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NASA TECHNICAL MEMORANDUM

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FY 1980 SCIENTIFIC AND TECHNICAL REPORTS, ARTICLES, PAPERS, AND PRESENTATIONS

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**Abstract:**
This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY 80. It also includes papers of MSFC contractors.

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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.”

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

'FY 1980 SCIENTIFIC AND TECHNICAL REPORTS,
ARTICLES, PAPERS, AND PRESENTATIONS

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The Materials Processing in Space (MPS) Program is stimulating the scientific use of the unique aspects of the space environment on material processes. The reduction of the pervasive influences of gravity on Earth-based processes provides opportunities for a basic understanding and improvement in many processes. Initial demonstrations of such scientific principles were accomplished on Apollo, Skylab, and Apollo-Soyuz flights. During the period between that era and the era of routine orbital space flight on the Space Shuttle in the 1980's, the Space Processing Applications Rocket (SPAR) Project is providing the only scientific flight opportunities for experimenters.

The Black Brant rockets which are used to lift the scientific payload, provide a duration on the order of five minutes of low gravity (coasting) time during the suborbital flight. SPAR also affords experimenters and apparatus developers an opportunity to check out concepts, equipment and procedures before the longer term and more extensive flights on the Shuttle. This report describes the results of SPAR IV, the fourth rocket flight in a series of nine planned flights.

Previous experiments on the first three SPAR flights involved the measurement of liquid mixing due to spacecraft motions and the dispersion of normally immiscible liquids in the area of fluid mechanics. In the area of solidification, experiments were made on the effects of gravity on dendritic growth, epitaxial growth and the eutectic point of materials with widely differing densities. In the area of multiphase particle interaction, experiments were made on the migration and coalescence of bubbles and particles, closed-cell metal foam and dispersion strengthening of composites. Finally, in the new area of containerless processing, an experiment on the melting and solidification of Beryllium in an electromagnetic field was accomplished.

Objectives, methods, and results of low-gravity materials processing experiments are summarized, and a bibliography of published results for each experiment is provided. Included are drop tower experiments, the Apollo demonstration experiments, the Skylab experiments and demonstration experiments, and the Apollo-Soyuz experiments and demonstrations. The findings of these experiments in the fields of crystal growth, metallurgy, and fluid behavior are summarized.

A trowellable closeout/repair material designated as MTA-2 (Marshall Trowellable Ablator) has been developed in-house at Marshall Space Flight Center and has been evaluated for use on the Solid Rocket Booster. This material is composed of an epoxy-polysulfide binder and is highly filled with phenolic microballoons for density control and ablative performance. The MTA-2 material has been evaluated by mechanical property testing as well as thermal testing in a wind tunnel to simulate the combined Solid Rocket Booster trajectory aeroshear and
Rocket Booster trajectory aeroshear and heating environments. This material is characterized by excellent thermal performance and has been used extensively on the Space Shuttle STS-1 and STS-2 flight hardware.

TM-78242 September 1979

The purpose of this study is to provide insight toward development of an optimal program for investment analysis of project proposals offering commercial potential and components thereof. This involves a critique of economic investment criteria viewed in relation to requirements of engineering economy analysis. An outline for a systems approach to project analysis is developed. Application of the Leontief input-output methodology to analysis of projects involving multiple processes and products is investigated. Effective application of elements of neoclassical economic theory of investment analysis of project components is demonstrated. Patterns of both static and dynamic activity levels are incorporated in the study.

TM-78243** August 1979

This document summarizes the final results of contract NAS8-32257 with Sunkeeper Control Corporation (now Andover Controls) of Andover, Massachusetts for the additional development work on their existing programmable electronic controller and hydronic package 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 and relates how they were accomplished.

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

TM-78244** August 1979

This document summarizes the final results of contract NAS8-32257 with Sunkeeper Control Corporation (now Andover Controls) of Andover, Massachusetts for the additional development work on their existing programmable electronic controller and hydronic package 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 and relates how they were accomplished.

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

TM-78245** October 1979

This report is intended to provide product development information as an aid to the solar systems manufacturing industry in their effort to determine the product adaptability for use in a specifically configured solar heating system in residential and commercial applications.

This report will also serve as an aid to those who desire to remain abreast of the state-of-the-art of solar energy heating and cooling projects.
The Maxi-Therm S-101 is a thermosyphon liquid-to-air heat exchanger for use in heating systems in residential single-family dwellings and small commercial applications. It is a pumpless heating module which, when attached to a water storage tank, comprises a self contained heating unit. Electric resistance heating elements can be installed in the storage tank to provide a backup or off-peak heating system.

At the completion of the development contract, Sigma Research obtained certificates from professional engineers and test laboratories that the Maxi-Therm S-101 meets or exceeds performance specifications, performance criteria and applicable standards and codes.

The Laser Beam Manifold is a new device for transforming a single, narrow, collimated beam of light into several beams of desired intensity ratios; e.g., all of the outgoing beams might be of the same intensity. The Laser Beam Manifold's function is similar to that of a beam splitter, but the Laser Beam Manifold divides the beam into several rather than only two beams. The device consists of a single optical substrate with a metallic coating on both optical surfaces. By changing the entry point, the number of outgoing beams can be varied.

A mathematical model is derived for heat loss due to radiation and free convection for a small copper sphere (approximately 0.3 to 0.4 cm diameter) cooled by a helium-argon gas mixture. A FORTRAN program written to simplify calculations and extend the range of applicability to experimentation is presented. Pressures used were less than 400 torr, and resulting temperatures ranged from 500 to 4600 K. Comparison of results for initial cooling by the gas mixture with experimental data showed a 5 percent error for temperature values and a 2.7 percent error for the temperature difference caused by the cooling. Accuracy could be increased significantly by using better estimates for thermal conductivities.
This report describes a computer program (SHCOST) used to perform economic analyses of the Operational Test Sites managed for DOE by MSFC as part of the National Solar Heating and Cooling Development Program. The computer program is user oriented and allows consideration of only the economic parameters which are important to the user problem. A life cycle cost and cash flow comparison is made between a solar heating system and a conventional system. The program assists in sizing the solar heating system. A sensitivity study and plot capability allow the user to select the most cost effective system configuration.

This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY79. 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.


The technical feasibility of utilizing solar energy to meet domestic, space heating and hot water loads for single family residences and light commercial applications has been clearly demonstrated. However, the economic feasibility is a complex problem requiring subjective judgments of the future value of key economic parameters, particularly conventional fuel escalation rates. In simplest terms, the prospective installer must decide whether he is willing to spend money now (to install a solar heating system) in order to save money later (lowered conventional fuel bills in the future).

Deliberate relocation of the Skylab footprint (to lower the chances of injury or damage) required controlling to a high-drag and a low-drag attitude (with a transition capability from one to the other at any time) to an altitude below 150 km (80 n.mi.).

However, the Skylab attitude control system was designed for holding a solar inertial attitude (temporary Earth-pointing was possible at the expense of cold-gas thruster fuel) at an altitude (435 km or 235 n.mi.) where the gravity gradient torques were predominant and the aerodynamic torques were practically negligible.

To control Skylab to below 150 km (where the aerodynamic torques were 10 times higher than the gravity gradient torques), without the use of thruster fuel (once the attitude was established), required the design, development, and software implementation of a completely new method: Active seeking of a torque equilibrium attitude.
This report describes all the available torque equilibrium attitudes (most were useless from the standpoint of lack of electrical power), the equilibrium seeking method, as well as the actual successful application during the 3 weeks prior to Skylab reentry.


Three types of high performance silicon solar cells, BSF/BSR 10 ohm-cm, BSR 10 ohm-cm, and BSR 2 ohm-cm, manufactured by Optical Coating Laboratories, Inc., have been evaluated for their low temperature and low intensity performance. Sixteen cells of each type were subjected to ten temperatures and nine intensities. The BSF/BSR 10 ohm-cm cells provided the best performance at 1 solar constant and +25°C with an efficiency of 14.1 percent while the BSR 2 ohm-cm cells had the highest low temperature and low intensity performance with an efficiency of 22.2 percent at 0.04 solar constant and -170°C and the most consistent cell-to-cell characteristics.

The stratigraphic sequence of volcanic and sedimentary units in the North Polar Region of Mars. Michael E. Botts. Space Sciences Laboratory.

Based on photogeologic mapping of Viking Orbiter images of Mars, four distinct informal stratigraphic units can be defined for the region north of 70°N latitude. They are: (a) bulbous plains, (b) mantled plains, (c) dune deposits, and (d) layered deposits/perennial ice.

The bulbous plains unit underlies all other north polar units and represents a subunit of the mottled cratered plains. Based on crater size-frequency data, bulbous plains are equivalent in age to the relatively old cratered plains unit at Tempe Plateau (90°W, 30°N). The low albedo of bulbous plains and the appearance of what appears to be a dike suggest that bulbous plains has a volcanic origin. Cumulative crater size-frequency distribution functions for bulbous and mantled plains display two-segment curves with a crater-production slope of -2.0 and a crater-obliteration equilibrium slope of -0.7. This supports the interpretation that mantled plains were formed by dust blanketing of bulbous plains. As calculated from crater size-frequency distribution functions, the relative surface-obliteration rates are 1:9:88 for bulbous, moderately mantled, and heavily mantled plains, respectively.

Dune deposits occur in the form of longitudinal, transverse, and barchan dunes, and possibly as sheet sand deposits. Actual dunes are generally confined to mantled plains, suggesting that mantling provides a proper substratum for dune accumulation.

Surface winds for the north polar region were determined from dune orientations to flow predominantly counterclockwise around the polar cap, although there is evidence for dune modification by secondary winds spiralling clockwise off of the cap.
A gradation from densely spaced transverse dunes to more dispersed barchan and transverse dunes implies a general thinning of circumpolar dune deposits downwind of extensive areas mapped as bulbous plains. The author suggests that dune material is being stripped from bulbous plains and is accumulating as dunes downwind on mantled plains.

TM-78255  December 1979
Prosthetic Device for Correction of Urinary Incontinence, Ray Helms, Structures and Propulsion Laboratory. N80-16739

This report documents how the development of a prosthetic device for the correction of urinary incontinence originated from aerospace technology and the status of this ongoing project. It is anticipated that there will be a follow-on publication at the conclusion of NASA's participation on this project.

TM-78256  December 1979
AVE-SESAME I: 25-MB Sounding Data, Myron L. Gerhard, Henry E. Fuelberg, Steven F. Williams, and Robert E. Turner. Texas A&M University and St. Louis University. N80-16683

This report describes the rawinsonde sounding program for the AVE-SESAME I experiment and presents tabulated data at 25-mb intervals from the surface to 25 mb for the 23 National Weather Service and 19 special stations participating in the experiment. Soundings were taken at 3-hr intervals beginning at 1200 GMT on April 10, 1979, and ending at 1200 GMT on April 11, 1979 (nine sounding times). The method of processing is discussed briefly, estimates of the rms errors in the data presented, an example of contact data given, reasons given for the termination of soundings below 100 mb, and soundings listed which exhibit abnormal characteristics.

TM-78257  January 1980

This report gives the results of a comprehensive investigation of the stress corrosion cracking resistance of the martensitic precipitation hardening stainless steels PH13-8Mo, 15-5PH, and 17-4PH. Round tensile and c-ring type specimens taken from several heats of the three alloys were stressed up to 100 percent of their yield strengths and exposed to alternate immersion in salt water, to salt spray, and to a seacoast environment. The results indicate that 15-5PH is highly resistant to stress corrosion cracking in conditions H1000 and H1050 and is moderately resistant in condition H900. The stress corrosion cracking resistance of PH13-8Mo and 17-4PH stainless steels in conditions H1000 and H1050 was sensitive to mill heats and ranged from low to high among the several heats included in the tests. Based on a comparison with data from seacoast environmental tests, it is apparent that alternate immersion in 3.5 percent salt water is not a suitable medium for accelerated stress corrosion testing of these PH stainless steels.

TM-78258  December 1979

This report presents the results of the verification testing sequence V-2 performed on the Space Shuttle Solid Rocket Booster Thrust Vector Control (SRB TVC) subsystem by the Marshall Space Flight Center, Huntsville, Alabama. These tests were performed between January 1978 and April 1979, per SE-c19-098-2H, SRB TVC Overall Systems Test Requirements.
A detailed history of the hot firings plus additional discussion of the Auxiliary Power Unit (APU) and the hydraulic component performance is presented. In addition, the test objectives, data, and conclusions are included for general information.

The National Aeronautics and Space Administration Space Shuttle is designed as a low cost payload delivery system to Earth orbit. Each Shuttle launch consists of the payload carrying Orbiter, an expendable External Tank and two reusable Solid Rocket Boosters. Low cost-per-flight is a major Space Shuttle program goal. The Solid Rocket Booster is the most expensive recurring cost element of the reusable space transportation system. Periodic replacement of damaged or worn-out SRB components is necessary to maintain an adequate inventory to sustain the projected 500-flight, 12-year traffic model. Determining new SRB hardware requirements and the associated costs requires consideration of: traffic model, component attrition, hardware useful life, turnaround time for refurbishment, manufacturing rates, learning curves on the time to perform tasks, cost improvement curves on quantity hardware buys, inflation, spares philosophy, long lead hardware funding requirements and other logistics and scheduling constraints. A Cost-Per-Flight computer model is described which considers these factors and is used at Marshall Space Flight Center for operations planning and budgeting. Additional uses of the model include assessing the cost-per-flight impact of changing major Space Shuttle program parameters and searching for opportunities to make cost effective management decisions.

