NASA TECHNICAL MEMORANDUM

NASA TM 78250

FY 1979 SCIENTIFIC AND TECHNICAL REPORTS, ARTICLES, PAPERS, AND PRESENTATIONS

Compiled by O. L. White
Management Services Office

October 1979

NASA

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
NASA TM 78250		

4. TITLE AND SUBTITLE	5. REPORT DATE
FY 1979 Scientific and Technical Reports, Articles, Papers, and Presentations	October 1979
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
Compiled by O. L. White	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY NAME AND ADDRESS	
National Aeronautics and Space Administration Washington, D.C. 20546	Technical Memorandum
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Management Services Office, Administration and Program Support

16. ABSTRACT

This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY 79. It also includes papers of MSFC contractors.

After being announced in STAR, all of the NASA series reports may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

The information in this report may be of value to the scientific and engineering community in determining what information has been published and what is available.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
	Unclassified – Unlimited

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	61	NTIS

FOREWORD

In accordance with the NASA Space Act of 1958 the MSFC has provided for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

Since July 1, 1960, when the George C. Marshall Space Flight Center was organized, the reporting of scientific and engineering information has been considered a prime responsibility of the Center. Our credo has been that "research and development work is valuable, but only if its results can be communicated and made understandable to others."

The N number shown for the reports listed are assigned by the NASA Scientific and Technical Information Facility, Baltimore, Maryland, indicating that the material is unclassified and unlimited and is available for public use. These publications can be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. The N number should be cited when ordering.

GEORGE C. MARSHALL SPACE FLIGHT CENTER
Marshall Space Flight Center, Alabama

FY 1979 SCIENTIFIC AND TECHNICAL REPORTS, ARTICLES, PAPERS, AND PRESENTATIONS

TABLE OF CONTENTS

RP-1029 September 1978

The PR2D (Place, Route in 2-Dimensions) Automatic Layout Computer Program Handbook. Teddy M. Edge. Electronics and Control Laboratory. N79-71512

Place, Route in 2-Dimensions (PR2D) is a standard cell automatic layout computer program for generating Large Scale Integrated/Metal Oxide Semiconductor (LSI/MOS) arrays. It is one of the components in the NASA/MSFC Computer Aided Design and Test system (CADAT). The program has been utilized successfully for a number of years in both Government and private sectors but until now had been undocumented. This material describes the compilation, loading, and execution of the program on a Sigma V CP-V operating system located at the NASA/MSFC Electronics and Control Facility. This material is also intended to aid in the conversion and running of the program on other data processing systems.

TM-78186** August 1978

Cost Analysis of New and Retrofit Hot-Air Type Solar Assisted Heating Systems. Rodney D. Stewart and Billy J. Hawkins. Systems Analysis and Integration Laboratory. N79-10519

A detailed cost analysis/cost improvement study has been performed on two Department of Energy/National Aeronautics and Space Administration Operational Test Sites to determine actual costs and potential cost improvements of new and retrofit hot-air type solar assisted heating and hot water systems for single family sized structures. This analysis concentrates on the "first-cost" of a system which includes procurement, installation, and integration of a solar assisted heating and hot water system on a new or retrofit basis; it also provides several cost projections which can be used as inputs to payback analyses, depending upon the degree of optimism or future improvements assumed. Cost definitions were developed for five categories of cost, and preliminary estimates were developed for each. The costing methodology, approach, and results together with several candidate low cost designs are described.

TM-78187 August 1978

SRB Materials and Processes Assessment from Laboratory and Ocean Environmental Tests. Prepared from information furnished by Materials and Processes Laboratory and Electronics and Control Laboratory. N78-30165

The Materials and Processes Laboratory at the Marshall Space Flight Center recognized early in the Shuttle Program that material performance on a long-term basis would be critical to the success of the Shuttle and its goal of reusable components. The laboratory instituted, in-house, a comprehensive series of materials tests simulating exposure of the refurbishable components of the propulsion system to expected flight and marine environments. These tests were subsequently expanded to include ocean environment exposure of these laboratory type samples. An Integrated Test Bed of 3.048 m (10 ft) diameter by 2.438 m (8 ft) high was also fabricated in support of this program. The Integrated Test Bed allowed large scale evaluation of principal manufacturing, insulating, cleaning and refurbishment methods.

This report gives the results and an assessment of the series of ocean environment tests that were conducted at Panama City and Kennedy Space Center, Florida, during the Spring and Summers of 1976 and 1977.

TM-78192 September 1978

User's Manual for Large-Scale Integrated Circuit Layout Check Program. Electronics and Control Laboratory. N79-78978

**See notation page 15.

This document describes a computer program that checks for correctness with the output of the PRF (Place-Route-Fold) against the net list input to the PRF program. Also included are a description of the computer program and an example computer run.

TM-78193 August 1978

An Induced Environment Contamination Monitor for the Space Shuttle. Edited by Edgar R. Miller and Rudolf Decher. Space Sciences Laboratory. N78-32172

The Induced Environment Contamination Monitor (IECM) is a set of ten instruments integrated into a self-contained unit. The IECM is scheduled to fly as part of the Demonstration Flight Instrumentation (DFI) on Shuttle Orbital Flight Tests (OFT) 1 through 6 and on Spacelabs 1 and 2 as part of the Verification Flight Instrumentation (VFI).

NASA began strong manned mission contamination control efforts for the Skylab mission and, recognizing the possible limiting effects induced contamination might have on sophisticated observational programs planned for the 1980's, committed to an effort to insure that the induced environment would not be a problem.

The purpose of the IECM is to measure the actual environment to determine whether the strict controls placed on the Shuttle system have solved the contamination problem. The IECM will operate during prelaunch, ascent, on-orbit, descent, and postlanding. The on-orbit measurements are molecular return flux, background spectral intensity, molecular deposition, and optical surface effects. During the other mission phases dew point, humidity, aerosol content, and trace gas will be measured as well as optical surface effects and molecular deposition. These measurements will be made with ten separate instruments: Humidity Monitor, Dew Point Hygrometer, Air Sampler, Cascade Impactor, Passive Sample Array, Optical Effects Module, Temperature-Controlled Quartz Crystal Microbalance, Cryogenic Quartz Crystal Microbalance, Camera/Photometer, and Mass Spectrometer. Each instrument is described in detail.

The IECM systems and thermal design are discussed. Preflight and ground operations are presented together with associated ground support equipment. Finally, flight operations and data reduction plans are given.

TM-78194 September 1978

The MSFC Silicon Gate Silicon-On-Sapphire Standard Cell Library. Electronics and Control Laboratory. N79-79569

This document is a pictorial representation of the MSFC Silicon-On-Sapphire Standard Cell Library. The cells are intended to be used with the PR2D (Place, Route in 2 Dimensions) Automatic Layout Computer Program.

TM-78195 June 1977

Aerodynamic Roll Characteristics of a 0.00548 Scale 146-Inch Solid Rocket Booster Reentry Configuration (MSFC Model Number 486) Over a Portion of the Reentry Flight Regime in the NASA/MSFC 14-Inch Trisonic Wind Tunnel. P. E. Ramsey. N78-32173

An experimental investigation (SA21F, TWT 645) was conducted in the MSFC 14-inch TWT to study the roll characteristics of a 0.00548 scale model of the 146-inch Shuttle Solid Rocket Booster. The primary objective of the test was to obtain improved and more accurate rolling moment data on the Solid Rocket Booster by utilizing a sensitive single component roll balance (No. 247). This data will hopefully be useful in determining roll characteristics of the SRB with protuberances consisting of ring stiffeners, separation motors, actuator supports, hold-down posts, and cable systems tunnel.

Data were obtained for a single nose-mounted sting. The angle of attack range consisted of angles from 150° to 190°; roll angles consisted of angles from 0° to 337½° in increments of 22½°; and Mach numbers were 1.46, 1.96, 2.74 and 3.48.

TM-78196** August 1978
Rankine Cycle Machines for Solar Cooling. Hoyt M. Weathers. Special Projects Office. N79-10524

The Department of Energy of the United States of America has initiated a vigorous effort to develop and demonstrate practical uses of solar energy to heat and cool buildings, to process agricultural products, and to provide thermal and electrical energy for industry. One significant part of this effort is the research, development, and demonstration of Rankine cycle machines using fluids heated by solar energy rather than by coal, petroleum, natural gas, or nuclear fuels.

TM-78197 October 1978
NASA's AVE VII Experiment: 25-mb Sounding Data. J. Greg Davis, Henry E. Fuelberg, and Robert E. Turner. Space Sciences Laboratory. N79-10666

This report describes the AVE VII Experiment and presents tabulated rawinsonde data at 25-mb intervals from the surface to 25 mb for the 24 stations participating in the experiment. Soundings were taken between 0000 GMT May 2 and 1200 GMT May 3, 1978. The methods of data processing and the accuracy are briefly discussed. Selected synoptic charts prepared from the data are presented as well as an example of contact data. A tabulation of adverse weather events that occurred during the AVE VII period, including freezing temperatures, snow, tornadoes, damaging winds, and flooding, is presented.

TM-78198 September 1978
Spacelab Mission 2 Experiment Descriptions. Edited by K. Stuart Clifton. Space Sciences Laboratory. N79-12122

A brief description is presented of each of the 13 experiments selected to fly aboard Spacelab 2. The experiments were selected in response to an Announcement of Opportunity issued by NASA Headquarters for the second Spacelab mission.

TM-78199** August 1978
Solar Tracking Control System "Sun Chaser." D. R. Scott and P. R. White. Electronics and Control Laboratory. N79-10514

The solar tracking control system ("Sun Chaser") is believed to be an improved method of tracking the Sun in all types of weather conditions. The Sun Chaser will follow the Sun from east to west in clear or cloudy weather, and reset itself to the east position after sundown in readiness for the next sunrise.

A description of the Sun Chaser hardware and its operation together with results is presented.

TM-78200 September 1978
Photolithography for Automatic Processing of Integrated Circuits. Bobby W. Kennedy. Electronics and Control Laboratory.

This report presents a discussion of photolithography including the wafer carriers, photoresist coater, pre-bake station, mask aligner, photoresist developer, hard bake, and inspection.

TM-78201 October 1978
Arc Termination Cracks in Inconel 718 and Incoloy 903. E. Bayless, J. McCaig,

and R. Poorman. Materials and Processes Laboratory. N79-10184

Inconel 718 and Incoloy 903 are nickel base, heat resistant alloys that are used extensively for welded Shuttle engine components. The welding associated with these components has revealed solidification cracking characteristics at weld termination points known as "crater cracking." These crater cracks, if not detected and removed, may cause costly component failure. To better understand this characteristic, welding termination techniques were studied and methods developed to eliminate crater cracks. It was determined that weld termination solidification cracking can be eliminated by controlled decrease of welding current, welding voltage, wire feed, and travel speed.

TM-78202 October 1978

The Large Scale Microelectronics Computer Aided Design and Test (CADAT) System. John M. Gould. Electronics and Control Laboratory.

This report describes a large scale microelectronic Computer Aided Design and Test system referred to as CADAT. CADAT consists of a number of computer programs written in FORTRAN that provide the capability to simulate, lay out, analyze, and create the artwork for large scale microelectronics. The function of each software component of the system is described with references to specific documentation for each software component.

TM-78203 October 1978

FY 1978 Scientific and Technical Reports, Articles, Papers, and Presentations. Compiled by O. L. White. Management Services Office, Administration and Program Support. N79-13915

This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY 78. It also includes papers of MSFC contractors.

After being announced in STAR, all of the NASA series reports may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

The information in this report will be of value to the scientific and engineering community in determining what information has been published and what is available.

TM-78204* December 1978

Testing and Environmental Exposure of Parachute Materials for the Solid Rocket Booster Decelerator Subsystem. B. K. Tannehill. Materials and Processes Laboratory. N79-14215

This report describes static tests and evaluation of nonmetallic materials proposed for use in parachutes for recovery of Solid Rocket Boosters used in the Space Shuttle program. Literature survey and manufacturer and vendor contacts led to the choice of nylon as the fabric most capable of withstanding the extreme loads and environmental conditions during repeated use. The material tests included rupture strength, elongation, abrasion resistance, shrinkage, environmental exposure, and degradation levels. Rinsing and drying procedures were also investigated and a salt-free level for nylon recommended in preparation for reuse. In all possible cases, worst-case conditions were used (e.g., inflation loads, seawater exposure for 3 days per drop-recovery, etc.). From these tests the number of parachute drop-recoveries and reuse cycles may be projected.

Dynamic conditions such as drop tests are being performed by other elements of the Marshall Space Flight Center in conjunction with the Air Force and are still in progress.

TM-78205 September 1978

Mossbauer Study in Thin Films of $FeSi_2$ and FeSe Systems. W. T. Escue, Kamna Aggarwall, and R. G. Mendiratta. Electronics and Control Laboratory.

N79-10919

Thin films of $FeSi_2$ and FeSe were studied Mossbauer spectroscopically. Information regarding dangling bond configuration and nature of crystal structure in thin films has been derived. A significant influence of crystalline aluminum substrate on film structure has been observed.

TM-78206 October 1978

MSFC Hot Air Collectors — Final Report. Kenneth Anthony. Structures and Propulsion Laboratory.

N79-12556

The final report on the MSFC hot air collector consists of the description of the collector, history of development, a history of the materials development and a program summary.

It is well known that one of the major obstacles in widespread application of solar energy is the initial cost of the system required for the utilization of this energy. The major portion of the solar energy system cost is the collector. Since the collector is the "heart" of the system and the most costly subsystem, reducing the cost of producing collectors in large quantities is a major goal. This solar collector is designed for economy and simplicity. In summary, the purpose of this invention is to heat air and/or water cheaply and efficiently through the use of solar energy.

TM-78207 November 1978

Nonterrestrial Material Processing and Manufacturing of Large Space Systems. Georg F. von Tiesenhausen. Advanced Systems Office. N79-14120

A number of NASA sponsored summer studies and independent university efforts indicated the possibility that large space system material delivery and construction from lunar sources may be of a potential economic and environmental advantage. Presently this potential is under investigation to provide NASA with supplemental information required to arrive at optimum large space system options and programs, for the time period around the turn of the century. This report attempts to provide pertinent and readily usable information on the extraterrestrial processing of materials and manufacturing of components and elements of these planned large space systems from preprocessed lunar materials which are made available at a processing and manufacturing site in space.

The activities at the space manufacturing facility consist of final processing of the incoming pre-processed material to commercial grade raw material and of performing a series of large scale manufacturing processes which would include the following products: large structures to support energy generating and large communication systems in space, large area solar cell blankets, radio frequency generators, and electrical equipment. These processing and manufacturing facilities are highly automated and are sized for annual outputs of at least 10^5 metric tons of products. Required facilities, equipment, machinery, energy and manpower are defined.

TM-78208 December 1978

Transfer Function Tests of the Joy Longwall Shearer. Paul H. Fisher, Jr. Electronics and Control Laboratory.

N79-14504

A series of operational tests was performed in March 1977, on the Joy longwall shearer located at the Bureau of Mines in Bructon, Pennsylvania. The purpose of these

tests was to determine the transfer function and operational characteristics of the system. These characteristics will be used to generate a simulation model of the longwall shearer used in the development of the closed-loop vertical control system.

TM-78209 November 1978

An Experiment to Verify that the Weak Interactions Satisfy the Strong Equivalence Principle. Peter B. Eby. Space Sciences Laboratory. N79-13830

This report proposes the construction of a clock based on the beta decay process to test for any violations by the weak interaction of the strong equivalence principle. The basic idea is to determine whether the weak interaction coupling constant β is spatially constant or whether it is a function of gravitational potential U. The clock will be constructed by simply counting the beta disintegrations of some suitable source. The total number of counts will be taken as a measure of elapsed time. The accuracy of the clock will be limited by the statistical fluctuations in the number of counts N, which is equal to $\sqrt{N}$. Thus, to obtain an accuracy of 1 part in 10^6 one needs a total number of counts of 10^{12}, feasible number to actually measure in a few weeks' time. Increasing N gives a corresponding increase in accuracy. It is proposed to use a source based on the electron capture process so as to avoid low energy electron discrimination problems. Solid state and gaseous detectors are being considered. While the accuracy of this type of beta decay clock is much less than clocks based on the electromagnetic interaction, there is a corresponding lack of knowledge of the behavior of β as a function of gravitational potential. No predictions from nonmetric theories as to variations in β are available as yet, but they may occur at the U/C^2 level.

TM-78210 November 1978

Continuous-Flow Electrophoresis: Membrane-Associated Deviations of Buffer pH and Conductivity. Adam J. K. Smolka and Janice K. McGuire. Space Sciences Laboratory. N79-13101

The deviations in buffer pH and conductivity which occur near the electrode membranes in continuous-flow electrophoresis were studied in the Beckman charged particle electrophoresis system and the Hannig FF-5 preparative electrophoresis instrument. The nature of the membranes separating the electrode compartments from the electrophoresis chamber, the electric field strength, and the flow rate of electrophoresis buffer were all found to influence the formation of the pH and conductivity gradients. Variations in electrode buffer flow rate and the time of electrophoresis were less important. The results obtained supported the hypothesis that a combination of Donnan membrane effects and the differing ionic mobilities in the electrophoresis buffer was responsible for the formation of the gradients. The significance of the results for the design and stable operation of continuous-flow electrophoresis apparatus is discussed.

TM-78211 November 1978

Description of the Three Axis Low-g Accelerometer Package. A. J. Amalavage, E. H. Fikes, and Eugene H. Berry. Electronics and Control Laboratory. N79-14152

This document describes the three axis low-g accelerometer package designed for use on the Space Processing Application Rocket (SPAR) Program. The package consists of the following major sections: (1) three Kearfott model 2412 accelerometers mounted in an orthogonal triad configuration on a

temperature controlled, thermally isolated cube, (2) the accelerometer servoelectronics (printed circuit cards PC-6 through PC-12), and (3) the signal conditioner (printed circuit cards PC-15 and PC-16).

