For abstract, see Anspaugh, B E

MOACANIN, J.

M085 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes: Second Annual Report, July 1977–July 1978

J. Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D Lawson, T. Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

A series of hybrid fluorochemicals of general structure $R^1R^2R^3CR^4$, was prepared where the R^i's (i = 1,2,3) is a saturated fluoroalkyl group of formula C_nF_{2n+1}, and R^4 is an alkyl group C_nH_{2n+1} or a related moiety containing amino, ether or ester functions but no CF bonds. Such compounds, except for a few isolated examples, have been unknown and none have been tested for toxicity or their physical properties systematically studied We proposed that compounds of this class containing approximately eight to twenty carbons total would have physical properties suitable for use as the oxygen carrying phase of fluorochemical emulsion artificial blood, and that there was reason to hope for low toxicity. The program included the chemical synthesis, and physical and biological testing of pure single isomers of the proposed artificial blood candidate compounds

Results of the work include. (a) the successful synthesis of several candidate compounds, i e, compounds with acceptable physical properties, (b) preliminary toxicity results indicating that at least two of these are nontoxic, contrary to the previous belief that significant hydrogen content necessitates toxicity, and (c) the development of a method for predicting vapor pressure and oxygen solubility from chemical structure alone, to guide the synthetic efforts in the most fruitful direction Much of the effort was devoted to synthesis of chemical intermediates and development of testing methodology

Prepared for the Division of Blood Diseases and Resources, National Heart, Lung and Blood Institute, National Institutes of Health

M086 Effects of Space Environment on Composites: An Analytical Study of Critical Experimental Parameters

A Gupta, W F Carroll, and J. Moacanin

JPL Publication 79-47, July 1, 1979

For abstract, see Gupta, A

M087 Viscoelastic Properties of Entangled Polymers: Ternary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), S S Shyu (University of California, Berkeley), M. Shen (University of California, Berkeley), S D Hong, and J. Moacanin

J Appl Phys, Vol. 50, No 10, pp. 6077–6082, October 1979

For abstract, see Soong, D

M088 Solid State Photochemistry of Polycarbonates

A Gupta, A Rembaum, and J. Moacanin

Macromolecules, Vol 11, pp 1285–1288, November–December 1978

For abstract, see Gupta, A.

MOHAN, S. N.

M089 New Determinations of Far-Side Lunar Radii from Apollo Photography

S. N Mohan

Icarus, Vol 38, pp 317–330, 1979

The global distribution of existing lunar topography suffers from a lack of measurements of far-side radii because of the sparsity of data types in the nonequatorial regions This paper presents determinations of far-side lunar radii based on the reduction of photogrammetric measurements derived from selected Apollo 16 trans-Earth phase photographs The regions covered in this analysis lie west of Mare Moscoviense between longitudes 90 and 130°E and latitudes 10 and 60°N. The determinations are made using control points appearing

on both NASA topographic orthophoto maps and the Apollo 16 photographs The estimated lunar radii are referred to these control points and determined with a relative accuracy of 500 m The new lunar radii are used to generate a topographic map covering the area investigated. The map shows that, with the given spatial density of surface features measured, basin-sized features can be resolved In particular, the far-side craters Fabry, Riemann, and Szilard comprise a topographically depressed region about 500 km in diameter centered at 120°E and 38 5°N The floor of this basin is 2 4 to 3 4 km below the reference sphere of 1738 0 km and 4 8 to 5 8 km below the northern rim of the basin. A comparison of the depth of the unfilled basin with the depths of maria-filled front-side basins leads to the conclusion that basalt fill of the near-side maria may be 2 km deep The topographic map shows good correlation with geologic provinces of young plains and cratered terra in the far-side highland region investigated Lack of correlation between sampled values of the state-of-the-art 16th-order and 16th-degree harmonic gravity field model and corresponding topographical values leads to the conclusion that the far-side region investigated is isostatically compensated

MORABITO, L. A.

M090 Discovery of Currently Active Extraterrestrial Volcanism

L A Morabito, S. P Synnott, P. N. Kupferman, and S A. Collins

Science, Vol 204, p. 972, June 1, 1979

Two volcanic plumes were discovered on an image of Io taken as part of the Voyager optical navigation effort. This is the first evidence of active volcanism on any body in the solar system other than Earth

MORELLI, F.

M091 Microbiological Evaluation of the Mobile Biological Isolator System

D M Taylor, F. Morelli, W. Neiderheiser, and W M Tratz

JPL Publication 79-48, July 1, 1979

For abstract, see Taylor, D M

MOSESMAN, I. D.

M092 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W. A Mueller, S H Kalfayan, W. W. Reilly, A H. Yavrouian, I. D. Mosesman, and J. D. Ingham

JPL Publication 79-40, May 15, 1979

For abstract, see Mueller, W A.

MOSESMAN, M.

M093 Smoke Properties of Highly Filled Ethylene-Propylene-Diene Terpolymer Rubbers

M Mosesman and J D Ingham

Rubber Chem Technol, Vol 51, No 5, pp 970–976, November–December 1978

This paper is concerned with efforts to reduce the smoke load from ethylene-propylene-diene terpolymer (EPDM) rubber Interest in developing materials with low smoke potential stems from the identification of smoke and the incumbent loss of visibility and toxic offgassing as major reasons for loss of life in some fire situations Regulations governing the smokiness of materials which may be used in airplanes already exist More stringent ones for airplanes, trains and buses are presently proposed and serving as guidelines

The approach used in this work to formulate a low smoking EPDM rubber was based on the hypothesis that there might be a special combination of critical filling level, hydrate releasing material and base polymer which would produce a pronounced reduction in smoke load. The smoke evolution rates produced by such an EPDM rubber formulation filled with mineral hydrates or inert fillers for comparison serve to partially confirm this hypothesis. The flammability of these formulations was assessed by measuring their limiting oxygen indices (LOI). Also, in order to determine the effect of the fillers on the mechanical properties of the filled rubber, tensile strength measurements were made Since cable insulation is a possible application for a smoke retarded EPDM rubber, bulk resistivities, dielectric constants, and dissipation factors are given

MUELLER, W. A.

M094 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W A Mueller, S H Kalfayan, W W Reilly, A. H. Yavrouian, I. D. Mosesman, and J D Ingham

JPL Publication 79-40, May 15, 1979

This report covers the second year of the Jet Propulsion Laboratory's development and evaluation of elastomers for geothermal applications The research involves for-

mulation of commercially available materials and synthesis of new elastomers In the present report period, formulation studies at JPL and elsewhere produced a material having about 250 to 350 psi tensile strength and 30 to 80% elongation at 260°C for at least 24 hours in simulated brine The relationship between these laboratory test results and sealing performance in actual or simulated test conditions is not entirely clear, however, it is believed that no conventional formation or casing packer design is likely to perform well using these materials

The synthetic effort focused on high temperature block copolymers and development of curable polystyrene Procedures were worked out for synthesizing these new materials Initial results with heat-cured unfilled polystyrene "gum" at 260°C indicated a tensile strength of about 50 psi. Cast films of the first sample of polyphenyl quinoxaline-polystyrene block copolymer, which has a "graft-block" structure consisting of a polystyrene chain with pendant polyphenyl quinoxaline groups, showed elastomeric behavior in the required temperature range Its tensile strength and elongation at 260°C were 220 to 350 psi and 18 to 36%, respectively All of these materials also showed satisfactory hydrolytic stability.

A procedure for the synthesis of a linear block copolymer of this type has been devised, and the required new intermediates have been synthesized and characterized.

MUSTAIN, J. A.

M095 Technical Assistance for Law-Enforcement Communications Case Study Report 1

N. B Reilly and J. A. Mustain

JPL Publication 79-71, June 15, 1979

For abstract, see Reilly, N B

M096 Technical Assistance for Law-Enforcement Communications: Case Study Report 2

N. B Reilly and J A Mustain

JPL Publication 79-78, August 15, 1979

For abstract, see Reilly, N B

M097 Technical Assistance for Law-Enforcement Communications: Grant Summary

N B. Reilly and J A Mustain

JPL Publication 79-84, August 15, 1979

For abstract, see Reilly, N. B

NANCE, H

N001 Voyager Support

J Allen and H Nance

The Deep Space Network Progress Report 42-49 November and December 1978, pp 29–33, February 15, 1979

For abstract, see Allen, J

N002 Voyager Mission Support

N Fanelli and H. Nance

The Deep Space Network Progress Report 42-54 September and October 1979, pp. 19–23, December 15, 1979

For abstract, see Fanelli, N.

NANCE, H. E.

N003 Voyager Support

J. E. Allen and H E Nance

The Deep Space Network Progress Report 42-50. January and February 1979, pp. 19–23, April 15, 1979

For abstract, see Allen, J E

N004 Voyager Support

J E Allen and H E. Nance

The Deep Space Network Progress Report 42-51 March and April 1979, pp 4–13, June 15, 1979

For abstract, see Allen, J E

N005 Voyager Support

J E. Allen and H E Nance

The Deep Space Network Progress Report 42-53 July and August 1979, pp 4–9, October 15, 1979

For abstract, see Allen, J E

NASH, D. B.

N006 Albedo Distribution on Io's Surface

D B. Nash and T V. Johnson

Icarus, Vol 38, pp. 69–74, 1979

A visual albedo distribution model for all hemispheres of Io's surface has been synthesized from available Earth-based and spacecraft image and photometric data The resulting model indicates some interesting patterns and symmetries on Io's surface. The dark polar caps are

shifted off Io's rotational axis and are elliptical rather than circular in shape, with extensions toward the sub-Jupiter and anti-Jupiter points on Io, equatorial bright areas are located approximately on a great circle about Io, the plane of which is tilted approximately 15 deg toward Io longitude 60 deg These and other indicated features may be clues to understanding the endogenic and exogenic processes that have resulted in Io's present observed surface characteristics

NASH, J. C

N007 Helios Mission Support

W. N. Jensen and J C Nash

The Deep Space Network Progress Report 42-49. November and December 1978, pp 43–44, February 15, 1979

For abstract, see Jensen, W N

NEIDERHEISER, W.

N008 Microbiological Evaluation of the Mobile Biological Isolator System

D M Taylor, F Morelli, W. Neiderheiser, and W M Tratz

JPL Publication 79-48, July 1, 1979

For abstract, see Taylor, D. M.

NEUGEBAUER, M.

N009 Can X-Ray Bursts be Caused by Substorms at a Neutron Star?

M Neugebauer and B T Tsurutani

Astrophys J, Vol 226, pp 494–500, December 1, 1978

A model for X-ray bursts from accreting neutron stars is developed by analogy with geomagnetic substorms The essential steps in the substorm process are the nearly steady merging or reconnection of the magnetic field in the magnetosphere with the field in the stellar wind, the transport of some of the merged plasma into a magnetically controlled tail, and the explosive release of plasma from the tail into the magnetosphere The strength of the magnetic field in the stellar wind required to drive a substorm is approximately 10^{-1} gauss If the stellar wind is organized into large-scale magnetic sectors, as is the solar wind, topological dissipation will not occur, and the large-scale field will be available for merging at the magnetopause Once the material is in the tail, the time scales for the Kruskal-Schwarzschild instability and the unidentified instability which drives terrestrial substorms may be comparable Alternating periods of burst activity and quiescence could be caused by passage from one sector to another with opposite polarity, or by seasonal variations

NEUGEBAUER, M. M

N010 Relation Between Superheating and Superacceleration of Helium in the Solar Wind

M. M Neugebauer and W C Feldman (Los Alamos Scientific Laboratory)

Solar Phys, Vol. 63, pp. 201–205, 1979

Solar-wind data obtained by the OGO-5 and IMP-6-8 Earth satellites show a positive correlation between the ratio of helium to hydrogen temperatures and the velocity difference between the helium and hydrogen ions Although this result disagrees with the Prognoz-1 results reported earlier in this journal, it is consistent with the expected control by Coulomb collisions when the solar-wind density is high

NEWBURN, R. L., JR.

N011 Models of P/Tempel 2

R L Newburn, Jr

JPL Publication 79-60, September 1, 1979

Quantitative models of Comet Tempel 2 at various heliocentric distances have been created using a semi-empirical theory which ties gas production rates to the light curve Physical properties of the nucleus and gas and dust densities are supplied for a nominal case and two extreme cases at each distance, the extreme cases being based upon a "sum-of-negative-tolerances" approach

NEWELL, D. M.

N012 Designer's Guide to Radiation Effects on Materials for Use on Jupiter Fly-bys and Orbiters

F. L Bouquet, W. E Price, and D M Newell (Ford Aerospace)

IEEE Trans Nucl Sci, Vol NS-26, No. 4, pp 4660–4669, August 1979

For abstract, see Bouquet, F. L

NG, E. W.

N013 Symbolic-Numeric Interface: A Review

E. W Ng

JPL Publication 79-106, January 1, 1980

This is a survey of recent activities that either used or encouraged the potential use of a combination of symbolic and numerical calculations Symbolic calculations here primarily refer to the computer processing of procedures from classical algebra, analysis and calculus Numerical calculations refer to both numerical mathematics research and scientific computation This survey is intended to point out a large number of problem areas where a co-operation of symbolic and numeric methods is likely to bear many fruits These areas include such classical operations as differentiation and integration, such diverse activities as function approximations and qualitative analysis, and such contemporary topics as finite element calculations and computational complexity It is contended that other less obvious topics such as the Fast Fourier Transform, linear algebra, nonlinear analysis and error analysis would also benefit from a synergistic approach advocated here

N014 Symbolic-Numeric Interface: A Review

E. W. Ng

Symbolic and Algebraic Computation Proc EUROSAM '79, Int Symp Symbolic & Algebraic Manipulation, Marseille, France, June 1979, pp 330–345

This is a survey of recent activities that either used or encouraged the potential use of a combination of symbolic and numerical calculations Symbolic calculations here primarily refer to the computer processing of procedures from classical algebra, analysis and calculus Numerical calculations refer to both numerical mathematics research and scientific computation This survey is intended to point out a large number of problem areas where a co-operation of symbolic and numeric methods is likely to bear many fruits These areas include such classical operations as differentiation and integration, such diverse activities as function approximations and qualitative analysis, and such contemporary topics as finite element calculations and computational complexity. It is contended that other less obvious topics such as the Fast Fourier Transform, linear algebra, nonlinear analysis and error analysis would also benefit from a synergistic approach advocated here

NISHIMURA, H.

N015 Multi-Mission Receiver (MMR)

H Donnelly and H. Nishimura

The Deep Space Network Progress Report 42-52 May and June 1979, pp 75–81, August 15, 1979

For abstract, see Donnelly, H

NIXON, D.

N016 A Prototype DSN X-S Band Feed: DSS 13 Application Status (Third Report)

W Williams, D Nixon, H Reilly, J Withington, and D Bathker

The Deep Space Network Progress Report 42-52 May and June 1979, pp 51–60, August 15, 1979

For abstract, see Williams, W

NJOKU, E G.

N017 Seasat Scanning Multichannel Microwave Radiometer. Results of the Gulf of Alaska Workshop

R G Lipes, R L Bernstein (Scripps Institution of Oceanography), V J Cardone (Oceanweather, Inc), K B. Katsaros (University of Washington), E G Njoku, A L Riley, D B Ross (Atlantic Oceanic and Meteorological Laboratory), C T Swift (Langley Research Center), and F. J Wentz (Frank J Wentz and Associates)

Science, Vol 204, pp 1415–1417, June 29, 1979

For abstract, see Lipes, R. G

NORMAN, R

N018 An Efficient Technique for the Computation of Vector Secondary Patterns of Offset Paraboloid Reflectors

R Mittra (University of Illinois), Y. Rahmat-Samii, V Galindo-Israel, and R. Norman

IEEE Trans Anten Prop, Vol AP-27, No 3, pp 294–304, May 1979

For abstract, see Mittra, R.

NORRIS, D. D.

N019 Onboard Processing for Future Space-Borne Imaging Systems

J. B Wellman and D D Norris

Preprint 78-1710, AIAA/NASA Conf "Smart" Sensors, Hampton, Va , November 14–16, 1978

For abstract, see Wellman, J B

NORTON, H. N.

N020 Instrumentation Concepts and Requirements for a Space Vacuum Research Facility

H N Norton

JPL Publication 78-105, March 1, 1979

An earth-orbiting molecular shield offers a unique opportunity for conducting physics, chemistry, and material processing experiments under a combination of environmental conditions that are not available in terrestial laboratories microgravity, very-low background gas density, high molecular escape probability for gas released by experiments, and high heat rejection capability A molecular shield equipped with apparatus for forming a molecular beam from the freestream additionally offers the opportunity to conduct experiments using a moderate-energy, high-flux-density, high-purity atomic oxygen beam in the very-low density environment within the molecular shield

Instrument concepts and requirements are given based on contacts with potential science users As a minimum, the following instruments are required for the molecular shield (1) a mass spectrometer, (2) a multifunction material analysis instrumentation system and (3) optical spectrometry equipment

The design is given of a furlable molecular shield that allows deployment and retrieval of the system (including instrumentation and experiments) to be performed without contamination Interfaces between the molecular shield system and the associated spacecraft are given in detail An in-flight deployment sequence is discussed that minimizes the spacecraft-induced contamination in the vicinity of the shield Finally design approaches toward a precursor molecular shield system are shown

OAKS, J.

0001 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W. J. Hurd, S C Wardrip (Goddard Space Flight Center), J Bussion (Naval Research Laboratory), J Oaks (Naval Research Laboratory), T. McCaskill (Naval Research Laboratory), H Warren (Bendix Field Engineering Corp), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49, November and December 1978, pp 64–69, February 15, 1979

For abstract, see Hurd, W J

OLSEN, E. T.

0002 Interferometric Observations of the Quiet Sun at 8 Millimeter Wavelength

M. A. Janssen, E. T Olsen, and K R.- Lang (Tufts University)

Astrophys. J, Vol 228, pp. 616–623, March 1, 1979

For abstract, see Janssen, M. A

OTOSHI, T. Y.

0003 Definition of Antenna Microwave Time Delay for VLBI Clock Synchronization

T. Y Otoshi

The Deep Space Network Progress Report 42-49 November and December 1978, pp 45–56, February 15, 1979

This article presents derivations and definitions of antenna time delays above the phase calibrator injection points for VLBI time synchronization work. As nearly as possible, the symbols and nomenclature are made to be identical or similar to those used in ranging work These definitions will be helpful in assessing the accuracy requirements of antenna time delay values to be provided to the VLBI clock sync project by the Microwave Phase Center Calibration work unit

0004 Multipath Effects on the Time Delays of Microwave Cassegrainian Antennas

T. Y Otoshi and W. V T Rusch (University of Southern California)

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 52–55, April 15, 1979

Preliminary results of a theoretical study of multipath errors on antenna time delays are discussed A computer program has been developed to simulate multipath scattering between cone surfaces and the subreflector.

0005 An Experimental Investigation of the Effects of Antenna Pointing Errors on Range Delays

T Y Otoshi and T H Taylor

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 141–147, October 15, 1979

The effect of antenna pointing errors has been a possible source of error on range and VLBI time delay measurements that has not been previously investigated This article presents the results of some S-band tests performed specifically to study this effect. The test procedure involved the intentional mispointing of a 26-meter antenna while ranging to a zero delay device (ZDD) connected to a collimation tower antenna The observed range changes were less than 0 25 meters when the collimation tower target was within the 3 dB points of the main beam of the 26-meter antenna.

0006 Microwave Delay Characteristics of Cassegrainian Antennas

A G. Cha, W. V. T Rusch (University of Southern California), and T Y Otoshi

IEEE Trans. Anten Prop, Vol. AP-26, No. 6, pp 860–865, November 1978

For abstract, see Cha, A G

OVERLAND, J. E.

0007 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J. C. Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V J Cardone (Oceanweather, Inc), R. E. Coons, A A. Loomis, J. E. Overland (Pacific Marine Environmental Laboratory), S. Peteherych (Atmospheric Environmental Service), W. J Pierson (City University of New York), P. M. Woiceshyn, and M. G Wurtele (University of California, Los Angeles)

Science, Vol 204, pp. 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

PARKER, R. H.

P001 The Galactic Gamma-Ray Flux in the 0.06–5 MeV Range

D Gilman, A E Metzger, R H Parker, and J. I. Trombka (Goddard Space Flight Center)

Astrophys J, Vol 229, pp 753–761, April 15, 1979

For abstract, see Gilman, D

PARTHASARATHY, S P.

P002 Separation of Core Noise and Jet Noise

S. P Parthasarathy, R. F Cuffel, and P F Massier

Preprint 79-0589, AIAA Fifth Aeroacoustics Conf , Seattle, Washington, March 12–14, 1979

A method of identification and measurement of core noise and jet noise separately has been developed based on cross-correlation of signals from microphones located at widely separated angles in the far field of a jet The different coherent properties of core noise and jet noise are used in this method to achieve this separation Experimental data obtained in a small scale facility is analyzed to demonstrate that this method can be used successfully to separate the mean square pressures of core noise and jet noise

P003 Twin Jet Shielding

S P Parthasarathy, R. F Cuffel, and P. F. Massier

Preprint 79-0671, AIAA Fifth Aeroacoustics Conf., Seattle, Washington, March 12–14, 1979

For an over-the-wing/under-the-wing engine configuration on an airplane, the noise produced by the upper jet flow is partially reflected by the lower jet An analysis has been performed which can be used to predict the distribution of perceived noise levels along the ground plane at take-off for an airplane which is designed to take advantage of the over/under shielding concept

Typical contours of PNL, the shielding benefit in the shadow zone, and the EPNL values at 3 5 nautical miles from brake release as well as EPNL values at sideline at 0 35 nautical miles have been calculated This has been done for a range of flow parameters characteristic of engines producing inverted velocity profile jets suitable for use in a Supersonic Cruise Vehicle Reductions up to 6 0 EPNdB in community noise levels can be realized when the over engines are operated at higher thrust and the lower engines simultaneously operated with reduced thrust keeping the total thrust constant A noise reduction on the sideline would occur also if the spanwise distance between the engines is small enough for shielding in this direction to be beneficial

PATEL, I. R.

P004 Liquid Content of the Lower Clouds of Venus as Determined from Mariner 10 Radio Occultation

A J. Kliore, C. Elachi, I R Patel, and J B Cimino (California Institute of Technology)

Icarus, Vol 37, No 1, pp. 51–72, January 1979

For abstract, see Kliore, A. J

P005 The Polar Ionosphere of Venus Near the Terminator from Early Pioneer Venus Orbiter Radio Occultations

A J Kliore, R. Woo, J W. Armstrong, I R Patel, and T A Croft (SRI International)

Science, Vol 203, pp 765–768, February 23, 1979

For abstract, see Kliore, A J

PELLIN, R.

P006 Silicon Materials Outlook Study for 1980–85 Calendar Years

E Costogue, R Ferber, W. Hasbach,
R. Pellin (Consultant, Charlotte, NC), and
C Yaws (Consultant, Beaumont, TX)

JPL Publication 79-110, November 1, 1979

For abstract, see Costogue, E

PENG, S. T. J.

P007 The Elastic Potential Function of Slightly Compressible Rubberlike Materials

S. T J. Peng

J Polym Sci Polym Phys, Vol 17, No 3, pp 345–350, March 1979

This paper discusses determining the elastic strain energy function of slightly compressible materials from careful measurements of the volume change in multiaxial deformations

PETEHERYCH, S

P008 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V J Cardone (Oceanweather, Inc), R E Coons, A A Loomis, J. E Overland (Pacific Marine Environmental Laboratory), S Peteherych (Atmospheric Environmental Service), W J Pierson (City University of New York), P M. Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol 204, pp 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

PETERFREUND, A R

P009 Thermal Infrared Properties of the Martian Atmosphere 1 Global Behavior at 7, 9, 11, and 20 μm

T. Z Martin (University of California, Los Angeles), A R Peterfreund (Arizona State University), E D Miner, H H. Kieffer (U S. Geological Survey), and G E Hunt (University College London, London, England)

J Geophys Res, Vol. 84, No. B6, pp 2830–2842, June 10, 1979

For abstract, see Martin, T Z

PETERSEN, G R.

P010 Potential Heat Exchange Fluids for use in Sulfuric Acid Vaporizers

D. D Lawson and G R Petersen

JPL Publication 79-81, October 1, 1979

For abstract, see Lawson, D D

PETERSON, J C

P011 Implementation of the DSN VLBI Correlator

J C Peterson and J W Dillon

The Deep Space Network Progress Report 42-50 January and February 1979, pp 226–236, April 15, 1979

This article focuses on the overall design and current status of the VLBI Correlator designed to accommodate DSN requirements The two-station correlator design uses real-time digital computation with microprocessors to perform cross correlation detection of sampled signals in the 0 125 to 2 MHz range

PETRAC, D

P012 Evaluation of Porous-Plug Liquid Separators for Space Superfluid Helium Systems

D Petrac and P. V Mason

Proc. Seventh Int Cryog Eng Conf., London, United Kingdom, July 4–7, 1978, pp 120–125

NASA plans to use superfluid cryostats for a number of missions requiring temperatures in the superfluid regime, below 2 172 K The work reported here provides an operational demonstration of the usefulness of porous plugs for liquid-vapor separators and associated temperature control in a zero-gravity environment We also expand on the previously reported work on superfluid filters with the specific goal of finding useful materials to match a range of requirements for cooling power, temperature range, and conditions for venting to space

PHILLIPS, H. P.