This report documents the culmination of a 2 year effort from May 1976 to April 1978 to develop finite element models as input to dynamic simulations of the High Pressure Fuel Turbopump (HPFTP), the High Pressure Oxidizer Turbopump (HPOTP), and the Space Shuttle Main Engine (SSME).

Descriptions are provided for the five basic finite element models: HPFTP rotor, HPFTP case, HPOTP rotor, HPOTP case, and SSME (excluding turbopumps).

Model results are presented for the HPFTP rotor, HPFTP case, coupled HPFTP rotor and case, HPOTP rotor, HPOTP case, coupled HPOTP rotor and case, SSME (excluding turbopumps), and SSME (including turbopumps).

Results for the SSME (including turbopumps) model are compared to data from a SSME HPOTP modal survey conducted at the N3TL, Bay St. Louis, Mississippi.
results from the prototype hardware development are also presented.

TM-78262 February 1980
A Preliminary Look at SESAME I Conducted on April 10-11, 1979. Steven F. Williams, James R. Scoggins, Nicholas Horvath, and Kelly Hill. Space Sciences Laboratory. N80-18636

This report contains information on data collected, synoptic conditions, and severe and unusual weather reported during the AVE-SESAME I period. The information presented is preliminary and incomplete. The purpose of the report is to provide to researchers a preliminary look at conditions during the AVE-SESAME I period.

TM-78263 January 1980

Four radioactive isotopes have been found in aluminum and stainless steel samples from Skylab debris recovered in Australia. The low-level activity was induced by high-energy protons and neutrons in the space environment. Measurements of the specific activities are given.

TM-78264 January 1980

This document presents the test results from a concept verification test program conducted to assess the use of an Infrared Scanner as a remote temperature sensing device for the Space Shuttle program. The Infrared Scanner would be used during pre-launch operations to determine the surface temperature of the External Tank, which contains the cryogenic propellants for the Shuttle Main Engines. The surface of the External Tank is a Spray On Foam Insulation (SOFI) used to thermally insulate the tank and control boiloff of the cryogenic propellants. Under certain weather conditions ice or frost accumulations are likely on the insulation surface, the temperature of which can be significantly below freezing. The Infrared Scanner would be used to assess the possible ice/frost accumulations by mapping the insulation surface temperature to detect freezing areas on the tank. The subject test program was conducted during the Fall of 1979 to determine the feasibility of this concept. A total of 127 tests were performed using a typical 8 to 12 micron Infrared Scanner and simulated External Tank surfaces. Areas of investigation included temperature and geometric resolution limits, atmospheric attenuation effects including conditions with fog and rain, and the problem of surface emissivity variations. It was concluded that the basic concept of using an Infrared Scanner to determine near freezing surface temperatures is feasible. The major problem identified was concerned with Infrared reflections which can result in significant errors if not controlled. Action taken to manage these errors will likely result in design and operational constraints to control the viewing angle and surface emissivity. The contents of this report are intended to aid and guide future implementation of this concept.

TM-78265 January 1980
Characterization of Epoxy Resin Binder for SRB Sprayable Ablator MSA-1. Donald E. Morris. Materials and Processes Laboratory. X80-10047

Techniques have been developed for the characterization and quality control of the epoxy resin binder used in the formulation of Marshall sprayable ablator (MSA-1) thermal
protection system for the Space Shuttle Solid Rocket Booster. Four techniques, liquid chromatography, gel permeation chromatography, infrared spectroscopy and epoxy equivalent weight determinations, have been utilized to assess the chemical composition of the resin. Viscosity and lap shear tensile bond strength measurements were used to evaluate the physical properties.

**TM-78266**  
February 1980  
Evaluation of SRM Flex Bearing Materials and Processes. Thomas E. Wood.  
N80-19264

Tensile, peel, and shear testing was performed on combinations of primers, adhesives, tycements and rubber compounds cured at various times and temperatures. In addition to the materials currently used in the fabrication of the SRM flex bearing, other systems were evaluated. A compatibility study between adhesives and tycements was initiated. The flex bearing mold design was reviewed by our tooling experts.

**TM-78267**  
March 1980  
N80-21392

On July 11, 1979, Skylab impacted the Earth's surface. The debris dispersion area stretched from the South Eastern Indian Ocean, across a sparsely populated section of Western Australia. This report discusses in some detail the events leading to the reentry of Skylab, together with a final assessment of the Skylab debris impact footprint. Also included are detailed evaluations of the various Skylab systems that were reactivated when control of Skylab was regained in mid-1978 after having been powered down since February 4, 1974.

**TM-78268**  
February 1980  
N80-19217

This report summarizes various investigations into the steps commonly used to obviate gravity in isoelectric focusing. Isoelectric focusing is an equilibrium electrophoretic method in which amphoteric compounds are separated in a pH gradient according to their isoelectric values. Gravitational stabilization is required and is normally achieved by imposing a density gradient of neutrally charged carbohydrates on the pH gradient. Ficoll, a polysaccharide, is commonly used in isoelectric focusing, and its influence on focused red blood cells was measured. The influence of the media pH at the cell application location was specifically determined in addition to other operational parameters, such as media properties and migration behavior of the cells.

**TM-78269**  
February 1980  
Improved Sample Management in the Cylindrical-Tube Microelectrophoresis Method. Adam J. K. Smolka. Space Sciences Laboratory.  
N80-21466

A modification to an analytical microelectrophoresis system is described that improves the manipulation of the sample particles and fluid. The apparatus modification and improved operational procedure should yield more accurate measurements of particle mobilities and permit less skilled operators to use the apparatus.

**TM-78270**  
March 1980  
A Study of the Effect on a Typical Orbiter Payload Thermal Environment Resulting from Specular Reflections from the Forward Orbiter Radiators.
Most analyses performed to determine the Shuttle Payload Bay on-orbit thermal environment have considered all Orbiter, as well as payload, surfaces to be diffuse. The Orbiter radiator external coating is highly specular silverized teflon. This study considers solar energy specularly reflected from these radiators on a typical payload which, when deployed, extends above the payload bay envelope. Comparisons are made between the flux levels assuming both diffuse and specular radiators.

An analysis is made of the emergency relief venting of the liquid helium dewar of the Spacelab 2 Infrared Telescope experiment in the event of a massive failure of the dewar guard vacuum. Such a failure, resulting from a major accident, could cause rapid heating and pressurization of the liquid helium in the dewar and lead to relief venting through the emergency relief system. This report estimates the heat input from an accident for various fluid conditions in the dewar and lead to relief venting through the emergency relief system. This report estimates the heat input from an accident for various fluid conditions in the dewar and considers the relief process as it takes place through one or both of the emergency relief paths. It is shown that under all reasonable circumstances the dewar will safely relieve itself, and the pressure will not exceed 85 percent of the proof pressure or 63 percent of the burst pressure.
processing of integrated circuits including
the wafer carrier and loading from a receiving
air track into automatic furnaces and unloading
on to a sending air track.

TM-78275* August 1980
Space Processing Application Rocket Project SPAR V Final Report. Compiled
by F. Reeves and D. Schaefer.
N80-28404

The Space Processing Application Rocket Project (SPAR) V Final Report con-
tains the compilation of the postflight reports of each of the principal investigators of the
four selected science payloads, in addition to the engineering report as documented by the
Marshall Space Flight Center (MSFC). In addition to a discussion of the flight operations
and analyses, the sections on each experiment describe the objectives, rationale, and asso-
ciated ground-based research activities to varying degrees.

The SPAR Project is coordinated and managed by MSFC as part of the Materials
Processing in Space (MPS) program of the Office of Space and Terrestrial Applications
(OSTA) of NASA Headquarters.

This technical memorandum addresses the payload manifest flown in the fifth of a
series of SPAR flights conducted at the White Sands Missile Range and includes the exper-
iments entitled "Agglomeration in Immiscible Liquids," "Contained Polycrystalline Solidi-
fication in Low G," "The Direct Observation of Dendrite Remelting and Macrosegregation
in Casting," and "Uniform Dispersion by Crystallization."

TM-78276 May 1980

A comprehensive investigation of the stress corrosion cracking resistance of high
strength alloy steels 4130, 4340, and H-11 at selected strength levels and D6AC and HY140
at a single strength is presented. Round tensile
and C-ring type specimens were stressed up to
100 percent of their yield strengths and ex-
posed to alternate immersion in salt water,
salt spray, the atmosphere at Marshall Space Flight Center, and the seacoast at Kennedy
Space Center. Under the test conditions, 4130
and 4340 steels heat treated to a tensile strength of 1240 MPa (180 ksi), H-11 and
D6AC heat treated to a tensile strength of 1450 MPa (210 ksi), and HY140 (1020 MPa,
148 ksi) are resistant to stress corrosion cracking because failures were not encountered at
stress levels up to 75 percent of their yield strengths. A maximum exposure period of
one month for alternate immersion in salt
water or salt spray and three months for sea-
coast is indicated for alloy steel to avoid false
indications of stress corrosion cracking
because of failure resulting from severe pitting.

TM-78277 May 1980

Convection flows were systematically
observed in a layer of fluid between two iso-
thermal horizontal boundaries. The working
fluid was a nematic liquid crystal, which
exhibits a liquid-liquid phase change at which
latent heat is released and the density
changed. In addition to ordinary Rayleigh-
Benard convection when either phase is
present alone, there exist two distinct types
of convective motions initiated by the unstable density difference. When a thin layer of
heavy fluid is present near the top boundary,
hexagons with downgoing centers exist with
no imposed thermal gradient. When a thin
layer of light fluid is brought on near the
lower boundary, the hexagons have upshooting centers. In both cases, the motions are kept going once they are initiated by the instability due to release of latent heat. Relation of the results to applicable theories is discussed.

TM-78278  March 5, 1980
F-104 L-w-Gravity Calibration Tests
For Materials Processing in Space Precursory Experiments. R. M. Poorman.
N80-25355

The Materials Processing in Space Projects Office at Marshall Space Flight Center sponsored a precursory low-gravity flight experiment in an F-104 aircraft operated by Dryden Flight Research Center to check out the vehicle as a suitable flight test carrier for microgravity experiments. Calibration experiment verification tests in the F-104 were completed. Three flight parabolas were flown. A "quick look" at the test data shows all the test parameters recorded by telemetry had reasonable values. Photographic records are clear and distinct. Solidification modes were the same as those observed in other low-gravity environments. The F-104 has now been proven to be a useful test bed for low-gravity experiments which require less than 60 seconds of low-g time.

TM-78279  May 1980
N80-26056

This user's manual provides a description of the capabilities of SKYDYN, the required input data and the resulting program output.

TM-78280  June 1980
A Preliminary Look at AVE-SESAME II Conducted on 19-20 April 1979. Steven F. Williams, Nicholas Horvath, and Robert E. Turner. Space Sciences Laboratory. N80-27916

This report contains information on data collected, synoptic conditions, and severe and unusual weather reported during the AVE-SESAME II period. The information presented is preliminary. The purpose of the report is to provide to researchers a preliminary look at conditions during the AVE-SESAME II period.

TM-78281  June 1980

This report describes the rawinsonde sounding program for the AVE-SESAME II experiment and presents tabulated data at 25-mb intervals from the surface to 25 mb for the 23 National Weather Service and 19 special stations participating in the experiment. Soundings were taken at 3-hr intervals beginning at 1200 GMT on April 19, 1979, and ending at 1200 GMT on April 20, 1979 (nine sounding times). The method of processing is discussed briefly, estimates of the rms errors in the data presented, an example of contact data given, reasons for the termination of soundings below 100 mb, and soundings listed which exhibit abnormal characteristics.

TM-78282  June 1980
A Preliminary Look at AVE-SESAME III Conducted on 25-26 April, 1979. Steven
F. Williams, Nicholas Horvath, and Robert E. Turner. Space Sciences Laboratory.

This report contains information on data collected, synoptic conditions, and severe and unusual weather reported during the AVE-SESAME III period. The information presented is preliminary. The purpose of the report is to provide to researchers a preliminary look at conditions during the AVE-SESAME III period.

TM-78283 June 1980

This report describes the rawinsonde sounding program for the AVE-SESAME III experiment and presents tabulated data at 25-mb intervals from the surface to 25 mb for the 23 National Weather Service and 19 special stations participating in the experiment. Soundings were taken at 3-hr intervals beginning at 1200 GMT on April 25, 1979, and ending at 1200 GMT on April 26, 1979 (nine sounding times). The method of processing is discussed briefly, estimates of the rms errors in the data presented, an example of contact data given, reasons given for the termination of soundings below 100 mb, and soundings listed which exhibit abnormal characteristics.