The measurement range is 0±0.031 g with a quantization of 1.1×10^{-7} g. The package has been flown successfully on six SPAR launches with the Black Brant booster. These flights provide approximately 300 s of free fall or zero-g environment.

TM-78212 December 1978

25 kW Power Module Updated Baseline System. Science and Engineering.

N79-15247

In September 1977, MSFC published a report entitled "25 kW Power Module Preliminary Definition," which depicted a proposed baseline system. Since then, analyses and trades have been performed to improve the original baseline. This report describes a suggested new baseline that incorporates modifications to the September 1977 system.

TM-78213 January 1979

Preliminary Characterization of a One-Axis Acoustic System. W. A. Oran, D. A. Reiss, L. H. Berge, and H. W. Parker. Space Sciences Laboratory.

N79-16650

Measurements have been made of the acoustic fields and levitation forces produced along the axis of a single-axis resonance system. The system consisted of a St. Clair generator and a planar reflector. The levitation force was measured for bodies of various sizes and geometries (i.e., spheres, cylinders, and discs). The force was found to be roughly proportional to the volume of the body until the characteristic body radius reaches $\sim 2/k$ (k = wave number).

The acoustic pressures along the axis were modeled using Huygens' principle and a method of imaging to approximate multiple reflections. The modeled pressures were found to be in reasonable agreement with those measured with a calibrated microphone.

TM-78214 December 1978

Materials Processing in Space Program Tasks. Edited by Eugene C. McKannan.

N79-16889

This report is a list of active research tasks as of the end of 1978 of the Materials Processing in Space Program of the Office of Space and Terrestrial Applications, involving several NASA Centers and other organizations. The purpose of this compilation is to provide an overview of the program scope for managers and scientists in industry, university and government communities. The report is structured to include an introductory description of the program, its history, strategy and overall goal; identification of the organizational structures and people involved; and a description of each research task. Tasks are categorized by ground based research according to four process areas. Research and flight experiments are listed together. Cross references to the performing organizations and principal investigators are provided. It is expected that any questions on specific tasks will be directed to the individual involved. Any corrections, additions or general comments should be directed to the editor at the George C. Marshall Space Flight Center. Abstracts of completed tasks are listed separately in a "Bibliography of Space Processing Applications," NASA Technical Memorandum 78167, April 1978.

TM-78215 January 1979

A Programmable Power Processor for a 25-kW Power Module. Roy Lanier, Jr., Robert E. Kapustka, and John R. Bush, Jr. Electronics and Control Laboratory.

N79-24441

This report presents a discussion of the power processor for an electrical power system for a 25-kW Power Module that could support the Space Shuttle program during the 1980's and 1990's and which could be a stepping stone to future large space power systems. Trades that led to the selection of a microprocessor-controlled power processor are briefly discussed. Emphasis is given to the power processing equipment that uses a microprocessor to provide versatility that allows multiple use and to provide for future growth by reprogramming output voltage to a higher level (to 120 V from 30 V). Efficiency data from a breadboard programmable power processor are presented, and component selection and design considerations are also discussed.

TM-78216 January 1979

Electrets Used in Measuring Rocket Exhaust Effluents from the Space Shuttle's Solid Rocket Booster During Static Test Firing, DM-3. Michael Susko. Space Sciences Laboratory.

N79-17356

The purpose of this experimental research was to compare Marshall Space Flight Center's electrets with Thiokol's fixed flow air samplers during the Space Shuttle Solid Rocket Booster Demonstration Model-3 static test firing on October 19, 1978, at Thiokol's desert static test site near Brigham City, Utah.

The measurement of rocket exhaust effluents by Thiokol's samplers and MSFC's electrets indicated that the firing of the Solid Rocket Booster had no significant effect on the quality of the air sampled. The highest measurement by Thiokol's samplers was obtained at Plant 3 (site 11) approximately 8 km at a 113-degree heading from the static test stand.

At sites 11, 12, and 5, Thiokol's fixed flow air samplers measured 0.0048, 0.00016, and 0.00012 mg/m^3 of Cl. These measurements converted to 0.0016, 0.0008, and 0.0004 ppm, or an average of 0.0009 ppm. Alongside the fixed flow measurements, the electret counts from X-ray spectroscopy were 685, 894, and 719 counts. After background corrections, the counts were 334, 543, and 368, or an average of 415 counts. An additional electret, E20, which was the only measurement device at a site approximately 20 km northeast from the test site where no power was available, obtained 901 counts. After background correction, the count was 550. Equating the average counts of 415 from the electret and 0.0009 ppm from Thiokol's samplers, the 550 counts convert to 0.0011 ppm. Again, there was no measurement of significant rocket exhaust effluents at the test site.

Electrets can be used to obtain measurements in areas where no power is available. Consequently, the electret is a valuable complementary instrument for measuring rocket exhaust effluents in areas where other measuring devices may not be able to assess the contaminants.

TM-78217 January 1979

Descriptions of Space Processing Applications Rocket (SPAR) Experiments. Edited by R. J. Naumann. Space Sciences Laboratory. N79-16888

This report presents experiment descriptions for all of the Space Processing Applications Rocket experiments, including those flown on previous Space Processing Applications Rocket flights as well as those under development for future flights. The descriptions summarize the experiment objective, rationale, approach, and results or anticipated results.

TM-78218** January 1979

Development, Testing, and Certification of Calmac Mfg. Corp. Solar Collector and Solar Operated Pump — Final

Report. John C. Parker. Solar Heating and Cooling Projects Office. N79-17338
N79-17338

This report presents a summary of the final results of Contract NAS8-32253 with the Calmac Manufacturing Corporation of Englewood, New Jersey, for the additional development work on their existing rubber tube solar collector and solar operated pump for use with solar heating and cooling systems. It discusses the intended use of the final report, describes the development hardware, lists deliverable end items, deals with problems encountered during fabrication and testing, and includes certification statements of performance.

This report shows that the products developed are marketable and suitable for public use, with limitations.

TM-78219** March 1979
Development, Testing, and Certification of the Northrup, Inc., ML Series Concentrating Solar Collector Model NSC-01-0732 — Final Report. John C. Parker. Solar Heating and Cooling Projects Office. N79-21618

This report presents a summary of the final results of Contract NAS8-32251 with Northrup, Inc., of Hutchins, Texas, for the additional development work on their existing ML Series concentrating solar collector Model NSC-01-0732 for use with solar heating and cooling systems. It discusses the intended use of the final report, describes the development hardware, lists deliverable end items, deals with problems encountered during fabrication and testing, and includes certification statements of performance.

This report shows that the products developed are marketable and suitable for public use.

TM-78220 February 1979
Propellant Grain Dynamics in Aft Attach Ring of Shuttle Solid Rocket Booster. V. Verderaime. Systems Dynamics Laboratory. N79-20263

This report presents an analytical technique for implementing simultaneously the temperature, dynamic strain, real modulus, and frequency properties of solid propellant in an unsymmetrical vibrating ring mode. All dynamic parameters and sources are defined for a free vibrating ring-grain structure with initial displacement and related to a forced vibrating system to determine the change in real modulus. Propellant test data application is discussed.

The technique was developed to determine the aft attach ring stiffness of the Shuttle booster at lift-off.

TM-78221 January 1979
Weld Bead Reinforcement Removal — A Method of Improving the Strength and Ductility of Peaked Welds in 2219-T87 Aluminum Alloy Plate. Charles V. Lovoy. Materials and Processes Laboratory. N79-21351

This report presents the results of a study to determine the degree to which the ductility and tensile properties of peaked welds could be enhanced by removing the reinforcing bead and fairing the weld nugget into the adjacent parent metal. The study employed 2219-T87 aluminum alloy plate, tungsten inert gas (TIG) welding, and 2319 filler wire.

The study concluded that significant improvements in peak weld, ultimate strength, and ductility can be obtained through removal and fairing of the weld reinforcing bead. The specimens so treated and tested in this program exhibited ultimate strength improvements of 2 to 3 percent for peak angles of 5.8 to 10 degrees

and 10 to 22 percent for welds with peak angles of 11.7 to 16.9 degrees. It was also determined that removal of the weld bead enhanced the ability of peaked welds to straighten when exposed to cyclic loading at stress levels above the yield strength.

TM-78222 February 1979

Performance Characteristics of a 1.8 by 3.7 meter Fresnel Lens Solar Concentrator. L. J. Hastings and S. L. Allums.

Line-focusing acrylic Fresnel lenses with application potential in the 200 to 370 C range were analytically and experimentally investigated. The measured solar concentration characteristics of a 1.8 by 3.7 m lens and its utilization in a solar collection mode are presented. A measured peak concentration ratio of 62 with 90 percent of the transmitted energy focused into a 5.0 cm width was achieved. A peak concentration of 59 and a 90 percent target width of 4.3 cm were analytically computed. The experimental and analytical lens transmittance was 78 percent and 86 percent, respectively. The lens was also interfaced with a nonevacuated received assembly and operated in a collection mode. With a natural oxide absorber tube coating (alpha/epsilon = 0.79/0.10), the measured collection efficiency ranged from 43 percent to 200 C to 34 percent at 260 C. Efficiency improvements to the 40 to 50 percent range can be achieved with second generation lenses and higher performance absorptive coatings.

TM-78223** March 1979

Development, Testing, and Certification of Owens-Illinois Model SEC-601 Solar Energy Collector System — Final Report. John C. Parker. Solar Heating and Cooling Projects Office.

N79-21620

This document summarizes the final results of contract NAS8-32259 with Owens-Illinois, Toledo, Ohio, for the additional development work on their existing air-cooled solar energy collector subsystem for use with solar heating and cooling systems. It discusses the intended use of the final report, describes the deliverable end items, lists program objectives, relates how they were accomplished, deals with problems encountered during fabrication and testing, and includes a certification statement of performance.

The report shows that the products developed are marketable and suitable for public use.

TM-78224 April 1979

Ion Implantation for Automatic Processing of Integrated Circuits. Bobby W. Kennedy. Electronics and Control Laboratory.

This report presents a discussion of ion implantation including the wafer carriers, mask aligner, hard bake, and loading from a receiving air track into a 10-7 torr vacuum and unloading onto a sending air track.

TM-78225** April 1979

Solar Tracking Control System "Sun Chaser." D. R. Scott and P. R. White. Electronics and Control Laboratory.

N79-22622

The solar tracking control system ("Sun Chaser") is believed to be an improved method of tracking the Sun in all types of weather conditions. The Sun Chaser will follow the Sun from east to west in clear or cloudy weather, and reset itself to the east position after sundown in readiness for the next sunrise.

The description of the Sun Chaser hardware and its operation together with results is presented.

This report supersedes DOE/NASA TM-78199 in its entirety.

TM-78227 February 1979
Evaluation of Registration, Compression and Classification Algorithms — Volume I (Results). R. Jayroe, R. Atkinson, L. Callas, J. Hodges, B. Gaggini, and J. Peterson. Data Systems Laboratory. N79-27630

Volume one examines the effects that are produced by three registration and seven compression approaches on Landsat imagery and on results obtained from three classification approaches. The registration, compression, and classification algorithms were selected on the basis that such a group would include most of the different and commonly used approaches. The results of the investigation indicate clear-cut, cost effective choices for registering, compressing, and classifying multispectral imagery. Volume two is a programmer's user manual containing IBM-360/75 Fortran listings of the algorithms used in the investigation.

TM-78227 February 1979
Evaluation of Registration, Compression and Classification Algorithms. Volume 2 (Documentation). R. Jayroe, R. Atkinson, L. Callas, J. Hodges, B. Gaggini, and J. Peterson. Data Systems Laboratory. N79-27631

Volume I examines the effects that are produced by three registration and seven compression approaches on Landsat imagery and on results obtained from three classification approaches. The registration, compression and classification algorithms were selected on the basis that such a group would include most of the different and commonly used approaches. The results of the investigation indicate clear-cut, cost-effective choices for registering, compressing and classifying multispectral imagery. Volume 2 is a programmer's user manual containing IBM-360/75 Fortran listings of the algorithms used in the investigation.

TM-78228 April 1979
Strain Compatibility Assessment for SRB Sprayable Ablator MSA-1. William J. Patterson. Materials and Processes Laboratory. N79-25144

Tensile and compressive strain compatibility testing was performed on as-sprayed samples of the Shuttle Solid Rocket Booster external ablator material, MSA-1. Strain gages on the aluminum substrate were used to monitor strain. Strain compatibility was determined as the percent strain in the substrate at first visual evidence of MSA-1 failure. The 1/8-in. MSA-1, baselined for large areas of the SRB external skin, was characterized by a strain compatibility of 1.5 to 1.8 percent, which far exceeded the yield range of the metal substrate. Thicker MSA-1 applications (1.4 to 3/8 in.) were characterized by a lower level of strain compatibility, which appeared to be a manifestation of application limitations.

TM-78229 June 1979
Ground Winds for Kennedy Space Center, Florida (1979 Revision). D. L. Johnson and S. C. Brown. Space Sciences Laboratory. N79-25662

This report presents revised ground-level runway wind statistics for the Kennedy Space Center, Florida area. Crosswind, headwind, tailwind, and headwind reversal percentage frequencies are given with respect to month and hour for the Kennedy Space Center Space Shuttle runway. This document supersedes NASA TM-78181 and should be used in place of it.

TM-78230 May 1979
Test of Concentrator Solar Array Model for SEPS. H. H. Huie. Program Development. N79-27662

The use of concentrators to improve the performance of solar arrays in deep space was

tested in a simulated deep space environment. The results of these tests are presented and discussed. Areas of discussion include cell temperature and performance in a low temperature, low illumination environment with and without concentration, concentration ratios, and theoretical analysis versus test results. Tests were conducted on a series/parallel configuration and individual cells.

TM-78231 June 1979

SRB — TPS Spray Nozzle Development for MSA-1 Application. Willibald Peter Prasthofer. Materials and Processes Laboratory. N79-28371

The Materials and Processes Laboratory of the George C. Marshall Space Flight Center has developed a new spray nozzle system for the Marshall Sprayable Ablator (MSA-1) material. In developmental work using a standard automatic spray gun, the spray jet disintegrated before impacting the workpiece and formed an undesirable overspray at the outer zone of the spray pattern. This disintegration of the spray jet was caused primarily by the radically different densities of the 10 ingredients of MSA-1 and design of the nozzle. Improperly sprayed MSA-1 has nonoptimum thermal properties and exhibits debonding of subsequently sprayed MSA-1. Prior to this development, overspray was mechanically scraped off before spraying the next band. Several different devices to suppress overspray were proposed, designed, and tested before developing a nozzle based on the convergent-divergent Laval principle. A nozzle system of this type was first described for the design of steam turbines by Carl Patrick Gustaf de Laval, a Swedish engineer. A significant departure from theory, in our design, is the divergent bell shaped chamber instead of a straight cone as described by de Laval. This MSFC-developed nozzle provided a superior spray pattern, suppressed the overspray to an acceptable level, and produced a homogeneous jet of MSA-1 that adhered well to the substrate. This development provides a substantial cost and time saving by permitting a continuous spray operation.

TM-78232 July 1979

An Evaluation of Grease Type Ball Bearing Lubricants Operating in Various Environments (Status Report No. 4). E. L. McMurtrey. Materials and Processes Laboratory. N79-27515

Because many future spacecraft or space stations will require mechanisms to operate for long periods of time in environments which are adverse to most bearing lubricants, a series of tests is continuing to evaluate 33 grease type lubricants in R-4 size bearings in five different environments for a 1-year period. Four repetitions of each test are made to provide statistical samples. These tests have also been used to select four lubricants for 5 year tests in selected environments with five repetitions of each test for statistical samples. At the present time, 85 test sets have been completed and 22 test sets are underway. Three 5-year tests have already been started in (1) continuous operation and (2) start-stop operation, with both in vacuum at ambient temperatures, and (3) continuous operation at 93.3° C. To date, in the 1 year tests, the best results in all environments have been obtained with a high viscosity index perfluoroalkylpolyether (PFPE) grease.

TM-78233 July 1979

Surface to 90 km Winds for Kennedy Space Center, Florida, and Vandenberg AFB, California. D. L. Johnson and S. C. Brown. Space Sciences Laboratory. N79-28847

This report presents bivariate normal wind statistics for a 90 degree flight azimuth, from 0 through 90 km altitude, for Kennedy Space Center, Florida, and Vandenberg AFB, California. Wind probability distributions and

statistics for any rotation of axes can be computed from the five given parameters $\bar{u}$, $\bar{v}$, S(u), S(v), and R(uv). This document supersedes NASA TMX-64771 and TMX-64897 and should be used in place of them. There is no intent to automatically change any references to the previous documents in contract scopes of work by the issuance of the 1979 revision of this document.

TM-78234 July 1979
Early Space Experiments in Materials Processing. Robert J. Naumann. Space Sciences Laboratory. N79-28192

This volume represents a comprehensive survey of the flight experiments conducted in conjunction with the United States Materials Processing in Space Program. Also included are a brief description of the conditions prevailing in an orbiting spacecraft and the research implications provided by this unique environment. The purpose of this document is to summarize what has been done and what has been learned in order to serve as a background for future experiments. It is assumed that the reader has some knowledge of the physical sciences but no background in spaceflight experimentation or in the materials sciences per se. The document is expected to serve as an introduction to the Materials Processing in Space Program for investigators in many different fields who might wish to use the unique aspects of spaceflight to further their own research efforts.