P013 A Study of the Influence of Oil Saturation on the 64-Meter Antenna Hydrostatic Bearing Grout

H P Phillips, A A Riewe, M Polivka (University of California, Berkeley), and
P. K Mehta (University of California, Berkeley)

The Deep Space Network Progress Report 42-54 September and October 1979, pp 62–70, December 15, 1979

Deterioration of the grout supporting the hydrostatic bearing runners in the DSN 64-m antennas has been a continuing maintenance problem This paper describes an investigation, carried out at the University of California at Berkeley, into the effect of oil saturation on the grout It is concluded that oil saturation as such did not significantly affect the strength of the concrete in either static or cyclic loading The possibility is raised that the presence of oil as the concrete is placed may inhibit the development of the full strength of the material

PHILLIPS, R. J.

P014 Simulation Gravity Modeling to Spacecraft-Tracking Data Analysis and Tracking

R J. Phillips, W L Sjogren, E A Abbott, and S H Zisk (Massachusetts Institute of Technology)

J Geophys Res, Vol 83, No B11, pp. 5455–5464, November 10, 1978

It is proposed that line-of-sight gravity measurements derived from spacecraft-tracking data can be used for quantitative subsurface density modeling by suitable orbit simulation procedures Such an approach avoids complex dynamic reductions and is analogous to the modeling of conventional surface gravity data This procedure utilizes the vector calculations of a given gravity model in a simplified trajectory integration program that simulates the line-of-sight gravity Solutions from an orbit simulation inversion and a dynamic inversion on Doppler observables compare well (within 1% in mass and size), and the error sources in the simulation approximation are shown to be quite small An application of this technique is made to lunar crater gravity anomalies by simulating the complete Bouguer correction to several large young lunar craters It is shown that the craters all have negative Bouguer anomalies

P015 Gravity Field of Venus A Preliminary Analysis

R J Phillips, W L Sjogren, E A Abbott, J C Smith, R N Wimberly, and C. A Wagner (Goddard Space Flight Center)

Science, Vol 205, pp. 93–96, July 6, 1979

The line-of-sight gravity field for Venus has been mapped by tracking the Pioneer Venus spacecraft in the vicinity of periapsis for a 45 deg swath of longitude eastward of 294 deg There are consistent and systematic variations in the gravity signature from orbit to orbit, attesting to the reality of observed anomalies Orbit 93 passes over a large positive topographic feature, the "northern plateau," for which there is no corresponding gravity signature If this region has no isostatic compensation, the gravity signal would exceed the noise level by a factor of 7 The results of simulation modeling indicate that the northern plateau must be compensated at depths of about 100 kilometers or less The long-wavelength anomalies seen in the Venus gravity data have been Fourier-decomposed along the orbital tracks and compared to analogous spectra for Earth The gross power in the two mean spectra is approximately the same, but systematic variations among the harmonics suggest differences in dynamic processes or lithospheric behavior, or both, for the two planets

PICKETT, H. M

P016 The Physical Basis for Absorption of Light

H M Pickett

Nature, Vol. 279, No 5710, pp 224–225, May 17, 1979

The effects of light absorption on the wave functions of gas-phase molecules and atoms are investigated by high resolution spectral measurements of radiation emerging from a sample A Stark-modulated sample of methyl fluoride was irradiated at the 102 GHz rotational transition and the emergent radiation was resolved by means of a spectrum analyzer For signal oscillator frequencies below or above the molecular resonance by one modulation frequency, the amplitudes of the upper and lower modulation sidebands are found to be of nonuniform intensity, which is inconsistent with amplitude modulation Emission due to polarization is, however, calculated to be consistent with the results observed, indicating that light absorption should be considered as a subtractive stimulated emission

PIDEK, D. G.

P017 One Mars Year: Viking Lander Imaging Observations

K L Jones (Planetary Research, Inc),
R E Arvidson (Washington University),
E A Guinness (Washington University),
S L Bragg (Washington University),
S D Wall (Langley Research Center),
C E Carlston (Martin Marietta Corporation), and
D G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

For abstract, see Jones, K L

PIERSON, W. J

P018 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R. A. Brown (University of Washington), V. J Cardone (Oceanweather, Inc), R. E Coons, A A Loomis, J. E Overland (Pacific Marine Environmental Laboratory), S Peteherych (Atmospheric Environmental Service), W J. Pierson (City University of New York), P M. Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

PLESS, L. C.

P019 Plume Characterization of a One-Millipound Solid Teflon Pulsed Plasma Thruster

L C Pless, L K Rudolph, and D J. Fitzgerald

JPL Publication 78-96, October 1978

An evaluation was made of the pulsed plasma thruster plume-wall backscatter characteristics of the MOLSINK facility. On the thruster axis, the MOLSINK backscatter was found to be $1\,23 \times 10^{-2}$ μg-cm^{-2}-pulse^{-1} This backscatter drops off to zero as the angle between the axis and wall location reaches 40 deg This wall backscatter was found to be essentially symmetric about the plume axis The total integrated backscatter from the MOLSINK wall is approximately equal to 5% of the total mass injected from the pulsed plasma thruster during the discharge pulse

Prepared for the Air Force Rocket Propulsion Laboratory, AFRPL-TR-78-63

POLIVKA, M.

P020 A Study of the Influence of Oil Saturation on the 64-Meter Antenna Hydrostatic Bearing Grout

H P. Phillips, A A Riewe, M Polivka (University of California, Berkeley), and P K Mehta (University of California, Berkeley)

The Deep Space Network Progress Report 42-54 September and October 1979, pp 62–70, December 15, 1979

For abstract, see Phillips, H P

POMPA, M. F.

P021 Aircraft Vortex Marking Program: Final Report

M F. Pompa

JPL Publication 79-77, October 1, 1979

The objective of this program was to develop a simple, reliable device for identifying atmospheric vortices, principally as generated by in-flight aircraft and with emphasis on the use of non-polluting aerosols for marking by injection into such vortex(-ices)

The refractive index and droplet size were determined from an analysis of aerosol optical and transport properties (e g , vapor pressure, molecular weight) as the most significant parameters in effecting vortex optimum light scattering (for visual sighting) and visual persistency of at least 300 sec The analysis also showed that a steam-ejected tetraethylene glycol aerosol with droplet size near 1μ and refractive index of approximately 1 45 could be a promising candidate for vortex marking

A marking aerosol was successfully generated with the steam-tetraethylene glycol mixture from breadboard system hardware A compact 25-lb$_f$ thrust (nominal) H_2O_2 (hydrogen peroxide) rocket chamber was the key component of the system which produced the required steam by catalytic decomposition of the supplied H_2O_2

POSTAL, R. B.

P022 Evaluation of the JPL X-Band 32-Element Active Array: Final Report

J F Boreham, R B Postal, and B L. Conroy

JPL Publication 79 69, Rev 1, August 1, 1979

For abstract, see Boreham, J F

POTTER, P. D

P023 Antenna Feedhorn Software Upgrade

P D Potter

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 75–84, June 15, 1979

The HYBRIDHORN computer program was developed in 1973 to serve as an item of general purpose antenna feedhorn design and analysis software, and has been utilized extensively since that time for this purpose The 1973 formulation contains a small flare angle approximation which is subject to question for designs such as the Williams S- and X-band feedhorn Additionally, the original formulation did not allow azimuthal variation indices other than unity The HYBRIDHORN program has been recently upgraded to correct both of these deficiencies A new large flare angle formulation has been found which appears to have escaped the attention of others In the upgrade, all of the major program elements have been converted to Univac 1108 compatible structured Fortran (SFTRAN) for ease of software maintenance This article

describes the small and large angle formulations and presents some sample numerical results

P024 Feasibility of Inertialess Conscan Utilizing Modified DSN Feedsystems

P. D Potter

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 85–93, June 15, 1979

The closed-loop conical-scan (conscan) technique has proven to be a useful method for pointing the DSN antennas more accurately than is possible by open-loop methods As presently implemented, the antenna beam is scanned about the received signal direction by physical movement of the antenna. While straightforward, this approach has at least two disadvantages Firstly, because of structural distortions, finite angle encoder resolutions, and drive servo response, the actual antenna beam direction only approximates the commanded beam direction Secondly, because of the large mass moved during scan, the rate of scan is severely restricted If there are significant gain or signal level variations during a scan period, the conscan system interprets these variations as antenna pointing error Both of these disadvantages would be alleviated in an inertialess conscan system in which the beam scanning was performed electronically Recently, standard JPL antenna feedhorn software was upgraded (described separately in this report) to calculate, among other things, asymmetric corrugated horn radiation patterns of the type that would be needed for electronic beam scan A brief look has been taken at the required horn excitation The results, described in this article, are highly promising

PRASAD, S. S

P025 Interstellar Synthesis of the Cyanopolyynes and Related Molecules

G. F Mitchell, W. T. Huntress, Jr., and S S Prasad

Astrophys. J, Vol 233, pp 102–108, October 1, 1979

For abstract, see Mitchell, G F

PRICE, W E.

P026 Designer's Guide to Radiation Effects on Materials for Use on Jupiter Fly-bys and Orbiters

F. L Bouquet, W E Price, and D M. Newell (Ford Aerospace)

IEEE Trans Nucl Sci, Vol NS-26, No 4, pp 4660–4669, August 1979

For abstract, see Bouquet, F L

PRUSSIN, S.

P027 Model for MOS Field-Time-Dependent Breakdown

S. P Li, S Prussin, and J Maserjian

Reliability Phys. 1978 16th Annu Proc, San Diego, Calif, April 18–20, 1978, pp 132–136

For abstract, see Li, S P

P028 A Comparison of Gettering Techniques

S. Prussin (TRW Semiconductors, Inc), S. P Li (California State Polytechnic University, Pomona), and R. H Cockrum

Semiconductor Characterization Techniques Proc Top Conf Characterization Tech Semicond Mater & Devices, Seattle, Wash, May 21–26, 1978, pp 357–365

The effectiveness of four gettering techniques was evaluated from MOS parameter measurements Microdefect nuclei were introduced by implanting the front surfaces of silicon wafers with 5×10^{13}, 1×10^{14}, 2×10^{14}, and 5×10^{14} Ne cm^{-2} Gettering techniques applied to the back surfaces included heavy phosphorous diffusion, mechanical damage plus oxidation, ion implantation plus oxidation, and Si_3N_4 deposition plus annealing During gate oxidation, the back surfaces can act as sources or sinks for point defects and impurities, restricting the expansion of microdefect nuclei on the front surfaces and their decoration The heavy phosphorus diffusion appeared to be most effective

PUROHIT, G.

P029 Methanol Decomposition Bottoming Cycle for IC Engines

G Purohit and J Houseman

Preprint 79-0427, SAE Congress & Exposition, Detroit, Mich, February 26–March 2, 1979

This paper presents the concept of methanol decomposition using engine exhaust heat, and examines its potential for use in the operation of passenger cars, diesel trucks, and diesel-electric locomotives

Energy economy improvements of 10–20% are calculated over the representative driving cycles without a net loss in power Some reductions in exhaust emissions are also projected

RAHMAT-SAMII, Y.

R001 An Efficient Technique for the Computation of Vector Secondary Patterns of Offset Paraboloid Reflectors

R Mittra (University of Illinois), Y. Rahmat-Samii, V. Galindo-Israel, and R. Norman

IEEE Trans Anten Prop, Vol AP-27, No 3, pp. 294–304, May 1979

For abstract, see Mittra, R

R002 Diffraction by an Arbitrary Subreflector. GTD Solution

S W Lee (University of Illinois), P Cramer, Jr, K Woo, and Y Rahmat-Samii

IEEE Trans Anten Prop, Vol AP-27, No 3, pp 305–316, May 1979

For abstract, see Lee, S W

R003 Useful Coordinate Transformations for Antenna Applications

Y. Rahmat-Samii

IEEE Trans Anten Prop, Vol AP-27, No 4, pp 571–574, July 1979

General coordinate transformations which are commonly encountered in many antenna applications are presented Neither the feed coordinates nor the far-field pattern coordinates in general coincide with the antenna coordinates Transformations discussed allow one to relate the spherical and Cartesian components of one system to the spherical and Cartesian components of the other system In particular, attempts are made to use unified notations to assist the reader in a straightforward application of the transformations

RAIBERT, M. H.

R004 Autonomous Mechanical Assembly on the Space Shuttle An Overview

M H Raibert

JPL Publication 79-62, July 15, 1979

The Space Shuttle will be equipped with a pair of 50 ft manipulators used to handle payloads and to perform mechanical assembly operations While current plans call for these manipulators to be operated by a human teleoperator, this article examines the possibility of using results from robotics and machine intelligence to automate this Shuttle assembly system The major components of an autonomous mechanical assembly system are examined, along with the technology base upon which they depend The state of the art in advanced automation is assessed in the Appendix

RAMAKUMAR, R.

R005 Application of Field-Modulated Generator Systems to Dispersed Solar Thermal Electric Generation

R Ramakumar and K Bahrami

JPL Publication 79-83, August 15, 1979

A Parabolic Dish-Electric Transport concept for dispersed solar thermal generation is considered In this concept the power generated by 15 kWe Solar Generation Units is electrically collected in a large plant

Various approaches are possible for the conversion of mechanical shaft output of the heat engines to electricity This study focuses on the Application of Field Modulated Generation System (FMGS) for that purpose

Initially the state-of-the-art of FMGS is presented, and the application of FMGS to dispersed solar thermal electric generation is investigated This is followed by the definition of the control and monitoring requirements for solar generation system Then comparison is made between FMGS approach and other options Finally, the technology developmental needs are identified

RAMOHALLI, K.

R006 Novel Approaches for Alleviation of Electrical Hazards of Graphite-Fiber Composites

K Ramohalli

JPL Publication 79-63, October 15, 1979

This study was aimed at exploring the feasibility of different approaches to solve the electrical problems posed by graphite-fiber composites Four basically different approaches were considered gasification of fibers, retention in the matrix, clumping to prevent entrainment, and electrical insulation of fibers The techniques used to achieve them are described in some detail These involved surface treatment of fibers to improve the wettability of fibers and coating the fibers with the selected substances before laying them up for composite fabrication Thermogravimetric analyses were performed on the plain and treated fibers in inert (nitrogen, argon) and reactive (air) atmospheres The treated fibers embedded in epoxy were ignited in a Bunsen flame to determine the efficiency of these treatments A simple apparatus was assembled to detect the time for the first short circuit (in a typical electrical circuit) when exposed to the combustion products from a graphite fiber composite fire The state-of-the-art and treated fibers cast in typical epoxy were burned and ranked for potential success It was inferred that the gasification schemes appear promising

when reduction or oxidation is tried It was also found that some very promising candidates were available for the clumping and for the electrical insulation of fibers The description of a plan for future work in this area concludes this report

RAYERMANN, P.

R007 **A Photoionization Study of Ion Pair Formation From $CFCl_3$**

J M Ajello and P Rayermann

J Chem Phys, Vol 71, No 3, pp 1512–1513, August 1, 1979

For abstract, see Ajello, J M

REASENBERG, R. D.

R008 **The Viking Relativity Experiment**

I I Shapiro (Massachusetts Institute of Technology), R. D. Reasenberg (Massachusetts Institute of Technology), P E MacNeil (Massachusetts Institute of Technology), R B. Goldstein (Massachusetts Institute of Technology), J P. Brenkle, D. L Cain, T Komarek A I Zygielbaum, W. F. Cuddihy (Langley Research Center), and W H Michael, Jr. (Langley Research Center)

J Geophys Res, Vol 82, No 28, pp. 4329–4334, September 30, 1977

For abstract, see Shapiro, I I

REASONER, R

R009 **Costas Loop Demodulation of Suppressed Carrier BPSK Signals in the DSN Environment—Experimental Results Obtained at TDL**

R Reasoner, G. Stevens, and K T Woo

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 94–104, June 15, 1979

Suppressed carrier binary phase-shift keyed (BPSK) signalling is currently being considered as a design alternative for future DSN telemetry in the multimegabit range Carrier tracking of such signals is usually achieved by a Costas loop, as opposed to the ordinary phase lock loop A Costas loop capable of demodulating BPSK signals with data rates up to 1 Msps has been designed and constructed and its Doppler tracking performance with respect to a Block III receiver has been tested at the Telecommunications Development Laboratory (TDL) The purpose of these experiments is to investigate the compatibility of suppressed carrier signalling with the current radio metric system, specifically Doppler tracking and ranging This article documents the experimental results obtained to-date with respect to Doppler tracking

REED, I. S

R010 **Further Results on Fast Transforms for Decoding Reed-Solomon Codes Over $GF(2^n)$ for $n = 4,5,6,8$**

I S Reed (University of Southern California), T K Truong, R L Miller, and B. Benjauthrit

The Deep Space Network Progress Report 42-50 January and February 1979, pp. 132–155, April 15, 1979

In this article it is shown that Winograd's methods can be modified to compute Fourier-like transforms over $GF(2^n)$, where $n = 4,5,6,8$ Such transforms are used to encode and decode Reed-Solomon codes of block length $2^n - 1$ With these transforms a Reed-Solomon decoder can be made faster and more efficient than a decoder that uses the conventional fast transforms over $GF(2^n)$.

R011 **A Fast Technique for Computing Syndromes of BCH and RS Codes**

I S Reed (University of Southern California), T K. Truong, and R. L Miller

The Deep Space Network Progress Report 42-52 May and June 1979, pp 67–70, August 15, 1979

In this article, a combination of the Chinese Remainder Theorem and Winograd's algorithm is used to compute transforms of odd length over $GF(2^m)$. Such transforms are used to compute the syndromes needed for decoding BCII and RS codes The present scheme requires substantially fewer multiplications and additions than the conventional method of computing the syndromes directly

R012 **A Reed-Solomon Decoding Program for Correcting Both Errors and Erasures**

R. L. Miller T K Truong, B Benjauthrit, and I S Reed (University of Southern California)

The Deep Space Network Progress Report 42-53: July and August 1979, pp 102–107, October 15, 1979

For abstract, see Miller, R L

R013 **An Efficient Program for Decoding the (255,223) Reed-Solomon Code Over $GF(2^8)$ With Both Errors and Erasures, Using Transform Decoding**

R. L. Miller, T K. Truong, and I. S. Reed

The Deep Space Network Progress Report 42-54 September and October 1979, pp 82–91, December 15, 1979

For abstract, see Miller, R. L

R014 On Decoding of Reed-Solomon Codes Over *GF*(32) and *GF*(64) Using the Transform Techniques of Winograd

I S Reed (University of Southern California), T. K Truong, and B Benjauthrit

Conf. Rec. 1978 Nat Telecommun. Conf, Birmingham, Ala, December 3–6, 1978, pp 20 4.1–20.4.7

The Winograd algorithm over the complex number field is modified to compute a Fourier-like transform over Galois field $GF(2^n)$, where n = 5,6, such a transform can be used to encode and decode Reed-Solomon (RS) codes of length $2^n - 1$.

REGISTER, D.

R015 Elastic and Inelastic (5^1D, 6^1P) Electron Scattering Cross Sections for Barium

S Jensen (University of California, Riverside), D Register, and S. Trajmar

J. Phys. B At Mol. Phys, Vol 11, No 13, pp 2367–2376, 1978

For abstract, see Jensen, S

REILLY, H

R016 A Prototype DSN X-S Band Feed: DSS 13 Application Status (Third Report)

W Williams, D. Nixon, H Reilly, J Withington, and D Bathker

The Deep Space Network Progress Report 42-52 May and June 1979, pp 51–60, August 15, 1979

For abstract, see Williams, W

REILLY, N B.

R017 Technical Assistance for Law-Enforcement Communications Case Study Report 1

N. B Reilly and J A Mustain

JPL Publication 79-71, June 15, 1979

Two case histories are offered as examples of the work being done with 27 state and local law-enforcement agencies by the Jet Propulsion Laboratory. The work is being done under a grant from the federal Law Enforcement Assistance Administration, to improve police communications systems In one, use of the technique of queueing analysis shows several ways of improving time of response to inquiries made to the Texas Department of Public Safety from the field, principally for license-plate checks and for information on current wants and warrants from its officers and from other agencies, through a state multiple-switcher network Another phase of the task was aid in developing design criteria for new, more efficient centralized switching equipment for the department The other case history traces the application of JPL analysis techniques to the message-load problem experienced by the Nassau County (New York) Police Department in its dispatch center, showing that its communications could be improved by adding communications channels, not by adding people.

Prepared for the U S Department of Justice

R018 Technical Assistance for Law-Enforcement Communications: Case Study Report 2

N B Reilly and J A Mustain

JPL Publication 79-78, August 15, 1979

Two case histories are offered as examples of the work done with 31 state and local law-enforcement agencies by the Jet Propulsion Laboratory under a grant from the federal Law Enforcement Assistance Administration to improve police communications systems In one study the feasibility of consolidating dispatch center operations for small agencies is considered System load measurements were taken and queueing analysis applied to determine numbers of personnel required for each separate agency and for a consolidated dispatch center Functional requirements were developed and a cost model was designed to compare relative costs of various alternatives including continuation of the present system, consolidation of a manual system, and consolidated computer-aided dispatching The second case history deals with the consideration of a multi-regional, intra-state radio frequency for improved inter-regional communications Sample standards and specifications for radio equipment are provided

Prepared for the U S Department of Justice

R019 Technical Assistance for Law-Enforcement Communications. Grant Summary

N B Reilly and J A Mustain

JPL Publication 79-84, August 15, 1979

Activities of the Jet Propulsion Laboratory in conducting a Technical Assistance for Law-Enforcement Communications project under a grant from the U S Department of Justice, Law Enforcement Assistance Administration, are described in this final grant management report It identifies the grant's goals and objectives and discusses

the approach to attaining them Publicity measures taken to announce the project, criteria for selecting agencies for participation, seminars held to broaden dissemination of information developed, and the publication of representative case studies are discussed

Section IV, Results, summarizes a characterization of the technical assistance delivered by the project, offers an analysis of feedback from the seminars and discusses results obtained from a project questionnaire filled out by participants Significant findings of the project in such areas as radio channel loading, dispatch system design, training, and technology transfer are discussed

The report concludes with recommendations for future technical assistance efforts to aid law-enforcement command and control operations

Prepared for the U.S Department of Justice

REILLY, W. W.

R020 Compatibility of Elastomers in Alternate Jet Fuels

S H Kalfayan, R F Fedors, and W W Reilly

JPL Publication 79-28, June 1, 1979

For abstract, see Kalfayan, S H

R021 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W A Mueller, S. H Kalfayan, W W Reilly, A H. Yavrouian, I. D. Mosesman, and J. D. Ingham

JPL Publication 79-40, May 15, 1979

For abstract, see Mueller, W A

REMBAUM, A.

R022 Design of Polymeric Immunomicrospheres for Cell Labelling and Cell Separation

A. Rembaum and S. Margel

Brit. Polym J, Vol 10, pp 275–280, December 1978

Immunomicrospheres consist of hydrophilic cross-linked particles with antibodies bound to their surface These particles find specific receptors on living or fixed cells and therefore can label cell sub-populations and the labelled cells can be observed by means of a scanning, electron or light-microscope To label cells with polymeric particles, biocompatible microspheres are needed preferably with a narrow distribution of sizes in the range 10 to 10,000 Å

Particles having a gel-like nature and high porosity seem to meet the biocompatibility requirement and they do not stick non-specifically to cell membranes Use of cross-linking agents renders the microspheres insoluble in common solvents Therefore, subsequent reactions with molecules of biochemical interest are possible in various media

Five classes of hydrophilic cross-linked microspheres with functional groups, e g, carboxyl, hydroxyl, amide and/or pyridine groups, were synthesized These functional groups were used to bind covalently antibodies and other proteins to the surface of the microspheres To optimize the derivatization technique, polyglutaraldehyde immunomicrospheres have been prepared and utilized Specific populations of human and murine lymphocytes were labelled with microspheres synthesized either by the emulsion or the ionizing radiation technique The labelling of the cells by means of microspheres containing an iron core lead to a successful separation of B from T lymphocytes by means of a magnetic field

R023 Polyglutaraldehyde· A New Reagent for Coupling Proteins to Microspheres and for Labeling Cell-Surface Receptors

A Rembaum, S Margel (Weizmann Institute, Israel), and J Levy (University of California, Los Angeles)

J. Immunol Methods, Vol. 24, pp 239–250, 1978

Glutaraldehyde polymerized in basic aqueous solutions was found to react with low molecular weight amines, immunoglobulins and hemoglobin The polyglutaraldehyde was covalently bound to hydrophilic microspheres The rate of addition of proteins to the polyglutaraldehyde-derivatized microspheres was investigated spectrophotometrically as a function of pH and temperature The reaction of polyglutaraldehyde was found to be faster than that of the monomer The findings led to successful labeling of human lymphocyte subpopulations

R024 Solid State Photochemistry of Polycarbonates

A Gupta, A Rembaum, and J. Moacanin

Macromolecules, Vol 11, pp 1285–1288, November–December 1978

For abstract, see Gupta, A

REMER, D. S.

