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(NASA-TM-80905) REPORT ON ACTIVE AND
PLANNED SPACECRAFT AND EXPERIMENTS (NASA)
319 p HC A14/MF A01 CSCL 22A

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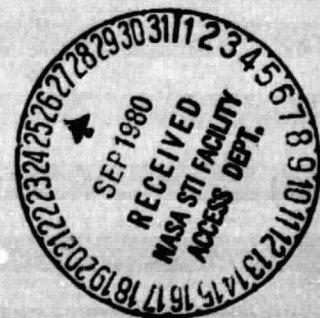


National Space Science Data Center/
World Data Center A For Rockets and Satellites

80-06

Report on Active and Planned Spacecraft and Experiments

August 1980



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TWX No.: 7108289716

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World Data Center A for Rockets and Satellites
Code 601
Goddard Space Flight Center
Greenbelt, Maryland 20771
U.S.A.

Telephone: (301) 344-6695
Telex No.: 89675
TWX No.: 7108289716

REPORT ON ACTIVE AND PLANNED
SPACECRAFT AND EXPERIMENTS

Edited by

Richard Horowitz

Robert W. Vostreys

National Space Science Data Center

August 1980

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

PREFACE

The *Report on Active and Planned Spacecraft and Experiments* provides the professional community with information on current as well as planned spacecraft activity in a broad range of scientific disciplines. Spacecraft that were active sometime in the period June 1, 1979, to May 31, 1980, are included, as well as those planned missions that have progressed beyond the experiment or investigation selection stage. This document provides a brief description for each spacecraft and experiment as well as its current status. The performance information for active NASA and NASA-cooperative programs is based, to a large extent, on the project office status reports through May 31, 1980. The National Space Science Data Center (NSSDC) has attempted to update all performance information to that date.

We would like to acknowledge the cooperation of the staff at NSSDC in obtaining information and offering suggestions for this report. The cooperation of the project offices and experimenters in supplying current documentation of their spacecraft and experiments is gratefully acknowledged. We are particularly pleased with the many constructive comments and corrections we have received from interested users of this report.

Richard Horowitz
Robert W. Vostreys

August 1980

TABLE OF CONTENTS

	<u>Page</u>
PREFACE	iii
1. INTRODUCTION	3
1.1 Purpose	3
1.2 Contents	3
1.3 Organization	3
1.4 Document Availability	4
1.5 Request for Additions/Corrections	4
2. DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS	9
2.1 Contents of Spacecraft Entries	9
2.2 Contents of Experiment Entries	9
2.3 Active Spacecraft and Experiment Descriptions*	10
3. DESCRIPTIONS OF PLANNED SPACECRAFT AND EXPERIMENTS	105
3.1 Contents of Spacecraft Entries	105
3.2 Contents of Experiment Entries	105
3.3 Planned Spacecraft and Experiment Descriptions*	106
4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS	183
5. INVESTIGATOR NAME INDEX	207
APPENDIX A - OTHER RELEVANT SPACECRAFT	A-1
APPENDIX B - SPECIAL INVESTIGATORS	B-1
B1. Joint IRAS Science Working Group	B-2
B2. The Caravane Collaboration (COS-B)	B-3
B3. Individual Galileo Investigations	B-5
B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release Module (IRM) Scientific Team	B-12
B5. Copernicus Quest Investigators and Investigations	B-13
B6. International Solar Polar Mission (ISPM) Theoretical and Interdisciplinary Scientists	B-16
B7. List of NASA-Selected Magsat Investigators	B-17
APPENDIX C - DEFINITIONS	C-1
APPENDIX D - ABBREVIATIONS AND ACRONYMS	D-1

*For a complete listing of the spacecraft and experiments described in these sections, please refer to the Index of Active and Planned Spacecraft and Experiments (Section 4).

1

INTRODUCTION

1. INTRODUCTION

1.1 Purpose

This report provides the professional community with information on current and planned spacecraft activity for a broad range of scientific disciplines. By providing a brief description of each spacecraft and experiment as well as its current status, it is hoped that this document will be useful to many people interested in the scientific, applied, and operational uses of data collected. Furthermore, for those planning or coordinating future observational programs employing a number of different techniques such as rockets, balloons, aircraft, ships, and buoys, this document can provide some insight into the contributions that may be provided by orbiting instruments.

1.2 Contents

This document includes information concerning active and planned spacecraft and experiments known to the National Space Science Data Center (NSSDC). The information covers a wide range of disciplines: astronomy, earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and funding of individual countries as well as cooperative arrangements among different countries.

Descriptions of navigational and communications satellites are specifically not included here. Also not given are descriptions of spacecraft that contain only continuous radio beacons used for ionospheric studies. Many of these spacecraft are listed in the *SPACEWARN Bulletin**. No attempt has been made to present information regarding classified spacecraft or experiments.

1.3 Organization

This report is divided into two major parts with descriptive material introducing each section.

The first half of this report, Section 2 - "Descriptions of Active Spacecraft and Experiments," is a listing of descriptions of the spacecraft and experiments that were active sometime during the period June 1, 1979, to

*The *SPACEWARN Bulletin* is prepared by the World Data Center A for Rockets and Satellites, Code 601, Goddard Space Flight Center, Greenbelt, MD 20771, USA. It is intended to serve as an international communications mechanism for the rapid distribution of information on satellites and space probes. It is published on behalf of the Committee on Space Research (COSPAR) by the International URSIGRAM and World Days Service (IUWDS), a permanent service of the International Scientific Radio Union in association with the International Astronomical Union and the International Union for Geodesy and Geophysics.

May 31, 1980. The listing is arranged by spacecraft common name and the last name of the principal investigator or team leader.

The second part, Section 3 - "Descriptions of Planned Spacecraft and Experiments," contains descriptions of the spacecraft and experiments that were planned or approved missions as of May 31, 1980, for which experiments or investigations have been selected and NSSDC has at least minimal documentation.

Sections 4 and 5 are indexes to the information presented in Sections 2 and 3. Section 4, "Index of Active and Planned Spacecraft and Experiments," is an alphabetical listing by spacecraft name, including both common and alternate names, of all active and planned spacecraft and experiments. This listing serves as an index to the location of spacecraft and experiment descriptions and includes launch dates and current status-of-operation data. Section 5, "Investigator Name Index," is a listing, ordered by last name, of the investigators or team members associated with the experiments and their current affiliations.

These major sections were generated from NSSDC automated files. Other relevant spacecraft without brief descriptions are given in Appendix A. Special investigators for some missions that could not be presented conveniently in Section 2 or 3 appear in Appendix B. Certain words and phrases used in this report are defined in Appendix C. Appendix D is a comprehensive list of the abbreviations and acronyms used in this document.

1.4 Document Availability

Upon request, NSSDC will provide copies of this report and future supplements to individuals or organizations resident in the United States who can establish a need (in writing or by telephone) for this information. The same services are available to persons outside the United States through the World Data Center A for Rockets and Satellites (WDC-A-R&S). The official addresses for requests are printed on the inside front cover.

Recipients are requested to inform potential users of the availability of this report. Because of continuing costs involved in publishing a document of this size on a periodic basis, NSSDC encourages individuals located at the same organization to share this document.

1.5 Request for Additions/Corrections

NSSDC continually strives to increase the usefulness of this report by improving the spacecraft and experiment descriptions and by including additional spacecraft and experiments as they become known to NSSDC. This report is complete and reasonably accurate concerning NASA and NASA-cooperative programs; however, descriptions of other spacecraft and experiments may be incomplete because of a lack of information available to NSSDC. It should be noted that the information concerning the planned spacecraft and experiments is frequently general in nature and subject to change.

NSSDC would welcome comments as to errors or omissions in this report. Recommendations regarding the overall contents and organization also would be appreciated. In particular, it is hoped that principal experimenters and project offices will cooperate in bringing such matters to NSSDC's attention.

2

DESCRIPTIONS OF ACTIVE SPACECRAFT
AND EXPERIMENTS

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2. DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were active sometime during the period June 1, 1979, to May 31, 1980. A few changes subsequent to this date may appear, depending on availability. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. Explorer spacecraft prelaunch generic names are used as common names; e.g., IMP-J instead of Explorer 50. If the common name, as used by NSSDC, is not known, it can be found by referring to an alternate name in the Index of Active and Planned Spacecraft and Experiments (Section 4).

Each spacecraft or experiment entry in this section is composed of two parts, a heading and brief description. The headings list characteristics of satellites and experiments. Many of the terms used in this section are defined in Appendix C.

2.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of initial orbit parameters: orbit type, epoch date, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, or probe missions. In addition, the heading contains the spacecraft weight, launch date, site, and vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel:

CODE CO (general contact)
CODE MG (program manager)
CODE MM (mission manager)
CODE MS (mission scientist)
CODE PC (project coordinator)
CODE PD (project director)
CODE PE (project engineer)
CODE PM (project manager)
CODE PS (project scientist)
CODE SC (program scientist)
CODE TD (technical director)

This terminology is standard for NASA missions; the equivalent functions for the missions of other countries or agencies have been given the same position names. The spacecraft brief description is immediately below each heading.

2.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name and affiliation or location of the principal investigator (PI) or team leader

(TL) for the experiment as well as other investigators (OI), team members (TM), deputy team leader (DT), co-investigator (CI), or general contact (CO) associated with the experiment. The investigators are not listed in any particular order within each experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

CODE EB (Environmental Observations)
CODE EC (Communications)
CODE EM (Space Processing)
CODE ER (Resource Observations)
CODE RS (Space Systems)
CODE SB (Life Sciences)
CODE SC (Astrophysics)
CODE SL (Planetary)
CODE ST (Solar Terrestrial)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and another agency.

2.3 Active Spacecraft and Experiment Descriptions

A spacecraft is included in the active section of this report if it had a status of "normal" or "partial" and a data acquisition rate of "standard" or "substandard" for any length of time since June 1, 1979. Experiments that meet these same criteria also are included.

Active spacecraft with only passive experiments such as laser reflectors or those only used in upper atmospheric drag observations are included in Appendix A.

***** 1976-059A*****

SPACECRAFT COMMON NAME- 1976-059A
ALTERNATE NAMES- 08916, USAF OPERATIONAL SAT-76

NSDDC ID- 76-059A

LAUNCH DATE- 06/26/76 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/28/76
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - W.D. EVANS LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL TIME PARTICLE DATA WERE USED BY SELECTED US AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

***** 1976-059A, HIGHIE*****

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSDDC ID- 76-059A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS SCI LAB
O1 - R.D. BELIAN LOS ALAMOS SCI LAB
O1 - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRON, PROTON, AND ALPHA PARTICLE POPULATIONS. THE LOW-ENERGY ELECTRON (LEE) UNIT WAS MADE WITH FIVE SEPARATE ELEMENTS, EACH WITH A 5-DEG-HALF-ANGLE COLLIMATOR (HAC); THESE DETECTORS VIEWED AT 0 DEG, PLUS AND MINUS 30 DEG, AND PLUS AND MINUS 60 DEG LATITUDE RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE. THE LEE MEASURED ELECTRONS ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 30 TO 300 KEV. THE HIGH-ENERGY ELECTRON UNIT CONSISTED OF ONE DETECTOR WITH AN 8-DEG HAC; FLUXES ABOVE SEVEN THRESHOLD ENERGIES RANGING FROM 0.2 TO 2.0 MEV WERE MEASURED. THE LOW-ENERGY PROTON UNIT CONSISTED OF A SINGLE DETECTOR WITH A GUARD SCINTILLATOR, A 5 DEG HAC, AND DISCRIMINATORS FOR 11 THRESHOLD ENERGIES RANGING FROM 50 TO 500 KEV. THE HIGH-ENERGY PROTON (HEP) UNIT WAS A THREE-ELEMENT TELESCOPE WITH A GUARD SCINTILLATOR AND A 15-DEG HAC THAT MEASURED PROTONS WITHIN 16 ENERGY INTERVALS RANGING FROM 0.3 TO 150 MEV. ON COMMAND, THE HEP COULD MEASURE ALPHA PARTICLES IN 16 ENERGY INTERVALS RANGING FROM 1.2 TO 600 MEV.

***** 1977-007A*****

SPACECRAFT COMMON NAME- 1977-007A
ALTERNATE NAMES- 09023, USAF OPERATIONAL SAT-77

NSDDC ID- 77-007A

LAUNCH DATE- 02/06/77 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/08/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0. DEG
PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - W.D. EVANS LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED US AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

***** 1977-007A, HIGHIE*****

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSDDC ID- 77-007A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS SCI LAB
O1 - R.D. BELIAN LOS ALAMOS SCI LAB
O1 - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
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***** 1979-053A*****

SPACECRAFT COMMON NAME- 1979-053A
ALTERNATE NAMES- 11397, USAF OPERATIONAL SAT-79

NSDDC ID- 79-053A

LAUNCH DATE- 06/10/79 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/11/79
ORBIT PERIOD- 1436.5 MIN INCLINATION- 0.9 DEG
PERIAPSIS- 35729. KM ALT APOAPSIS- 35829. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - W.D. EVANS LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SATELLITE WAS PLACED IN A GEOSTATIONARY ORBIT WITH SOME STATION CHANGING CAPABILITIES. IT WAS SPIN STABILIZED AT 6 RPM WITH ITS SPIN VECTOR ALIGNED ALONG A RADIIUS VECTOR TO THE EARTH BY AN ACTIVE CONTROL SYSTEM. REAL-TIME PARTICLE DATA WERE USED BY SELECTED US AGENCIES FOR SPACE DISTURBANCE MONITORING AND FORECASTING.

***** 1979-053A, HIGHIE*****

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR

NSDDC ID- 79-053A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGHIE LOS ALAMOS SCI LAB
O1 - R.D. BELIAN LOS ALAMOS SCI LAB
O1 - D.N. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
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ORIGINAL PAGE IS
OF POOR QUALITY

RANGING FROM 1.2 TO 600 REV. THIS LATEST INSTRUMENT DIFFERS FROM THE PREVIOUS INSTRUMENTS IN THAT IT HAS A FAST-TIME MODE FOR ELECTRONS.

***** AE-E *****

SPACECRAFT COMMON NAME- AE-E
ALTERNATE NAMES- S 6E, ATMOSPHERE EXPLORER-E
EXPLORER 55, AE 5

NSSDC ID- 75-107A

LAUNCH DATE- 11/20/75 WEIGHT- 735. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-DSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/25/75
ORBIT PERIOD- 117.29 MIN INCLINATION- 19.7 DEG
PERIAPSIS- 156. KM ALT APOAPSIS- 2983. KM ALT

PERSONNEL
RG - M.B. WEINRED NASA HEADQUARTERS
SC - E.R. SCHNERLING NASA HEADQUARTERS
PH - J.P. CORRIGAN NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THE PURPOSE OF THE AE-E MISSION WAS TO INVESTIGATE THE CHEMICAL PROCESSES AND ENERGY TRANSFER MECHANISMS THAT CONTROL THE STRUCTURE AND BEHAVIOR OF THE EARTH'S ATMOSPHERE AND IONOSPHERE IN THE REGION OF HIGH ABSORPTION OF SOLAR ENERGY AT LOW AND EQUATORIAL LATITUDES. THE SIMULTANEOUS SAMPLING AT HIGHER LATITUDES WAS CARRIED OUT BY THE AE-B SPACECRAFT UNTIL ITS FAILURE ON 1/29/76 AND THEN BY AE-C, UNTIL IT REENTERED ON 12/12/78. THE SAME TYPE OF SPACECRAFT AS AE-C WAS USED, AND THE PAYLOAD CONSISTED OF THE SAME TYPES OF INSTRUMENTS EXCEPT THAT THE LOW-ENERGY ELECTRON AND UV NITRIC OXIDE EXPERIMENTS WERE DELETED AND A BACKSCATTER UV SPECTROMETER WAS ADDED TO MONITOR THE OZONE CONTENT OF THE ATMOSPHERE. THE TWO EXPERIMENTS THAT WERE DELETED WERE MORE APPROPRIATE FOR THE HIGH LATITUDE REGIONS. THE PERIGEE SWEEP THROUGH MORE THAN SIX FULL LATITUDE CYCLES AND TWO LOCAL TIME CYCLES DURING THE FIRST YEAR AFTER LAUNCH WHEN THE ORBIT WAS ELLIPTICAL AND THE PERIGEE HEIGHT WAS VARIED BETWEEN 130 AND 400 KM. THE CIRCULARIZATION OF THE ORBIT AROUND 390 KM WAS MADE ON 11/20/76 AND THE SPACECRAFT WAS RAISED TO THIS HEIGHT WHENEVER IT WOULD DECAY TO ABOUT 250 KM. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 263-266, APRIL 1973.

***** AE-E, BRACE *****

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE (CEP)

NSSDC ID- 75-107A-01 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL
PI - L.H. BRACE NASA-GSFC
OI - R.F. THEIS NASA-GSFC
OI - A. DALGARNO SAO

BRIEF DESCRIPTION
THE CEP CONSISTED OF TWO IDENTICAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURES, ELECTRON AND ION CONCENTRATIONS, ION MASS, AND SPACECRAFT POTENTIAL. ONE PROBE WAS ORIENTED ALONG THE SPIN AXIS OF THE SPACECRAFT (USUALLY PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER RADially SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED 1-5 TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 1.0E4 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 1.0E4 AND 1.0E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 1.0E6 PER CUBIC CM; AND ION MASS AT ION DENSITIES ABOVE 1.0E4 PER CUBIC CM. EACH PROBE HAD A COLLECTOR ELECTRODE EXTENDING FROM THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE 2.5-CM-LONG GUARD RING WAS AT THE END OF A 25-CM BOOM, AND THE COLLECTOR EXTENDED ANOTHER 7.5 CM BEYOND THE GUARD RING. THE BOOM, GUARD, AND COLLECTOR WERE 0.2 CM IN DIAM. MORE DETAILED INFORMATION CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 341-348, APRIL 1973.

***** AE-E, BRINTON *****

INVESTIGATION NAME- BENNETT ION-MASS SPECTROMETER (BINS)

NSSDC ID- 75-107A-10 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - H.C. BRINTON NASA-GSFC
OI - M.W. PHARO, III NASA-GSFC
OI - W.A. TAYLOR, JR. NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (U) AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER CUBIC CM TO 5.0E6 IONS PER CUBIC CM EACH. THE MASS RANGE IS NORMALLY SCANNED IN 1.6 S, BUT THE SCAN TIME PER RANGE CAN BE INCREASED BY COMMAND. LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION PERMITTED DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. CORRELATION OF THESE MEASURED DATA WITH THE RESULTS FROM COMPANION EXPERIMENTS, 'ELECTROSTATIC PROBE (75-107A-01)' AND 'RETARDING POTENTIAL ANALYZER (75-107A-04),' PERMITTED INDIVIDUAL ION CONCENTRATIONS TO BE DETERMINED WITH HIGH ACCURACY. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WERE: GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. A THREE-STAGE BENNETT TUBE WITH 7- TO 5-CYCLE DRIFT SPACES WAS FLOWN, AND HAS BEEN MODIFIED TO PERMIT ION CONCENTRATION MEASUREMENTS TO BE OBTAINED DOWN TO 120 KM ALTITUDE. SPECIFICALLY, A VENT WAS PROVIDED AT THE REAR OF THE SPECTROMETER, AND THE USUAL FLAT-DISK, ION-CURRENT COLLECTOR WAS REPLACED BY A STACK OF WIRE-MESH GRIDS. THE BALANCE BETWEEN ION-CURRENT SENSITIVITY AND MASS-RESOLUTION IN A BENNETT SPECTROMETER MAY BE ALTERED BY CHANGING APPROPRIATE VOLTAGES. THESE VOLTAGE CHANGES WERE CONTROLLED INDEPENDENTLY BY GROUND COMMAND FOR EACH ONE OF THE THREE MASS RANGES -- 1 TO 4, 2 TO 18, AND 8 TO 72. MORE COMPLETE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 323-332, APRIL 1973.

***** AE-E, CHAMPION *****

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 75-107A-02 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL
PI - K.S.W. CHAMPION USAF GEOPHYS LAB
OI - F.A. MARCOS USAF GEOPHYS LAB

BRIEF DESCRIPTION
MESA (MINIATURE ELECTROSTATIC ANALYZER) OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLE-AXIS ACCELEROMETERS, MOUNTED MUTUALLY AT RIGHT ANGLES, TWO IN THE SPACECRAFT X-Y PLANE AND THE OTHER ALONG THE Z-AXIS. THE INSTRUMENT DETERMINED THE APPLIED ACCELERATION FROM THE ELECTROSTATIC FORCE REQUIRED TO RECENTER A PROOF MASS. THE OUTPUT OF THE DEVICE WAS A DIGITAL PULSE RATE PROPORTIONAL TO THE APPLIED ACCELERATION. THE MEASUREMENTS ALLOWED DETERMINATION OF THE DENSITY OF THE NEUTRAL ATMOSPHERE, MONITORED THE THRUST OF THE ORBIT-ADJUST PROPULSION SYSTEM (OAPS), DETERMINED THE SATELLITE MINIMUM ALTITUDE, MEASURED SPACECRAFT ROLL, AND PROVIDED SOME ATTITUDE-SENSING INFORMATION. SPACECRAFT NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 EARTH'S GRAVITY (G) IN OAPS MONITOR MODE; 4.F-4 G BETWEEN 120 KM (PLUS OR MINUS 2 PERCENT) AND 280 KM (PLUS OR MINUS 10 PERCENT); AND 2.E-5 G BETWEEN 180 KM (PLUS OR MINUS 2 PERCENT) AND 400 KM (PLUS OR MINUS 10 PERCENT). NUMBERS IN PARENTHESES REPRESENT ERRORS; IN ADDITION, THERE MAY BE A SYSTEMATIC ERROR OF UP TO PLUS OR MINUS 5 PERCENT DUE TO DRAG COEFFICIENT UNCERTAINTY. THE HIGHEST ALTITUDE WAS DETERMINED ASSUMING THE INSTRUMENT COULD SENSE TO 0.2 PERCENT OF FULL SCALE. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 297-303, APRIL 1973.

***** AE-E, BOERING *****

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 75-107A-03 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.P. BOERING
OI - C.O. BOSTROM

JOHNS HOPKINS U
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO PROVIDE INFORMATION ON THE INTENSITY, ANGULAR DISTRIBUTION, ENERGY SPECTRUM, AND NET FLOW ALONG FIELD LINES, OF ELECTRONS IN THE THERMOSPHERE WITH ENERGIES BETWEEN 2 AND 500 EV. THE INSTRUMENT CONSISTED OF TWO IDENTICAL, OPPOSITELY DIRECTED, HEMISPHERICAL, ELECTROSTATIC ANALYZERS. EACH SPECTROMETER HAD A RELATIVE ENERGY RESOLUTION OF PLUS OR MINUS 2.5 PERCENT AND A GEOMETRIC FACTOR ON THE ORDER OF 0.001 SQ CM-SR, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE MEASURED -- 0 TO 25 EV, 0 TO 100 EV, OR 0 TO 500 EV. MEASUREMENTS FROM THESE INTERVALS COULD BE SEQUENCED IN 5 DIFFERENT WAYS. DATA COULD BE TAKEN FROM EITHER SENSOR SEPARATELY, OR ALTERNATELY WITH TIME RESOLUTION VARYING FROM 0.25 TO 8 S. THERE WERE TWO DEFLECTION VOLTAGE SCAN RATES DETERMINED BY SPACECRAFT CLOCK. THIS VOLTAGE WAS CHANGED IN 64 STEPS, AND WAS DONE AT 4 OR 16 STEPS PER TELEMETRY FRAME, WITH 16 FRAMES/S, THIS ALLOWED A CHOICE OF EITHER ONE 64-POINT SPECTRUM, OR FOUR 16-POINT SPECTRA IN ONE SECOND. THE LONGEST (8 S) CYCLE OF DATA INVOLVED OBSERVATIONS USING INCREASING VOLTAGE STEPS FOR THE LOWEST, MIDDLE, LOWEST, THEN HIGHEST ENERGY RANGES (IN THAT ORDER) FOR 1 S EACH. A REPEAT FOR DECREASING VOLTAGE STEP COMPLETED THE CYCLE. A MORE DETAILED DESCRIPTION OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 387-392, APRIL 1973.

----- AE-E, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)

NSSDC ID- 75-107A-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES

PERSONNEL

PI - W.D. HANSON
OI - D.R. ZUCCARO
OI - S. SANATANI
OI - C.R. LIPPENCOTT

U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE OBSERVATIONS OF VECTOR ION DRIFT VELOCITIES, ION CONCENTRATION AND TEMPERATURE, AND SPACECRAFT POTENTIAL. AN IONOSPHERIC IRREGULARITY INDEX WAS ALSO OBTAINED FROM THE ION CONCENTRATION SENSOR. THE EXPERIMENT CONSISTED OF A RETARDING POTENTIAL ANALYZER WITH FOUR PLANAR SENSOR HEADS. THE SENSOR HEAD USED FOR ION DRIFT MEASUREMENTS WAS CO-LOCATED WITH ANOTHER HEAD, AND ALL WERE SPACED NEARLY EQUALLY, LOOKING OUTWARD FROM THE SATELLITE EQUATOR. SINCE THE SATELLITE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE, THESE HEADS COULD OBSERVE ALONG THE SPACECRAFT VELOCITY VECTOR IN EITHER THE SPIN OR DESPUN MODE OF THE SPACECRAFT. THE PRIMARY PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE ACCURATE ION TEMPERATURES WITH OTHER MEASUREMENTS BEING OF SECONDARY IMPORTANCE. THREE OF THE SENSOR HEADS WERE SIMILAR. THEY HAD TWO GROUNDED ENTRANCE GRIDS, TWO RETARDING GRIDS, A SUPPRESSOR GRID, A SHIELD GRID, AND A COLLECTOR. A LINEAR SWEEP VOLTAGE (32 OR 22 TO 0 V, UP OR DOWN) WAS NORMALLY APPLIED TO THE RETARDING GRIDS IN 0.75 S. INTERPRETATION OF THE RESULTING CURRENT-VOLTAGE PROFILES PROVIDED THE ION TEMPERATURE, THE ION AND ELECTRON CONCENTRATION, SOME ION COMPOSITION INFORMATION, VEHICLE POTENTIAL AND PLASMA DRIFT VELOCITY PARALLEL TO THE VELOCITY VECTOR. TWO OF THE THREE SIMILAR SENSORS HAD AN ADDITIONAL GRID BETWEEN THE ENTRANCE AND RETARDING GRIDS IN ORDER TO PROTECT INNER GRIDS FROM ION BOMBARDMENT DURING ELECTRON MEASUREMENTS. THE OTHER SIGNIFICANT FEATURE OF THESE TWO SENSORS WAS THAT A SMALL POSITIVE COLLECTOR BIAS COULD BE APPLIED TO ASSURE ADEQUATE ACCESS OF THERMAL ELECTRONS TO THE COLLECTOR. WITH THE RETARDING GRID AT CONSTANT ZERO VOLTS, CURRENT CHANGES COULD BE OBSERVED FOR 3-5 PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 U COULD BE IDENTIFIED. THE FOURTH SENSOR HEAD WAS FOR THE ION-DRIFT VELOCITY MEASUREMENTS, AND CONSISTED OF FOUR GROUNDED GRIDS, A NEGATIVELY BIASED SUPPRESSOR GRID, AND A FOUR-SEGMENT COLLECTOR. DIFFERENCES IN VARIOUS COLLECTOR SEGMENT CURRENTS PROVIDED ION-DRIFT DIRECTIONAL COMPONENT INFORMATION. MORE DETAILS OF THIS EXPERIMENT ARE AVAILABLE IN 'RADIO SCIENCE,' 8, 4, 333-339, APRIL 1973.

----- AE-E, HAYS-----

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 75-107A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS
OI - G.G. SHEPHERD
OI - G.R. CARIGNAN
OI - J.C.G. WALKER

U OF MICHIGAN
YORK U
U OF MICHIGAN
U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED DETAILED DATA ON THE RATES OF EXCITATION OF THE ATOMIC AND MOLECULAR CONSTITUENTS OF THE THERMOSPHERE. THE WAVELENGTH RANGE COVERED, EXPRESSED IN ANGSTROMS, WAS MEASURED IN PAIRS -- 7319 AND 6563, 8300 AND DARK, 5577 AND 7319, 2800 AND 5200, 6500 AND 5577, CALIBRATE AND 2800, AND 6563 AND 6300. A PHOTOMETER WAS USED WHICH CONTAINED TWO SEPARATE OPTICAL CHANNELS, A NARROW FIELD OF VIEW AND A WIDE FIELD OF VIEW. SPECTRAL SELECTION WAS ACCOMPLISHED WITH A FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. THE TWO CHANNELS WERE SEPARATED BY 90 DEG. ONE CHANNEL HAD A 3-DEG HALF-ANGLE CONE FIELD OF VIEW FOR HIGH SENSITIVITY AND POINTED NORMALLY TOWARD THE LOCAL ZENITH. THE SECOND HAD A FIELD OF VIEW OF 0.75-DEG HALF CONE FOR HIGH SPATIAL RESOLUTION POINTING TANGENT TO THE SURFACE OF THE EARTH WHEN THE SATELLITE WAS IN THE ORIENTED MODE. BOTH CHANNELS WERE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING THE DAYTIME WITH MULTISTAGE BAFFLE SYSTEMS. FILTERS WERE OPERATED IN SEVERAL MODES. THE TWO SEPARATE OPTICAL CHANNELS WERE MONITORED AT TIME INTERVALS CONSISTENT WITH THEIR ANGULAR RESOLUTION IN THE SPINNING MODE. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 369-377, APRIL 1973.

----- AE-E, HEATH-----

INVESTIGATION NAME- BACKSCATTER UV SPECTROMETER (BUV)

NSSDC ID- 75-107A-16

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.F. HEATH

NASA-GSFC

BRIEF DESCRIPTION

THE BACKSCATTER ULTRAVIOLET INSTRUMENT (BUV) MONITORED THE SPATIAL DISTRIBUTION OF ATMOSPHERIC OZONE BY MEASURING THE INTENSITY OF THE UV RADIATION BACKSCATTERED FROM THE EARTH'S ATMOSPHERE. TO OBTAIN THIS OZONE DISTRIBUTION, THE BUV SUBSYSTEM MEASURED DIRECT SOLAR RADIATION AND BACKSCATTERED UV RADIATION FROM THE DAYTIME SUN-ILLUMINATED ATMOSPHERE. THE EXPERIMENT CONSISTED OF A SPECTROMETER (MONOCHROMATOR) AND A PHOTOMETER. THE MONOCHROMATOR MEASURED THE INTENSITY OF UV RADIATION BACKSCATTER AND REFLECTED RADIATION FROM THE EARTH'S ATMOSPHERE IN 12 WAVELENGTHS (2555 A TO 3398 A) IN WHICH OZONE ATTENUATION OCCURS. THE PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN A SINGLE WAVELENGTH SPAN IN WHICH ATTENUATION BY OZONE DOES NOT OCCUR. THE BUV HAD FOUR OPERATING MODES.