TM-78236 August 1979
HEAO-C Observatory Description. Carroll Dailey and Thomas A. Parnell. Space Science Projects Office.

This report presents an abbreviated description of the High Energy Astronomy Observatory (HEAO-C) Program, including spacecraft subsystems, scientific instrumentation, and the mission operations concept. Also, scientific participants such as Principal Investigators and Co-investigators are presented. This report is prepared as an aid to HEAO Guest Observers. Most of the material relating to the scientific instruments has been supplied by the investigators.

TM-78237 July 1979
Results of Coronal Hole Research: An Update. Robert M. Wilson. Space Sciences Laboratory.

As a continuing effort, the author updates his previous overview of coronal hole research results (NASA TM X-73317, July 1976) to include annotated abstracts of some 220 papers. This report stresses results for the period 1976-1978.

TM-78238 September 1979
Computer Program Development and User's Manual for Program PARACH. Hughlen I. Murphree.

A user's manual is provided for program PARACH, a Fortran digital computer program operational on the Univac 1108. A description of the program and operating instructions for it are included. Program PARACH has been extensively used to study the interaction dynamics of a parachute and its payload during terminal descent. Operating instructions, required input data, program options and limitations, and output data are described. Subroutines used in this program are also listed and explained.

TM-78239 July 1979
Optimum Repair Level Analysis (ORLA) for the Space Transportation System (STS). W. R. Henry. Shuttle Projects Office.

This memorandum presents an adaptation of the Air Force ORLA method to a Space Shuttle Scenario. The Air Force designation and abbreviation style for cost equations have been retained. Those equations

having the identical definitions as applied by the Air Force retain identical abbreviations; however, their constants may have been changed to fit the Space Shuttle Scenario. The "vendor repair" cost buildup and many cost equations and methods were originated to suit requirements of this scenario which are not addressed by the Air Force publication. As with the Air Force ORLA, only those costs which discriminate between repair alternates are considered.

TM-78300 May 1979

Thermal Control of High Energy Nuclear Waste, Space Option. Jerry A. Peoples. Preliminary Design Office.

N79-25869

A discussion is presented which relates to the thermal and packaging problems of space disposal of nuclear waste material. An approach is suggested which solves both of these problems with emphasis on high energy density waste material. A passive cooling concept is presented utilizing conduction rods which penetrate the inner core. Data are presented which illustrate the effectiveness of cooling rods and the limit of their capability. A computerized thermal model is discussed and developed for the cooling concept.

TM-78301 June 1979

The Space Telescope Observatory. John N. Bahcall and C. R. O'Dell.

N79-27043

This review provides a convenient guide to the expected characteristics of the Space Telescope Observatory for astronomers and physicists. We have tried to provide enough detail so that a professional scientist, observer or theorist, can plan how the observatory may be used to further his observing program or to test theoretial models. Further detail is available in NASA documents that are referenced throughout this report.

TM-78302 June 1978

SCATS — SRB Cost Accounting and Tracking System Handbook. Ross B. Zorn, Rodney D. Stewart, Gary Coley, and Marie Higginbotham. Systems Analysis and Integration Laboratory and Computer Services Office. N79-27002

This technical memorandum describes the Solid Rocket Booster Cost Accounting and Tracking System (SCATS) which is an automatic data processing system designed to keep a running account of the number, description, and estimated cost of Level II, III, and IV changes. Although designed specifically for the Space Shuttle Solid Rocket Booster Program, the ADP system can be used for any other program that has a similar structure for recording, reporting, and summing numbers and costs of changes. The program stores the alpha-numeric designators for changes, government estimated costs, proposed costs, and negotiated value in a MIRADS (Marshall Information Retrieval and Display System) format which permits rapid access, manipulation, and reporting of current change status. Output reports listing all changes, totals of each level, and totals of all levels, can be derived for any calendar interval period.

TM-78303 June 1979

Apollo Telescope Mount — A Partial Listing of Scientific Publications and Presentations, Supplement 3. Edited by John M. Reynolds, Stanley A. Fields, and William C. Snoddy. Space Sciences Laboratory. N79-27500

This report supplements NASA TM X-73300, NASA TM X-73393, and NASA TM-78183. These reports are compilations of bibliographies from the principal investigator groups of the Apollo Telescope Mount (Skylab solar observatory facility) that gathered data from May 28, 1973, to February

8, 1974. The analysis of these data is presently under way and is expected to continue for several years.

The publications listed in this report are divided into the following categories: (1) Journal Publications, (2) Journal Publications Submitted, (3) Other Publications, (4) Presentations — National and International Meetings, and (5) Other Presentations. An author index is included together with errata for previous reports.

*Blue cover reports printed at Langley.
**DOE/NASA reports.

TP-1072 November 1977

The Mechanics of Atmospheric Systems Derived through Vertical and Horizontal Analysis of Parametric Data. Robert E. Turner. Space Sciences Laboratory.

N78-15641

For 36 hours during April 1975, an Atmospheric Variability Experiment was conducted. This research effort supported an observational program in which rawinsonde data, radar data, and satellite data were collected from a network of 42 stations east of the Rocky Mountains at intervals of 3 hours. This program presents data with a high degree of time resolution over a spatially and temporally extensive network.

Reduction of the experiment data is intended primarily as a documentation of the checking and processing of the data and should be useful to prospective users. Various flow diagrams of the data processing procedures are described, and a complete summary of the formulas used in the data processing is provided. A wind computation scheme designed to extract as much detailed wind information as possible from the unique experiment data set is discussed in detail. Estimates of the accuracy of the thermodynamic and wind data are presented. Estimates of errors in the thermodynamic and wind data are given together with a discussion of how these errors affect the final processed data.

Analysis of pressure, height, and temperature on constant pressure charts at 3-hour intervals shows that large-scale features with amplitudes only half the values of commonly cited observational uncertainties exhibit space and time continuity. Examination of 3-hour tendencies of important meteorological variables indicates that they typically exceed measurement uncertainties, may often be inadequately represented by interpolation of 12-hour observations, and exhibit appreciable spatial variation. Time cross sections in the lower troposphere constructed from the 3-hour observations reveal features with scales of motion not seen by the meteorologist in routine operations (except for regional 3-hour surface maps); horizontal and temporal scales of motion encompass a major portion of the mesoscale, and vertical scales encompass variations as small as 0.3 km. The detailed wind profile data of the experiment resolve the mesoscale wind structure of the lower stratosphere consistent with the findings of other investigators.

An initial method of analysis of satellite image data is presented. It is based on the application of densitometry techniques whereby the field of density of the satellite image is correlated with the associated meteorological events. This work represents an initial attempt to analyze Synchronous Meteorological Satellite (SMS) images with the densitometry methods in the context of mesoscale phenomena.

TP-1354 December 1978

Sequential High-Resolution Wind Profile Measurements. D. L. Johnson and W. W. Vaughan. Space Sciences Laboratory.

N79-14680

Tropospheric flow and lower stratospheric flow as measured by 94 sequences of high-resolution Jimsphere balloon data ar presented and discussed. The 70 and 24 sequential series are presented for the Kennedy Space Center, Florida, and Point Mugu, California, areas, respectively. Supplemental data, consisting of the associative temperature profiles and the surface and 200 mb synoptic maps, are also presented. The measurements are discussed relative to both the engineering and disciplinary areas. An initial subjective analysis of mesoscale features observed on some sequences is presented.

TP-1357 November 1978

Atmospheric Effects on CO_2 Laser Propagation. S. S. R. Murty and J. W. Bilbro. Electronics and Control Laboratory. N79-13607

This report is concerned with the losses encountered in the propagation of CO_2 laser radiation through the atmosphere, particularly as it applies to the NASA/Marshall Space Flight Center Pulsed Laser Doppler System. As such it addresses three major areas associated with signal loss: molecular absorption, refractive index changes in a turbulent environment, and aerosol absorption and scattering. In particular, the molecular absorption coefficients of carbon dioxide, water vapor, and nitrous oxide are calculated for various laser lines in the region of 10.6 μm as a function of various pressures and temperatures. The current status in the physics of low-energy laser propagation through a turbulent atmosphere is presented together with the analysis and evaluation of the associated heterodyne signal power loss. Finally, aerosol backscatter and extinction coefficients are calculated for various aerosol distributions and the results incorporated into the signal-to-noise ratio equation for the Marshall Space Flight Center system.

TP-1359 December 1978

Engineering Handbook on the Atmospheric Environmental Guidelines for Use in Wind Turbine Generator Development. Walter Frost, B. H. Long, and R. E. Turner. Space Sciences Laboratory. N79-14679

Atmospheric environmental guidelines for use in wind turbine generator development are presented. The guidelines are given in the form of design criteria relative to wind speed, wind shear, turbulence, wind direction, ice and snow loading, and other climatological parameters which include rain, hail, thermal effects, abrasive and corrosive effects, and humidity. This report is not a discussion of fundamental concepts or theories, but a presentation of design criteria in an engineering format which can be directly input to wind turbine generator design computations.

A summary section in each chapter provides a range of recommended design values for a general purpose, "off-the-shelf-type" wind turbine generator which could be sited in most any region of the United States. Following these summarized design values, detailed computational procedures and working data are provided which allow the designer to establish his own design values if desired. Thus, guidelines are also provided for developing specialized wind turbine generators or for designing wind turbine generators which are to be used in a specific region of the United States.

TP-1371 December 1978

Eulusmap; an International Land Resources Map Utilizing Satellite Imagery. T. Paludan and E. Csáti. Earth Resources Office, Science and Engineering. N79-13475

In 1972, the International Geographical Union's Commission on World Land Use Survey adopted a project for a land-use map of Europe. Such a map, under the name "Eulusmap," had been started earlier under sponsorship of several government offices in Hungary. Although there was great response from a number of contributors in many countries, it became evident by mid-1974 that the map would contain gaps and some inaccuracies unless additional data sources were utilized. By then, the satellite Landsat-1 had obtained imagery of most of Europe. Using theme extraction techniques, the map was completed in draft form and portions of it displayed at the 23rd International Geographical Congress in Moscow during July 1976. Printing of the completed map was accomplished in May 1978.

A comprehensive standard land-use classification system was established in 1949. A goal of world mapping at a scale of 1:1 million was also set, but remains far from realization. The advent of satellite data makes achievement possible, but only if some compromises are made in the classification system. It is now realistic to map land resources of large areas and regions undergoing rapid change. This is especially important in developing areas of the world.

TP-1383 December 1978

Characterization of Large 2219 Aluminum Alloy Hand Forgings for the Space Shuttle Solid Rocket Booster. M. W. Brennecke. Materials and Processes Laboratory. N79-16950

This report presents the mechanical properties, including fracture toughness, and stress corrosion properties of four types of 2219-T852 aluminum alloy hand forgings. Weight of the forgings varied between 450 and 3500 lb at the time of heat treatment and dimensions exceeded the maximum covered in existing specifications. Dimensions ranged from approximately 5¾ to approximately 16¼" thick, 10½ to 29½" wide and 33 to 115½" long at heat treatment. The forgings were destructively tested to develop reliable mechanical property data to replace estimates employed in the design of the Space Shuttle Solid Rocket Booster (SRB) and to establish minimum guaranteed properties for structural refinement and for entry into specification revisions. The report summarizes data required from the forgers and from the SRB Structures contractor. Specific technical requirements for testing were defined; testing was coordinated; and results were organized, analyzed and evaluated by the Materials and Processes Laboratory of the George C. Marshall Space Flight Center.

TP-1384 December 1978

Space Shuttle Afterbody Aerodynamics/Plume Simulation Data Summary. Kenneth L. Blackwell and Leroy M. Hair. Systems Dynamics Laboratory. N79-17810

A series of parametric wind tunnel tests was conducted to provide a base for developing a simulation of afterbody/base aerodynamics for multibody/multibase rocket-powered vehicles (such as Space Shuttle) which use unheated air as the simulant gas in development wind tunnel tests. The tests described herein were parameterized on external configuration, nozzle internal configuration, base geometry, propulsion gas type (air, CF_4, solid propellant exhausts), and freestream Mach number (0.5 to 3.5). These tests were conducted over a 4-year period in the MSFC 14-Inch Trisonic, AEDC-PWT-4T, and Ames 11-Foot wind tunnels. Presented in this report are the data and pertinent reference information necessary to perform an analysis which would lead to a simulation procedure. The type of data obtained during the tests described herein include model base, afterbody, and nozzle internal surface static pressure distributions, model chamber pressure and temperature, and freestream conditions. Also included is a brief description of simulation procedures that have been used by the Space Shuttle program.

TP-1389 January 1979

Summary of Atmospheric Wind Design Criteria for Wind Energy Conversion System Development. Walter Frost and Robert E. Turner. Space Sciences Laboratory. N79-14678

This report presents basic design values of significant wind criteria, in graphical format,

for use in the design and development of wind turbine generators for energy research. It is a condensed version of portions of the "Engineering Handbook on the Atmospheric Environmental Guidelines for Use in Wind Turbine Generator Development," NASA TP-1359, 1978.

TP-1417 February 1979

Management System, Organizational Climate and Performance Relationships. Bervil D. Davis. Program Planning Office. N79-19912

This study investigated seven aerospace firms to determine if a relationship existed among management systems, organizational climate, and organization performance. Positive relationships were found between each of these variables, but a statistically significant relationship existed only between the management system and organizational climate. The direction and amount of communication and the degree of decentralized decision-making, elements of the management system, also had a statistically significant relationship with organization performance.

CR-3041 August 1978
Applications of Remote Sensing to Hydrologic Planning. Harry Loats, Jr., Thomas Fowler, and Peter Castruccio. NAS8-32423. ECOsystems International, Inc. N78-32526

CR-3051 September 1978
Studies of Convection in a Solidifying System with Surface Tension at Reduced Gravity. Basil N. Antar and Frank G. Collins. NAS8-32484. University of Tennessee Space Institute. N78-32386

CR-3052 September 1978
Investigations of Simulated Aircraft Flight through Thunderstorm Outflows. Walter Frost and Bill Crosby. NAS8-32217. FWG Associates, Inc. N78-32037

CR-3073 December 1978
Investigation of Aircraft Landing in Variable Wind Fields. Walter Frost and Kapuluru Ravikumar Reddy. NAS8-29584. University of Tennessee Space Institute. N79-13643

CR-3076 December 1978
Current Research on Aviation Weather (Bibliography). Don E. Durham and Walter Frost. NAS8-29584. University of Tennessee Space Institute. N79-17434

CR-3084 December 1978
Studies of Vorticity Imbalance and Stability, Moisture Budget, Atmospheric Energetics, and Gradients of Meteorological Parameters During AVE III. Edited by James R. Scoggins. NAS8-31773. Department of Meteorology, Texas A&M University. N79-14676

CR-3085 December 1978
Hygroscopic Chemicals and the Formation of Advection Warm Fog — A Numerical Simulation. R. J. Hung and G. S. Liaw. NAS8-31729. The University of Alabama in Huntsville. N79-14677

CR-3095 January 1979
A Field Study of Air Flow and Turbulent Features of Advection Fog. J. D. Connell. NAS8-32031. University of Tennessee Space Institute. N79-15513

CR-3129 April 1979
Frost Formation on an Airfoil: A Mathematical Model I. Mark Dietenberger, Prem Kumar, and James Luers. NAS8-31294. University of Dayton Research Institute. N79-22706

CR-3150 June 1979
Differences between Measured and Linearly Interpolated Synoptic Variables over a 12-h Period during AVE IV. Leonard R. Dupuis and James R. Scoggins. NAS8-31773. Department of Meteorology, Texas A&M University. N79-25670

CR-3158 July 1979
Particle Dynamics Associated with the Spacelab Environment. V. A. Sandborn. NAS8-31688. College of Engineering, Colorado State University. N79-28471

CR-3166 August 1979
Kinetic Energy Budgets in Areas of Convection. Henry E. Fuelberg. NAS8-32838. Department of Earth and Atmospheric Sciences, Saint Louis University. N79-28850

CR-150812** July 1978
Thermal Energy Storage Subsystems (Quarterly Reports). NAS8-32254. Artech Corp. N79-10517

**See notation page 42.

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-150813** October 1978
Development of Surfaces Optically Suitable for Flat Plate Solar Panels (Final Report). NAS8-32481.