R025 Initial Economic and Operations Data Base for DSS 13 Automation Test

D S. Remer and G Lorden (California Institute of Technology)

The Deep Space Network Progress Report 42-49 November and December 1978, pp 78–85, February 15, 1979

This article summarizes the data base collected for nine weeks of recent operation at DSS 11 Life cycle cost (LCC) parameters on efficiency and productivity ratios, costs, and telemetry were calculated from this data base The data base and LCC parameters will be used as part of the economic and performance evaluation of the operations demonstration of running DSS 13 unattended and remotely controlled from JPL The results will enable a comparison to be made between the remote operation of telemetry at DSS 13 with the cost and performance of a comparable manned operation at DSS 11

R026 Mathematical Model for Preventive Maintenance Scheduling

G Lorden (California Institute of Technology) and D. S. Remer

The Deep Space Network Progress Report 42-51· March and April 1979, pp 144–149, June 15, 1979

For abstract, see Lorden, G

R027 Preliminary Maintenance Experience for DSS 13 Unattended Operations Demonstration

D. S. Remer and G. Lorden (California Institute of Technology)

The Deep Space Network Progress Report 42-51 March and April 1979, pp –150–155, June 15, 1979

This article summarizes the maintenance data base collected for 15 weeks of recent unattended and automated operation of DSS 13 During this period, DSS 13 has been receiving spacecraft telemetry while being controlled remotely from JPL in Pasadena Corrective and preventive maintenance manhours are reported by subsystem for DSS 13 including the equipment added for the automation demonstration. The corrective and preventive maintenance weekly manhours at DSS 13 averaged 22 and 40, respectively The antenna hydraulic and electronic systems accounted for about half of the preventive and corrective maintenance manhours A comparison is presented for overall preventive and corrective maintenance manhours for a comparable attended DSN station, DSS 11

RENNELS, D. A.

R028 Architectures for Fault-Tolerant Spacecraft Computers

D A Rennels

Proc IEEE, Vol 66, No 10, pp 1255–1268, October 1978

This paper summarizes the results of a long-term research program in fault-tolerant computing for spacecraft on-board processing In response to changing device technology this program has progressed from the design of a fault-tolerant uniprocessor to the development of fault-tolerant distributed computer systems The unusual requirements of spacecraft computing are described along with the resulting real-time computer architectures The following aspects of these designs are discussed 1) architectural features to minimize complexity in the distributed computer system, 2) fault-detection and recovery, 3) techniques to enhance reliability and testability, and 4) design approaches for LSI implementation

RENZETTI, N. A

R029 Network Functions and Facilities

N A Renzetti

The Deep Space Network Progress Report 42-49. November and December 1978, pp. 1–3, February 15, 1979

The objectives, functions, and organization of the Deep Space Network are summarized, deep space station, ground communication, and network operations control capabilities are described

R030 Network Functions and Facilities

N. A Renzetti

The Deep Space Network Progress Report 42-50· January and February 1979, pp. 1–3, April 15, 1979

The objectives, functions, and organization of the Deep Space Network are summarized, deep space station, ground communication, and network operations control capabilities are described

R031 Network Functions and Facilities

N A Renzetti

The Deep Space Network Progress Report 42-51. March and April 1979, pp 1–3, June 15, 1979

The objectives, functions, and organization of the Deep Space Network are summarized, deep space station, ground communication, and network operations control capabilities are described.

R032 Network Functions and Facilities

N A Renzetti

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 1–3, August 15, 1979

The objectives, functions, and organization of the Deep Space Network are summarized, deep space station, ground communication, and network operations control capabilities are described

R033 Network Functions and Facilities

N A Renzetti

The Deep Space Network Progress Report 42-54 September and October 1979, pp 1–3, December 15, 1979

The objectives, functions, and organization of the Deep Space Network are summarized, deep space station, ground communication, and network operations control capabilities are described

RHIM, W. K.

R034 Analysis of Multiple Pulse NMR in Solids III

D P Burum and W. K Rhim

J Chem Phys, Vol 71, No 2, pp 944–956, July 15, 1979

For abstract, see Burum, D P

R035 Proton NMR Study of Gypsum, $CaSO_4 \cdot 2H_2O$, Using an Improved Technique for Homonuclear Dipolar Decoupling in Solids

D P. Burum and W K Rhim

J Magnet. Reson, Vol 34, pp 241–246, 1979

For abstract, see Burum, D P

RICE, R. F.

R036 Some Practical Universal Noiseless Coding Techniques

R F. Rice

JPL Publication 79-22, March 15, 1979

Discrete data sources arising from real problems are generally characterized by only partially known and varying statistics This report provides the development and analysis of some practical adaptive techniques for the efficient noiseless coding of a broad class of such data sources

Specifically, algorithms are developed for coding discrete memoryless sources which have a known symbol probability ordering but unknown probability values A general applicability of these algorithms to solving practical problems is obtained because most real data sources can be simply transformed into this form by appropriate preprocessing

These algorithms have exhibited performance only slightly above *all* entropy values when applied to real data with stationary characteristics over the measurement span However, performance considerably under a measured average data entropy may be observed when data characteristics are changing over the measurement span The latter observation is a result of the ability to adjust to both short term and long term variations in data characteristics

These techniques are applicable to virtually any alphabet size arising in practice A subset of these results is the specification and analysis of a large class of efficient adaptive coders for a binary memoryless source which is characterized by unknown or varying statistic p_0 (probability of a zero) Again, performance will be slightly above the binary entropy function when p_0 is unchanging but will typically be well under a measured average binary entropy when p_0 is changing over the measurement span

These techniques are both easy to use and amenable to practical high rate implementations Functions of sums of data samples provide tight bounds to algorithm performance Thus investigations of the effects of alternative algorithm or preprocessing configurations can be accomplished without the need for complete coder simulations These same functions also serve to simplify internal decison making Partially as a result of the unique cascading of variable length coding operations, the only implementation requirement for storage of code words is eight binary codewords of which the longest is five bits

RICHTER, P. H.

R037 The Effects of Regional Insolation Differences Upon Advanced Solar Thermal Electric Power Plant Performance and Energy Costs

A F. Latta, J M. Bowyer, T. Fujita, and P H. Richter

JPL Publication 79-39, March 15, 1979

For abstract, see Latta, A F

RIEGLER, G. R.

R038 An Intense Soft High-Latitude X-Ray Source H2156–304: A New BL Lacertae Object?

P. C Agrawal and G R. Riegler

Astrophys J, Vol 231, pp L25–L29, July 1, 1979

For abstract, see Agrawal, P C

RIEWE, A. A.

R039 A Study of the Influence of Oil Saturation on the 64-Meter Antenna Hydrostatic Bearing Grout

H P Phillips, A A Riewe, M. Polivka (University of California, Berkeley), and P K. Mehta (University of California, Berkeley)

The Deep Space Network Progress Report 42-54 September and October 1979, pp 62–70, December 15, 1979

For abstract, see Phillips, H. P

RILEY, A. L.

R040 Seasat Scanning Multichannel Microwave Radiometer Results of the Gulf of Alaska Workshop

R. G Lipes, R L Bernstein (Scripps Institution of Oceanography), V. J Cardone (Oceanweather, Inc), K B Katsaros (University of Washington), E G Njoku, A L Riley, D. B Ross (Atlantic Oceanic and Meteorological Laboratory), C T. Swift (Langley Research Center), and F. J Wentz (Frank J. Wentz and Associates)

Science, Vol. 204, pp. 1415–1417, June 29, 1979

For abstract, see Lipes, R. G

RINDERLE, E. A., JR.

R041 Phobos Encounter Trajectory and Maneuver Design

R E Diehl, M. J Adams, and E A Rinderle, Jr

J Guidance Contr, Vol 2, No 2, pp 123–129, March–April 1979

For abstract, see Diehl, R E

ROBINSON, W. G.

R042 Kitt Peak Speckle Camera

J. B Breckinridge, H. A. McAlister (Georgia State University), and W G Robinson (Kitt Peak National Observatory)

Appl Opt, Vol. 18, No 7, pp 1034–1041, April 1, 1979

For abstract, see Breckinridge, J B

ROCKEY, D. E.

R043 Evaluation of Concentrated Space Solar Arrays Using Computer Modeling

D. E Rockey

JPL Publication 79-87, November 1, 1979

A general approach is developed for predicting the power output of a concentrator enhanced photovoltaic space array. A ray trace routine determines the concentrated intensity arriving at each solar cell An iterative calculation determines the cell's operating temperature since cell temperature and cell efficiency are functions of one another The end result of the iterative calculation is that the individual cell's power output is determined as a function of temperature and intensity Circuit output is predicted by combining the individual cell outputs using the single diode model of a solar cell. Concentrated array characteristics such as uniformity of intensity and operating temperature at various points across the array are examined using computer modeling techniques An illustrative example is given showing how the output of an array can be enhanced using solar concentration techniques

ROCKWELL, G. M.

R044 Pioneer 11 Saturn Encounter Support

G M. Rockwell

The Deep Space Network Progress Report 42-53. July and August 1979, pp 10–20, October 15, 1979

This article reports on activities of DSN Operations in support of Saturn Encounter Operations of Pioneer 11

RODEMICH, E. R.

R045 The Constantin-Rao Construction for Binary Asymmetric Error-Correcting Codes

R J. McEliece and E R Rodemich

The Deep Space Network Progress Report 42-51 March and April 1979, pp 124–129, June 15, 1979

For abstract, see McEliece, R J

ROGERO, R. S.

R046 Handbook of Recommended Practices for the Determination of Liquid Monopropellant Rocket Engine Performance

R A Bjorklund, R S Rogero, and R K. Baerwald

JPL Publication 79-32, June 1, 1979

For abstract, see Bjorklund, R A

ROSCHKE, E. J.

R047 A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules

E J. Roschke, L. Wen, H Steele, N. El Gabalawi, and J. Wang

JPL Publication 79-21, March 1, 1979

A preliminary assessment of three conceptual point-focusing distributed solar modules is presented in this report The basic power conversion units consist of small Brayton or Rankine engines individually coupled to two-axis, tracking, point-focusing solar collectors An array of such modules can be linked together, via electric transport, to form a small power station Each module also can be utilized, on a stand-alone basis, as an individual power source

In the present study the technical evaluation and economic analysis were treated separately. Each system concept was optimized by maximizing the thermal output per unit of concentrator area. System performance was then simulated based on the insolation data recorded at Barstow, California (in 1976). Parametric studies concerning concentrator quality and power conversion efficiency were conducted to provide relevant sensitivity relationships and trade-off information. Hardware cost targets were assessed according to the system energy production rate (kWe-hr/yr), and a range of projected energy cost levels (mills/kWe-hr) The trade-off relationship can be utilized as a realistic guideline for establishing concentrator manufacturing requirements and power conversion development targets

Prepared for the U S. Department of Energy, DOE/JPL-1060-16, Distribution Category UC-62

R048 Techno-Economic Projections for Advanced Small Solar Thermal Electric Power Plants to Years 1990–2000

T Fujita, R. Manvi, E. J Roschke, N. El Gabalawi, G Herrera, T J. Kuo, and K H Chen

JPL Publication 79-25, November 15, 1978

For abstract, see Fujita, T

ROSEBORO, J. A.

R049 Swept Frequency Ultrasonic Measurements of Tissue Characteristics

P M Gammell, J A Roseboro, R C Heyser, D H Le Croissette, and R L Wilson (University of Southern California)

Proc Thirtieth Annu Conf on Eng in Med & Bio, Los Angeles, Calif., November 5–9, 1977, p. 229

For abstract, see Gammell, P M

ROSS, D. B.

R050 Seasat Scanning Multichannel Microwave Radiometer Results of the Gulf of Alaska Workshop

R. G Lipes, R L Bernstein (Scripps Institution of Oceanography), V J. Cardone (Oceanweather, Inc), K B Katsaros (University of Washington), E G Njoku, A L Riley, D B Ross (Atlantic Oceanic and Meteorological Laboratory), C T Swift (Langley Research Center), and F J. Wentz (Frank J. Wentz and Associates)

Science, Vol 204, pp 1415–1417, June 29, 1979

For abstract, see Lipes, R G

R051 Seasat Synthetic Aperture Radar. Ocean Wave Detection Capabilities

F I Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W. E. Brown, P S DeLeonibus (National Environmental Satellite Service), J W. Sherman III (National Environmental Satellite Service), J. F. R Gower (Institute of Ocean Sciences, Canada), D. Lichy (U S. Army Corps of Engineers), D. B Ross (Sea-Air Interaction Laboratory), C. L. Rufenach (Wave Propagation Laboratory), and R A Shuchman (Environmental Research Institute of Michigan)

Science, Vol. 204, pp. 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

ROTH, R. B.

R052 X-Band Sampling by the Occultation Data Assembly

R B Roth

The Deep Space Network Progress Report 42-53 July and August 1979, pp 176–179, October 15, 1979

Extraneous peaks appear in the power spectrum of X-band radio science data from the Occultation Data Assembly after it has been processed The article shows that the cause lies in an incompatibility between the hardware implementation of Nyquist sampling and the software processing This also shows that a forthcoming change in the hardware will eliminate the problem

RUDOLPH, L. K.

R053 Plume Characterization of a One-Millipound Solid Teflon Pulsed Plasma Thruster

L C. Pless, L K. Rudolph, and D. J. Fitzgerald

JPL Publication 78-96, October 1978

For abstract, see Pless, L C

RUFENACH, C. L.

R054 Seasat Synthetic Aperture Radar Ocean Wave Detection Capabilities

F. I Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W E Brown, P S. DeLeonibus (National Environmental Satellite Service), J W Sherman III (National Environmental Satellite Service), J F R. Gower (Institute of Ocean Sciences, Canada), D Lichy (U.S. Army Corps of Engineers), D. B Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

RUMSEY, H., JR.

R055 Coding for Optical Channels

L D. Baumert (Arizona State University), R J. McEliece (University of Illinois), and H. Rumsey, Jr

The Deep Space Network Progress Report 42-49 November and December 1978, pp. 70–77, February 15, 1979

For abstract, see Baumert, L D

RUSCH, W. V. T.

R056 Multipath Effects on the Time Delays of Microwave Cassegrainian Antennas

T Y Otoshi and W V T. Rusch (University of Southern California)

The Deep Space Network Progress Report 42-50 January and February 1979, pp 52–55, April 15, 1979

For abstract, see Otoshi, T Y

R057 Microwave Delay Characteristics of Cassegrainian Antennas

A G Cha, W V T Rusch (University of Southern California), and T Y. Otoshi

IEEE Trans Anten. Prop, Vol AP-26, No 6, pp 860–865, November 1978

For abstract, see Cha, A G

RUSSELL, D P

R058 An Improved Storage Bulb Mount for DSN Hydrogen Masers

P. R Dachel, D P. Russell, T K Tucker, and L B Stratman

The Deep Space Network Progress Report 42-52 May and June 1979, pp 21–25, August 15, 1979

For abstract, see Dachel, P R

RYAN, B.

R059 Pioneer Venus Multiprobe Entry Mission Support

B Ryan (Tidbinbilla Deep Space Complex), D Hollingsworth (Tidbinbilla Deep Space Complex), A. Bailey (Tidbinbilla Deep Space Complex), and J Wells (Tidbinbilla Deep Space Complex)

The Deep Space Network Progress Report 42-50 January and February 1979, pp 24–26, April 15, 1979

The support of the Pioneer Venus Multiprobe entry event by DSS 42/43 is described Support included aiding in procedure development, determining staffing requirements, equipment checkout, and determination of final detailed station configuration

SAFFREN, M. M.

S001 Drop Dynamics in Space

T. G Wang, M M Saffren, and D. D Elleman

Materials Sciences in Space with Application to Space Processing, AIAA, New York, pp. 151–172, 1977

For abstract, see Wang, T G

SALAMA, A M.

S002 Characterization of Deliberately Nickel-Doped Silicon Wafers and Solar Cells

A M Salama

JPL Publication 79-116, November 1, 1979

Microstructural and electrical evaluation tests were performed on nickel-doped p-type silicon wafers before and after solar cell fabrication The concentration levels of nickel in silicon were 5×10^{14}, 4×10^{15}, and 8×10^{15} atoms/cm^3 It was found that nickel precipitated out during the growth process in all three ingots Clumps of precipitates, some of which exhibited star shape, were present at different depths If the clumps are distributed at depths approximately 20 microns apart and if they are larger than 10 microns in diameter, degradation occurs in solar cell electrical properties and cell conversion efficiency The larger the size of the precipitate clump, the greater the degradation in solar cell efficiency A large grain boundary around the cell effective area acted as a gettering center for the precipitates and impurities and caused improvement in solar cell efficiency Details of the evaluation test results are given

Prepared for the U S Department of Energy, DOE/JPL-1012-34, Distribution Category UC-63b

SAMSON, S.

S003 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S K Khanna, S P. S Yen, R B Somoano, P M. Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R Williams (California Institute of Technology), and S. Samson (California Institute of Technology)

Phys. Rev. B Condensed Matter, Vol. 19, No 2, pp 655-663, January 15, 1979

For abstract, see Khanna, S K

SARANGI, S.

S004 A Determination of Jovian Ammonia Abundance Based on a 2 μm Spectrum

S Sarangi (Physical Research Laboratory, Navrangpura Ahmedabad, India) and J S Margolis

Icarus, Vol 36, pp 330-333, 1978

A spectrum of Jupiter in the two micron region has been analyzed to determine the Jovian ammonia abundance The result is a $\cong$4 cm - amagat, assuming an airmass factor $\eta = 2\,5$ and a single effective reflecting layer for this wavelength This is compared with the abundances observed at other wavelengths

SARBOLOUKI, M. N.

S005 Ultrathin Films as Photomechanical Transducers

M N Sarboloukı and R F Fedors

J Polym Sci. Polym Lett, Vol. 17, 629-633, 1979

Stretched, ultrathin, polymeric films are used as photochemical transducers for the detection and measurement of total exposure to light

SAROHIA, V.

S006 Effect of Angle of Attack on Cavity Flow Oscillations

V Sarohia and P F. Massier

JPL Publication 79-19, October 1978

Separated subsonic flow over cavities of several widths and depths located on fuze-nose and ellipsoidal axisymmetric bodies have been investigated experimentally at various angles of attack to the free-stream The fluctuating and mean velocities and pressures inside the cavity were measured at various circumferential locations Large circumferential variations in the root mean square pressure fluctuations were observed in the cavity at an angle of attack The hotwire measurements of velocity fluctuations showed that the circumferential variations in cavity pressure oscillations were caused by the loss of spanwise coherency of the large-scale structures around the cavity Visualization of the flow further confirmed that the strength of the cavity pressure fluctuations was closely related to the presence of the large-scale organized fluctuations in the cavity shear flow The mean velocity measurements showed changes in growth rates, $d\theta/dx$, at various circumferential locations along the cavity shear layer, where θ is the momentum thickness, and x is the streamwise coordinate Highspeed Schlieren motion pictures further showed that this growth of the shear layer was accompanied by a process of the large-scale eddies engulfing the fluid inside the cavity The engulfed fluid was subsequently carried by these eddies into the potential flow surrounding the cavity and remained unmixed downstream from the cavity for many wavelengths of the convecting large-scale eddies For the fuze-nose model, the upstream edge of the axisymmetric cavity should be located at $X_0 \geq 1\,25$ in for cavity flow to oscillate At this location, for cavity widths $\geq 0\,25$ in and depths $\geq 0\,050$ in, the cavity flow oscillations were observed at free-stream velocities $\geq$ 500 ft/s

Prepared for the U S Army Electronics Research and Development Command, HDL-CR-78-025-1

S007 Some Flight Simulation Experiments on Jet Noise from Supersonic Underexpanded Flows

V. Sarohia

AIAA J, Vol. 16, No 7, pp. 710–716, July 1978

Experiments on underexpanded cold jet flows from a convergent nozzle under simulated flight conditions have shown that a large periodic spinning motion of the jet can occur with greatly enhanced broadband noise production Shadowgraph pictures indicate that this oscillatory jet motion accompanies the generation of random weak shock waves at the source These waves appear to be generated at the point downstream of the nozzle exit where the shock cells in the jet begin to disappear. The weak shock waves propagate upstream and have been identified to be the cause of enhanced broadband jet noise production in flight In addition, the results show that the boundary-layer flow conditions over the outside of the primary nozzle (simulating engine cowl flow in flight) influence the production of these random weak shock waves

S008 Experimental Results of Large-Scale Structures in Jet Flows and Their Relation to Jet Noise Production

V Sarohia and P F. Massier

AIAA J, Vol 16, No 8, pp 831–835, August 1978

Experiments have been performed to determine the role of large-scale turbulent structures in the production of jet noise Axisymmetric turbulent jet flows at ambient stagnation temperature have been observed with the aid of flow visualization techniques Jet Mach numbers at the nozzle exit ranged between 0 1 and 0 9 and the Reynolds number, based on nozzle exit diameter, was approximately 10^6 Large, organized turbulent structures existed as far downstream of the nozzle exit as 7 diameters High-speed Schlieren motion pictures synchronized with near-field pressure measurements of an excited jet indicated that strong instantaneous peaks in the pressure signal occurred whenever a merging process between two large-scale organized structures occurred This pressure pulse propagated at a speed which was somewhat larger than the velocity of the jet at the nozzle exit

SAXBERG, B. V. H.

S009 Extrapolated UT1 Effect on VLBI Clock Sync

J W Layland and B V H Saxberg

The Deep Space Network Progress Report 42-50 January and February 1979, pp 56–59, April 15, 1979

For abstract, see Layland, J W

SCHAAF, G. B.

S010 The Microprocessor-Based Synthesizer Controller

H Donnelly, M. R. Wick, R. W. Weller, G. B Schaaf, B Barber, and M. A. Stern

The Deep Space Network Progress Report 42-54 September and October 1979, pp 92–103, December 15, 1979

For abstract, see Donnelly, H

SCHABER, G.

S011 Discrimination of Geologic Units in Death Valley Using Dual Frequency and Polarization Imaging Radar Data

M Daily, C Elachi, T Farr, and G Schaber (U S Geological Survey)

Geophys, Res Lett, Vol. 5, No 10, pp. 889–892, October 1978

For abstract, see Daily, M

SCHERER, K.

S012 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes Second Annual Report, July 1977–July 1978

J. Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D Lawson, T. Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

SCHERER, K. V., JR.

S013 Perfluoro-3,3-dimethyl-2(E)-pentene by Fluoride Ion Catalyzed Addition of Octafluoroisobutene to Hexafluoropropene

K V. Scherer, Jr (University of Southern California) and T F. Terranova

J. Fluorine Chem, Vol 12, pp. 89–91, 1978

This paper discusses the fluoride ion catalyzed oligomerization of perfluoroolefins, which has been employed extensively to prepare higher homologs

SCHIELDGE, S. P.

S014 On Estimating the Sensible Heat Flux Over Land

S P Schieldge

Agr Meteorol, Vol 19, pp 315–328, 1978

The sensible heat flux from a land surface can be estimated from the ground temperature, and the air speed and air temperature at a single height in the surface layer To test this technique, a study was made over a newly-planted wheat field in- southwestern Kansas Hourly averages of the sensible heat flux were calculated for a two day period The data consisted of infrared measurements of the ground temperature, and of wind speed and air temperature measurements made at 1 5 m The results obtained were in close agreement with sensible heat flux calculations derived from profile measurements of wind speed and air temperature made concurrently at the same site

SCHOFIELD, J. T.

S015 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W Taylor, D. J. Diner, L S Elson, D J McCleese, J. V. Martonchik, J. Delderfield (University of Oxford, England), S P Bradley (University of Oxford, England), J T Schofield (University of Oxford, England), J C. Gille (National Center for Atmospheric Research), and M T Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

For abstract, see Taylor, F W

SEAMAN, C. H.

S016 Results of the 1978 NASA/JPL Balloon Flight Solar Cell Calibration Program

C H. Seaman and L B Sidwell

JPL Publication 79-66, September 1, 1979

The 1978 scheduled solar cell calibration balloon flight was successfully completed on July 20, 1978, meeting all the objectives of the program Thirty-six modules were carried to an altitude of above 36 kilometers Recovery of telemetry and flight packages was without incident These calibrated standard cells can be used as reference standards in simulator testing of cells and arrays with similar spectral response characteristics

SEIDMAN, J. B.

S017 VICAR Image Processing System: Guide to System Use

J. B Seidman and A Y Smith

JPL Publication 77-37, Rev 1, December 1, 1979

This document is designed both to instruct the new user in the use of the VICAR (Video Image Communication and Retrieval) System and to serve as a reference manual for the more experienced user. The document has been divided into nine sections which describe the functional characteristics and operating requirements of the VICAR system

SELCUK, M K.