----- AE-E, HEDIN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION (NACE)

NSSDC ID- 75-107A-08

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.E. HEDIN
OI - C.A. REBER
OI - G.R. CARIGNAN

NASA-GSFC
NASA-GSFC
U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED IN SITU THE SPATIAL DISTRIBUTION AND TEMPORAL CHANGES OF THE CONCENTRATIONS OF THE NEUTRAL ATMOSPHERIC SPECIES. IN ADDITION, NEW INSIGHT INTO IN SITU MEASUREMENT TECHNIQUES WAS OBTAINED FROM COMPARISONS OF THESE MEASUREMENTS WITH THOSE OBTAINED FROM OTHER ONBOARD EXPERIMENTS, NAMELY, OPEN SOURCE SPECTROMETER (75-107A-07), SOLAR EUV SPECTROPHOTOMETER (75-107A-06), AND DENSITY-ACCELEROMETER (75-107A-02). THE MASS-SPECTROMETER SENSOR INCLUDED A GOLD-PLATED STAINLESS STEEL THERMALIZING CHAMBER AND ION SOURCE, A HYPERBOLIC ROD QUADRUPOLE ANALYZER, AND AN OFF-AXIS ELECTRON MULTIPLIER. WHEN OPERATING IN THE 'NORMAL' FORMAT, THE ANALYZER MEASURED ALL MASSES IN THE RANGE 1 TO 44 WITH EMPHASIS ON HYDROGEN, HELIUM, OXYGEN, NITROGEN, AND ARGON. ANOTHER FORMAT WAS OPTIMIZED FOR MINOR CONSTITUENT STUDIES OF GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION WAS DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. IN ORBIT, THE PRESEALED SPECTROMETER WAS OPENED, AND THE ATMOSPHERIC CONSTITUENTS PASSED THROUGH A KNIFE-EDGED ORIFICE INTO THE THERMALIZATION CHAMBER AND ION SOURCE. SELECTED IONS LEFT THE QUADRUPOLE ANALYZER THROUGH A WEAK FOCUSING LENS AND WERE ACCELERATED INTO AN ELECTRON MULTIPLIER, WHERE THEY WERE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. THE SPECTROMETER HAD A RESOLUTION OF BETTER THAN 1 U FOR ALL MASSES BETWEEN 1 AND 44, AND THE MEASUREMENT SYSTEM HAD A DYNAMIC RANGE OF APPROXIMATELY 1.E8. THERE WAS PROVISION FOR THE INSTRUMENT ORIFICE TO BE COVERED DURING SPACECRAFT THRUSTER OPERATIONS. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 277-285, APRIL 1973.

----- AE-E, HINTEREGGER-----

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 75-107A-06

INVESTIGATIVE PROGRAM
CCDE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - H.E. HINTEREGGER	USAF GEOPHYS LAB
O1 - D.E. BEDO	USAF GEOPHYS LAB
O1 - L.A. HALL	USAF GEOPHYS LAB
O1 - J.E. MANSON	USAF GEOPHYS LAB
O1 - C.W. CHAGNON	USAF GEOPHYS LAB

BRIEF DESCRIPTION

EUVS WAS USED TO OBSERVE THE VARIATIONS IN THE SOLAR EUV FLUX IN THE WAVELENGTH RANGE FROM 140 TO 1850 Å AND THE ATMOSPHERIC ATTENUATION AT VARIOUS FIXED WAVELENGTHS. THIS PROVIDED QUANTITATIVE ATMOSPHERIC STRUCTURE AND COMPOSITION DATA. THE INSTRUMENT CONSISTED OF 24 GRAZING-INCIDENCE GRATING MONOCHROMATORS, USING PARALLEL-SLIT SYSTEMS FOR ENTRANCE COLLIMATION AND PHOTOELECTRIC DETECTORS AT THE EXIT SLITS. TWELVE OF THESE MONOCHROMATORS HAD WAVELENGTH SCAN CAPABILITY, EACH WITH 128 SELECTABLE WAVELENGTH POSITIONS, WHICH COULD ALSO AUTOMATICALLY STEP SCAN THROUGH THESE POSITIONS. THE OTHER 12 MONOCHROMATORS OPERATED AT FIXED WAVELENGTHS WITH FIELDS OF VIEW SMALLER THAN THE FULL SOLAR DISK TO AID IN THE ATMOSPHERIC ABSORPTION ANALYSIS. THE SPECTRAL RESOLUTION VARIED FROM 2 TO 54 Å DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINTING SYSTEM COULD POINT TO 256 DIFFERENT POSITIONS, EXECUTE A 16-STEP ONE-DIMENSIONAL SCAN OR A FULL 256-STEP RASTER. THE TIME RESOLUTION VARIED FROM 0.5 S FOR OBSERVING 12 FIXED WAVELENGTHS UP TO 256 S FOR PROGRAMMING THE EUVS THROUGH ALL POSSIBLE MODES. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 349-360, APRIL 1973.

----- AE-E, NIER-----

INVESTIGATION NAME- OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)

NSSDC ID- 75-107A-07

INVESTIGATIVE PROGRAM
CCDE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.O.C. NIER	U OF MINNESOTA
O1 - W.E. POTTER	U OF MINNESOTA
O1 - K. MAUERSBERGER	U OF MINNESOTA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO CONTRIBUTE TO A STUDY OF THE CHEMICAL, DYNAMIC, AND ENERGETIC PROCESSES THAT CONTROL THE STRUCTURE OF THE THERMOSPHERE BY PROVIDING DIRECT, IN SITU MEASUREMENTS OF BOTH MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASS. S IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (U). A DOUBLE-FOCUSING, MATTACH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS FLOWN. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF 8; I.E., THE TWO MASS RANGES COVERED WERE 1 TO 8 AND 7 TO 48 U. IN THE ION SOURCE THE NEUTRAL SPECIES WAS IONIZED BY MEANS OF ELECTRON IMPACT. THE ELECTRON ENERGIES WERE SELECTABLE; 75 EV FOR THE HIGH EV MODE AND 25 EV FOR THE LOW EV MODE. AT ALTITUDES GREATER THAN 380 KM, ION CURRENTS WERE MEASURED WITH AN ELECTRON MULTIPLIER COUNTING INDIVIDUAL IONS. COUNTS WERE ACCUMULATED FOR 1/20 S BEFORE AUTOMATICALLY SWITCHING TO A DIFFERENT MASS NUMBER. WHILE COMPLETE MASS SPECTRA COULD BE SWEEPED, IN THE COMMON MODE OF OPERATION PEAK STEPPING WAS EMPLOYED, WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. AMBIENT PARTICLES STRIKING THE ION SOURCE RETAIN ENERGIES LESS THAN 0.1 EV, WHICH IS NOT HIGH ENOUGH TO OVERCOME THE NEGATIVE SPACE CHARGE POTENTIAL HOLDING THE IONS IN THE BEAM. THOSE AMBIENT PARTICLES THAT DID NOT STRIKE THE ION SOURCE RETAINED THEIR INCOMING ENERGY OF SEVERAL EV AFTER IONIZATION AND ESCAPE INTO THE ACCELERATING REGION OF THE ANALYZER. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 271-276, APRIL 1973.

----- AE-E, RICE-----

INVESTIGATION NAME- CAPACITANCE MANOMETER

NSSDC ID- 75-107A-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE
AEROSPACE CORP

BRIEF DESCRIPTION

THE CAPACITANCE MANOMETER FLOWN ON AE-E WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE ALSO CORRELATED WITH ACCELEROMETER AND ION GAUGE DATA IN EVALUATING SATELLITE DRAG. THE MANOMETER, ALSO REFERRED TO AS PRESSURE SENSOR B (PSB), PROVIDED A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE VARIED FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB CONSISTED OF TWO SPHERICAL, THERMALLY CONTROLLED CHAMBERS, SEPARATED BY A THIN MEMBRANE STRETCHED FLAT AND UNDER RADIAL TENSION. ANY DEFLECTION OF THE DIAPHRAGM CAUSED BY A PRESSURE DIFFERENCE BETWEEN THE TWO SIDES CAUSED A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH BIASED AN AC BRIDGE CIRCUIT. AIR WAS ALLOWED INTO ONE OF THE CHAMBERS THROUGH TWO PORTS 180 DEG APART AND PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THUS THE WAKE-RAM PRESSURE DIFFERENTIAL WAS SAMPLED TWICE EACH SPACECRAFT REVOLUTION. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 305-314, APRIL 1973.

----- AE-E, RICE-----

INVESTIGATION NAME- COLD CATHODE ION GAUGE

NSSDC ID- 75-107A-13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.J. RICE
AEROSPACE CORP

BRIEF DESCRIPTION

THE COLD CATHODE-ION GAUGE WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), MEASURED ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 AND 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN $1.3E-3$ AND $1.3E-7$ MB. THE ESTIMATED ACCURACY OF THE PSA WAS PLUS OR MINUS 20 PERCENT. THE CYLINDRICALLY-SHAPED SENSOR PACKAGE CONSISTED OF A WEDGE-SHAPED ORIFICE, A CATHODE NEAR GROUND POTENTIAL, AN ANODE OPERATING AT ABOUT 1300 VDC, AND A PERMANENT MAGNETIC FIELD OF ABOUT 0.16T (1600 GAUSS). THE GAUGE CONTAINED NO PRIMARY SOURCE OF IONIZING ELECTRONS. THE DISCHARGE WAS INITIATED BY FIELD EMISSION AND WAS SELF-SUSTAINING AT A PRESSURE ABOVE $1.3E-7$ MB. THE ION CURRENT WAS COLLECTED AT THE CATHODE. THE SENSOR WAS MOUNTED ON THE SPACECRAFT, WITH THE ORIFICE PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WHICH WAS NORMAL TO THE ORBITAL PLANE. THE INSTRUMENT WAS OPERATED IN TWO MODES, SPINNING AND DESPUN. WHEN THE SPACECRAFT WAS IN A SPINNING MODE, THE PSA ALTERNATELY SAMPLED THE RAM AND WAKE PRESSURE. WHEN THE SPACECRAFT WAS IN THE DESPUN MODE, THE PSA FACED 30 DEG FROM THE DIRECTION OF MOTION. DATA FROM THIS EXPERIMENT WERE NOT TAPE RECORDED, BUT OBSERVED IN REAL TIME. MORE DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 305-314, APRIL 1973.

----- AE-E, SPENCER-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)

NSSDC ID- 75-107A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER	NASA-GSFC
O1 - G.B. CARGANAN	U OF MICHIGAN
O1 - H.B. NIEMANN	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE KINETIC TEMPERATURE OF THE NEUTRAL ATMOSPHERE BY DETERMINING THE INSTANTANEOUS DENSITY OF MOLECULAR NITROGEN IN A SPHERICAL CHAMBER COUPLED TO THE ATMOSPHERE THROUGH A KNIFE-EDGED ORIFICE. ANALYSIS OF THE MEASURED MOLECULAR NITROGEN DENSITY VARIATION OVER A SPIN CYCLE WITH A KNOWLEDGE OF THE SATELLITE'S MOTION AND ORIENTATION LED TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. MEASUREMENTS OF THE AMBIENT NITROGEN DENSITY AND NEUTRAL WIND WERE ALSO OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WAS ALSO UNDERTAKEN, USING A BAFFLE INSERTED IN FRONT OF THE ORIFICE TO INTERCEPT A PORTION OF THE GAS PARTICLE STREAM ENTERING THE CHAMBER. WHEN THE SATELLITE WAS IN THE DESPUN MODE, THE BAFFLE WAS MADE TO OSCILLATE IN A STEPWISE FASHION IN ORDER TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICE CHAMBER. THESE CHAMBER DENSITY VARIATIONS WERE INTERPRETED TO YIELD THE

NEUTRAL GAS KINETIC TEMPERATURE ALSO. A DUAL-FILAMENT ION SOURCE SAMPLED THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND PRODUCED AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WAS DIRECTED INTO A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WHOSE MASS-TO-CHARGE RATIO (M/E) IS 28, AND ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED. THE SENSOR WAS VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT WAS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, 287-296, APRIL 1973.

***** BHASKARA*****

SPACECRAFT COMMON NAME- BHASKARA
ALTERNATE NAMES- SEO, 11392

NSSDC ID- 79-051A

LAUNCH DATE- 06/07/79 WEIGHT- 444. KG
LAUNCH SITE- KAPUSTIN YAR, U.S.S.R.
LAUNCH VEHICLE- INTRCOS

SPONSORING COUNTRY/AGENCY
INDIA ISRO
U.S.S.R. UNKNOWN

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/07/79
ORBIT PERIOD- 95.2 MIN INCLINATION- 50.7 DEG
PERIAPSIS- 512. KM ALT APOAPSIS- 557. KM ALT

PERSONNEL
MG - U.R. RAO ISRO SATELLITE CENTER
PD - K. KASTURIRANGAN ISRO SATELLITE CENTER
PS - D.P.N.CALLA SPACE APPLICATIONS CTR
PS - G. JOSEPH SPACE APPLICATIONS CTR

BRIEF DESCRIPTION
BHASKARA, THE SECOND INDIAN SATELLITE, WAS LAUNCHED AS PART OF THEIR SATELLITE FOR EARTH OBSERVATIONS (SEO) PROGRAM. IT WAS PLACED IN ORBIT BY A U.S.S.R. VEHICLE LAUNCHED FROM A COSMOPHORE IN THE U.S.S.R. THE MAIN OBJECTIVES WERE TO CONDUCT EARTH OBSERVATION EXPERIMENTS FOR APPLICATIONS RELATED TO HYDROLOGY, FORESTRY, AND GEOLOGY USING A TWO-BAND TV CAMERA SYSTEM, AND TO CONDUCT OCEAN SURFACE STUDIES USING A TWO-FREQUENCY SATELLITE MICROWAVE RADIOMETER (SAMIR) SYSTEM. SECONDARY OBJECTIVES WERE TO TEST ENGINEERING AND DATA PROCESSING SYSTEMS, TO COLLECT LIMITED METEOROLOGICAL DATA FROM REMOTE PLATFORMS, AND TO CONDUCT SCIENTIFIC INVESTIGATIONS IN X-RAY ASTRONOMY. BHASKARA WAS A 26-FACED QUASI-SPHERICAL POLYHEDRON. IT HAD A HEIGHT OF 1.66 M, AND DIAM OF 1.55 M.

***** BHASKARA, CALLA*****

INVESTIGATION NAME- SATELLITE MICROWAVE RADIOMETER (SAMIR)

NSSDC ID- 79-051A-01 INVESTIGATIVE PROGRAM
APPLICATIONS
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - D.P.N.CALLA SPACE APPLICATIONS CTR

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO CONDUCT STUDIES OVER THE INDIAN CONTINENT AND SURROUNDING SEAS USING A 19 AND 23 GHZ MICROWAVE RADIOMETRIC SYSTEM.

***** BHASKARA, JOSEPH*****

INVESTIGATION NAME- TV CAMERA

NSSDC ID- 79-051A-02 INVESTIGATIVE PROGRAM
APPLICATIONS
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - G. JOSEPH SPACE APPLICATIONS CTR

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO CONDUCT EARTH OBSERVATION STUDIES FOR APPLICATIONS RELATED TO HYDROLOGY, FORESTRY AND GEOLOGY USING A TWO-BAND TV CAMERA SYSTEM.

***** BHASKARA, KAMAT*****

INVESTIGATION NAME- DATA COLLECTION PLATFORM

NSSDC ID- 79-051A-07 INVESTIGATIVE PROGRAM
APPLICATIONS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.S. KAMAT SPACE APPLICATIONS CTR
OI - S. KALYANARAMAN ISRO SATELLITE CENTER

BRIEF DESCRIPTION
THIS INVESTIGATION WAS DESIGNED TO COLLECT DATA OF METEOROLOGICAL INTEREST FROM REMOTELY LOCATED PLATFORMS.

***** BHASKARA, KASTURIRANGAN*****

INVESTIGATION NAME- PINHOLE X-RAY SKY SURVEY

NSSDC ID- 79-051A-03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - K. KASTURIRANGAN ISRO SATELLITE CENTER
OI - P.C. AGARWAL TATA INST OF FUND RES

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WAS TO MONITOR AND SURVEY X-RAY SOURCES IN THE SKY.

***** COS-B*****

SPACECRAFT COMMON NAME- COS-B
ALTERNATE NAMES- COSMIC RAY SATELLITE-B, PL-7418

NSSDC ID- 75-072A

LAUNCH DATE- 08/09/75 WEIGHT- 277.5 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/12/75
ORBIT PERIOD- 2227.0 MIN INCLINATION- 90.13 DEG
PERIAPSIS- 339.6 KM ALT APOAPSIS- 99876. KM ALT

PERSONNEL
PM - G. ALTMANN ESA-ESTEC
PS - R.D. WILLS ESA-ESTEC

BRIEF DESCRIPTION
THE COS-B SCIENTIFIC SATELLITE WAS DEVELOPED BY THE EUROPEAN SPACE AGENCY (ESA) TO STUDY EXTRATERRESTRIAL GAMMA RADIATION IN THE 25-NEV TO 1-GEV ENERGY RANGE FROM A HIGHLY ELLIPTICAL ORBIT OF ROUGHLY 100,000-KM APOGEE, 350-KM PERIGEE, AND NEAR-POLAR INCLINATION. NASA PROVIDED, ON A FULLY REIMBURSABLE BASIS, THE DELTA LAUNCH VEHICLE AND THE ASSOCIATED LAUNCH SERVICES. THE COS-B SPACECRAFT WAS A CYLINDER WITH A DIAMETER OF 140 CM AND A HEIGHT OF 121 CM. FOUR MONOPOLE ANTENNAS, PROTRUDING 51.2 CM BELOW THE BOTTOM OF THE CYLINDRICAL BODY, GAVE THE SPACECRAFT A TOTAL EFFECTIVE HEIGHT OF 172.2 CM. THE SPACECRAFT OBTAINED ORIENTATION OF ITS MOMENTUM VECTOR WITH RESPECT TO INERTIAL SPACE USING DATA FROM AN EARTH ALBEDO SENSOR AND A SOLAR SENSOR. SPACECRAFT ATTITUDE WAS ADJUSTED BY A NITROGEN COLD-GAS ATTITUDE CONTROL SYSTEM (ACS). THE ACS INCLUDED TWO SPIN-RATE-ADJUST NOZZLES TO MAINTAIN THE SPIN RATE AT 10 RPM AND TWO PRECESSION NOZZLES TO ADJUST THE MOMENTUM VECTOR. THE SPACECRAFT HAD A PCM/PSK/PM TELEMETRY SYSTEM WITH 6.5-M REAL-TIME-ONLY TRANSMITTER PROVIDING A SWITCHABLE BIT RATE OF 160 AND 320 BPS AND A PCM/PSK/PM UP-LINK/DOWN-LINK, RANGE-TONE COMMAND SYSTEM. POWER WAS SUPPLIED BY 9480 SOLAR CELLS MOUNTED ON 12 SURFACES ON THE CYLINDRICAL BODY OF THE SPACECRAFT. COMMUNICATIONS, COMMAND, AND CONTROL OF THE COS-B SATELLITE IN ORBIT WERE PROVIDED BY THE ESA ESTRACK NETWORK. THE SPACECRAFT ENCLOSED A GAMMA-RAY ASTRONOMY EXPERIMENT DESCRIBED UNDER 'COS-B CARAVANE COLLABORATION' BELOW. MEMBERS OF THE UNIVERSITY AND RESEARCH GROUPS WHO IMPLEMENTED THIS SATELLITE ARE LISTED IN APPENDIX B2 WITH THEIR AFFILIATIONS.

***** COS-B, CARAVANE COLLABOR*****

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY SPARK CHAMBER
EXPERIMENT (25 - 1000 MEV)

NSSDC ID- 75-072A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - CARAVANE COLLABOR. SEE APPENDIX B2

BRIEF DESCRIPTION
THIS EXPERIMENT USED A 16-DECK SPARK CHAMBER TO PERFORM GAMMA-RAY ASTRONOMY IN THE 25- TO 1000- MEV ENERGY INTERVAL. THE MISSION GOALS WERE -- (1) TO STUDY THE ANGULAR STRUCTURE OF THE SO-CALLED LINE-SOURCE OF RADIATION IN THE GALACTIC PLANE, (2) TO EXAMINE IDENTIFIED POINT SOURCES AND TO INVESTIGATE OTHER CELESTIAL OBJECTS, WHICH MAY BE EXPECTED TO EMIT GAMMA-RAYS (E.G., SUPERNOVA REMNANTS, QUASARS, NOVAE, ETC.), (3) TO MEASURE THE INTENSITY OF THE ISOTROPIC RADIATION FROM HIGH GALACTIC LATITUDES, (4) TO ASCERTAIN THE ENERGY SPECTRA OF

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RADIATION FROM ALL OBSERVED SOURCES, (6) TO SEARCH FOR LONG-TERM VARIATIONS IN THE STRENGTH OF SOURCES, AND (7) TO SEARCH FOR SHORT-PERIOD PULSATIONS FROM SOURCES ALREADY KNOWN TO BE PULSARS AT OTHER WAVELENGTHS AND TO DETECT GAMMA-RAY BURSTS. THE INSTRUMENT CONTAINED THE FOLLOWING KEY ELEMENTS (TOP TO BOTTOM) -- (1) ANTICOINCIDENCE SCINTILLATION BOMB, (2) 16-DECK SPARK CHAMBER (SC), (3) TRIGGERING TELESCOPE (TT), (4) ENERGY CALORIMETER (E), AND (5) CASCADE-PARTICLE PLASTIC SCINTILLATOR COUNTER (B). THE ANTICOINCIDENCE COUNTER WAS A BOMB OF SCINTILLATION PLASTIC, 16-MM THICK, VIEWED BY NINE PHOTOMULTIPLIER TUBES (PMT). IT DETECTED THE ENTRY OF CHARGED PARTICLES AND INHIBITED THE TRIGGERING OF THE SC. THE SC HAD 16 DECKS, EACH COMPOSED OF A PAIR OF ORTHOGONAL GRIDS OF 192 PARALLEL WIRES. THE TOP 12 DECKS WERE INTERLEAVED WITH TUNGSTEN PLATES AND THE LOWER 4 DECKS WITH MOLYBDENUM PLATES. THE SC WAS FILLED WITH NEON AT 12 ATM, PLUS A SMALL PERCENTAGE OF ETHANE. UPON CONVERSION OF A GAMMA RAY INTO AN ELECTRON-POSITRON PAIR, AN 8-KV VOLTAGE PULSE WAS APPLIED ACROSS THE DECKS CAUSING SPARK DISCHARGE ALONG THE IONIZATION TRACKS OF THE PAIR FROM WHICH THE ARRIVAL DIRECTION OF THE GAMMA RAY COULD BE DETERMINED. THE RECHARGE TIME OF THE SC HIGH VOLTAGE WAS 0.1 S. THE TT CONSISTED OF THREE ELEMENTS -- A 4-MM-THICK SCINTILLATION COUNTER (B1) ABLE TO IDENTIFY EVENTS IN WHICH AN E-P PAIR LEFT THE SC, A CEMENKOV COUNTER (C) OF 30-MM-THICK PLEXIGLASS THAT WAS SENSITIVE TO RELATIVISTIC PARTICLES MOVING IN A DOWNWARD DIRECTION, AND A SECOND SCINTILLATOR (B2) 10-MM THICK. THE PRIMARY OBJECTIVES OF THE TT WERE TO DEFINE THE FIELD OF VIEW, TO DETECT THE DOWNWARD-MOVING ELECTRONS, AND TO PROVIDE THE FAST TRIGGER TO DISCHARGE THE SC. IT WAS POSSIBLE TO RESTRICT THE FIELD OF VIEW OF THE INSTRUMENT BY THE DIVISION OF THE C AND B2 COUNTERS INTO QUADRANTS, WHICH WERE VIEWED BY PMT OUTSIDE THE FIELD OF VIEW. THE PMT OUTPUTS WERE PULSE-HEIGHT ANALYSED TO PROVIDE INFORMATION ON THE NUMBERS OF PARTICLES LEAVING THE SC AND ENTERING THE CALORIMETER, E. THE E UNIT WAS A SINGLE CRYSTAL OF CESIUM IODIDE, 4.5 RADIATION LENGTHS THICK, IN WHICH THE E-P PAIR INITIATED AN ELECTRON-PHOTON CASCADE THAT WAS COMPLETELY ABSORBED AT LOW ENERGIES. AT HIGHER ENERGIES THE CASCADE PENETRATED TO THE FINAL PLASTIC SCINTILLATOR COUNTER, B. THE OUTPUT OF B WAS ANALYZED TO MEASURE THE NUMBER OF PARTICLES ESCAPING. INFORMATION FROM THE TT COUNTERS AND FROM THE SC PROVIDED A MEASURE OF THE ENERGY LOST BY SCATTERING OR ABSORPTION. THIS QUANTITY MUST BE ADDED TO THE CALORIMETER SIGNAL TO DERIVE THE ENERGY OF THE INCIDENT GAMMA RAY. THE ANTICOINCIDENCE BOMB WAS INSTRUMENTED TO DETECT GAMMA-RAY BURSTS, AND A SMALL 80-80 CM ARGON-FILLED PROPORTIONAL COUNTER SENSITIVE TO X-RAYS BETWEEN 2 AND 12 KEV VIEWED PARALLEL TO THE AXIS OF THE MAIN GAMMA-RAY INSTRUMENT TO PROVIDE CONTEMPORARY X-RAY DATA ON AXIALLY LOCATED SOURCES.

***** COSMOS 900*****

SPACECRAFT COMMON NAME- COSMOS 900
ALTERNATE NAMES- 0989B, OVAL

NSSDC ID- 77-023A

LAUNCH DATE- 03/30/77 WEIGHT- 900. KG
LAUNCH SITE- PLESETSK, U.S.S.R.
LAUNCH VEHICLE- C-1

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/31/77
ORBIT PERIOD- 94.4 MIN INCLINATION- 83. DEG
PERIAPSIS- 460. KM ALT APOAPSIS- 525. KM ALT

PERSONNEL
PM - K.I. GRINGAUZ IKI
PS - B.A. TVERSKOY INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
SPUTNIK COSMOS 900 CARRIED SCIENTIFIC APPARATUS, A RADIO SYSTEM FOR PRECISE MEASUREMENTS OF ORBIT ELEMENTS, AND A RADIO TELEMETRY SYSTEM.

----- COSMOS 900, AFONIN-----

INVESTIGATION NAME- FLAT RETARDING POTENTIAL ANALYZER

NSSDC ID- 77-023A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - V.V. AFONIN IKI
OI - V.V. BEZRUKIKH IKI

BRIEF DESCRIPTION
NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, AFONIN-----

INVESTIGATION NAME- HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE

NSSDC ID- 77-023A-02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - V.V. AFONIN IKI
OI - J.I. SMILAUER GEOPHYS INST CAS

BRIEF DESCRIPTION
THE RADIO FREQUENCY PROBE WAS OPERATED IN REAL TIME AND TWO DIFFERENT STORAGE MODES. THE FIRST STORAGE MODE FILLED THE ON-BOARD MEMORY IN ONE ORBIT; WHILE IN THE 2ND MODE, IT REQUIRED ONE DAY TO FILL MEMORY. RESULTS OF ELECTRON TEMPERATURE WERE OBTAINED ASSUMING A MAXWELLIAN VELOCITY DISTRIBUTION RATHER THAN RECORDING I-V CURVES. THE NORMAL SPACECRAFT POTENTIAL OF -1 TO -3V WAS EXCEEDED DURING LONG PERIODS ON THE SUNLIT PORTIONS OF THE ORBIT WHERE VALUES UP TO -15V WERE EXPERIENCED.

----- COSMOS 900, GDALEVICH-----

INVESTIGATION NAME- SPHERICAL ION TRAP WITH FLOATING POTENTIAL

NSSDC ID- 77-023A-03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. GDALEVICH IKI
OI - V.B. OZEROV IKI

BRIEF DESCRIPTION
NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, GDALEVICH-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 77-023A-04 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. GDALEVICH IKI
OI - V.F. GUBSKY IKI

BRIEF DESCRIPTION
NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, GORTCHAKOV-----

INVESTIGATION NAME- RELATIVISTIC PROTON AND ELECTRON COUNTER

NSSDC ID- 77-023A-08 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - YE. V. GORTCHAKOV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
NO INFORMATION GIVEN ON THE EXPERIMENT OTHER THAN THE NAMES SUPPLIED.

----- COSMOS 900, SCHUTTE-----

INVESTIGATION NAME- PANORAMIC ELECTROSTATIC SPECTROMETER

NSSDC ID- 77-023A-07 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - N.M. SCHUTTE IKI

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED ELECTRONS AND PROTONS FROM 0.1 TO 20 KEV.

----- COSMOS 900, SOBNOVETS-----

INVESTIGATION NAME- DIFFERENTIAL ENERGY SPECTROMETER

NSSDC ID- 77-023A-05 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.N. SOBNOVETS INST NUCLEAR PHYSICS
OI - N.I. PANASYUK INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED TRAPPED ELECTRONS AND PROTONS USING JUNCTION SPECTROMETERS. ONE PROTON DETECTOR WITH AN ANGULAR APERTURE OF 60 DEG (GEOMETRIC FACTOR OF 0.3 SQ CM-SR) COVERED THE ENERGY RANGE 1-3 MEV, AND THE OTHER PROTON DEVICE WITH AN 18-DEG ANGULAR APERTURE (GEOMETRIC FACTOR OF 0.0004 SQ CM-SR) COVERED THE RANGE 80-130 KEV. THE ELECTRON DETECTOR WITH AN ANGULAR APERTURE OF 15 DEG (GEOMETRIC FACTOR OF 0.0034 SQ CM-SR) COVERED THE RANGE 80-130 KEV. FOR L.G.T. 3, THE ANGLE BETWEEN THE DETECTOR AXES AND THE GEOMAGNETIC FIELD WAS 80 PLUS OR MINUS 10 DEG.

----- COSMOS 900, TELTSOV-----

INVESTIGATION NAME- DIFFERENTIAL LOW ENERGY SPECTROMETER

NSSDC ID- 77-023A-06 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.V. TELTSOV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED ELECTRONS AND PROTONS FROM 0.5 TO 20 KEV.

----- COSMOS 900, TULUPOV-----

INVESTIGATION NAME- AURORAL PHOTOMETER

NSSDC ID- 77-023A-09 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - V.I. TULUPOV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED AURORAL LIGHT EMISSIONS AT 3914 A.