CR-150814** August 7, 1978
Solar System Installation at Louisville, Kentucky (Final Report). ERDA Contract E(49-18)-2385. Rademaker Corp.
N79-10518

CR-150815 August 1978
STS Payload Data Collection and Accommodations Analysis Study, Volume I — Executive Summary. NAS8-32711. Teledyne Brown Engineering.
N78-32174

CR-150816 August 1978
STS Payload Data Collection and Accommodations Analysis Study, Volume II, Payload Data Collection. NAS8-32711. Teledyne Brown Engineering. N78-32175

CR-150817 August 1978
STS Payload Data Collection and Accommodations Analysis Study, Volume III, Accommodations Analysis. NAS8-32711. Teledyne Brown Engineering. N78-32176

CR-150818** November 1978
Long Term Weathering Effects on the Thermal Performance of the Lennox/Honeywell (Liquid) Solar Collector. NAS8-32036. Wyle Laboratories.
N79-13493

CR-150819** June 6, 1978
Thermal Performance Evaluation of the Calmac (Liquid) Solar Collector. NAS8-32036. IBM. N79-10521

CR-150820** October 9, 1978
SIMS Prototype System 4 Performance Test Report. NAS8-32036. IBM.
N79-13499

CR-150821 June 1978
Transistor Step Stress Testing Program, Final Report. NAS8-31944. DCA Reliability Laboratory. N78-33341

CR-150822 August 1978
Dual Throat Thruster Cold Flow Analysis, Final Report. NAS8-32666. Aerojet Liquid Rocket Co. N78-33142

CR-150823 July 1978
Updating of Adapt Predictions of Sunspot Activity, Final Report. NAS8-32851. Adapt Service Corp. N78-34024

CR-150824 August 7, 1978
Vapor Transport Mechanisms, Final Report. NAS8-31731. Athens State College. N78-33383

CR-150825 June 12, 1978
Trends and Techniques for Space Base Electronics, Quarterly Report. NAS8-26749. Mississippi State University.
N78-79568

CR-150826 September 1978
Development of Base Pressure Similarity Parameters for Application to Space Shuttle Launch Vehicle Power-On Aerodynamic Testing, Final Report. NAS8-32658. Lockheed Missiles and Space Co., Inc. N78-33134

CR-150827 September 19-21, 1978
Satellite Power System (SPS) Concept Definition Study (Exhibit C) Midterm

Performance Review, Second Quarterly Review. NAS8-32475. Rockwell International Satellite Systems Division. N79-11475

CR-150828** April 1978
Prototype Solar Heating and Cooling Systems. NAS8-32091. AiResearch Mfg. Co. N79-12552

CR-150829** July 1978
Prototype Solar Heating and Cooling Systems. NAS8-32091. AiResearch Mfg. Co. N79-12549

CR-150830* October 1978
Prototype Solar Heating and Cooling Systems. NAS8-32091. AiResearch Mfg. Co. N79-12551

CR-150831 September 1978
Development of Surfaces Optically Suitable for Flat Solar Panels, Final Report. NAS8-32481. University of Alabama in Huntsville. N79-10522

CR-150832 September 15, 1978
Design, Processing and Testing of LSI Arrays Hybrid Microelectronics Task, Final Report. NAS8-32607. Hughes Aircraft Co. N79-10341

CR-150833 June 1978
Load and Dynamic Assessment of B-52B-008 Carrier Aircraft for Finned Configuration 1 Space Shuttle Solid Rocket Booster Decelerator Subsystem Drop Test Vehicle, Volume I - Summary. NAS8-31805. Boeing Co. N79-10048

CR-150834 June 1978
Load and Dynamic Assessment of B-52B-008 Carrier Aircraft for Finned Configuration 1 Space Shuttle Solid Rocket Booster Decelerator Subsystem Drop Test Vehicle, Volume II, Airplane Flutter and Load Analysis Results. NAS8-31805 Boeing Co. N79-10049

CR-150835 June 1978
Load and Dynamic Assessment of B-52B-008 Carrier Aircraft for Finned Configuration 1 Space Shuttle Solid Rocket Booster Decelerator Subsystem Drop Test Vehicle - Volume III, Pylon Load Data Method 1. NAS8-31805. Boeing Co. N79-10050

CR-150836 June 1978
Load and Dynamic Assessment of B-52B-008 Carrier Aircraft for Finned Configuration 1 Space Shuttle Solid Rocket Booster Decelerator Subsystem Drop Test Vehicle, Volume IV, Pylon Load Data Method 2. NAS8-31805. Boeing Co. N79-10051

CR-150837* July 31, 1978
Remote Sensing Data Handbook, Final Report. NAS8-31423. New Technology, Inc. N79-14499

CR-150838 August 31, 1978
Design of a Low Cost Earth Resources System, Final Report. NAS8-32397. Georgia Institute of Technology. N79-16323

CR-150839** November 1978
System Design Package for SIMS Prototype System 4, Solar Heating and Domestic Hot Water. NAS8-32036. IBM Federal Systems Division. N79-16361

CR-150840** November 1978
System Design Package for SIMS Prototype System 3, Solar Heating and Domestic Hot Water. NAS8-32036. IBM Federal Systems Division. N79-16359

*See notation page 42

CR-150841** November 1978
Largo Hot Water System Thermal Performance Test Report. NAS8-32036. IBM Federal Systems Division.
N79-13500

CR-150842** November 1978
Largo Hot Water System Long Range Thermal Performance Test Report — Addendum. NAS8-32036. IBM Federal Systems Division. N79-13492

CR-150843 October 13, 1978
Orbital Transfer Vehicle (OTV) — Bimonthly Progress Report No. 2. NAS8-32996. Rockwell International Rocketdyne Division.

CR-150844 August 1978
Development of Low Cost, High Reliability Sealing Techniques for Hybrid Microcircuit Packages, Phase II — Supplement 1, Moisture Permeation of Adhesive-Sealed Hybrid Microcircuit Packages. NAS8-31992. Rockwell International, Electronics Devices Division. N79-11316

CR-150845 November 1978
Skylab Viscous Damper Study, Final Report. H-34352B. General Electric Co.
N79-10093

CR-150846 November 1, 1978
Research Study on Stabilization and Control Modern Sampled-Data Control Theory: Digital Controller Design — Analysis of the Annular Suspension Pointing System. NAS8-32358. Systems Research Laboratory. N79-12744

CR-150847 November 1978
Thermal Curtain Permeability and Thermal Response Test for SRB Reentry, Final Report. NAS8-32997. Remtech, Inc. N79-10090

CR-150848 October 1978
Space Shuttle Plume Simulation Effect on Aerodynamics, Final Report. NAS8-29751. Remtech, Inc. N79-11103

CR-150849** October 1977
Passive Thermosyphon Solar Heating and Cooling Module with Supplementary Heating, Quarterly Reports. NAS8-23360. Sigma Research, Inc.
N79-15402

CR-150850**
Prototype Solar Heating and Cooling Systems Including Potable Hot Water, Quarterly Reports. NAS8-32249. Solaron Corp. N79-13498

CR-150851** October 1978
Instrumentation at the "Decade 80" Solar House in Tuscon, Arizona. Copper Dev. Assoc. Inc. N79-13491

CR-150852** December 1978
Libbey-Owens-Ford Solar Collector Static Load Test. NAS8-32036. IBM Federal System Divison. N79-13494

CR-150853** December 1978
Preliminary Design Package for Prototype Solar Heating/Cooling Systems. NAS8-32093. Honeywell, Inc.
N79-15409

CR-150854** October 1978
Prototype Solar Heated Hot Water Systems and Double-Walled Heat Exchangers. NAS8-32245. Elcam, Inc.
N79-13495

CR-150855 October 20, 1978
B-52B-008/DTV (Drop Test Vehicle) Configuration 1 (with and without fins) Flight Test Results — Captive Flight and Drop Test Missions. NAS8-31805.
Boeing Co. N79-12065

CR-150856** December 1978
Solar Hot Water System Installed at Anderson, South Carolina. DOE Contract 77-G-01-1663. Solar Designs, Inc.
N79-15405

CR-150857** December 1978
Thermal Performance Evaluation of the Solargenics Solar Collector at Outdoor Conditions. NAS8-32036.
N79-15401

CR-150858** December 1978
Preliminary Design Package for Prototype Solar Heating Program. NAS8-32093. Honeywell, Inc. N79-14557

CR-150859** December 1978
Design and Installation Package for Solar Heating and Cooling System. NAS8-32248. Solar Engr. and Manufacturing Co. N79-14556

CR-150860** December 1978
Qualification Test and Analysis Report, Solar Collectors. NAS8-32259. Owens-Illinois, Inc. N79-16360

CR-150861** December 1978
Prototype Solar Heating and Cooling Systems Including Potable Hot Water, Quarterly Report. NAS8-32249. Solar Corporation. N79-16372

CR-150862 October 26, 1978
Microcomputer Technology Applications: Charger and Regulator Software for a Breadboard Programmable Power Processor, Final Report. NAS8-32896. Green Research. N79-12773

CR-150863 October 1978
Advanced Designs for Fluid Flow Visualization, Final Report. NAS8-31173. Science Applications, Inc.
N79-12365

CR-150864 December 1978
A Study of Digital Holographic Filter Generation Phase II: Digital Data Communication Systems, Final Report, Volume I. NAS8-31373. Mississippi State University. N79-12419

CR-150865 December 1978
A Study of Data Technology Developments in the 1980-1985 Time Frame, Final Report, Volume II. NAS8-31373. Mississippi State University.
N79-12774

CR-150866 December 1978
Applying NASA Remote Sensing Data to Geologically Related Regional Planning Problems in Tennessee, Final Report. NAS8-32034. University of Tennessee.
N79-17289

CR-150867** December 1978
Installation Package for Hyde Memorial Observatory, Lincoln Nebraska. NAS8-32247. Solar Engineering and Equipment Co., Inc. N79-16373

CR-150868** December 1978
Design Data Brochure for the Owens-Illinois Sunpak$_{TM}$ Air-Cooled Solar Collector. NAS8-32259. Owens-Illinois.
N79-15404

CR-150869** December 1978
Final System Instrumentation Design Package for Decade 80 Solar House. NAS8-32244. Copper Development Assn.
N79-19455

CR-150870** December 1978
Solar Heating and Hot Water System Installed at Listerhill, Alabama. DOE Contract G-77-A-01-4070. N79-15406

CR-150871** December 1978
Preliminary Design Package for Residential Heating Cooling System — Rankine

Air Conditioner Redesign. NAS8-32093. Honeywell Inc. N79-19453

CR-150872** January 1979
Certification Report for the Calmac Solar-Powered Pump. NAS8-32253. Calmac Mfg. Co. N79-17331

CR-150873** October 1979
Solar Heating and Cooling Systems Design and Development. Quarterly Report. NAS8-32093. Honeywell, Energy Resources Center.

CR-150874** January 1979
Analysis and Experimental Tests of a High-Performance Evacuated Tubular Collector. NAS8-32259. Owens-Illinois. N79-16370

CR-150875** January 1979
Preliminary Design Package for "Sunair" SEC-601 Solar Collector. NAS8-23359. Owens-Illinois. N79-17332

CR-150876** January 1979
Installation Package for a Solar Heating System. NAS8-32247. Solar Engr. and Equipment Co. N79-18454

CR-150877 November 8, 1978
Development of User Guidelines for ECAS Display Design, Final Report, Volume I. NAS8-32991. Essex Corp. N79-15675

CR-150878 December 22, 1978
Study of New Solar Cycle During the Current Solar Minimum, Final Report. NAS8-30628. Lockheed Palo Alto Research Laboratory.

CR-150879 November 30, 1978
Independent Appraisal of the MSFC Optical Data Reduction Schemes, Final Report. NAS8-33192. Lumin, Inc. N79-14893

CR-150880 December 23, 1978
Accuracy Analysis of Pointing Control System of Solar Power Station, Final Report. NAS8-33065. University of Tennessee. N79-14143

CR-150881 December 4, 1978
Manufacturing Process Applications Team (MATEAM). NAS8-32229. IIT Research Institute. N79-73629

CR-150882 June 1977
Development of a Moderately Sized Finite Element Program for Nonlinear Structural Analysis, Final Report. NAS8-31332. Texas A&M Research Foundation. N79-15324

CR-150883 November 30, 1978
Power Module Data Management System (DMS) Study, Final Report. NAS8-31747. IBM Federal Systems Division. N79-16038

CR-150884 August 1978
Bent Crystal X-Ray Topography, Final Report. NAS8-32527. Texas A&M University. N79-73653

CR-150885 November 1978
The 'Proto-Type Wrist Joint Wrist Assembly TACPAW (Triple Axis Common Pivot Arm Wrist), Phase II, Final Report. NAS8-31897. University of Nebraska. N79-15635

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-150886 October 10, 1978
Development and Verification of Stress Level Standards, Final Report. NAS8-32894. Vanderbilt University.

CR-150887 November 7, 1978
Study of Solar Cell Welds, Final Report. NAS8-33077. North Alabama Scientific and Engineering Consultants, Inc. N79-16354

CR-150888 August 16, 1978
Study of Iron-Borate Materials Systems Processed in Space, Final Report. NAS8-32659. Owens-Illinois, Inc. N79-16022

CR-150889 July 28, 1978
Space Shuttle Plume/Simulation Application, Final Report, Results and Math Model. NAS8-32524. Northrop Services, Inc. N79-16055

CR-150890 June 1978
Integrated Orbital Servicing Study Follow-On, Final Report, Volume I, Executive Summary. NAS8-30820. Martin Marietta Corp. N79-19065

CR-150891 April 1978
Integrated Orbital Servicing Study Follow-On, Final Report, Volume II, Technical Analysis and System Design. NAS8-30820. Martin Marietta Corp. N79-19066

CR-150892 June 1978
Integrated Orbital Servicing Study Follow-On, Final Report, Volume III, Engineering Test Unit and Controls. NAS8-30820. Martin Marietta Corp. N79-19067

CR-150893 August 1978
Low Energy State Study, Volume I, Executive Summary. NAS8-32710. Vought Corp. N79-15130

CR-150894 August 1978
Low Energy Stage Study, Volume II, Requirements and Candidate Propulsion Modes. NAS8-32710. Vought Corp. N79-15131

CR-150895 August 1978
Low Energy Stage Study, Volume III, Conceptual Design, Interface Analysis, Flight and Ground Operations. NAS8-32710. Vought Corp. N79-15132

CR-150896 August 1978
Low Energy Stage Study, Volume IV, Cost Benefits Analysis and Recommendations. NAS8-32710, Vought Corp. N79-16023

CR-150897 August 1978
Low Energy Stage Study, Volume V, Program Study Cost Elements and Appendices. NAS8-32710. Vought Corp. N79-16024

CR-150898 November 1978
Growth of Single Crystals by Vapor Transport, Final Technical Report. NAS8-26146. Rensselaer Polytechnic Institute. N79-15804

CR-150899** January 1979
Long Term Weathering Effects on the Thermal Performance of the Sunworks (Liquid Solar Collector). NAS8-32036. IBM Corp. N79-17328

CR-150900** January 1979
Thermal Performance Evaluation of MSFC Hot Air Collectors with Various

Flow Channel Depths. NAS8-32036. IBM Corp. N79-18449

CR-150901* September 11, 1978
Placement Techniques for the Standard Transistor Array (STAR). NAS8-31572. Auburn University. N79-74086

CR-150902 January 1, 1979
Research Study on Stabilization and Control Modern Sampled-Data Control Theory Digital Controller Design — Analysis of the Annular Suspension Pointing System. NAS8-32358. Systems Research Laboratory.

CR-150903 January 1978
Investigation of Jet Exhaust and Local Mach Number Effects on the Solid Rocket Booster (SRB) Base Pressures (FA19), Final Report. NAS8-29752. Lockheed Missiles & Space Co., Inc. N79-16069

CR-150904 December 10, 1978
Implementation of Alabama Resources Information System ARIS, Final Report. NAS8-32215. Auburn University. N79-16328

CR-150905 January 5, 1979
Preparatory Studies of Zero-G Cloud Drop Coalescence Experiment, Final Report. NAS8-31441. Desert Research Institute. N79-16886

CR-150906* November 22, 1978
Evaluation of Shuttle Turbopump Bearings. NAS8-32987. Battelle Columbus Labs. N79-18321

CR-150907 December 1978
The Problem of Low Energy Particle Measurements in the Magnetosphere, Final Report. NAS8-31145. University of California. N79-16482

CR-150908 October 1, 1978
Optical Effects Module, Final Technical Report. NAS8-32090. Advanced Kinetics, Inc. N79-16664

CR-150909 December 22, 1978
Design, Development, Test, and Evaluation of an Automated Analytical Electrophoresis Apparatus. NAS8-31948. University of Arizona. N79-16104

CR-150910 December 6, 1978
Ball Bearing Heat Analysis Program (BABHAP). NAS8-31904. Wyle Laboratories. N79-17218

CR-150911 December 1978
Space Shuttle Program Solid Rocket Booster Decelerator Subsystem, Final Drop Test Report. NAS8-32122. Martin Marietta Aerospace. N79-73701

CR-150912 February 1, 1979
Earth Orbital Teleoperator Systems Evaluation, 1978 Year End Report. NAS8-31848. Essex Corporation. N79-16552

CR-150913 January 8, 1979
Exhibit A: Design, Fabrication and Delivery of TRS and MDA Mockups, Exhibit B: Development of Remotely Controller Vehicle and Target Mockups for Docking Lighting Evaluation. NAS8-33147. Essex Corporation. N79-73679

CR-150914 December 1978
Diode Step Stress Program, Final Report for JANTX1N981B. NAS8-31944. DCA Reliability Laboratory. N79-17251

NASA CONTRACTOR REPORTS

(Abstracts for these reports may be obtained from STAR)

CR-161091 December 1978
Diode Step Stress Program, Final Report for JANTXIN5614. NAS8-31944. DCA Reliability Laboratory. N79-17250

CR-161092 January 1979
Research Study Entitled Advanced X-ray Astrophysical Observatory (AXAF), Final Report. NAS8-32667. Smithsonian Astrophysical Observatory. N79-17767

CR-161093** January 1979
Long Term Weathering Effects on the Thermal Performance of the Libbey-Owens-Ford (Liquid) Solar Collector. NAS8-32036. IBM Corporation. N79-18450

CR-161094** February 1979
Owens-Illinois Subsystem Design Package for the SEC 601 Air-Cooled Solar Collector. NAS8-32259. Owens-Illinois.