S018 A Fixed Tilt Solar Collector Employing Reversible Vee-Trough Reflectors and Evacuated Tube Receivers for Solar Heating and Cooling Systems: Final Report - Phase II Data Acquisition

M K Selcuk

JPL Publication 78-106, October 15, 1978

The objective of the Vee-Trough/Evacuated Tube Collector (VTECTC) Project, undertaken for the DOE Solar Heating and Cooling Branch, was to show how vee-trough concentrators could improve the heat collection capability and reduce the cost of collectors consisting of evacuated tube receivers The work was carried out in two phases

During the first phase, the VTETC was analyzed rigorously and various mathematical models were developed to calculate the optical performance of the vee-trough concentrators and the thermal performance of the evacuated tube receivers A test bed was constructed to verify the mathematical analyses and compare reflectors made of back-silvered glass mirror, Alzak, Aluminized Teflon, and Kinglux (an electro polished aluminum reflector) Testing was conducted and data was obtained for the months of April to August 1977. The results of the mathematical analyses, as well as the results from 1977, were reported in DOE/JPL/1024-1, published in January 1978

In the second phase, additional tests were run at temperatures ranging from 80 to 190°C (176 to 374°F) during the months of April, May, June, and July 1978

The results obtained compared well with theoretical predictions For the glass mirror reflectors, peak efficiencies, based on aperture area and operating temperature of 125°C (257°F), were over 40% Efficiencies of about 40% were observed at temperatures of 150°C (302°F) and 30% at 175°C (347°F)

Test data covering a complete day are presented for selected dates throughout the test season Predicted daily useful heats collected and efficiency values are presented for a full year These theoretical values are then compared with actual data points for the same temperature range

The study conducted did not examine a system incorporating an energy storage subsystem and a load Instead, its purpose was to determine the quasi-steady-state performance of the evacuated tube receiver with and without vee-trough concentrators

Recommendations are made for the continuation of data acquistion through the winter months to identify year-round performance in an actual solar heating and cooling system, with thermal storage and varying load conditions

Prepared for the U S Department of Energy, DOE/JPL-1024-78/1, Distribution Category UC-59a

S019 Analysis, Development and Testing of a Fixed Tilt Solar Collector Employing Reversible Vee-Trough Reflectors and Vacuum Tube Receivers

M. K Selcuk

Solar Energy, Vol 22, pp 413–426, 1979

The Vee-Trough/Vacuum Tube Collector (VTVTC) aimed to improve the efficiency and reduce the cost of collectors assembled from evacuated tube receivers

The VTVTC was analyzed rigorously and a mathematical model was developed to calculate the optical performance of the vee-trough concentrator and the thermal performance of the evacuated tube receiver. A test bed was constructed to verify the mathematical analyses and compare reflectors made out of glass, Alzak and aluminized FEP Teflon Tests were run at temperatures ranging from 95 to 180°C during the months of April, May, June, July and August 1977 Vee-trough collector efficiencies of 35–40 per cent were observed at an operating temperature of about 175°C Test results compared well with the calculated values Test data covering a complete day are presented for selected dates throughout the test season

Predicted daily useful heat collection and efficiency values are presented for a year's duration at operation temperatures ranging from 65 to 230°C Estimated collector costs and resulting thermal energy costs are presented Analytical and experimental results are discussed along with an economic evaluation

SHAPIRO, I. I.

S020 The Viking Relativity Experiment

I I Shapiro (Massachusetts Institute of Technology), R D. Reasenberg (Massachusetts Institute of Technology), P E MacNeil (Massachusetts Institute of Technology), R. B. Goldstein (Massachusetts Institute of Technology), J P Brenkle, D L Cain, T. Komarek A I. Zygielbaum, W. F Cuddihy (Langley Research Center), and W. H Michael, Jr (Langley Research Center)

J Geophys. Res, Vol 82, No 28, pp 4329–4334, September 30, 1977

Measurements of the round-trip time of flight of radio signals transmitted from the Earth to the Viking spacecraft are being analyzed to test the predictions of Einstein's theory of general relativity According to this theory the signals will be delayed by up to ~250 μs owing to the direct effect of solar gravity on the propagation A very preliminary qualitative analysis of the Viking data obtained near the 1976 superior conjunction of Mars indicates agreement with the predictions to within the estimated uncertainty of 0 5%

SHEMDIN, O.

S021 Nonlinear and Linear Bottom Interaction Effects in Shallow Water

O. Shemdin, K Hasselmann (Max-Planck-Institut fur Meteorologie), S V Hsiao, and K Herterich (Max-Planck-Institut fur Meteorologie)

Turbulent Fluxes Through the Sea Surface, Wave Dynamics, and Prediction, Plenum Publishing Corp, New York, 1978, pp 347–372

Spectral wave transformation in shallow water is investigated by examining nonlinear and linear bottom interaction effects The effect of nonlinear wave-wave interaction in shallow water is investigated by including the depth dependent dispersion relationship in the nonlinear calculations Dissipative mechanisms examined are bottom friction, percolation within the sand layer, and wave motion in the mud layer induced by hydrodynamic forces acting at the mud line Comparisons with observations suggest that bottom motion can be one order of magnitude more pronounced than friction or percolation when soft mud occupies the top layer such as found in the Gulf of Mexico In the North Sea (JONSWAP area) coarse sand with mean grain diameter $\geq$ 0 3 mm is found in the top sediment layer Here swell energy dissipation can be explained by the linear percolation mechanism When bottom sand is fine (mean grain diameter $\leq$ 0 4 mm), such as found offshore of Panama City and Marineland, Florida, nonlinear bottom friction is found to explain swell dissipation adequately. A nonlinear bottom scattering mechanism was investigated by Long (1973) who found the effect to be possibly important in the

JONSWAP area but required detailed directional wave measurements to derive conclusive results This paper examines five different data sets on wave transformation in shallow water and offers explanations in terms of bottom interaction mechanisms

SHEMDIN, O. H.

S022 Modulation of Centimetric Waves by Long Gravity Waves: Progress Report on Field and Laboratory Results

O. H. Shemdin

Turbulent Fluxes Through the Sea Surface, Wave Dynamics, and Prediction, Plenum Publishing Corp., New York, 1978, pp 235–255

The modulation of short wind waves (centimeter to decimeter long) by long gravity waves is investigated under field and laboratory conditions The field study employed a wave follower capable of tracking ocean waves with frequencies less than 1 0 Hz and heights less than 2 0 m A high response laser-optical system was used to detect upwind-downwind and cross-wind slopes of short waves Cross correlations of short wave slopes with long waves reveal the presence of definite coupling between the two A well defined peak appears in the cross-correlation function at 45 deg downwind of the long wave crest, suggesting higher density waves there

The laboratory investigation was conducted with wind over periodic long waves The periodicity of the latter allowed determination of statistically meaningful energy spectra of short waves at different phase locations along the long wave profile The laboratory results appear to be consistent with the relaxation theory introduced by Keller and Wright (1975) The relaxation constant is computed from the data and found to have dependencies on wave frequency and wind speed Preliminary comparisons between field and laboratory results are discussed

SHEN, M

S023 Viscoelastic Properties of Entangled Polymers Ternary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), S S Shyu (University of California, Berkeley), M. Shen (University of California, Berkeley), S D Hong, and J Moacanin

J Appl Phys, Vol 50, No 10, pp 6077–6082, October 1979

For abstract, see Soong, D

S024 Viscoelastic Properties of Entangled Polymer. IV. Binary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), M. Shen (University of California, Berkeley), and S D Hong

J Rheol, Vol 23, No 3, pp 301–322, 1979

For abstract, see Soong, D

SHERMAN, J W., III

S025 Seasat Synthetic Aperture Radar. Ocean Wave Detection Capabilities

F. I Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W E Brown, P S DeLeonibus (National Environmental Satellite Service), J W Sherman III (National Environmental Satellite Service), J F R Gower (Institute of Ocean Sciences, Canada), D Lichy (U S Army Corps of Engineers), D B Ross (Sea-Air Interaction Laboratory), C L Rufenach (Wave Propagation Laboratory), and R A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

SHERMAN, R. D.

S026 Cosmic Far-Ultraviolet Background Radiation. Probe of a Dense Hot Intergalactic Medium?

R D Sherman and J. Silk (University of California, Berkeley)

Astrophys J, Vol. 231, pp L61–L65, July 15, 1979

Line and continuum radiation fluxes have been computed for a wide range of enriched intergalactic medium (IGM) models Observations of the diffuse extragalactic light at optical and far-ultraviolet wavelengths are found to provide a potentially important probe of a dense, hot intergalactic medium If the diffuse X-ray background is produced by this gas, our models constrain $\Omega < 0\,4$ The associated Compton distortions of the cosmic blackbody background radiation and the optical depths to distant quasars at X-ray wavelengths are also evaluated

SHLICHTA, P J.

S027 Convection Phenomena During the Growth of Sodium Chlorate Crystals From Solution

P S Chen (University of Southern California), P. J Shlichta, W R Wilcox (Clarkson College of Technology), and R A. Lefever (Ampex Corporation)

J Crystal Growth, Vol 47, pp 43–60, 1979

For abstract, see Chen, P S

SHUCHMAN, R. A.

S028 Seasat Synthetic Aperture Radar: Ocean Wave Detection Capabilities

F I Gonzalez (Pacific Marine Environmental Laboratory), R C Beal (Johns Hopkins University), W E Brown, P. S. DeLeonibus (National Environmental Satellite Service), J. W Sherman III (National Environmental Satellite Service), J F R Gower (Institute of Ocean Sciences, Canada), D. Lichy (U.S Army Corps of Engineers), D B Ross (Sea-Air Interaction Laboratory), C. L Rufenach (Wave Propagation Laboratory), and R. A Shuchman (Environmental Research Institute of Michigan)

Science, Vol 204, pp 1418–1421, June 29, 1979

For abstract, see Gonzalez, F I

SHYU, S. S.

S029 Viscoelastic Properties of Entangled Polymers: Ternary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley), S S Shyu (University of California, Berkeley), M. Shen (University of California, Berkeley), S D Hong, and J Moacanin

J Appl. Phys, Vol. 50, No 10, pp. 6077–6082, October 1979

For abstract, see Soong, D.

SIDWELL, L. B.

S030 Results of the 1978 NASA/JPL Balloon Flight Solar Cell Calibration Program

C. H Seaman and L. B Sidwell

JPL Publication 79-66, September 1, 1979

For abstract, see Seaman, C H

SIEV, B.

S031 DSS 13 Antenna Monitor System

B Siev and B Bayergo

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 138–140, June 15, 1979

A monitor system is being developed for the 26-meter antenna at DSS 13 so that unattended station operation can proceed safely The antenna has been successfully operating unattended since July 1978 This article documents the part of the monitor system that is currently in use A later article will be issued which will document the full monitor system

SIEVERS, M.

S032 Density and Reliability Predictions for a General Logic Structure for Custom LSI

M Sievers

The Deep Space Network Progress Report 42-53 July and August 1979, pp 66–73, October 15, 1979

A general logic structure (GLS) for implementing arbitrary functions in integrated circuits has been described in a previous report Density and reliability predictions for the GLS will be presented in this article The GLS has been found to be more dense than programmed logic arrays (PLA) and certain configurations of "optimized" macros Macro is used here to mean a predefined function that may be inserted into a design

A reliability model is presented that includes the possibility of undetected manufacturing flaws This model is more accurate than models that consider only so-called wear-out failures It may be used to indicate how much preinstallation test coverage is necessary to guarantee a given installed reliability

SIEVERS, M. W.

S033 A General Logic Structure for Custom LSI

M. W Sievers

The Deep Space Network Progress Report 42-50 January and February 1979, pp 97–105, April 15, 1979

A designer of custom large-scale integrated circuits (LSI) should be primarily concerned with deriving a working chip as rapidly as is practical Obtaining maximal usage of area or pushing a technology to its limit is best left for large producers of LSI who are able to recover the additional required expenditures of time and processing facilities by volume sales Custom design may be greatly facilitated by a general template into which most circuitry can be built This template must be both simple to use and reasonably conservative of area to be practical.

This paper describes a general structure that is being considered as a template candidate Examples of circuits built in NMOS technology are shown It is hoped this structure is suitable for building special-purpose devices such as correlators and FFT's as well as general-purpose controllers

S034 A Computer-Aided Design System for Custom Large-Scale Integrated Circuits

M W Sievers

The Deep Space Network Progress Report 42-54· September and October, 1979, pp 51–61, December 15, 1979

This paper describes a computer-aided design system for custom large-scale integrated circuits The system is composed of a high-level descriptive language and a SIMULA based language interpreter The interpreter is running on the Caltech DEC SYSTEM 20 computer It has been used to design a 16-bit self-checking comparator of medium-scale integration proportions

SILK, J.

S035 Cosmic Far-Ultraviolet Background Radiation Probe of a Dense Hot Intergalactic Medium?

R. D Sherman and J Silk (University of California, Berkeley)

Astrophys. J, Vol 231, pp L61–L65, July 15, 1979

For abstract, see Sherman, R D

SIMON, M. K.

S036 Spectral Characteristics of Convolutionally Coded Digital Signals

D. Divsalar and M K. Simon

JPL Publication 79-93, August 1, 1979

For abstract, see Divsalar, D

S037 On the Optimality of the MAP Estimation Loop for Carrier Phase Tracking BPSK and QPSK Signals

M. K Simon

IEEE Trans Commun, Vol COM-27, No 1, pp 158–165, January 1979

Starting with MAP estimation theory as a basis for optimally estimating carrier phase of BPSK and QPSK modulations, it is shown in this paper that the closed loop phase trackers, which are motivated by this approach, are indeed closed loop optimum in the minimum mean-square tracking jitter sense The corresponding squaring loss performance of these so-called MAP estimation loops is compared with that of more practical implementations wherein the hyperbolic tangent nonlinearity is approximated by simpler functions

SINCLAIR, W. S.

S038 Tidal Acceleration of the Moon

J G Williams, W S Sinclair, and C F. Yoder

Geophys Res Lett, Vol 5, No. 11, pp. 943–946, November 1978

For abstract, see Williams, J G

SJOGREN, W. L.

S039 Simulation Gravity Modeling to Spacecraft-Tracking Data Analysis and Tracking

R J Phillips, W L Sjogren, E A Abbott, and S H Zisk (Massachusetts Institute of Technology)

J Geophys Res, Vol 83, No B11, pp 5455–5464, November 10, 1978

For abstract, see Phillips, R J

S040 Mars Gravity: Additional Resolution From Viking Orbiter I

W L Sjogren, R N Wimberly, D L Cain, and J P. Brenkle

Proc Lunar Planet. Sci Conf 9th, 3561–3573, 1978

Previous analyses have produced Mars gravity models with resolution limited to ≈2000 km The Doppler radio tracking data that were taken from Viking Orbiter I at a 300 km periapsis altitude are now capable of resolving shorter wavelength features such as Olympus Mons and Alba Patera The number of data is limited as is the area of high resolution which forms a narrow band near 35°N latitude We have estimated the masses of 71 disks placed in a geometric pattern on the surface The corresponding acceleration surface at 350 km altitude is displayed Systematic postfit residuals imply further information can be extracted with more detailed modeling

S041 Mars gravity: High-Resolution Results from Viking Orbiter 2

W L Sjogren

Science, Vol 203, pp. 1006–1010, March 9, 1979

Doppler radio-tracking data have provided detailed measurements for a Martian gravity map extending from 30°S to 65°N in latitude and through 360° of longitude The feature resolution is approximately 500 kilometers,

revealing a huge anomaly associated with Olympus Mons, a mascon in Isidis Planitia, and other anomalies correlated with volcanic structure Olympus Mons has been modeled with a 600-kilometer surface disk having a mass of 8.7×10^{21} grams

S042 Gravity Field of Venus A Preliminary Analysis

R J. Phillips, W L Sjogren, E A Abbott, J C Smith, R N Wimberly, and C A Wagner (Goddard Space Flight Center)

Science, Vol. 205, pp 93–96, July 6, 1979

For abstract, see Phillips, R J

SLOBIN, S. D.

S043 DSN Water Vapor Radiometer—Tropospheric Range Delay Calibration

S. D. Slobin and P. D. Batelaan

The Deep Space Network Progress Report 42-49· November and December 1978, pp 136–145, February 15, 1979

This report discusses the calibration of the DSN water vapor radiometer by means of simultaneous antenna temperature and radiosonde measurements at Edwards Air Force Base The calibration of radiometer gain and hot load radiometric noise temperature is also described Calibration equations are given It is found that with a selected data set, the RMS error is less than 1 cm over a total delay range of 9 to 38 cm Limitations on the use of the water vapor radiometer are also given

S044 X-Band Atmospheric Noise Temperature Data and Statistics at Goldstone, DSS 13,. 1977–1978

S D Slobin, K B Wallace, M M. Franco, E. M Andrés, and O V Hester

The Deep Space Network Progress Report 42-52· May and June 1979, pp. 108–116, August 15, 1979

X-band noise temperature data have been taken at Goldstone DSS 13 continuously since August 1975 Presented here are sample data and cumulative distributions of atmospheric noise.temperature increase above the quiescent baseline for the calendar years 1977 and 1978 Comparison is made with the existing Deep Space Network noise temperature statistics

SLONSKI, M. L.

S045 Potential for Cogeneration of Heat and Electricity in California Industry—Phase II Final Report

H S. Davis, E Edelson, A K. Kashani, and M L Slonski

JPL Publication 78-109, January 1, 1979

For abstract, see Davis, H S

SMITH, A. Y.

S046 VICAR Image Processing System: Guide to System Use

J B Seidman and A Y Smith

JPL Publication 77-37, Rev 1, December 1, 1979

For abstract, see Seidman, J. B

SMITH, B. A.

S047 The Jupiter System Through the Eyes of Voyager 1

B A Smith, et al.

Science, Vol 204, pp 951–971, June 1, 1979

The cameras aboard Voyager 1 have provided a closeup view of the Jupiter system, revealing heretofore unknown characteristics and phenomena associated with the planet's atmosphere and the surfaces of its five major satellites On Jupiter itself, atmospheric motions—the interaction of cloud systems—display complex vorticity On its dark side, lightning and auroras are observed A ring was discovered surrounding Jupiter The satellite surfaces display dramatic differences including extensive active volcanism on Io, complex tectonism on Ganymede and possibly Europa, and flattened remnants of enormous impact features on Callisto

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SMITH, E J

S048 Compression of Jupiter's Magnetosphere by the Solar Wind

E J Smith, R. W Fillius (University of California, San Diego), and J H Wolfe (Ames Research Center)

J Geophys. Res, Vol. 83, No. A10, pp. 4733–4742, October 1, 1978

A study of the major changes in the solar wind during the Pioneer 10 and 11 encounters and their influence on the size of the Jovian magnetosphere is reported Simultaneous sets of encounter data acquired by the Jet Propulsion Laboratory vector helium magnetometer, the Ames Research Center plasma analyzer, and the University of California at San Diego trapped radiation detector have been compared with data acquired simultaneously in interplanetary space by the sister spacecraft Of particular interest were four intervals during which it appeared that the spacecraft had reentered the magnetosheath near 50 R_J after having first entered the magnetosphere near 100 R_J The principal outcome of the study is that in three of these cases the reentries into the magnetosheath occurred when high-speed solar wind streams and their associated interaction regions were expected to arrive at Jupiter Thus the study supports the hypothesis advanced previously that the Jovian magnetosphere had undergone a large-scale compression The results are contrary to an alternative hypothesis that the Pioneers had traversed a spatial region located inside the magnetosphere possibly associated with plasma outflow The fourth case, which was observed by Pioneer 11 outbound, appears to have occurred during quiet interplanetary conditions However, a detailed reinvestigation of magnetic field and plasma data during this interval shows that the spacecraft had reentered the magnetosheath and not a region interior to the magnetosphere. The reentry into the magnetosheath and the subsequent return to the magnetosphere were separated by an interval of 10 hours and would have been expected to occur when the spacecraft was at its highest magnetic latitude It is concluded, tentatively, that this reentry was the result of a large-scale north-south motion intrinsic to the Jovian magnetosphere The question of whether or not the magnetic field just inside the magnetopause is sufficiently strong to withstand the pressure of the incident solar wind has been reexamined within the context of this present study The field appears able to hold off the solar wind both at 100 R_J and near 50 R_J The compressibility of the Jovian magnetosphere is enhanced because the field inside the magnetopause is not the planetary field but is principally caused by currents inside the magnetosphere, presumably the equatorial current sheet The possible acceleration of energetic trapped radiation when the magnetosphere was compressed has been investigated Comparison of the increased particle fluxes and the magnetic field shows that gyrobetatron acceleration can be discounted Based on the measured time difference between the particle enhancement and the arrival of the magnetopause at the spacecraft, an estimate is derived for the average plasma density inside the magnetosphere of 1–10 cm^{-3} Finally, the characteristic time constants appropriate to an electric circuit model of Jupiter's magnetosphere have been estimated as being in the range between 15 and 50 hours

S049 Interplanetary Discontinuities: Temporal Variations and the Radial Gradient From 1 to 8 5 AU

B. T Tsurutani and E J. Smith

J Geophys Res, Vol 84, No. A6, pp 2773–2787, June 1, 1979

For abstract, see Tsurutani, B T

S050 Fields and Plasmas in the Outer Solar System

E J Smith and J H Wolfe (Ames Research Center)

Space Sci Rev, Vol. 23, pp 217–252, 1979

The most significant information about fields and plasmas in the outer solar system, based on observations by Pioneer 10 and 11 investigations, is reviewed The characteristic evolution of solar wind streams beyond 1 AU has been observed. The region within which the velocity increases continuously near 1 AU is replaced at larger distances by a thick interaction region with abrupt jumps in the solar wind speed at the leading and trailing edges These abrupt increases, accompanied by corresponding jumps in the field magnitude and in the solar wind density and temperature, consist typically of a forward and a reverse shock The existence of two distinct corotating regions, separated by sharp boundaries, is a characteristic feature of the interplanetary medium in the outer solar system. Within the interaction regions, compression effects are dominant and the field strength, plasma density, plasma temperature and the level of fluctuations are enhanced Within the intervening quiet regions, rarefaction effects dominate and the field magnitude, solar wind density and fluctuation level are very low. These changes in the structure of interplanetary space have significant consequences for the many energetic particles propagating through the medium The interaction regions control the access to the inner solar system of relativistic electrons from Jupiter's magnetosphere The interaction regions and shocks appear to be associated with an acceleration of solar protons to MeV energies Flare-generated shocks are observed to be propagating through the outer solar system with constant speed, implying that the previously recognized decelera-

tion of flare shocks takes place principally near the Sun Radial gradients in the solar wind and interplanetary field parameters have been determined The solar wind speed is nearly constant between 1 and 5 AU with only a slight deceleration of ≅30 km s^{-1} on the average The proton flux follows an r^{-2} dependence reasonably well The proton density, however, shows a larger departure from this dependence The proton temperature decreases steadily from 1 to 5 AU and the solar wind protons are slightly hotter than anticipated for an adiabatic expansion The radial component of the interplanetary field falls off like r^{-2} and, on the average, the magnitude and spiral angle also agree reasonably well with theory. However, there is evidence, principally within quiet regions, of a significant departure of the azimuthal field component and the field magnitude from simple theoretical models Pioneer 11 has obtained information up to heliographic latitudes of 16 deg Observations of the interplanetary sector structure show that the polarity of the field becomes gradually more positive, corresponding to outward-directed fields at the Sun, and at the highest latitudes the sector structure disappears These results confirm a prior suspicion that magnetic sectors are associated with an interplanetary current sheet surrounding the Sun which is inclined slightly to the solar equator

S051 Does ELF Chorus Show Evidence of Power Line Stimulation?

B. T Tsurutani and E J Smith

Wave Instabilities in Space Plasmas, pp 51–54, D. Reidel Pub Co, Dordrecht, Holland & Boston, 1979

For abstract, see Tsurutani, B T

S052 Chorus, Energetic Electrons and Magnetospheric Substorms

B. T Tsurutani, E J Smith, H. I. West, Jr, and R M Buck

Wave Instabilities in Space Plasmas, pp 55–62, D. Reidel Pub. Co, Dordrecht, Holland & Boston, 1979

For abstract, see Tsurutani, B T

SMITH, J. C.

S053 Gravity Field of Venus: A Preliminary Analysis

R J. Phillips, W. L. Sjogren, E. A Abbott, J C Smith, R. N. Wimberly, and C A Wagner (Goddard Space Flight Center)

Science, Vol. 205, pp. 93–96, July 6, 1979

For abstract, see Phillips, R. J

SMOOT, G F.

S054 Pattern Measurements of a Low-Sidelobe Horn Antenna

M A Janssen, S M Bednarczyk, S Gulkis, H. W. Marlin, and G F Smoot (University of California, Berkeley)

IEEE Trans Anten Prop, Vol AP-27, No 4, pp 551–555, July 1979

For abstract, see Janssen, M. A.

SOHA, J. M.

S055 Color Enhancement of Landsat Agricultural Imagery· Final Report for the JPL LACIE Image Processing Support Task

D. P. Madura, J M. Soha, W. B Green, D B Wherry, and S D Lewis

JPL Publication 78-102, December 15, 1978

For abstract, see Madura, D P

S056 Processing of Multispectral Thermal IR Data for Geologic Applications

A B. Kahle, D P. Madura, and J M Soha

JPL Publication 79-89, November 15, 1979

For abstract, see Kahle, A. B

SOMOANO, R. B.