TM-78284 July 1980

This document is a user's manual for the operation of the Payload Specialist Training Scheduler (PACTS) which is used to schedule Payload Specialists for mission training on the Spacelab Experiments. PACTS is a fully automated, interactive, computerized scheduling program equipped with tutorial displays. The tutorial displays are sufficiently detailed for use by a program analyst having no computer experience. PACTS is designed to operate on the UNIVAC 1108 computer system, and has the capability to load output into a PDP 11/45 Interactive Graphics Display System for printing schedules. The program has the capacity to handle up to three overlapping Spacelab missions.

TM-78285 May 1980

The Advanced X-Ray Astrophysics Facility (AXAF) Science Working Group report documents the results of the studies by a group of 16 scientists appointed by the NASA Office of Space Sciences to examine the AXAF mission concept from a scientific viewpoint. This report contains (1) a brief description of the development of X-ray astronomy and a summary description of AXAF, (2) the scientific objectives of the facility, (3) a description of representative scientific instruments, (4) requirements for X-ray ground testing, and (5) a summary of studies related to spacecraft and support subsystems.

TM-78286** May 1980

A computer code, ASHMET, has been developed by MSFC to estimate the amount of solar insolation incident on the surfaces of solar collectors. Both tracking and fixed-position collectors have been included. Climatological data for 248 U. S. locations are built into the code. This report describes the methodology of the code, and its input and output.
The basic methodology used by ASHMET is the ASHRAE clear-day insolation relationships modified by a clearness index derived from SOLMET-measured solar radiation data to a horizontal surface.

ET LOX Modal Survey Analysis and Test Assessment. R. L. McComas. Systems Dynamics Laboratory. N80-29414

This report presents the results of the analysis and modal test of the liquid oxygen tank and intertank of the Space Shuttle External Tank.

A description of analytical models, test article, and support hardware is presented. Frequency and damping are compared on a mode-by-mode basis.

The data assessment clearly confirms the validity of the analytical model and establishes a high level of confidence that the methodology will accurately predict modal characteristics of flight configurations.


The report describes a proposed Space Shuttle experiment to demonstrate techniques for global high-precision comparison of clocks and primary frequency standards. The experiment, using transmitted microwave and pulsed laser signals, will compare a hydrogen maser clock onboard the Space Shuttle with a clock in a ground station. The goal of the proposed experiment is to demonstrate time transfer with accuracies of 1 nsec or better and frequency comparison at the $10^{-14}$ accuracy level.


The "Matrix Frequency Response" technique has been used to analyze stability of continuous and sampled data systems by the Vehicle Control Systems Branch, Control Systems Division, Systems Dynamics Laboratory for several years. Incorporation of "Frequency Decomposition" methods into the Matrix Frequency Response program creates an analysis tool which can be used to evaluate stability of 2:1 integer related multirate sampled data systems. The resulting Multirate Matrix Frequency Response program is used in conjunction with a Generalized Determinant Expansion Routine and a program which converts Laplace transformed S-plane transfer functions into the sampled data W-plane to yield a generalized analysis tool for the stability evaluation of 2:1 multirate sampled data control systems. This report deals with multirate stability analysis using the Multirate Matrix Frequency Response method and discusses extension of the method to permit analysis of other integer related multirate sampled systems.


A user guide and programmer documentation are provided for a system of PRIME 400 mini-computer programs. The system was designed to support loading analyses on the Tracking Data Relay Satellite System (TDRSS); however, possible broader applications were considered throughout the software design. In essence, the system is a scheduler for various types of data relays (including tape recorder dumps and real-time relays) for orbiting payloads to the TDRSS.
Several model options are available to statistically generate data relay requirements. TDRSS time lines (representing resources available for scheduling) and payload/TDRSS acquisition and loss of sight time lines are input to the scheduler from disk. Tabulated output from the interactive system includes a summary of the scheduler input and output information. A history file, which records every event generated by the scheduler, is written to disk to allow further scheduling on remaining resources and to provide data for graphic displays or additional statistical analysis.

TM-78291** July 1980
Solar Site Test Module. Ralph R. Kissel and Donald R. Scott. Electronic and Control Laboratory.

A solar site test module using the Rockwell AIM 65 micro-computer is described. The module is designed to work at any site where an IBM site data acquisition system (SDAS) is installed and is intended primarily as a troubleshooting tool. It collects sensor information (temperatures, flow rates, etc.) and displays or prints it immediately in calibrated engineering units. It will read one sensor on demand, periodically read up to 10 sensors or periodically read all sensors. Performance calculations can also be included with sensor data. Unattended operation is possible to, e.g., monitor a group of sensors once per hour. Work is underway to add a data acquisition system to the test module so that it can be used at sites which have no SDAS.

TM-78292 August 1980
Longitudinal and Transverse Magnetic Field Program Procedure and Detailed Specification (For Sigma 5). Caroline K. Wang. Space Sciences Laboratory.

This document presents a computer program and procedure for plotting the contour of the data transferred from the Marshall Space Flight Center solar magnetograph. The plotted data then can be easily compared with solar data from other sources, such as the Solar Maximum Mission (SMM).

TM-78293** July 1980

A computer program, TAPFIL, has been developed by MSFC to read data from an IBM 360 tape for use on the PDP 11/70. The information (insolation, flowrates, temperatures, etc.) from 48 operational solar heating and cooling test sites is stored on the tapes. Two other programs, CHPLOT and WRTCNL, have been developed to plot and tabulate the data. These data will be used in the evaluation of collector efficiency and solar system performance.

This report describes the methodology of the programs, their inputs, and their outputs.

TM-78294 August 1980
Materials Processing in Space Catalog of Tasks, FY-80. Edited by R. J. Naumann. Space Sciences Laboratory.

This report is a compilation of the active research tasks as of the end of fiscal year 1980 of the Materials Processing in Space Program, NASA Office of Space and Terrestrial Applications, involving several NASA Centers and other organizations. The purpose of this document 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 together with a list of recent publications.

The tasks are grouped into six categories: Crystal Growth; Metals, Alloys, and Composites; Glasses, Ceramics, and Refractories; Fluids, Transport, and Chemical Processes; Containerless and Ultrahigh Vacuum Processes; and Bioprocessing. In many cases a task is placed in more than one category. For example, studies involving fluid dynamics of crystal growth were entered in both Crystal Growth and Fluids, Transport, and Chemical Processes. This insures complete coverage of each category.

TM-78295 August 1980
Torques on a Nearly Rigid Body in a Relativistic Gravitational Field. Alessandro Caporali. Space Sciences Laboratory.

The effect of post-Newtonian potentials on the rotation of a nearly rigid body is shown to consist of a precession and a torque. The frequency of the precession can be exactly represented by means of suitable differential operators. The relativistic torques in the quadrupole approximation depend on the instantaneous orientation of the principal axes of one body with respect to the position — like the classical torque — and velocity of the other. For a relatively low-mass body, such as a gyroscope, these velocity-dependent torques have no observable consequences.

TM-78297 August 1980

This report contains a detailed description of the scientific aspects of the Materials Processing in Space (MPS) program. Included are: general summaries of the possible contributions that materials science experiments in space can make to the various disciplines, rationales of why it is necessary to perform certain experiments or processes in space, a general synopsis of what has been learned from previous experiments relating to space processing, summaries of current investigations, identification of remaining issues that require resolution, and recommendations for future direction of the program.

The purposes of the report are: (1) to acquaint the reader with the overall scope of the MPS program, (2) to present the status of scientific research in the program, (3) to identify areas that may be overemphasized or underemphasized, (4) to identify critical scientific open issues in the program, and (5) to provide a basis for formulating a coherent, focused research plan.

The report is divided into six major categories: Crystal Growth; Solidification of Metals, Alloys, and Composites; Fluids and Chemical Processes; Containerless Processing, Glasses, and Refractories; Ultrahigh Vacuum Processes; and Bioprocessing. For the reader's convenience, a detailed index is provided at the beginning of each section.

TM-78298 July 1980

This report presents the Mated Vertical Ground Vibration Test (MVGVT) program evolution, the test configurations, their suspension system and the test results compared with predicted analytical results. The MVGVT test began May 30, 1978 at Marshall Space Flight Center in Huntsville, Alabama with the Boost Configuration and ended February 28, 1979 with the launch end burn configuration.

Instabilities have apparently been observed in high-temperature, single-axis acoustic processing chambers. It is hypothesized that at certain temperatures strong wall resonances are generated within the processing chamber itself and that these transverse resonances are sufficient to disrupt the levitation "well." This investigation indicates that, if these wall resonances do exist in the processing chamber, they are apparently not strong enough to cause instabilities in the levitation well.

The Space Shuttle will provide a low cost delivery system for Earth orbital payloads by amortizing launch costs through system reusability. This development paves the way for large platforms and structures in space. But successful design of long life platforms and structures for space use requires due consideration of space environmental effects on the materials used. Large space system materials, especially those in geosynchronous Earth orbit (GEO), will be subjected to vacuum, ultraviolet radiation and charged particle radiation which will influence the performance and functional lifetime of the systems. This report describes research oriented toward the acquisition of long term environmental effects data needed to support the design and development of large low Earth orbit (LEO) and GEO space platforms and systems for the next decade.

*Blue cover reports printed at Langley.
**DOE/NASA reports.
The Wave Structures of the Eady Model of Baroclinic Instability, Jae Min Hyun and William W. Fowlis, Space Sciences Laboratory.

A comprehensive analysis is presented of the wave structures of the Eady model of baroclinic instability. By solving the linear quasi-geostrophic set of equations pertinent to the Eady model, the complex eigenvalues and the eigenfunctions are obtained. The propagation speed and the growth rate are computed. Detailed quantitative information is provided about the wave structures for several unstable modes, a marginally stable mode, and a stable mode. The peculiarities concerning the amplitude and the phase variations of the waves are noted as the wavenumber varies from the unstable region to the stable region. Physical interpretations of the interrelationships among the dynamical variables are given, with a view toward revealing important aspects of the energy transfer from the basic state to the growing waves.


Solutions are obtained for a quasi-geostrophic baroclinic instability problem in which gravity is a function of height. Curvature and horizontal shear of the basic state flow are omitted and the vertical and horizontal temperature gradients of the basic state are taken as constant. The primary motivation of this work was to determine the effect of a variable dielectric body force, analogous to gravity, on baroclinic instability for the design of a spherical, baroclinic model for Spacelab. Such modeling cannot be performed in a laboratory on the Earth's surface because the body force cannot be made strong enough to dominate terrestrial gravity. A consequence of the body force variation and the preceding assumptions is that the potential vorticity gradient of the basic state vanishes. The problem is solved using a perturbation method. The solution gives results which are qualitatively similar to Eady's results for constant gravity; a short wavelength cutoff and a wavelength of maximum growth rate are observed. Based on averaged values of the basic state, both the wavelength range of the instability and the growth rate at maximum instability are increased. The conclusion is that the presence of the variable body force will not significantly alter the dynamics of the Spacelab experiment. The solutions are also relevant to other geophysical fluid flows where gravity is constant but the static stability or Brunt-Vaisala frequency is a function of height.

Ice Crystal Growth in a Dynamic Thermal Diffusion Chamber. Vernon W. Keller, Space Sciences Laboratory.

Ice crystals were grown in a supersaturated environment produced by a dynamic thermal diffusion chamber, which employed two horizontal plates separated by a distance of 2.5 cm. Air was circulated between and along the 1.2 m length of the plates past ice crystals which nucleated and grew from a fiber suspended vertically between the two plates. Using a zoom stereo microscope with a magnification which ranged from 3X to 80X and utilizing both 35 mm still photographs and 16 mm time lapse cine films taken through the microscope, the variation of the shape and linear growth rate of ice crystals was examined as a function of the ambient temperature, the ambient supersaturation and the forced ventilation velocity. The ambient growth conditions were varied over the range of temperature 0°C to -40°C, over the range of supersaturation 4% to 50% with respect to
ice, i.e., over vapor density excesses ranging from $0.07 \text{ g m}^{-3}$ to $0.7 \text{ g m}^{-3}$, and over the range of forced ventilation velocities $0 \text{ cm s}^{-1}$ to $20 \text{ cm s}^{-1}$.

It is shown that the introduction of a ventilation velocity is roughly equivalent to increasing the ambient supersaturation. For a fixed ambient temperature and ambient supersaturation, the linear 'a'-axis growth rate is directly proportional to the square root of the ventilation velocity, as theory predicts, provided the crystal shape does not change significantly. The transitions plate → dendrite and column → needle occur at a lower ambient supersaturation as the ventilation velocity increases. A definite time constant, which is a function of the ambient temperature, the ambient supersaturation and the magnitude of the change in the ventilation velocity, exists for the transition of both crystal shape and linear growth rate following a change in the ventilation velocity. For increasing ventilation velocities at a fixed ambient supersaturation the maximum in the linear growth rate near $-15^\circ\text{C}$ apparently occurs at successively colder temperatures. Over the temperature range $-4^\circ\text{C}$ to $-6^\circ\text{C}$ growth occurs along a direction up to $25^\circ$ from the 'c'-axis as the local supersaturation is increased. Thus, under the proper temperature conditions a change in the local supersaturation can induce a change, not only in the absolute growth rates, but also in the relative growth rates along the 'a' and 'c'-axes.