CR-161095 January 1, 1979
Development of User Guidelines for ECAS Display Design, Task 9 and Task 10, Final Report, Volume II. NAS8-32991. Essex Corp. N79-16910

CR-161096 March 24, 1978
Deployable Antenna Demonstration Project, Final Report. NAS8-32394. Grumman Aerospace Corp. N79-17079

CR-161097 1978
King II 2519 ATM Residual Gyros Reestablishing 5 Year Life Requirements. NAS8-32837. Singer Co. N79-17194

CR-161098 January 25, 1978
Large Space Structures Fabrication Experiment, Final Report. NAS8-32471. Convair Div., General Dynamics. N79-17899

CR-161099 May 1978
Plume RF Interference Calculations for Space Shuttle, Final Report on Added Tasks. NAS8-32528. Physical Dynamics, Inc. N79-17900

CR-161100 December 1978
Long-Term Risk Analysis Associated with Nuclear Waste Disposal in Space, Final Report. NAS8-33022. Science Applications, Inc. N79-74674

CR-161101 January 31, 1979
Evaluation of the Space Disposal of Defense Nuclear Waste, Phase II, Final Report, Volume I, Executive Summary. NAS8-32391. Battelle Columbus Laboratories. N79-74672

CR-161102 January 31, 1979
Evaluation of the Space Disposal of Defense Nuclear Waste, Phase II, Final Report, Volume III, Supporting Research and Technologies Licensing and Flight Test Requirements. NAS8-32391. Battelle Columbus Laboratories. N79-74673

CR-161103 January 31, 1979
Evaluation of the Space Disposal of Defense Nuclear Waste — Phase II, Final Report, Volume II. NAS8-32391. Battelle Columbus Laboratories. N79-74263

CR-161104** February 1979
System Integration of Marketable Subsystems (Third Collection of Progress Reports). NAS8-32036. IBM Federal Systems Division. N79-18448

CR-161105 August 31, 1973
Sunfall Monitor Design Study, Volume I — System Description. NAS8-14000. IBM Federal Systems Division. N79-74137

CR-161106 August 31, 1973
Sunfall Monitor Design Study, Volume II — Systems Specifications. NAS8-14000. IBM Federal Systems Division. N79-74138

CR-161107 August 31, 1973
Sunfall Monitor Design Study, Volume III — Systems Parts List and Drawings. NAS8-14000. IBM Federal Systems Division. N79-74139

CR-161108 June 15, 1975
Sunfall Monitor Operating Procedures. NAS8-31309. IBM Federal Systems Division. N79-74140

CR-161109* September 1978
Lubrication Handbook for the Space Industry: Part A: Solid Lubricants, Part B: Liquid Lubricants. NAS8-31715. Midwest Research Institute. N79-19346

CR-161110 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5420. NAS8-31944. DCA Reliability Laboratory. N79-18254

CR-161111 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2369A. NAS8-31944. DCA Reliability Laboratory. N79-18251

CR-161112 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N759A. NAS8-31944. DCA Reliability Laboratory. N79-18252

CR-161113 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2945A. NAS8-31944. DCA Reliability Laboratory. N79-18253

CR-161114 January 1979
Design, Fabrication and Delivery of a Prototype Saturator for ACPL, Final Report. NAS8-31776. Desert Research Institute, University of Nevada. N79-17885

CR-161115 July 1, 1978
Aerosol and Nucleation Research in Support of NASA Cloud Physics Experiments in Space, Final Report. NAS8-32067. University of Wyoming. N79-18511

CR-161116 February 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2905A. NAS8-31944. DCA Reliability Laboratory. N79-18195

CR-161117 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5554. NAS8-31944. DCA Reliability Laboratory. N79-18196

CR-161118 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5550. NAS8-31944. DCA Reliability Laboratory. N79-18197

CR-161119 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N937B. NAS8-31944. DCA Reliability Laboratory. N79-18198

CR-161120 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N972B. NAS8-31944. DCA Reliability Laboratory. N79-18199

CR-161121 January 1979
Transistor Step Stress Testing Program,

Final Report for JANTX 2N4856. NAS8-31944. DCA Reliability Laboratory.
N79-18200

CR-161122 February 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N3637. NAS8-31944. DCA Reliability Laboratory.
N79-18201

CR-161123 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5622. NAS8-31944. DCA Reliability Laboratory.
N79-18202

CR-161124 February 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2920. NAS8-31944. DCA Reliability Laboratory.
N79-18203

CR-161125 February 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N4150. NAS8-31944. DCA Reliability Laboratory.
N79-18204

CR-161126 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5619. NAS8-31944. DCA Reliability Laboratory.
N79-18205

CR-161127 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2432A. NAS8-31944. DCA Reliability Laboratory.
N79-18206

CR-161128 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N4570A. NAS8-31944. DCA Reliability Laboratory.
N79-18207

CR-161129 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5552. NAS8-31944. DCA Reliability Laboratory.
N79-18208

CR-161130 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N2970B. NAS8-31944. DCA Reliability Laboratory.
N79-18209

CR-161131 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5415. NAS8-31944. DCA Reliability Laboratory.
N79-18210

CR-161132 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5615. NAS8-31944. DCA Reliability Laboratory.
N79-18211

CR-161133 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N1202A. NAS8-31944. DCA Reliability Laboratory.
N79-18212

CR-161134 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N746A. NAS8-31944. DCA Reliability Laboratory.
N79-18213

CR-161135 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5417. NAS8-31944. DCA Reliability Laboratory.
N79-18214

CR-161136 January 1979
Transistor Step Stress Testing Program,

Final Report for JANTX 2N2605. NAS8-31944. DCA Reliability Laboratory. N79-18215

CR-161137 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2060. NAS8-31944. DCA Reliability Laboratory. N79-18216

CR-161138 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N645-1. NAS8-31944. DCA Reliability Laboratory. N79-18217

CR-161139 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2219A. NAS8-31944. DCA Reliability Laboratory. N79-18218

CR-161140 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5623. NAS8-31944. DCA Reliability Laboratory. N79-18219

CR-161141 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N3893. NAS8-31944. DCA Reliability Laboratory. N79-18220

CR-161142 January 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N649-1. NAS8-31944. DCA Reliability Laboratory. N79-18221

CR-161143 August 1, 1978
24kW Power Module Evolution Study, Part I, Final Report, Payload Requirements and Growth Scenarios. NAS8-32928. Lockheed Missiles and Space Co. N79-17887

CR-161144 September 30, 1978
25kW Power Module Evolution Study, Part II, Payload Support System Evolution. NAS8-32928. Lockheed Missiles and Space Co. N79-17888

CR-161145 January 27, 1979
25kW Power Evolution Study, Final Report, Part III: Conceptual Designs for Power Module Evolution, Volume I, Power Module Evolution. NAS8-32928. Lockheed Missiles and Space Co. N79-17889

CR-161146 January 27, 1979
25kW Power Module Evolution Study, Final Report, Part III: Conceptual Designs for Power Module Evolution, Volume 2: Program Plans. NAS8-32928. Lockheed Missiles and Space Co. N79-17890

CR-161147 January 27, 1979
25kW Power Module Evolution Study, Part III: Conceptual Designs for Power Module Evolution, Volume 3, Cost Estimates. NAS8-32928. Lockheed Missiles and Space Co. N79-17891

CR-161148 January 27, 1979
25kW Power Module Evolution Study, Part III: Conceptual Designs for Power Module Evolution, Volume 4, Design Analysis. NAS8-32928. Lockheed Missiles and Space Co. N79-17892

CR-161149 January 27, 1979
25kW Power Module Evolution Study, Final Report, Part III: Conceptual Designs for Power Module Evolution, Volume 5, Mission Accommodations. NAS8-32938. Lockheed Missiles and Space Co. N79-17893

CR-161150 January 27, 1979
25kW Power Module Evolution Study,

Final Report, Part III: Conceptual Designs for Power Module Evolution, Volume 6, WBS and Dictionary. NAS8-32928. Lockheed Missiles and Space Co. N79-17894

CR-161151** March 1979
Design Package for Programmable Controller and Hydronic Subsystem. NAS8-32257. Sunkeeper Control Corp. N79-21619

CR-161152 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N3811. NAS8-31944. DCA Reliability Laboratory. N79-18255

CR-161153 January 1979
Transistor Step Stress Testing Program, Final Report for JANTX 2N2484. NAS8-31944. DCA Reliability Laboratory. N79-18256

CR-161154 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N5618. NAS8-31944. DCA Reliability Laboratory. N79-18250

CR-161155 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N3031B. NAS8-31944. DCA Reliability Laboratory. N79-18249

CR-161156 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N3016B. NAS8-31944. DCA Reliability Laboratory. N79-18248

CR-161157 February 1979
Diode Step Stress Testing Program, Final Report for JANTX 1N2989B. NAS8-31944. DCA Reliability Laboratory. N79-18247

CR-161158 May 30, 1975
Sunfall Monitor Calibration Plan. NAS8-31309. IBM Federal Systems Division. N79-74092

CR-161159 February 1979
Bubble Behavior During Solidification in Low-Gravity, Final Report. NAS8-31529. Grumman Aerospace Corp. N79-17881

CR-161160 December 12, 1979
Computer Processing of Peach Tree Decline Data, Final Report. NAS8-31850. Georgia Institute of Technology. N79-20442

CR-161161 January 31, 1979
Solar Power Satellite (SPS) Pilot Beam and Communication Link Subsystem Investigation Study, Phase I. NAS8-33157. Raytheon Co. N79-17896

CR-161162 December 1978
Study and Analysis of the Real Time Solar Magnetograph, Final Report. NAS8-31514. Sperry Support Services. N79-74311

CR-161163 February 1, 1979
25kW Power Module Solar Array Preliminary Design, Final Report, Solar Array Technology Development for SEP (Solar Electric Propulsion). NAS8-31352. Lockheed Missiles and Space Co. X79-10046

CR-161164** March 1979
Certification and Verification for Northrup Model NSC-01-0732, Fresnel Lens Concentrating Solar Collector. NAS8-32251. Northrup, Inc. N79-25504

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161165** July 21, 1978
Verification Test Report on a Solar Heating and Hot Water System. NAS8-32242. Cole, Inc. N79-20493

CR-161166** March 1979
Long Term Weathering Effects on the Thermal Performance of the Solaron (Air) Solar Collector. NAS8-32036. Wyle Laboratories. N79-21621

CR-161167 February 1979
Simulated EVA Operation of a Remote Connector Assembly Test Report. NAS8-33146. Rockwell International. N79-19687

CR-161168 November 1978
Post Heat Treatment Effects on Double Layer Metal Structures for VLSI Applications, Special Report. NAS8-26749. Mississippi State University. N79-75342

CR-161169 February 1979
High-Voltage DC Power Processing Thermal Control and Packaging Techniques, Final Report. NAS8-33078. Martin Marietta Corp. N79-19223

CR-161170 February 1979
Structural Attachments for Large Space Structures, Task 2 Report, Detailed Design of Attachments. NAS8-32654. Martin Marietta Corp. X79-10043

CR-161171 December 1978
Solid Rocket Booster Thermal Protection System Materials Development, Final Report. NAS8-31555. Lockheed Missiles and Space Co. N79-19075

CR-161172 March 1, 1979
Research Study on Stabilization and Control Modern Sampled-Data Control Theory Digital Controller Design: Analysis of the Annular Suspension Pointing System, Final Report. NAS8-32358. Systems Research Laboratory. N79-19347

CR-161173 March 21 1979
Satellite Power System (SPS) Concept Definition Study (Exhibit C) Final Performance Review. NAS8-32475. Rockwell International. N79-19071

CR-161174 1978
Study Coal Radar Measuring System, Interim Final Report. NAS8-32655. Info Systems, Inc. X79-10062

CR-161175 February 1979
Design Study of Teleoperator Space Spider, Final Report. NAS8-32620. Martin Marietta Corp. X79-10038

CR-161176 February 1979
Design Study of Teleoperator Space Spider, Final Report, Appendix A. NAS8-32620. Martin Marietta Corp. X79-10039

CR-161177 February 1979
Design Study of Teleoperator Space Spider, Final Report, Appendix B. NAS8-32620. Martin Marietta Corp. X79-10040

CR-161178 February 8, 1979
Development of Concepts for Satellite Retrieval Devices, Final Report. NAS8-33073. Essex Corp. N79-20158

CR-161179 February 1979
SPAR V Technical Report for Experiment 74-37 Contained Polycrystalline Solidification in Low-G. NAS8-31530. Grumman Aerospace Corp. N79-75643

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161180 September 1978
Skylab Reuse Study, Final Report. NAS8-32916. Martin Marietta Corp. N79-75325

CR-161181 February 1979
Application of Coupled Base Motion Analyses to Design Load Studies of Civil Structures, Final Report. NAS8-33196. Colorado Institute of Structural Mechanics. N79-74886

CR-161182 February 17, 1979
25 kW Power Module Evolution Study, Executive Summary. NAS8-32928. Lockheed Missiles and Space Co. N79-20219

CR-161183 December 8, 1978
Optical Surface Damage from Reentrant Gases on STS, Final Report. NAS8-32483. Athens State College. N79-20859

CR-161184 February 18, 1979
Air Breathing Engine Rocket Trajectory Optimization, Final Report. NAS8-33225. University of Tennessee Space Institute. N79-20159

CR-161185 December 15, 1978
Assessment of Economic Factors Affecting the Satellite Power System, Volume I, System Cost Factors. NAS8-33002. Econ, Inc N79-21551

CR-161186 March 1979
Assessment of Economic Factors Affecting the Satellite Power System, Volume II, The Systems Implications of Rectenna Siting Issues. NAS8-33002. Arthur L. Little, Inc. N79-21552

CR-161187 December 1978
Skylab Reuse Study, Final Report and Reference Data, Part 1. NAS8-32917. McDonnell Douglas Astronautics Co. N79-20169

CR-161188 December 1978
Skylab Reuse Study, Final Report and Reference Data, Part 2 — Appendixes. NAS8-32917. McDonnell Douglas Astronautics Co. N79-20170

CR-161189** April 1979
Design Package for Solar Domestic Hot Water System. NAS8-32245. Elcam, Inc.

CR-161190** April 1979
Installation Package for the Solaron Solar Subsystems. NAS8-32249. Solaron Corp. N79-23491

CR-161191** April 1979
Test and Evaluation of Fern Engr. Co., Inc., Solar Heating and Hot Water System. NAS8-32246. Fern Engr. Co. N79-24438

CR-161192** April 1979
System Design Package for a Solar Heating and Cooling System Installed at Akron, Ohio. NAS8-32249. N79-23490

CR-161193 March 15, 1979
Thermal Analysis of Bridgman-Stockbarger Growth, Final Technical Report. NAS8-33204. GAI, Advanced Materials Division. N79-20889

CR-161194 December 1977
Turbulence Simulation Mechanization for Space Shuttle Orbiter Dynamics and Control Studies, Summary Report. NAS8-31173. Science Applications, Inc. N79-20174

CR-161195 August 31, 1978
Solidification (Crystal Growth) in the

Presence of Gravitational Forces, Final Report. NAS8-30537. Massachusetts Institute of Technology. N79-21922

CR-161196 February 1979
Investigations in Cosmic and Gamma Ray Astronomy and Nuclear Instruments, Annual Report. NAS8-31895. University of Alabama in Huntsville. N79-21963

CR-161197 December 1978
Results of a Test in the MSFC 14-Inch Wind Tunnel to Determine the Space Shuttle Launch Vehicle Attach Structure Aerodynamics and the Effects of Mold Line Changes, Instrumentation Leads and Tunnel Flow Angularity on the Launch Vehicle Aerodynamics. NAS8-32530. Lockheed Missiles and Space Co. X79-10041

CR-161198 February 1979
Aerodynamic Heating to Representative SRV and ET Protuberances, Final Report. NAS8-32585. Remtech, Inc. N79-21004

CR-161199 January 1978
Global Crop Production Forecasting Data Systems Analysis, Final Report. NAS8-32408. Ecosystems International, Inc. N79-25447

CR-161202** April 1979
Design Data Brochure for a Pyramidal Optics Solar System. NAS8-32250. Wormser Scientific Corp.

CR-161203**. April 1979
Installation, Operation and Maintenance for the Pyramidal Optics Solar System Installed at Yacht Cove, Columbia, South Carolina. NAS8-32250. Wormser Scientific Corp.

CR-161204** April 1979
Prototype Solar Heating and Cooling Systems. NAS8-32091. AiResearch Manufacturing Co. N79-24437

CR-161205 December 12, 1978
Evaluation of Shaberth (A Bearing Simulation Computer Progam). NAS8-31904. Wyle Laboratories. N79-24349

CR-161206 January 1979
NASA/IITRI Manufacturing Process Applications Team (MATeam). NAS8-32229. Research Institute. X79-10053

CR-161207 December 1978
Metallurgical Analysis of Skylab M552 and M557 Samples, Final Report. NAS8-28728. Grumman Aerospace Corp. N79-22276

CR-161208 April 6, 1979
Evaluation of SSME High Pressure Liquid Oxygen Turbopump Bearings, Final Report. NAS8-33221. Battelle Columbus Laboratories. N79-22521

CR-161209 February 1979
A Query Into the Source of Proton Emission from Solar Flares, Final Report. NAS8-32855. Spectra Optics. N79-22990

CR-161210 March 30, 1979
Low Gravity Flight Complement Data, Final Report. NAS8-32711. Teledyne Brown Engineering. N79-22173

CR-161211 March 27, 1979
Shuttle Orbiter Turbulence Simulation Model Development, Summary Report. NAS8-33076. Engineering Analysis, Inc. N79-76888

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161212 April 9, 1979
Study of Software Application of Airborne Laser Doppler System for Severe Storms Measurement, Final Report. NAS8-33089. M&S Computing, Inc.
N79-23586

CR-161213* February 27, 1979
Research Study: Device Technology, Star Router User's Guide, Final Report. NAS8-32632. M&S Computing, Inc.