S057 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S K. Khanna, S P. S Yen, R B Somoano, P M Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R Williams (California Institute of Technology), and S Samson (California Institute of Technology)

Phys Rev B Condensed Matter, Vol 19, No 2, pp. 655–663, January 15, 1979

For abstract, see Khanna, S K

SONNABEND, D.

S058 To the Solar Foci

D. Sonnabend

JPL Publication 79-18, June 1, 1979

Earlier authors (Cyranski and Lubkin, 1974) have shown that the sun is likely to act as a lens for gravitational

radiation, with foci in the outer solar system They have suggested that missions to these foci have the potential of directly measuring the density structure of the sun. Other applications include gravitational wave astronomy and new tests of general relativity

The present work re-examines this idea, concentrating on the engineering aspects of focal missions—primarily spacecraft design and performance Other topics studied include solar optics, gravitational wave detectors, navigation, and the design of missions for different purposes Specifically, it will be shown that Shuttle-launched chemical rockets have a substantial capability for reaching some foci, and that all can be reached with large payloads using nuclear isotope/electric propulsion Thus, when gravitational wave detectors of sufficient sensitivity become available, a variety of new and attractive scientific missions will beckon.

SOONG, D.

S059 Viscoelastic Properties of Entangled Polymers: Ternary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley),
S S Shyu (University of California, Berkeley),
M Shen (University of California, Berkeley),
S D. Hong, and J Moacanin

J. Appl. Phys, Vol 50, No 10, pp. 6077–6082, October 1979

In a previous publication from this laboratory, the Rouse-Bueche-Zimm molecular theory of viscoelasticity has been extended by using a transient network model to apply to binary blends of monodisperse polymers with chain entanglement The dynamics of the entanglements were modeled both by the enhanced frictional coefficients and by the additional elastic couplings It was recognized that entanglements not only may form between chains of the same lengths (intracomponent entanglements) but also between those of different lengths (intercomponent entanglements) At a given intercomponent entanglement, the longer chain was assumed to have the frictional coefficient of the shorter chain Similarly, for blends consisting of several monodisperse components with different molecular weights, such modifications are also required to predict their linear viscoelastic behavior The frequency of these interactions is assumed to be proportional to the weight ratio of the respective component chains in the blend Equations of motion are formulated for each component and solved numerically for the relaxation time spectra Linear viscoelastic properties such as the dynamic mechanical moduli, stress relaxation moduli, and zero-shear viscosity can then be computed for these systems by linear summation of those of the components The reduced steady-state shear compliance of the blends can also be computed from the component relaxation times Results are found to be in good agreement with experimental data on polystyrene ternary blends

S060 Viscoelastic Properties of Entangled Polymer. IV. Binary Blends of Monodisperse Homopolymers

D Soong (University of California, Berkeley),
M. Shen (University of California, Berkeley), and
S D Hong

J. Rheol., Vol. 23, No 3, pp 301–322, 1979

In a previous publication the Rouse–Bueche–Zimm molecular theory of viscoelasticity had been extended by using a transient network model to apply to monodisperse polymers with chain entanglements Effects of the entanglements were modeled both by the enhanced frictional coefficients and by the additional elastic couplings resulting from the transient entanglement network. For binary blends consisting of two monodisperse polymers with different molecular weights, additional modifications are now required to predict their linear viscoelastic behavior. It is recognized that entanglements not only may form between chains of the same length, but also between those of different lengths For the latter case, the longer chain will in fact have the frictional coefficient of the shorter chain at the point of entanglement The frequency of such interactions is assumed to be proportional to the weight ratio of the respective component chains in the blend Equations of motion are formulated for each component and solved numerically for the relaxation spectra Linear viscoelastic parameters such as the dynamic mechanical moduli, stress relaxation moduli, and zero shear viscosity can then be computed for the blends by linear summation of those of the components The reduced steady state shear compliance of the blends can also be computed from knowledge of the component relaxation times Results are found to be in excellent agreement with literature data on polystyrene, poly(dimethyl siloxane), and poly(methyl methacrylate)

SPRADLIN, G L.

S061 DSN Tracking System Uplink Frequency Control

G L Spradlin

The Deep Space Network Progress Report 42-53 July and August 1979, pp 108–112, October 15, 1979

The failure of the Voyager 2 spacecraft receiver requires that the DSN maintain the communications link to the spacecraft by constantly tuning the uplink frequency to null the effects of doppler The following article discusses the planned implementation within the DSN Tracking System to automate this current manual process

SPRUCK, A.

S062 **Seasonal Recession of Mars' South Polar Cap As Seen by Viking**

P B James, G Briggs (NASA Headquarters), J Barnes (University of Washington), and A Spruck (Marquette University)

J Geophys Res, Vol 84, No. B6, pp 2889–2922, June 10, 1979

For abstract, see James, P B

SRIVASTAVA, S K.

S063 **Absolute Elastic Differential Electron Scattering Cross Sections in the Intermediate Energy Region IV. CO**

H Tanaka (Sophia University, Japan), S K Srivastava, and A Chutjian

J Chem Phys, Vol 69, No 12, pp. 5329–5333, December 15, 1978

For abstract, see Tanaka, H

S064 **Electron Impact Excitation of Autoionising States of Krypton**

S. K. Srivastava and S. Trajmar

J. Phys. B. At. Mol. Phys, Vol. 11, No 19, pp. 3433–3438, 1978

Energy-loss spectra of krypton in the region between 21 and 29 eV have been obtained at electron impact energies of 30, 60 and 100 eV For each energy, the angular distribution of intensities has been measured at 5°, 10°, and 15° scattering angles Assignments of spectral features found in this region are suggested and a comparison is made with previous measurements

STANLEY, A. G.

S065 **Analysis of Long-Term Ionizing Radiation Effects in Bipolar Transistors**

A G Stanley and K E Martin

Radiat Phys Chem, Vol 12, pp. 133–142, 1978

The ionizing radiation effects of electrons on bipolar transistors have been analyzed using the data base from the Voyager project. The data were subjected to statistical analysis, leading to a quantitative characterization of the product and to data on confidence limits which will be useful for circuit design purposes These newly-developed methods may form the basis for a radiation hardness assurance system

In addition, an attempt was made to identify the causes of the large variations in the sensitivity observed on different product lines This included a limited construction analysis and a determination of significant design and processes variables, as well as suggested remedies for improving the tolerance of the devices to radiation

STEELE, H.

S066 **A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules**

E J Roschke, L Wen, H Steele, N El Gabalawi, and J Wang

JPL Publication 79-21, March 1, 1979

For abstract, see Roschke, E J

STERN, M. A

S067 **The Microprocessor-Based Synthesizer Controller**

H Donnelly, M R Wick, R W. Weller, G B Schaaf, B. Barber, and M. A Stern

The Deep Space Network Progress Report 42-54. September and October 1979, pp 92–103, December 15, 1979

For abstract, see Donnelly, H

STEVENS, G.

S068 **Costas Loop Demodulation of Suppressed Carrier BPSK Signals in the DSN Environment—Experimental Results Obtained at TDL**

R Reasoner, G Stevens, and K T Woo

The Deep Space Network Progress Report 42-51 March and April 1979, pp 94–104, June 15, 1979

For abstract, see Reasoner, R

S069 **Design of a Costas Loop to Operate With the Block III Receiver and Its Predicted Performance**

G Stevens and K T Woo

The Deep Space Network Progress Report 42-51 March and April 1979, pp 113–123, June 15, 1979

A Costas loop has been designed and constructed to operate with the Block III receiver It is a scaled-down version of the carrier tracking loop design in the Multimegabit Telemetry Demodulator and Detector (MTDD) unit under development The constructed loop has been tested with the Block III Receiver at the Telecommunications Development Laboratory (TDL) This

article describes its system design, hardware construction, and predicted performance

STIMPSON, L. D

S070 **Experience with Fluorine and Its Safe use as a Propellant**

D. L Bond, M. E Guenther, L D Stimpson, L R Toth, and D L Young

JPL Publication 79-64, June 30, 1979

For abstract, see Bond, D L

STIRN, R. J.

S071 **High-Efficiency Thin-Film GaAs Solar Cells**

R J. Stirn

JPL Publication 79-38, April 15, 1979

A continuation of a solar cell research task previously funded by ERDA was initiated March 1, 1978 for the Department of Energy. The overall objective is to demonstrate the feasibility of producing high-efficiency (15% or greater) thin-film gallium arsenide (GaAs) solar cells with costs suitable for terrestrial power generation The approach is that of growing GaAs by organo-metallic chemical vapor deposition (OM-CVD) on recrystallized germanium (Ge) films previously deposited on metal substrates, and fabricating AMOS (Anti-reflecting Metal-Oxide-Semiconductor) solar cells on the GaAs New work will investigate CVD-grown n/p homojunction GaAs solar cells on the large-grain Ge layers

Prepared for the U S Department of Energy

STONE, E. C.

S072 **Voyager 1 Encounter with the Jovian System**

E C Stone (California Institute of Technology) and A L Lane

Science, Vol. 204, pp 945–948, June 1, 1979

An overview of the Voyager 1 encounter with Jupiter is presented, including a brief discussion of the characteristics of the spacecraft and trajectory and highlights of the results which are described in the subsequent reports

STRAIN, D. M.

S073 **The Updated Algorithm of the Energy Consumption Program (ECP)—A Computer Model Simulating Heating and Cooling Energy Loads in Buildings**

F L Lansing, D M. Strain, V. W. Chai, and S Higgins

The Deep Space Network Progress Report 42-49. November and December 1978, pp 107–115, February 15, 1979

For abstract, see Lansing, F L

STRAND, L D.

S074 **Transient Processes in the Combustion of Nitramine Propellants: Annual Research Progress Report**

N S Cohen and L. D Strand

JPL Publication 78-108, November 1978

For abstract, see Cohen, N S

S075 **A Variable-Frequency Driver-Microwave Transient Regression Rate Measurement System**

L D. Strand and R. P McNamara (Kirk-Mayer, Inc)

Experimental Diagnostics in Combustion of Solids, AIAA, New York, pp 155–172, 1978

The feasibility of a system capable of rapidly and directly measuring the combustion response function characteristics has been investigated The system consists of a variable-frequency oscillatory driver device coupled with an improved version of a microwave propellant regression rate measurement system The ratio of the normalized regression rate and pressure amplitudes and their relative phase are measured as a function of varying pressure level and frequency. An analysis of the microwave detection system response and possible technique limitations are discussed, with a review of test results to date

STRATMAN, L. B.

S076 **An Improved Storage Bulb Mount for DSN Hydrogen Masers**

P R Dachel, D P Russell, T K Tucker, and L B Stratman

The Deep Space Network Progress Report 42-52 May and June 1979, pp 21–25, August 15, 1979

For abstract, see Dachel, P R.

STUART, J. R.

S077 **Solar Mesosphere Explorer Mission**

J R. Stuart and K A Gause (University of Colorado)

Preprint 79-0054, AIAA Seventeenth Aerosp Sci. Meet, New Orleans, La., January 15–17, 1979

The Solar Mesosphere Explorer (SME) will be launched in July 1981 on a two-stage Delta launch vehicle into a 500-km, polar, sun-synchronous orbit. The Jet Propulsion Laboratory is managing the SME project and will procure the satellite bus The five science instruments to be carried are being developed by the University of Colorado Laboratory for Atmospheric and Space Physics (LASP) and will measure the ozone density and altitude distribution, monitor the incoming solar radiation, and measure other atmospheric constituents which affect ozone The SME satellite will be operated on-orbit from the LASP campus facilities through the Goddard Space Flight Center TDRSS

S078 New Concepts for Mercury Orbiter Missions

J R French, J. R Stuart, and B Zeldin

J. Spacecraft Rockets, Vol 16, No 1, pp 35–41, January–February 1979

For abstract, see French, J R.

STULTZ, J. W.

S079 Thermal Analysis of a High-Energy Propulsion System for a Rover Class Mars Orbiter

J. W Stultz

Thermophysics and Thermal Control, AIAA, New York, pp 366–387, 1979

Maintaining cryogenic fluorine at −189°C during the interplanetary cruise period to Mars is a major thermal problem At this low temperature, the heat rejection by radiation is limited severely, and the allowable thermal load to the fluorine tank is less than approximately 8 W Previous studies generally constrain the spacecraft to an inline tank configuration that tends to maximize the fluorine tank's view and heat rejection to space With the inertial upper stage, sufficient stack height may not be available on the Shuttle for an inline tank configuration Therefore, this study addresses the more thermally constraining side-by-side tank configuration

SULENTIC, J. W.

S080 Some Properties of the Knots in the M87 Jet

J. W. Sulentic (Hale Observatories), H Arp (Hale Observatories), and J Lorre

Astrophys J, Vol. 233, pp 44–55, October 1, 1979

Photographs taken in 1956 by Baade show the knots in the jet of M87 to be polarized In 1978, these plates were repeated under conditions as identical as possible A careful comparison indicates that the polarization and intensity of the knots have changed in the 22 year interval

Emission lines in the nucleus of M87 not previously seen have been revealed by extensive 5 m SIT spectroscopy The same spectroscopy with galaxy subtracted, however, has failed to reveal any features in the jet

The known optical and radio properties of the jet are reviewed A coincidence is found in almost all of the defining properties of BL Lacertae objects with the properties of the knots in the jet Statistical studies of the distribution of BL Lacertae objects near bright galaxies reveals a marginally significant excess of such associations

SWIFT, C. T.

S081 Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop

R. G. Lipes, R L Bernstein (Scripps Institution of Oceanography), V J Cardone (Oceanweather, Inc.), K. B Katsaros (University of Washington), E. G Njoku, A L Riley, D B Ross (Atlantic Oceanic and Meteorological Laboratory), C T. Swift (Langley Research Center), and F J. Wentz (Frank J Wentz and Associates)

Science, Vol 204, pp 1415–1417, June 29, 1979

For abstract, see Lipes, R G

SYDNOR, R.

S082 Projected State-of-the-Art for Frequency Standards for the DSN in the 1982–1990 Time Frame

W. Higa and R. Sydnor

The Deep Space Network Progress Report 42-53 July and August 1979, pp. 54–61, October 15, 1979

For abstract, see Higa, W

SYNNOTT, S. P.

S083 Discovery of Currently Active Extraterrestrial Volcanism

L. A Morabito, S P Synnott, P. N Kupferman, and S A. Collins

Science, Vol 204, p. 972, June 1, 1979

For abstract, see Morabito, L A

TANAKA, H.

T001 Absolute Elastic Differential Electron Scattering Cross Sections in the Intermediate Energy Region. IV. CO

H. Tanaka (Sophia University, Japan), S K Srivastava, and A Chutjian

J Chem Phys, Vol 69, No 12, pp. 5329–5333, December 15, 1978

Using a crossed electron beam–molecular beam scattering geometry and a relative-flow technique, ratios of elastic differential cross sections of CO to those of He data have been measured at electron impact energies of 3, 5, 7.5, 9 9, 15, 20, 30, 50, 75, and 100 eV At each energy, an angular range of 15 deg to 130 deg has been covered These ratios have been multiplied by previously known He elastic differential cross sections to obtain elastic differential cross sections for CO Since pure rotational excitations were not resolved, the elastic differential cross sections are a sum of elastic and pure rotational excitations at room temperature From a knowledge of differential cross sections (DCS), integral and momentum transfer cross sections have been calculated Both the DCS and integral cross sections are compared at 50, 75, and 100 eV to a recent two-potential theory of *e*–molecule scattering Present results show that the isoelectronic molecules CO and N_2 have very similar magnitudes and shapes of their differential cross sections

TAPLEY, B. D.

T002 Seasat Altimeter Calibration: Initial Results

B D Tapley, et al.

Science, Vol. 204, pp 1410–1412, June 29, 1979

Preliminary analysis of radar altimeter data indicates that the instrument has met its specifications for measuring spacecraft height above the ocean surface (±10 centimeters) and significant wave height (±0 5 meter) There is ample evidence that the radar altimeter, having undergone development through three earth orbit missions (Skylab, Geodynamics Experimental Ocean Satellite 3 (GEOS-3), and Seasat), has reached a level of precision that now makes possible its use for important quantitative oceanographic investigations and practical applications

Contributors to this article include:

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Wallops Flight Center W F Townsend

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Pacific Marine Environmental Laboratory. H. M Byrne

Wave Propagation Laboratory L S Fedor

Naval Research Laboratory. D C Hammond

Centre National d'Etudes Spatiales, France N. M. Mognard

TAUSWORTHE, R. C.

T003 Preparation Guide for Class B Software Specification Documents

R C Tausworthe

JPL Publication 79-56, October 1, 1979

This Guide provides general conceptual requirements and specific application rules and procedures for the production of Software Specification Documents in conformance with Deep Space Network software standards and "Class B" standards Class B documentation is identified as the appropriate level applicable to implementation and sustaining engineering and operational uses by qualified personnel, engineer or equivalent Specific characteristics of Class B documents are defined in this Guide

TAYLOR, D. M.

T004 Microbiological Evaluation of the Mobile Biological Isolator System

D M Taylor, F Morelli, W Neiderheiser, and W M Tratz

JPL Publication 79-48, July 1, 1979

Evaluations on critical components of the Mobile Biological Isolation System were performed HEPA filter efficiency and suit integrity were found to withstand repeated ethylene oxide (ETO) sterilizations The minimum ETO sterilization time required to inactivate all contaminant organisms was established at four hours Two days of aerating at 120°F was found to dissipate all harmful ETO residuals from the suit Donning and doffing procedures were clarified and written specifically for isolation rooms

TAYLOR, F. W.

T005 Phosphine Absorption in the 5-μm Window of Jupiter

R Beer and F. W. Taylor

Icarus, Vol 40, pp 189–192, 1979

For abstract, see Beer, R.

T006 Infrared Remote Sounding of the Middle Atmosphere of Venus from the Pioneer Orbiter

F W. Taylor, et al

Science, Vol 203, pp 779–781, February 23, 1979

Orbiter infrared measurements of the Venus atmosphere in the 60- to 140-kilometer region show very small diurnal temperature differences near the cloud tops, increasing somewhat at higher levels the seasonal (that is, equator to pole) contrasts are an order of magnitude larger, and the temperatures unexpectedly increase with increasing latitude below 80 kilometers An isothermal layer at least two scale heights in vertical extent is found near the 100-kilometer altitude, where the temperature is about 175 K Structure is present in the cloud temperature maps on a range of spatial scales The most striking is at high latitude, where contrasts of nearly 50 K are observed between a cold circumpolar band and the region near the pole itself

Contributors to this article include

Jet Propulsion Laboratory F W Taylor, D. J Diner, L S Elson, M. S Hanner, D. J McCleese, J V Martonchik, and P E Reichley

University of Oxford, England J. T Houghton, J Delderfield, J T Schofield, and S E Bradley

California Institute of Technology. A P Ingersoll

T007 Temperature, Cloud Structure, and Dynamics of Venus Middle Atmosphere by Infrared Remote Sensing from Pioneer Orbiter

F. W Taylor, D. J Diner, L S Elson,
D. J. McCleese, J V. Martonchik,
J Delderfield (University of Oxford, England),
S P Bradley (University of Oxford, England),
J T Schofield (University of Oxford, England),
J. C. Gille (National Center for Atmospheric Research), and M. T Coffey (National Center for Atmospheric Research)

Science, Vol 205, pp 65–67, July 6, 1979

Further results from the Venus orbiter radiometric temperature experiment (VORTEX) on the Pioneer orbiter are presented These are used to characterize the three-dimensional temperature field, the cloud structure, and the dynamics of the 60- to 130-kilometer altitude region of the Venus atmosphere One of the new discoveries is a "dipole" structure at high latitudes, with two hot spots rotating around the pole, surrounded by banks of cold cloud

TAYLOR, H

T008 Codes for a Priority Queue on a Parallel Data Bus

D E Wallis and H Taylor

The Deep Space Network Progress Report 42-51· March and April 1979, pp 141–143, June 15, 1979

For abstract, see Wallis, D E

TAYLOR, R. M

T009 Radio Astronomy

R J. Fahnestock and R M Taylor

The Deep Space Network Progress Report 42-53. July and August 1979, pp 21–23, October 15, 1979

For abstract, see Fahnestock, R J

TAYLOR, T.

T010 DSN CONSCAN—A Vector Nomenclature and Method for Determining Parameter Values

T. Taylor and J. Lu Valle

The Deep Space Network Progress Report 42-53. July and August 1979, pp 113–122, October 15, 1979

The DSN CONSCAN algorithm can be conveniently expressed in vector notation A vector system is developed and used to describe a procedure for determining CONSCAN parameter values

TAYLOR, T. H.

T011 An Experimental Investigation of the Effects of Antenna Pointing Errors on Range Delays

T Y. Otoshi and T H Taylor

The Deep Space Network Progress Report 42-53. July and August 1979, pp 141–147, October 15, 1979

For abstract, see Otoshi, T. Y

TERRANOVA, T

T012 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes· Second Annual Report, July 1977–July 1978

J Moacanin, K Scherer, A. Toronto (Utah Biological Test Laboratory), D Lawson, T Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D. H Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J

TERRANOVA, T F.

T013 Perfluoro-3,3-dimethyl-2(E)-pentene by Fluoride Ion Catalyzed Addition of Octafluoroisobutene to Hexafluoropropene

K V Scherer, Jr (University of Southern California) and T. F Terranova

J Fluorine Chem, Vol 12, pp 89–91, 1978

For abstract, see Scherer, K V, Jr

TERRILE, R. J.

T014 Summary of Historical Data: Interpretation of the Pioneer and Voyager Cloud Configurations in a Time-Dependent Framework

R J Terrile and R F. Beebe (New Mexico State University)

Science, Vol. 204, pp 948–951, June 1, 1979

Ground-based imaging of Jupiter at visible and infrared wavelengths has been used to build up a time sequence of cloud feature variations The global cloud configuration seen by Voyager 1 appears markedly different from that seen by Pioneer 10 and 11 In the context of historical data, these two different cloud distributions are not unique but part of a continuous spectrum of global variations The most recent global changes occurred in a pattern which has been a characteristic trend observed many times before

T015 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R J Terrile, R W. Capps (University of Hawaii), D E Backman (University of Hawaii), E. E Becklin (University of Hawaii), D. P Cruikshank (University of Hawaii), C A Beichman (University of Hawaii), R. H. Brown (University of Hawaii), and J A Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

A coordinated program to observe Jupiter at high spatial resolution in the 5-micrometer wavelength region was undertaken to support Voyager 1 imaging and infrared radiation experiment targeting Jupiter was observed over a 5-month period from Palomar and Mauna Kea observatories The frequency of observations allowed the selection of interesting areas for closer Voyager examination and also provided good short-term monitoring of variations in cloud morphology Significant global changes in the 5-micrometer distribution are seen over this time period

THORMAN, H C.

T016 DSN Command System Mark III-78

H C Thorman

The Deep Space Network Progress Report 42-49 November and December 1978, pp 11–18, February 15, 1979

DSN Command System Mark III-78 implementation and functional operation are described Recent software upgrade enables expanded storage capacity in the DSS Command Processor Assembly Store-and-forward command data handling is operational for Voyager and Helios Near-real-time command data handling has been retained for Viking and Pioneer

THORNTON, C. L.

T017 Filtering and Error Analysis via the UDU^T Covariance Factorization

C. L Thornton and G J. Bierman

IEEE Trans Automat Contr, Vol AC-23, No 5, pp 901–907, October 1978

Kalman filter algorithms based on the UDU^T covariance factorization are discussed, with special attention given to algorithm implementation efficiency A *U-D* factored covariance error analysis algorithm is formulated, and its efficiency and numerical stability are demonstrated in a representative orbit determination problem The numerical results are compared with those obtained using covariance error analysis formulae, and the comparison highlights the numerical superiority of our algorithm A by-product of the *U-D* analysis is a new, highly efficient

algorithm mechanization of the arbitrary gain covariance update formula

T018 Navigation Capability for an Ion Drive Rendezvous with Halley's Comet

C L. Thornton and R A Jacobson

J. Astronaut Sci., Vol XXVI, No 3, pp. 197–210, July–September, 1978

Navigation accuracies are presented for a 1985 rendezvous with Halley's Comet using an ion propulsion system Individual error sources are examined to determine their relative contributions to final delivery errors The sensitivity of delivery accuracy to stochastic thrust variations is demonstrated by considering a baseline thrust error model and a more benign alternative model Also studied are the effects of increased comet ephemeris uncertainties and of operational time delays between the orbit determination process and the guidance implementation.

TOON, O. B.

T019 Past Obliquity Oscillations of Mars: The Role of the Tharsis Uplift

W R Ward, J A Burns (Cornell University), O B Toon (Ames Research Center)

J Geophys Res, Vol 84, No. B1, pp. 243–259, January 10, 1979

For abstract, see Ward, W R

TORONTO, A.

T020 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes Second Annual Report, July 1977–July 1978

J. Moacanin, K Scherer, A. Toronto (Utah Biological Test Laboratory), D Lawson, T. Terranova, A. Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D H. Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J.

TOTH, L. R

T021 Experience with Fluorine and Its Safe use as a Propellant

D L Bond, M. E Guenther, L D Stimpson, L R. Toth, and D L Young

JPL Publication 79-64, June 30, 1979

For abstract, see Bond, D L

TRAJMAR, S.