In the presence of $10 \mu\text{m}$ mean diameter droplets with concentrations of $10^3$ to $10^5 \text{ cm}^{-3}$ droplet accretion accounted for over 90% of the growth of both ice crystal columns and dendrites at ventilation velocities of $15 \text{ cm s}^{-1}$. However, even at higher velocities the most extensively rimed crystals still retained the original orientation of their crystalline axes. At velocities less than $1.0 \text{ cm s}^{-1}$ droplets of $10 \mu\text{m}$ diameter or smaller evaporated as they approached a growing ice crystal and crystal growth was entirely by vapor diffusion.

The first vapor grown discoid ice crystals were observed. They grew in the temperature regime $-5^\circ\text{C}$ to $-7^\circ\text{C}$ at low local supersaturations, i.e., in the regime formerly believed to only support nearly equiaxed columns.

Results from these experiments are interpreted in terms of diffusion through a local boundary layer whose thickness is a function of ventilation velocity, the diffusivity of water vapor and heat through air, and the crystal shape; and interaction with different nucleation and growth kinetics on different surfaces. Two-dimensional nucleation and layer growth from corners or edges is believed to occur at ambient supersaturations significantly lower than present theories would predict. At low supersaturation and temperature the crystal habit and growth may be controlled by the presence of defects sometimes giving rise to crystals of habit opposite to that normally observed.

TP-1702 July 1980

The Release Mechanism (REM) unlatches an experiment so that it can be moved about inside and outside the Shuttle bay by the remote manipulator system (RMS) then reattaches it to the REM base. With the REM being operated from the crew compartment after the RMS has been attached to the experiment, the REM releases the experiment by an electric motor driving a gear train and linkage which extracts four pins from holes in four plates. Electrical connectors on the REM are disengaged by the mechanical action of the structural pins retracting from the plates.
When the REM releases the experiment, an unlatched indicator is actuated in the crew compartment, and then the experiment can be moved by using the RMS.

To reattach the experiment to the REM, the RMS places the experiment with REM attachment angles against the flat, smooth surface of the REM; then the RMS moves the experiment into position for latchup. Locating the experiment for reattachment might be analogous to finding the corner of a room in the dark when you are standing on the floor and walk to a wall, then follow the wall to a corner at (another wall).

When the REM is in the “corner” ready to be latched, indications in the crew compartment show the experiment position relative to the REM. Actuation of an electric motor drives the four pins into the four holes in the plates. When fully latched, a switch actuated by the motion of the linkage, shuts the electric motor off and gives an indication to the crew compartment that the REM is latched.

TP-1719 August 1980

Two technologies relating to energy saving concepts for induction generators are presented in this paper. The first describes a regenerative scheme using an induction generator as a variable load for prime movers under test. The second describes a method for reducing losses in induction machines used specifically as wind driven generators.
RP-1034 September 1979
Convective Rainfall Estimation from Digital GOES-1 Infrared Data. Gary L. Sickler and Aylmer H. Thompson. This report is based on a study accomplished as a Master of Science Thesis at Texas A&M University. N79-31885

RP-1054 January 1980
Thunderstorm-Environment Interactions Determined with Three-Dimensional Trajectories. Gregory Sims Wilson, Space Sciences Laboratory. N80-16675
<table>
<thead>
<tr>
<th>Publication Number</th>
<th>Date</th>
<th>Title</th>
<th>Editor(s)</th>
<th>Location</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CP-2104</td>
<td>April 3-5, 1979</td>
<td>Proceedings: Third Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems</td>
<td>Dennis W. Camp and Walter Frost</td>
<td>Marshall Space Flight Center</td>
<td>N80-14633</td>
</tr>
<tr>
<td>CP-2111</td>
<td>August 8-11, 1979</td>
<td>Scientific Research with the Space Telescope, International Astronomical Union Colloquium Number 54</td>
<td>Marshall Space Flight Center</td>
<td>N80-22130</td>
<td></td>
</tr>
<tr>
<td>CP-2113</td>
<td>November 1979</td>
<td>HEAO Science Symposium</td>
<td>Marshall Space Flight Center</td>
<td>N80-14977</td>
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<tr>
<td>CP-2140</td>
<td>April 1, 1980</td>
<td>Exploratory Meeting on Airborne Doppler LIDAR Wind Velocity Measurements</td>
<td>Marshall Space Flight Center</td>
<td>N80-28965</td>
<td></td>
</tr>
</tbody>
</table>
CR-3136 January 1980
N80-15660

CR-3207 December 1979
N80-13742

CR-3255 March 1980
Fog Dispersion. Larry S. Christensen and Walter Frost. NAS8-33095. FWG Associates, Inc.
N80-19703

CR-3256 March 1980
N80-19704

CR-3284 May 1980
N80-24940

CR-3285 May 1980
N80-23988

CR-3308 August 1980
N80-29964

CR-3309 September 1980

CR-3317 September 1980

CR-3318 September 1980

CR-3319 March 1979

CR-3320 March 1979

CR-3321 September 1980
Satellite Power Systems (SPS) Concept
<table>
<thead>
<tr>
<th>CR-161309</th>
<th>September 30, 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacelab Scrubber Analysis and Test Support. NAS8-32628. Lockheed Missiles and Space Co., Inc.</td>
<td>N79-33849</td>
</tr>
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<table>
<thead>
<tr>
<th>CR-161310</th>
<th>August 30, 1979</th>
</tr>
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<tbody>
<tr>
<td>Manufacturing Process Applications Team (MATeam). NAS8-32229. IIT Research Institute.</td>
<td>N79-33230</td>
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<tr>
<th>CR-161311</th>
<th>September 15, 1979</th>
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<th>CR-161313</th>
<th>September 1979</th>
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<th>September 1973</th>
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<th>September 1973</th>
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<th>August 31, 1979</th>
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<tr>
<th>CR-161317</th>
<th>September 30, 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystal Growth Configuration Thermal Analysis. NAS8-33204. Advanced Materials Division.</td>
<td>N79-34051</td>
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<tr>
<th>CR-161305**</th>
<th>September 1979</th>
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<th>CR-161306**</th>
<th>September 1979</th>
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<th>CR-161307</th>
<th>May 1979</th>
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<tr>
<td>Study to Determine the Aquatic Biological Effects on the Solid Rocket Booster (SRB). NAS8-32148. University of Maryland.</td>
<td>N79-33612</td>
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<tr>
<th>CR-161308</th>
<th>October 1979</th>
</tr>
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<tbody>
<tr>
<td>Bellows Flow-Induced Vibrations. NAS8-31994. Southwest Research Institute.</td>
<td>N79-79963</td>
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<tr>
<th>CR-3322</th>
<th>March 1979</th>
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<th>CR-3323</th>
<th>March 1979</th>
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<th>CR-3324</th>
<th>September 1980</th>
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<th>CR-161309**</th>
<th>September 30, 1979</th>
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<td>Indoor Test for Thermal Performance of the GE TC-100 Liquid Solar Collector Eight and Ten Tube Configuration.</td>
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<td>Indoor Test for Thermal Performance of the Sunmaster Evacuated Tube (Liquid) Solar Collector.</td>
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<td>Study to Determine the Aquatic Biological Effects on the Solid Rocket Booster (SRB).</td>
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<tr>
<td>Bellows Flow-Induced Vibrations.</td>
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</table>
CR-161318 October 12, 1979
N79-33250

CR-161319 September 1979

CR-161320 October 5, 1979

CR-161321 September 1979

CR-161322 October 5, 1979

CR-161283 October 1979
Implications of Possible Shuttle Charging. NAS8-32580. TRW Defense and Space Systems Group. N80-10277

CR-161323 October 12, 1979
MSFC Solar Heating and Cooling High Speed Performance (HISPER) Code Validation. NAS8-33387. Western Kentucky University. N80-10604

CR-161324* November 9, 1978

CR-161325* November 9, 1978

CR-161326* November 9, 1978

CR-161327* November 1979
Data Analysis Software for the Autoradiographic Enhancement Process, Vols. 1 and 2 and Appendix. NAS8-33405 and H-30573B. ESPEE, Inc. N80-11804

CR-161328* September 14, 1979

CR-161329** September 6, 1978

CR-161330** April 5, 1979

CR-161331** June 15, 1979
NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161332 October 1979

CR-161333 1979

CR-161334 October 1979

CR-161335 October 31, 1979

CR-161336 September 30, 1979

CR-161337 October 15, 1979

CR-161338 November 12, 1979

CR-161339** December 1979

CR-161340** October 1, 1979

CR-16341 November 10, 1979
Geophysical Fluid Dynamics Experiment Definition. NAS8-32360. Universities Space Research Association.

CR-161342 September 1979
High-Pressure LOX/CH₄ Injector Program, Final Report. NAS8-33206. Rockwell International Corp. N80-13161

CR-161343 November 15, 1979

CR-161344 November 15, 1979

CR-161345 October 13, 1979
High Density Circuit Technology, Quarterly Report. NAS8-33448. Mississippi State University. N80-70974

CR-161346 November 1979

CR-161347 November 1979

CR-161348 November 30, 1979
Space Fabrication Demonstration
NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)


CR-161350 - October 31, 1979

CR-161351 - October 1979

CR-161352 - September 1979

CR-161353 - September 1, 1979

CR-161354** - December 1979

CR-161355** - January 1980

CR-161356** - January 1980

CR-161357** - July 1977

CR-161358 - January 1977

CR-161359 - January 1977

CR-161360 - January 1977

CR-161361 - January 1977
Final Definition and Preliminary Design Study for the Initial Atmospheric Cloud Physics Laboratory, a Spacelab Mission Payload, Executive Summary. NAS8-31845. General Electric. N80-71578
NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161362 January 1977

CR-161363 December 15, 1979

CR-161364 1979

CR-161365 December 1979

CR-161366 December 13, 1979

CR-161367 December 14, 1978

CR-161368 November 1989

CR-161369 April 1979

CR-161370 November 1, 1979

CR-161371 December 1979

CR-161372 December 1979

CR-161373 January 1980

CR-161374 January 11, 1980

CR-161375 January 11, 1980

CR-161376 January 1980

CR-161377 January 2, 1980
The Identification and Correction of Channel-to-Channel Phase Differences Within a Data Processing System. Final
NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161378 October 1970
Space Vehicle Acoustics Prediction Improvement for Payloads. NAS8-33193. Wyle Laboratories. N80-72415

CR-161379** January 1980

CR-161380** January 1980
Solar Energy System Performance Evaluation – Seasonal Report for Semco, Macon, Georgia. NAS8-32036, IBM Corp. N80-19629

CR-161381** February 1980
The Relationship of Storm Severity to Directionally Resolved Radio Emissions. NAS8-33371. Southwest Research Institute. N80-21626

CR-161382** February 1977
Qualification Test Procedures and Results for Honeywell Solar Collector Subsystem, Single-Family Residence. NAS8-32093. Honeywell. N80-20813

CR-161383** January 1980

CR-161384** February 1980

CR-161385 January 13, 1980
High Density Circuit Technology. NAS8-33448. Mississippi State University. N80-72552

CR-161386 January 1980

CR-161387 January 1980

CR-161388 November 2, 1979

CR-161389 February 15, 1980

CR-161390 February 11, 1980

CR-161391 October 31, 1979

CR-161392** January 1980
NASA CONTRACTOR REPORTS
(Abstracts for these reports may be obtained from STAR)

CR-161393  1979

CR-161394  May 1978
Simultaneous, Multiple, Independently Steered Beam Study for Airborne Electronically Steerable Phase Array (AESPA) Program, Final Report. NAS8-32627. Texas Instruments, Inc. N80-73191

CR-161395  November 1979

CR-161396  August 15, 1979

CR-161397  July 31, 1979

CR-161398  May 15, 1979

CR-161399  December 1978
Project FIRES (Firefighters Integrated Response Equipment System), Volume I, Program Overview and Summary, Final Report, Phase 1A. NAS8-32329. Grumman Aerospace Corp. N80-19795

CR-161400  December 1978

CR-161401  December 1978

CR-161402  December 1978

CR-161403  December 1978

CR-161404  February 4, 1980

CR-161405  November 16, 1979

CR-161406  February 13, 1980
Orbital Transfer Vehicle Advanced Expander Cycle Engine Point Design Study. NAS8-33568. Rockwell International. X80-72691
|-----------|---------------|-------------------------------------------------------------------------------------------------|-----------|---------------|-------------------------------------------------------------------------------------------------|
CR-161422** October 1979

CR-161423 April 1980
Cables and Connectors for Large Space System Technology (LSST), Final Report. NAS8-33432. Boeing Aerospace Co. N80-28713

CR-161424 March 28, 1980

CR-161425 March 1980

CR-161246 October 1979

CR-161427 December 1979
Results of Two Tests in the MSFC 14 x 14-inch Trisonic Wind Tunnel, FA 27 (TWT-655) FA28 (TWT-656), Final Report. NAS8-32530. Lockheed Missiles and Space Co., Inc. N80-21281