CR-161214 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C) Volume III, Experimental Verification Definition. NAS8-32475. Rockwell International. N79-22632

CR-161215 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume V, Special Emphasis Studies. NAS8-32475. Rockwell International.
N79-22633

CR-161216 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume VI, In-Depth Element Investigation. NAS8-32475. Rockwell International. N79-22634

CR-161217 April 1979
Space Station Thermal Control Surfaces, Final Report. NAS8-32637. Aerojet Electrosystems Co. N79-22178

CR-161218 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report (Exhibit C), Volume I, Executive Summary. NAS8-32475. Rockwell International.
N79-23484

CR-161219 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume II, Part I, Systems Engineering. NAS8-32475. Rockwell International. N79-23485

CR-161220 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume II, Part 2, Systems Engineering (Cost and Programmatics). NAS8-32475. Rockwell International.
N79-23486

CR-161221 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume II, Part 2 — Appendixes, Systems Engineering (Cost and Programmatics — Appendixes). NAS8-32475. Rockwell International.
N79-23487

CR-161222 March 1979
Satellite Power Systems (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume IV, Transportation Analysis. NAS8-32475. Rockwell International.
N79-23488

CR-161223 March 1979
Satellite Power System (SPS) Concept Definition Study, Final Report, (Exhibit C), Volume VII, System/Subsystem Requirements Data Book. NAS8-32475. Rockwell International. N79-23489

CR-161224 April 1979
Thermal and Fluid Flow Analyses of Sounding Rocket Experiments 74-21/2R and 74-21/3R (Final Report). NAS8-32422. Lockheed Missiles and Space Co., Inc. N79-24295

CR-161225 1979
Development of Sensitized Pick Coal Interface Detector System, Final Report. NAS8-32538. Shaker Research Corp. N79-24417

CR-161226 April 1979
Design, Fabrication, and Delivery of a Charge Injection Device as a Stellar Tracking Device, Final Technical Report. NAS8-32801. General Electric Co. N79-24919

CR-161227 April 1979
Dynamic Characterization and Analysis of Space Shuttle SRM Solid Propellant Final Report. NAS8-32234. W. L. Hufferd & Associates. N79-77527

CR-161228** May 1979
Solar Heating System Final Design Package. NAS8-32243. Contemporary Systems, Inc. N79-25503

CR-161229** May 1979
System Installation Package for the New Hampshire Vocational Technical College, Manchester, N. H. NAS8-32243. Contemporary Systems. N79-25502

CR-161230** May 1979
Thermal Performance Evaluation of the Semco (Liquid) Solar Collector. NAS8-32248. Florida Solar Energy Center. N79-27656

CR-161231**
Solar Heating System for Visitor Center at Stephens College, Columbia, Missouri. DOE-EG-77-A-01-4084. John Epple Construction Co.

CR-161232 April 1979
Swath Width Study, Final Report, A Simulation Assessment of Costs and Benefits of a Sensor System for Agricultural Application. NAS8-32491. General Electric Co. N79-25461

CR-161233 February 1979
Analysis of Time Dependent Phenomena Observed with the LPSP OSO-8 Instrument, Final Report. NAS8-32356. Lockheed Palo Alto Research Laboratory. N79-24932

CR-161234 June 1979
Transistor Screening Evaluation S16708H, Final Report. NAS8-32087. Motorola, Inc. N79-24258

CR-161235** May 16, 1979
Solar Heating and Hot Water System Installed at Cherry Hill Inn, Cherry Hill, New Jersey. DOE Contract EG-77-A-01-4086. Garden State Racing Association. N79-28729

CR-161236** June 1979
Indoor Test for Thermal Performance Evaluation of Seven Elcam Fin-Tube Solar Collector Configurations. NAS8-32036. IBM Inc. N79-27657

CR-161237** June 1979
Solar Heating, Cooling, and Hot Water Systems Installed at Richland, Washington, Final Report. Engr. Olympic Corp. N79-28721

CR-161238** June 1979
Solar Energy System Installed at Mount Rushmore National Visitor Center in Keystone, S. D. Doe Contract EX-76-C-01-2399. N79-27661

CR-161239 May 29, 1979
Identification of Limit Cycles in Multi-Nonlinearity, Multiple Path Systems, Final Report for January 1, 1978 to May 31, 1979. NAS8-32810. Mississippi State University. N79-25805

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161240 May 1979
Investigation of the Free Flow Electrophoretic Process, Final Report, Volume II, Technical Analysis. NAS8-32200. McDonnell Douglas Astronautics Co.
N79-26133

CR-161241 May 1979
Investigation of the Free Flow Electrophoretic Process, Final Report, Volume I, Executive Summary. NAS8-32200. McDonnell Douglas Astronautics Co.
N79-26132

CR-161242
Detection of Plant Stress Through Multispectral Photography, Final Report. NAS8-29856. Auburn University.
N79-28633

CR-161243 April 30, 1979
Cat Information Display System Users Manual, Final Report. NAS8-33089. M&S Computing, Inc. N79-26711

CR-161244 May 1979
Development of Stable Low-Electroosmotic Mobility Coatings, Final Report. NAS8-32406. Lehigh University.
N79-25180

CR-161245 May 18, 1979
Manufacturing Process Applications Team (MATeam), Quarterly Status Report No. 1 for 1979. NAS8-32229. IIT Research Institute. X79-75357

CR-161246 May 1979
Thermal Analysis of a Materials Processing Furnace Being Developed for Use with Heat Pipes, Final Report. NAS8-33471. Lockheed Missiles and Space Co., Inc. N79-25350

CR-161247 January 31, 1979
Evaluation of the Effects of Solar Radiation on Glass, Final Report. NAS8-32521. IIT Research Institute.
N79-26209

CR-161248 November 1978
Evaluation of Surface Properties in SPAR Electrophoresis, Final Report. NAS8-32657. LeHigh University.
N79-26136

CR-161249 April 30, 1979
Mathematical Models of Continuous Flow Electrophoresis, Progress report for November 1, 1979 through April 30, 1979. NAS8-32614. Princeton University.
N79-77963

CR-161250 June 5, 1979
Magnetic and Velocity Fields of Faculae in Collaboration with OSO-I, Final Report. NAS8-32409. The Aerospace Corp. N79-78290

CR-161251 June 14, 1979
Inertial Upper Stage (IUS) Software Analysis, Final Report. NAS8-33072. M&S Computing, Inc.
N79-26107

CR-161252 April 20, 1979
HEAO-1 Mission Evaluation, Final Report. NAS8-28300. TRW Defense and Space Systems Group. N79-78287

CR-161253** July 1979
Thermal Performance Evaluation of the Suncatcher SH-11 Liquid Solar Collector. NAS8-32036. IBM Corp.

CR-161254* June 1979
Subscale Solid Motor Nozzle Tests —

Phase IV — and Nozzle Materials Screening and Thermal Characterization — Phase V. NAS8-30264. Acurex Corp./ Aerotherm. N79-29226

CR-161255 June 1979
Meta Assembler Enhancements and Generalized Linkage Editor, Final Report. McDonnell Douglas Astronautics Co. N79-27872

CR-161256 December 1973
Evaluation of Modal Analysis Techniques, Final Report, Volume I, Theory. NAS8-26750. Martin Marietta Corp. N79-78801

CR-161257 December 1973
Evaluation of Modal Analysis Techniques, Final Report, Volume II, Subroutine Explanations. NAS8-26750. Martin Marietta Corp. N79-78802

CR-161258 December 1973
Evaluation of Modal Analysis Techniques, Final Report, Volume III, Subroutine Listings. NAS8-26750. Martin Marietta Corp. N79-78803

CR-161259 August 18, 1977
SRB/HPU Turbine and Sensor Simulator. NAS8-32405. M&S Computing, Inc.

CR-161260 August 18, 1977
TVC Actuator Hardware Design Document. NAS8-32405. M&S Computing, Inc.

CR-161261 August 18, 1977
TVC Actuator Software Design Document. NAS8-32405. M&S Computing, Inc.

CR-161262 July 14, 1978
MMES Self-Test Hardware. NAS8-32405. M&S Computing, Inc.

CR-161263 March 31, 1978
MMES TVC Actuator Simulator Design Document, Volume III, Hardware Self-Test and Repair Document. NAS8-32405. M&S Computing, Inc.

CR-161264 November 15, 1978
Marshall Mated Element System Mechanical Separation Simulator Operational Description and Arming Procedure, Final Report. NAS8-32405. M&S Computing, Inc.

CR-161265 February 1979
Design Study for Countercurrent Distribution (CCD) Studies, Final Report. NAS8-32086. Beckman Instruments, Inc. N79-78780

CR-161266 February 1978
Biological Liquids Handling Procedures Study, Final Report. NAS8-32612. Beckman Instruments, Inc. N79-78733

CR-161267 June 1979
Crystal Nucleation in Glass-Forming Alloy and Pure Metal Melts Under Containerless and Vibrationless Conditions, Annual Report. NAS8-32691. Harvard University N79-28285

CR-161268 1979
Final Report on Contract NAS8-31612. Tylan Corp.

CR-161269 1979
Final Report on Contract NAS8-31617. Tylan Corp.

CR-161270 June 1979
Trends and Techniques for Space Base

Electronics, Final Report. NAS8-26749. Mississippi State University. N79-78782

CR-161271** July 1979
Solar Heating and Hot Water System Installed at Mentor, Kansas. DOE Contract EG-77-A-01-4077. Wilson & Co. N79-29602

CR-161272** August 1979
Solar Energy Retrofit for Clarksville Middle School, Clarksville, Indiana. DOE Contract EG-77-A-01-4076. Clarksville Community School Corp.

CR-161273** August 1979
Solar Energy System Installed at the North Georgia AODC Office Building. DOE Contract EG-77-A-01-4075. North Georgia Area Planning & Dev. Commission.

CR-161274 May 15, 1979
Space Shuttle Plume/Simulation Application, Final Report, Results and Math Model Supersonic Data. NAS8-32524. Northrop Services, Inc. N79-29220

CR-161275 May 15, 1979
Space Shuttle Plume/Simulation Application, Final Summary Report. NAS8-32524. Northrop Services, Inc. N79-29221

CR-161276 June 1978
Trends and Techniques for Space Base Electronics, Quarterly Report for March 10, 1978 to June 10, 1978. NAS8-26749. Mississippi State University.

CR-161277 September 1978
Trends and Techniques for Space Base Electronics, Quarterly Report for June 11, 1978 to September 10, 1978. NAS8-26749. Mississippi State University.

CR-161278 December 1978
Trends and Techniques for Space Base Electronics, Quarterly Report for September 11, 1978 to December 10, 1978. NAS8-26749. Mississippi State University.

CR-161279 March 1979
Trends and Techniques for Space Base Electronics, Quarterly Report for December 11, 1978 to March 10, 1979. NAS8-26749. Mississippi State University.

CR-161280 1979
The Upgrading of Glass Microballoons, Final Report. NAS8-33101. Bjorksten Research Laboratories, Inc. N79-29330

CR-161281 December 1978
Characterization and Modeling of Radiation Effects on NASA/MSFC Semiconductor Devices, Final Report. NAS8-32634. Auburn University.

CR-161282 June 1979
Accelerated Life Testing Effects on CMOS Microcircuit Characteristics, Phase IV Report, November 1977 to April 1979. NAS8-31905. RCA, Solid State Division. N79-29433

CR-161283 June 1979
Crystal Nucleation in Glass-Forming Alloy and Pure Metal Melts Under Containerless and Vibrationless Conditions, Annual Summary. NAS8-32691. Harvard University.

CR-161284 July 1979
AXAF Optical Technology Analysis, Final Report. NAS8-33158. TAI Corp. N79-30008

NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161285 July 1979
Design of a Low-Cost Automated Landsat Data Analysis System, Final Report. NAS8-33136. Metrics, Inc.

CR-161286 March 15, 1979
Space Fabrication Demonstration System, Final Report, Technical Volume. NAS8-32472. Grumman Aerospace Corp. N79-29213

CR-161287 March 15, 1979
Space Fabrication Demonstration System, Final Report, Executive Summary. NAS8-32472. Grumman Aerospace Corp. N79-29214

CR-161288 October 27, 1978
Space Construction Base Control System, Final Report. NAS8-32660. Bendix Corp. N79-29215

CR-161289* July 26, 1979
Standard Transistor Array (STAR) — Volume 1: Placement Technique. NAS8-31572. Auburn University.

CR-161290** August 1979
Development of Surfaces Optically Suitable for Flat Solar Panels — Final Report. NAS8-32481. University of Alabama.

CR-161291* July 26, 1979
Standard Transitor Array (STAR) — Addendum 1 to Volume 1, CAPSTAR User's Guide. NAS8-31572. Auburn University.

CR-161292* August 10, 1979
Standard Transistor Array (STAR) — Addendum 2 to Volume 1: CAPSTAR Programmer's Guide. NAS8-31572. Auburn University.

CR-161293* September 1979
Extraterrestrial Processing and Manufacturing of Large Space Systems. NAS8-32925. Massachusetts Institute of Technology.

CR-161294* September 14, 1979
Standard Transistor Array (STAR) — Volume 2: Test Pattern Generation. NAS8-31572. Auburn University.

CR-161295* September 14, 1979
Standard Transistor Array (STAR) — Volume 2, Addendum 1: SIMLOG/TESTGN User's Guide. NAS8-31572. Auburn University.

CR-161296 June 1979
Low Cycle Fatigue Properties of MAR-M-246 Hf in Hydrogen, Final Report. NAS8-33109. Pratt & Whitney Aircraft Group.

CR-161297 June 29, 1979
Orbit Transfer Vehicle (TV) Engine, Phase "A" Study, Final Report, Volume I: Executive Summary. NAS8-32999. Aerojet Liquid Rocket Company.

CR-161298 June 29, 1979
Orbit Transfer Vehicle (OTV) Engine Phase "A" Study, Final Report, Volume II: Study Results. NAS8-32999. Aerojet Liquid Rocket Company.

CR-161299 April 1979
Evaluation of Candidate Metals in a Simulated Space Shuttle Main Engine Environment for Application as Turbine Blade Dampers. NAS8-33102. Princeton University.

CR-161300 June 30, 1979
Design, Fabrication and Installation of

Yaw Measuring Device, Final Report. NAS8-33209. Benton Corporation.

CR-161301 July 17, 1979
Standalone Engine Simulator (SAES) Engine Dynamics Simulator (EDS) Xerox Sigma 5 Interface Hardware Manual. NAS8-33244. M&S Computing, Inc.

CR-161302 June 30, 1979
Feasibility Study of Silicon Nitride Protection of Plastic Encapsulated Semiconductors, Final Report. NAS8-33075. Hughes Aircraft Co.

CR-161303 June 29, 1979
Orbit Transfer Vehicle (OTV) Engine, Phase "A" Study, Final Report, Volume III; Study Cost Estimates. NAS8-329-9. Aerojet Liquid Rocket Company.

CR-161304 August 1979
Dual-Fuel, Dual-Throat Engine Preliminary Analysis, Final Report. NAS8-32967. Aerojet Liquid Rocket Co.

*White cover reports published at MSFC.
**DOE/NASA reports.

MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

ANDERSON, B. J. ES83
HALLETT, J. Desert Research Institute
Influence of Environmental Saturation and Electric Field on Growth and Evaporation of Epitaxial Ice Crystals. For publication in the Journal of Crystal Growth.

ARTHUR, CARLENE W. ES53
Digital Techniques for UFL Wave Polarization Analysis. For presentation at the URSI XIX General Assembly to be held at Helsinki, Finland on August 2-9, 1978.

ARTHUR, CARLENE W. ES53
BJORDAL, J. University of Bergen
ROSENBERG, T. J. University of Maryland
Pc3 Magnetic Pulsations and Precipitation of Energetic Electrons. For publication in the Journal of Geophysical Research.

ARTHUR, C. W. ES53
McPHERRON, R. L.
University of California at Los Angeles
The Statistical Character of Pc 4 Magnetic Pulsations at Synchronous Orbit. For publication in the Journal of Geophysical Research.

ASKINS, BARBARA S. ES52
The Effect of Reduced Scatter of Radiographic Information. Content and Patient Exposure. For publication in Medical Physics.

ASKINS, BARBARA S. ES52
Post Development Image Intensification by Autoradiography. For publication in Publications of the Astronomical Society of the Pacific.

BALENTINE, ROBERT C. EE61
Space Telescope Flight Software Requirements. For presentation at the Real-Time Programming for NASA Flight Project Workshop to be held at Langley Research Center, Hampton, Virginia on August 9, 1979.

BAUGHER, CHARLES R. ES53
CHAPPELL, C. R. ES53
SHELLEY, E. G. ES53
On the Properties of Thermal Ions in the Magnetosphere. For presentation at the Spring Meeting of the American Geophysical Union to be held in Washington, D. C. on May 29-June 1, 1979.

BILBRO, J. W. EC32
WEAVER, E. A. EC32
DiMARZIO, C. Raytheon Co.
HARRIS, C. Raytheon Co.
BURNHAM, D. C.
DOT Transportation Systems Center
AHLLOCK, J. N.
DOT Transportation Systems Center
Pulsed Laser Doppler Measurements of Wind Shear. For publication in the Bulletin of the American Meteorological Society.

BROUSSARD, P. H. PF09
PALOWITCH, E. R. Department of Energy
Automated Guidance and Control for a Longwall Shearer. For presentation at the AIME Annual Meeting to be held in New Orleans, Louisiana on February 19-22, 1979.

BUCHANAN, H. ED15
HOPKINS, M. ED15
GALABOFF, Z. ED15
Dynamics of Uncontrolled Skylab. For presentation at the 18th AIAA Aerospace Sciences Meeting to be held in Pasadena, California on January 14-16, 1980.

BURCH, J. L. ES53
FIELDS, S. A. ES53

MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.).

HEELIS, R. A.
University of Texas at Dallas
Polar-Cap Electron Acceleration Regions. For publication in Journal of Geophysical Research.

CALVERT, JOHN A. EP34
A Polarimeter for the High Resolution Ultraviolet Spectrometer/Polarimeter For presentation at the 14th Aerospace Mechanisms Symposium to be held at Langley Research Center, Hampton, Virginia on May 1-2, 1980.