***** DMSF 50-1/F1*****

SPACECRAFT COMMON NAME- DMSF 50-1/F1
ALTERNATE NAMES- DMSF 12535, DMSF BLOCK 50-1
09415, DMSF5D1
DMSF-F1

NSSDC ID- 76-091A

LAUNCH DATE- 09/11/76 WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.6 MIN
PERIAPSIS- 818. KM ALT

EPOCH DATE- 09/14/76
INCLINATION- 98.7 DEG
APOAPSIS- 848. KM ALT

PERSONNEL

PM - J.J. MCGLINCHY USAF SPACE DIVISION

BRIEF DESCRIPTION

DMSF-50-1/F1 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSF). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M-LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT

HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) WHICH SUPPORTS (4) A 9.29 SQ M SOLAR CELL PANEL. THE BLOCK 50 SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE OF BLOCK 50 WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, COULD STORE A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITE LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELATED VIA SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE BLOCK 50 SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSF 50-1/F1, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 76-091A-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSF BLOCK 50 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. THERE WERE THREE ONBOARD RECORDERS, AND EACH HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSF BLOCK 50,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSF 50-1/F1, BLAKE-----

INVESTIGATION NAME- RADIATION DOSIMETER

NSSDC ID- 76-091A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.B. BLAKE AEROSPACE CORP
OI - S.J. IMAYOTO AEROSPACE CORP
OI - M. KATZ AEROSPACE CORP
OI - W.A. KOLASINSKI AEROSPACE CORP

BRIEF DESCRIPTION

THE PURPOSE OF THE GFE-3R DOSIMETER WAS TO MEASURE THE RADIATION DOSE IN SILICON UNDER ALUMINUM SHIELDING OF FOUR THICKNESSES REPRESENTATIVE OF BLOCK 50 DRSP SPACECRAFT. THE DOSIMETER, BUILT BY THE AEROSPACE CORPORATION SPACE SCIENCE LABORATORY, CONSISTED OF FOUR SEPARATE, SINGLE-DETECTOR UNITS. THESE OMNIDIRECTIONAL SENSORS WERE SMALL, CUBICAL, LITHIUM-DRIFFED, SILICON DETECTORS CENTERED UNDER HEMISPHERICAL SHELLS, AND HEAVILY SHIELDED (RELATIVE TO THE HEMISPHERICAL SHELL) OVER THE REAR 2 PI SOLID ANGLE. THE SHIELDING DORES FOR THE FOUR SENSORS WERE 35, 75, 125, AND 200 MILS OF ALUMINUM, RESPECTIVELY. THE DOSIMETER DIRECTLY MEASURED THE IONIZATION IN THE SILICON CUBE CAUSED BY THE NATURAL RADIATION AND SERVED

AS AN ELECTRON-PROTON SPECTROMETER, THUS YIELDING THE FLUENCES OF ENERGETIC ELECTRONS AND PROTONS ENCOUNTERED IN THE DMSP ORBIT, AS A FUNCTION OF TIME. FOUR INTEGRAL DISCRIMINATORS, WITH THRESHOLDS CORRESPONDING TO DEPOSITED ENERGY OF 25, 75, 300, AND 5000 KEV, WERE USED TO ANALYZE THE PULSE-HEIGHT SPECTRUM OF SIGNALS PRODUCED BY PROTONS, ELECTRONS, AND GAMMA RAYS ENTERING THE DETECTOR. INDIVIDUAL PULSES FROM THE 25, 300, AND 5000 KEV CHANNELS WERE COUNTED IN SCALING REGISTERS, WHICH ARE READ OUT AND RESET BY THE TELEMETRY SYSTEM EVERY THREE S. PULSES, WHOSE AMPLITUDES EXCEEDED THE GATING THRESHOLDS OF 25 KEV AND 75 KEV, WERE INTEGRATED INTO 1 MEV EQUIVALENT ENERGY PULSES (CORRESPONDING TO A DOSE OF $8.0E-6$ RAD), WHICH WERE COUNTED BY A CUMULATIVE STORAGE REGISTER. THESE REGISTERS WERE READ OUT EVERY THREE SECONDS BUT NOT RESET BY THE TELEMETRY SO THAT THE NUMBER OF COUNTS READ OUT AT ANY TIME REPRESENTED THE TOTAL ENERGY IN MEV DEPOSITED IN THE SILICON ACTIVE VOLUME DURING THE MISSION LIFE. MAXIMUM ACCUMULATED DOSE STORAGE CORRESPONDED TO 5.925 RAD. ADDITIONAL INFORMATION CAN BE OBTAINED FROM AEROSPACE CORPORATION PUBLICATION NUMBER TOR-0077(2630)-1, JUNE 1977.

----- DMSP 5D-1/F1, SHRUM-----

INVESTIGATION NAME- GAMMA RAY DETECTOR
 NSSDC ID- 76-091A-04 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 AERONOMY

PERSONNEL
 PI - J. SHRUM USAF TECH APPL CTR

BRIEF DESCRIPTION
 THE INSTRUMENT CONSISTED OF A FOUR-DETECTOR ARRAY OF CESIUM IODIDE SCINTILLATORS AND PHOTOMULTIPLIER TUBES EACH SURROUNDED BY A TANTALUM RING SHIELD TO PROVIDE A DIRECTIONAL SYSTEM. EACH DETECTOR WAS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACED 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS WERE USED TO PROVIDE GAMMA-RAY ENERGY LOSS THRESHOLDS OF 0.06, 0.15, AND 0.375 MEV. GAMMA RAYS PRODUCED IN THE ATMOSPHERE BY COSMIC RAYS, PRECIPITATING ELECTRONS, AND OTHER MEANS COULD BE MONITORED WITH THIS INSTRUMENT.

***** DMSP 5D-1/F2*****

SPACECRAFT COMMON NAME- DMSP 5D-1/F2
 ALTERNATE NAMES- DMSF 13536, DMSF DLCKK 5D-1
 DMSFSD1, DMSF-F2

NSSDC ID- 77-044A
 LAUNCH DATE- 06/05/77 WEIGHT- 450. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/06/77
 ORBIT PERIOD- 101.7 MIN INCLINATION- 99. DEG
 PERIAPSIS- 811. KM ALT APOAPSIS- 869. KM ALT

PERSONNEL
 PM - J.J. MCLINCHEY USAF SPACE DIVISION

BRIEF DESCRIPTION
 DMSP 5D-1/F2 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN PLANNED 850-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) WHICH SUPPORTS (4) A 9.29 SQ MM SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3-NAUTICAL-MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2-NAUTICAL-MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO

THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR H (SSH), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED VIA SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F2, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)
 NSSDC ID- 77-044A-01 INVESTIGATIVE PROGRAM
 OPERATIONAL METEOROLOGICAL SYS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
 THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP 5D-1/F2 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATED IN TWO ("LIGHT" AND "THERMAL") SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. THERE WERE THREE ONBOARD RECORDERS, AND EACH HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSP 5D-1/F2, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
 SPECIAL SENSOR H (SSH)
 NSSDC ID- 77-044A-02 INVESTIGATIVE PROGRAM
 OPERATIONAL METEOROLOGICAL SYS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
 SPECIAL SENSOR H (SSH) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH WAS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 695, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR WAS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION WAS APPROXIMATELY 34 KM AT NAZIR. RADIANCE DATA WERE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP 5D-1/F2, MIZERA-----

INVESTIGATION NAME- REMOTE X-RAY SENSOR - PRECIPITATING ELECTRONS

NSSDC ID- 77-044A-06 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS AERONOMY

PERSONNEL PI - P.F. MIZERA AEROSPACE CORP

BRIEF DESCRIPTION THE INSTRUMENT CONSISTED OF A LARGE-AREA PROPORTIONAL COUNTER AND FOUR CIRCULAR CADMIUM TELLURIDE (CDTE) SEMICONDUCTORS EMBEDDED IN A HEMISPHERICAL PLASTIC SCINTILLATOR THAT WAS VIEWED BY A PHOTOMULTIPLIER TUBE. THE SEALED PROPORTIONAL COUNTER HAD A COLLIMATOR AND WAS SENSITIVE TO X RAYS FROM 1.5 TO 20.2 KEV. THE CDTE DETECTORS HAD DISCRIMINATORS THAT PROVIDED THRESHOLD VALUES OF 15, 30, 60, AND 90 KEV. THE INVESTIGATION WAS PRIMARILY CONCERNED WITH X RAYS PRODUCED IN THE ATMOSPHERE BY PRECIPITATING ELECTRONS.

----- DMSP 5D-1/F2, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 77-044A-03 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS AERONOMY

PERSONNEL PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION THE SPECTROMETER CONSISTED OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINTED TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAD A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAD A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERED THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT WAS OBTAINED IN 1 S.

----- DMSP 5D-1/F2, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- 77-044A-05 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS AERONOMY IONOSPHERES

PERSONNEL PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION THE INSTRUMENT CONSISTED OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDED MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.E6/CUBIC CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA MEASURED ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA WAS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY VECTOR, WHILE THE SEA WAS ORIENTED AT RIGHT ANGLES TO THIS DIRECTION AND AWAY FROM THE SUN TO MINIMIZE THE EFFECT OF PHOTOELECTRONS. THE DEVICE ALSO PROVIDED A MEASUREMENT OF THE SPACECRAFT POTENTIAL.

----- DMSP 5D-1/F2, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- 77-044A-04 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S) IONOSPHERES

PERSONNEL PI - A.L. SNYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION THE INSTRUMENT CONSISTED OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPED FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE WAS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MANMADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (FOF2). THE FOF2 PARAMETER WAS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT COULD DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

----- DMSP 5D-1/F3-----

SPACECRAFT COMMON NAME- DMSP 5D-1/F3 ALTERNATE NAMES- DMSP 14537, DMSP BLOCK 5D-1 D5P5D1, DMSP-F3

NSSDC ID- 78-042A

LAUNCH DATE- 05/01/78 WEIGHT- 480. KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY UNITED STATES 000-USAF

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/02/78 ORBIT PERIOD- 96.89 MIN INCLINATION- 97.6 DEG PERIAPSIS- 564. KM ALT APOAPSIS- 653. KM ALT

PERSONNEL PM - G.J. SAMOS USAF SPACE DIVISION

BRIEF DESCRIPTION DMSP 5D-1/F3 WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM WERE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M-LONG SPACECRAFT WAS SEPARATED INTO FOUR SECTIONS: (1) A PRECISION MOUNTING PLATFORM (PMP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 SQ M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS COULD BE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE WAS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWED AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, WAS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDED REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3-NAUTICAL-MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2-NAUTICAL-MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDED WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR M (SSM), A STEP-SCANNING RADIOMETER, WAS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDED THREE HIGH-DENSITY TAPE RECORDERS, WAS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND CORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F3, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 78-042A-01 INVESTIGATIVE PROGRAM OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP 5D-1/F3 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYED A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTED IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS: (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCED, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM, AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAD A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN

ORIGINAL PAGE IS OF POOR QUALITY

OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT LF AND TS DATA WERE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERED A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDED VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTED THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F3, AFGMC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR N (SSN)

NSSDC ID- 78-042A-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGMC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR N (SSN) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSN WAS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 16-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 676, 668.8 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (835, 408.9, 441.5, 428, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR WAS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSN TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION WAS APPROXIMATELY 39 KM AT NAZAR. THE RADIANCE DATA WERE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR N, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP 5D-1/F3, SHRUR-----

INVESTIGATION NAME- GAMMA-RAY DETECTOR

NSSDC ID- 78-042A-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - J. SHRUR USAF TECH APPL CTR

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF A FOUR-DETECTOR ARRAY OF CESIUM IODIDE SCINTILLATORS AND PHOTOMULTIPLIER TUBES EACH SURROUNDED BY A TANTALUM RING SHIELD TO PROVIDE A DIRECTIONAL SYSTEM. EACH DETECTOR WAS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACED 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS WERE USED TO PROVIDE GAMMA-RAY ENERGY LOSS THRESHOLDS OF 0.06, 0.15, AND 0.375 MEV. GAMMA-RAYS PRODUCED IN THE ATMOSPHERE BY COSMIC RAYS, PRECIPITATING ELECTRONS, AND OTHER MEANS CAN BE MONITORED WITH THIS INSTRUMENT.

***** DMSP 5D-1/F4*****

SPACECRAFT COMMON NAME- DMSP 5D-1/F4
ALTERNATE NAMES- DMSP 15539, DMSP BLOCK 5D-1
DMSP5D1, DMSP-F4

NSSDC ID- 79-050A

LAUNCH DATE- 06/06/79 WEIGHT- 450. K6
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/07/79
ORBIT PERIOD- 101.4 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 817. KM ALT APOAPSIS- 839. KM ALT

PERSONNEL
PI - G.J. SAROS USAF SPACE DIVISION

BRIEF DESCRIPTION
DMSP 5D-1/F4 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN PLANNED 830-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 9.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS -- (1) A PRECISION MOUNTING PLATFORM (PRP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 0.29 50 M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND AN UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 1/3 NAUTICAL MILE RESOLUTION FOR ALL MAJOR LAND MASSES, 1-1/2 NAUTICAL MILE RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR N (SSN), A STEP-SCANNING RADIOMETER, IS THE INFRARED TEMPERATURE-HUMIDITY-OZONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MIN OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED BY SATCOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F4, AFGMC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- 79-050A-01 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGMC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP 5D-1/F4 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.8 KM. EACH OF THREE ONBOARD RECORDERS HAS A STORAGE CAPABILITY OF 400 MIN OF BOTH LS AND TS DATA OR 20 MIN OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVER A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F4, AFGMC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR N (SSN)

NSSDC ID- 79-050A-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSM) IS A VERTICAL TEMPERATURE PROFILE
RADIOMETER (VTPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO
OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF
THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN
OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSM IS A
16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE
10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (830 CM-1) IN
THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725,
708, 695, 676, 648.0 CM-1) IN THE 18-MICROMETER CO2 ABSORPTION
BAND, AND EIGHT CHANNELS (535, 488.5, 441.5, 420, 374, 397.5,
355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER
VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL
SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING
MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE
SUBTRACK, ALLOWING THE SSM TO VIEW 25 SEPARATE COLUMNS OF THE
ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000
KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION,
THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW.
THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NADIR. THE
RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND
OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE
COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE
REPORT, 'DSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL
SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4,
284-288, JULY-AUGUST 1975.

----- DMSP 5D-1/F4, AFGWC STAFF-----
INVESTIGATION NAME- SSM/T-MICROWAVE TEMPERATURE SOUNDER

NSSDC ID- 79-050A-06 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
AERONOMY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE SPECIAL SENSOR MICROWAVE/ TEMPERATURE SOUNDER IS A
SEVEN-CHANNEL SCANNING RADIOMETER WHICH WILL MEASURE RADIATION
IN THE 5- TO 6- MM WAVELENGTH (50-60 GHZ) REGION SPECIFICALLY
50.5, 53.2, 54.35, 54.9, 58.4, 58.828, AND 59.4 GHZ TO PROVIDE
DATA FOR VERTICAL TEMPERATURES FROM THE EARTH'S SURFACE TO
ABOVE 30 KM. IT IS DESIGNED TO SCAN IN SYNCHRONIZATION WITH
THE SPECIAL SENSOR H PACKAGE AND WILL PROVIDE TEMPERATURE
SOUNDINGS OVER PREVIOUSLY INACCESSIBLE CLOUDY REGIONS AND AT
HIGHER ALTITUDES THAN ARE ATTAINABLE FROM THE SSM. THE SSM/T
OPERATES IN THE ABSORPTION BAND OF MOLECULAR OXYGEN. BY
CHOOSING FREQUENCIES WITH DIFFERENT ABSORPTION COEFFICIENTS ON
THE WING OF THE OXYGEN ABSORPTION BAND, A SERIES OF WEIGHTING
FUNCTIONS PEAKING AT PRESELECTED ALTITUDES IS OBTAINED. THE
RADIOMETER SCANS ACROSS THE NADIR TRACK ON SEVEN SCAN POSITIONS
AND TWO CALIBRATION POSITIONS (COLD SKY AND 300 DEG K). THE
Dwell TIME FOR THE CROSSTRACK AND CALIBRATION POSITIONS IS 2.7
S EACH. THE TOTAL SCAN PERIOD IS 32 S. THE INSTRUMENT HAS AN
INSTANTANEOUS FIELD OF VIEW OF 12 DEG AND SCANS PLUS OR MINUS
36 DEG FROM NADIR.

----- DMSP 5D-1/F4, AFGWC STAFF-----
INVESTIGATION NAME- SNOW/CLOUD DISCRIMINATOR SPECIAL SENSOR
C (SSC)

NSSDC ID- 79-050A-08 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE SNOW/CLOUD SENSOR IS AN EXPERIMENTAL UNIT THAT IS
BEING USED IN CONJUNCTION WITH THE OLS SENSOR ON SPACECRAFT
F-4. THE EXPERIMENT BEING PERFORMED BY THE SIMULTANEOUS
IN-ORBIT USE OF THESE TWO SENSORS IS PRIMARILY THAT OF PROVING
THE PROPOSITION THAT SNOW/CLOUD SCENE DISCRIMINATION CAN BE
OBTAINED THROUGH THE COMBINATION OF NEAR IR (1.6 MICROMETER
WAVELENGTH) SENSOR DATA AND OLS L-CHANNEL (VISUAL)
INFORMATION. THE SNOW/CLOUD DETECTOR IS A "PUSH-BROOM" SCAN
RADIOMETER THAT WILL DEPEND UPON ORBITAL VELOCITY OF THE SD
SPACECRAFT TO PROVIDE THE ALONG TRACK SCAN AND A LINEAR ARRAY
OF 48 DETECTOR ELEMENTS AT THE IMAGE PLANE OF A WIDE LENS TO
PROVIDE A 40.2 DEG CROSS TRACK SCAN. THE SENSOR DEPENDS UPON
REFLECTED SOLAR ENERGY IN THE 1.51 TO 1.63 MICROMETER SPECTRAL
BAND FOR ITS INPUT SIGNAL.

----- DMSP 5D-1/F4, MORSE-----
INVESTIGATION NAME- SSD - ATMOSPHERIC DENSITY SENSOR

NSSDC ID- 79-050A-07 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
AERONOMY

PERSONNEL
PI - F.A. MORSE AEROSPACE CORP
OI - D. NICKMAN AEROSPACE CORP
OI - A.D. CHRISTENSEN AEROSPACE CORP
OI - J.B. PRANKE AEROSPACE CORP

BRIEF DESCRIPTION
THE SSD IS A LIMB-SCANNING ULTRAVIOLET SPECTROMETER WHICH
MEASURES DAYGLOW EMISSIONS FROM O AND N2. THE WAVELENGTHS OF
PRIMARY INTEREST ARE AT 1356 AND 3371 A. ENERGETIC
PHOTOELECTRONS ARE PRODUCED BY PHOTOIONIZATION OF NEUTRAL
MOLECULES BY SOLAR EUV RADIATION. AS THESE FAST PHOTOELECTRONS
LOSE ENERGY THROUGH COLLISIONS WITH NEUTRALS, THOSE WITH
ENERGIES NEAR 16 EV EXCITE O AND N2 TO ELECTRONIC STATES OF
ENERGY HIGHER THAN THE GROUND STATES. THE SUBSEQUENT DECAY TO
THE GROUND STATE PRODUCES EMISSIONS MONITORED BY THE SSD. THE
SSD WILL MEASURE LIGHT EMITTED BY MOLECULAR NITROGEN EXCITATION
IN THE LOW AND 20 POSITIVE BANDS, AND ATOMIC OXYGEN IN THE 1356
AND 1300 LINES. THE INSTRUMENT ALSO HAS THE CAPABILITY OF
PROVIDING SPECTRAL SCANS FROM 800 TO 1200, FROM 1300 TO 1600,
AND FROM 2900 TO 3950 A AT 4, 6, AND 12 A RESOLUTION,
RESPECTIVELY. LIGHT MONITORED WITH NARROW COLLIMATORS THAT
PROVIDES A FIELD-OF-VIEW OF 0.1 DEG X 4 DEG. THE SSD WAS
MECHANICALLY DRIVEN TO SCAN VERTICALLY THROUGH THE EARTH'S LIMB
FROM 85 TO 480 KM. IT PROVIDED APPROXIMATELY 50 SETS OF
DENSITY PROFILES ON THE DAYLIGHT PORTION OF EACH ORBIT.

----- DMSP 5D-1/F4, ROTHWELL-----
INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 79-050A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SPECTROMETER CONSISTS OF TWO DIFFERENT-SIZED
CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON
ELECTRON MULTIPLIERS. THE ESA'S POINT TOWARD THE ZENITH IN
ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAS A
FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04,
WHILE THE SMALL ONE HAS A FOV OF 3.7 BY 4.8 DEG WITH A DELTA
E/E OF 0.072. THE LARGE ESA COVERS THE RANGE FROM 1 TO 20 KEV
AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT
SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSP 5D-1/F4, SAGALYN-----
INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- 79-050A-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF ONE SPHERICAL (SEA) AND ONE
PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDES
MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.66/CUBIC CM
THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA
MEASURES ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE
AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA IS ORIENTED
IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY.

----- DMSP 5D-1/F4, SNYDER-----
INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- 79-050A-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - A.L. SNYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPS FROM 1.3 TO 13.9 MHz IN 100-KHz STEPS. THE DEVICE IS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT CAN DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** ESA-GEOS 2 *****

SPACECRAFT COMMON NAME- ESA-GEOS 2
ALTERNATE NAMES- 10901

NSDDC ID- 78-071A

LAUNCH DATE- 07/14/78 WEIGHT- 273.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/06/78
ORBIT PERIOD- 1431.2 MIN INCLINATION- 0.772 DEG
PERIAPSIS- 39619.9 KM ALT APOAPSIS- 39774.1 KM ALT

PERSONNEL
PM - D.E. MULLINGEN ESA-ESTEC
PS - K. KNOTT ESA-ESTEC

BRIEF DESCRIPTION

ESA-GEOS 2 WAS THE FIRST SPACECRAFT PLACED IN AN EQUATORIAL GEOSTATIONARY ORBIT DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. THE SPACECRAFT SERVED AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND CARRIED OUT CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA. THE PAYLOAD CONSISTED OF INSTRUMENTS TO MEASURE: (1) DC AND AC ELECTRIC AND MAGNETIC FIELDS; (2) GRADIENT OF THE MAGNETIC FIELD; (3) THERMAL AND SUPRATHERMAL PLASMA PARALLEL AND PERPENDICULAR TO THE MAGNETIC FIELD; (4) ENERGY SPECTRA, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS; AND (5) ANGULAR DISTRIBUTION AND ENERGY SPECTRA OF ENERGETIC ELECTRONS AND PROTONS. THE SPACECRAFT WAS CYLINDRICAL WITH A HEIGHT OF 1.321 M. THE TOTAL MASS, EXCLUDING PROPELLANTS, WAS 273.6 KG. THERE WERE FOUR TELESCOPIC ANIAL BOOMS 2.5 M IN LENGTH FOR THE MESHED WIRE SPHERES OF AN AC ELECTRIC FIELD EXPERIMENT, TWO 20-M CABLE BOOMS FOR MAGNETIC AND ELECTRIC FIELD SENSORS AND FOR AN EXCITATION ANTENNA FOR PLASMA RESONANCES, AND TWO LOCKING RADIANT BOOMS 3 M IN LENGTH FOR A VARIETY OF INSTRUMENTS. THERE WERE SIX HYDRAZINE THRUSTERS, TWO TO TILT AND PRECESS THE SPACECRAFT, TWO TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE COULD BE CHANGED, AND TWO FOR SPIN UP AND SPIN DOWN. THE SPIN RATE WAS NOMINALLY 10 RPM. DATA WERE TELEMETRED IN REAL TIME AT 137.2 MHz (106 AND 744 BPS) AND AT 2292.5 MHz (11.91 OR 95.25 KDB). ALTITUDE MEASUREMENTS WERE OBTAINED BY A SUN SENSOR, A DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER WAS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE SPACECRAFT SURFACE. TO PREVENT SPACECRAFT DIFFERENTIAL CHARGING, 96 PERCENT OF THE SURFACE WAS ELECTRICALLY CONDUCTIVE. BECAUSE OF THE IMPORTANCE OF THE MAGNETIC FIELD MEASUREMENTS, THE SPACECRAFT RESIDUAL FIELD AT THE MAGNETOMETER IS ONLY 0.3 NT (Gauss). EXCEPT FOR MINOR MODIFICATIONS TO CERTAIN EXPERIMENTS, THIS SPACECRAFT AND INSTRUMENTS WERE IDENTICAL TO ESA-GEOS 1 (77-029A) AND MORE DETAILED INFORMATION CAN BE FOUND IN 'ESA BULLETIN' NO. 9 MAY 1977. ONE SOLAR PANEL DEVELOPED A SHORT CIRCUIT SOON AFTER LAUNCH AND A NUMBER OF THE EXPERIMENTS COULD OBTAIN USEFUL DATA ONLY FOR ONE HALF OF THE SPIN PERIOD.

***** ESA-GEOS 2, BEGMIN *****

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSDDC ID- 78-071A-11 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. BEGMIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF ESA EXPERIMENT NO. 5-300 AND MADE USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE ANIAL BOOMS (PART OF 78-071A-10, UNGSTRUP) AND THE TWO VITREOUS CARBON SPHERES MOUNTED ON THE END OF THE 20-M RADIAL BOOMS (78-071A-07, PEDERSEN). THE MESHED SPHERES WERE USED AS TRANSMITTING ELEMENTS FOR FREQUENCIES FROM 0.2 TO 76 KHz. THE SELF-IMPEDANCE OF THESE SPHERES AND THE MUTUAL IMPEDANCE BETWEEN THE MESHED AND LONG-BOOM CARBON SPHERES WERE MEASURED. STRONG RESONANCES AT THE HYBRID RESONANCE FREQUENCIES AND ANTI-RESONANCES AT THE GYRO FREQUENCIES WERE USED TO DETERMINE THE DENSITY OF THE SURROUNDING PLASMA. FREQUENCIES UP TO 450 HZ WERE TELEMETRED DIRECTLY, AND SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATION WERE EMPLOYED TO OBTAIN THE AUTO- AND/COR CROSS-CORRELATION UP TO 77

KHz WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHz.

***** ESA-GEOS 2, GEISS *****

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSDDC ID- 78-071A-03 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J. GEISS U OF BERNE
PI - M.R. ROSENBAUER MPI-AERONOMY
OI - P.A. EBERHARDT U OF BERNE
OI - M. DALGIER U OF BERNE
OI - A. GHIELMETTI U OF BERNE
OI - M. LOJDL MPI-EXTRATERM PHYS
OI - D.T. YOUNG U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. 5-303) MEASURED THE ENERGY, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS USING A CYLINDRICAL ELECTROSTATIC ANALYZER (ESA) FOLLOWED BY A CROSSED ELECTRIC AND MAGNETIC FIELD ANALYZER (CFA) TO SELECT THE ENERGY AND VELOCITY. THE ENERGY (PER UNIT CHARGE) RANGED FROM 0.001 TO 17.7 KEV IN 32 STEPS WITH A DELTA E/E OF 0.03 AND A MASS RANGE OF 1 TO 140 U IN 64 LOGARITHMICALLY SPACED STEPS. THERE WAS A THERMAL POLE IN WHICH A RETARDING GRID IN THE ENTRANCE SLIT WAS USED FOR ANALYSIS BELOW 0.1 KEV. ALL PARTICLES THAT OVERCAME THIS GRID VOLTAGE WERE ACCELERATED TO 3 KEV BEFORE ENTERING THE ESA IN ITS LOWEST ENERGY STEP, WHERE BOTH THE ESA AND CFA WERE TRANSPARENT. THE DEVICE VIEWED PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW-ENERGY IONS, THE ACCEPTANCE ANGLES WERE PLUS OR MINUS 4 DEG IN AZIMUTH AND PLUS OR MINUS 30 DEG IN ELEVATION (REFERENCED TO THE Z AXIS). FOR THE HIGHEST ENERGIES, THESE ANGLES DECREASED TO 3.5 AND 7.1 DEG, RESPECTIVELY. THREE PERCENT OF THE IONS LEAVING THE ESA WERE COUNTED BY A CHANNELTRON. THE REMAINING 97 PERCENT ENTERED THE CFA AND THE OUTPUT WAS DETECTED BY AN ELECTRON MULTIPLIER. THIS SIGNAL WAS PULSE-HEIGHT ANALYZED BY ONE PIPED AND ONE VARIABLE DISCRIMINATOR TO OBTAIN BETTER MASS DISCRIMINATION. THE MAIN PURPOSE OF THIS INVESTIGATION WAS TO IDENTIFY THE SOURCES OF LOW-ENERGY PARTICLES IN THE MAGNETOSPHERE. TIME VARIATIONS OF THE HELIUM/HYDROGEN RATIO, THE DEGREE OF IONIZATION OF HELIUM AND OXYGEN, AND THE ISOTOPIC ABUNDANCE RATIO OF HELIUM 3/HELIUM 4 COULD BE MEASURED TO DETERMINE THESE SOURCES.

***** ESA-GEOS 2, GENDRIN *****

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSDDC ID- 78-071A-06 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. GENDRIN CNET
OI - J.M. ETCHETO CNET
OI - E. UNGSTRUP DANISH SPACE RES INST

BRIEF DESCRIPTION

THE INSTRUMENT USED TWO SETS OF THREE-AXIS SEARCH COIL MAGNETOMETERS, ONE FOR THE ULF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 KHz). EACH SEARCH COIL CONSISTED OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS WAS BUILT INTO A SINGLE ASSEMBLY AND MOUNTED ON THE LOCKING 3-M BOOMS AT A DISTANCE OF 2 M FROM THE SPACECRAFT. TYPICAL SENSITIVITIES OF THESE SENSORS IN UNITS OF GAMMAS PER SQ ROOT OF HZ, WERE 1.E-1 AT 0.1 HZ, 2.E-4 AT 10 HZ, AND ABOUT 3.E-6 AT 1 KHz. THESE SENSORS AND SOME ASSOCIATED ELECTRONICS CONSISTING OF (1) A LARGE NUMBER OF CHANNEL-SELECTION SWITCHES, (2) A NUMBER OF BANDPASS FILTERS, (3) SIX SWEEP-FREQUENCY ANALYZERS (SFA), (4) A DIGITAL CORRELATOR, AND (5) EIGHT STEPPED-GAIN AMPLIFIERS, WERE A PART OF THE ESA WAVE EXPERIMENT NO. 5-300. THESE COMPONENTS WERE EMPLOYED FOR THE SENSORS DESCRIBED IN 78-071A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGMIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR OUTPUT WERE TRANSMITTED BY THE 95.25 KDB TELEMETRY MODE. THE SFAS COVERED THE FREQUENCY RANGE UP TO 77 KHz IN 256 PARTLY OVERLAPPING STEPS. THE CORRELATOR PROVIDED AN AUTO-CORRELOGRAM OF 128 POINTS WITHIN 29 MS. ITS BANDWIDTH COULD BE SELECTED TO BE 2.5, 5.0, OR 10.0 KHz. CROSS-CORRELOGRAM BETWEEN TWO SENSORS COULD BE PROVIDED. THE CORRELATOR ALSO OPERATED IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

***** ESA-GEOS 2, HULTQVIST *****

INVESTIGATION NAME- LOW-ENERGY ELECTRON AND PROTON PITCH
ANGLE DISTRIBUTION

NSSDC ID- 78-071A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G. MULLTOVIST
OI - H. BORG
OI - L.A. HOLMGREN

KIRUNA GEOPHYS INST
KIRUNA GEOPHYS INST
KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. 9-310) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 0.2 TO 20 KEV WITH EXTENSIVE ANGULAR COVERAGE CONCENTRATED IN THE LOSS CONE REGION. THE PURPOSE OF THE INVESTIGATION WAS TO IMPROVE THE UNDERSTANDING OF AURORAL PARTICLE ACCELERATION AND PRECIPITATION MECHANISMS BY COMPARING NEAR-EQUATORIAL PARTICLE DISTRIBUTIONS WITH COORDINATED GROUND-BASED OBSERVATIONS AT THE FOOT OF THE MAGNETIC FIELD LINE. HIGH TEMPORAL AND SPATIAL RESOLUTION OF THE INSTRUMENT WAS PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF WILKEN (78-071A-01) WAS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 32 CURVED-PLATE ANALYZERS WITH CHANNEL ELECTRON MULTIPLIERS FOR PARTICLE DETECTION WERE USED. ALTHOUGH NORMALLY EIGHT ANALYZERS WERE USED TO DETECT ELECTRONS AND TWO TO DETECT PROTONS, A COMPLEX ARRANGEMENT WITH FOUR SEPARATE HV SUPPLIES ALLOWED INDEPENDENT SWITCHING OF FOUR DETECTOR GROUPS. THE ANALYZING PLATE VOLTAGES COULD OPERATE IN A STEPPING MODE, A SWEEPING MODE, OR A CONSTANT-VOLTAGE MODE. IN ADDITION, THE TIME ACCUMULATION COULD BE VARYED WITH A NOMINAL FRAME DURATION OF 43 MS. HOWEVER, THIS DURATION COULD BE DECREASED BY A FACTOR OF FOUR AT THE EXPENSE OF OBTAINING DATA FROM CERTAIN DETECTORS IN THOSE CASES WHERE FAST TEMPORAL VARIATIONS WERE ENCOUNTERED IN THE LOSS CONE. THE ENERGY INTERVALS IN THE STEPPING MODE CONSISTED OF 32 ENERGY STEPS. THE EIGHT NORMAL ELECTRON ANALYZERS, WITH GEOMETRIC FACTOR (G) OF 3.E-4 SR CM-SR, CONSISTED OF FOUR NARROW-ANGLE (2 DEG X 2 DEG, DELTA 1/E OF 0.11) AND FOUR WIDE-ANGLE (8 DEG X 7.5 DEG, DELTA 1/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAD DELTA 1/E OF 0.15, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.E-3 SR CM-SR. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT RELIED HEAVILY ON REAL-TIME GROUND COMPUTER CONTROL.