CR-161428 April 8, 1980

CR-161429 April 1, 1980

CR-161430 April 15, 1980

CR-161431* January 11, 1980

CR-161432 March 10, 1980

CR-161433 March 20, 1980

CR-161434** April 1980

CR-161435** March 1980

CR-161436** September 1979
CR-161437** October 26, 1979
N80-25786

CR-161438 May 1979
N80-23348

CR-161439 April 15, 1980
X80-73341

CR-161440 February 1980

CR-161441 March 1980
N80-23932

CR-161442** May 1980
N80-25784

CR-161443** November 1979
N80-25788

CR-161444** May 1980
Solar Energy Facility at North Hampton Recreation Center, Dallas, Texas,
Final Report. DOE Contract EX-76-C-01-2543.  
N80-26766

CR-161445 February 29, 1980
N80-74878

CR-161446 February 29, 1980
SPS Antenna Pointing Control. NAS8-33604. University of Tennessee.  
N80-24515

CR-161447 May 1980
N80-74371

CR-161448 April 1980
N80-24355

CR-161449** January 15, 1980
Test Results on the Frenchman's Reef Solar Data Acquisition and Control System. NAS8-32036. Wyle Laboratories.  
N80-25783

CR-161450** May 1980
N80-25787

CR-161451 February 1980
N80-24757

CR-161452 Marcy 1980
Study of Multi-kW Solar Arrays for Earth Orbit Application. NAS8-32981. Lockheed Missiles and Space Co., Inc.  
N80-24345

33
**NASA CONTRACTOR REPORTS**  
(Abstracts for these reports may be obtained from STAR)

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

NAS8-32491, General Electric Co.
N80-25199

CR-161469                February 28, 1980
Coal Conversion Products Industrial Applications, NASA-33759. Technology Development Corp.
N80-24465

CR-161470                May 8, 1980

CR-161471**               June 1980

CR-161472                March 31, 1979

CR-161473                July 1979

CR-161474                October 20, 1979

CR-161475                April 9, 1980

CR-161476                June 1979

CR-161477                January 1980

CR-161478                March 3, 1980

CR-161479                March 3, 1980

CR-161480**               May 1980

CR-161481**               May 1980

CR-161482**               May 1980

CR-161483**               June 1980
Solar Heating and Hot Water System Installed at Office Building, One Solar Place, Dallas, Texas. DOE EG-77-A-01-4093. N80-29846

CR-161484**               June 1980
Solar Heating and Cooling System
Installed at Leavenworth, Kansas

CR-161485** June 1980

CR-161486 April 1980

CR-161487 March 1979
Countercurrent Distribution of Biological Cells, Final Report. NAS8-32817. University of Oregon Health Sciences Center. N80-27069

CR-161488 May 1980
Manufacturing Applications Team (MATeam), First Quarterly Report for 1980. NAS8-32229. IIT Research Institute.

CR-161489 May 2, 1980
Optical Mass Memory Investigation, Final Report. NAS8-30564. Harris Corp. N80-26641

CR-161490** November 15, 1979

CR-161491** June 1980

CR-161492** June 1980

CR-161493** June 1980

CR-161494** June 1980
Solar Energy System Performance Evaluation -- Seasonal Report for Contemporary Newnan, Newnan, Georgia. NAS8-32036. IBM Corp. N80-29853

CR-161495** June 1980

CR-161496 December 1979

CR-161497 December 20, 1978
Addendum to SSV Generic OFT First Stage Ascent Base Convective Heating Environments. NAS8-29270. Temtech, Inc. N80-27631

CR-161498 December 1978
Space Shuttle Main Engine Plume Radiation Model. NAS8-29270. Temtech, Inc. N80-27415

CR-161499 October 31, 1978
SSV Generic OFT First Stage Ascent Base Convective Heating Environment. NAS8-29270. Remtech, Inc. N80-27630
<table>
<thead>
<tr>
<th>Report Number</th>
<th>Date</th>
<th>Title</th>
<th>Authors</th>
<th>Code</th>
</tr>
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<tbody>
<tr>
<td>CR-161513**</td>
<td>1980</td>
<td>Solar Heating and Domestic Hot Water System Installed at Kansas City Fire Station, Kansas City, Missouri.</td>
<td>City of Kansas City, Missouri.</td>
<td></td>
</tr>
</tbody>
</table>
NASA CONTRACTOR REPORTS
(Abstrats for these reports may be obtained from STAR)

CR-161516 July 11, 1980

CR-161517 May 1980
Ultimate Intrinsic-Coercivity Samarium – Cobalt Magnet, an Earth-Based Feasibility Study for Space Shuttle Missions. NAS8-33607. Charles Stark Draper Laboratory. N80-28384

CR-161518 June 30, 1980

CR-161519 June 30, 1980

CR-161520** June 1980

CR-161521 July 7, 1980

CR-161522 March 1980

CR-161523 June 1980

CR-161524 June 30, 1980
Transient and Diffusion Analysis of Hg Cd Te (Third Quarterly Progress Report). NAS8-33698. Semtec Inc.

CR-161525 July 1980

CR-161526 June 1980

CR-161527 May 15, 1980
The Distribution of Maximum Temperatures of Coronal Active Region Loops. NAS8-33112. Aerospace Corp. N80-29224

CR-161528 July 1980

CR-161529* May 1980

CR-161530* May 1980


CR-161534 July 1979 Systems Definition Study for Shuttle Demonstration Flights of Large Space Structures, Volume 1 — Executive Summary. NAS8-32390. Grumman Aerospace Corp. N80-29376


|-----------|----------------|----------------------------------------------------------------------------------------------------------------------------------|

*White cover reports published at MSFC.

**DOE/NASA reports
ALEXANDER, MARGARET B. ES82
CAMP, DENNIS W. ES82
Magnitude and Frequency of Wind Speed Shears from 3 to 150 meters. For publication in the Journal of Aircraft.

ANDERSON, B. J. ES83
CARTER, J. M. ES83
Cloud Formation Studies by Thermal Wave Propogation. For presentation at the VIIIth International Conference on Cloud Physics to be held in Clermont, France on July 15-19, 1980.

ASKINS, BARBARA S. ES52
The Fluids Experiment System: Facility for Chemistry Experiment in Space. For presentation at the American Chemical Society Pacific Northwest Rocky Mountain Joint Regional Meeting to be held in Salt Lake City, Utah on June 12-13, 1980.

AUSTIN, ROBERT E. PF13

BAILEY, G. A. EC35
BRYANT, S. B. EF36
THOMAS, D. T. EF15
WAGNON, F. W. EC31
The Needs Data Base Management and Archival Mass Memory Systems. For presentation at the AIAA Data Sensor Systems Conference to be held at the USAF Academy in Colorado Springs, Colorado on December 2-4, 1980.

BAUGHER, CHARLES R. ES53
Control of Sheath Effects in Low Energy Particle Detectors. For publication in EOS Transactions and for presentation at the American Geophysical Union Fall Meeting to be held in San Francisco, California on December 8-12, 1980.

BAUGHER, C. R. ES53
CHAPPELL, C. R. ES53
Initial Results of Thermal Plasma Investigations by the Plasma Composition Experiments on ISEE-1. For publication in the Geophysical Research Letters.

BAUGHER, C. R. ES53
CHAPPELL, C. R. ES53
HORWITZ, J. L.
University of Alabama in Huntsville
SHELLEY, E. G.
Lockheed Palo Alto Research Laboratories
PYOUNG, D. T.
University of Bern (Switzerland)
Occurrence of Isotropic and Field-Aligned Distributions in Low Energy Ions Near the Plasmapause. For presentation at the American Geophysical Union Meeting to be held in San Francisco, California on December 2, 1979 and for publication in the EOS Transactions.

BILBRO, JAMES W. EC32
CO₂ Doppler Lidar Measurements. For presentation at the Symposium on Long Range and Short Range Optical Velocity Measurements to be held in Saint-Louis, France on September 15-18, 1980.

BILBRO, JAMES W. EC32
Atmospheric Laser Doppler Velocimetry An Overview. For publication in Optical Engineering.
BILBRO, JAMES W. EC32
DiMARZIO, CHARLES A. Raytheon Co.
An Airborne Doppler Lidar. For presentation at the Heterodyne Systems and Technology Conference to be held in Williamsburg, Virginia on April 1-3, 1980.

BILBRO, J. EC32
FICHTL, G. ES82
KRAUSE, M. Raytheon Co.
DiMARZIO, C. Raytheon Co.
BUCK, C. M&S Corp.
WILEY, G. M&S Corp.
SHAW, K. Advanced Computer Equipment
LEE, R. Lassen Research
Airborne Doppler Severe Storms Measurement System. For presentation at the Coherent Laser Radar for Atmospheric Measurement Conference to be held in Aspen, Colorado on July 15-17, 1980.

BILBRO, J. W. EC32
GORZYNSKI, E. J. Raytheon Co.
JOHNSON, S. C. MSFC
JONES, W. D. MSFC
LEE, R. W. Lassen Research
RIDDLE, A. N. MSFC
Doppler Lidar Signal Processor Comparison Measurements. For presentation at the Coherent Laser Radar for Atmospheric Sensing Conference to be held in Aspen, Colorado on July 15-17, 1980.

BILBRO, JAMES W. EC32
DiMARZIO, C. A. Raytheon Co.
Doppler Lidar Wind Measurement. For presentation at the Coherent Laser Radar for Atmospheric Measurement Conference to be held in Aspen, Colorado on July 15-17, 1980.

BROWN, RICHARD L. LA41
Commercial Use of Materials Processing in Space. For presentation at the 1980 Annual American Astronautical Society Meeting to be held in Boston, Massachusetts on October 20-23, 1980.

BURNS, ROWLAND E. EL23
Nuclear Waste Disposal in Space. For publication in Science.

CAMP, DENNIS W. ES82
FROST, WALTER FWG Associates, Inc.
CHRISTENSEN, L. F. FWG Associates, Inc.
Investigation of Charged Particle Techniques for Warm Fog Dispersal at Airports. For presentation at the World Meteorological Organization (WMO) Third Scientific Conference on Weather Modification to be held in Clermont-Ferrand, France on July 21-25, 1980.

CAMP, DENNIS W. ES82
FROST, WALTER FWG Associates, Inc.
CHRISTENSEN, LARRY S.
SVERDRUP/ARO, Inc.
University of Tennessee Space Institute Fog Dispersion. For presentation at the 1980 Aerospace Congress and Exposition to be held in Los Angeles, California on October 13-16, 1980.

CAMP, DENNIS W. ES82
FROST, WALTER University of Tennessee Space Institute
ENDERS, JOHN H. NASA Headquarters
SOWAR, JOSEPH F.
Federal Aviation Administration
CONNELLY, JOHN W. NOAA
Meteorological and Environmental Inputs to Aviation Systems. For presentation at the WMO Technical Conference on Applications of Aeronautical Meteorology to Operating Efficiency and Safety of Air Operations to be held in Geneva, Switzerland in November 1979.

CAMP, DENNIS W. ES82
FROST, WALTER University of Tennessee Space Institute

GROSS, EDWARD M.          NOAA
SOWAR, JOSEPH F.           Federal Aviation Administration

TOBIASON, ALLAN R.         NASA, Aviation Safety Technology
Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. For publication in the Bulletin of the American Meteorological Society.

CAMP, DENNIS W.            ES82
FROST, WALTER              University of Tennessee Space Institute

TOBIASON, A. RICHARD      NASA
SOWAR, JOSEPH F.           Federal Aviation Administration

BLASIC, JOHN               NOAA
Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. For presentation at the International Conference on the Aviation Weather System to be held in Montreal, Quebec, Canada on October 14-17, 1980.

CAMP, DENNIS W.            ES82
TURKEI, B. S.              FWG Associates
FROST, WALTER              FWG Associates
WANG, S. T.                University of Tennessee Space Institute
Pilot-Aircraft System Response to Wind Shear. For presentation at the AIAA 7th Atmospheric Flight Mechanics Conference to be held in Danvers, Massachusetts on August 11-13, 1980.

CAMP, DENNIS W.            ES82
McCARTHY, JOHN             National Center for Atmospheric Research
FROST, WALTER W.           University of Tennessee Space Institute
DOVIAK, RICHARD D.         National Severe Storms Laboratory
An Airport Wind Shear Detection and Warning System Using Doppler Radar For presentation at the 19th Conference on Radar Meteorology to be held in Miami, Florida on April 15-18, 1980.

CAREY, W. T.               PS06
BOWMAN, R. M.              General Dynamics Convair Div.

STONE, G. R.               General Dynamics Convair Div.

CURTIN, D. J.              Comsat Laboratories
GORDON, G.                 Comsat Laboratories
Developing the Concept of a Geostationary Platform. For presentation at the Eighth AIAA Communication Satellite Systems Conference to be held in Orlando, Florida on April 20, 1980.

CHAPPELL, CHARLES R.       ES53
Low Energy Particles in the Magnetosphere. Submitted as a section of a COSPAR Background Paper “Current & Future State of Space Science” to be held in Paris France.