T022 Electron Impact Study of Potassium Hydroxide

L. Vuskovic and S Trajmar

J Chem Phys, Vol. 71, No. 9, pp. 3887–3889, November 1, 1979

For abstract, see Vuskovic, L

T023 Elastic and Inelastic (5^1D, 6^1P) Electron Scattering Cross Sections for Barium

S Jensen (University of California, Riverside), D Register, and S Trajmar

J Phys. B At Mol Phys, Vol 11, No 13, pp. 2367–2376, 1978

For abstract, see Jensen, S

T024 Electron Impact Excitation of Autoionising States of Krypton

S. K Srivastava and S. Trajmar

J. Phys B At. Mol Phys, Vol 11, No 19, pp 3433–3438, 1978

For abstract, see Srivastava, S K

TRATZ, W M.

T025 Microbiological Evaluation of the Mobile Biological Isolator System

D. M. Taylor, F. Morelli, W Neiderheiser, and W. M Tratz

JPL Publication 79-48, July 1, 1979

For abstract, see Taylor, D M

TRAXLER, M. R.

T026 Near-Earth Tracking and Data System Support for the Pioneer Venus 1978 Missions

M. R. Traxler and H W Calhoun

The Deep Space Network Progress Report 42-50 January and February 1979, pp 27–35, April 15, 1979

This article reports on the support provided by the Near-Earth Tracking and Data System(NETDS) for the Pioneer Venus 1978 Missions

TREDER, A J

T027 In-Flight Gyro Drift Rate Calibration on the Viking Orbiters

W. G. Breckenridge and A J. Treder

J Guidance Contr, Vol 1, pp 433–439, November–December 1978

For abstract, see Breckenridge, W G

TROMBKA, J. I.

T028 The Galactic Gamma-Ray Flux in the 0.06–5 MeV Range

D Gilman, A E Metzger, R H Parker, and J. I. Trombka (Goddard Space Flight Center)

Astrophys. J, Vol 229, pp 753–761, April 15, 1979

For abstract, see Gilman, D

TROWBRIDGE, D.

T029 S-Band Ultralow-Noise Traveling-Wave Maser

D Trowbridge and J. Loreman

The Deep Space Network Progress Report 42-53. July and August 1979, pp 148–154, October 15, 1979

Two S-band traveling-wave maser (TWM) systems with effective input noise temperatures of 2 0 K at 2295 MHz have been supplied to the Deep Space Network. These TWMs are used on the 64-m antennas at Deep Space Stations 43 and 63 to meet the requirements of the Voyager and Pioneer projects The TWMs use shortened and cooled signal input transmission lines to reduce noise and are equipped with superconducting magnets and solid-state pump sources to provide improved stability performance

TRUONG, T. K.

T030 Further Results on Fast Transforms for Decoding Reed-Solomon Codes Over $GF(2^n)$ for n = 4,5,6,8

I. S Reed (University of Southern California), T K Truong, R L Miller, and B. Benjauthrit

The Deep Space Network Progress Report 42-50 January and February 1979, pp 132–155, April 15, 1979

For abstract, see Reed, I S

T031 A Fast Technique for Computing Syndromes of BCH and RS Codes

I. S. Reed (University of Southern California), T. K Truong, and R. L Miller

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 67–70, August 15, 1979

For abstract, see Reed, I S

T032 A Reed-Solomon Decoding Program for Correcting Both Errors and Erasures

R L Miller T. K Truong, B Benjauthrit, and I. S Reed (University of Southern California)

The Deep Space Network Progress Report 42-53. July and August 1979, pp. 102–107, October 15, 1979

For abstract, see Miller, R L.

T033 An Efficient Program for Decoding the (255,223) Reed-Solomon Code Over $GF(2^8)$ With Both Errors and Erasures, Using Transform Decoding

R L Miller, T. K Truong, and I S Reed

The Deep Space Network Progress Report 42-54. September and October 1979, pp 82–91, December 15, 1979

For abstract, see Miller, R. L.

T034 On Decoding of Reed-Solomon Codes Over $GF(32)$ and $GF(64)$ Using the Transform Techniques of Winograd

I S Reed (University of Southern California), T K Truong, and B Benjauthrit

Conf Rec 1978 Nat. Telecommun Conf, Birmingham, Ala, December 3–6, 1978, pp 20.4.1–20.4 7

For abstract, see Reed, I. S

TRUSCELLO, V. C.

T035 The Parabolic Concentrating Collector A Tutorial

V C Truscello

JPL Publication 79-7, March 1, 1979

This paper presents a tutorial overview of point-focusing parabolic collectors Optical and thermal characteristics

of such collectors are discussed Data representing typical achievable collector efficiencies are presented and the importance of balancing collector cost with concentrator quality is argued through the development of a figure of merit for the collector The impact of receiver temperature on performance is assessed and the general observation made that temperatures much in excess 1500 to 2000°F can actually result in decreased performance Various types of two-axis tracking collectors are described, including the standard parabolic deep dish, Cassegrainian and Fresnel, as well as two forms of fixed mirrors with articulating receivers The present DOE program to develop these devices is briefly discussed, as are present and projected costs for these collectors Pricing information is presented for the only known commercial design available on the open market.

Prepared for the U S Department of Energy, DOE/JPL-1060-79/1, Distribution Category UC-62

TSUGE, K.

T036 Finite Deformation Behavior of Elastomers· Dependence of· Strain Energy Density on Degree of Crosslinking for SBR

K. Tsuge (Hokkaido University, Japan),
R. J Arenz (Loyola Marymount University), and
R. F Landel

Rubber Chem Technol, Vol 51, No 5, pp. 948–958, November–December 1978

This paper explores the effect on strain energy density W of varying the network chain concentration ν_e of an elastomer. This parameter plays a predominant role in the uniaxial response, from small strains to rupture Yet its role is readily accounted for, so much so that a change in chain concentration can be shown to be equivalent to a time scale shift

With so pronounced a role in uniaxial response, it is therefore imperative to investigate the manner in which ν_e modifies the biaxial response Is the Valanis-Landel treatment of W in terms of the extension ratios generally valid or only over a restricted range of ν_e? If valid, how does ν_e enter into W and its time dependence?

Styrene–butadiene rubber (SBR) was selected for study, because it does not crystallize on deformation like natural rubber. It is, like all hydrocarbon rubbers, essentially incompressible for our purposes Moreover, we have built up a large fund of information about SBR and its uniaxial response

Stress relaxation was selected as the basic test mode to avoid experimental problems inherent in creep or constant strain rate experiments, such as apparatus friction and variable boundary conditions The basic apparatus has previously been described, and the results for natural rubber published For this study it was modified to give a better definition of the loads on the sample

TSURUTANI, B. T.

T037 Can X-Ray Bursts be Caused by Substorms at a Neutron Star?

M Neugebauer and B T. Tsurutani

Astrophys J, Vol 226, pp 494–500, December 1, 1978

For abstract, see Neugebauer, M

T038 Interplanetary Discontinuities: Temporal Variations and the Radial Gradient From 1 to 8.5 AU

B. T Tsurutani and E. J Smith

J Geophys Res, Vol 84, No A6, pp. 2773–2787, June 1, 1979

Interplanetary discontinuities have been investigated at heliocentric distances between 1 and 8 5 AU by using Pioneer 10 and 11 vector helium magnetometer observations The principal purpose of the study was to investigate a possible dependence of the rate of occurrence and properties of the discontinuities on radial distance This objective required a separation of spatial and temporal variations and used the simultaneous nearly continuous data from both spacecraft Discontinuities were identified by using carefully developed criteria that were shown to be comparable to those used in earlier studies but which are still applicable in the weak magnetic fields that are typical of large radial distances Special attention was given to the identification of relatively thick discontinuities in the expectation that discontinuities might grow progressively thicker with distance The statistics associated with the rate of occurrence of discontinuities have been shown to be well approximated by a Poisson distribution The rate of occurrence of discontinuities undergoes large variations, from day to day and from one solar rotation to another, which are well outside the deviations to be expected on the basis of statistical fluctuations alone Temporal changes in the rate of occurrence averaged over Bartels solar rotations were well correlated at Pioneer 10 and 11, which were separated by a distance of $\cong$2 AU The time variations consisted of a slow modulation of the rate of occurrence such that successive increases and decreases persisted for several months at a time, presumably as a result of changing solar conditions The correlation over widely separated distances is most simply interpreted by a model in which the discontinuities originate inside 1 AU, probably near the sun, and are convected outward by the solar wind Further support for this model is provided by the statistical properties of the discontinuities at 1 and 5 AU, which were found to be very similar. Clear evidence of a decrease in the rate of occurrence ρ with distance has been obtained. The

simultaneous rates from the two spacecraft reveal that this decrease is well approximated on the average by the function $\rho = 50e^{-(R-1)/4}$ and imply a radial gradient of 25% per astronomical unit This gradient may be apparent and does not necessarily imply that discontinuities actually occur less frequently at large radial distances The decreased rate of occurrence may be associated with an increasing thickness of the discontinuities such that they no longer satisfy the identification criteria Possible evidence of a dependence of ρ on heliographic latitude was sought, but no statistically significant dependence was found The results of this study are inconsistent with previous inferences of a very large radial or latitudinal gradient on the basis of Pioneer 8 data (Mariani et al , 1973) The reason for this earlier result was probably the influence of time variations which occurred on a scale of several months, as was found in our study, and masqueraded as spatial variations

T039 'Does ELF Chorus Show Evidence of Power Line Stimulation?

B T. Tsurutani and E J. Smith

Wave Instabilities in Space Plasmas, pp 51–54, D. Reidel Pub Co, Dordrecht, Holland & Boston, 1979

It has previously been reported (Luette et al , 1977) that electromagnetic chorus exhibits a longitudinal dependence, with enhanced occurrence over population centers (Alaska–New Zealand, Eastern U S –Canada, Western Europe and Western Siberia) This result has been cited as possible evidence of Power Line Harmonic Radiation (PLR) control of magnetospheric chorus In this paper we report an analogous study using chorus data from OGO-5 to test this result Chorus is found to exhibit maxima over the Eastern USSR, Greenland and Central Siberia and minima over central and Eastern Canada, a distribution significantly different than the OGO-3 result This gross discrepancy is explained as an effect of data oversampling (persistence) in the method of analysis used in the previous study The OGO-5 data are reanalyzed with the oversampling removed It is found that none of the longitudinal maxima or minima are then statistically significant Thus, we find no statistically significant correlation between longitude and chorus occurence which implies that there is little or no evidence of PLR effects on chorus triggering.

T040 Chorus, Energetic Electrons and Magnetospheric Substorms

B T Tsurutani, E J. Smith, H I West, Jr , and R M. Buck

Wave Instabilities in Space Plasmas, pp 55–62, D Reidel Pub Co , Dordrecht, Holland & Boston, 1979

The origin(s) of whistler mode chorus in the outer region of the terrestrial magnetosphere has been investigated using simultaneous measurements of chorus, energetic (79 ± 23 keV) electron fluxes and pitch angle distributions and ambient magnetic fields obtained with OGO 5 It is found that chorus occurring within 15 deg of the magnetic equator (equatorial chorus) was detected during magnetospheric substorms and is closely related to enhanced, anisotropic fluxes of energetic electrons The observations are consistent with wave generation by a loss-cone instability associated with freshly injected 10–100 keV electrons Chorus observed at higher latitudes appear to have several causes 1) Nightside emissions are substorm related and are observed when the magnetic field changes from a tail-like to a more dipolar configuration Possible explanations are an onset of chorus growth due to a change in the electron pitch angle distribution or a decrease in the Landau damping of the waves as they propagate to higher latitudes 2) Dayside high latitude emissions, which are substorm related, are found to be correlated with high fluxes of energetic electrons Local, high latitude generation in "minimum B pockets" or equatorial generation and subsequent propagation to higher latitudes by wave ducting can both occur It is possible to determine the proper mechanism for each individual case if the measurements of the value f/f_c (f_c is the local electron gyrofrequency) and the ambient plasma densities can be made 3) High latitude chorus also occurs during prolonged geomagnetic quiet but is not well understood. These emissions were not related to features in the electron flux or pitch angle distribution Solar wind pressure fluctuations and magnetic flux cutting were ruled out as major causes of these emissions Several possible generation mechanisms are proposed One possibility is that lower energy electrons ($E < 55$ keV) are responsible Another possible generation mechanism requires the existence of boundary layer plasma This enhanced, thermal plasma could lower the local wave phase velocity, leading to enhanced wave-particle interactions and to chorus growth Further study is necessary to test the latter hypothesis

TUCKER, T. K.

T041 An Improved Storage Bulb Mount for DSN Hydrogen Masers

P. R Dachel, D P. Russell, T K. Tucker, and L B. Stratman

The Deep Space Network Progress Report 42-52 May and June 1979, pp 21–25, August 15, 1979

For abstract, see Dachel, P R.

TWARD, E.

T042 **Potential Scientific Uses of Cryogenics in Space in the Temperature Range From 1 mK to 10 K**

E Tward (University of Regina, Canada) and P. V Mason

Applications of Closed-Cycle Cryocoolers to Small Superconducting Devices Conf. Proc, Nat Bur Stand, Boulder, Col, October 3–4, 1977, pp 227–241

This paper reports the results of a survey of potential users of cryogenics in space The survey was conducted informally in July, 1976, in order to determine the cryogenic needs of the scientific community for space experiments The experiments which are described below are restricted to a temperature range extending from the mK region to liquid helium temperatures Experimental areas identified are experimental relativity, He^3 and He^4 experiments, IR astronomy, microwave astronomy, and cosmic ray detection.

TYLER, G. L.

T043 **Radio Science with Voyager 1 at Jupiter Preliminary Profiles of the Atmosphere and Ionosphere**

V. R Eshleman (Stanford University), G L Tyler (Stanford University), G. E. Wood, G F. Lindal, J. D. Anderson, G S Levy, and T. A Croft (SRI International)

Science, Vol 204, pp 976–978, June 1, 1979

For abstract, see Eshleman, V. R

URBACH, A. R.

U001 **Design of a Superfluid Helium Dewar for the IRAS Telescope**

A R Urbach (Ball Aerospace Systems Division), J. Vorreiter (Ames Research Center), and P Mason

Proc Seventh Int. Cryog Eng. Conf, London, United Kingdom, July 4–7, 1978, pp 126–133

The Infrared Astronomy Satellite (IRAS) is planned for launch in 1981, and is a joint project of the Netherlands, the United Kingdom and the United States The instrument will consist of a superfluid helium-cooled 60 cm telescope with a large array of infrared detectors at the focal plane The primary purpose of the mission is to perform an all-sky survey in the infrared region from 8 to 120 micrometers The dewar contains 70 Kg of superfluid helium which will maintain the telescope and detectors at 2 K for one year The dewar contains a supercritical helium cover tank which will be ejected after the experiment has been in orbit for two weeks

URECH, J. M.

U002 **Preliminary Report on DSN System Performance Under Local Weather Effects**

J M Urech

The Deep Space Network Progress Report 42-52. May and June 1979, pp 82–88, August 15, 1979

Local effects of precipitation are studied, and a simplified working model is developed Experimental results obtained by simulation are in good agreement with the model, showing that it could be an important contribution to system degradation If this is confirmed, some suggestions for improvement are presented Nevertheless, definite results with actual rain are not yet available

VARSI, G.

V001 **Feasibility of Rocket Propellant Production on Mars**

R L Ash, W L Dowler, and G Varsi

Acta Astronautica, Vol 5, pp. 705–724, 1978

For abstract, see Ash, R L

VASQUEZ, R. P.

V002 **High-Resolution X-ray Photoelectron Spectroscopy as a Probe of Local Atomic Structure· Application to Amorphous SiO_2 and the Si-SiO_2 Interface**

F J. Grunthaner, P. J. Grunthaner, R. P. Vasquez, B F Lewis, J Maserjian, and A Madhukar (University of Southern California)

Phys Rev Lett, Vol 43, No. 22, pp. 1683–1686, November 26, 1979

For abstract, see Grunthaner, F J

VISWANATHAN, C. R.

V003 **Trapping Effects in Irradiated and Avalanche-Injected MOS Capacitors**

M. Bakowski, R H. Cockrum, N Zamani, J Maserjian, and C. R Viswanathan (University of California, Los Angeles)

IEEE Trans Nucl Sci., Vol. NS-25, No 6, pp 1233–1238, December 1978

For abstract, see Bakowski, M

VON ROOS, O.

V004 Diffusion Length Measurements of Thin GaAs Solar Cells by Means of Energetic Electrons

O von Roos

JPL Publication 79-121, February 1, 1980

A calculation of the short circuit current density j_{sc} of a thin (thickness of the active region approximately 10 microns) GaAs solar cell induced by fast (approximately 1 MeV) electrons is presented The active region of the cell, manufactured by Hughes, consist of a layer of P^+–Al_xGa_{1-x} As deposited on a P^+–N–N^+ GaAs junction It is shown that in spite of the disparity in thickness between the N-type portion of the junction (approximately 10 microns) and the P-type portion of the junction (approximately 0 3 microns) the measurement of the bulk diffusion length L_p of the N-type part of the junction is seriously hampered due to the presence of a sizable contribution to the j_{sc} from the P-type region of the junction Corrections of up to 50% have to be made in order to interpret the data correctly Since these corrections are not amenable to direct measurements it is concluded that the electron beam method for the determination of the bulk minority carrier diffusion length, which works so well for Si solar cells, is a poor method when applied to thin GaAs cells

V005 Extension of a Theorem Used in the Investigation of *P–N* Junctions With the Scanning Electron Microscope to Arbitrary Geometries and Arbitrarily Inhomogeneous Material

O von Roos

Appl. Phys Lett., Vol 35, No. 5, pp 408–409, September 1, 1979

It is shown that the relationship $\lim_{n\to S} \partial I_{SC}/\partial n = (s/D)I_{SC}$ connecting the normal derivative of the short circuit I_{SC} generated by an electron or ion beam in a *P–N* junction with the surface recombination velocity s and the diffusion constant D is valid for arbitrary junction geometries, arbitrary doping profiles, and arbitrary distributions of recombination centers, provided that (1) low-level injection prevails and (2) the radius of the beam-semiconductor interaction volume is small compared to the local diffusion length It thus becomes possible to study the surface recombination velocity of the front surface of a highly nonuniformly doped shallow junction representative of, for instance, a solar cell by means of an ion beam

V006 Recombination Lifetime and Surface Recombination Velocities of Minority Carriers in *n-p* Junctions. A New Method for Their Determination by Means of a Stationary Amplitude-Modulated Electron Beam

O von Roos

J. Appl. Phys, Vol 50, No. 5, pp 3738–3742, May 1979

When a well-collimated electron beam of an electron microscope impinges on the free surface of an *n-p* junction, a short circuit I_{SC} will be generated If the primary beam current is amplitude modulated sinusoidally in time, the I_{SC} exhibits a characteristic coherent phase shift with respect to the modulated primary beam This phase shift depends on the minority-carrier lifetime, doping level, and the position of energy levels of recombination centers within the band gap For solar-grade material with their long lifetimes the influence of energy-level positions is negligible, but for short-lifetime material (switching devices) the dependence of the phase shift on the energy levels of the recombination centers is critical In this paper it is shown that the measurement of the phase shift at two different beam-modulation frequencies allows for the determination of the lifetime and surface recombination velocity in solar-grade material (solar cells).

V007 Reply to "Comments on 'A Note on the Assumption of Quasiequilibrium in Semiconductor Junction Devices'"

O von Roos

J Appl. Phys, Vol 50, No 6, p. 4482, June 1979

This reply points out that recently published criticisms of the author's work are based on a misunderstanding

V008 A Note on Photocurrents in Extrinsic Semiconductors

O. von Roos

Solid-State Electron, Vol 22, pp. 229–232, 1979

The absorption of light generates excess carriers (electrons and holes) in a uniformly doped semiconductor and sets up diffusion currents Owing to the difference of the diffusion constants for electrons and holes, the diffusion currents produce a small electric field in a zero current configuration. This is well known It is not realized generally that fairly large electrical currents of tens of mA can be generated under short circuit conditions Theoretical treatments of these effects in the literature are logically flawed In this paper the situation will be remedied

VON ROOS, O.

V009 Quantum Nondemolition Measurements: Comment on Recent Developments

O von Roos

Phys. Rev D· Part Fields, Vol 18, No 12, pp 4796–4798, December 15, 1978

The limitations of the detectability of extremely weak signals (gravitational radiation for instance) imposed by Heisenberg's uncertainty principle on the *sequential* determination of those signals have been explored recently A variety of schemes have been proposed to circumvent these limitations Although all of the earlier attempts have been proven fruitless a recent proposal seems to be quite promising The scheme, consisting of two harmonic oscillators interacting with each other in a peculiar way, allows for an exact analytical solution which is derived here If it can be assumed that the expectation value of one of the canonical variables of the total system suffices to monitor the weak signal it can be shown that, in the absence of thermal noise, arbitrarily weak signals can in principle be measured without interference from the uncertainty principle

V010 On the Determination of Diffusion Lengths by Means of Angle-Lapped *P–N* Junctions

0. von Roos

Solid-State Electron, Vol 22, pp 113–114, January 1979

A standard procedure for determining the minority carrier diffusion length by means of a scanning electron microscope consists of scanning across an angle-lapped surface of a *p–n* junction and measuring the resulting short circuit current as a function of beam position The present paper points out that the usual expression linking the short circuit current induced by the electron beam to the angle between the semiconductor surface and the junction plane is incorrect The correct expression is discussed and it is noted that, for angles less than 10°, the new and the old expression are practically indistinguishable

VORREITER, J.

V011 Design of a Superfluid Helium Dewar for the IRAS Telescope

A R. Urbach (Ball Aerospace Systems Division), J. Vorreiter (Ames Research Center), and P Mason

Proc Seventh Int Cryog Eng Conf, London, United Kingdom, July 4–7, 1978, pp 126–133

For abstract, see Urbach, A R

VUSKOVIC, L.

V012 Electron Impact Study of Potassium Hydroxide

L Vuskovic and S Trajmar

J Chem Phys, Vol. 71, No 9, pp 3887–3889, November 1, 1979

An attempt is made to measure the sum of the elastic, rotational, and vibrational scattering of electrons by KOH at low impact energies (5 to 20 eV) at angles from 10 to 120 deg Energy loss spectra taken in the 0 to 18 eV range using an electron impact spectrometer are used to identify the species contributing to electric scattering At temperatures between 300 and 500°C only inelastic spectral features belonging to water are detected, while at temperatures from 500 to 800°C strong atomic K lines, indicative of molecular dissociation, and H_2 energy loss features become prominent No features attributable to KOH, the KOH dimer, 0_2 or potassium oxides were observed, due to the effects of the dissociation products, and it is concluded that another technique will have to be developed in order to measure electron scattering by KOH

WADA, B. K.

W001 Estimation of Payload Loads Using Rigid-Body Interface Accelerations

J. C Chen, J. A Garba, and B K Wada

J Spacecraft Rockets, Vol 16, No 2, pp 74–80, March–April 1979

For abstract, see Chen, J C

WAGNER, C. A.

W002 Gravity Field of Venus: A Preliminary Analysis

R J Phillips, W L Sjogren, E A Abbott, J C Smith, R N Wimberly, and C A. Wagner (Goddard Space Flight Center)

Science, Vol. 205, pp 93–96, July 6, 1979

For abstract, see Phillips, R J

WAGNER, P.

W003 Homogeneous Vortex Model for Liquid Slosh in Spinning Spherical Tanks

M. El-Raheb and P. Wagner

JPL Publication 79-99, November 15, 1979

For abstract, see El-Raheb, M

WALL, S. D.

W004 One Mars Year: Viking Lander Imaging Observations

K. L. Jones (Planetary Research, Inc.),
R. E Arvidson (Washington University),
E A Guinness (Washington University),
S L Bragg (Washington University),
S D Wall (Langley Research Center),
C E Carlston (Martin Marietta Corporation), and
D G Pidek

Science, Vol 204, pp 799–806, May 25, 1979

For abstract, see Jones, K L

WALLACE, K. B.

W005 X-Band Atmospheric Noise Temperature Data and Statistics at Goldstone, DSS 13, 1977–1978

S. D. Slobin, K. B Wallace, M M Franco,
E. M Andres, and O. V Hester

The Deep Space Network Progress Report 42-52 May and June 1979, pp 108–116, August 15, 1979

For abstract, see Slobin, S D

WALLIS, D. E.

W006 Dual A/D Converter With Automatic DMA Block-Transfer Capability

D. E Wallis

The Deep Space Network Progress Report 42-50 January and February 1979, pp 85–94, April 15, 1979

A PDP-11 computer-controlled UNIBUS analog-to-digital (A/D) converter has been designed and constructed for use in the DSN Planetary Radar Data Acquisition System The converter is intended for synchronous quadrature-pair sampling and can be programmed to automatically transmit the sample values via direct memory access (DMA) to any desired blocks of memory locations The article describes the converter in detail, and gives information on mechanical construction, data-transfer rates, self-test and calibration provisions, and programming

W007 Codes for a Priority Queue on a Parallel Data Bus

D E Wallis and H Taylor

The Deep Space Network Progress Report 42-51 March and April 1979, pp 141–143, June 15, 1979

The article describes some codes for arbitration of priorities among subsystem computers or peripheral device controllers connected to a parallel data bus At arbitration time, several subsystems present wire-OR, parallel code words to the bus, and the central computer can not only identify the subsystem of highest priority, but can also determine which of two or more transmission services the subsystem requires The article contains a mathematical discussion of the optimality of the codes with regard to the number of subsystems that may participate in the scheme for a given number of wires, and also the number of services that each subsystem may request

WANG, J.