----- ESA-GEOS 2, MARIANI

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-071A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MARIANI
OI - H. CANDIDI
OI - D.M. FAIRFIELD

U OF ROME
CNR, SPACE PLASMA LAB
NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLUXGATE MAGNETOMETER WAS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDED FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE THE MAIN COMPONENT OF THE FIELD COINCIDED WITH THE Z-AXIS OF THE INSTRUMENT, WHICH WAS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAD BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS FOR WHICH THE MAGNETIC FIELD COMPONENT WAS ONLY A FRACTION OF THE TOTAL FIELD AND WAS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MADE THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES WERE PLUS OR MINUS 60 NT (GAMMAS) AND PLUS OR MINUS 180 NT, RESPECTIVELY. IN Z-AXIS, WHERE THE FIELD WAS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION, A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 60 NT WAS USED. THE SIGNAL WAS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60 NT EACH, SUCH THAT A RANGE PLUS OR MINUS 480 NT WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 NT USING A 9-BIT DIGITIZATION WAS OBTAINED. THE NOISE LEVEL OF THE SENSORS WAS COMPARABLE TO THIS QUANTIZATION ERROR.

----- ESA-GEOS 2, MELZNER

INVESTIGATION NAME- DC ELECTRIC FIELD AND GRADIENT & ELECTRON BEAM DEFLECTION

NSSDC ID- 78-071A-08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MELZNER
OI - H. VOLK
OI - G. METZNER

MPI-EXTRATERM PHYS
MPI-NUCLEAR PHYS
MPI-EXTRATERM PHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS INVESTIGATION (ESA EXPERIMENT NO. 9-320) WAS THE MEASUREMENT OF THE DC ELECTRIC FIELD (E) IN THE PLANE PERPENDICULAR TO THE LOCAL MAGNETIC FIELD (B). THE INVESTIGATION ALSO MEASURED THE SPATIAL GRADIENT OF E IN THE VICINITY OF THE SPACECRAFT. WITH THIS DATA, A MAPPING OF THE ELECTRIC FIELDS IN THE EQUATORIAL MAGNETOSPHERE LINKED MAGNETICALLY TO THE AURORAL ZONES COULD BE ACHIEVED, AS WELL AS DETERMINING PLASMA CONVECTION AND PARTICLE FLOW WITHIN THE PLASMA SHEET. THE INSTRUMENT CONSISTED OF FOUR ELECTRON GUNS SPACED LOGARITHMICALLY FROM THE ELECTRON DETECTOR. TWO OF THE GUNS WERE MOUNTED ON ONE OF THE 3-M RADIAL BOOMS. THE GUNS WERE USED ONE AT A TIME TO GENERATE AN ELECTRON BEAM OF ABOUT 1.E-8 AMP AND ENERGY ABOUT 1 KEV. BOTH PARAMETERS WERE VARIED BY TELECOMMAND. DEFLECTION PLATES ASSOCIATED WITH EACH GUN RECEIVED A SINUSOIDAL SIGNAL FROM THE MAGNETOMETER INVESTIGATION TO INSURE THAT THE BEAM WAS ALWAYS AT RIGHT ANGLES TO B, IN SPITE OF THE ANGLE OF THE SPIN VECTOR TO B. THE ELECTRON DETECTOR CONSISTED OF DEFLECTION PLATES THAT REMOVED THE ELEVATION CORRECTION GIVEN TO THE BEAM BY THE MAGNETOMETER SIGNAL, A CURVED PLATE ENERGY FILTER, AND A PHOTOMULTIPLIER TUBE. BECAUSE THE MAXIMUM DISPLACEMENT OCCURRED WHEN THE BEAM MADE AN ANGLE OF 0 OR 180 DEG TO THE ELECTRIC FIELD, ALL POSSIBLE DISPLACEMENTS LESS THAN THIS OCCURRED TWICE DURING A SPIN PERIOD. CONSEQUENTLY, THE BEAM SWEEP ACROSS THE DETECTOR TWICE PER SPIN PERIOD, PROVIDED THE MAXIMUM DISPLACEMENT WAS LESS THAN THE DISTANCE BETWEEN THE GUN AND THE DETECTOR. THE VALUES OF THE SPIN ANGLE AT WHICH THE BEAM WAS DETECTED AFTER ONE GYRATION, AND THE DISTANCE BETWEEN THE GUN AND RECEIVER, ALLOWED THE DETERMINATION OF THE ELECTRIC FIELD. A POSSIBLE CONTRIBUTION FROM THE GRADIENT OF E COULD BE DETERMINED BY VARYING THE ENERGY OF THE BEAM. THE INVESTIGATION RELIED ENTIRELY ON REAL-TIME CONTROL BY A GROUND-BASED COMPUTER. IT HAS FOUR BASIC MODES OF OPERATION; SEARCH, ADJUSTMENT, OPTIMIZATION, AND NORMAL. THE SEARCH MODE WAS DESIGNED TO FIND THE SIGNAL AT NOMINAL BEAM PARAMETERS. IF THIS WAS NOT ACHIEVED, THE ADJUSTMENT MODE WAS USED TO VARY THESE PARAMETERS SYSTEMATICALLY. ONCE THE BEAM WAS DETECTED, THE OPTIMIZATION MODE DETERMINED THE BEST COMPROMISE BETWEEN BEAM CURRENT AND RECEIVED SIGNAL QUALITY. THEN THE NORMAL MODE STARTED, WHICH CONSISTED OF A CONTINUOUS MEASUREMENT OF THE ELECTRIC FIELD AND THE GRADIENT OF E, USING THE MOST APPROPRIATE OF THE FOUR GUNS.

----- ESA-GEOS 2, PEDERSEN

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 78-071A-07

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A. PEDERSEN
OI - D. JONES
OI - K. KNOTT
OI - R.J.L. GRAND

ESA-ESTEC
ESA-ESTEC
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20-M CABLE BOOMS, WHICH EXTENDED RADIALLY FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS AND COMPRISED PART OF THE ESA NO. 9-300 NAVI EXPERIMENT. THIS INVESTIGATION WAS CONCERNED WITH THE DC SINGLE AXIS ELECTRIC FIELD ANALYSIS. THE TWO OUTPUT SIGNALS WERE EVALUATED IN TERMS OF DC ELECTRIC FIELD AND CONDITIONED FOR FURTHER TREATMENT IN THE ANALYSIS OF AC ELECTRIC FIELDS. THE OUTPUT FROM ONE SPHERE WAS SIGNAL CONDITIONED ON A LINEAR SCALE; THE DIFFERENTIAL OUTPUT FROM THE TWO SPHERES WAS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS WERE PASSED THROUGH 450 HZ TO 77 KHZ FILTERS. THESE FILTERED SIGNALS WERE DIFFERENCED AND ALL THREE SIGNALS MADE AVAILABLE FOR ANALYSIS BY THE SWEEP-FREQUENCY ANALYZERS AND DIGITAL CORRELATOR AS PART OF 78-071A-05 (PETIT), -10 (JUNGSTRUP), AND -01 (DEGHIN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE WAS ABOUT 1.E-4 V/M AT DC AND 1.E-8 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, PETIT

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 78-071A-05

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - H. PETIT

CNET

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THIS INVESTIGATION (PART OF ESA EXPERIMENT NO. S-300) UTILIZED THE 20-M BOOMS (NORMAL TO THE SPACECRAFT SPIN AXIS) AS A DIPOLE ANTENNA, AND THE CARBON SPHERES (PART OF 70-071A-07, PROGRAM) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.5 TO 77 KHZ WERE EMPLOYED. ON TRANSMISSION OF A ULF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL WAS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDING THE SPECTRUM OF THE TRANSMITTED SIGNAL INCLUDED ONE OF THE RESONANCE FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY WAS INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ WERE TELEMETRED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDED AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.0, 5.0, OR 10.0 KHZ COULD BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 2, UNOSTRUP-----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS
NSSDC ID- 70-071A-10 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. UNOSTRUP DANISH SPACE RES INST

BRIEF DESCRIPTION

THIS INVESTIGATION WAS PART OF THE ESA NO. S-300 WAVE EXPERIMENT AND EMPLOYED THE FOUR MESH SPHERES MOUNTED AT THE END OF THE 2.0-M AXIAL BOOMS. DIFFERENTIAL MEASUREMENTS FROM THESE SENSORS PROVIDED THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 30 HZ TO 77 KHZ WERE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ WERE TELEMETRED DIRECTLY, AND AUTO- AND FOR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ WERE ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.0, 5.0, 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ WAS 1.0×10^{-6} V/M TIMES THE SQUARE ROOT OF Hz.

----- ESA-GEOS 2, MILKEN-----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE
DISTRIBUTION

NSSDC ID- 70-071A-01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B. MILKEN MPI-AERONAUTY
O1 - G. PFOTZER (RETIRED) MPI-AERONAUTY
O1 - E. KEPPLER MPI-AERONAUTY
O1 - A. KORTH MPI-AERONAUTY
O1 - J. MUNCH MPI-AERONAUTY

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-321) MEASURED THE ENERGY AND PITCH ANGLE DISTRIBUTION OF HIGHER ENERGY ELECTRONS AND PROTONS THAN THAT OF MULTIVIST (70-071A-04), AND WAS COMPLEMENTARY TO THAT INSTRUMENT. THE DETECTOR SYSTEM CONSISTED OF TWO SEPARATE MAGNETIC SPECTROMETERS FOR ELECTRONS WITH TWO PROTON TELESCOPES ASSOCIATED WITH EACH OF THE MAGNETS THAT FOCUSED THE ELECTRONS AWAY FROM THE PROTON DETECTORS. THERE WERE FIVE RECTANGULAR SOLID-STATE DETECTORS MOUNTED ALONG THE FOCAL LINE OF EACH SPECTROMETER TO MEASURE THE ELECTRONS. EACH SPECTROMETER COVERED AN ANGULAR APERTURE IN ELEVATION ANGLE (RELATIVE TO THE SPIN AXIS) OF 60 DEG. THE TWO DEFLECTION MAGNETS WERE POSITIONED SO THAT ELEVATION ANGLES (REFERRED TO THE SPIN AXIS) FROM 10 TO 120 DEG. ON 10 DEG CENTERS, WERE COVERED FOR ELECTRONS, GIVING ELEVATION ANGLES OF 23, 46, 69, AND 106 DEG FOR THE PROTON TELESCOPES. THESE TELESCOPES CONSISTED OF A FRONT, SURFACE-BARRIER DETECTOR AND A REAR, SOLID-STATE DETECTOR. ELECTRON ENERGIES FROM 30 TO 200 KEV AND PROTON ENERGIES FROM 0.04 TO 1.4 MEV WERE COVERED. THE EFFECTIVE ANGULAR APERTURE FOR PROTONS WAS 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS WAS 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF 1.0×10^{-4} CM²/SR WERE FIVE FOR PROTONS AND ONE FOR ELECTRONS. A 12-CHANNEL PULSE-HEIGHT ANALYZER (PHA) FOR PROTONS COULD BE USED FOR ANY ONE OF THE FOUR FRONT DETECTORS. PROVIDED A FRONT-REAR COINCIDENCE IS DETECTED, AND A 19-CHANNEL PHA CAN BE USED FOR ANY ONE OF THE 19 ELECTRON DETECTORS. THE SINGLES RATE FOR ONE OF THE FOUR PROTON DETECTORS AND THE COINCIDENCE RATE FROM ONE OF THE FOUR PROTON TELESCOPES COULD BE SELECTED. THERE WERE THREE MODES FOR DATA SELECTION -- MODE 0, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR ALL 10 DETECTORS; MODE 1, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR FOUR DETECTORS -- GOOD TIME RESOLUTION OF INTEGRAL RATES; AND MODE 2, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS -- GOOD TIME RESOLUTION FOR ENERGY SPECTRA. THE MINIMUM TIME FOR A COMPLETE SPECTRUM WAS 600 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS WAS 43 MS. THE SPECTRAL MEASUREMENTS HAD A RESOLUTION OF $\Delta E/E = 0.25$.

----- ESA-GEOS 2, WRENN-----

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 70-071A-02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - G.L. WRENN U COLLEGE LONDON
O1 - G.L.P. DOVO U COLLEGE LONDON
O1 - K. NORMAN U COLLEGE LONDON
O1 - W.J. RAITT UTAH STATE U

BRIEF DESCRIPTION

THE INSTRUMENT (ESA EXPERIMENT NO. S-302) EMPLOYED TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS MOUNTED ON ONE OF THE LOCKING BOOMS FOR THE MEASUREMENT OF ELECTRONS OR PROTONS OVER THE RANGE 0.5 TO 500 EV ARRIVING CLOSE TO PARALLEL AND CLOSE TO PERPENDICULAR TO THE LOCAL MAGNETIC FIELD. THE ENERGY RANGE WAS COVERED IN 64 STEPS WITH A RELATIVE ENERGY RESOLUTION OF 0.11. ONE ANALYZER HAD ITS APERTURE POINTING ALONG THE NEGATIVE (Z) SPIN AXIS WITH AN OPENING ANGLE OF 10 DEG X 10 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF 0.8×10^{-4} CM²/SR. THE OTHER ANALYZER MADE AN ANGLE OF 100 DEG WITH RESPECT TO THE +Z AXIS WITH AN OPENING ANGLE OF 8 DEG X 30 DEG PROVIDING A G OF 5.8×10^{-4} CM²/SR. BOTH DETECTORS HAD TO MEASURE THE SAME TYPE OF PARTICLES AT THE SAME TIME. THE COLLIMATORS OF THESE INSTRUMENTS COULD BE SET AT ANY VOLTAGE FROM -20 TO +32 V IN STEPS OF 0.1 V TO COMPENSATE FOR THE POTENTIAL DIFFERENCE BETWEEN THE INSTRUMENT AND THE UNDISTURBED PLASMA ENVIRONMENT. THIS VOLTAGE DETERMINED THE SPACECRAFT POTENTIAL.

----- GEOS 3-----

SPACECRAFT COMMON NAME- GEOS 3
ALTERNATE NAMES- GEODETIC SATELLITE-C, GEOS-C

NSSDC ID- 70-0274

LAUNCH DATE- 04/09/75 WEIGHT- 340. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/10/75
ORBIT PERIOD- 101.02 MIN INCLINATION- 114.96 DEG
PERIAPSIS- 839. KM ALT APOAPSIS- 853. KM ALT

PERSONNEL
MG - C.J. FINLEY NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PS - H.R. STANLEY NASA-UFC

BRIEF DESCRIPTION

THE SPACECRAFT WAS AN OCTAHEDRON, TOPPED BY A TRUNCATED PYRAMID, WITH A PARABOLIC REFLECTOR FOR A RADAR ALTIMETER ON THE FLAT BOTTOM SIDE. A METAL RIBBON BOOM WITH END MASS EXTENDED UPWARD APPROXIMATELY 6.1 M FROM THE TOP OF THE PYRAMID. PASSIVE LASER RETROREFLECTOR CUBES WERE MOUNTED IN A RING AROUND THE PARABOLIC REFLECTOR WITH THE NORMAL VECTOR FROM EACH CUBE FACING 45 DEG OUTWARD FROM THE EARTH DIRECTION OF THE BOOM AXIS. A TURNSTILE ANTENNA FOR VHF AND UHF FREQUENCIES AND SEPARATE ANTENNAS FOR EARTH-VIEWING, 324-MHZ DOPPLER, C-BAND, AND S-BAND TRANSpondERS WERE MOUNTED SEPARATELY ON FLAT SURFACES NEXT TO THE PARABOLIC REFLECTOR. THE DIMENSION ACROSS THE PLATE OF THE OCTAHEDRON WAS 1.22 M, AND THE SPACECRAFT WAS 1.11-M HIGH. THE MISSION PROVIDED THE STEPPING STONE BETWEEN THE NATIONAL GEODETIC SATELLITE PROGRAM (NGSP) AND THE EARTH AND OCEAN PHYSICS APPLICATION PROGRAM. IT PROVIDED DATA TO REFINE THE GEODETIC AND GEOPHYSICAL RESULTS OF THE NGSP AND SERVED AS A TEST FOR NEW SYSTEMS. MISSION OBJECTIVES WERE TO PERFORM A SATELLITE ALTIMETRY EXPERIMENT IN ORBIT, TO SUPPORT FURTHER THE CALIBRATION AND POSITION DETERMINATION OF NASA AND OTHER AGENCY C-BAND RADAR SYSTEMS, AND TO PERFORM A SATELLITE-TO-SATELLITE TRACKING EXPERIMENT WITH THE ATS 6 SPACECRAFT USING AN S-BAND TRANSDUCER SYSTEM. THIS SYSTEM WAS ALSO USED FOR PERIODIC GEOS 3 TELEMETRY DATA DELAY THROUGH ATS 6, TO SUPPORT FURTHER THE INTERCOMPARISON OF TRACKING SYSTEMS, TO INVESTIGATE THE SOLID-EARTH DYNAMIC PHENOMENA THROUGH PRECISION LASER TRACKING, TO REFINE FURTHER ORBIT DETERMINATION TECHNIQUES AND DETERMINE INTERPLANETARY TIES AND GRAVITY MODELS, AND TO SUPPORT THE CALIBRATION AND POSITION DETERMINATION OF NASA-SP-1N S-BAND TRACKING STATIONS.

----- GEOS 3, ANDERLE-----

INVESTIGATION NAME- US NAVY DOPPLER SYSTEM

NSSDC ID- 75-027A-05 INVESTIGATIVE PROGRAM
CODE BR

INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - R.J. ANDERLE USN SURFACE WEAPNS CTR

BRIEF DESCRIPTION
THE DOPPLER TECHNIQUE OF TIMING AND MEASURING THE FREQUENCY SHIFT OF RADIO TRANSMISSIONS FROM A MOVING SPACECRAFT WAS USED TO OBTAIN DATA THAT FURTHER ESTABLISHED THE STRUCTURE OF THE EARTH'S GRAVITATIONAL FIELD THROUGH THE COMPARISON OF NEW WITH ESTABLISHED GEODETIC MEASUREMENTS. TWO TRANSMITTERS WERE OPERATED AT FREQUENCIES OF 162 AND 324 MHz. THE DUAL FREQUENCIES WERE CONCURRENTLY RELATED AND UTILIZED IN CONJUNCTION WITH GROUND DOPPLER RECEIVING STATIONS TO OBTAIN PRECISION SATELLITE RANGE-RATE DATA. THE DUAL FREQUENCIES WERE GENERATED BY A HIGHLY STABLE OSCILLATOR DRIVING TWO FREQUENCY MULTIPLIERS. BOTH FREQUENCIES WERE USED SIMULTANEOUSLY TO PROVIDE COMPARISON DATA OF THE EFFECT OF THE IONOSPHERE ON THE SIGNALS, WHICH WERE TO CORRECT THE DATA FOR THIS ERROR SOURCE. THIRTEEN OR MORE FIRED GROUND RECEIVING STATIONS OPERATED BY THE U.S. NAVY DOPPLER TRACKING NETWORK (TRANET) AND 12 PORTABLE GEOCEIVERS OPERATED BY THE U.S. ARMY, U.S. NAVY, AND U.S. AIR FORCE -- ALL UNDER THE DIRECTION OF THE DEFENSE MAPPING AGENCY (DMA) -- WERE EXPECTED TO BE IN OPERATION. OBSERVATIONS MADE FROM THREE OR MORE KNOWN STATIONS ALLOWED DEDUCTION OF ORBITAL PARAMETERS. RANGE-RATE DATA FROM EITHER THE FIRED STATIONS OR THE GEOCEIVERS WERE ESTIMATED TO BE ACCURATE WITHIN 0.5 CM/S.

----- GEOS 3, GALICINAO-----

INVESTIGATION NAME- SATELLITE-TO-SATELLITE TRACKING
NSDDC ID- 75-027A-06 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - I.V. GALICINAO NASA-65FC

BRIEF DESCRIPTION
THE SATELLITE-TO-SATELLITE TRACKING (SST) SYSTEM USED CONSISTED OF: (1) THE GROUND-BASED APPLICATION TECHNOLOGY SATELLITE RANGING (ATS) SYSTEM (MODIFIED FOR SATELLITE-TO-SATELLITE TRACKING), (2) THE WIDEBAND COMMUNICATION TRANSPONDER ON THE ATS 6 GEOSYNCHRONOUS SPACECRAFT, AND (3) THE RANGING TRANSPONDER ON THE LOW-ORBITING SATELLITE.

----- GEOS 3, JACKSON-----

INVESTIGATION NAME- C-BAND SYSTEM
NSDDC ID- 75-027A-03 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - E.B. JACKSON NASA-WFC

BRIEF DESCRIPTION
THE C-BAND TRANSPONDER SUBSYSTEM CONSISTED OF TWO TRANSPONDERS, ONE THE GEOS 2 NONCOHERENT TYPE AND THE OTHER A COHERENT C-BAND TRANSPONDER. THE NONCOHERENT TRANSPONDER PROVIDED FOR RANGE AND ANGLE MEASUREMENTS, WHILE THE COHERENT TRANSPONDER PROVIDED FOR BOTH RANGE, RANGE-RATE, AND ANGLE MEASUREMENTS. BOTH TRANSPONDERS RECEIVED SIGNALS AT 5690 MHz. THE COHERENT TRANSPONDER TRANSMITTED AT 5690 MHz WHILE THE NONCOHERENT TYPE TRANSMITTED AT 5765 MHz. EACH C-BAND TRANSPONDER TRANSMITTED ONE PULSE FOR EACH CODED GROUP OF PULSES TRANSMITTED BY A GROUND TRACKING C-BAND RADAR. THE INTERNAL DELAY BETWEEN THE RECEIVED GROUND TRANSMITTED PULSE CODE AND THE TRANSPONDER TRANSMITTED PULSE WAS CALIBRATED PRIOR TO LAUNCH. EACH TRANSPONDER (WHILE OPERATING SEPARATELY OR SIMULTANEOUSLY) OPERATED IN EITHER STANDBY OR OVERRIDE MODE. IN STANDBY, THE RECEIVER BECAME OPERATIONAL AFTER APPROXIMATELY 60 S OF INTERROGATION OR LONG ENOUGH FOR THE OUTPUT TUBE TO WARM UP. IN OVERRIDE, THE OUTPUT TUBE FILAMENT WAS ENERGIZED BY THE EXTERNAL COMMAND AND THE WARM-UP DELAY CIRCUIT BYPASSED AFTER THE TUBE WARMED UP, THUS ALLOWING THE TRANSPONDER TO RESPOND IMMEDIATELY TO INTERROGATION SIGNALS. THIS OVERRIDE MODE REDUCED GROUND COMMAND REQUIREMENTS AND CONSERVED SPACECRAFT POWER.

----- GEOS 3, PURDY-----

INVESTIGATION NAME- RADAR ALTIMETER SYSTEM
NSDDC ID- 75-027A-01 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - C.L. PURDY NASA-WFC

BRIEF DESCRIPTION
THE RADAR-ALTIMETER EXPERIMENT WAS THE HIGHEST PRIORITY EXPERIMENT ON GEOS 3. THE OBJECTIVES WERE TO DETERMINE THE FEASIBILITY AND UTILITY OF A SPACEBORNE RADAR ALTIMETER FOR MAPPING THE TOPOGRAPHY OF THE OCEAN SURFACE WITH AN ABSOLUTE ACCURACY WITHIN 5 M, AND WITH A RELATIVE ACCURACY OF 1 TO 2 M, TO DETERMINE THE FEASIBILITY OF MEASURING THE DEFLECTION OF THE VERTICAL AT SEA, TO DETERMINE THE FEASIBILITY OF MEASURING WAVE HEIGHT, AND TO CONTRIBUTE TO THE TECHNOLOGY LEADING TO A FUTURE OPERATIONAL ALTIMETER-SATELLITE SYSTEM WITH A 10-CM MEASUREMENT CAPABILITY. TO MEET THE EXPERIMENT OBJECTIVES, THE ALTIMETER HAD TWO DISTINCT DATA GATHERING MODES -- A LONG-PULSE ALTIMETER DATA MODE AND A SHORT-PULSE MODE. PERFORMANCE CAPABILITIES AND OPERATING CHARACTERISTICS OF THE ALTIMETER DIFFERED FOR THE TWO MODES. BOTH MODES OPERATED ON A 13.9-GHZ FREQUENCY, USED A PARABOLIC ANTENNA, HAD A MAXIMUM RANGE ACQUISITION TIME OF 6 S, AND HAD AN ALTITUDE GRANULARITY OF PLUS OR MINUS 0.2 M. DIFFERING CHARACTERISTICS WERE: (1) ALTITUDE DATA RATE FOR LONG PULSE WAS 2 READINGS/S AND FOR SHORT PULSE 6 READINGS/S, AND (2) INPUT POWER FOR LONG PULSE WAS 50 W, FOR SHORT PULSE 100 W. THE GEOS 3 RADAR ALTIMETER HAD SEVERAL FEATURES IN COMMON WITH THE ALTIMETER USED ON THE SKYLAB SATELLITE, BUT HAD ADVANTAGES OVER THE SKYLAB ALTIMETER BECAUSE OF IMPROVED ACCURACY AND ABILITY TO OPERATE OVER EXTENDED AREAS FOR GREATER PERIODS OF TIME, THEREBY PROVIDING THE CAPABILITY TO EXAMINE THE EARTH OVER LONGER ARCS AND OBSERVE EXTENSIVE OCEAN AREAS.

----- GEOS 3, SALZBERG-----

INVESTIGATION NAME- S-BAND TRACKING SYSTEM
NSDDC ID- 75-027A-02 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - E.M. SALZBERG NASA-65FC

BRIEF DESCRIPTION
THE S-BAND TRANSPONDER SUBSYSTEM PROVIDED METRIC TRACKING DATA (RANGE, RANGE-RATE). IT TRANSMITTED TELEMETRY DATA BUT DID NOT RECEIVE COMMANDS. THE TRANSPONDER OPERATED IN THE FOLLOWING THREE MODES: (1) SATELLITE-TO-SATELLITE TRACKING (SST) FROM THE ROSMAN OR EUROPEAN ATS GROUND STATIONS THROUGH ATS 6 TO GEOS 3 AND BACK, (2) DIRECT USE (DOPPLER ONLY) GROUND STATION TRACKING OF GEOS 3, AND (3) DIRECT GROUND STATION TRACKING OF GEOS 3. THE TRANSPONDER SUBSYSTEM CONSISTED OF A SINGLE-CHANNEL TRANSPONDER, A POWER AMPLIFIER, A DIPLER, AND AN EARTH-VIEWING AND ATS-VIEWING ANTENNA SYSTEM. THE ANTENNAS WERE SELECTABLE BY GROUND COMMAND. THE EARTH-VIEWING ANTENNA FOR DIRECT TRACKING WITH THE USG AND GROUND GROUND STATIONS HAD APPROXIMATELY HEMISPHERICAL COVERAGE AND A MINIMUM OF 8 DB GAIN WITHIN 60 DEG OF THE SPACECRAFT Z AXIS. THE SST ANTENNA SYSTEM CONSISTED OF AN IN-TRACK ARRAY THAT PROVIDED A 3-DB GAIN IN THE DIRECTION OF ATS FOR GEOS ASCENDING AND DESCENDING NODE PASSES, WHICH CROSSED THE EQUATOR WITHIN PLUS OR MINUS 76 DEGREES OF THE ATS SUBSATELLITE POINT. IN THE SST OPERATION MODE, THE INTERROGATION SIGNAL WAS FIRST TRANSMITTED AT C-BAND BY THE ATS GROUND STATION TO THE ATS 6 SPACECRAFT. ATS 6 INSTRUMENTATION CONCURRENTLY ALTERED THE SIGNAL, MAKING IT COMPATIBLE WITH THE INPUT FREQUENCY (2069.1125 MHz) OF THE S-BAND TRANSPONDER ON GEOS 3, AND TRANSMITTED THE SIGNAL TO GEOS 3. GEOS 3 THEN, AFTER TRANSLATING THE RECEIVED SIGNAL, RETRANSMITTED IT TO ATS 6 AS IF ATS 6 WERE ANOTHER GROUND STATION. ATS 6 THEN RETRANSMITTED THE SIGNAL TO THE ATS GROUND STATION AT C-BAND. RANGE SUM AND RANGE-RATE SUM WERE OBTAINED BY COMPARING THE INTERROGATION AND RESPONSE SIGNALS. THE S-BAND ON GEOS 3 WAS ALSO TRACKED BY THE USG AND GROUND STATION STATIONS. CARRIER FREQUENCIES (2069.1125 MHz UP AND 2247 MHz DOWN) WERE IDENTICAL TO THOSE OF THE SST MODE. COHERENT GROUND TRACKING WAS ACCOMPLISHED VIA STANDARD GROUND RANGING SIDE TONES. USG TRACKING CONSISTED ONLY OF COHERENT-CARRIER DOPPLER TRACKING. THE S-BAND TRANSPONDER WAS A SINGLE-CHANNEL TRANSPONDER; THEREFORE, SIMULTANEOUS OPERATION WAS NOT POSSIBLE.

----- GEOS 3, STEPHANIDES-----

INVESTIGATION NAME- LASER TRACKING REFLECTOR
NSDDC ID- 75-027A-04 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - C.C. STEPHANIDES NASA-65FC

BRIEF DESCRIPTION
LASER CORNER REFLECTORS, COMPOSED OF 270 (MINIMUM) 35-MM CUBES, AND GROUND-BASED LASER SYSTEMS WERE USED TO OBTAIN PRECISE SATELLITE TRACKING INFORMATION. THE APPLIED PHYSICS LABORATORY PROVIDED THE LASER CUBE REFLECTOR PANELS. THE CUBES WERE CONFIGURED ON THE LATERAL SURFACE OF A CONIC FRUSTUM, WITH THE LATERAL SURFACE OF THE FRUSTUM ADJOINING THE BOTTOM, EARTH-ORIENTED SURFACE OF THE SPACECRAFT AT A 45-DEG ANGLE. THE BASE OF THE FRUSTUM MEASURED APPROXIMATELY 0.9 METERS IN DIAM. WHEN ILLUMINATED BY A LASER LIGHT PULSE FROM THE GROUND, EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTED THE LIGHT RAY BACK TO A SPECIAL TELESCOPE RECEIVER ON THE GROUND. THE REFLECTED LIGHT WAS PICKED UP BY THE TELESCOPE AND THE OPTICAL

IMPULSES CONVERTED TO AN ELECTRICAL SIGNAL. A DIGITAL COUNTER RECORDED THE TIME WHEN THE LIGHT BEAM WAS RETURNED TO THE GROUND. THE TOTAL TRAVEL TIME OF THE LIGHT PULSES, FROM GROUND TO SATELLITE AND BACK TO THE GROUND, MEASURED THE DISTANCE TO THE SATELLITE, THUS FORMING THE BASIS OF THE SATELLITE OPTICAL LASER SYSTEM. THE FOLLOWING OBSERVATIONAL SYSTEMS ACQUIRED THE NECESSARY DATA -- NASA/MALLOPS LASER RANGING SYSTEMS, SAO LASER RANGING SYSTEMS, GSFC LASER RANGING SYSTEMS, AND OTHER NATIONAL AND INTERNATIONAL LASER STATIONS AS DETERMINED.