CHAPPELL, CHARLES R.       ES51
BAUGHER, CHARLES R.        ES51
HORWITZ, JAMES L.          University of Alabama in Huntsville
New Advances in Thermal Plasma Research. For publication in Reviews of Geophysics and Space Physics.

CHASSAY, ROGER P.          LA21
MSFC Materials Processing in Space Activities. For presentation at the First Annual Get Away Special Users
Symposium to be held at the USAF Academy in Colorado Springs, Colorado on November 28-30, 1979.

CHENG, C. C. ES52
On the High Densities Observed in Solar Flare Plasmas. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

CHENG, CHUNG-CHIEH ES51

CHENG, CHUNG-CHIEH ES52

CHENG, CHUNG-CHIEH ES52

CHENG, CHUNG-CHIEH ES52
FELDMAN, U. Naval Research Laboratory DOSCHEK, G. A.
Naval Research Laboratory Observations of the O I 1355.6 Å and C I 1355.8 Å Lines in Solar Flares. For publication in Astronomy and Astrophysics (Germany).

CHENG, CHUNG-CHIEH ES52
FELDMAN, U. Naval Research Laboratory DOSCHEK, G. A.
Naval Research Laboratory What Produces the High Densities Observed in Solar Flare Plasmas. For publication in Astronomy and Astrophysics (West Germany).

CHENG, CHUNG-CHIEH ES52
TANDBERG-HANSSSEN, E. ES51
SMITH, J. B. ES51(NOAA)
Morphology and Spatial Distribution of XUV and X-Ray Emissions in Active Region Observed from Skylab. For publication in Solar Physics (Holland).

CHRISTIAN, HUGH J., JR. ES83
Lightning Detection and Location Techniques. For presentation at the AIAA 19th Aerospace Sciences Meeting to be held in Saint Louis, Missouri on January 12-15, 1981.

CHUBB, WILLIAM B. EL54
Skylab's Apollo Telescope Mount. For presentation at the SPIE Los Angeles Technical Symposium to be held in North Hollywood, California on February 9, 1981.

CLIFTON, K. S. ES64
HILL, C. K. ES64

COFIELD, KESTER I., JR. NA51
Spacelab Status Report. For presentation at the National Technical Association Meeting to be held in Chicago, Illinois on August 11-17, 1980.

COLLINS, RUFUS D., JR. EL51
The Cost of Inspection Error. For publication in the Journal of the National Estimating Society.

CRABTREE, W. L. EC12
Solar Thermophotovoltaic Space Power System. For presentation at the Inter-society Energy Conversion Engineering Conference to be held in Seattle, Washington on August 19-21, 1980.
CRAFT, HARRY G., JR.  

CRAVEN, PAUL D.  
REASONER, DAVID L.  
Studies of Mass Composition and Dynamics of the Plasmaspheric Bulge Region. For publication in EOS Transactions.

CROFT, F. MAX  
WHITE, DON  
Configuration Management and Accounting Utilizing Interactive Forms Mode Technology. For presentation at the Computers and Industrial Engineering Conference to be held in Orlando, Florida on October 22, 1980 and subsequent publication in the journal (Computers and Industrial Engineering).

CUMINGS, NESBITT P.  
McINTOSH, W. R.  
The MSFC Solar Correlation Tracker. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

DARBRO, W.  
ELSNER, R. F.  
GHOSH, P.  
WEISSKOPF, M. C.  
GRINDLAY, J. E.  

DECHER, RUDOLF  
Interferometer for Gravitational Radiation. For presentation at SPIE’s Technical Symposium East “Active Optical Devices and Applications” to be held in Washington, D. C. on April 7-11, 1980.

DECHER, R.  
A Space System for High-Precision, Global Time and Frequency Comparison of Clocks. For presentation at the Precise Time and Time Interval Applications and Planning Meeting to be held in Greenbelt, Maryland on December 2-4, 1980.

DENTON, STEPHEN J.  
ENGLER, ERICH E.  
Large Space Structures Activity at MSFC. For presentation at the AIAA/ASME 21st SDM Conference to be held in Seattle, Washington on May 12-14, 1980.

DeSANCTIS, CARMINE E.  
Spacelab Utilization for Future Optics Technology and Applications. For presentation at the SPIE Huntsville Electro-Optical Technical Symposium to be held in Huntsville, Alabama on September 19-October 3, 1980.
DISHER, JOHN H.  
NASA Headquarters
HETHCOAT, JERRY P.  
PS01
PAGE, MILTON A.  
PS01
Advanced Space Transportation Systems. For presentation at the DGLR/AAS Symposium to be held in Hannover, Germany on April 28-30, 1980.

DORAN, BILL  
EL03
SHAFIER, JOSEPH, JR.
Jet Propulsion Laboratory
SEPS Mission and System Integration/Interface Requirements for the STS. For presentation at the American Astronautical Society Annual Meeting to be held in Los Angeles, California on October 29-November 1, 1979.

DOWNEY, JAMES A.  
PS01
DAILEY, CARROLL C.  
PS01
Concept Definition and Management of Optical System Payloads. For presentation at the SPIE Electro-Optical Technical Symposium to be held in Huntsville, Alabama on September 29-October 2, 1980.

ELMS, R. V., JR.
Lockheed Missiles and Space Co., Inc.
YOUNG, L. E.  
EC12
SEP Solar Array Development Testing. For publication in Direct Energy Conversion.

ELSNER, R. F.
MSFC-NAS/NRC Research Associate
GHOSH, P.
MSFC-NAS/NRC Research Associate
DARBO, W.  
ES62
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ES62
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GRINDLAY, J. E.
Alfred P. Sloan Foundation Fellow
Observations of Cygnus X-3 with the Einstein (HEAO-2) X-Ray Observatory: The Period Derivative and the Asymmetric X-Ray Light Curve. For presentation at the AAS High Energy Astrophysics Division Meeting to be held at Cambridge, Massachusetts on January 28-30, 1980 and for publication in the AAS Bulletin.

ELSNER, R. F.  
ES62
(NAS/NRC Resident Research Associate)
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ES62
NAS/NRC Resident Research Associate
LAMB, F. K.
University of Illinois

ENGLER, E. E.  
EP13
AGAN, W. E.
Vought Corp.
Erectable/Deployable Concepts for Large Space Structures. For presentation at the 39th Annual Conference of the Society of Allied Weight Engineers, Inc., to be held in St. Louis, Missouri on May 12-14, 1980 and for presentation at the AIAA/ASME/ASCE/AHS 21st Structures, Structural Dynamics and Materials Conference to be held in Seattle, Washington on May 12-14, 1980.
ENGLER, E. E.  EP13
STOKES, JACK  EP13
AGAN, W. E.  Vought Corporation
Neutral Buoyancy Test Results of a Deployable Space Beam. For presentation at the AIAA 2nd Conference on Large Space Platforms to be held in San Diego, California in February 1981.

FELIX, A. RICHARD  ED35
Calibration Results of a 0.25-Inch-Diameter Six-Component Force Balance. For presentation at the 53rd Meeting of the Supersonic Tunnel Association to be held in Palo Alto, California on March 26-28, 1980.

FERNANDEZ, KENNETH  EF42
Application of a Computer Controlled Robot to Remote Equipment Maintenance. For presentation at the Industry Applications Society Conference (IASCON) to be held in Cincinnati, Ohio on September 29-October 3, 1980.

FERNANDEZ, KENNETH  EF37
Computer Control of a Robotic Satellite Servicer. For presentation at the Southeastcon '80 to be held in Nashville, Tennessee on April 15, 1980.

FIELD, ELMER L.  TA31
Space Telescope Design for Maintenance. For presentation at the EASCON '80 IEEE to be held in Washington, D.C. on September 30, 1980.

FIELDS, STANLEY A.  ES53
Cusp Region Particle Precipitation and Ion Convection for Northward Interplanetary Magnetic Field. For publication in Geophysical Research Letters.

FISCHMAN, G. J.  ES62
The NASA/MARSHALL Space Flight Center Program in Gamma-Ray Burst Astronom and Space Science (The Netherlands).

FISHMAN, G. J.  ES62
DUTHIE, J. G.  ES62
NAS/NRC Research Associate
DUFOUR, R. J.  Rice University

FOUNTAIN, W. F.  ES62
GARY, G. A.  ES62
O'DELL, C. R.  ES62
MUFSON, S. L.  Indiana University
HOWARD, W. E., III  National Science Foundation
WOLFF, M. T.  Indiana University
An Investigation of the Neutral and Ionized Gas in M16. For publication in the Astrophysical Journal.

FOWLIS, WILLIAM W.  ES82
Results of the Research Program for the Design and Construction of a Spherical Baroclinic Experiment for Spacelab Flights. For presentation at the Third Conference on Atmospheric and Oceanic Waves and Stability Conference (American Meteorological Society) to be held in San Diego, California on January 19-22, 1981.

FOWLIS, WILLIAM  ES82
Book Review: Rotation Fluids in Geophysics. For publication in EOS Transactions.

FOWLIS, WILLIAM W.  ES82
ANTAR, BASIL N.
University of Tennessee Space Institute
Baroclinic Instability of a Real Hadley Cell. For presentation at the Third Conference on Atmospheric and Oceanic Waves and Stability (American Meteorological Society) to be held in San Diego, California on January 19-22, 1981.
FOWLIS, W. W., ES82
ANTAR, BASIL N.,
University of Tennessee Space Institute
Eigenvalues of a Baroclinic Stability Problem with Ekman Damping. For publication in the Journal of Atmospheric Sciences.

FOWLIS, WILLIAM W., ES82
GIERE, ALBERT C.,
Universities Space Research Association

GELLER, GERALD, EP31
LAMB, CARL D., EP31
ROSS, WALT, Rocketdyne

GOULD, JOHN M., EC45
EDGE, TEDDY M., EC45

GREEN, JAMES L., ES61
Observations of AKR. For presentation at the Chapman Conference on Formation of Auroral Arcs, AGU to be held in Fairbanks, Alaska on July 21, 1980.

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</tr>
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<td>The Direct Observation of Uni-Directional Solidification as a Function of Gravity Level.</td>
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</tr>
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<td></td>
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<tr>
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<td>Visible Light Scatter Measurement of AXAF Mirror Samples.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>HARDY, GEORGE B.</td>
<td>SA41</td>
<td>Space Shuttle Solid Rocket Booster. For presentation at the AAS Annual Conference to be held in Los Angeles, California on October 29-November 1, 1979.</td>
<td></td>
</tr>
<tr>
<td>HEAMAN, JOHN P.</td>
<td>ED35</td>
<td>A Computer Controlled System for Acquisition and Interactive Analysis of Unsteady Aerodynamic Data. For presentation at the Integration of Computers and Wind Tunnel Testing Conference to be held in Chattanooga, Tennessee on September 24-25, 1980.</td>
<td></td>
</tr>
<tr>
<td>HOLLAND, LAWRENCE ROZIER</td>
<td>ES72</td>
<td>A Thermal Transmission Function for Fused Silica Ampoules. For publication in the Journal of Crystal Growth (The Netherlands).</td>
<td></td>
</tr>
<tr>
<td>HOOPER, JAMES W.</td>
<td>EF43</td>
<td>Algorithmic Formulations for Simulation Strategies. For publication in Simulation.</td>
<td></td>
</tr>
<tr>
<td>HORTON, WILLIAM P.</td>
<td>EE11</td>
<td>Solid Rocket Booster. For presentation at the Seventeenth Space Congress to be held in Cocoa Beach, Florida on April 31, 1980.</td>
<td></td>
</tr>
<tr>
<td>HOWELL, J. T.</td>
<td>PD12</td>
<td></td>
<td>University of Tennessee Command Signal Generation for Satellite Power System Pointing Control. For presentation at the Southeastern Symposium Theory to be held in Virginia Beach, Virginia on May 19-20, 1980.</td>
</tr>
</tbody>
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MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

HOWELL, J. T. PD12
HUNG, J. C. University of Tennessee
PELLES, P. Z. University of Tennessee

HSU, J. P. ES63

HSU, J. P. ES63

HSU, J. P. ES63

HYUN, J. M. NRC/NAS-ES82
Baroclinic Instability in Two Coupled Eady-Type Zonal Currents with Different Shear. For publication in the Journal of Atmospheric Sciences.

HYUN, J. M. ES82
FOWLIS, W. W. ES82
WARN-VARNAS, A. NORDA

IVORY, CORNELIUS F. ES73

JOHNSON, MARY H. EH22
Owen, Robert B. ES22

JOHNSON, MARY HELEN EH22
Owen, Robert B. ES74
Study of Optical Techniques for the Observation of Gravity Related Flow During Solidification. For presentation at the 157th Meeting of the Electrochemical Society to be held in St. Louis, Missouri on May 11-16, 1980.

JONES, K. W. EL42
SPEAK, C. A. TC/Wasatch
Space Shuttle Solid Rocket Motor Improved Performance Design. For presentation at the JANNAF Conference to be held in New Orleans, Louisiana on May 26-28, 1981.