W008 A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules

E J Roschke, L Wen, H Steele,
N. El Gabalawi, and J Wang

JPL Publication 79-21, March 1, 1979

For abstract, see Roschke, E J

WANG, T G.

W009 Drop Dynamics in Space

T. G Wang, M. M Saffren, and D. D. Elleman

Materials Sciences in Space with Application to Space Processing, AIAA, New York, pp. 151–172, 1977

Experiments to study the dynamics of liquid drops are being planned to be performed in the weightless environment of Spacelab The liquids will range from superfluid helium through ordinary liquid to molten metals and glasses The experiments will be conducted in a chamber now being developed which utilizes the forces and torques produced by acoustic waves excited within the chamber None of the currently available facilities (drop towers, sounding rockets, or zero-g aircraft flights) can provide a sustained weightless environment, since the resulting zero-g periods are from 3 sec to 5 min Spaceflight, however, will provide weightlessness for periods of one week, or more, allowing truly laboratory-like experiments to be conducted on free liquid drops and bubbles In this paper we discuss both the drop dynamics experiments proposed for Spacelab and the acoustic chamber its operation and current testing for these and other experiments

WARD, R. S.

W010 Galileo Dual-Spin Attitude and Articulation Control System

R S Ward

J Guidance Contr, Vol 2, No. 5, pp 420–425, September–October 1979

Galileo, the first outer-planet explorer to be configured as a dual spinner, will conduct intensive investigation of Jupiter's atmosphere, satellites, and magnetosphere. The exacting mission, coupled with the inherently complex spin and flexible body dynamics of the vehicle, demands careful design of the Galileo Attitude and Articulation Control System (AACS) A brief overview of the Galileo mission and spacecraft is presented, followed by a detailed discussion on the mechanization of the AACS and the many factors that influence its design Included are discussions on attitude determination and control, high-gain antenna pointing, science scan platform pointing, nutation damping, wobble compensation, spin and despin control, and propellant migration and boom flexibility effects

WARD, W. R.

W011 Comments on the Venus Rotation Pole

W R Ward and W M DeCampli (California Institute of Technology)

Astrophys. J, Vol 230, pp L117–L121, June 1, 1979

Possible orientations of the Venus rotation pole as a function of planetary oblateness are calculated, taking into account the variation of the orbital inclination and motion of the nodal line produced by long-term planetary perturbations and assuming the obliquity to be fully damped If the obliquity is stabilized against solar tides by core-mantle viscous coupling, a fully damped obliquity is the expected state An analysis of Earth-based radar data from 1964 to 1977 yields a pole position which lies near damped pole positions of small oblateness, $\lesssim 10^{-6}$ Possible implications of this result are considered

W012 Does Venus Wobble?

C. F Yoder and W. R. Ward

Astrophys. J., Vol 233, pp L33–L37, October 1, 1979

For abstract, see Yoder, C F.

W013 Present Obliquity Oscillations of Mars: Fourth-Order Accuracy in Orbital *e* and *I*

W R. Ward

J Geophys. Res, Vol 84, No B1, pp 237–241, January 10, 1979

A long period analysis of solar system orbital evolution, correct to fourth order in orbital eccentricities and inclinations (Bretagnon, 1974), and an improved value of the planet's moment of inertia (Reasenberg, 1977) have been incorporated in a recalculation of the obliquity oscillations of Mars A linearized solution predicts a maximum oscillation amplitude of 13 6° centered on a long-term average value of 24 4°. A numerical integration of the obliquity for the past 10^7 years is also presented Epochs of minimal oscillation like the present occur at intervals of the order of 4 m y

W014 Past Obliquity Oscillations of Mars: The Role of the Tharsis Uplift

W R. Ward, J. A. Burns (Cornell University), O B. Toon (Ames Research Center)

J. Geophys Res, Vol 84, No B1, pp. 243–259, January 10, 1979

The present gravitational quadrupole moment of Mars contains a 6-1/2% nonhydrostatic contribution from the uncompensated Tharsis construct Prior to the Tharsis uplift, the rate of spin axis precession was nearly equal to the frequency of a minor term in the expression for the orbital precession of Mars developed by Bretagnon (1974) In such a situation, small changes in the J_2 of Mars could have caused the spin axis precession rate to drift repeatedly through the orbital frequency We show that even minor, low-amplitude orbital components can have a significant impact on the obliquity oscillations due to secular spin-orbit resonance Our approach to this problem is in three stages First, we examine a number of processes which have the potential to alter the spin axis precession-rate, discussing both the expected magnitude and time scales involved Of these, Tharsis plays a dominant role, but other processes, i e, differentiation, mantle convection, etc, may also have significantly influenced the planet's quadrupole moment in the past Second, a theory describing the consequences of passage through a secular spin-orbit resonance is developed The problem is solved analytically for the case of uniform orbital precession It is then shown that the resonance behavior is almost undisturbed by the presence of other orbital terms (i e, nonuniform precession), even if these terms are appreciably larger than the resonance terms Third, numerical integrations of the full equations of motion for Mars are presented that demonstrate the resonance and indicate that the obliquity of Mars may have intermittently been as low as ~9 deg and as high as 46 deg (or more) in its early history.

WARDRIP, S. C.

W015 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W. J. Hurd, S. C Wardrip (Goddard Space Flight Center), J. Bussion (Naval Research Laboratory), J. Oaks (Naval Research Laboratory), T McCaskill (Naval Research Laboratory), H. Warren (Bendix Field Engineering Corp), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49 November and December 1978, pp 64–69, February 15, 1979

For abstract, see Hurd, W J

WARNE, L.

W016 Wave Tilt Sounding of a Linearly Inhomogeneous Layered Half-Space

L. Warne, D. Evans, and C Elachi

IEEE Trans Anten. Prop, Vol. AP-27, No. 3, pp 417–422, May 1979

The wave tilt of a transverse electric (TE) electromagnetic wave over a linearly inhomogeneous lossy layer overlying a homogeneous half-space is studied Two approaches are used: an exact formulation using solutions of Airy's equation and an approximate numerical solution using a large number of homogeneous layers with a linearly increasing dielectric constant The numerical results of both solutions are practically identical as long as the thickness of the layers in the approximate model are somewhat smaller than a quarter-wavelength

WARREN, E. H., JR.

W017 The Economic Approach to Crime

E. H Warren, Jr

Can J Criminol, Vol 20, No 4, pp 437–449, October 1978

This paper reviews the foundations of economic theory relevant to the economic approach to crime and examines their significance

WARREN, H.

W018 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W J. Hurd, S. C. Wardrip (Goddard Space Flight Center), J. Bussion (Naval Research Laboratory), J Oaks (Naval Research Laboratory), T. McCaskill (Naval Research Laboratory), H Warren (Bendix Field Engineering Corp), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49· November and December 1978, pp. 64–69, February 15, 1979

For abstract, see Hurd, W J

WARWICK, J. W.

W019 Voyager 1 Planetary Radio Astronomy Observations Near Jupiter

J. W Warwick, et al.

Science, Vol 204, pp 995–998, June 1, 1979

We report results from the first low-frequency radio receiver to be transported into the Jupiter magnetosphere We obtained dramatic new information, both because Voyager was near or in Jupiter's radio emission sources and also because it was outside the relatively dense solar wind plasma of the inner solar system Extensive radio spectral arcs, from above 30 to about 1 megahertz, occurred in patterns correlated with planetary longitude A newly discovered kilometric wavelength radio source may relate to the plasma torus near Io's orbit In situ wave resonances near closest approach define an electron density profile along the Voyager trajectory and form the basis for a map of the torus Detailed studies are in progress and are outlined briefly

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Observatoire de Paris· A Boischot, C C Harvey, and B M Pedersen

WEINBERG, M.

W020 Molecular Rotation and Reorientation: Microscopic and Hydrodynamic Contributions

J T Hynes (University of Colorado), R Kapral (University of Toronto), and M Weinberg

J. Chem Phys, Vol, 29, No. 6, pp 2725–2733, September 15, 1978

For abstract, see Hynes, J T

WEISS, R S.

W021 Characterization of Solar Cells for Space Applications: Electrical Characteristics of OCLI 225-Micron MLAR Wraparound Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, T F. Miyahira, and R S Weiss

JPL Publication 78-15, Vol V, April 1, 1979

For abstract, see Anspaugh, B E

W022 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured, 10 ohm-cm, 50 Micron Advanced OAST Solar Cells as a Function of Intensity, Temperature, and Irradiation

B E. Anspaugh, R. G Downing, T F. Miyahira, and R. S Weiss

JPL Publication 78-15, Vol VI, June 15, 1979

For abstract, see Anspaugh, B E

W023 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab HEWAC BSF, Textured, 10 ohm-cm, 225 Micron Solar Cells as a Function of Intensity and Temperature

B E Anspaugh, D M Beckert, R G. Downing, T. F Miyahira, and R S Weiss

JPL Publication 78-15, Vol. VII, June 15, 1979

For abstract, see Anspaugh, B E

W024 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, BSR, Textured 290-Micron Solar Cells (K7) as a Function of Intensity, Temperature and Irradiation

B E Anspaugh, D. M Beckert, R. G Downing, T F. Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol. VIII, September 1, 1979

For abstract, see Anspaugh, B E

W025 Characterization of Solar Cells for Space Applications: Electrical Characteristics of Spectrolab BSF, Textured, 10-ohm-cm 200-Micron Cells as a Function of Intensity, Temperature, and Irradiation

B. F Anspaugh, D M Beckert, R G Downing, T. F Miyahira, and R S Weiss

JPL Publication 78-15, Vol IX, September 15, 1979

For abstract, see Anspaugh, B F

W026 Characterization of Solar Cells for Space Applications Electrical Characteristics of Spectrolab BSF, Textured, 10 ohm-cm, 300 Micron Cells as a Function of Intensity, Temperature and Irradiation

B E Anspaugh, R G Downing, T F Miyahira, and R. S. Weiss

JPL Publication 78-15, Vol X, October 1, 1979

For abstract, see Anspaugh, B E

W027 Characterization of Solar Cells for Space Applications· Electrical Characteristics of 2 Ohm-cm, 228 Micron Wraparound Solar Cells as a Function of Intensity, Temperature, and Irradiation

B E Anspaugh, D M Beckert, R G Downing, and R S Weiss

JPL Publication 78-15, Vol XI, January 15, 1980

For abstract, see Anspaugh, B E

WEISSMAN, P. R.

W028 Nongravitational Perturbations of Long-Period Comets

P. R Weissman

Astron J, Vol 84, No. 4, pp. 580–584, April 1979

The effect of nongravitational forces on the orbits of long-period comets is investigated using the model of Marsden, Sekanina, and Yeomans Assuming a range of typical, observed values for the nongravitational force and the lag angle, we show that the resulting change in inverse semimajor axis during a single perihelion passage can be comparable to that caused by planetary perturbations for comets with perihelia less that 0 5 AU For comets whose rotation is prograde relative to their orbital angular momentum, both the energy and the perihelion distance of the orbits increase For retrograde rotation both the energy and perihelion distance decrease If one assumes that the orientation of the rotation axis of each comet does not change between perihelion passages, then the nongravitational forces provide a mechanism to regularly step the comets' semimajor axes into or out of the solar system, as compared with the random steps of planetary perturbations The mechanism provides an explanation for the relatively small semimajor axes of the Kreutz family of sun-grazing comets The role of nongravitational forces in the evolution of long-period comets in general is also discussed.

WELCH, L. R.

W029 Spectral Shaping Without Subcarriers

L R Welch

The Deep Space Network Progress Report 42-50 January and February 1979, pp 74–77, April 15, 1979

For proper operation of the phase lock loop which tracks a carrier, it is important to minimize the spectral energy at frequencies near the carrier A traditional method is to modulate the data onto a subcarrier in such a way that there is little energy near DC The resulting signal is then used to modulate the carrier The problem with such a scheme is that the total bandwidth is much larger than necessary to transmit the data This paper proposes and analyzes a simpler scheme that increases the data bandwidth by a very small fraction, yet reduces the energy near DC to nearly zero

W030 Coding for Optical Channels With Photon-Counting

R J McEliece and L R. Welch

The Deep Space Network Progress Report 42-52· May and June 1979, pp. 61–66, August 15, 1979

For abstract, see McEliece, R. J.

WELLER, R. W.

W031 The Microprocessor-Based Synthesizer Controller

H Donnelly, M. R Wick, R W. Weller, G B Schaaf, B Barber, and M. A Stern

The Deep Space Network Progress Report 42-54. September and October 1979, pp 92–103, December 15, 1979

For abstract, see Donnelly, H

WELLMAN, J. B.

W032 Onboard Processing for Future Space-Borne Imaging Systems

J B Wellman and D D Norris

Preprint 78-1710, AIAA/NASA Conf "Smart" Sensors, Hampton, Va , November 14–16, 1978

There is a strong rationale for increasing the rate of information return from imaging class experiments aboard both terrestrial and planetary spacecraft Future imaging systems will be designed with increased spatial resolution, broader spectral range and more spectral channels (or higher spectral resolution) The data rate implied by these improved performance characteristics can be expected to grow more rapidly than the projected telecommunications capability. One solution to this dilemma is the use of improved onboard data processing Onboard application of calibration data can remove the fixed pattern noise characteristic of solid-state array image detectors, thereby facilitating subsequent data compression and spectral classification While data compression alone may achieve a reduction of a factor of 8 in the number of bits required to satisfactorily represent an image, additional source encoding techniques may raise the improvement factor to the order of 100 over an uncompressed, uncoded channel The use of onboard classification processing in a multispectral imager can result in orders of magnitude increase in information transfer for very specific types of imaging tasks Several of these processing functions are included in the conceptual design of an Infrared Multispectral Imager which would map the spatial distribution of characteristic geologic features associated with deposits of economic minerals

WELLS, J

W033 FTS Maintenance and Calibration at DSS 42/43

P. R Dachel and J Wells (Deep Space Station 43, Tidbinbilla)

The Deep Space Network Progress Report 42-49 November and December 1978, pp. 146–154, February 15, 1979

For abstract, see Dachel, P R.

W034 Pioneer Venus Multiprobe Entry Mission Support

B. Ryan (Tidbinbilla Deep Space Complex), D Hollingsworth (Tidbinbilla Deep Space Complex), A Bailey (Tidbinbilla Deep Space Complex), and J Wells (Tidbinbilla Deep Space Complex)

The Deep Space Network Progress Report 42-50 January and February 1979, pp 24–26, April 15, 1979

For abstract, see Ryan, B.

WEN, L.

W035 A Preliminary Assessment of Small Steam Rankine and Brayton Point-Focusing Solar Modules

E J. Roschke, L Wen, H Steele, N El Gabalawi, and J Wang

JPL Publication 79-21, March 1, 1979

For abstract, see Roschke, E J

W036 Effect of Optical Surface Properties on High-Temperature Solar Thermal Energy Conversion

L. Wen

J Energy, Vol 3, No. 2, pp. 82–89, March–April 1979

The effects of thermal surface properties on the performance of representative point-focusing solar power plants are assessed in this paper The tradeoff relationships are presented in terms of normalized system performance as a function of thermal optical design parameters Crucial surface properties include solar reflectance, specular spreading due to microscopic roughness, surface error due to manufacturing slope tolerance or waviness, and concentrator pointing accuracy Two representative power conversion systems, a Rankine steam cycle and an open-air Brayton cycle, are considered.

WENTZ, F. J.

W037 Modern Estimation Techniques Applied to Microwave Sensing of the Marine Boundary Layer

G. J Bierman, F J. Wentz (Frank J. Wentz and Associates), and R. G Lipes

Conf Rec. Twelfth Asilomar Conf. on Circuits, Systems & Computers, Pacific Grove, Calif, November 6–8, 1978, pp 101–106

For abstract, see Bierman, G J

W038 Seasat Scanning Multichannel Microwave Radiometer: Results of the Gulf of Alaska Workshop

R G Lipes, R L. Bernstein (Scripps Institution of Oceanography), V J. Cardone (Oceanweather, Inc), K B Katsaros (University of Washington), E G Njoku, A L Riley, D. B Ross (Atlantic Oceanic and Meteorological Laboratory), C. T Swift (Langley Research Center), and F J. Wentz (Frank J Wentz and Associates)

Science, Vol. 204, pp 1415–1417, June 29, 1979

For abstract, see Lipes, R. G.

WEST, H. I., JR.

W039 Chorus, Energetic Electrons and Magnetospheric Substorms

B. T. Tsurutani, E J Smith, H I. West, Jr , and R. M Buck

Wave Instabilities in Space Plasmas, pp 55–62, D Reidel Pub Co , Dordrecht, Holland & Boston, 1979

For abstract, see Tsurutani, B T.

WEST, W. R.

W040 Alternate Propellant Program Phase I Final Report

F A Anderson and W. R. West

JPL Publication 79-29, July 1, 1979

For abstract, see Anderson, F A

WESTPHAL, J. A.

W041 Infrared Images of Jupiter at 5-Micrometer Wavelength During the Voyager 1 Encounter

R J Terrile, R W Capps (University of Hawaii), D. E Backman (University of Hawaii), E. E. Becklin (University of Hawaii), D P. Cruikshank (University of Hawaii), C A Beichman (University of Hawaii), R H Brown (University of Hawaii), and J. A Westphal (California Institute of Technology)

Science, Vol 204, pp 1007–1008, June 1, 1979

For abstract, see Terrile, R J

WHERRY, D. B.

W042 Color Enhancement of Landsat Agricultural Imagery Final Report for the JPL LACIE Image Processing Support Task

D P Madura, J. M Soha, W B Green, D B Wherry, and S D Lewis

JPL Publication 78-102, December 15, 1978

For abstract, see Madura, D. P

WHITWORTH, G.

W043 Submicrosecond Comparison of Intercontinental Clock Synchronization by VLBI and the NTS Satellite

W. J. Hurd, S C Wardrip (Goddard Space Flight Center), J Bussion (Naval Research Laboratory), J. Oaks (Naval Research Laboratory), T. McCaskill (Naval Research Laboratory), H Warren (Bendix Field Engineering Corp), and G Whitworth (Applied Physics Laboratory)

The Deep Space Network Progress Report 42-49 November and December 1978, pp. 64–69, February 15, 1979

For abstract, see Hurd, W J

WICK, M. R.

W044 The Microprocessor-Based Synthesizer Controller

H Donnelly, M R. Wick, R W. Weller, G. B Schaaf, B Barber, and M A Stern

The Deep Space Network Progress Report 42-54: September and October 1979, pp. 92–103, December 15, 1979

For abstract, see Donnelly, H

WILCOX, W. R.

W045 Convection Phenomena During the Growth of Sodium Chlorate Crystals From Solution

P S Chen (University of Southern California), P J. Shlichta, W R. Wilcox (Clarkson College of Technology), and R. A Lefever (Ampex Corporation)

J. Crystal Growth, Vol. 47, pp 43–60, 1979

For abstract, see Chen, P S.

WILF, J. M.

W046 Computing Region Moments from Boundary Representations

J M Wilf and R T Cunningham

JPL Publication 79-49, November 1, 1979

The moments of a region in an image can be used to describe the region's location, orientation, and shape. This paper drives the class of all possible formulas for computing arbitrary moments of a region from the region's boundary. The selection of a particular formula depends on the choice of an independent parameter Several choices of this parameter are explored for region boundaries approximated by polygons The parameter choice that minimizes computation time for boundaries represented by chain code is derived Finally, two algorithms are presented The first computes arbitrary moments for a region from a polygonal approximation of its boundary The second algorithm is optimal for computing low order moments from chain-encoded boundaries

W047 Low-Level Processing for Real-Time Image Analysis

R Eskenazi and J M Wilf

JPL Publication 79-79, September 1, 1979

For abstract, see Eskenazi, R.

W048 Robotic Vision

D S. Williams, J. M. Wilf, R T. Cunningham, and R Eskenazi

Astronaut. Aeronaut., Vol 17, pp. 36–41, May 1979

For abstract, see Williams, D S.

WILKERSON, J. C.

W049 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V. J. Cardone (Oceanweather, Inc), R. E. Coons, A A Loomis, J E Overland (Pacific Marine Environmental Laboratory), S. Peteherych (Atmospheric Environmental Service), W J. Pierson (City University of New York), P. M Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp 1408–1410, June 29, 1979

The surface observations used in the initial assessment of Seasat are discussed with emphasis on their ability to describe the synoptic-scale winds over the ocean

WILLETT, J. B.

W050 A Possible Line Feature at 73 keV From the Crab Nebula

J C Ling, W. A. Mahoney, J. B Willett, and A S Jacobson

Astrophys J, Vol. 231, No. 3, Part 1, pp. 896–905, August 1, 1979

For abstract, see Ling, J. C

WILLIAMS, B. G.

W051 Mars Gravity Field Derived from Viking-1 and Viking-2· The Navigation Results

E J Christensen and B G Williams

J. Guidance Contr., Vol 2, No 3, pp 179–183, May–June 1979

For abstract, see Christensen, E J

WILLIAMS, D. S.

W052 Robotic Vision

D S. Williams, J. M. Wilf, R. T Cunningham, and R Eskenazi

Astronaut Aeronaut, Vol 17, pp 36–41, May 1979

Robotic vision, involving the use of a vision system to control a process, is discussed Design and selection of active sensors employing radiation of radio waves, sound waves, and laser light, respectively, to light up unobservable features in the scene are considered, as are design and selection of passive sensors, which rely on external sources of illumination The segmentation technique by which an image is separated into different collections of contiguous picture elements having such common characteristics as color, brightness, or texture is examined, with emphasis on the edge detection technique The IMFEX (image feature extractor) system performing edge detection and thresholding at 30 frames/sec television frame rates is described The template matching and discrimination approach to recognize objects are noted Applications of robotic vision in industry for tasks too monotonous or too dangerous for the workers are mentioned

WILLIAMS, J. G.

W053 Tidal Acceleration of the Moon

J G Williams, W S Sinclair, and C F. Yoder

Geophys. Res Lett, Vol 5, No 11, pp 943–946, November 1978

The analysis of eight years of lunar laser ranging data yields a value for the tidally induced secular acceleration of the lunar orbital longitude of $\dot{n} = -23.8 \pm 4$"/century^2 For semidiurnal tidal frequencies this corresponds to a terrestrial $Q = 12 \pm 2$ The error in $\dot{n}$ is dominated by noise in the data and its modeling The error is expected to decrease significantly as future data become available and it may become possible to detect an 18 6 yr periodic modulation of the acceleration which would allow the separation of the effects of diurnal and semidiurnal tides Comparison of $\dot{n}$ given here with values published from the analysis of classical astronomical observations does not show a significant difference which can be attributed to a changing gravitational constant

WILLIAMS, R.

W054 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S. K Khanna, S P. S Yen, R. B Somoano, P M Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R. Williams (California Institute of Technology), and S Samson (California Institute of Technology)

Phys Rev B Condensed Matter, Vol 19, No 2, pp 655–663, January 15, 1979

For abstract, see Khanna, S K

WILLIAMS, W.

W055 A Prototype DSN X-S Band Feed DSS 13 Application Status (Third Report)

W Williams, D Nixon, H Reilly, J. Withington, and D. Bathker

The Deep Space Network Progress Report 42-52 May and June 1979, pp. 51–60, August 15, 1979

This article, the third in this series discussing a new prototype X-S band horn feed for future use at various DSN sites, deals with the testing of the final fabricated feed at DSS 13 Measured feedhorn patterns are presented and efficiencies calculated Preliminary results of system noise temperature and 26-m antenna system gain measurements are presented Also discussed are some measurements leading to an improved second generation feed

The preliminary results of the field measurements indicate that this horn will perform as originally specified and required Also the tests for the second generation feed have indicated the potential cause of minor X-band moding

WILLIAMS, W. F.

W056 LAAS Studies 26-, 34-, and 40-Meter Elements

W. F Williams

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 156–161, June 15, 1979

The Large Advanced Antenna Station (LAAS) studies have now included arraying modified 34-meter antennas and new 40-meter antennas This article discusses the microwave performance expected from these antenna elements when arrayed and fed with the new dual-band coaxial X/S feed Performance of the 26-meter elements is also discussed for comparison to the new modified antennas

WILLIS, P.

W057 Low-Cost Encapsulation Materials for Terrestrial Solar Cell Modules

E. F Cuddihy, B Baum (Springborn Laboratories, Inc), and P Willis (Springborn Laboratories, Inc)

Solar Energy, Vol. 22, pp 389–396, 1979

For abstract, see Cuddihy, E F.

WILLSON, R C.