***** GMS*****

SPACECRAFT COMMON NAME- GMS
ALTERNATE NAMES- GEOSTATION.METEOROL.SAT.

NSSDC ID- 77-065A

LAUNCH DATE- 07/14/77 WEIGHT- 647. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
JAPAN NASA
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/15/77
ORBIT PERIOD- 1429.4 MIN INCLINATION- 0.0 DEG
PERIAPSIS- 35531. KM ALT APOAPSIS- 35779. KM ALT

PERSONNEL
PI - N. KODAIRA METEOROL SATELLITE CTR
PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GEOSTATIONARY METEOROLOGICAL SATELLITE (GMS) WAS JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPTIC GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (TO INCLUDE TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA SERVED AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT WAS HOPED THAT DETERMINATION COULD BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT WAS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE WAS COVERED WITH SOLAR CELLS WHICH COULD PROVIDE 225 W. THE SATELLITE WAS SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE WAS POSITIONED NEAR 140 DEG E AND DESIGNED TO OPERATE FOR 5 YEARS.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 77-065A-01 INVESTIGATIVE PROGRAM APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE VISIBLE IR SPIN-SCAN RADIOMETER (VISSR) WAS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1. IT MADE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR, PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30 MIN INTERVALS. THE VISIBLE CHANNEL HAD A RESOLUTION OF ABOUT 1.25 KM AND THE IR CHANNEL HAD A RESOLUTION OF ABOUT 5 KP AT NADIR. REAL-TIME TRANSMISSION WAS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

----- GMS, JMA STAFF-----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- 77-065A-03 INVESTIGATIVE PROGRAM APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GMS INCLUDED A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT WERE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS, KOMNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 77-065A-02 INVESTIGATIVE PROGRAM APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. KOMNO METEOROL RES INST

BRIEF DESCRIPTION
THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVED THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV) AND SOLAR ELECTRONS (GREATER THAN 2 MEV) WERE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GOES 1*****

SPACECRAFT COMMON NAME- GOES 1
ALTERNATE NAMES- SMS-C, GOES-A
GOES-1

NSSDC ID- 75-100A

LAUNCH DATE- 10/16/75 WEIGHT- 631. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/17/75
ORBIT PERIOD- 1412.0 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 34165. KM ALT APOAPSIS- 36458. KM ALT

PERSONNEL
PI - R.W. PICKARD NASA-GSFL
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
GOES 1 (SMS-C) WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE INFRARED, SPIN SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY AND NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICAL SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 85 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT. ON DECEMBER 1, 1978 RESPONSIBILITY FOR GOES 1 WAS TURNED OVER TO ESA WHO USED IT AS PART OF GARP. IT WAS STATIONED OVER THE INDIAN OCEAN AND CONTROLLED BY ESOC IN DARMSTADT, FRG. IN DECEMBER, 1979, IT WAS PLACED UNDER THE CONTROL OF NOAA AND POSITIONED AT 135 DEG W.

----- GOES 1, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-100A-01 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 315 K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WALLPOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD.

----- GOES 1, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-100A-05 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL, GROUND-BASED APT RECEIVER STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS FOR CONTACT IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPES AND VARIETIES OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-100A-02 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH HAVING A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE APPLICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN PARTICLE-TYPE/ENERGY MEASUREMENTS. SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 50 MEV. SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV. ONE CHANNEL MEASURED ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-100A-03 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27 E-AM BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27 E-3M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5- TO 3-A.

----- GOES 1, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-100A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

A SHORT BOOM DEPLOYED (ABOUT .61 M) BIAXIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS MEASURED THE MAGNETIC FIELD AT SYNCHRONOUS ALTITUDE. EACH SENSOR HAD A SELECTABLE RANGE (.450, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-LIGHT CALIBRATION CAPABILITY.

***** GOES 2*****

SPACECRAFT COMMON NAME- GOES 2
ALTERNATE NAMES- GOES-B

NSSDC ID- 77-048A

LAUNCH DATE- 06/16/77 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/21/77
ORBIT PERIOD- 1436. MIN INCLINATION- 0.88 DEG
PERIAPSIS- 35266. KM ALT APOAPSIS- 36304. KM ALT

PERSONNEL
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 2 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER

ORIGINAL PAGE IS
OF POOR QUALITY

PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT.

----- GOES 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 77-048A-05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (MEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 77-048A-02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS: SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.8 MEV.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 77-048A-03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAS A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAD A 1.27E-3 M BERYLLIUM WINDOW FOR MEASUREMENT OF X RAYS IN THE WAVELENGTH RANGE 0.5-TO 3-A.

----- GOES 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 77-048A-04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WAS A BIAXIAL, CLOSED-LOOP, FLUNGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** GOES 3*****

SPACECRAFT COMMON NAME- GOES 3
ALTERNATE NAMES- 10952, GOES-C

NSSDC ID- 78-062A

LAUNCH DATE- 06/16/78 WEIGHT- 294. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/17/78
ORBIT PERIOD- 1450.8 MIN INCLINATION- 1.7 DEG
PERIAPSIS- 35469.1 KM ALT APOAPSIS- 36679.2 KM ALT

PERSONNEL
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 3 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SRAV FLUXES AND MAGNETIC FIELDS. THE CYLINDRICAL-SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED ORBIT.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 78-062A-01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
O1 - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON GOES 3 WAS CAPABLE OF PROVIDING BOTH DAY AND NIGHT OBSERVATIONS OF CLOUD COVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. BOTH THE INFRARED CHANNEL (10.5 TO 12.5 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH

THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 10.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEPED THE EARTH, WITH A GROUND RESOLUTION OF 8.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 100 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.0 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WILLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER,' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REDBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL TYPE DATA, THE VISSR DATA WERE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING.

----- GOES 3, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 78-062A-05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WIFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 78-062A-02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE-HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURING PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURING ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURING ELECTRONS GREATER THAN 2.0 MEV.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 78-062A-03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS COULD BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN WAS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH KENON AT 1.5 TO 2 ATM, AND HAD A 1.27E-3 M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5 TO 3-A.

----- GOES 3, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 78-062A-04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE MAGNETOMETER WAS A BIANIAL, CLOSED-LOOP, FLUXGATE MAGNETOMETER WITH THE TWO SENSORS ALIGNED AT RIGHT ANGLES TO ONE ANOTHER. AFTER MOUNTING ON A SHORT BOOM (ABOUT .61 M), ONE SENSOR WAS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAD A SELECTABLE RANGE (50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** HAKUCHO*****

SPACECRAFT COMMON NAME- HAKUCHO
ALTERNATE NAMES- COSMIC RADIATION SAT B, CORSA-B
11272

NSSDC ID- 79-014A

LAUNCH DATE- 02/21/79 WEIGHT- 100. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3C

SPONSORING COUNTRY/AGENCY ISAS
JAPAN

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/22/79
ORBIT PERIOD- 96. MIN INCLINATION- 29.9 DEG
PERIAPSIS- 545. KM ALT APOAPSIS- 577. KM ALT

PERSONNEL
PM - N. ODA U OF TOKYO
PS - S. HAYAKAWA NAGOYA U

BRIEF DESCRIPTION
THE COSMIC RADIATION SATELLITE, HAKUCHO, HAD THE SHAPE OF AN OCTAGONAL RIGHT PRISM WITH A MAXIMUM WIDTH OF 80 CM AND A HEIGHT OF 65 CM. THE SPACECRAFT WAS SPIN-STABILIZED WITH A SPIN RATE OF 5 RPM. THE SPIN AXIS WAS MANEUVERED BY MEANS OF MAGNETIC TORQUING TOWARDS THE CELESTIAL OBJECTS TO BE OBSERVED. X-RAY DETECTORS LOOKED PARALLEL AND PERPENDICULAR TO THE SPIN AXIS, OBSERVING X-RAY SOURCES OVER A WIDE ENERGY RANGE WITH SHORT TIME RESOLUTION.

----- HAKUCHO, MAKINO-----

INVESTIGATION NAME- DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES

NSSDC ID- 79-014A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - F. MAKINO NAGOYA U
PI - Y. TANAKA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT SURVEYED THE SKY AND MONITORED TRANSIENT SOFT X-RAY SOURCES IN THE ENERGY RANGE 0.1 TO 2 KEV BY MEANS OF GAS-FLOW-TYPE PROPORTIONAL COUNTERS WITH THIN POLYPROPYLENE WINDOWS.

----- HAKUCHO, MIYAMOTO-----

INVESTIGATION NAME- MONITOR OF X-RAY SOURCES

NSSDC ID- 79-014A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S. MIYAMOTO OSAKA CITY U
PI - Y. OGAWARA U OF TOKYO
PI - I. KONDO U OF TOKYO
PI - M. YOSHIMORI RIKKYO U

BRIEF DESCRIPTION
THIS EXPERIMENT LOCATED AND MONITORED X-RAY BURST SOURCES OVER THE ENERGY RANGE 1 TO 100 KEV USING ROTATING MODULATION COLLIMATORS.

***** HCMR*****

SPACECRAFT COMMON NAME- HCMR
ALTERNATE NAMES- SATS, APPL EXPL MISSION A
HEAT CAPACITY MAP MSH, AEM-A
1981B

NSSDC ID- 78-041A

LAUNCH DATE- 04/26/78 WEIGHT- 117. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY NASA-OSTA
UNITED STATES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GECENTRIC EPOCH DATE- 04/27/78
ORBIT PERIOD- 96.7 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 598. KM ALT APOAPSIS- 646. KM ALT

PERSONNEL
MG - D.S. DILLER NASA HEADQUARTERS
SC - B.B. SCHARDT NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - J.C. PRICE NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVE OF THE HEAT CAPACITY MAPPING MISSION (HCMR) WAS TO PROVIDE COMPREHENSIVE, ACCURATE, HIGH SPATIAL RESOLUTION THERMAL SURVEYS OF THE SURFACE OF THE EARTH. THE SPACECRAFT WAS SPIN STABILIZED AT A RATE OF 14 RPM. THE HCMR CIRCULAR SUN-SYNCHRONOUS ORBIT ALLOWED THE SPACECRAFT TO SENSE SURFACE TEMPERATURE NEAR THE MAXIMUM AND MINIMUM OF THE DIURNAL CYCLE. THE ORBIT HAD AN ASCENDING DAYLIGHT MODE WITH NOMINAL EQUATORIAL CROSSING TIME OF 2:00 PM, AND PROVIDED A 1:30 PM TO 2:30 AM CROSSING TIME OVER MIDDLE NORTHERN LATITUDES. THE ORBIT ALSO ALLOWED FOR REFLECTANCE MEASUREMENTS DURING DAYLIGHT PASSES.

----- HCMR, BARNES-----

INVESTIGATION NAME- HEAT CAPACITY MAPPING RADIOMETER

NSSDC ID- 78-041A-01 INVESTIGATIVE PROGRAM
CCDE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - W.L. BARNES NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE HEAT CAPACITY MAPPING RADIOMETER (HCMR) WERE AS FOLLOWS -- (1) TO PRODUCE THERMAL MAPS AT THE OPTIMUM TIMES FOR MAKING THERMAL INERTIA STUDIES FOR DISCRIMINATION OF ROCK TYPES AND MINERAL RESOURCES LOCATION, (2) TO MEASURE PLANT CANOPY TEMPERATURES AT FREQUENT INTERVALS TO DETERMINE THE TRANSPIRATION OF WATER AND PLANT LIFE, (3) TO MEASURE SOIL MOISTURE EFFECTS BY OBSERVING THE TEMPERATURE CYCLE OF SOILS, (4) TO MAP THERMAL EFFLUENTS, BOTH NATURAL AND MAN-MADE, (5) TO INVESTIGATE THE FEASIBILITY OF GEOTHERMAL SOURCE LOCATION BY REMOTE SENSING, AND (6) TO PROVIDE FREQUENT COVERAGE OF SNOW FIELDS FOR WATER RUNOFF PREDICTION. THE HCMR TRANSMITTED ANALOG DATA IN REAL TIME TO SELECTED RECEIVING STATIONS. IT WAS DESIGNED TO PROVIDE ACCURATE, HIGH SPATIAL RESOLUTION THERMAL MAPS OF THE SURFACE OF THE EARTH AT AN OPTIMUM TIME FOR DETERMINATION OF THERMAL INERTIA. THE HIGH THERMAL RESOLUTION DATA WERE ALSO USED TO MAP THERMAL GRADIENTS IN BODIES OF WATER. THE RADIOMETER WAS SIMILAR TO THE HIGH-RESOLUTION SURFACE COMPOSITION MAPPING RADIOMETER (HRSCMR) OF NIMBUS 5 (72-097A). THE HCMR HAD A SMALL INSTANTANEOUS GEOMETRIC FIELD OF VIEW (LESS THAN 1 BY 1 MILLIRADIANS), HIGH RADIOMETRIC ACCURACY, AND A WIDE ENOUGH SWATH COVERAGE ON THE GROUND SO THAT SELECTED AREAS WERE COVERED WITHIN THE 12-H PERIOD CORRESPONDING TO THE MAXIMUM AND MINIMUM OF TEMPERATURE OBSERVED. THE INSTRUMENT OPERATED IN TWO CHANNELS, 10.5 TO 12.5 MICROMETERS (IR) AND 0.8 TO 1.1 MICROMETERS (VISIBLE). THE LATTER CHANNEL WAS MATCHED TO THE ERTS-1 (72-058A) BAND 4. THE INSTRUMENT UTILIZED A RADIATION COOLER TO COOL THE TWO HE-CD-TE DETECTORS TO 100 DEG K. THE EXPERIMENT INCLUDED AN ANALOG MULTIPLEXER THAT ACCEPTED THE ANALOG OUTPUT OF EACH DETECTOR AND MULTIPLEXED THEM IN A FORM SUITABLE FOR TRANSMISSION BY THE SPACECRAFT S-BAND TRANSMITTER. THE DATA WERE AVAILABLE THROUGH THE EROS DATA CENTER, SIOUX FALLS, SD. MORE COMPLETE INFORMATION CAN BE FOUND IN SMITH, S.R. 'APPLICATIONS EXPLORER MISSIONS (AEM) MISSION PLANNER'S HANDBOOK.'

***** HEAD 2*****

SPACECRAFT COMMON NAME- HEAD 2
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-B, 11101
HEAD-B, EINSTEIN

NSSDC ID- 78-103A

LAUNCH DATE- 11/13/78 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY NASA-OSS
UNITED STATES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GECENTRIC EPOCH DATE- 11/14/78
ORBIT PERIOD- 94.0 MIN INCLINATION- 23.5 DEG
PERIAPSIS- 465. KM ALT APOAPSIS- 476. KM ALT

PERSONNEL
MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - F.A. SPEER NASA-GSFC
PS - S.S. HOLT NASA-GSFC

BRIEF DESCRIPTION
THIS SECOND MISSION WAS A POINTING MISSION PROVIDING MORE DETAILED INFORMATION ABOUT PREVIOUSLY IDENTIFIED X-RAY SOURCES. A LARGE GRAZING-INCIDENCE X-RAY TELESCOPE PROVIDED IMAGES OF SOURCES THAT WERE THEN ANALYZED BY INTERCHANGEABLE INSTRUMENTS AT THE FOCAL PLANE OF THE TELESCOPE. THE TELESCOPE COLLECTED X-RAYS OVER AN ANGULAR RANGE OF APPROXIMATELY 1 DEG X 1 DEG, WITH THE FOCAL PLANE INSTRUMENTS DETERMINING THE LIMITING RESOLUTION FOR EACH MEASUREMENT. THESE INSTRUMENTS INCLUDED A SOLID-STATE X-RAY DETECTOR, A CURVED-CRYSTAL BRAGG SPECTROMETER, AN IMAGING PROPORTIONAL COUNTER, AND A CHANNEL-PLATE IMAGING ARRAY. IN ADDITION, A MONITOR PROPORTIONAL COUNTER VIEWED THE SKY ALONG THE TELESCOPE AXIS. THE SCIENTIFIC OBJECTIVES WERE TO -- (1) ACCURATELY LOCATE AND EXAMINE X-RAY SOURCES IN THE ENERGY RANGE 0.2 TO 4.0 KEV WITH HIGH RESOLUTION; (2) PERFORM HIGH-SPECTRAL-SENSITIVITY MEASUREMENTS WITH BOTH HIGH- AND LOW-DISPERSION SPECTROGRAPHS; (3) PERFORM HIGH-SENSITIVITY MEASUREMENTS OF TRANSIENT X-RAY BEHAVIOR. THE SAME TYPE OF SPACECRAFT USED FOR HEAD 1 WAS EMPLOYED; I.E., A SIX-SIDED STRUCTURE 5.68 M HIGH AND 2.67 M IN DIAMETER. DOWNLINK TELEMETRY WAS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF TWO TAPE-RECORDER SYSTEMS. AN ATTITUDE-CONTROL-AND-DETERMINATION SUBSYSTEM WAS USED TO POINT AND MANEUVER THE SPACECRAFT. GYROs, SUN SENSORS, AND STAR TRACKERS WERE EMPLOYED AS SENSING DEVICES.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- MONITOR PROPORTIONAL COUNTER

NSSDC ID- 78-103A-01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H.D. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED A MONITOR COUNTER AS A SUPPORT INSTRUMENT FOR CALIBRATION AND NORMALIZATION OF THE FOCAL-PLANE INSTRUMENTATION. IT WAS USED TO (1) NORMALIZE INTENSITY FLUCTUATIONS DURING SPECTROMETER OBSERVATIONS, (2) OBSERVE THE CONTINUUM DURING SPECTRAL LINE OBSERVATIONS, AND (3) CALIBRATE CERTAIN INSTRUMENTS IN FLIGHT.

----- HEAD 2, GIACCONI-----

INVESTIGATION NAME- HIGH-RESOLUTION IMAGER

NSSDC ID- 78-103A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO
OI - H.D. TANANBAUM SAO
OI - G.W. CLARK MASS INST OF TECH
OI - S.S. HOLT NASA-GSFC
OI - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO (1) DETECT AND ACCURATELY LOCATE X-RAY SOURCES FROM 0.2 TO 4.0 KEV, (2) STUDY THE STRUCTURE OF OBJECTS LARGER THAN 2 ARC S, AND (3) MEASURE THE INTENSITY AND TEMPORAL CHARACTERISTICS OF INDIVIDUAL SOURCES. THIS INSTRUMENT WAS A CHANNEL-PLATE IMAGING ARRAY OF DETECTORS WITH A PIXEL SIZE CORRESPONDING TO APPROXIMATELY 2 ARC S.

----- HEAO 2, GIACCONI-----

INVESTIGATION NAME- CURVED-CRYSTAL BRAGG X-RAY

NSSDC ID- 78-103A-03 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL

PI - R. GIACCONI SAO
O1 - H.D. TANANBAUM SAO
O1 - G.W. CLARK MASS INST OF TECH
O1 - S.S. HOLT NASA-GSFC
O1 - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO SEARCH FOR X-RAY SPECTRAL-LINE EMISSIONS ARISING FROM THE SELECTED CELESTIAL OBJECTS. THE SEARCH WAS LIMITED TO THE ENERGY LEVEL FROM 0.1R TO 3 KEV. THE INSTRUMENT WAS A CURVED-CRYSTAL BRAGG SPECTROMETER USING THE FOLLOWING SIX CRYSTALS: LEAD STEARATE AND LEAD LAURATE, WHICH GAVE RESOLUTIONS IN LAMBDA/Delta LAMBDA OF 50-100; TAP, 70-200; PET, 100-500; RAP, 150-1000; AND ADP, 200-1000. THE X-RAY LINES WERE DETECTED BY A THIN-WINDOW, POSITION-SENSITIVE PROPORTIONAL COUNTER.

----- HEAO 2, GIACCONI-----

INVESTIGATION NAME- IMAGING PROPORTIONAL COUNTER

NSSDC ID- 78-103A-04 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL

PI - R. GIACCONI SAO
O1 - H.D. TANANBAUM SAO
O1 - G.W. CLARK MASS INST OF TECH
O1 - S.S. HOLT NASA-GSFC
O1 - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE (1) TO SURVEY X-RAY SOURCES OF AN EXTENDED NATURE IN THE ENERGY RANGE FROM 0.1 TO 4 KEV, WHERE RESOLUTION OF 1 ARC MIN WAS SUFFICIENT, (2) TO STUDY THE ANGULAR STRUCTURE OF EXTENDED SOURCES, (3) TO SURVEY FOR WEAK SOURCES, AND (4) TO LOCATE OBJECTS WITH POORLY KNOWN POSITIONS.

----- HEAO 2, GIACCONI-----

INVESTIGATION NAME- SOLID-STATE X-RAY DETECTOR

NSSDC ID- 78-103A-05 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL

PI - R. GIACCONI SAO
O1 - H.D. TANANBAUM SAO
O1 - G.W. CLARK MASS INST OF TECH
O1 - S.S. HOLT NASA-GSFC
O1 - R. NOVICK COLUMBIA U

BRIEF DESCRIPTION

THIS INSTRUMENT WAS A COOLED SOLID-STATE SPECTROMETER AND WAS USED TO DETECT WEAK SOURCES AND WEAK SPECTRAL FEATURES OVER A BROAD BAND OF ENERGIES BY EMPLOYING A NONDISPERSIVE SPECTRAL TECHNIQUE. A LITHIUM-DRIFTED, SOLID-STATE DETECTOR WAS OPERATED AT A TEMPERATURE OF 120 DEG K. THE PRIMARY DETECTOR WAS 6 MM IN DIAMETER AND WAS SURROUNDED BY TWO VETO GUARD COUNTERS. A TWO-STAGE SOLID CRYOGEN REFRIGERATOR WAS USED TO COOL THE DETECTOR. SPECTRAL MEASUREMENTS WERE MADE BETWEEN 0.5 AND 4 KEV, WITH A RESOLUTION FROM 120 TO 150 EV, FWHM AND AN EFFICIENCY GREATER THAN 0.9.

***** HEAO 3*****

SPACECRAFT COMMON NAME- HEAO 3
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS3, 11532

NSSDC ID- 79-0B2A

LAUNCH DATE- 09/20/79 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSG

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN
PERIAPSIS- 486.4 KM ALT

EPOCH DATE- 09/21/79
INCLINATION- 43.6 DEG
APOAPSIS- 504.9 KM ALT

PERSONNEL

MG - R.E. HALPERN NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PH - F.A. SPEER NASA-NSFC
PS - T.A. PARNELL NASA-NSFC

BRIEF DESCRIPTION

THIS THIRD MISSION PERFORMS A SKY SURVEY OF GAMMA RAYS AND COSMIC RAYS IN A MANNER SIMILAR TO HEAO 1. IT HAS A HIGHER ORBITAL INCLINATION THAN THE PREVIOUS MISSIONS IN THIS SERIES SINCE THE PAYLOAD CONSISTS PRIMARILY OF COSMIC-RAY INSTRUMENTATION; GREATER COSMIC-RAY FLUX OCCURS NEAR THE EARTH'S MAGNETIC POLES. THE SCIENTIFIC OBJECTIVES OF THE MISSION ARE TO -- (1) DETERMINE THE ISOTOPIIC COMPOSITION OF THE MOST ABUNDANT COMPONENTS OF THE COSMIC-RAY FLUX WITH ATOMIC MASS BETWEEN 7 AND 56, AND THE FLUX OF EACH ELEMENT WITH ATOMIC NUMBER (Z) BETWEEN Z = 4 AND Z = 50; (2) SEARCH FOR SUPER-HEAVY NUCLEI UP TO Z = 120, AND MEASURE THE COMPOSITION OF THE NUCLEI WITH Z .GT. 20; (3) STUDY INTENSITY, SPECTRUM, AND TIME BEHAVIOR OF X-RAY AND GAMMA-RAY SOURCES BETWEEN 0.06 AND 10 MEV, AND MEASURE ISOTROPY OF THE DIFFUSE X-RAY AND GAMMA-RAY BACKGROUND; AND (4) PERFORM AN EXPLORATORY SEARCH FOR X- AND GAMMA-RAY LINE EMISSIONS. THE NORMAL OPERATING MODE IS A CONTINUOUS CELESTIAL SCAN ABOUT THE Z-AXIS (WHICH NOMINALLY POINTS TO THE SUN).

----- HEAO 3, ISRAEL-----

INVESTIGATION NAME- HEAVY NUCLEI

NSSDC ID- 79-0B2A-03 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) COSMIC RAYS HIGH ENERGY ASTROPHYSICS

PERSONNEL

PI - M.H. ISRAEL WASHINGTON U
PI - E.C. STONE CALIF INST OF TECH
PI - C.J. WADDINGTON U OF MINNESOTA
O1 - W.R. BINNS MCDONNELL-DOUGLAS CORP
O1 - J. KLARMANN WASHINGTON U
O1 - R.E. VOGT CALIF INST OF TECH

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE THE CHARGE SPECTRUM OF COSMIC-RAY NUCLEI OVER THE NUCLEAR CHARGE RANGE FROM 17 TO 120 IN THE ENERGY INTERVAL 0.3- TO 10-GEV/NUCLEON TO CHARACTERIZE COSMIC RAY SOURCES, PROCESSES OF SYNTHESIS, AND PROPAGATION MODES. THE DETECTOR CONSISTS OF A DOUBLE-ENDED INSTRUMENT OF UPPER AND LOWER Hodoscopes AND THREE DUAL-GAP ION CHAMBERS. THE TWO ENDS ARE SEPARATED BY A CERENKOV RADIATOR. THE GEOMETRICAL FACTOR IS 4 SQ CM-SR. THE ION CHAMBERS CAN RESOLVE CHARGE TO 0.24 CHARGE UNITS AT LOW ENERGY AND 0.39 CHARGE UNITS AT HIGH ENERGY AND HIGH Z. THE CERENKOV COUNTER CAN RESOLVE 0.3 TO 0.4 CHARGE UNITS.

----- HEAO 3, JACOBSON-----

INVESTIGATION NAME- GAMMA-RAY LINE SPECTROMETER

NSSDC ID- 79-0B2A-01 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) GAMMA-RAY ASTRONOMY X-RAY ASTRONOMY

PERSONNEL

PI - A.S. JACOBSON NASA-JPL
O1 - J.R. ARNOLD U OF CALIF, SAN DIEGO
O1 - A.E. METZGER NASA-JPL
O1 - L.E. PETERSON U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THE BASIC GOALS OF THIS EXPERIMENT ARE TO SEARCH FOR GAMMA-RAY LINE EMISSIONS ARISING FROM A VARIETY OF SOURCE PHENOMENA. PARTICULAR EMPHASIS IS PLACED ON FINDING LINE EMISSIONS FROM NUCLEOSYNTHESIS PROCESSES IN SUPERNOVAE, AND FROM POSITRON-ELECTRON ANNIHILATION AND NUCLEAR REACTIONS IN LOW-ENERGY COSMIC RAYS. IN ADDITION, CAREFUL STUDY IS MADE OF THE SPECTRAL AND TIME VARIATIONS OF KNOWN HARD X-RAY SOURCES. THE EXPERIMENT IS CAPABLE OF MEASURING GAMMA-RAY LINES FALLING WITHIN THE ENERGY INTERVAL FROM 0.06 TO 10 MEV, AND WITH AN ENERGY RESOLUTION BETTER THAN 2.5 KEV AT 1.33 MEV AT A LINE SENSITIVITY FROM 1.E-4 TO 1.E-5 PHOTONS/SQ CM/S, DEPENDING ON THE ENERGY. THE EXPERIMENTAL PACKAGE CONTAINS FOUR COOLED DRIFTED GERMANIUM DETECTORS SHIELDED BY CESIUM IODIDE. THE KEY EXPERIMENTAL PARAMETERS ARE -- (1) GEOMETRY FACTOR OF 11.1 SQ CM-SR, (2) A FIELD OF VIEW OF 27 DEG FWHM AND, (3) A TIME RESOLUTION OF LESS THAN 0.1 MS FOR THE GERMANIUM DETECTOR AND 10 S FOR THE CESIUM IODIDE DETECTOR.

ORIGINAL PAGE IS OF POOR QUALITY

----- HEAO 3, KOCH-----

INVESTIGATION NAME- ISOTOPIIC COMPOSITION OF COSMIC RAYS

NSSDC ID- 79-082A-04 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - L. KOCH CENS
PI - B. PETERS DANISH SPACE RES INST
OI - J.J. ENGLERAN CENS
OI - M. CANTIN CENS
OI - A. SOUTOUL CENS
OI - P. MASSE CENS
OI - P. MESTREAU CENS
OI - N. LUND DANISH SPACE RES INST
OI - I. RASMUSSEN DANISH SPACE RES INST
OI - B. BYRNAN DANISH SPACE RES INST
OI - N.J. WESTERGARD DANISH SPACE RES INST
OI - M. ROTHENBERG DANISH SPACE RES INST
OI - Y. RIO CENS
OI - M. PETROU CENS
OI - P. GORED CENS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES THE RELATIVE COMPOSITION OF THE ISOTOPES OF THE PRIMARY COSMIC RAYS BETWEEN BERYLLIUM AND IRON (Z FROM 4 TO 26) AND THE ELEMENTAL ABUNDANCES UP TO TIN (Z=50). CERENKOV COUNTERS AND MUDOSCOPES TOGETHER WITH THE EARTH'S MAGNETIC FIELD FORM A SPECTROMETER. THEY DETERMINE CHARGE AND MASS OF COSMIC RAYS TO A PRECISION OF 10 PERCENT FOR THE MOST ABUNDANT ELEMENTS OVER THE MOMENTUM RANGE FROM 2 TO 25 GEV/C.