JONES, LEE W. EP24

KAUFMAN, JOHN W. ES82
FROST, WALTER FWG Associates, Inc.
Wind-Wheel Turbine. For presentation at the SERI Second Energy Innovative Systems Conference to be held in Colorado Springs, Colorado on December 3-5, 1980.

KELLER, VERNON W. ES83
HALLETT, JOHN Desert Research Institute
The Plate-Dendrite Transition of
Growing Snow Crystals. For presentation at the VIIIth International Conference on Cloud Physics to be held in Clermont, France on July 15-19, 1980.

KELLER, V. ES83
McKINNIGHT, C. V. Texas Instruments, Inc.
HALLETT, J. Desert Research Institute
Growth of Ice Discs from the Vapor and the Mechanism of Habit Change of Ice Crystals. For publication in the Journal of Crystal Growth.

KELLER, VERNON W. ES83
SAC, ROBERT I. Joseph Oat Corporation

KELLER, VERNON W. ES83
SAX, ROBERT I. ES83
Observational Evidence for Secondary Ice Generation in a Deep Convection Cloud. For presentation at the VIIIth International Conference on Cloud Physics to be held in Clermont, France on July 15-19, 1980.

KELLER, VERNON W. ES83
VAUGHAN, O. H., JR. ES83
Ice Crystal Growth from Liquid in Low-Gravity. For presentation at the VIIIth International Conference on Cloud Physics to be held in Clermont, France on July 15-19, 1980.

KIEFLING, LARRY A. ED22
Space Shuttle Main Engine, Nozzle-Steerhorn Dynamics. For presentation at the AIAA/ASME/ASCE/AHS 22nd Structure, Structural Dynamics and Materials Conference to be held in Atlanta, Georgia on April 6-8, 1981.

KRALL, K. R. et al. ES52 (NAS Fellow)
Analysis of Changes in Photospheric Magnetic Fields Within a Flare-Productive Active Region. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

KRALL, K. R. ES51 (NRC Associate)
ANTIOCHOS, S. K. Stanford University
The Evolution of Active Region Loop Plasma. For publication in the Astrophysical Journal.

KROES, ROGER L. ES74
Growth of TGS Crystals by Solution Technique Onboard Spacelab III. For presentation at the Electrochemical Society Meeting to be held in St. Louis, Missouri on May 11-16, 1980.

KROES, ROGER L. ES74
Liquid Phase Epitaxy (LPE) of GaAs in Low Gravity. For presentation at the Electrochemical Society St. Louis Meeting to be held in St. Louis, Missouri on May 11-16, 1980.

LACY, L. L. ES74
JOHNSON, J. ES74
STEINBERG, J. Drexel University
LORD, A. E. JR. Drexel University
Production of Bulk Amorphous Pd_{77.5}Si_{16.5}Cu_{6} in a Containerless Low-Gravity Environment. For publication in Applied Physics Letters.

LACY, L. L. ES74
ROBINSON, M. B. ES74
RATHZ, T. J. ES74
Containerless Supercooling and Solidification in Drop Tubes. For publication in the Journal of Crystal Growth.
LANIER, J. R., JR. EC12
KAPUSTKA, ROBERT E. EC12
GRAVES, J. EC12
LUKENS, F. E. Martin Marietta Aerospace

LINDSTROM, ROBERT E. SA01
Status of Space Shuttle ET, SRB and SSME. For presentation at the SAE Aerospace Congress to be held in Los Angeles, California on October 14, 1980.

LINTON, ROGER C. ES64
FOUNTAIN, JAMES F. ES64
McKEOWN, D. Faraday Laboratories, Inc.
FOUKAL, P.
Atmospheric and Environmental Research, Inc.

NCYES, ROBERT W.
Smithsonian Astrophysical Observatory
The Crystal Cavity Radiometer and Solar Radiant Flux Variations. For presentation at the Spring Meeting of the American Geophysical Union to be held in Toronto, Canada on May 22-27, 1980.

LOMBARDO, J. EP21
GOETZ, O. K. EP21
RODGERS, R. N. EP21
Status of the Space Shuttle Main Engine Flight Certification Program. For presentation at the 1980 JANNAF Propulsion Meeting to be held in Monterey, California on March 11-14, 1980.

LOOSE, J. D. EL52
FLEISCHMAN, G. L. General Electric
SCOLLLOW, T. R. General Electric
Vapor Chambers for Atmospheric Cloud Physics Laboratory. For presentation at the AIAA 15th Thermophysics Conference to be held in Snowmass, Colorado on July 14-16, 1980.

LOW, B. C. ES51

LOW, B. C. ES51 (NAS Fellow)
Exact Magnetostatic Models of Filament Prominences. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

LOW, B. C. ES52

LOW, B. C. ES51
NAS/NRC Research Associate

LOW, B. C. ES51
The Vertical Filamentary Structures of Quiescent Prominences. For publication in Solar Physics (Holland).

LOW, B. C. ES51
LERCHE, I. University of Chicago

LOW, B. C. ES51
WU, S. T. University of Alabama in Huntsville
LUNDQUIST, C. A. ES01
FICHTL, G. H. ES82
NAUMANN, R. J. ES71

Fluid Mechanics and Solidification Investigation in Low-Gravity Environments.
For presentation at the 31st International Astronautical Federation (IAF)
Congress to be held in Tokyo, Japan on September 21-28, 1980.

McGUIRE, JANICE K. ES73
MILLER, TERESA Y. ES73
TIPPS, RUBY W. ES73
SNYDER, ROBERT S. ES73
RIGHETTI, PIER GIORGIO
University of Milano (Italy)
New Experimental Approaches to Isoelectric Fractionation of Cells. For publication in Cell Biophysics.

McPHERSON, W. B. EH23

MALLERNEE, MAX E. AP12

MEEGAN, C. A. ES62
FISHMAN, G. J. ES62
HAYMES, R. C. Rice University
Search for Transient Gamma-Ray Lines. For presentation at the AAS 155th Meeting to be held at San Francisco, California on January 13-16, 1980 and for publication in the Bulletin of the AAS.

NAKAGAWA, Y. ES51

NAKAGAWA, Y. ES51 (NAS Fellow)

NAKAGAWA, Y. ES51
HAN, S. M.
University of Alabama in Huntsville
WU, S. T.
University of Alabama in Huntsville
Numerical Study of Two-Dimensional, Non-Plane Transient Magnetohydrodynamic Flow. For publication in Computers and Fluids.

NAKAGAWA, Y. ES51
TEUBER, D. L. ES51
Analytical Representation of Temporal Behaviors with Finite Amplitude Fluid Transport. For publication in The Physics of Fluids.

NAKAGAWA, Y. ES51 (NAS Fellow)
WU, S. T.
University of Alabama in Huntsville
HAN, S. M.
University of Alabama in Huntsville
Further Development of Numerical MHD Model of Coronal Dynamics. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 15-19, 1980.

NAKAGAWA, Y. ES51 (NRC Research Associate)
WU, S. T.
University of Alabama in Huntsville
HAN, S. M.
University of Alabama in Huntsville
Magnetohydrodynamics of Atmospheric Transients III. Basic Results of Non-Plane Two-Dimensional Analysis. For publication in the Astrophysical Journal.

NAUMANN, ROBERT J. ES71
Skylab and Apollo-Soyuz Experiment: Indications of the Promise of Space Processing. For presentation at the American Chemical Society Pacific Northwest Rocky Mountain Joint Regional Meeting to be held in Salt Lake City, Utah on June 12-13, 1980.

NEIN, MAX E. PS02
WARNER, JOHN W. TA01
A Very Large Space Telescope for the Optical-UV. To be presented at the SPIE Technical Symposium East “Active Optical Devices and Applications” to be held in Washington, D. C. on April 7-11, 1980.

NISHIOKA, G. ES74
LACY, L. ES74
FACEMIRE, B. ES74

NOLA, FRANK J. EC24
Power Factor Controller — An Energy Saver. For presentation at the Textile Industry Society of the IEEE to be held in Atlanta, Georgia on May 10-11, 1980.

NURRE, GERALD S. ED12
Space Telescope Observatory in Space. For presentation at the Rocky Mountain Guidance and Control Conference to be held in Keystone, Colorado on February 17-21, 1980.

NURRE, G. S. ED12
DOUGHERTY, H.
Lockheed Missiles and Space Co., Inc.

TOMPETRINI, K.
Bendix Guidance Systems Division

LEVINTHAL, J.
Bendix Guidance Systems Division
Space Telescope, Observatory in Space. For presentation at the AIAA G&C Conference to be held in Danvers, Massachusetts on August 11-13, 1980.

O’DELL, C. R. DS30
Scientific Management of the Space Telescope. For presentation at the SPIE Electro-Optical Technical Symposium to be held in Huntsville, Alabama on September 29-October 3, 1980.

O’DELL, C. R. DS30
The Space Telescope. For presentation at the Optical and Infrared Telescopes for the 1990’s Conference to be held in Tuscon, Arizona on January 7-8, 1980 and for publication in “Telescopes for the 1980’s.”

O’DELL, C. R. DS30
ASKINS, BARBARA S. ES52

O’DELL, C. R. DS30
BAHCALL, J. N. Institute of Advanced Study
The Space Telescope Observatory. For publication in the Journal of the Astronautical Sciences.

OMENYI, S. N. ES73
SNYDER, R. S. ES73
Concentration Dependence of Broadening Rates of Layered Chicken Erythrocyte Suspensions. For publication in the Journal Colloid and Interface Science.

OMENYI, S. N. ES73 (NAS Fellow)
SNYDER, R. S. ES73
Effects of Zero Van Der Waals and Zero Electrostatic Forces on Droplet Sedimentation. For presentation at the American Chemical Society National Meeting to be held in San Francisco, California in August 1980.

OMENYI, S. M. ES73
SNYDER, R. S. ES73
VAN OSS, C. J.
State University of New York at Buffalo
ABSOLOM, D. R. University of Toronto
NEUMANN, A. W. University of Toronto
Effects of Zero Van Der Waals and Zero Electrostatic Forces on Droplet Sedimentation. For publication in the Journal of Colloid and Interface Science.

OMENYI, S. N. ES73 (NRC Research Associate)
SNYDER, R. S. ES73
van Oss, C. J.
State University of New York at Buffalo
Stability of Layered Erythrocyte Suspensions at Unit Gravity. For presentation at the 54th Colloid Symposium to be held at Lehigh University at Bethlehem, Pennsylvania on June 15-18, 1980.

ORAN, W. A. ES72
Capabilities of the Vacuum in the Wake of Spacecraft. For presentation at the American Vacuum Society 16th Symposium (New Mexico Chapter) to be held in Santa Fe, New Mexico on May 6-8, 1980.

ORAN, W. A. ES72
Containerless Melting and Solidification. For presentation at the Symposium of the Electrochemical Society, 157th Annual Meeting to be held in St. Louis, Missouri on May 11-16, 1980.

ORAN, W. A. ES72
Containerless Processing of Metals with an Electromagnetic Levitation System. For publication in Metallurgical Transactions.

OWEN, J. W. EP44
VANIMAN, J. L. EP44
Thermal Control Testing for Low Cost Programs. For presentation at the Sixth Aerospace Testing Seminar to be held in Los Angeles, California on March 11-13, 1981.

OWEN, ROBERT B. ES74
CAMPBELL, C. WARREN ES74

OWEN, ROBERT B. ES74
RILEY, CLYDE ES74
COBLE, H. DWAINES University of Alabama in Huntsville
FISHER, GORDON
Inco Research and Development Center

POWELL, LUTHER E. PM01
25 kW Power Module. For presentation at the DGLR/AAS Symposium on Shuttle/Spacelab — The New Transportation System and Its Utilization to be held in Hannover, Germany on April 28-30, 1980.

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POWELL, LUTHER E. PM01

POWERS, LUTHER B. EP25
BAILEY, RICHARD L. JPL
Shuttle Subscale Ablative Nozzle Tests. For presentation at the AIAA/SAE/ASME 16th Joint Propulsion Conference to be held in Hartford, Connecticut on June 30-July 2, 1980.

PRIEST, C. C. PS04
NIXON, R. F. PS04
RICE, E. E. Battelle Columbus Laboratories Space Disposal of Nuclear Wastes. For publication in Astronautics and Aeronautics.

PRIEST, C. C. PS04

RANDALL, JOSEPH L. EC31
DECHER, RUDOLF ES61
Interferometer for Gravitational Radiation. For presentation at the SPIE's (Society of Photo-Optical Instrumentation Engineers) Symposium, East; to be held in Washington, D. C. on April 9-10, 1980.

REDMON, JOHN W. EP34
AXAF Mirror Periscope. For presentation at the 15th Aerospace Mechanisms Symposium to be held at MSFC, Huntsville, Alabama on May 14-15, 1981.

RHODES, PERCY H. ES73

RYAN, ROBERT S. ED21
Unstable Plume Oscillation of a High Expansion Ratio Nozzle Fired on Ground. For presentation at the Aerospace Flutter and Dynamics Council Spring Meeting to be held in Marina Del Rey, California on May 29-30, 1980.