W058 Active Cavity Radiometer Type IV

R C Willson

Appl Opt, Vol 18, No 2, pp 179–188, January 15, 1979

A new cavity pyrheliometer, the active cavity radiometer type IV (ACR IV), has been developed for the measurement of total solar optical irradiance Analysis predicts its ability to measure at the solar constant level with 0 1% uncertainty in SI units In comparison tests ACR IVs have consistently demonstrated 0 3% higher results than the World Radiometric Reference scale A prototype has been tested, and a flight instrument has been developed and flown in a sounding rocket experiment to determine the solar constant ACR IV instrumentation is being developed for flight experiments on the Spacelab I and Solar Maximum missions to monitor the total solar output of optical radiation as part of a long-term program to detect variations of climatological significance

W059 Total Solar Irradiance at Table Mtn, California 1926–77

R. C Willson and C P. Butler

Solar Energy, Vol. 21, pp 351–352, 1978

This paper discusses the measurement of total solar irradiance made by the Smithsonian Astrophysical Observatory at Table Mtn, California from 1926 to 1952 The principal purpose of these observations was the derivation of the time dependence of the solar total and spectral irradiance outside the atmosphere, and its correlation with changing patterns of the earth's climate Additionally, this paper discusses the temporary resumption of pyrheliometric measurements at Table Mtn during July 1977, the purpose of which was to determine whether a significant irradiance change has occured at the site since the previous observation period

WILSON, A. H.

W060 Roadside Tree/Pole Crash Barrier Field Tests

A H Wilson

JPL Publication 79-114, November 15, 1979

A series of tests was carried out by the Jet Propulsion Laboratory (JPL) under the sponsorship of NASA to evaluate the performance of a unique crash barrier designed to protect the occupants of an automobile from serious injury The JPL barrier design is a configuration of empty aluminum beverage cans contained in a tear-resistant bag which, in turn, is encased in a collapsible container made of plywood and steel Tests were conducted with a driven vehicle impacting the barrier The basic requirements of NCHRP Report 153 were followed except that speeds of 30 mph rather than 60 mph were used Accelerometer readings on the driver's helmet showed that he was never subjected to dangerous decelerations, and in no case did the driver experience more than temporary discomfort Also, all of the requirements of the cited report were met

An extrapolation of data indicated that the JPL barrier installed in front of a tree or telephone pole along a roadside would also have met the requirements at a speed of 40 mph

WILSON, R. L.

W061 Swept Frequency Ultrasonic Measurements of Tissue Characteristics

P. M Gammell, J A Roseboro, R C Heyser, D H Le Croissette, and R L Wilson (University of Southern California)

Proc Thirtieth Annu Conf on Eng in Med & Bio, Los Angeles, Calif, November 5–9, 1977, p. 229

For abstract, see Gammell, P M

WIMBERLY, R. N.

W062 Mars Gravity: Additional Resolution From Viking Orbiter I

W. L Sjogren, R. N Wimberly, D L Cain, and J P Brenkle

Proc Lunar Planet Sci Conf 9th, 3561–3573, 1978

For abstract, see Sjogren, W L

W063 Gravity Field of Venus A Preliminary Analysis

R J. Phillips, W. L Sjogren, E. A Abbott, J C. Smith, R N. Wimberly, and C A Wagner (Goddard Space Flight Center)

Science, Vol 205, pp 93–96, July 6, 1979

For abstract, see Phillips, R J

WITHINGTON, J.

W064 A Prototype DSN X-S Band Feed: DSS 13 Application Status (Third Report)

W. Williams, D Nixon, H. Reilly, J Withington, and D Bathker

The Deep Space Network Progress Report 42-52 May and June 1979, pp 51–60, August 15, 1979

For abstract, see Williams, W

WITT, N.

W065 Simultaneous H(1216Å) and He(584Å) Observations of the Interstellar Wind by Mariner 10

J M. Ajello and N Witt (Universitat Bonn, Germany)

COSPAR Space Research, Vol. XIX, pp. 417–420, 1979

For abstract, see Ajello, J M.

WOICESHYN, P. M.

W066 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J. C Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V. J. Cardone (Oceanweather, Inc), R E. Coons, A A Loomis, J. E Overland (Pacific Marine Environmental Laboratory), S. Peteherych (Atmospheric Environmental Service), W. J Pierson (City University of New York), P. M Woiceshyn, and M. G Wurtele (University of California, Los Angeles)

Science, Vol. 204, pp. 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

WOLFE, J. H.

W067 Compression of Jupiter's Magnetosphere by the Solar Wind

E J Smith, R W Fillius (University of California, San Diego), and J H Wolfe (Ames Research Center)

J. Geophys Res., Vol 83, No A10, pp 4733–4742, October 1, 1978

For abstract, see Smith, E J

W068 Fields and Plasmas in the Outer Solar System

E. J Smith and J H Wolfe (Ames Research Center)

Space Sci Rev , Vol 23, pp 217–252, 1979

For abstract, see Smith, E J

WOLFF, R. S.

W069 A Model of the Variability of the Venus Ionopause Altitude

R S Wolff, B E Goldstein, and S Kumar

Geophys. Res Lett, Vol. 6, No. 5, pp. 353–356, May 1979

A model for the variability of the Venus ionopause as a function of solar wind dynamic pressure and EUV flux during quiescent solar wind conditions is presented The radio occultation measurements of the Venus ionopause from Mariner 5, 10 and Venera 9, 10 spacecraft, as well as recent in situ Pioneer Venus measurements are interpreted in terms of this model An ionospheric model consistent with observations in the 400–1000 km region is predominantly O^+ with densities ~104 cm^{-3} and $(T_e + T_i)$ ~4500–6500 K For ionopause measurements below 400 km the ionosphere appears severely compressed and density and temperature profiles cannot be simply described, although a strong correlation with solar wind dynamic pressure is observed Possible effects of IMF direction switching on the dynamics and structure of the ionosphere are also considered and compared with available ionopause data.

WOO, K.

W070 Diffraction by an Arbitrary Subreflector: GTD Solution

S. W Lee (University of Illinois), P Cramer, Jr., K Woo, and Y Rahmat-Samii

IEEE Trans Anten Prop, Vol AP-27, No 3, pp 305–316, May 1979

For abstract, see Lee, S W.

WOO, K T.

W071 Costas Loop Demodulation of Suppressed Carrier BPSK Signals in the DSN Environment—Experimental Results Obtained at TDL

R Reasoner, G Stevens, and K T Woo

The Deep Space Network Progress Report 42-51 March and April 1979, pp 94–104, June 15, 1979

For abstract, see Reasoner, R

W072 Effects of Asymmetric Passband Filtering on the Phase of the Costas Loop's Reconstructed Carrier

K. T Woo

The Deep Space Network Progress Report 42-51. March and April 1979, pp 105–112, June 15, 1979

The reconstructed carrier of a telemetry return signal is used in deriving the Doppler and range information in the radiometric systems When suppressed carrier BPSK signalling with Costas loop demodulation is used, there are concerns on the amount of shift in the reconstructed carrier phase, when the received signal suffers asymmetric bandpass filtering through the various stages of the receiver This paper quantifies this effect and concludes that the phase shifts due to asymmetric bandpass filtering on the Costas loop's reconstructed carrier can be slightly worse than those suffered by the residual carrier loop's reconstructed carrier However, they are well within the error budgets of the radiometric system

W073 Design of a Costas Loop to Operate With the Block III Receiver and Its Predicted Performance

G Stevens and K. T Woo

The Deep Space Network Progress Report 42-51. March and April 1979, pp. 113–123, June 15, 1979

For abstract, see Stevens, G

WOO, R.

W074 Interplanetary Phase Scintillation and the Search for Very Low Frequency Gravitational Radiation

J W Armstrong, R. Woo, and F B Estabrook

Astrophys J., Vol. 230, pp. 570–574, June 1, 1979

For abstract, see Armstrong, J W

W075 Measurements of the Magnetic Field Orientation in the Jovian Ionosphere Deduced From Pioneer 10 and 11 Scintillation Observations

R Woo and F. Yang (Dikewood Corporation)

J Geophys Res, Vol 83, No A11, pp 5245–5255, November 1, 1978

In this paper we analyze the *S* band scintillations observed during the Pioneer 10 and 11 occultation measurements of Jupiter We find that while the electron density irregularities are isotropic in the collision-dominated lower ionosphere, they are anisotropic in the upper ionosphere because of alignment along the magnetic field By using Rytov's approximation the frequency spectrum of the log-amplitude scintillations is derived for a wave propagating in an anisotropic turbulent medium It is shown that the spectrum depends to a large extent on the direction of anisotropy and is therefore useful for measuring the orientation of the magnetic field in regions that have not yet been probed by direct measurements Applying this new technique to the Pioneer 10 and 11 observations, we deduce the first measurements of magnetic field orientation in the ionosphere of Jupiter.

W076 The Polar Ionosphere of Venus Near the Terminator from Early Pioneer Venus Orbiter Radio Occultations

A. J Kliore, R Woo, J W. Armstrong, I. R Patel, and T A Croft (SRI International)

Science, Vol 203, pp. 765–768, February 23, 1979

For abstract, see Kliore, A J

W077 Measurements of Turbulence in the Venus Atmosphere Deduced from Pioneer Venus Multiprobe Radio Scintillations

R. Woo, J. W. Armstrong, and W. B Kendall (Mark Resources)

Science, Vol 205, pp 87–89, July 6, 1979

The 2 3-gigahertz log-amplitude fluctuations observed in the radio links of the Pioneer Venus entry probes during Venus encounter have been used to study turbulence in the Venus atmosphere The deduced estimates of the upper bound of structure constant c_n of the refractive index fluctuations ($c_n \lesssim 4 \times 10^{-8}$ cm$^{-1/3}$) are inconsistent with similar entry probe measurements by Veneras 4 to 8 but are consistent with the radio occultation measurements by flyby (Mariners 5 and 10) and orbiting (Venera 9) spacecraft The Pioneer Venus measurements therefore provide a resolution of the long-standing order of magnitude discrepancy between these earlier measurements of c_n

WOOD, G E.

W078 Radio Science with Voyager 1 at Jupiter. Preliminary Profiles of the Atmosphere and Ionosphere

V R Eshleman (Stanford University), G L Tyler (Stanford University), G E Wood, G. F Lindal, J D Anderson, G S Levy, and T A Croft (SRI International)

Science, Vol 204, pp 976–978, June 1, 1979

For abstract, see Eshleman, V R.

WU, S.

W079 Optimum Frequencies of a Passive Microwave Radiometer for Tropospheric Path-Length Correction

S Wu

IEEE Trans Anten. Prop, Vol AP-27, No 2, pp. 233–239, March 1979

Radio-astronomical observations require accurate calibration of tropospheric path length Such calibration can be achieved by microwave radiometers operating near the 22-GHz water vapor line However, the performances of current passive microwave radiometers are meteorology-profile dependent This is shown due mainly to incorrect frequency combinations and to saturation of brightness temperatures By properly selecting an optimum frequency pair and removing the saturation effect, the dependency is alleviated and can be further adjusted by surface measurements alone Hence, a universal calibration equation is applicable to all environmental conditions Optimum frequency pairs are systematically searched Simulation analysis indicates that calibration for the tropospheric water-vapor path-length error is better than 0 3 cm at zenith and better than 2 cm for an elevation angle as low as 10 deg

WU, S. C.

W080 Connection and Validation of Narrow-Band ΔVLBI Phase Observations

S C. Wu

The Deep Space Network Progress Report 42-52 May and June 1979, pp 13–20, August 15, 1979

Two-station narrow-band ΔVLBI requires phase connections between consecutive scans This article presents an efficient computer-aided scheme for this purpose This scheme is an iteration process alternating between a grand fit on many scans and integer quantization of the phase-shift cycles to be assigned to the scans Only linear simultaneous equations of a few unknowns need to be solved A simulation analysis indicates that faultless phase connection can be expected when there is no localized systematic noise When systematic noise of moderate level exists, the possible incorrect phase connection can be detected and corrected for by comparing the connected phases from the two alternating observations, after removing the residual diurnal effects

WURTELE, M. G.

W081 Surface Observations for the Evaluation of Geophysical Measurement from Seasat

J C Wilkerson (National Environmental Satellite Service), R A Brown (University of Washington), V J Cardone (Oceanweather, Inc), R E. Coons, A A Loomis, J E. Overland (Pacific Marine Environmental Laboratory), S Peteherych (Atmospheric Environmental Service), W J Pierson (City University of New York), P. M Woiceshyn, and M G Wurtele (University of California, Los Angeles)

Science, Vol 204, pp. 1408–1410, June 29, 1979

For abstract, see Wilkerson, J C

YAGI, G. M.

Y001 Dynamic Feature Analysis for Voyager at the Image Processing Laboratory

G. M Yagi, J J. Lorre, and P L Jepsen

Conf Atmos. Environ of Aerospace Syst & Appl Meteorol, New York, N Y, November 14–16, 1978, Preprint Volume, pp 110–117

Voyager 1 and 2 were launched from Cape Kennedy to Jupiter, Saturn, and beyond on September 5, 1977 and August 20, 1977 The role of the Image Processing Laboratory is to provide the Voyager Imaging Team with the necessary support to identify atmospheric features (tiepoints) for Jupiter and Saturn data, and to analyze and display them in a suitable form This support includes the software needed to acquire and store tiepoints, the hardware needed to interactively display images and tiepoints, and the general image processing environment necessary for decalibration and enhancement of the input images The objective is an understanding of global circulation in the atmospheres of Jupiter and Saturn Attention is given to the Voyager imaging subsystem, the Voyager imaging science objectives, hardware, software, display monitors, a dynamic feature study, decalibration, navigation, and data base

YAMARONE, C. A.

Y002 Seasat Low-Rate Data System

J. W Brown, G C Cleven, J C Klose, D B Lame, and C A Yamarone

Science, Vol 204, pp 1407–1408, June 29, 1979

For abstract, see Brown, J W

YANG, F.

Y003 Measurements of the Magnetic Field Orientation in the Jovian Ionosphere Deduced From Pioneer 10 and 11 Scintillation Observations

R Woo and F Yang (Dikewood Corporation)

J Geophys Res, Vol 83, No A11, pp 5245–5255, November 1, 1978

For abstract, see Woo, R

YAVROUIAN, A

Y004 Synthesis and Biological Screening of Novel Hybrid Fluorocarbon Hydrocarbon Compounds for Use as Artificial Blood Substitutes: Second Annual Report, July 1977–July 1978

J Moacanin, K Scherer, A Toronto (Utah Biological Test Laboratory), D Lawson, T Terranova, A Yavrouian, L Astle (Utah Biological Test Laboratory), S Harvey (Utah Biological Test Laboratory), and D H. Kaelble (Rockwell International)

JPL Publication 79-36, October 15, 1979

For abstract, see Moacanin, J.

YAVROUIAN, A. H.

Y005 Development and Evaluation of Elastomeric Materials for Geothermal Applications: Annual Report, October 1977 to December 1978

W. A. Mueller, S H. Kalfayan, W W. Reilly, A H Yavrouian, I D Mosesman, and J D Ingham

JPL Publication 79-40, May 15, 1979

For abstract, see Mueller, W A

YAWS, C.

Y006 Silicon Materials Outlook Study for 1980–85 Calendar Years

E Costogue, R Ferber, W Hasbach, R Pellin (Consultant, Charlotte, NC), and C. Yaws (Consultant, Beaumont, TX)

JPL Publication 79-110, November 1, 1979

For abstract, see Costogue, E

YEN, H. C.

Y007 A Circuit Model for Electromagnetic Properties of Waveguide Arcs

H C Yen

The Deep Space Network Progress Report 42-51 March and April 1979, pp 193–195, June 15, 1979

This is the third article in the series reporting the progress of a waveguide arc study undertaken by the Transmitter Group In this article, a dielectric model of waveguide arcs is presented to relate measurable electromagnetic quantities to the physical parameters characterizing the breakdown process

Y008 Waveguide Arc Study

H C Yen

The Deep Space Network Progress Report 42-51 March and April 1979, pp 196–203, June 15, 1979

This is the second article in the series reporting the progress of a waveguide arc study undertaken by the Transmitter Group In this article we report some experiments and their preliminary results on the arc study and the arc detector evaluation Some future experiments are also briefly discussed

YEN, S P S.

Y009 Effects of Disorder on the Transport Properties of *Bis*(tetrathiatetracene)triiodide

S. K Khanna, S P. S. Yen, R B Somoano, P. M Chaikin (University of California, Los Angeles), C L Ma (California Institute of Technology), R Williams (California Institute of Technology), and S Samson (California Institute of Technology)

Phys. Rev B· Condensed Matter, Vol 19, No 2, pp 655–663, January 15, 1979

For abstract, see Khanna, S K

YEUNG, W F

Y010 Effect of Temperature on Optical Fiber Transmission

W F. Yeung and A R. Johnston

Appl Opt, Vol 17, NO 23, pp 3703–3705, December 1, 1978

Results are presented concerning the effects of temperature on the transmission properties of various optical fibers including a silicone plastic clad, an acrylic plastic clad, and CVD step-index fibers both with and without polyurethane jackets Results are presented for the normalized transmitted power vs temperature, the index of refraction vs temperature, and induced attenuation coefficients vs temperature The data show that the intrinsic transmission of a CVD fiber is independent of tem-

perature over the −110 to +150°C range Plastic clad fused silica fibers are subject to transmission losses at lower temperatures due to changes in the optical index of the cladding polymer Acrylic-clad and plastic-clad silica fibers also show transmission losses at lower temperatures, but to lesser extents

YODER, C. F.

Y011 Does Venus Wobble?

C F Yoder and W R Ward

Astrophys J, Vol 233, pp L33–L37, October 1, 1979

The free wobble damping time for Venus due to solar tides and rotational flexing is found to be $\tau \approx 0.7 \times 10^8$ Q_W years, where Q_W is the dissipation function associated with the wobble frequency The slow spin and expected small (nonhydrostatic) J_2 predict a very long wobble period of $\sim 10^5$ years As a result, a simple scaling of the Earth's Chandler wobble excitation rate to that of Venus suggests that an appreciable wobble could exist Detection (or lack thereof) of a free wobble may thus place constraints on the dynamic activity (e g., mantle convection, Venusquakes, etc.) of the Venus interior

Y012 Tidal Acceleration of the Moon

J. G Williams, W. S Sinclair, and C. F. Yoder

Geophys Res. Lett, Vol 5, No. 11, pp 943–946, November 1978

For abstract, see Williams, J. G.

YOUNG, D. L.

Y013 Experience with Fluorine and Its Safe use as a Propellant

D. L Bond, M E Guenther, L D: Stimpson, L R. Toth, and D L Young

JPL Publication 79-64, June 30, 1979

For abstract, see Bond, D. L

YUNCK, T. P.

Y014 Demonstration of Remote Clock Monitoring by VLBI, With Three Baseline Closure

C M Cheetham, W J. Hurd, J. W. Layland, G A Madrid, and T P Yunck

The Deep Space Network Progress Report 42-53. July and August 1979, pp 40–53, October 15, 1979

For abstract, see Cheetham, C M.

YUNG, C. S.

Y015 A Two-Dimensional Thermal Analysis of a New High-Performance Tubular Solar Collector

F L Lansing and C S. Yung

The Deep Space Network Progress Report 42-49 November and December 1978, pp 116–131, February 15, 1979

For abstract, see Lansing, F L

Y016 Computerized Simulation and Parameterization of a New High-Performance Tubular Solar Collector

F L Lansing and C S Yung

The Deep Space Network Progress Report 42-50 January and February 1979, pp 161–180, April 15, 1979

For abstract, see Lansing, F L.

ZAMANI, N.

Z001 Trapping Effects in Irradiated and Avalanche-Injected MOS Capacitors

M Bakowski, R. H. Cockrum, N. Zamani, J. Maserjian, and C. R Viswanathan (University of California, Los Angeles)

IEEE Trans. Nucl Sci, Vol. NS-25, No. 6, pp 1233–1238, December 1978

For abstract, see Bakowski, M

Z002 Lateral Nonuniformities (LNU) of Oxide and Interface State Charge

N Zamani and J Maserjian

Physics of SiO_2 and Its Interfaces: Proc Int Top Conf Phys. SiO_2 & Its Interfaces, Yorktown Heights, N Y., March 22–24, 1978, pp. 443–448

A method is described for determining the distribution density of charge LNU in MOS capacitors The method involves freezing the initial occupation of interface states with rapid C-V measurements at low temperatures The charge-distribution density is then readily deconvolved from the C(V) data using an FFT computer analysis Results obtained for a radiation "soft" MOS capacitor with nearly ideal initial characteristics before irradiation show—after 10^5 rads—large charge LNU with a half-

width spread of about $3 \cdot 10^{12}$ cm^{-2}. The apparent increase of interface state density near mid-gap is in excess of 10^{12} cm^{-2} eV^{-1} when LNU is not considered It is shown that when the LNU is taken into account, an alternate explanation can be simply the contribution of interface states near the band edges This ambiguity raises serious questions on the proper interpretation of the apparent phenomena of interface state generation during radiation and electrical stress

ZAWACKI, B. E.

Z003 Diagnosis of Cutaneous Thermal Burn Injuries by Multispectral Imaging Analysis

V. J. Anselmo and B E Zawacki (Los Angeles County/USC Medical Center)

JPL Publication 79-34, September 1, 1978

For abstract, see Anselmo, V. J

ZELDIN, B.

Z004 New Concepts for Mercury Orbiter Missions

J R. French, J R Stuart, and B. Zeldin

J Spacecraft Rockets, Vol 16, No. 1, pp 35–41, January–February 1979

For abstract, see French, J. R.

ZIMMERMAN, W.

Z005 User Requirements for a Patient Scheduling System

W. Zimmerman

JPL Publication 79-119, December 1, 1979

The Rehabilitation Institute in Detroit, Michigan, has indicated that, due to its present and projected growth in patient workload, it does not feel that the goals of the Institute are being met by the existing scheduling system. In considering a modification or replacement scheduling system as the ultimate goal, the first step was to establish the Institute's needs and wants from a scheduling system This phase was accomplished through 1) studying the existing scheduling system and the variables that affect patient scheduling, 2) conducting a human-factors study to establish the human interfaces that affect patients' meeting prescribed therapy schedules, and 3) developing and administering a questionnaire to the staff which pertains to the various interface problems in order to identify staff requirements to minimize scheduling problems and other factors that may limit the effectiveness of any new scheduling system

Prepared for the Rehabilitation Institute

ZISK, S. H.

Z006 Simulation Gravity Modeling to Spacecraft-Tracking Data: Analysis and Tracking

R J. Phillips, W. L. Sjogren, E A Abbott, and S. H. Zisk (Massachusetts Institute of Technology)

J. Geophys. Res, Vol 83, No B11, pp 5455–5464, November 10, 1978

For abstract, see Phillips, R J

ZOHAR, S.

Z007 Faster Fourier Transformation: The Algorithm of S. Winograd

S Zohar

JPL Publication 78-104, February 15, 1979

The new DFT algorithm of S Winograd is developed and presented in detail This is an algorithm which uses about 1/5 of the number of multiplications used by the Cooley-Tukey algorithm and is applicable to any order which is a product of relatively prime factors from the following list 2,3,4,5,7,8,9,16 The algorithm is presented in terms of a series of tableaus—one for each term in this list—which are convenient, compact, graphical representations of the sequence of arithmetic operations in the corresponding parts of the algorithm Using these in conjunction with included tables makes it relatively easy to apply the algorithm and evaluate its performance

ZUREK, R. W.

Z008 Thermal Tides and Martian Dust Storms: Direct Evidence for Coupling

C B. Leovy (University of Washington) and R. W. Zurek

J Geophys. Res, Vol. 84, No B6, pp. 2956–2968, June 10, 1979

For abstract, see Leovy, C B

ZWISSLER, J.

Z009 Performance Prediction Evaluation of Ceramic Materials in Point-Focusing Solar Receivers

J. Ewing and J Zwissler

JPL Publication 79-58, June 1, 1979

For abstract, see Ewing, J

ZYGIELBAUM, A. I.

Z010 On Improved Ranging—II

J. W. Layland and A. I. Zygielbaum

The Deep Space Network Progress Report 42-50. January and February 1979, pp. 68–73, April 15, 1979

For abstract, see Layland, J. W.

Z011 Installation of the Mu2 Ranging System in Australia

A. I. Zygielbaum

The Deep Space Network Progress Report 42-51 March and April 1979, pp. 51–57, June 15, 1979

The Mu2 Ranging System has been installed at DSS 42/43 in Australia. It was used to support the 1979 Viking Relativity Experiment and is currently supporting the Voyager Navigation and the Advanced Systems program. This article describes these tasks as well as Mu2 software and hardware modifications prior to installation.

Z012 The Viking Relativity Experiment

I. I. Shapiro (Massachusetts Institute of Technology), R. D. Reasenberg (Massachusetts Institute of Technology), P. E. MacNeil (Massachusetts Institute of Technology), R. B. Goldstein (Massachusetts Institute of Technology), J. P. Brenkle, D. L. Cain, T. Komarek, A. I. Zygielbaum, W. F. Cuddihy (Langley Research Center), and W. H. Michael, Jr. (Langley Research Center)

J. Geophys. Res., Vol. 82, No. 28, pp. 4329–4334, September 30, 1977

For abstract, see Shapiro, I. I.

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