***** HELIOS-A*****

SPACECRAFT COMMON NAME- HELIOS-A
ALTERNATE NAMES- HELIO-A, PL-741A
HELIOS 1

NSSDC ID- 74-097A
LAUNCH DATE- 12/10/74 WEIGHT- 371.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
FED REP OF GERMANY BRWF
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 01/16/75
ORBIT PERIOD- 190.15 DAYS INCLINATION- 0.02 DEG
PERIAPSIS- 0.3095 AU RAD APOAPSIS- 0.985 AU RAD

PERSONNEL
MG - E.J. MONTOYA NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - A. KUTZER GES FUR WELTRAUMFORSCH
PH - G.W. OUSLEY NASA-GSFC
PS - M. PORSCHE DFVLR
PS - J.H. TRAINOR NASA-GSFC

BRIEF DESCRIPTION
THIS SPACECRAFT WAS ONE OF A PAIR OF DEEP SPACE PROBES DEVELOPED BY THE FEDERAL REPUBLIC OF GERMANY (FRG) IN A COOPERATIVE PROGRAM WITH NASA. EXPERIMENTS WERE PROVIDED BY SCIENTISTS FROM BOTH FRG AND THE U.S. NASA SUPPLIED THE TITAN/CENTAUR LAUNCH VEHICLE. THE SPACECRAFT WAS EQUIPPED WITH TWO BOOMS AND A 32-M ELECTRIC DIPOLE. THE PAYLOAD CONSISTED OF A FLUXGATE MAGNETOMETER, ELECTRIC AND MAGNETIC WAVE EXPERIMENTS, WHICH COVERED VARIOUS BANDS IN THE FREQUENCY RANGE 6 HZ TO 3 MHZ; CHARGED PARTICLE EXPERIMENTS, WHICH COVERED VARIOUS ENERGY RANGES STARTING WITH SOLAR WIND THERMAL ENERGIES AND EXTENDING TO 1 GEV; A ZODIACAL LIGHT EXPERIMENT; AND A MICROMETEOROID EXPERIMENT. THE PURPOSE OF THE MISSION WAS TO MAKE PIONEERING MEASUREMENTS OF THE INTERPLANETARY MEDIUM FROM THE VICINITY OF THE EARTH'S ORBIT TO 0.3 AU. THE SPIN AXIS WAS NORMAL TO THE ECLIPTIC, AND THE NOMINAL SPIN RATE WAS 1 RPS. THE OUTER SPACECRAFT SURFACE WAS DIELECTRIC, EFFECTIVELY (BECAUSE OF THE SHEATH POTENTIAL) RAISING THE LOW-ENERGY THRESHOLD FOR THE SOLAR WIND PLASMA EXPERIMENT TO AS HIGH AS 100 EV. ALSO, SHEATH-RELATED COUPLING CAUSED BY THE SPACECRAFT ANTENNAE PRODUCED INTERFERENCE WITH THE WAVE EXPERIMENTS. THE SPACECRAFT WAS CAPABLE OF BEING OPERATED AT BIT RATES FROM 4096 TO 8 BPS, VARIABLE BY FACTORS OF TWO. WHILE THE SPACECRAFT WAS MOVING TO PERIHELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT THE HIGHEST BIT RATE. BECAUSE OF A DEPLOYMENT FAILURE OF ONE AXIS OF THE 32-M, TIP-TO-TIP, DIPOLE ANTENNA, ONE AXIS WAS SHORTED, CAUSING THE ANTENNA TO FUNCTION AS A MONOPOLE. THE MAJOR EFFECT OF THIS ANOMALY WAS TO INCREASE THE EFFECTIVE INSTRUMENT THRESHOLDS, AND TO INTRODUCE ADDITIONAL UNCERTAINTIES IN THE EFFECTIVE ANTENNA LENGTH. INSTRUMENT DESCRIPTIONS WRITTEN BY THE EXPERIMENTERS WERE PUBLISHED (SOME IN GERMAN, SOME IN ENGLISH) IN THE JOURNAL 'RAUMFAHRTFORSCHUNG', VOL. 19, NO. 5, SEPT. 1975.

----- HELIOS-A, FECHTIG-----

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 74-097A-12 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
INTERPLANETARY DUST

PERSONNEL
PI - H. FECHTIG MPI-NUCLEAR PHYS
OI - J. WEINRAUCH MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION
THE PURPOSE OF THE EXPERIMENT (E10) WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER -- (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUTOFF FOR SMALL PARTICLES IS DEPENDENT ON THE DISTANCE FROM THE SUN, BECAUSE SOLAR PRESSURE INCREASES NEARER THE SUN, AND (3) THE NUMBER DENSITIES OF PARTICLES CHANGE NEAR THE ORBITS OF PLANETS. THE KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/S) CAUSED THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD WAS THEN SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. THE MASS AND THE ENERGY OF THE DUST PARTICLES WAS DETERMINED FROM THE IMPULSE HEIGHTS. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET ALLOWED THE SMALL ION CLOUD TO BE ANALYZED. IN THIS WAY THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES BECAME POSSIBLE. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WAS ABOUT 1.E-15 G. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 G. FOR PARTICLES LARGER THAN 1.E-13 G, A MASS SPECTRUM WAS GATHERED. FOR FURTHER DETAILS, SEE PP 265-269 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- 74-097A-04 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.A. GURNETT U OF IOWA
OI - P.J. KELLOGG U OF MINNESOTA
OI - S.J. BAUER NASA-GSFC
OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (ESA) SHARED THE 32 M, TIP-TO-TIP ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 16-CHANNEL SPECTRUM ANALYZER WITH APPROXIMATELY LOGARITHMICALLY SPACED CENTER FREQUENCIES, 16 LOG COMPRESSORS, 16 R-C INTEGRATORS FOR AVERAGING THE LOG COMPRESSED ELECTRIC FIELD AMPLITUDE BETWEEN READOUTS, AND 16 PEAK DETECTORS WHICH WERE RESET AFTER READOUT. THE 16 AVERAGES AND 16 PEAK LOG VALUES WERE SAMPLED ALMOST SIMULTANEOUSLY. THE CHANNELS COVERED THE FREQUENCY RANGE OF ABOUT 20 HZ TO 200 KHZ, WITH FOUR CHANNELS PER DECADE OF FREQUENCY. THE LOG COMPRESSORS HAD A DYNAMIC RANGE OF 100 DB. SAMPLING RATE DEPENDED IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL TIME TELEMETRED RATE WAS FOR 16 AVERAGES AND 16 PEAK VALUES TO BE SAMPLED EVERY 1.125 S. WHENEVER A VERY STRONG SIGNAL WAS DETECTED IN A PRE-SELECTED CHANNEL, THE SHOCK ALARM DATA MODE WAS INITIATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND TERMINATING AFTER THE TRIGGERING SIGNAL TIME. THE MAXIMUM SAMPLING RATE OF THE SPECTRUM DATA IN THIS MODE WAS 14.2 SAMPLES PER S FOR EACH CHANNEL. ONE HALF OF THE DIPOLE ANTENNA FAILED TO EXTEND PROPERLY AND WAS SHORT CIRCUITED TO THE SPACECRAFT GROUND. THE RESULTANT CONFIGURATION WAS THAT OF A MONOPOLE WHICH WAS CALCULATED TO HAVE AN EFFECTIVE LENGTH OF APPROXIMATELY 8 M. THE PRIMARY DETRIMENTAL EFFECTS WERE THE LOSS OF 6 DB IN E FIELD SENSITIVITY DUE TO THE SHORTENED ANTENNA AND THE INCREASE IN THE 178 KHZ CHANNEL BY 25 DB. SOLAR CELL AND SHEATH EFFECTS CAUSED INTERFERENCE IN THE LOWEST 6 CHANNELS (WHICH WAS LESS SEVERE WITH INCREASING CHANNEL FREQUENCY). FOR MORE DETAILS, SEE J. GEOPHYS. RES., 82, P 632, 1975, AND P 245-247 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, GURNETT-----

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- 74-097A-05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT
 OI - P.J. KELLOGG
 OI - S.J. BAUER
 OI - R.G. STONE

U OF IOWA
 U OF MINNESOTA
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (ESD) SHARED THE 32 M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -06. INSTRUMENTATION CONSISTED OF THREE TUNABLE PLASMA WAVE RECEIVERS, A FIXED-FREQUENCY WIDEBAND RECEIVER, AND A WAVE FORM SAMPLER. THE TUNABLE RECEIVERS AND WIDEBAND RECEIVER PROVIDED DATA FOR DIRECT TELEMETRY TO EARTH. EACH OF THE TUNABLE RECEIVERS COVERED A DIFFERENT FREQUENCY BAND IN THE RANGE 1 HZ TO 200 KHZ. THE HIGH FREQUENCY RECEIVER HAD 96 FREQUENCY SETTINGS SEPARATED BY ABOUT 4 PERCENT AND COVERED THE FREQUENCY RANGE 6.4 KHZ TO 205 KHZ. THE MID-RANGE RECEIVER HAD 48 FREQUENCY SETTINGS SEPARATED BY ABOUT 8 PERCENT AND COVERED THE RANGE 208 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION AND COVERED THE RANGE 11 HZ TO 309 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDED IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SHOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVE FORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS, THE MOST RAPID BEING 2.2 MS. ONE HALF OF THE ELECTRIC DIPOLE FAILED TO DEPLOY PROPERLY, AND BECAME SHORT CIRCUITED TO GROUND. THE RESULTING CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF ABOUT 8 M. THIS RESULTED IN A 6 DB LOSS IN SENSITIVITY, AND AN INCREASED RECEIVER NOISE LEVEL, PARTICULARLY AT LOW FREQUENCIES. IN ADDITION, THE HIGH-GAIN TELEMETRY ANTENNA PRODUCED ADDITIONAL INTERFERENCE. FOR A MORE DETAILED DISCUSSION, SEE P 248 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, GURNETT -----

INVESTIGATION NAME- 50-KHZ TO 2-PHZ RADIO WAVE

NSSDC ID- 74-097A-06

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 RADIO PHYSICS
 PARTICLES AND FIELDS
 SCALAR PHYSICS

PERSONNEL

PI - D.A. GURNETT
 OI - P.J. KELLOGG
 OI - R.R. WEBER
 OI - R.G. STONE

U OF IOWA
 U OF MINNESOTA
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (ESC) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUNDANT) 16-FREQUENCY CHANNEL RADIOMETER, WITH APPROXIMATELY LOGARITHMICALLY SPACED CHANNELS, WAS USED TO DETECT TYPE III RADIO EMISSIONS ASSOCIATED WITH SOLAR FLARE EVENTS IN THE FREQUENCY BAND 26.5 KHZ TO 3 MHZ. THE EXPERIMENT SAMPLING RATE WAS SYNCHRONIZED SUCH THAT EACH SPACECRAFT REVOLUTION WAS DIVIDED INTO 32 SECTORS. THE SEQUENCE AND FREQUENCY OF SAMPLING DEPENDED ON THE INSTRUMENT OPERATIONAL MODE (ONE OF FOUR) AND THE SPACECRAFT BIT RATE. THE MOST RAPID SAMPLING POSSIBLE FOR A SINGLE FREQUENCY CHANNEL WAS ONCE EVERY 1/32 OF A SATELLITE SPIN PERIOD, OR ABOUT .05 S. A TYPICAL SAMPLING SEQUENCE WAS FOR ONE FREQUENCY CHANNEL TO BE SAMPLED FOR 16 SECTORS (1/2 REVOLUTION), FOLLOWED BY THE NEXT. ONE-HALF OF THE 32-M DIPOLE FAILED TO EXTEND PROPERLY DURING DEPLOYMENT, AND WAS SHORTED TO GROUND. THE RESULTING ANTENNA CONFIGURATION WAS THAT OF A MONOPOLE WITH AN OPERATIONAL EFFECTIVE LENGTH OF ABOUT 8 M. THIS SHORTER CONFIGURATION RESULTED IN INCREASED RADIO FREQUENCY INTERFERENCE (RFI) OF FROM 3 TO 30 DB ABOVE EXPECTED LEVELS, AND A LOSS OF 6 DB IN GAIN. ANOTHER PROBLEM WAS UNEXPECTED INTERFERENCE WITH THE HIGH-GAIN TELEMETRY ANTENNA. THIS ADDED 60 DB RFI AT 27.5 KHZ, DECREASING WITH INCREASING FREQUENCY, SO THAT ABOVE 200 KHZ IT PRODUCED NO DETECTABLE INTERFERENCE. FOR MORE DETAILS ABOUT THE INSTRUMENT AND MODES OF OPERATION, SEE P 250 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, KEPPLER -----

INVESTIGATION NAME- ENERGETIC ELECTRON DETECTOR

NSSDC ID- 74-097A-10

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL

PI - E. KEPPLER
 OI - B. WILKEN
 OI - D.J. WILLIAMS

MPI-AERONOMY
 MPI-AERONOMY
 NOAA-ERL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (EB) WAS TO STUDY THE ORIGIN AND THE DISTRIBUTION MECHANISM OF LOW-ENERGY ELECTRONS AND PROTONS. THE INSTRUMENT, A MAGNETIC SPECTROMETER, CONSISTED OF SIX SEMICONDUCTOR DETECTORS WITH THE FIELD OF VIEW IN THE PLANE OF THE ECLIPTIC. SPECIES SEPARATION WAS ACHIEVED BY AN INHOMOGENEOUS MAGNETIC FIELD ORIENTED PERPENDICULAR TO THE PARTICLE PATH. FOUR ELECTRON AND TWO PROTON DETECTORS MEASURED ELECTRONS FROM 20 TO 1000 KEV AND PROTONS FROM 80 TO 1000 KEV. THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGIC. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF "RAUMFAHRTFORSCHUNG," 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, KUNDT -----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 74-097A-14

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 CELESTIAL MECHANICS

PERSONNEL

PI - W. KUNDT
 OI - W.G. RELOOMARE

U OF HAMBURG
 NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE TRACKING DATA TO OBTAIN A DETAILED SPACECRAFT ORBIT AND IMPROVED KNOWLEDGE OF THE ORBITAL ELEMENTS OF THE EARTH-MOON SYSTEM AND GENERAL RELATIVITY PARAMETERS.

----- HELIOS-A, KUNOW -----

INVESTIGATION NAME- COSMIC-RAY PARTICLES

NSSDC ID- 74-097A-07

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL

PI - H. KUNOW
 OI - G.M. WIDDERENZ
 OI - G. GREEN
 OI - M. MUELLER-MELLIN
 OI - M. WITTE
 OI - H. MENPE

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT (E6) WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .67, 1.3 MEV/NUCLEON, AND ELECTRONS .67, 0.5 MEV WERE MEASURED WITHIN INTERPLANETARY SPACE OVER THE RANGE FROM 0.5 TO 1.0 AU. THE INSTRUMENT, A PARTICLE TELESCOPE WITH A 85-DEG FIELD OF VIEW, CONSISTED OF FIVE SEMICONDUCTOR DETECTORS, ONE SAPPHIRE CERENKOV COUNTER, AND ONE SCINTILLATION COUNTER, ALL ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE TELESCOPE WAS CALIBRATED PRIOR TO LAUNCH USING RADIOACTIVE SOURCES, PARTICLE ACCELERATORS, AND GROUND-LEVEL MUONS. IT MEASURED PROTONS AND ALPHA PARTICLES IN SIX CHANNELS (1.5-3.5, 3.5-13, 13-27, 27-37, 37-45, AND .67, 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .67, 4 MEV). FOR MORE DETAIL SEE PP 253-257 OF "RAUMFAHRTFORSCHUNG," 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-A, LEINERT -----

INVESTIGATION NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- 74-097A-11

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 INTERPLANETARY PHYSICS
 ZODIACAL LIGHT

PERSONNEL

PI - C. LEINERT
 OI - E. PITZ

MPI-ASTRONOMIE
 MPI-ASTRONOMIE

BRIEF DESCRIPTION

THIS EXPERIMENT (E9) CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS OBSERVED THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, AND VISUAL BANDS. THE PURPOSE OF THIS EXPERIMENT WAS TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES. FOR FURTHER DETAILS, SEE PP 264-267 OF "RAUMFAHRTFORSCHUNG," 19, 5, SEPT./OCT. 1975.

----- HELIOS-A, NESS-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- 74-097A-02

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - M.F. NESS
OI - F. MARIANI
OI - L.F. BURLAGA
OI - S.C. CANTARANO

NASA-GSFC
U OF ROME
NASA-GSFC
CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (E3) CONSISTED OF A BOOM-MOUNTED, TRIAXIAL-FLUXGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTED THE OPTIMUM OF FOUR RANGES THAT WERE MINUS TO PLUS 16, 48, 144, AND 432 NT PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.03, 0.09, 0.28, AND 0.84 NT. A SENSOR FLIPPER WAS ACTUATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 BPS, VECTOR MEASUREMENTS WERE MADE AT RATES BETWEEN 1 AND 16 PER S, DEPENDING ON BIT RATE. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS

NSSDC ID- 74-097A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - A. MAIER

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THE INSTRUMENT (E2) CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED ON A 2.75-M BOOM TO MAKE MAGNETIC FIELD MEASUREMENTS UP TO 4 HZ. DATA FROM EACH AXIS WERE FIRST SENT THROUGH A LOW-PASS FILTER WITH THE 3 DB ATTENUATION POINT AT 4 HZ. DEPENDING ON THE TELEMETRY FORMAT AND BIT RATE, THE DATA WERE FED EITHER INTO A TIME-AVERAGING COMPUTER OR DIRECTLY CONNECTED TO TELEMETRY. A SHOCK IDENTIFICATION COMPUTER TRIGGERED THE STORAGE OF RAPID RATE DATA IN THE SPACECRAFT MEMORY WHEN THERE WERE DISCONTINUITIES IN THE VARIATIONS OF THE AMBIENT MAGNETIC FIELD. TWO MEASUREMENT RANGES WERE USED, PLUS OR MINUS 100 AND 400 NT WITH RESOLUTIONS OF PLUS OR MINUS 0.2 AND 0.8 NT, RESPECTIVELY. THE INSTRUMENT WAS EQUIPPED WITH A FLIPPER MECHANISM, WHICH RE-ORIENTED EACH SENSOR BY 90 DEG PERIODICALLY. FOR DETAILED INFORMATION, SEE P 232 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, NEUBAUER-----

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- 74-097A-03

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.M. NEUBAUER
OI - G. DENHLE

BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT (E4) WAS DESIGNED TO INVESTIGATE THE MAGNETIC COMPONENT OF ELECTROMAGNETIC WAVES IN THE SOLAR WIND FROM 0.3 TO 1.0 AU. BY MEANS OF ITS WAVEFORM CHANNEL (WFC) THE RAPID VARIATIONS OF THE MAGNETIC FIELD WERE MEASURED UP FROM PLUS OR MINUS 8.75 NT TO PLUS OR MINUS 275 NT IN THREE ORTHOGONAL DIRECTIONS FROM 4 TO 128 HZ. A SPECTRUM ANALYZER OBSERVED THE FIELD COMPONENTS IN THE ECLIPTIC PLANE AND PERPENDICULAR TO IT, TO OBTAIN THE POWER SPECTRAL DENSITY AND PEAK VALUES FOR EIGHT LOGARITHMICALLY SPACED CHANNELS IN THE RANGE FROM 4.7 TO 2200 HZ. BECAUSE OF THE LARGE AMOUNT OF DATA PRODUCED BY THIS EXPERIMENT, AN ADAPTIVE DATA REDUCTION WAS APPLIED. FOR INTERESTING TIME INTERVALS SELECTED BY THE FLUXGATE MAGNETOMETER (74-097A-01, NEUBAUER) OR GURNETT (-04), WAVEFORM DATA COULD BE READ INTO AN ON-BOARD MEMORY AT A RAPID RATE TO BE TRANSMITTED SLOWLY AFTERWARDS. FOR MORE DETAILED INFORMATION SEE P 241 IN "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, ROSENBAUER-----

INVESTIGATION NAME- PLASMA DETECTORS

NSSDC ID- 74-097A-09

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - M.R. ROSENBAUER
OI - M. BELLKOFER
OI - J.H. WOLFE

MPI-AERONOMY
MPI-EXTRATERR PHYS
NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT (E1) EMPLOYED THREE PLASMA ANALYZERS FOR POSITIVE IONS AND ONE FOR ELECTRONS. ALL DETECTORS WERE MOUNTED NORMAL TO THE SPIN AXIS. POSITIVE IONS WITH ENERGY PER CHARGE WITHIN THE RANGE 0.155 TO 15.32 KEV/Q WERE MEASURED IN TWO ANGULAR DIMENSIONS USING A COMBINATION OF A HEMISPHERICAL, A QUADRISPHERICAL, AND A SINUSOIDALLY SHAPED ELECTROSTATIC ANALYZER. ELECTRONS WITH ENERGY FROM 0.5 TO 1660 EV WERE MEASURED WITH A HEMISPHERICAL ELECTROSTATIC ANALYZER IN ONE DIMENSION. THE EXPERIMENT OPERATED IN SEVERAL MODES WITH DIFFERING TIME RESOLUTION DEPENDING IN DETAIL ON TELEMETRY FORMAT AND SATELLITE BIT RATE. TYPICAL TIME RESOLUTION WAS ON THE ORDER OF A MINUTE. ALSO, WHENEVER THE SPECIAL SHOCK ALARM MODE WAS TRIGGERED BY EXPERIMENTS -04 OR -01, HIGH TIME RESOLUTION PLASMA DATA FOR A PERIOD BEFORE AND AFTER THE EVENT WAS RECORDED INTO SPACECRAFT MEMORY FOR LATER TRANSMISSION. BECAUSE THE SPACECRAFT BODY WAS DIELECTRIC, SHEATH POTENTIALS OF UP TO 100 EV DEGRADED THE USEFULNESS OF DATA TAKEN IN THE LOWER ELECTRON ENERGY CHANNELS. THIS PHENOMENON WAS JUDGED TO HAVE MINIMAL EFFECTS ON THE USEFULNESS OF THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-A, TRAINOR-----

INVESTIGATION NAME- GALACTIC AND SOLAR COSMIC RAYS

NSSDC ID- 74-097A-08

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. TRAINOR
OI - E.C. ROELOF
OI - B.J. TEEGARDEN
OI - F.B. McDONALD
OI - K.G. MCCracken

NASA-GSFC
APPLIED PHYSICS LAB
NASA-GSFC
NASA-GSFC
CSIRO

BRIEF DESCRIPTION

THE DETECTOR COMPLEMENT OF THIS EXPERIMENT (E7) CONSISTED OF THREE SEPARATE DELTA E/Delta X VS E TELESCOPES AND A PROPORTIONAL COUNTER FOR MONITORING SOLAR X RAYS IN THE RANGE 2-8 KEV. THE HIGH ENERGY TELESCOPE HAD A GEOMETRIC FACTOR OF 0.22 SQ CM-SR AND MEASURED ELECTRONS IN THREE RANGES BETWEEN 2 AND 8 MEV, AND PROTONS AND ALPHA PARTICLES IN THREE RANGES BETWEEN 20 AND 56 MEV/N. PROTONS ABOVE 230 MEV ARE ALSO MEASURED. THE FIRST LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.155 SQ CM-SR) MEASURED PROTONS AND 1.6T. 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM-SR) MEASURED PROTONS IN SEVERAL RANGES BETWEEN 0.12 AND 2.1 MEV, ALPHA PARTICLES IN THE RANGES 0.6-2.1 AND 6-21.2 MEV/N, AND ELECTRONS IN FOUR RANGES BETWEEN 0.12 AND 2 MEV. FOR A NUMBER OF COINCIDENCE MODES, COUNTING RATE DATA STORED INTO EIGHT 45 DEG SECTORS WERE OBTAINED. THE DATA CYCLE TIME WAS DEPENDENT ON THE SPACECRAFT TELEMETRY RATE (VARIABLE BETWEEN 4096 AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND WERE PULSE HEIGHT ANALYZED AND THE RATE DATA CYCLE IS OF THE ORDER OF 5 MINUTES. AT THE SLOWEST COMBINATION OF BIT RATE AND FORMAT, A COMPLETE DATA CYCLE REQUIRES ABOUT 2.5 HOURS. SEE "IEEE TRANS. ON NUC. SCI.," NS-22, 570, 1975, AND "RAUMFAHRTFORSCHUNG," 19, 5, PP 258-260, 1975, FOR FURTHER DETAILS.

***** HELIOS-B*****

SPACECRAFT COMMON NAME- HELIOS-B
ALTERNATE NAMES- HELIO-B, PL-751A
HELIOS 2

NSSDC ID- 76-003A

LAUNCH DATE- 01/15/76 WEIGHT- 371.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY

FED REP OF GERMANY
UNITED STATES

BWf
NASA-055

INITIAL ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 185.6 DAYS
PERIAPSIS- 0.289 AU RAD

EPOCH DATE- 07/21/76
INCLINATION- 0. DEG
AFOAPSIS- 0.983 AU RAD

PERSONNEL
 NG - E.J. MONTVOYA
 SC - A.G. OPP
 PM - A. KUTZER
 PM - G.W. OUSLEY
 PS - H. PORSCHE
 PS - J.H. TRAINOR

NASA HEADQUARTERS
 NASA HEADQUARTERS
 GES FÜR HELTRAUFORSCH
 NASA-GSFC
 DFVLR
 NASA-GSFC

BRIEF DESCRIPTION

THIS SPACECRAFT WAS ONE OF A PAIR OF DEEP SPACE PROBES DEVELOPED BY THE FEDERAL REPUBLIC OF GERMANY (FRG) IN A COOPERATIVE PROGRAM WITH NASA. EXPERIMENTS WERE PROVIDED BY SCIENTISTS FROM BOTH FRG AND THE U.S. NASA SUPPLIED THE TITAN/CENTAUR LAUNCH VEHICLE. THE SPACECRAFT WERE EQUIPPED WITH TWO BOOMS AND A 32-M ELECTRIC DIPOLE. THE PAYLOAD CONSISTED OF A FLUXGATE MAGNETOMETER; ELECTRIC AND MAGNETIC WAVE EXPERIMENTS, WHICH COVERED VARIOUS BANDS IN THE FREQUENCY RANGE 6 HZ TO 3 MHZ; CHARGED PARTICLE EXPERIMENTS, WHICH COVERED VARIOUS ENERGY RANGES STARTING WITH SOLAR WIND THERMAL ENERGIES AND EXTENDING TO 1 GEV; A ZODIACAL LIGHT EXPERIMENT; AND A MICROMETEOROID EXPERIMENT. THE PURPOSE OF THE MISSION WAS TO MAKE PIONEERING MEASUREMENTS OF THE INTERPLANETARY MEDIUM FROM THE VICINITY OF THE EARTH'S ORBIT TO 0.3 AU. THE SPACECRAFT WAS SPIN STABILIZED WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC, AND A NOMINAL SPIN RATE OF 1 RPS. THE OUTER SURFACE WAS COATED WITH A CONDUCTIVE MATERIAL, RESULTING IN A PLASMA SHEATH POTENTIAL OF TYPICALLY 5 EV. SHEATH-RELATED COUPLING CAUSED BY THE SPACECRAFT ANTENNAE PRODUCED INTERFERENCE WITH THE WAVE EXPERIMENTS, BUT THE CHARACTER OF THE INTERFERENCE WAS DIFFERENT THAN THAT OBSERVED ON THE HELIOS 1 SPACECRAFT. THE SPACECRAFT WAS CAPABLE OF BEING OPERATED AT BIT RATES OF FROM 4096 TO 8 BPS, VARIABLE BY FACTORS OF TWO. WHILE THE SPACECRAFT WAS MOVING TO PERHELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT HIGHER BIT RATES. BECAUSE OF DIFFICULTY ENCOUNTERED WITH THE HIGH GAIN ANTENNA, AND SCHEDULING CONFLICTS WITH VIKING, RELATIVELY LESS HIGH BIT RATE DATA WERE OBTAINED FROM HELIOS-B THAN WAS AVAILABLE FROM HELIOS-A. INSTRUMENT DESCRIPTIONS WRITTEN BY THE EXPERIMENTERS ARE PUBLISHED (SOME IN GERMAN, SOME IN ENGLISH) IN THE JOURNAL 'RAUMFAHRTFORSCHUNG', VOL. 19, NO. 5, SEPT./OCT., 1975.

----- HELIOS-B, FECHTIG-----

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 76-003A-12 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 INTERPLANETARY DUST
 INTERPLANETARY PHYSICS

PERSONNEL
 PI - H. FECHTIG MPI-NUCLEAR PHYS
 OI - J. WEHRAUCH MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT (E10) WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER -- (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUTOFF FOR SMALL PARTICLES IS DEPENDENT ON THE DISTANCE FROM THE SUN, BECAUSE SOLAR PRESSURE INCREASES NEARER THE SUN, AND (3) THE NUMBER DENSITIES OF PARTICLES CHANGE NEAR THE ORBITS OF PLANETS. THE DETECTOR UTILIZED THE FACT THAT THE KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/S) CAUSES THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD WAS SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. FROM THE IMPULSE HEIGHTS, THE MASS AND THE ENERGY OF THE DUST PARTICLES WERE DETERMINED. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET ALLOWED THE SMALL ION CLOUD TO BE ANALYZED, MAKING POSSIBLE THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WAS ABOUT 1.E-15 G. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 G. FOR PARTICLES LARGER THAN 1.E-13 G, A MASS SPECTRUM COULD BE GATHERED. FOR FURTHER DETAILS, SEE PP 268-269 OF 'RAUMFAHRTFORSCHUNG', 19, 5, SEPT./OCT., 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- COARSE FREQUENCY, FINE TIME RESOLUTION
 SPECTRUM ANALYSIS

NSSDC ID- 76-003A-04 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - D.A. GURNETT U OF IOWA
 OI - P.J. KELLOGG U OF MINNESOTA
 OI - S.J. BAUER NASA-GSFC
 OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E9A) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 16 CHANNEL SPECTRUM ANALYZER WITH APPROXIMATELY LOGARITHMICALLY EQUISPACED CENTER FREQUENCIES, 16 LOG COMPRESSORS, 16 R-C INTEGRATORS FOR AVERAGING THE LOG COMPRESSED ELECTRIC FIELD AMPLITUDE BETWEEN READOUTS, AND 16 PEAK DETECTORS WHICH WERE RESET AFTER READOUT. THE 16 AVERAGES AND 16 PEAK LOG VALUES WERE SAMPLED ALMOST SIMULTANEOUSLY. THE CHANNELS COVERED THE FREQUENCY RANGE OF ABOUT 20 HZ TO 200 KHZ, WITH FOUR CHANNELS PER DECADE OF FREQUENCY. THE LOG COMPRESSORS HAD A DYNAMIC RANGE OF 100 DB. SAMPLING RATE DEPENDENT IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL TIME TELEMETRY RATE WAS FOR 16 AVERAGES AND 16 PEAK VALUES TO BE SAMPLED EVERY 1.125 S. WHENEVER A VERY STRONG SIGNAL WAS DETECTED IN A PRE-SELECTED CHANNEL, THE SHOCK ALARM DATA MODE WAS INITIATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND TERMINATING AFTER THE TRIGGERING SIGNAL TIME. THE MAXIMUM SAMPLING RATE OF THE SPECTRUM DATA IN THIS MODE WAS 14.2 SAMPLES PER S FOR EACH CHANNEL. INTERFERENCE, CAUSED BY SOLAR CELL NOISE, OCCURRED PRIMARILY IN THE LOWEST SIX CHANNELS, AND HARMONICS RELATED TO THE SPIN FREQUENCY AND THE SPACECRAFT SHEATH. HOWEVER, A COMBINATION OF FACTORS, INCLUDING THE PROPER DEPLOYMENT OF THE DIPOLE ANTENNA AND THE CONDUCTIVE SPACECRAFT COATING, RESULTED IN DATA FROM THIS SPACECRAFT BEING OF HIGHER QUALITY THAN DATA FROM HELIOS-A. FOR FURTHER DETAILS, SEE PP 245-247 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION
 SPECTRUM ANALYSIS

NSSDC ID- 76-003A-05

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
 OI - P.J. KELLOGG U OF MINNESOTA
 OI - S.J. BAUER NASA-GSFC
 OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E9B) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -06. INSTRUMENTATION CONSISTED OF THREE TUNABLE PLASMA WAVE RECEIVERS, A FIXED-FREQUENCY WIDEBAND RECEIVER, AND A WAVE FORM SAMPLER. THE TUNABLE RECEIVERS AND WIDEBAND RECEIVER PROVIDED DATA FOR DIRECT TELEMETRY TO EARTH. EACH OF THE TUNABLE RECEIVERS COVERED A DIFFERENT FREQUENCY BAND IN THE RANGE 1 HZ TO 200 KHZ. THE HIGH FREQUENCY RECEIVER HAD 96 FREQUENCY SETTINGS SEPARATED BY ABOUT 4 PERCENT AND COVERED THE FREQUENCY RANGE 6.4 KHZ TO 205 KHZ. THE MID-RANGE RECEIVER HAD 48 FREQUENCY SETTINGS SEPARATED BY ABOUT 8 PERCENT AND COVERED THE RANGE 208 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION AND COVERED THE RANGE 11 HZ TO 309 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDENT IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SHOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVE FORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS, THE MOST RAPID BEING 2.2 MS. FOR A MORE DETAILED DISCUSSION SEE P 248 OF 'RAUMFAHRTFORSCHUNG', 19, 5, 1975.