SAXTON, DONALD R. PS04

SCHUTZENHOFER, LUKE A. ED24
Turbulent Boundary Layer Induced Beam Stresses Simulated with a Reverberant Acoustic Field. For presentation at the 22nd Structures, Structural Dynamics and Materials Conference to be held in Atlanta, Georgia on April 6-8, 1981.

SCHUTZENHOFER, L. A. ED23
JONES, J. H. ES23
JEWELL, R. E. ED23
RYAN, R. S. ED23
MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

SCHWARTZ, JONAS M. PD24
HILCHEY, JOHN D. PS02
The Manned Space Platform as an Evolutionary Means to Achieve a Permanent Manned Orbital Operations Facility. For presentation at the AIAA 2nd Conference on Large Space Platforms: Toward Permanent Manned Occupancy of Space to be held in San Diego, California in January-February 1981.

SCHWINGHAMER, ROBERT J. EH01

SMITH, AUBREY D. AT01
Lightweight Pumping Module Adaptation for Oil Spill Cleanup. For presentation at the 1981 Oil Spill Conference to be held in Atlanta, Georgia on March 2-5, 1981.

SMITH, J. B. ES52 (NOAA)
Vector Magnetic Field Measurements at Flare Locations. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

SMITH, ROBERT E. ES81
The Atmospheric Cloud Physics Laboratory. For presentation at the VIIIth International Conference on Cloud Physics to be held in Clermont, France on July 15-19, 1980.

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

SMITH, R. E. ES81
JAYROE, R. R. ES81
WEST, G. S. ES81
HUNG, R. J.
PHAN, T.
University of Alabama in Huntsville
University of Alabama in Huntsville

STEINCAMP, JAMES W. PD34
Unified Reliability Calculations for Standard Redundancy Implementations. For publication in IEEE Transactions on Reliability.

TANDBERG-HANSSEN, E. ES01
STEINOLFSON, R. S.
University of Alabama in Huntsville
University of Alabama in Huntsville
WU, S. T.

University of Alabama in Huntsville
Dryer, M. NOAA/ERI

STEWARD, RODNEY D. EL02
STEWART, RODNEY D. EL02
FORNEY, JAMES A. EL02
Computerized Economic Analysis for DOE/NASA Sponsored Solar Heating and Cooling Programs. For presentation at the Third Annual Systems Simulation Economic Analysis/Solar Heating and Cooling Operational Results Conference to be held in Reno, Nevada on April 17-May 1, 1981.

STONE, NOBIE H. ES53
The Plasma Wake of Mesosonic Conducting Bodies I: A Parametric Study of Ion Focusing by the Plasma Sheath. For publication in Plasma Physics (United Kingdom).

STONE, NOBIE H. ES53
SAMIR, URI University of Michigan
About the Interaction Between Rarefied Plasmas of Planetary and Interplanetary Origin and Bodies Moving in Space. For presentation at the 12th International Symposium on Rarefied Gas Dynamics to be held in Charlottesville, Virginia on July 7-11, 1980.

STONE, NOBIE H. ES53
SAMIR, URI University of Michigan Bodies in Flowing Plasmas: Laboratory Studies. For presentation at the COSPAR Meeting to be held in Budapest, Hungary on June 11-13, 1980.

STOKES, JACK W. EL15
LOUGHEAD, THOMAS E. Essex Corp.
PRUETT, EDWIN C. Essex Corp.
Development of a Cost Algorithm for Defining Manual Crew Tasks and Predicting Assembly Costs for Large Structures in Space. For presentation at the 24th Annual Meeting of the Human Factors Society to be held in Las Vegas, California on October 15-17, 1980.

SWENSON, G. R. ES53
REES, M. H. University of Alaska
HAYS, P. B. University of Michigan
The Production Efficiency of O\(^+\)(2 P) Ions by Auroral Electron Impaction. For publication in Geophysical Research Letters.

TANDBERG-HANSSSEN, EINAR ES01
CHENG, CHUNG CHIEH ES52
The Ultraviolet Spectrometer and Polarimeter (UVSP) on the Solar Maximum and Initial Results in Polarimetry. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

TANDBERG-HANSSSEN, E. A. ES51
WOODGATE, B. D. NASA/GSFC

TANDBERG-HANSSSEN, E. ES01
WU, S. T.
University of Alabama in Huntsville
STEINOLFSON, R. S.
University of Alabama in Huntsville
DRYER, M. NOAA/ERL

TAYLOR, KENNETH R. PS06
Materials Experiment Carrier — An Approach to Expanded Space Capabilities. For presentation at the 1980 Annual American Astronautical Society Meeting to be held in Boston, Massachusetts on October 20-23, 1980.

THOMAS, C. N. FA32
WIESENMAIER, B. L. EE01
MSFC PAPERS CLEARED FOR PRESENTATION
(Available only from authors. Dates are presentation dates.)

SCHULTZ, W. E. Wyle Laboratories
HENDERSON, B. Wyle Laboratories
BANKS, M. E. Wyle Laboratories
Evacuated Tube Collectors are not Flat Plates. For presentation at the AS/ISES 1980 Annual Meeting to be held in Phoenix, Arizona on June 2-6, 1980.

THOMASON, HERMAN E. EA01
Skylab Reactivation and Reconfiguration for Reentry. For presentation at the IFAC Workshop on Spacecraft System Reconfiguration in Orbit to be held in Cambridge, Massachusetts on September 9, 1980.

THOMPSON, JAMES R., JR. SA51
Space Shuttle Main Engine. For presentation at the Seventeenth Space Congress to be held at Cocoa Beach, Florida on April 30-May 2, 1980.

URBAN, EUGENE W. ES63
The Spacelab 2 Pointed Experiments. For presentation at the SPIE Los Angeles Technical Symposium to be held in Los Angeles, California on February 9-13, 1981.

URBAN, E. W. ES63
KATZ, L. ES63
HENDRICKS, J. B.
University of Alabama in Huntsville

KARR, G.
University of Alabama in Huntsville

VANIMAN, J. L. EP44
FISHER, R. R. EP44
Ablative Thermal Protection Systems.

For presentation at the International Conference on High Temperature Corrosion to be held in Phoenix, Arizona on March 2-5, 1981.

VAUGHAN, OTHA H., JR. ES83
BROOK, MARX
New Mexico Institute of Mining and Technology

ORVILLE, RICHARD E.
State University of New York at Albany

VONNEGUT, BERNARD
State University of New York at Albany
Observations Over a Nocturnal Thunderstorm Form A U-2 Airplane. For presentation at the Fall Meeting of the American Geophysical Union to be held in San Francisco, California on December 8-11, 1980 and for publication in the EOS, Transactions.

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

BROOK, M.
New Mexico Tech.

ORVILLE, R. E.
State University of New York at Albany
Thunderstorm Overflight Program. For presentation at the AIAA Conference on Sensor Systems for the 80's to be held at the U.S. Air Force Academy in Colorado Springs, Colorado on December 2-4, 1980.

VAUGHAN, OTHA H., JR. ES83
BROOK, MARX New Mexico Tech.

TENNIS, RICHARD New Mexico Tech.
RHODES, CHARLEY New Mexico Tech.

KREHBIEL, PAUL New Mexico Tech.

VONNEGUT, BERNARD
State University of New York at Albany
Simultaneous Observations of Lightning Radiations from Above and Below Clouds. For publication in Geophysical Research Letters.
VAUGHAN, O. H., JR.  ES83
HUNG, R. J.  
University of Alabama in Huntsville
LIAU, G. S.
University of Alabama in Huntsville
Advection Fog Formation and Aerosols Produced by Combustion-Originated Air Pollution. For presentation at the 2nd Joint Conference on Application of Air Pollution Meteorology to be held in New Orleans, Louisiana on March 24-27, 1980.

VAUGHAN, OTHA H.  ES83
VONNEGUT, B.  
State University of New York at Albany
BROOK, MAP.X  New Mexico Tech.
Nighttime/Daytime Optical Survey of Lightning and Convective Phenomena Experiment (NOSL). For presentation at the VIIIth International Conference on Atmospheric Electricity to be held in Manchester England on July 28-August 1, 1980.

VERBLE, A. J.  EP31
CONNELL, H. A.  EP34
CLARK, A. V.  EP34
Release Mechanism (REM) for Releasing and Reattaching Experiments on the Space Shuttle. For presentation at the 15th Aerospace Mechanisms Symposium to be held at MSFC, Huntsville, Alabama on May 14-15, 1981.

VILLELLA, F.  EC43
HAMITER, L.  EC43
Semiconductor Stress Testing at High Temperature. For presentation at the International Society for Testing and Failure Analysis to be held in Los Angeles, California on October 27, 1980.

WAITES, HENRY B.  ED12
Observation Without Plant Input Information. For presentation at the Fourth Annual Meeting of SEAS-SIAM to be held in Birmingham, Alabama on March 22, 1980.

WAITES, HENRY B.  ED12
An Observer for a Deployable Antenna. For presentation at the AIAA 2nd Conference on Large Space Platforms: Toward Permanent Manned Occupancy of Space to be held in San Diego, California in January/February 1981.

WARMBROD, JOHN D.  ED33
Design and Development of the Thermal Protection System for the External Tank. For presentation at the Aerothermal Workshop to be held in Colorado Springs, Colorado on March 17, 1980.

WARNER, JOHN W.  TA02
Super Size Telescope. For presentation at the SPIE Technical Symposium to be held in Washington, D. C. on April 10-11, 1980.

WEATHERS, HOYT M.  FA33

WEAVER, E. A.  EC32
BILBRO, J. W.  EC32
DUNKIN, J. A.  EC32
JOHNSON, S. C.  EC32
JONES, W. D.  EC32
Pulsed Doppler Lidar for Detection of Turbulence in Clear Air. For presentation at the NASA Aircraft Safety and Operating Problems Conference to be held in Hampton, Virginia in November 1980.

WEAVER, EDWIN A.  EC32
The 1979 Clear Air Turbulence Flight
Test. For presentation at the Aircraft Safety and Operating Problems Conference to be held in Hampton, Virginia in Mid-November 1980.

WEISSKOPF, MARTIN C.  ES62
The Advanced X-Ray Astrophysics Facility (AXAF). For presentation at SPIE’s Technical Symposium East “Active Optical Devices and Applications” to be held in Washington, D.C. on April 7-11, 1980.

WEISSKOPF, M. C.  ES62
X-Ray Astronomy. For publication in the AIAA Proceedings of “Shuttle to the Next Space Age.”

WEISSKOPF, M. C.  ES62
DARBRO, W.  ES62
ELSNER, R.  ES62 (NAS/NRC Resident)
GHOSH, P.  ES62 (NAS/NRC Resident)
SUTHERLAND, P. G.
Alfred P. Sloan Fellow
GRINDLAY, J.
Alfred P. Sloan Fellow
High Time Resolution Observation of the Transient Event of 5 March 1979. For publication in Nature.

WEISSKOPF, M. C.  ES62
DARBRO, W.  ES62
ELSNER, R. F.  ES62
GHOSH, P.  ES62
SUTHERLAND, P. G.  ES62
GRINDLAY, J. E.  ES62
Observations of 4U1626-67 With the Monitor Proportional Counter on the Einstein (HEAO-2) Observatory. For presentation at the AAS High Energy Astrophysics Division Conference to be held in Cambridge, Massachusetts on January 28-30, 1980 and for publication in the AAS Bulletin.

WEISSKOPF, M. C.  ES62
ELSNER, R. F.  ES62 (NAS/NRC)
GHOSH, P.  ES62 (NAS/NRC)

DARBRO, W.  ES62
GRINDLAY, J. E.
Harvard-Smithsonian Center for Astrophysics
MARSHALL, H. L.
Harvard-Smithsonian Center for Astrophysics
HERTZ, P.
Harvard-Smithsonian Center for Astrophysics
SOLTAN, A.
Harvard-Smithsonian Center for Astrophysics
Time-Resolved Imaging and Spectral Studies of an X-Ray Burst from the Globular Cluster Terzan 2. For publication in the Astrophysical Journal Letters

WEST, E. A.  ES52
HAGYARD, M. J.  ES52
SMITH, J.  ES52
Interpretation of Filter Magnetograph Results Including Solar Magneto-Optical Effects: Observations. For presentation at the 156th Meeting of the American Astronomical Society to be held in College Park, Maryland on June 16-19, 1980.

WOJTALIK, FRED S.  EE01
Project HEAO - Revisited. For presentation at the Eighth IFAC World Congress to be held in Kyoto, Japan on August 21-28, 1981.

WYMAN, CHARLES L.  EE01
WEISSKOPF, MARTIN  ES62
ZOMBECK, MARTIN V.
Harvard-Smithsonian Center for Astrophysics
High Resolution X-Ray Scattering Measurements for AXAF. For presentation at the SPIE Huntsville Electro-Optical Technical Symposium to be held in Huntsville, Alabama on September 29-October 3, 1980.

YOST, VAUGHN H.  EE05
A Review of Equipment Developed for Materials Processing in Space. For presentation at the First Annual Get Away Special Users Symposium to be held at
YOUNG, L. E.

ZOLLER, LOWELL K.
APPROVAL

FY 1980 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.

JAMES T. MURPHY
Director, Administration and Program Support