CAMP, DENNIS W. ES82
FROST, WALTER
University of Tennessee Space Institute
CONNOLLY, JOHN W. NOAA
ENDERS, JOHN H. NASA Headquarters
SOWAR, JOSEPH W.
Federal Aviation Administration
Third Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. For publication in the Bulletin of the American Meteorological Society.

CAREY, WILLIAM T. PS06
An Overview of Geostationary Platform Missions and Concepts. For presentation at the 1979 Annual Meeting of the American Astronautical Society "Space Shuttle: Dawn of an Era" to be held in Los Angeles, California on October 29-November 1, 1979.

CASH, MITCHELL FA31
Hardware Problems in Solar Heating and Cooling Systems — An Update. For presentation at the 1979 International Solar Energy Society Congress to be held at Atlanta, Georgia on May 28-June 1, 1979.

CASH, MITCHELL FA32
ELKIN, ROBERT F. EL55
The Effects of Air Leaks on Solar Air Heating Systems. For presentation at the 1979 International Solar Energy Society Congress to be held at Atlanta, Georgia on May 28-June 1, 1979.

CERNY, OTTO F. EG13
Product Assurance During Manufacturing and Testing of the Solid Rocket Motor for the NASA Space Shuttle. For presentation at the 28th Space Travel Congress of the Hermann Oberth Society to be held in Salzburg, Austria on June 21-26, 1979.

CHAPPELL, CHARLES R. ES53
The Earth's Plasmasphere. For presentation at the International Workshop on Selected Topics of the Magnetospheric Physics to be held at the International House of Japan, Tokyo on March 13-16, 1979.

COFIELD, KESTER L., JR. NA51
The Space Transportation System — An Opportunity for Black Participation in Space. For presentation at "Technology in the Black Community National Technical Association" to be held in Pittsburgh, PA on August 1-4, 1979.

COSTES, NICHOLAS C. ES81
The Potential for In-Space Research on Soil Behavior Under Earthquake Excitation. For presentation at the U. S. National Conference on Earthquake Engineering — 1977 to be held at Sanford, California on August 22-24, 1979.

CRAFT, HARRY G., JR. JA12
A Review of Spacelab Mission Management Approach. For presentation at the 1979 Annual Meeting of the American Astronautical Society to be held at Los Angeles, California on October 29-November 1, 1979.

MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

CRAVEN, P. D. ES51
REASONER, D. L. ES51
CHAPPELL, C. R. ES51
Observations of Hydrogen and Oxygen Plasmas Near Synchronous Orbit. For presentation at the 1979 Fall National Meeting of the American Geophysical Union to be held at San Francisco, California on December 3-7, 1979.

CURRIE, JAMES R. EC24
Multichannel Temperature Controller for Hot Air Solar Heating. For presentation at the Institute of Environmental Sciences Meeting to be held at Seattle, Washington on April 29-May 2, 1979.

DUTHIE, J. G. ES62
McMILLAN, R. S. ES62
Search for Optical Bursts from Cyg X-1. For publication in the Bulletin of the AAS.

DUTHIE, J. G. ES62
McMILLAN, R. S. ES62
An Upper Limit on Ultraviolet Shot Noise from Cygnus X-1. For publication in the Astrophysical Journal.

EBY, PETER ES63
Gyro Precession and Mach's Principle. For publication in General Relativity and Gravitation (Bern, Switzerland).

EDWARDS, T. R. ES64
Two-Dimensional Convolute Integers for Optical Image Data Processing. For presentation at the MIRADCOM Workshop to be held in Huntsville, Alabama on November 19, 1979.

EDWARDS, THOMAS R. ES64
Linear Modeling on a Nova with Graphics and Utilizing $TT01/$TT11. For presentation at the Sixth Annual Conference of the Data General Users Group to be held in New Orleans, Louisiana on December 4-7, 1979.

EHL, JAMES H. EH41
IRVINE, CHARLES N. EH44
WILLIAMS, JAMES R. EH41
Beam Builder for Space Fabrication. For presentation at the SAMPE Conference to be held in San Francisco, California on May 8-10, 1979.

ELKIN, ROBERT EL55
The Effect of Air Leaks on Solar Air Heating Systems. For presentation at the 1979 International Solar Energy Society Congress to be held in Atlanta, Georgia on May 28-June 1, 1979.

EULER, H. C. ES81
LUNDQUIST, C. A. ES01
VAUGHAN, W. W. ES81
MSFC Solar Activity Predictions for Satellite Orbital Lifetime Simulation. For publication in Solar-Terrestrial Predictions Proceedings.

FELIX, A. RICHARD ED35
Dryer Aging Problems in a 500 psi Air Supply System. For presentation at the 51st Meeting of the Supersonic Tunnel Association to be held in Valencia, California on April 10-11, 1979.

FICHTL, GEORGE H. ES82
FOWLIS, WILLIAM W. ES82
BROOME, BARRY G.
Aerojet Electrosystems Co.
The Geophysical Fluid Flow Experiment. For presentation at the SPIE Huntsville Electro-Optical Technical Symposium to be held in Huntsville, Alabama on May 22-25, 1979.

FICHTL, GEORGE H. ES82
FOWLIS, WILLIAM W. ES82
HART, JOHN E. University of Colorado
TOOMRE, JURI University of Colorado
GILMAN, PETER A.
National Center for Atmospheric Research
Spherical Convection Experiments in Space. For presentation at the Conference on Comparative Fluid Dynamics to be held in Annapolis, Maryland on June 11-13, 1979.

FIELD, E. L. TA31
Space Telescope — A Long-Life Free-flyer. For presentation at the 1979 Annual Meeting of American Astronautical Society to be held in Los Angeles, California on October 29-November 1, 1979.

FIELDS, STANLEY A. ES53
Polar-Cap Electron Acceleration Regions. For presentation at the Spring Meeting of the American Geophysical Union to be held in Washington, D. C. on May 29-June 1, 1979.

FISHMAN, G. J. ES61
Galactic Distribution Models of Gamma-Ray Burst Sources. For publication in Astrophysical Journal.

FISHMAN, G. J. ES62
HEAO-1 Observations. For publication in the IAU Circular 3206.

FISHMAN, GERALD J. ES62
The Marshall Program in Gamma Ray Burst Astronomy. For presentation at the Toulouse Symposium and Workshop on Cosmic Gamma Ray Bursts to be held in Toulouse, France on November 26-29, 1979.

FISHMAN, GERALD J. ES62
Models of Galactic Distributions of Gamma-Ray Burst Sources and Resulting Log N-Log S Curves and Burst Luminosities. For publication in the Bulletin o the American Astronomical Society.

FOUNTAIN, J. A. ES64
WEST, E. A. ES64
HORAI, K. Columbia University
WINKLER, J. L.
Lockheed Electronic Corp.
KEIHM, S. J. Columbia University
LANGSETH, M. G. Columbia University
Thermal Conduction in a Composite Circular Cylinder: A New Technique for Thermal Conductivity Measurements of Lunar Core Samples.* For publication in the Journal of Geophysical Research.

*Also for publication in the Philosophical Transactions of th Royal Society of London (England).

FOWLIS, WILLIAM W. ES82
Remote Optical Techniques for Liquid Flow and Temperature Measurement for Spacelab Experiments. For publication in Optical Engineering.

FOWLIS, W. W. ES82
GEISLER, J. E. University of Miami
Theoretical Regime Diagrams for Thermally Driven Flows in a Beta-Plane Channel. For publication in the Journal of the Atmospheric Sciences.

FOWLIS, WILLIAM W. ES82
GEISLER, JOHN E. University of Miami
GIERE, AL. NASA/MSFC—USRA
Theoretical Studies of Baroclinic Instability for a Spherical Model Experiment for Spacelab. For presentation at

the Conference on Comparative Fluid Dynamics to be held in Annapolis, Maryland on June 11-13, 1979.

FROST, WALTER
University of Tennessee Space Institute
BURTON, HARRY L.
Federal Aviation Administration
CAMP, DENNIS ES82
CONNOLLY, JOHN W.
National Oceanic and Atmospheric Administration
ENDERS, JOHN E. NASA Headquarters
SOWAR, JOSEPH F.
Federal Aviation Administration
Summary of Second Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. For publication by the American Meteorological Society.

GHOSH, P. MSFC-NAS-NRC
LAMB, F. K. University of Illinois at Urbana-Champaign & CIT
Accretion by Rotating Magnetic Neutron Stars. III. Accretion Torques and Period Changes in Pulsating X-Ray Sources. For publication in the Astrophysical Journal.

GLAESE, JOHN R. ED12
KENNEL, HANS F. ED12
Torque Equilibrium Attitude Control for Skylab Reentry. For presentation at the AAS Rocky Mountain Guidance and Control Conference to be held at Keystone, Colorado on February 17-21, 1980.

GRINER, DONALD B. EC32
BRDF Measurements of Stray Light Suppression Coatings for ST. For presentation at the SPIE Electro-Optical Technical Symposium and Workshop to be held at the Von Braun Civic Center, Huntsville, Alabama on May 22-25, 1979.

GRINER, DONALD B. EC32
A Scanner to Measure BRDF of Black Coatings. For presentation at the 14th Aerospace Mechanisms Symposium to be held at Langley Research Center, Hampton, Virginia on May 1-2, 1980.

GUYNES, BARRY V. FA33
Economic Considerations in Solar Construction. For presentation at the Plant Engineering and Maintenance Conference/Southwest to be held in Houston, Texas on November 14-16, 1978.

HAGEN, WILLIAM A. FA33
Harvesting the Puerto Rican Sun. For presentation at the 1979 International Solar Energy Society Congress to be held at Atlanta, Georgia on May 28-June 1, 1979.

HALL, STEPHEN PD24
Simulating the Assembly of Large Space Structures. For presentation at the 1979 Annual Meeting of the American Astronautical Society "Space Shuttle: Dawn of an Era" to be held in Los Angeles, California on October 19-November 1, 1979.

HAMITER, LEON EC43
Failure Causes and Reliability Improvements in Metallized Polycarbonate Capacitors. For presentation at the Advanced Techniques in Failure Analysis Symposium to be held in Los Angeles, California on October 8-11, 1979.

HILL, KELLY ES84
WILSON, GREGORY S.
USRA Visiting Scientist at MSFC
TURNER, ROBERT E. ES84
NASA's Participation in the AVESESAME '79 Program. For publication in the Bulletin of the American Meteorological Society.

HUETER, UWE EL32
Thermal/Environmental Control and Life Support Systems Requirements for Future Space Applications. For presentation at the International Symposium on Spacecraft Thermal and Environmental Control System to be held at Munich, Germany on October 10-12, 1978.

HUNG, R. J.
University of Alabama in Huntsville
SMITH, R. E. ES81
Gravity Waves, Tornadic Storms and Coupling Between Lower and Upper Atmospheres. For presentation at the SVII IUGG Meeting to be held in Canberra, Australia.

HUNG, R. J.
University of Alabama in Huntsville
SMITH, R. E. ES81
Study of GOES Infrared Digital Data of an Isolated Tornadic Storm on May 29, 1977. For presentation at the XVII IUGG Meeting to be held in Canberra, Australia on December 3-15, 1979.

HUNG, R. J.
University of Alabama in Huntsville
SMITH, R. E. ES81
Dynamics of Severe Storms Through the Study of Thermospheric-Tropospheric Coupling. For publication in the Journal of Geomagnetism and Geoelectricity.

HYUN, JAE MIN
ES82—NRC Research Associate
KIM, MOON-UHN
Korea Advanced Institute of Science
The Effect of the Nonuniform Wind Shear on the Intensification and Reflection of Mountain Waves. For publication in the Journal of Atmospheric Science.

JEAN, O. C. NA01
LEE, THOMAS J. NA01
The Cost Benefits of the Spacelab System to Scientific Investigations and Space Applications. For presentation at the 30th International Astronautical Congress to be held in Munich, West Germany on September 16-23, 1979.

JOHNSON, GORDON M.
McDonnell Douglas Astronautics Co.
HAMITER, LEON EC43
VILLELLA, FELMINIO EC43
Factors Influencing Microcircuit Package Reliability. For presentation at the Advanced Techniques in Failure Analysis Symposium - 1978, IEEE to be held in Los Angeles, California on November 6-9, 1978.

JOHNSTON, J. DWIGHT EE01
KERSTEN, LEENDERT
Univ. of Nebraska
Triple-Axis Common-Pivot Arm Wrist Device for Manipulative Applications. For presentation at the 14th Aerospace Mechanisms Symposium to be held at Langley Research Center, Hampton, Virginia on May 1-2, 1980.

JONES, CLYDE S., JR. EC24
MICHON, GERALD General Electric
The Charge Injection Device as a Candidate Sensor for Stellar Tracking. For presentation at the SPIE Huntsville Electro Optical Technical Symposium and Workshop to be held at the Von Braun Civic Center, Huntsville, Alabama on May 22-25, 1979.

KORSCH, DIETRICH TAI Corp.
WYMAN, CHARLES L. EE01
PERRY, L. MIKE TAI Corp.

Influence of Alignment and Surface Defects on the Performance of X-Ray Telescopes. For presentation at the Proceedings of the Society of Photo-Optical Instruments Engineering to be held in Huntsville, Alabama on May 23, 1979.

KROES, R. L. ES74
LAL, R. B.
Alabama A&M University, Huntsville
Solution Crystal Growth of TGS in a Low Gravity Environment. For presentation at the AIAA 17th Aerospace Sciences Meeting to be held at New Orleans, Louisiana on January 15-17, 1979.

KROSS, D. A. ED22
Space Shuttle Solid Rocket Booster Decelerator Subsystem Rocket Sled Test Program. For presentation at the AIAA 6th Aerodynamic Decelerator Conference to be held at Houston, Texas on March 5-7, 1979.

LAUE, JAY H. PS01
Briefing Material on "Shuttle/Tethered Satellite System (TSS). For presentation at the SAE Aerospace Control and Guidance Systems Meeting to be held in Englewood, Colorado on March 7-9, 1979.

LINDSTROM, ROBERT E. SA01
Space Shuttle Main Engine, External Tank and Solid Rocket Booster Status. For presentation at the Sixteenth Space Congress to be held in Cocoa Beach, Florida on April 25-27, 1979.

LOGAN, EARL Arizona State Univ.
CHANGE, JINGFA E.
Arizona State Univ.
ALEXANDER, MARGARET B. ES82
CAMP, DENNIS W. ES82
The Response of a Disturbed Pipe Flow to an Upstanding Roughness Element. For presentation at the 2nd International Symposium on Turbulent Shear Flows to be held in London, England on July 2-4, 1979.

LOMINICK, JAMES EC25
Design of the Space Shuttle SRB Thrust Vector Control Servoactuator. For presentation at the 14th Aerospace Mechanisms Symposium to be held at Langley Research Center, Hampton, Virginia on May 1-2, 1980.

LUNDQUIST, C. ES01
DECHER, R. ES61
SMARR, L.
Smithsonian Astrophysical Observatory
VESSOT, R.
Smithsonian Astrophysical Observatory
A Satellite Experiment for Testing Relativistic. Gravity Using Multiple Time-Correlated Doppler Signals. For presentation at the AAS Meeting to be held in Stanford, California on February 28-March 2, 1979 and for publication in the Bulletin of the AAS.

McCOOL, ALEX A. EP01
VERBLE, A. J. EP31
POTTER, JACK H. EP33
Space Transportation System Solid Rocket Booster Thrust Vector Control Systems. For presentation at the AIAA/SAE/ASME 15th Joint Propulsion Conference to be held in Las Vegas, Nevada on June 18-20, 1979.

McDONOUGH, G. F. EE01
Potential Earthquake Research at MSFC. For presentation at the University of Alabama in Huntsville, Dept. of Mechanical Engineering Colloquium to

be held in Huntsville, Alabama on March 30, 1979.

MAURER, ALICE CHENAULT ES73
Innovations in the Therapy of Diabetes. For publication in American Scientist.

MEEGAN, C. A. ES62
FISHMAN, G. J. ES62
HAYMES, R. C. Rice University
Observations of Cygnus X-3 Above 50 keV. For publication in Astrophysical Journal Letters.

MEEGAN, CHARLES ES62
FISHMAN, G. J. ES62
HAYMES, R. C. Rice University
A Search for Low Energy Gamma Rays Fron CG 195+4.

MEEGAN, CHARLES A. ES62
HAYMES, R. C. Rice University
Evidence for Variability of Hard X-Rays from NGC 4151. For publication in Astrophysical Journal (Letters).

MITCHELL, WALTER T. EE21
Space Shuttle Main Engine Digital Controller. For presentation at the AGARD (Advisory Group for Aerospace Research and Development) Meeting to be held in Cologne, West Germany on October 1-5, 1979.

MORGAN, SAMUEL H., JR. PS02
WU, S. T. UAH
Solar-Terrestrial Research in the Shuttle Age. For presentation at the AIAA Seminar "Shuttle to the Next Space Age" to be held in Huntsville, Alabama on July 18-19, 1979.

MORGAN, SAMUEL H., JR. PS02
Z^3 Contribution to Energy Loss of Heavy Charged Particles. For publication in Physical Review.

MURPHY, JAMES T. PA01
Orbital Transfer Vehicle Requirements and Concepts. For presentation at the XXXth International Astronautical Federation (IAF) Congress to be held in Munich, Germany on September 16-23, 1979.

NAKAGAWA. Y. ES51
Analyses of Temporal Behaviors, I. Basic Theory. For publication in the Astrophysical Journal.

NAKAGAWA, Y. ES51
TANDBERG-HANSSEN, E. ES51
WU, S. T. UAH
KAN, L. C. UAH
Effect of Thermal Conduction and Radiation on the Dynamics of a Flaring Loop. For publication in Solar Physics Journal (The Netherlands).