----- HELIOS-B, GURNETT-----

INVESTIGATION NAME- 50-KHZ TO 2-MHZ RADIO WAVE

NSSDC ID- 76-003A-06

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 RADIO PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
 OI - P.J. KELLOGG U OF MINNESOTA
 OI - R.N. WEBER NASA-GSFC
 OI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (E9C) SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUNDANT) 16-FREQUENCY CHANNEL RADIOMETER, WITH APPROXIMATELY LOGARITHMICALLY SPACED CHANNELS, WAS USED TO DETECT TYPE III RADIO EMISSIONS ASSOCIATED WITH SOLAR FLARE EVENTS IN THE FREQUENCY BAND 26.5 KHZ TO 3 MHZ. THE EXPERIMENT SAMPLING RATE WAS SYNCHRONIZED SUCH THAT EACH SPACECRAFT REVOLUTION WAS

ORIGINAL PAGE IS
 OF POOR QUALITY

DIVIDED INTO 32 SECTORS. THE SEQUENCE AND FREQUENCY OF SAMPLING DEPENDS ON THE INSTRUMENT OPERATIONAL MODE (ONE OF FOUR) AND THE SPACECRAFT BIT RATE. THE MOST RAPID SAMPLING POSSIBLE FOR A SINGLE FREQUENCY CHANNEL WAS ONCE EVERY 1/32 OF A SATELLITE SPIN PERIOD, OR ABOUT .03 S. A TYPICAL SAMPLING SEQUENCE WAS FOR ONE FREQUENCY CHANNEL TO BE SAMPLED FOR 16 SECTORS (1/2 REVOLUTION), FOLLOWED BY THE NEXT. FOR MORE DETAILS ABOUT THE INSTRUMENT AND MODES OF OPERATION, SEE P 258 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-B, KEPPLER-----

INVESTIGATION NAME- ENERGETIC ELECTRON DETECTOR
 NSSDC ID- 76-003A-10 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - E. KEPPLER MPI-AERONOMY
 OI - B. WILKEN MPI-AERONOMY
 OI - B.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
 THE OBJECTIVE OF THE EXPERIMENT (E8) WAS TO STUDY THE ORIGIN AND THE DISTRIBUTION MECHANISM OF LOW-ENERGY ELECTRONS AND PROTONS. THE INSTRUMENT, A MAGNETIC SPECTROMETER, CONSISTED OF SIX SEMICONDUCTOR DETECTORS WITH THE FIELD OF VIEW IN THE PLANE OF THE ECLIPTIC. SPECIES SEPARATION WAS ACHIEVED BY AN INHOMOGENEOUS MAGNETIC FIELD ORIENTED PERPENDICULAR TO THE PARTICLE PATH. FOUR ELECTRON AND TWO PROTON DETECTORS MEASURED ELECTRONS FROM 25 TO 1000 KEV AND PROTONS FROM 80 TO 1000 KEV. THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGICS. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-B, KUNDT-----

INVESTIGATION NAME- CELESTIAL MECHANICS
 NSSDC ID- 76-003A-14 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 CELESTIAL MECHANICS
 ASTRONOMY

PERSONNEL
 PI - W. KUNDT U OF HAMBURG
 OI - W.G. MELBOURNE NASA-JPL

BRIEF DESCRIPTION
 THIS EXPERIMENT USED THE TRACKING DATA TO OBTAIN A DETAILED SPACECRAFT ORBIT AND TO OBTAIN IMPROVED KNOWLEDGE OF THE ORBITAL ELEMENTS OF THE EARTH-MOON SYSTEM AND GENERAL RELATIVITY PARAMETERS.

----- HELIOS-B, KUNOW-----

INVESTIGATION NAME- COSMIC-RAY PARTICLES
 NSSDC ID- 76-003A-07 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - H. KUNOW U OF KIEL
 OI - G.H. WIDDERENZ U OF KIEL
 OI - G. GREEN U OF KIEL
 OI - H. MUELLER-MELLIN U OF KIEL
 OI - H. WITTE U OF KIEL
 OI - H. HEMPE U OF KIEL

BRIEF DESCRIPTION
 THE OBJECTIVE OF THE EXPERIMENT (E6) WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .6T, 1.3 MEV/NUCLEON, AND ELECTRONS .6T, 0.3 MEV WERE MEASURED WITHIN INTERPLANETARY SPACE OVER THE RANGE FROM 0.3 TO 1.0 AU. THE INSTRUMENT, A PARTICLE TELESCOPE WITH A 56-DEG FIELD OF VIEW, CONSISTED OF FIVE SEMICONDUCTOR DETECTORS, ONE SAPPHIRE Cerenkov COUNTER, AND ONE SCINTILLATION COUNTER, ALL ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE TELESCOPE WAS CALIBRATED PRIOR TO LAUNCH USING RADIOACTIVE SOURCES, PARTICLE ACCELERATORS, AND GROUND-LEVEL MUONS. IT MEASURED PROTONS AND ALPHA PARTICLES IN SIX CHANNELS (1.3-3.3, 3.3-13, 13-27, 27-37, 37-49, AND .6T, 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .6T, 4 MEV). FOR MORE DETAIL SEE PP 253-257 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

----- HELIOS-B, LEINERT-----

INVESTIGATION NAME- ZODIACAL LIGHT PHOTOMETER
 NSSDC ID- 76-003A-11 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 INTERPLANETARY PHYSICS
 ZODIACAL LIGHT

PERSONNEL
 PI - C. LEINERT MPI-ASTRONOMIE
 OI - E. PITZ MPI-ASTRONOMIE

BRIEF DESCRIPTION
 THIS EXPERIMENT (E9) CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS OBSERVED THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, SELECTED VISUAL BANDS, AND WHITE LIGHT. THE PURPOSE OF THIS EXPERIMENT WAS TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES. FOR FURTHER DETAILS, SEE PP 264-267 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPT./OCT. 1975.

----- HELIOS-B, NESS-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS
 NSSDC ID- 76-003A-02 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - W.F. NESS NASA-GSFC
 OI - F. MARIANI U OF RORE
 OI - L.F. BURLAGA NASA-GSFC
 OI - S.C. CANTARANO CNR, SPACE PLASMA LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT (E3) CONSISTED OF A BOOM-MOUNTED TRIAXIAL-FLUXGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTED THE OPTIMUM OF FOUR RANGES THAT ARE MINUS TO PLUS 16, 48, 144, AND 432 NT PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.05, 0.09, 0.28, AND 0.84 NT. A SENSOR FLIPPER WAS ACTUATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 BPS, VECTOR MEASUREMENTS WERE MADE AT RATES BETWEEN 1 AND 16 PER S, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH. FOR FURTHER DETAILS, SEE PP 257-260 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPT./OCT. 1975.

----- HELIOS-B, NEUBAUER-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS
 NSSDC ID- 76-003A-01 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - F.H. NEUBAUER BRAUNSCHWEIG TECH U
 OI - A. RAIER BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
 THE INSTRUMENT (E2) CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED ON A 2.75-M BOOM TO MAKE MAGNETIC FIELD MEASUREMENTS UP TO 4 HZ. DATA FROM EACH AXIS WERE FIRST SENT THROUGH A LOW-PASS FILTER WITH THE 3 DB ATTENUATION POINT AT 4 HZ. DEPENDING ON THE TELEMETRY FORMAT AND BIT RATE, THE DATA WERE FED EITHER INTO A TIME-AVERAGING COMPUTER OR DIRECTLY CONNECTED TO TELEMETRY. A SHOCK IDENTIFICATION COMPUTER TRIGGERED THE STORAGE OF RAPID RATE DATA IN THE SPACECRAFT MEMORY WHEN THERE WERE DISCONTINUITIES IN THE VARIATIONS OF THE AMBIENT MAGNETIC FIELD. TWO MEASUREMENT RANGES WERE USED, PLUS OR MINUS 100 AND 400 NT WITH RESOLUTIONS OF PLUS OR MINUS 0.2 AND 0.8 NT, RESPECTIVELY. THE INSTRUMENT WAS EQUIPPED WITH A FLIPPER MECHANISM, WHICH RE-ORIENTED EACH SENSOR BY 90 DEG PERIODICALLY. FOR DETAILED INFORMATION, SEE P 232 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, 1975.

----- HELIOS-B, NEUBAUER-----

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER
 NSSDC ID- 76-003A-03 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
PI - F.M. NEUBAUER
OI - G. DENDEL
BRAUNSCHWEIG TECH U
BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
THIS EXPERIMENT (E4) WAS DESIGNED TO INVESTIGATE THE MAGNETIC COMPONENT OF ELECTROMAGNETIC WAVES IN THE SOLAR WIND FROM 0.3 TO 1.0 AU. BY MEANS OF ITS WAVEFORM CHANNEL (WFC), THE RAPID VARIATIONS OF THE MAGNETIC FIELD WERE MEASURED UP FROM PLUS OR MINUS 8.75 NT TO PLUS OR MINUS 275 NT IN THREE ORTHOGONAL DIRECTIONS FROM 4 TO 128 HZ. A SPECTRUM ANALYZER OBSERVED THE FIELD COMPONENTS IN THE ECLIPTIC PLANE AND PERPENDICULAR TO IT, TO OBTAIN THE POWER SPECTRAL DENSITY AND PEAK VALUES FOR EIGHT LOGARITHMICALLY SPACED CHANNELS IN THE RANGE FROM 4.7 TO 2800 HZ. BECAUSE OF THE LARGE AMOUNT OF DATA PRODUCED BY THIS EXPERIMENT, AN ADAPTIVE DATA REDUCTION WAS APPLIED. FOR INTERESTING TIME INTERVALS SELECTED BY THE FLUGGATE MAGNETOMETER (NEUBAUER) 76-083A-01, OR GUNNETT (-04), WAVEFORM DATA COULD BE READ INTO AN ON-BOARD MEMORY AT A RAPID RATE TO BE TRANSMITTED SLOWLY AFTERWARDS. FOR MORE DETAILED INFORMATION SEE P 241 IN "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-B, ROSENBAUER -----

INVESTIGATION NAME- PLASMA DETECTORS
NSSDC ID- 76-003A-09
INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - M.R. ROSENBAUER
OI - M. PELLKOFER
OI - J.W. WOLFE
MPI-AERONOMY
MPI-EXTRATERM PHYS
NASA-ARC

BRIEF DESCRIPTION
THIS EXPERIMENT (E1) EMPLOYED THREE PLASMA ANALYZERS FOR POSITIVE IONS AND ONE FOR ELECTRONS. ALL DETECTORS WERE MOUNTED NORMAL TO THE SPIN AXIS. POSITIVE IONS WITH ENERGY PER CHARGE WITHIN THE RANGE 0.155 TO 15.32 KEV/Q WERE MEASURED IN TWO ANGULAR DIMENSIONS USING A COMBINATION OF A HEMISPHERICAL, A QUADRISPHERICAL, AND A SINUSOIDALLY SHAPED ELECTROSTATIC ANALYZER. ELECTRONS WITH ENERGY FROM 0.5 TO 1660 EV WERE MEASURED WITH A HEMISPHERICAL ELECTROSTATIC ANALYZER IN ONE DIMENSION. THE EXPERIMENT OPERATED IN SEVERAL MODES WITH DIFFERING TIME RESOLUTION DEPENDING IN DETAIL ON TELEMETRY FORMAT AND SATELLITE BIT RATE. TYPICAL TIME RESOLUTION WAS ON THE ORDER OF A MINUTE. ALSO, WHENEVER THE SPECIAL SHOCK ALARM MODE WAS TRIGGERED BY EXPERIMENTS -04 OR -01, HIGH TIME RESOLUTION PLASMA DATA FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE EVENT WERE RECORDED INTO SPACECRAFT MEMORY FOR LATER TRANSMISSION. BECAUSE THE SPACECRAFT BODY WAS COATED WITH A CONDUCTIVE COATING, THE SHEATH POTENTIALS WERE ABOUT 5 EV, CAUSING FAR LESS DEGRADATION IN THE USEFULNESS OF DATA TAKEN IN THE LOWER ELECTRON ENERGY CHANNELS THAN ON THE HELIOS-A SPACECRAFT, AND ALMOST NO EFFECT ON THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 5, 1975.

----- HELIOS-B, TRAINOR -----

INVESTIGATION NAME- GALACTIC AND SOLAR COSMIC RAYS
NSSDC ID- 76-003A-08
INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - J.M. TRAINOR
OI - E.C. ROELOF
OI - B.J. TEEGARDEN
OI - F.B. McDONALD
OI - K.G. MCCRACKEN
NASA-GSFC
APPLIED PHYSICS LAB
NASA-GSFC
NASA-GSFC
CSIRO

BRIEF DESCRIPTION
THE DETECTOR COMPLEMENT OF THIS EXPERIMENT (E7) CONSISTED OF THREE SEPARATE DELTA E/Delta X VS E TELESCOPES AND A PROPORTIONAL COUNTER FOR MONITORING SOLAR X RAYS IN THE RANGE 2-R KEV. THE HIGH ENERGY TELESCOPE HAD A GEOMETRIC FACTOR OF 0.22 SQ CM-SR AND MEASURED ELECTRONS IN THREE RANGES BETWEEN 2 AND 8 MEV, AND PROTONS AND ALPHA PARTICLES IN THREE RANGES BETWEEN 20 AND 56 MEV/N. PROTONS ABOVE 230 MEV WERE ALSO MEASURED. THE FIRST LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.155 SQ CM-SR) MEASURED PROTONS AND 2 .GT. 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM-SR) MEASURED PROTONS IN SEVERAL RANGES BETWEEN 0.12 AND 2.1 MEV, ALPHA PARTICLES IN THE RANGES 0.6-2.1 AND 6-21.2 MEV/N, AND ELECTRONS IN FOUR RANGES BETWEEN 0.12 AND 2 MEV. FOR A NUMBER OF COINCIDENCE MODES, COUNTING DATA SECTORED INTO EIGHT 45 DEG SECTORS WERE OBTAINED. THE DATA CYCLE TIME WAS DEPENDENT ON THE SPACECRAFT TELEMETRY RATE (VARIABLE BETWEEN 40% AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND ARE PULSE HEIGHT ANALYZED AND THE RATE DATA CYCLE WAS ON THE ORDER OF 5 MINUTES. AT THE SLOWEST COMBINATION OF BIT RATE AND FORMAT, A COMPLETE DATA CYCLE REQUIRED ABOUT 2.5 HOURS. FOR FURTHER DETAILS SEE "IEEE TRANS. ON NUC. SCI.," NS-22, 570, 1975, AND PP 258-260 OF "RAUMFAHRTFORSCHUNG," 19, 5, SEPT./OCT. 1975.

***** IMP-J *****

SPACECRAFT COMMON NAME- IMP-J
ALTERNATE NAMES- PL-723A, IMP B
EXPLORER 50, 6893

NSSDC ID- 73-078A

LAUNCH DATE- 10/26/73
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES
NASA-053

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 17286. MIN
PERIAPSIS- 141224. KM ALT
EPOCH DATE- 10/29/73
INCLINATION- 28.7 DEG
APOAPSIS- 280948. KM ALT

PERSONNEL
RG - J.R. HOLTZ
SC - E.R. SCHMERLING
PM - M.A. DAVIS
PS - J.W. KING
NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION
IMP B (EXPLORER 50), THE LAST SATELLITE OF THE IMP SERIES, WAS A DRUM-SHAPED SPACECRAFT, 135.6 CM ACROSS AND 187.4 CM HIGH, INSTRUMENTED FOR INTERPLANETARY AND MAGNETOTAIL STUDIES OF COSMIC RAYS, ENERGETIC SOLAR PARTICLES, PLASMA, AND ELECTRIC AND MAGNETIC FIELDS. ITS INITIAL ORBIT WAS MORE ELLIPTICAL THAN INTENDED, WITH APOGEE AND PERIGEE DISTANCES OF ABOUT 95 AND 25 EARTH RADII. ITS ECCENTRICITY DECREASED AFTER LAUNCH. THE SPACECRAFT SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN RATE WAS 23 RPM. THE DATA TELEMETRY RATE WAS 1600 BPS.

----- IMP-J, AGGSON -----

INVESTIGATION NAME- ELECTROSTATIC FIELDS
NSSDC ID- 73-078A-11
INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T.L. AGGSON
OI - J.P. HEPPNER
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION
THE INSTRUMENT WAS DESIGNED TO MEASURE AMBIENT ELECTRIC FIELDS IN THE SOLAR WIND AND THE EARTH'S MAGNETOSHEATH UP TO 1 KMZ IN FREQUENCY. THE SENSOR CONSISTED OF A PAIR OF 70-R WIRE ANTENNAS (140 R, TIP-TO-TIP), WHICH WERE HELD RIGID BY CENTRIFUGAL FORCE DUE TO SATELLITE SPIN (ABOUT 24 RPM). THE WIRES WERE INSULATED FROM THE PLASMA, EXCEPT FOR THEIR SHORT OUTER SECTIONS, TO REMOVE THE ACTIVE PROBE AREA FROM THE SPACECRAFT SHEATH. THE ANTENNA SERVED AS A DOUBLE FLOATING PROBE, AND MEASUREMENTS WERE OBTAINED EVERY 1/4 SPACECRAFT REVOLUTION (ABOUT 0.75 S). ULF AND VLF MEASUREMENTS WERE OBTAINED USING SEVEN 60 PERCENT BANDWIDTH FILTERS WITH CENTER FREQUENCIES LOGARITHMICALLY SPACED FROM 1 Hz TO 1 KMZ. THESE FREQUENCY CHANNELS HAD AN INTRINSIC SENSITIVITY OF 1.0E-5 V/M, AND A PEAK RANGE OF 1.0E-2 V/M. HOWEVER, THE EFFECTIVE LOW-FREQUENCY FILTER THRESHOLD WAS DETERMINED BY INTERFERENCE DUE TO HARMONICS OF THE SPACECRAFT SPINNING WITHIN AN ASYMMETRIC SHEATH. THE OTHER MAJOR LIMITATION WAS ALSO DUE TO SHEATH EFFECT. WHENEVER THE ELECTRON PLASMA DENSITY WAS LESS THAN ABOUT 10 PARTICLES/CM³, THE SHEATH OVERLAPPED THE ACTIVE ANTENNA PORTIONS AND PRECLUDED MEANINGFUL MEASUREMENTS OF AMBIENT CONDITIONS.

----- IMP-J, BAME -----

INVESTIGATION NAME- SOLAR PLASMA ELECTROSTATIC ANALYZER
NSSDC ID- 72-078A-10
INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
SOLAR PHYSICS

PERSONNEL
PI - S.J. BAME
OI - J.R. ASBRIDGE
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
A HEMISPHERICAL ELECTROSTATIC ANALYZER MEASURED THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, MAGNETOSHEATH, AND MAGNETOTAIL. IONS AS HEAVY AS OXYGEN WERE RESOLVED WHEN THE SOLAR WIND TEMPERATURE WAS LOW. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RC TIME CONSTANTS. IN THE SOLAR WIND, POSITIVE IONS FROM 200 EV

TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOSHEATH, POSITIVE IONS FROM 200 EV TO 5 KEV (15 PERCENT SPACING, 3 PERCENT RESOLUTION) AND FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED. IN THE MAGNETOTAIL, POSITIVE IONS FROM 200 EV TO 20 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND FROM 100 EV TO 20 KEV (15 PERCENT SPACING, 15 PERCENT RESOLUTION) WERE STUDIED.

----- IMP-J, BRIDGE-----

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSSDC ID- 73-078A-02

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.S. BRIDGE	MASS INST OF TECH
O1 - A.J. LAZARUS	MASS INST OF TECH
O1 - J.H. BINSACK	MASS INST OF TECH
O1 - E.F. LYON	MASS INST OF TECH

BRIEF DESCRIPTION

A MODULATED SPLIT-COLLECTOR FARADAY CUP, PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, TRANSITION REGION, AND MAGNETOTAIL. ELECTRONS WERE STUDIED IN EIGHT LOGARITHMICALLY EQUISPACED ENERGY CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE STUDIED IN EIGHT CHANNELS BETWEEN 50 EV AND 7 KEV. A SPECTRUM WAS OBTAINED EVERY EIGHT SPACECRAFT REVOLUTIONS. ANGULAR INFORMATION WAS OBTAINED IN EITHER 15 EQUALLY SPACED INTERVALS DURING A 360-DEG REVOLUTION OF THE SATELLITE OR IN 15 ANGULAR SEGMENTS CENTERED MORE CLOSELY ABOUT THE SPACECRAFT SUN LINE.

----- IMP-J, FRANK-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 73-078A-04

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK	U OF IOWA
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BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRA OF LOW-ENERGY ELECTRONS AND PROTONS IN THE GEOCENTRIC RANGE 30 TO 40 RCE) TO GIVE FURTHER DATA ON GEOMAGNETIC STORMS, AURORA, TAIL AND NEUTRAL SHEET, AND OTHER MAGNETOSPHERIC PHENOMENA. THE DETECTOR WAS A DUAL-CHANNEL CURVED-PLATE ELECTROSTATIC ANALYZER (LEPDEA - LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 EV AND 90 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG. THE DETECTOR COULD BE OPERATED IN ONE OF TWO MODES -- (1) ONE PROVIDING GOOD ANGULAR RESOLUTION (16 DIRECTIONS FOR EACH PARTICLE ENERGY BAND) ONCE EACH 272 S, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS WAS MEASURED EVERY 64 S.

----- IMP-J, GLOECKLER-----

INVESTIGATION NAME- SOLID-STATE DETECTORS

NSSDC ID- 73-078A-05

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - G. GLOECKLER	U OF MARYLAND
O1 - C.V. FAN	U OF ARIZONA
O1 - D.K. HOVESTADT	MPI-EXTRATERM PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES OBSERVED DURING SOLAR FLARES AND 27-DAY RECURRENT EVENTS. THE DETECTORS USED INCLUDE (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIRED ENERGY PER CHARGE) COMBINED WITH AN ARRAY OF WINDOWLESS SOLID-STATE DETECTORS (TO MEASURE THE ENERGY LOSS) AND SURROUNDED BY AN ANTICOINCIDENCE SHIELDING, AND (2) A THIN WINDOW PROPORTIONAL COUNTER, SOLID-STATE PARTICLE TELESCOPE. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1 TO 10 MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF 2 FROM 1 TO 8 (MC CHARGE RESOLUTION FOR Z GREATER THAN 8). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH DETECTOR, WERE INCLUDED IN THE EXPERIMENT PAYLOAD.

----- IMP-J, GURNETT-----

INVESTIGATION NAME- ELECTROSTATIC WAVES AND RADIO NOISE

NSSDC ID- 73-078A-12

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - B.A. GURNETT	U OF IOWA
O1 - T.L. AGGSON	NASA-GSFC
O1 - G.W. PFEIFFER	U OF IOWA

BRIEF DESCRIPTION

A WIDE-BAND RECEIVER WAS USED TO OBSERVE HIGH-RESOLUTION FREQUENCY-TYPE SPECTRA, AND A SIX-CHANNEL NARROW-BAND RECEIVER WITH A VARIABLE CENTER FREQUENCY WAS USED TO OBSERVE WAVE CHARACTERISTICS. THE RECEIVERS OPERATED FROM THREE ANTENNA SYSTEMS. THE FIRST SYSTEM CONTAINED A PAIR OF LONG DIPOLE ANTENNAS (ONE, EXTENDABLE TO ABOUT 124 M, NORMAL TO THE SPACECRAFT SPIN AXIS AND THE OTHER ANTENNA, EXTENDABLE TO ABOUT 6.1 M, ALONG THE SPIN AXIS). THE SECOND SYSTEM CONTAINED A BOOM-MOUNTED TRIAD OF ORTHOGONAL LOOP ANTENNAS. THE THIRD SYSTEM CONSISTED OF A BOOM-MOUNTED .51 M (20 IN.) SPIN AXIS DIPOLE. THE MAGNETIC AND ELECTRIC FIELD INTENSITIES AND FREQUENCY SPECTRA, POLARIZATION, AND DIRECTION OF ARRIVAL OF NATURALLY OCCURRING RADIO NOISE IN THE MAGNETOSPHERE WERE OBSERVED. PHENOMENA STUDIED WERE THE TIME-SPACE DISTRIBUTION, ORIGIN, PROPAGATION, DISPERSION, AND OTHER CHARACTERISTICS OF RADIO NOISES OCCURRING ACROSS AND ON EITHER SIDE OF THE MAGNETOSPHERIC BOUNDARY REGION. THE FREQUENCY RANGE FOR ELECTRIC FIELDS WAS 0.3 HZ TO 200 KHZ, AND FOR MAGNETIC FIELDS IT WAS 20 HZ TO 200 KHZ.

----- IMP-J, KRIMIGIS-----

INVESTIGATION NAME- CHARGED PARTICLE MEASUREMENTS EXPERIMENT

NSSDC ID- 73-078A-08

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - S.M. KRIMIGIS	APPLIED PHYSICS LAB
O1 - T.P. ARMSTRONG	U OF KANSAS
O1 - J.A. VAN ALLEN	U OF IOWA

BRIEF DESCRIPTION

THREE SOLID-STATE DETECTORS IN AN ANTICOINCIDENCE PLASTIC SCINTILLATOR OBSERVED ELECTRONS BETWEEN 0.2 AND 2.5 MEV, PROTONS BETWEEN 0.3 AND 500 MEV, ALPHA PARTICLES BETWEEN 2.0 AND 200 MEV, HEAVY PARTICLES WITH Z VALUES RANGING FROM 2 TO 5 WITH ENERGIES GREATER THAN 5 MEV, HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 57 MEV, AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER 50 CM S SR). FIVE THIN-WINDOW GEIGER-MUELLER TUBES OBSERVED ELECTRONS OF ENERGY GREATER THAN 15 KEV, PROTONS OF ENERGY GREATER THAN 250 KEV, AND X-RAYS WITH WAVELENGTHS BETWEEN 2 AND 10 A, ALL WITH A DYNAMIC RANGE OF 10 TO 100 MILLION (PER 50 CM S SR). PARTICLES AND X-RAYS PRIMARILY OF SOLAR ORIGIN WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED OBSERVATION OF COSMIC RAYS AND MAGNETOTAIL PARTICLES.

----- IMP-J, McDONALD-----

INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 73-078A-09

INVESTIGATIVE PROGRAM
CODE 5T

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS
COSMIC RAYS

PERSONNEL

PI - F.B. McDONALD	NASA-GSFC
O1 - D.E. MAGGE	UNKNOWN
O1 - B.J. TEGARDEN	NASA-GSFC

BRIEF DESCRIPTION

THE GSFC COSMIC-RAY EXPERIMENT WAS DESIGNED TO MEASURE ENERGY SPECTRA, COMPOSITION, AND ANGULAR DISTRIBUTIONS OF SOLAR AND GALACTIC ELECTRONS, PROTONS, AND HEAVIER NUCLEI UP TO 7.5. THREE DISTINCT DETECTOR SYSTEMS WERE USED. THE FIRST SYSTEM CONSISTED OF A PAIR OF SOLID-STATE TELESCOPES THAT MEASURED INTEGRAL FLUXES OF ELECTRONS ABOVE 150, 350, AND 700 KEV AND OF PROTONS ABOVE .05, .1, .50, .70, 1.0, 1.2, 2.0, 2.5, 5.0, 15, AND 25 MEV, EXCEPT FOR THE .05-MEV PROTON MODE, ALL COUNTING MODES HAD UNIQUE SPECIES IDENTIFICATION. THE SECOND DETECTOR SYSTEM WAS A SOLID-STATE BE/DX VS E TELESCOPE THAT LOOKED PERPENDICULAR TO THE SPIN AXIS. THIS TELESCOPE MEASURED Z = 1 TO 16 NUCLEI WITH ENERGIES BETWEEN 4 AND 20 MEV/NUCLEON. COUNTS OF PARTICLES IN THE 0.5- TO 4-MEV/NUCLEON RANGE, WITH NO CHARGE RESOLUTION, WERE OBTAINED AS COUNTS IN THE BE/DX BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM

HAS A THREE-ELEMENT TELESCOPE WHOSE AXIS MADE AN ANGLE OF 39 DEG WITH RESPECT TO THE SPIN AXIS. THE MIDDLE ELEMENT WAS A CsI SCINTILLATOR, WHILE THE OTHER TWO ELEMENTS WERE SOLID-STATE SENSORS. THE INSTRUMENT RESPONDED TO ELECTRONS BETWEEN 2 AND 12 MEV AND TO $Z = 1$ TO 30 NUCLEI IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON. FOR PARTICLES BELOW 80 MEV, THIS INSTRUMENT ACTED AS A DE/DX DETECTOR. ABOVE 80 MEV, IT ACTED AS A BIDIIRECTIONAL TRIPLE DE/DX DETECTOR. FLUX DIRECTIONALITY INFORMATION WAS OBTAINED BY DIVIDING CERTAIN PORTIONS OF THE DATA FROM EACH DETECTOR INTO EIGHT ANGULAR SECTORS.

----- IMP-J, NESS -----
 INVESTIGATION NAME- MAGNETIC FIELD EXPERIMENT

NSSDC ID- 73-078A-01 INVESTIGATIVE PROGRAM CODE 5T
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - M.F. NESS NASA-GSFC
 OI - C.S. SCARCE NASA-GSFC
 OI - J.D. SEEK NASA-GSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO STUDY THE INTERPLANETARY AND GEOMAGNETIC TAIL MAGNETIC FIELDS. EACH SENSOR HAD THREE DYNAMIC RANGES, PLUS OR MINUS 12, PLUS OR MINUS 36, AND PLUS OR MINUS 108 NT, WITH THE AID OF A BIT COMPACTION SCHEME (DELTA MODULATION). THERE WERE 25 VECTOR MEASUREMENTS MADE AND TELEMETERED PER SECOND. THE EXPERIMENT OPERATED NORMALLY FROM LAUNCH UNTIL MID-1975. ON JULY 11, 1975, BECAUSE OF A RANGE INDICATOR PROBLEM, THE EXPERIMENT OPERATION WAS FROZEN INTO THE 36-NT RANGE. THE DIGITIZATION ACCURACY IN THIS RANGE IS ABOUT PLUS OR MINUS 0.3 NT. ON 23 MARCH, 1978, THE SENSOR FLIPPER FAILED. SINCE THEN, ALTERNATIVE METHODS OF Z-AXIS SENSOR ZERO-LEVEL DETERMINATION WERE REQUIRED.

----- IMP-J, SIMPSON -----
 INVESTIGATION NAME- SOLAR FLARE HIGH-Z/LOW-Z AND LOW-Z ISOTOPE

NSSDC ID- 73-078A-07 INVESTIGATIVE PROGRAM CODE 5T
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS
 COSMIC RAYS

PERSONNEL
 PI - J.A. SIMPSON U OF CHICAGO
 OI - M. GARCIA-MUNOZ U OF CHICAGO

BRIEF DESCRIPTION
 THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLINEAR ELEMENTS (THREE SOLID STATE, ONE CsI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICOINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS, PERMITTING 8-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS IN THROUGH N1 OR OF THE ELECTRONS AND THE ISOTOPE OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SPECTRUMS.