NAKAGAWA, Y. ES51
WU, S. T. UAH
HAN, S. M. UAH
Dynamics of Coronal Transients: A Non-Planar Two-Dimensional MHD Model For presentation at the IAU Symposium No. 91 to be held in Cambridge, Massachusetts on August 27-31, 1979.

NAUMANN, ROBERT J. ES71
TAEUSCH, DAVID R.
Univ. of Michigan
Rationale and Implications of the Users Requirements on the Induced Atmospheric Environment of the Shuttle/Spacelab. For publication in the Journal of Spacecraft and Rockets.

NEIN, MAX E. PS02
BUTLER, JOHN M., JR. PS02
Mission Requirements and Design Concepts for Space Platforms. For presentation at the NASA/AIAA Joint Confer-

ence on Advanced Technology for Future Space Systems to be held in Hampton, Virginia on May 10, 1979.

O'DELL, C. R.
Status of the Space Telescope Project in the U. S. For presentation at the Workshop on Astronomical Uses of the Space Telescope to be held at Geneva, Switzerland on February 12-14, 1979.

O'DELL, C. R. DS30
FOUNTAIN, W. F. ES62
GARY, G. A. ES62
An Internal Velocity Study of the Rosette Nubula. For publication in the Astrophysical Journal.

O'DELL, C. R. DS30
SWAMY, K. S. KRISHNA
Tata Institute of Fundamental Research, Bombay, India
Statistical Equilibrium in Comet C_2 Molecules. For presentation at the XVII General Assembly, International Astronomical Union to be held in Montreal; Canada on August 19-23, 1979.

ORAN, W. A. ES72
BERGE, L. H. ES72
PARKER, H. W. ES72
A Parametric Study of an Acoustic Levitation System. For publication in Review of Scientific Instruments.

ORAN, W. A. ES72
WITHEROW, W. K. ES72
ROSS, R. B. ES72
RUSH, J. E. UAH
Some Limitations on Processing Materials in Acoustic Levitation Devices For presentation at the IEEE Symposium on Ultrasonics to be held in New Orleans, Louisiana on September 26-28, 1979 and for publication in the IEEE Transactions on Ultrasonics.

PATTERSON, W. C. EP41
MOSS, J. D. EP41
HOPSON, G. D. EP41
Thermal Integration of Spacelab Experiments. For presentation at the International Symposium on Spacecraft Thermal and Environmental Control Systems to be held at Munich, Germany on October 1-14, 1978.

POWELL, LUTHER E. PM01
25kW Power Module. For presentation at the XXXth International Astronautical Congress to be held in Munich, Germany on September 15-22, 1979.

RAY, C. D. EP45
LITTLES, J. W. EP45
BLAIR, J. L. EP45
Design and Development of a Trace Contaminant Removal Cannister for Spacelab. For presentation at the 9th Intersociety Conference on Environmental Systems to be held in San Francisco, California on July 10, 1979.

REASONER, D. L. ES53
CRAVEN, P. D. ES53
CHAPPELL, C. R. ES53
Observations of Spacecraft — Plasma Interactions Near Synchronous Orbit. For presentation at the 1979 Fall National Meeting of the American Geophysical Union to be held at San Francisco, California on December 3-7, 1979.

RICHARDSON, WILLIAM F. FA32
MASSEY, JOHN W. FA32
System Characteristics and Operational Data of Installed Solar-Powered Rankine Cycle Driven Cooling Systems. For presentation at the Solar Heating and

Cooling Systems Operational Results Conference to be held in Colorado Springs, Colorado on November 27-30, 1979.

RIVES, J. M. JA71
JEAN, O. C. JA01
Spacelab Payload Data Acquisition and Communications. For publication in Signal magazine.

ROBINSON, GLENN A. EP44
LDEF Transverse Flat Plate Heat Pipe Experiment. For presentation at the AIAA Thermophysics Conference to be held in Orlando, Florida on June 3-9, 1979.

RUPP, CHARLES C. PD12
GRESHAM, LENNOR
Mississippi State University
Effect of Tether Attachment on Shuttle Tethered Satellite System Dynamics. For presentation at the Annual Rocky Mountain Guidance and Control Conference to be held at Keystone Village, Colorado on February 24-28, 1979.

RUPP, C. C. PD12
GRESHAM, LENNOR L.
Mississippi State University
Investigating the Attitude Control of the Shuttle/Tethered Satellite System. For presentation at the Annual Southeastern Symposium on System Theory to be held at Clemson University, South Carolina on March 12-13, 1979.

RUTLAND, CARY H. PS04
Flight Development Tests for Large and Deployable Antennas. For presentation at the 1979 Annual Meeting of the American Astronautical Society "Space Shuttle: Dawn of an Era" to be held in Los Angeles, California on October 29-November 1, 1979.

SAX, ROBERT I. NOAA
KELLER, VERNON W. ES83
Water-Ice-Updraft Relationships Near -10°C Within a Population of Florida Cumuli. For publication in the Journal of Applied Meteorology.

SCALZI, JOHN B NSF
McDONOUGH, G. F., JR. EE01
The NASA/MSFC Experimental Facilities at Huntsville, Alabama. For presentation at the 11th Joint Meeting of the Panel on Wind and Seismic Effects (UJNR) to be held at Tsukuba City, Japan on September 3-7, 1979.

SCHUTZENHOFER, L. ED21
JONES, J. ED21
JEWELL, R. ED21
Mechanism Associated with the Space Shuttle Main Engine Oxidizer Valve/Duct System Anomalous High Amplitude Discrete Acoustical Excitation. For presentation at the 14th Aerospace Mechanisms Symposium to be held at Langley Research Center, Hampton, Virginia on May 1-2, 1980.

SCHUTZENHOFER, L. A. ED23
JONES, J. H. ED23
Elimination of a Discrete Frequency Acoustical Buzz Phenomenon Associated with the Space Shuttle Main Engine Oxidizer Valve/Duct System. For presentation at the 50th Shock and Vibration Symposium to be held in Colorado Springs, Colorado on October 16-18, 1979.

SCHWINGHAMER, ROBERT J. EH01
Paper-Space Environmental Effects on Materials. For presentation at the 1979 Annual Meeting of the American Astronautical Society "Space Shuttle: Dawn of an Era" to be held in Los Angeles, California on October 29-November 1, 1979.

SETTLE, GRAY L. EF35
Spacelab Flight Software Structure and Development. For presentation at the Workshop on Real-Time Programming for NASA Flight Projects, ICASE & LARC to be held in Hampton, Virginia on October 17-19, 1979.

SEYMOUR, DAVID ED33
GREENWOOD, TERRY ED33
SMITH, S.
Lockheed Missiles & Space Co., Inc.
Development of a Shear Layer Mixing Model for Large Solid Rocket Motors. For presentation at the JANNAF 11th Plume Technology Meeting to be held at Huntsville, Alabama on May 8-10, 1979.

SHACKELFORD, BENJAMIN W. EP25
CAVENY, LEONARD H. Princeton Univ.
KUO, KENNETH K. Penn State Univ.
Ignition Transients of the Space Shuttle SRM. For publication in the Proceedings of the 1979 JANNAF Propulsion Meeting which was held in Anaheim, California on March 5-8, 1979.

SHIPMAN, DAVID L. EL12
Payload Specialist Training Scheduler (PACTS). For presentation at the AIIE Annual Institute Conference to be held in Atlanta, Georgia on May 11-14, 1980.

SMITH, J. B., JR. et al. ES52
Vector Magnetic Measurements of an Active Region. For presentation at the 154th Meeting of the American Astronomical Society to be held June 11-14, 1979.

SMITH, R. E. ES81
HUNG, R. J. UAH
PHAN, T. UAH
Case Studies of Gravity Waves Associated with Isolated Tornadic Storms on January 13, 1976. For publication in the Journal of Applied Meteorology.

SMITH, R. E. ES81
HUNG, R. J. UAH
PHAN, T. UAH
Coupling of Ionosphere an Troposphere During the Occurrence of Isolated Tornadoes on November 20, 1973. For publication in the Journal of Geophysical Research.

SMITH, R. E. ES81
HUNG, R. J. UAH
PHAN, T. UAH
Ionosphere and Satellite Remote Sensing of Tornadic Storms. For presentation at the Thirteenth International Conference on Remote Sensing of the Environment to be held in Ann Arbor, Michigan on April 23-27, 1979.

SNODDY, WILLIAM C. PS01
NEIN, MAX E. PS01
Space Platforms — An Evolutionary Approach for Long Duration Space Science and Applications Missions. For presentation at the 1979 Annual Meeting of the American Astronautical Society to be held in Los Angeles, California on October 29-November 2, 1979.

STEELY, SIDNEY L.
FWG Associates, Inc.
FROST, WALTER
University of Tennessee Space Institute
CAMP, DENNIS W. ES82
Statistical Analysis of Atmospheric Flow About a Simulated Block Building. For presentation at the 5th International Wind Engineering Conference to be held at Fort Collins, Colorado in July 1979.

STERRETT, JAMES B. ET01
Large Scale Vibration Testing of Engineering Structures. For presentation at the U. S. National Conference on Earthquake Engineering to be held at Sanford, California on August 22-24, 1979.

STEWART, RODNEY D. EL02
Format and Content of Cost Information Required in Proposals. For presentation at the Second Annual Conference of the National Estimating Society to be held in Los Angeles, California on June 18-19, 1980.

TANDBERG-HANSSEN, E. ES51
Ejection of Mass from the Sun. For presentation at the Indo-U. S. Workshop on Solar-Terrestrial Physics to be held in Udaipur, India on June 12-16, 1979.

TANDBERG-HANSSEN, EINAR ES51
Formation, Support and Stability of Quiescent Prominences. For presentation at the IAU Colloquium 44, "The Physics of Solar Prominences" to be held at Oslo, Norway on August 14-18, 1978.

TANDBERG-HANSSEN, E. ES51
HENZE, W. Teledyne Brown Engineering
Polarimetry with the SSM Ultraviolet Spectrometer and Polarimeter. For presentation at the Workshop on Flare Research and Solar Maximum Mission to be held at Ann Arbor, Michigan on November 13-16, 1978.

TEUBER, D. L. ES51
A Unifying Analytic Method for Solar Flare Data, Sunspot Numbers, and a Stellar Observation. For publication in Solar Physics (Holland).

URBAN, E. W. ES63
KATZ, L. ES63
HENDRICKS, J. B. UAH
KARR, G. R. UAH
The Spacelab 2 Infrared Telescope Cryogenic System. For presentation at the Electro-Optical Technical Symposium and Workshop to be held in Huntsville, Alabama on May 22-25, 1979.

URBAN, EUGENE ES63
KATZ, LESTER ES63
HENDRICKS, J. UAH
KARR, G. UAH
Cryogenic Helium II Systems for Space Applications. For presentation at the International Symposium on Spacecraft Thermal and Environmental Control Systems to be held at Munich, Germany on October 10-12, 1978.

VAN RENSSELAER, FRANK FA51
ROHRBAUGH, DAVID J.
Boeing Aerospace Co.
The Inertial Upper Stage — Workhorse of the Future. For presentation at the Thirtieth International Astronautical Federation Congress to be held in Munich, Germany on September 16-23, 1979.

VAUGHAN, O. H. ES83
HUNG, R. J. UAH
LIAW, G. S. UAH
Aerosol Particles and the Formation of Advection Fog. For publication in the Journal Research Atmospheric (France).

VAUGHAN, O. H. ES83
VONNEGUT, BERNARD
State University of New York at Albany

Thunderstorm and Lightning Observations from Space Shuttle. For publication in the Bulletin of the American Meteorological Society and for presentation at the IEE/AIAA Conference on Space Instrumentation for Atmospheric Observation to be held in El Paso, Texas on April 3-5, 1979.

VAUGHAN, WILLIAM W. ES81
Lightning and Space Observations Potential. For publication in the AIAA Alabama Section Explorer periodical.

VINZ, FRANK L. EF41
Simulation for Development of Free-Flying Service Vehicles. For presentation at the 1979 Annual Meeting of the AAS to be held in Los Angeles, California on October 29-November 1, 1979.

VON TIESENHAUSEN, GEORG F. PS01
Nonterrestrial Processing and Manufacturing of Large Space Systems. For presentation at the 24th National Symposium of the Society for the Advancement of Material and Process Engineering to be held in San Francisco, California on May 8-10, 1979.

WARMBROD, JOHN D. ED33
Design and Development of the Thermal; Protection System for the External Tank For presentation at the AIAA 12th Fluid and Plasma Dynamics Conference to be held in Williamsburg, Virginia on July 23-25, 1979.

WATTERS, H. H. EL15
STOKES, J. W. EL15
Construction in Space. For publication in Astronautics and Astronautics Journal.

WEISSKOPF, M. C. ES61
The Search for, and Study of, Black Holes in the Galaxy. For publication in the Proceedings of the NASA Compact Objects Workshop which was held in Washington, D. C. on April 20-21, 1979.

WEISSKOPF, M. C. ES62
DARBRO, W. ES62
ELSNER, R. NAS/NRC Fellow
GHOSH, P. NAS/NRC Fellow
SUTHERLAND, P. Alfred P. Sloan Fellow
HERTZ, P.
VIANNA, G.
GRINDLAY, J.
Results from the Monitor Proportional Counter Aboard the Einstein Observatory: High Time Resolution Studies of Cygnus X-1, X-2, and X-3. For presentation at the 1979 Spring Meeting of the American Physical Society to be held in Washington, D. C. on April 23-26, 1979 and for publication of the Bulletin of the American Physical Society.

WEISSKOPF, M. C. ES61
SUTHERLAND, P. G. ES61
On the Time Variability of Circinus X-1: A Comparison with Cygnus X-1. For publication in the Astrophysical Journal.

WESTROPE, DOUGLAS W., JR. FA33
Solar Energy Works Profitably on a North Georgia Project. For presentation in the Solar Heating and Cooling Operational Results Conference to be held in Colorado Springs, Colorado on November 27-30, 1979.

WILKES, D. R. ES64
BROWN, M. J. Aerojet Electric Co.
An Active Thermal Control Surfaces

Experiment (TCSE). For presentation at the AIAA 14th Thermophysics Conference to be held at Orlando, Florida on June 4-6, 1979.

WILKES, D. R. ES64
HARADA, Y. IIT Research Institute
Inorganic Zn_2TiO_4 Thermal Control Coatings. For presentation at the 24th National SAMPE Symposium to be held in San Francisco, California on May 8-10, 1979.

WILSON, R. M. ES52
REICHMANN, E. J. ES52
TEUBER, D. L. ES52
SMITH, J. B., JR. NOAA
A Prediction Method for the Soft X-Ray Flux of Solar Flares. For publication in the Solar-Terrestrial Predictions Proceedings.

WILSON, R. M. ES52
SMITH, J. E. ES52
Physical Parameter Profiles of Selected Solar X-Ray Flares. For publication in Astronomy and Astrophysics.

WINKLER, CARL E. ES61
KORSCH, DIETRICH ES61
Design of Stigmatic Grazing Incidence Telescopes with Non-Parabolic Primaries. For presentation at the Electro-Optical Technical Symposium and Workshop to be held at Huntsville, Alabama on May 22-25, 1979.

WOJTALIK, FRED S. EE71
Project HEAO — Revisited. For presentation at the Eighth IFAC World Congress to be held in Kyoto, Japan on August 24-28, 1981.

WYMAN, CHARLES L. EE01
Huntsville Electro-Optical Technical Symposium and Workshop, SPIE-OSA-AAS. For presentation at the SPIE Symposium Proceedings to be held in Huntsville, Alabama on May 22-25, 1979.

YOUNG, LEIGHTON E. EC12
Solar Array Technology for Solar Electric Propulsion Missions. For presentation at the International Electric Propulsion Conference (AIAA) to be held at Princeton, New Jersey on October 30-November 1, 1979.

ZOLLER, LOWELL K. LA01
Commercialization of Space Processing. For presentation at the 1979 AAS Annual Meeting to be held in Los Angeles, California on October 29-November 1, 1979.

ZOLLER, LOWELL K. LA01
Commercialization of Materials Processing in Space. For presentation at the Sixteenth Space Congress to be held in Cocoa Beach, Florida on April 25-27, 1979.

ZOLLER, LOWELL K. LA01
Materials Processing — A Matter of Gravity. For presentation at the "Shuttling Into the Next Space Age" to be held at the Alabama Space and Rocket Center, Huntsville, Alabama on July 18-19, 1979.

MSFC CONFERENCE PUBLICATIONS

CP-2069 May 1-2, 1978
Proceedings of the Workshop on an Electromagnetic Positioning System in Space. Marshall Space Flight Center.
N79-13069

CP-2075 November 14-16, 1978
Government/Industry Workshop on Payload Loads Technology. Marshall Space Flight Center. N79-20162

CP-2083 February 13-15, 1979
Workshop on the Need for Lightning Observations from Space — Preliminary Report. University of Tennessee Space Institute and Marshall Space Flight Center. N79-21697

CP-2084 February 12, 1979
Laser Doppler Velocimetry Workshop. Marshall Space Flight Center.
N79-22455

CP-2091 June 1979
Proceedings of Workshops to Define Engineering Requirements for a Space Vacuum Research Facility. Marshall Space Flight Center. N79-26076

CP-2095 February 13-15, 1979
Proceedings: Workshop on the Need for Lightning Observations from Space. Marshall Space Flight Center.

APPROVAL

FY 1979 SCIENTIFIC AND TECHNICAL REPORTS, ARTICLES, PAPERS, AND PRESENTATIONS

Compiled by O. L. White

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

J. T. SHEPHERD
Director, Administration and Program Support