----- IMP-J, STONE -----
 INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPE

NSSDC ID- 73-078A-06 INVESTIGATIVE PROGRAM CODE 5T
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - E.C. STONE CALIF INST OF TECH
 OI - R.E. VOGT CALIF INST OF TECH

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIFFERENTIAL ENERGY SPECTRA OF THE ISOTOPE OF HYDROGEN THROUGH OXYGEN FROM 2 TO 40 MEV/NUCLEON, AND OF ELECTRONS FROM 0.2 TO 5 MEV. THE INSTRUMENT CONSISTED OF A STACK OF 11 FULLY DEPLETED SILICON SOLID-STATE DETECTORS SURROUNDED BY A PLASTIC SCINTILLATOR ANTICOINCIDENCE CUP. THE OUTER TWO SOLID-STATE DETECTORS WERE ANNUULAR, PERMITTING MEASUREMENTS IN BOTH NARROW GEOMETRY (TYPICAL GEOMETRICAL FACTOR WAS 0.2 SQ CM-SR) AND WIDE GEOMETRY (TYPICAL GEOMETRICAL FACTOR WAS 1.5 SQ CM-SR) COINCIDENCE MODES.

ANISOTROPY DATA (45 DEG ANGULAR AND 20 S TEMPORAL RESOLUTION) WERE OBTAINED. FOR FURTHER DETAILS SEE P 931 IN 'ASTROPHYS. J.' 205.

----- IMP-J, WILLIAMS -----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS
 NSSDC ID- 73-078A-05 INVESTIGATIVE PROGRAM CODE 5T
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - B.J. WILLIAMS NOAA-ERL
 OI - C.O. BOSTROM APPLIED PHYSICS LAB
 OI - J.M. TRAINOR NASA-GSFC

BRIEF DESCRIPTION
 THE PURPOSES OF THIS INVESTIGATION WERE (1) TO STUDY THE PROPAGATION CHARACTERISTICS OF SOLAR COSMIC RAYS THROUGH THE INTERPLANETARY MEDIUM OVER THE ENERGY RANGES INDICATED BELOW, (2) TO STUDY ELECTRON AND PROTON FLUXES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR THE PLANES OF THE MAGNETOSPHERE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE MAGNETOSPHERE. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE EMPLOYING FULLY DEPLETED SURFACE BARRIER SOLID-STATE DETECTORS AND A MAGNET TO DEFLECT ELECTRONS. TWO SIDE-MOUNTED DETECTORS WERE USED TO MEASURE THE DEFLECTED ELECTRONS. TWO ADDITIONAL DETECTORS IN SEPARATE MOUNTS WERE USED TO MEASURE CHARGED PARTICLES ABOVE 15 MEV (P) AND 2 GREATER THAN OR EQUAL TO 2 ABOVE 0.6 (G1) AND 1.0 MEV (G2) AND 2 GREATER THAN OR EQUAL TO 3 ABOVE 2.0 MEV (G3). THE TELESCOPE MEASURED PROTONS IN THREE RANGES BETWEEN 2.3 AND 20 MEV (L4, L5, L6), 2 GREATER THAN OR EQUAL TO 3 IN THREE RANGES BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3), ALPHA PARTICLES BETWEEN 0.4 AND 35.0 MEV IN TWO RANGES (L11, L12), 2 GREATER THAN OR EQUAL TO 2 BETWEEN 2.2 AND 8.4 MEV (L10), AND A BACKGROUND CHANNEL (L9). DEFLECTED ELECTRONS WERE MEASURED IN TWO RANGES BETWEEN 30 AND 200 KEV (L7, L8). A COMPLETE DESCRIPTION OF THE INSTRUMENT WAS GIVEN BY B. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 49, OCT. 1977.

***** INTERCOSMOS 18*****

SPACECRAFT COPRON NAME- INTERCOSMOS 18
 ALTERNATE NAMES- 11807, MAGIC
 MAG-18

NSSDC ID- 78-097A
 LAUNCH DATE- 10/24/78 WEIGHT- 46
 LAUNCH SITE- PLESETSK, U.S.S.R.
 LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
 U.S.S.R. IZMIRAN
 INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/25/78
 ORBIT PERIOD- 96.4 MIN INCLINATION- 83. DEG
 PERIAPSIS- 407. KM ALT APOAPSIS- 748. KM ALT

PERSONNEL
 PI - V.V. MIGULIN IZMIRAN

BRIEF DESCRIPTION
 LAUNCHED DURING THE IMS PERIOD, THE SPACECRAFT EXPERIMENT OBJECTIVE WAS TO STUDY THE CHARACTER OF THE IONOSPHERE-MAGNETOSPHERE COUPLING BY CONTINUING EXPERIMENTS SIMILAR TO THOSE ON INTERCOSMOS 18. BOTH REAL-TIME AND STORED DATA MODES WERE USED. THE SATELLITE MEASUREMENTS WERE ACCOMPANIED BY SIMULTANEOUS GROUND-BASED, BALLOON, AND ROCKET OBSERVATIONS. THE PARAMETERS WERE -- GEOMAGNETIC FIELD (3 COMPONENTS), LOW-ENERGY PARTICLE FLUXES AND THEIR ANGULAR DISTRIBUTIONS (ELECTRONS AND POSITIVE IONS, 100 EV TO 50 KEV), VLF WAVES (100 HZ TO 16 KHZ) ELECTRIC AND MAGNETIC COMPONENTS, ELECTROSTATIC FIELDS OF MAGNETOSPHERIC-IONOSPHERIC ORIGIN BY A DOUBLE-PROBE TECHNIQUE (3 COMPONENTS), ELECTRON AND ION DENSITIES AND TEMPERATURES USING SEVERAL TECHNIQUES, AND THE ION AND NEUTRAL COMPOSITION OF THE UPPER ATMOSPHERE. EXPERIMENT PERSONNEL AND DESCRIPTIONS OF THE INSTRUMENTS HAVE BEEN REPORTED FROM TRISKA (6/79) BUT NOT YET RECEIVED.

***** INTERCOSMOS 19*****

SPACECRAFT COPRON NAME- INTERCOSMOS 19
 ALTERNATE NAMES- 11285, IONOSONDE-1K
 IONO-1K

NSSDC ID- 79-028A
 LAUNCH DATE- 02/27/79 WEIGHT- 550. KG
 LAUNCH SITE- PLESETSK, U.S.S.R.
 LAUNCH VEHICLE- UNKNOWN

ORIGINAL PAGE IS
 OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
U.S.S.R.

INTERCOS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.8 MIN
PERIAPSIS- 302. KM ALT

EPOCH DATE- 02/28/79
INCLINATION- 74. DEG
APOAPSIS- 966. KM ALT

PERSONNEL
PS - V.V. NIGULIN

IZMIRAN

BRIEF DESCRIPTION

DURING THE INTERNATIONAL MAGNETOSPHERE STUDY PERIOD AN INTERCOSMOS SPACECRAFT, IONOSONDE-1K, WAS LAUNCHED INTO A HIGH INCLINATION ELLIPTICAL ORBIT WITH A LOW APOGEE. THE MAIN SCIENTIFIC OBJECTIVES OF IONOSONDE-1K WERE (1) THE STUDY OF ELECTRON DENSITY DISTRIBUTION FROM THE MAIN IONIZATION MAXIMUM OF F REGION UP TO THE SATELLITE ALTITUDE WITH A TOP SIDE SOUNDER, AND THE CORRELATION OF THE TIME AND SPACE VARIATIONS WITH SOLAR ACTIVITY, CORPUSCULAR FLUXES AND OTHER GEOPHYSICAL PHENOMENA, (2) GLOBAL MAPPING OF BASIC IONOSPHERIC PARAMETERS AND CONSTRUCTION OF A TOP-SIDE IONOSPHERE MODEL, (3) THE STUDY OF WAVE PROCESSES IN MAGNETOSPHERIC PLASMA IN THE FREQUENCY RANGE 100 HZ TO 5 MHZ, (4) THE STUDY OF TIME AND SPACE VARIATIONS OF EMISSIONS IN THE 6300-6364 Å BANDS AND 3914 Å AND 5577 Å LINES, (5) THE STUDY OF TIME AND SPACE VARIATIONS OF CHARGED PARTICLES WITH ENERGIES BETWEEN 10 EV AND 50 MEV AND THEIR IONOSPHERIC EFFECTS, AND (6) THE STUDY OF TIME AND SPACE VARIATIONS OF LOCAL ELECTRON AND ION DENSITIES AND TEMPERATURES. THE PROGRAM INCLUDES SIMULTANEOUS GROUND-BASED OBSERVATIONS AT IONOSPHERIC AND SOLAR STATIONS OF THE USSR AND SOCIALIST COUNTRIES. EXPERIMENT INFORMATION NOT SUPPLIED.

***** ISEE 1 *****

SPACECRAFT COMMON NAME- ISEE 1
ALTERNATE NAMES- IMP-K, 10422
MOTHER, INTNL SUN EARTH EXPL-A
ISEE-A

NSSDC ID- 77-102A

LAUNCH DATE- 10/22/77 WEIGHT- 340.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3446.4 MIN
PERIAPSIS- 281. KM ALT

EPOCH DATE- 10/23/77
INCLINATION- 28.7 DEG
APOAPSIS- 138120. KM ALT

PERSONNEL
MG - J.P. CORRIGAN
SC - E.R. SCHRELLING
PM - R.O. WALES
PS - K.W. OGILVIE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS MOTHER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE--(1) TO INVESTIGATE SOLAR/TERRRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE TO 25 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE WAS SET AT 19.75 RPM, DIFFERING SLIGHTLY FROM THE ISEE-B SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 1, ANDERSON -----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102A-10

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K.A. ANDERSON
OI - C.I. MENG
OI - F.V. CORONITI
OI - J.M. BOSQUED
OI - R. PELLAT
OI - G.K. PARKS
OI - R.P. LIN
OI - M. RENE

U OF CALIF, BERKELEY
APPLIED PHYSICS LAB
U OF CALIF, LA
CESR
CTR FOR THEORETIC PHYS
U OF WASHINGTON
U OF CALIF, BERKELEY
CESR

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS: 0 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS: 0 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD COULD BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTED OF A PAIR OF SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-ENERGY ELECTRIC FIELD PARTICLE ANALYZERS. THE TELESCOPES HAD A VIEWING CONE WITH HALF ANGLE 40 DEG, ORIENTED AT ABOUT 20 DEG TO THE SPIN AXIS.

----- ISEE 1, BAME -----

INVESTIGATION NAME- FAST PLASMA AND SOLAR WIND IONS

NSSDC ID- 77-102A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME
OI - H. NIGGENRIEDER
OI - K. SCHINDLER
OI - J.R. ASBRIDGE
OI - M.R. ROSENBAUER
OI - M. VOLK
OI - M.D. MONTGOMERY
OI - G. PASCHMANN
OI - M.C. FELDMAN
OI - E.W. HONES, JR.

LOS ALAMOS SCI LAB
MPI-EXTRATERR PHYS
RUHR-U BOCHUM
LOS ALAMOS SCI LAB
MPI-AERONOMY
MPI-NUCLEAR PHYS
LOS ALAMOS SCI LAB
MPI-EXTRATERR PHYS
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED, IN CONJUNCTION WITH A SIMILAR INSTRUMENT PROVIDED BY G. PASCHMANN OF MAX PLANCK INSTITUTE FOR FLIGHT ON THE DAUGHTER SPACECRAFT, TO STUDY THE PLASMA VELOCITY DISTRIBUTION AND ITS SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, MAGNETOTAIL, AND MAGNETOSPHERE. PROTONS FROM 50 EV TO 40 KEV AND ELECTRONS FROM 5 EV TO 20 KEV WERE MEASURED IN ONE, TWO, AND THREE DIMENSIONS BY THREE 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS. THE EXPERIMENT, WHICH UTILIZED CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS, OPERATED IN TWO RANGES, WITH ENERGY RESOLUTION FOR SEVERAL STEPS IN EACH RANGE OF 10 PERCENT OF THE CENTER ENERGY LEVEL.

----- ISEE 1, CLINE -----

INVESTIGATION NAME- GAMMA-RAY BURSTS

NSSDC ID- 77-102A-14

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - T.L. CLINE
OI - D.K. HOVESTADT
OI - B.J. TEEGARDEN
OI - G. GLOECKLER

NASA-GSFC
MPI-EXTRATERR PHYS
NASA-GSFC
U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS. TWO SENSORS WERE USED: A 4-CM DIAM CESIUM IODIDE SCINTILLATOR SYSTEM AND A 6-SQ CM SOLID-STATE (CADMIUM TELLURIDE) ARRAY. AN INTENSITY INCREASE IN EITHER OF THE SENSORS COULD CAUSE A TRIGGER TO OCCUR, FREEZING THE CIRCULATING MEMORY OF THE IMMEDIATE PAST COUNTING RATE HISTORY AND FILLING ANOTHER MEMORY WITH THE COUNTING RATES FOR 1 MIN FOLLOWING THE TRIGGER. THE TIME OF THE TRIGGER AND ITS LOCATION IN THE TEMPORAL HISTORY WERE ALSO STORED IN MEMORY. ALL STORED INFORMATION WAS THEN READ OUT AT A VERY LOW BIT RATE DURING THE SUCCEEDING SEVERAL HOURS. THREE TRIGGERS WERE USED BASED ON TOTAL COUNTS IN 4 MS, 32 MS, AND 256 MS. SIX MEMORIES WERE USED, THREE BEFORE AND THREE AFTER THE TRIGGER, YIELDING STORAGE OF 1/64, 1/8, AND 1 MIN OF DATA EACH TO PROVIDE DETAILED RISE-TIME INFORMATION.

----- ISEE 1, FRANK -----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-102A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - L.A. FRANK U OF IOWA
 OI - V.M. VASYLIUNAS MPI-AERONOMY
 OI - C.F. KENNEL U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION ($\Delta E/E$) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO (ONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4 PI-SR SOLID-ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PROTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 1, GURNETT-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-102A-07 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - D.A. GURNETT U OF IOWA
 OI - F.L. SCARF TRW SYSTEMS GROUP
 OI - R.W. FREDERICKS TRW SYSTEMS GROUP
 OI - E.J. SMITH NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR (BUT SIMPLER) EXPERIMENT ON ISEE 2, WAS DESIGNED TO MEASURE WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND. THREE ELECTRIC DIPOLE ANTENNAS AND A TRIAXIAL SEARCH COIL ANTENNA WERE USED. THE INSTRUMENTATION CONSISTED OF FOUR MAIN ELEMENTS: (1) A NARROW-BAND SWEEP FREQUENCY RECEIVER WITH 32 FREQUENCY STEPS IN EACH OF FOUR BANDS FROM 100 HZ TO 400 KHZ. A COMPLETE SWEEP REQUIRED 23 S; (2) A HIGH TIME RESOLUTION SPECTRUM ANALYZER WITH 20 CHANNELS FROM 5.62 HZ TO 311 KHZ FOR ELECTRIC FIELD AND 14 IDENTICAL CHANNELS FROM 5.62 HZ TO 10 KHZ FOR MAGNETIC FIELD INFORMATION. THE ELECTRIC AND MAGNETIC CHANNELS WERE SAMPLED SIMULTANEOUSLY; (3) A WAVE NORMAL ANALYZER TO PROVIDE COMPONENTS FOR COMPUTING THE WAVE NORMAL AND THE POYNTING FLUX. THIS ANALYZER HAD A 10 HZ BANDWIDTH, AND COVERED 32 FREQUENCIES FROM 100 HZ TO 5 KHZ; AND (4) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THIS RECEIVER ALSO PROVIDED THE SIGNALS FOR LONG BASELINE INTERFEROMETER MEASUREMENTS BETWEEN ISEE 1 AND ISEE 2. THERE WERE TWO BASIC FREQUENCY CHANNELS: 10 HZ TO 1 KHZ AND 650 HZ TO 10 OR 40 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY CONVERSION SCHEME TO ANY OF 8 RANGES UP TO 2 MHZ.

----- ISEE 1, HARVEY-----

INVESTIGATION NAME- PLASMA DENSITY

NSSDC ID- 77-102A-08 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 SPACE PLASMAS
 PARTICLES AND FIELDS

PERSONNEL

PI - C.C. HARVEY PARIS OBSERVATORY
 OI - M. PETIT CNET
 OI - J.R. MCAFEE NOAA-ERL
 OI - D. JONES ESA-ESTEC
 OI - J.M. ETCHEO CNET
 OI - R.J.L. GRARD ESA-ESTEC
 OI - R.E. GENDRIN CNET

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE PLASMA ELECTRON DENSITY NEAR THE MOTHER SATELLITE AND ALSO THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER SPACECRAFT. THE EXPERIMENT CONSISTED OF TWO DISTINCT PARTS -- (1) THE MOTHER SPACECRAFT THAT CARRIED AN EXPERIMENT (THE 'FOUNDER') TO DETECT RESONANCES OF THE AMBIENT PLASMA. AFTER AN ANTENNA HAD BEEN MOMENTARILY EXCITED AT ONE OF THE CHARACTERISTIC FREQUENCIES OF THE PLASMA IN WHICH IT WAS IMMERSSED, A PRONOUNCED 'RINGING' WAS OBSERVED. THESE RESONANCES OCCUR AT THE PLASMA FREQUENCY, THE UPPER HYBRID RESONANCE, THE CYCLOTRON FREQUENCY AND ITS HARMONICS, AND THE MEASUREMENT OF THEIR FREQUENCIES PERMITTED THE DETERMINATION OF SEVERAL PLASMA PARAMETERS, INCLUDING THE ELECTRON DENSITY. IN THIS EXPERIMENT, THE TRANSMITTER WAS DESIGNED TO STEP THROUGH 128 SUB-BANDS, COVERING THE CHARACTERISTIC RESONANCE FREQUENCIES OF THE PLASMA, FROM 0.3 TO 40.9 KHZ, AND FROM 0 TO 353 KHZ. (2) THE INTEGRATED DENSITY BETWEEN THE MOTHER AND THE DAUGHTER WAS OBTAINED FROM A SECOND

EXPERIMENT (THE PROPAGATION EXPERIMENT) THAT MEASURED THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ TRANSMITTED FROM THE MOTHER AND RECEIVED ON THE DAUGHTER (EXPERIMENT 6). THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH TO BE UNAFFECTED BY THE AMBIENT PLASMA (272.5 MHZ). DUE TO PERTURBATIONS TO OTHER EXPERIMENTS, ACTIVE OPERATION WAS ON A LIMITED DUTY CYCLE.

----- ISEE 1, HELLIWELL-----

INVESTIGATION NAME- VLF WAVE PROPAGATION

NSSDC ID- 77-102A-13 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS
 INTERPLANETARY PHYSICS

PERSONNEL

PI - R.A. HELLIWELL STANFORD U
 OI - T.F. BELL STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO PROVIDE DATA TO STUDY INTERACTIONS BETWEEN DISCRETE VLF WAVES AND ENERGETIC PARTICLES IN THE MAGNETOSPHERE. THE VLF WAVES WERE PRODUCED BY A GROUND-BASED TRANSMITTER. INJECTION OF THE WAVE BEYOND THE IONOSPHERE WAS ASSURED BY TRANSMITTER LOCATION IN A REGION WHERE THE MAGNETIC LINES OF FORCE ARE OPEN. IN THIS CASE, SIPLE STATION, ANTARCTICA. THE INJECTED SIGNAL AND ANY STIMULATED VLF EMISSIONS WERE RECORDED THROUGH A LOOP ANTENNA BY A 1- TO 32-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS WERE INTENSITY OF RECEIVED RADIO FREQUENCY AS A FUNCTION OF TIME.

----- ISEE 1, HEPPNER-----

INVESTIGATION NAME- DC ELECTRIC FIELD

NSSDC ID- 77-102A-11 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - J.P. HEPPNER NASA-GSFC
 OI - T.L. AGGSON NASA-GSFC
 OI - M.C. MAYNARD NASA-GSFC
 OI - D.A. GURNETT U OF IOWA
 OI - D.P. CAUFFMAN LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS INTENDED TO STUDY QUASI-STATIC ELECTRIC FIELD AND LOW-FREQUENCY PLASMA WAVES IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE DOUBLE-PROBE FLOATING-POTENTIAL TECHNIQUE WAS APPLIED USING LONG-WIRE ANTENNA PROBES WITH AN EFFECTIVE ELECTRIC FIELD BASELINE OF 179 METERS. THE DC DIFFERENTIAL VOLTAGE WAS MEASURED 8 OR 32 TIMES PER SECOND, DEPENDING ON BIT RATE. IN ADDITION, THE DC FIELD WAS MEASURED AT SELECTED AZIMUTHAL ANGLES RELATIVE TO THE SUN AND THE MAGNETIC FIELD, AND THE PEAK VALUE OF DELTA V AND ITS AZIMUTHAL ANGLES. LOW-FREQUENCY WAVES WERE MEASURED IN 8 FREQUENCY BANDS AS FOLLOWS - 0.19 TO 0.6, 0.6 TO 1.9, 1.9 TO 6, 6 TO 19, 19 TO 60, 60 TO 190, 190 TO 600, AND 600 TO 1900 HZ. DC MODE MEASUREMENTS HAD A TWO-STEP VARIABLE GAIN AMPLIFIER CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE WAS 0.0005 MV/M. THE AC MEASUREMENT ELECTRONICS CONSISTED OF TWO AMPLIFIER SECTIONS. ONE AMPLIFIER WAS USED FOR LOW-FREQUENCY CHANNELS, AND ONE FOR HIGH-FREQUENCY CHANNELS. GAIN LINES FOR EACH AMPLIFIER WERE CONTROLLABLE INDEPENDENTLY FROM THE GROUND. IN THE HIGHEST GAIN MODE, EACH ANALYZER CHANNEL HAD A SENSITIVITY OF 0.04 MICROVOLTS/M RMS. THE EXPERIMENT COULD BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR A FREE STATE AS CONTROLLED FROM GROUND. IN ADDITION, THE AC PORTION COULD BE RUN IN AN AVERAGING MODE, OR AN ALTERNATING AVERAGING AND PEAK AMPLITUDE DETECTION MODE KEYED TO THE TELEMETRY READOUT SEQUENCE.

----- ISEE 1, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS

NSSDC ID- 77-102A-05 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS
 PARTICLES AND FIELDS

PERSONNEL

PI - D.K. HOVESTADT MPI-EXTRATERR PHYS
 OI - J.J. O'GALLAGHER U OF MARYLAND
 OI - M. SCHOLER MPI-EXTRATERR PHYS
 OI - L.A. FISK U OF NEW HAMPSHIRE
 OI - C.V. FAN U OF ARIZONA
 OI - G. GLOECKLER U OF MARYLAND

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/O. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A DE/OX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZER (ULTRALOW-ENERGY Z, E, AND D) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A DE/OX - E SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON. DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 1, MOZER-----

INVESTIGATION NAME- QUASI-STATIC ELECTRIC FIELDS

NSSDC ID- 77-102A-06

INVESTIGATIVE PROGRAM
CCDE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.S. MOZER
OI - M.C. KILLEY

U OF CALIF, BERKELEY
CORNELL U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE QUASI-STATIC ELECTRIC FIELD IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE 8-CM-DIAM SPHERES WERE SEPARATED BY 73.5 M AND WERE POSITIONED IN THE SATELLITE SPIN PLANE. TO ATTEMPT TO OVERCOME THE SPACECRAFT SHEATH (A POTENTIAL PROBLEM WHICH PLAGUES ALL ELECTRIC FIELD DETECTORS), AN ELECTRON GUN WAS INCLUDED ON THE SPACECRAFT BODY. THE INSTRUMENT WAS DESIGNED TO BE SENSITIVE TO FIELDS FROM 0.1 TO 200 MV/M IN THE FREQUENCY BAND OF 0 TO 12 HZ. THE EXPERIMENT ALSO MEASURED THE ELECTRIC FIELD COMPONENT OF WAVES AT FREQUENCIES LESS THAN 1000 HZ.

----- ISEE 1, OGILVIE-----

INVESTIGATION NAME- FAST ELECTRONS

NSSDC ID- 77-102A-02

INVESTIGATIVE PROGRAM
CCDE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - K.W. OGILVIE
OI - J.D. SCUDDER

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT STUDIED THE TRANSPORT COEFFICIENTS OF TURBULENCE IN -- THE COLLISIONLESS PLASMA REPRESENTED BY THE INTERPLANETARY MEDIUM AND MAGNETOSHEATH, LOW-ENERGY SOLAR ELECTRON EVENTS, AND BOW SHOCK ASSOCIATED ELECTRONS. TWO TRIAXIAL SYSTEMS OF 127-DEG CYLINDRICAL ELECTROSTATIC ANALYZERS WERE USED TO MAKE THREE-DIMENSIONAL MEASUREMENTS OF THE ELECTRON DISTRIBUTION FUNCTION. THERE WERE THREE MODES OF OPERATION, WITH THE FOLLOWING NOMINAL ENERGY RANGES: SOLAR WIND, 7 TO 500 EV; MAGNETOSHEATH, 10 EV TO 2 KEV; AND MAGNETOTAIL AND SOLAR, 105 EV TO 7.05 KEV. ENERGY RESOLUTION (DELTA E/E) WAS 0.07. THE ENTIRE SET OF SIX SIMULTANEOUS SPECTROMETER MEASUREMENTS WAS TAKEN WHILE THE SATELLITE ROTATED THROUGH 60 DEG. EACH SPECTROMETER CONSISTED OF THE CURVED PLATE ANALYZER AND TWO CHANNELTRON DETECTORS.

----- ISEE 1, RUSSELL-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102A-04

INVESTIGATIVE PROGRAM
CCDE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL
OI - R.L. MCPHERRON
OI - P.C. HEDGECOCK
OI - E.W. GREENSTADT
OI - M.G. KIVELSON

U OF CALIF, LA
U OF CALIF, LA
IMPERIAL COLLEGE
TRW SYSTEMS GROUP
U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW AND HIGH SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 8 CONSECUTIVE BITS OF THE ABOVE 16 BITS WERE SELECTED BY GROUND COMMAND FOR TRANSMISSION AND THE TELEMETRY BANDWIDTHS OF THE MAGNETOMETER WERE DOUBLED. THIS BANDWIDTH VARIED FROM 2 HZ AT THE LOW TELEMETRY RATE DOUBLE-PRECISION EXPERIMENT MODE TO 32 HZ AT THE HIGH TELEMETRY RATE SINGLE-PRECISION EXPERIMENT MODE.

----- ISEE 1, SHARP-----

INVESTIGATION NAME- ION COMPOSITION

NSSDC ID- 77-102A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - R.D. SHARP
OI - G. HAERENDEL
OI - H.R. ROSENBAUER
OI - R.G. JOHNSON
OI - E.G. SHELLEY
OI - J. GEISS
OI - P.H. EBERHARDT
OI - M. BALSIGER
OI - C.R. CHAPPELL
OI - A. GHIJLNETTI
OI - D.T. YOUNG

LOCKHEED PALO ALTO
MPI-EXTRATERM PHYS
MPI-AERONOMY
LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
U OF BERNE
U OF BERNE
U OF BERNE
NASA-MSC
U OF BERNE
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE ION COMPOSITION AND ENERGY SPECTRA OF THE PLASMA WITHIN THE MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND, AND TO DETERMINE THE ANGULAR DISTRIBUTION OF THE PLASMA IN THE MAGNETOSHEATH. AN ENERGETIC ION MASS SPECTROMETER WAS FLOWN THAT HAD AN ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL ELECTROSTATIC/MAGNETIC MASS ANALYZER. A COMBINATION OF ELECTRON MULTIPLIERS WAS USED AS THE DETECTOR. THE ENERGY-PER-UNIT-CHARGE RANGE MEASURED WAS FROM 0 TO 17 KEV/O. THE MASS-PER-UNIT-CHARGE RANGE MEASURED EXTENDED FROM 1 TO GREATER THAN 150 U/O.

----- ISEE 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 77-102A-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - C.O. BOSTROM
OI - B. WILKEN
OI - T.A. FRITZ
OI - G.H. WIBBERENZ
OI - E. KEPPLER

NOAA-ERL
APPLIED PHYSICS LAB
MPI-AERONOMY
NOAA-ERL
U OF KIEL
MPI-AERONOMY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO IDENTIFY AND TO STUDY PLASMA INSTABILITIES RESPONSIBLE FOR ACCELERATION, SOURCE AND LOSS MECHANISMS, AND BOUNDARY AND INTERFACE PHENOMENA THROUGHOUT THE ORBITAL RANGE OF THE MOTHER/DAUGHTER SATELLITES. A PROTON TELESCOPE AND AN ELECTRON SPECTROMETER WERE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRUM AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USED SILICON SURFACE BARRIER TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 8 OR 16 CHANNELS BETWEEN 20 KEV AND 1.2 MEV, AND ELECTRONS IN 8 OR 16 CHANNELS BETWEEN 20 KEV AND 1 MEV WERE MEASURED. A SEPARATE SOLID-STATE DETECTOR SYSTEM MEASURED THE ENERGY SPECTRA AND PITCH-ANGLE DISTRIBUTIONS OF ALPHA PARTICLES AND HEAVY IONS IN THE ENERGY RANGE ABOVE 125 KEV PER NUCLEON.

***** ISEE 2*****

SPACECRAFT COPPON NAME- ISEE 2
ALTERNATE NAMES- IMP-K PRIME, IME-B
10423, ISEE-B
DAUGHT:

NSSDC ID- 77-102B

LAUNCH DATE- 10/22/77 WEIGHT- 165.78 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/23/77
ORBIT PERIOD- 3454.1 MIN INCLINATION- 28.7 DEG
PERIAPSIS- 280. KM ALT APOAPSIS- 138317. KM ALT

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - A. MURKIN ESA-ESTEC
PS - A.C. DAWNEY ESA-ESTEC

BRIEF DESCRIPTION
THE EXPLORER CLASS DAUGHTER SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE -- (1) TO INVESTIGATE SOLAR-TERRRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTED OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE OF 23 EARTH RADII. THE SPACECRAFT MAINTAINED A SMALL SEPARATION DISTANCE, AND MADE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE. THE SPIN RATE OF THE SPACECRAFT WAS FIXED AT 19.8 RPM, DIFFERING SLIGHTLY FROM THE ISEE-A SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 2, ANDERSON-----

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102B-08 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K.A. ANDERSON U OF CALIF, BERKELEY
OI - C.I. MENG APPLIED PHYSICS LAB
OI - J.M. BOSQUED CESR
OI - R. PELLAT CTR FOR THEORETIC PHYS
OI - F.V. CORONITI U OF CALIF, LA
OI - H. REHE CESR
OI - R.P. LIN U OF CALIF, BERKELEY
OI - G.K. PARKS U OF WASHINGTON

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETERMINE, BY USING IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL EXTENT, PROPAGATION VELOCITY, AND TEMPORAL BEHAVIOR OF A WIDE VARIETY OF PARTICLE PHENOMENA. ELECTRONS WERE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS; 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS WERE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS; 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 300 KEV. THE 30 KEV THRESHOLD COULD BE COMMANDS TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTED OF A PAIR OF SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND FOUR FIXED-ENERGY ELECTRIC FIELD PARTICLE ANALYZERS. THE TELESCOPES HAD A VIEWING CONE WITH HALF ANGLE 40 DEGREES, ORIENTED AT ABOUT 20 DEGREES TO THE SPIN AXIS.

----- ISEE 2, EGIDI-----

INVESTIGATION NAME- SOLAR WIND IONS

NSSDC ID- 77-102B-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - A. EGIDI CNR, SPACE PLASMA LAB
OI - G. MORENO CNR, SPACE PLASMA LAB
OI - P. CERULLI CNR, SPACE PLASMA LAB
OI - V. FORMISANO CNR, SPACE PLASMA LAB
OI - S.C. CANTARANO CNR, SPACE PLASMA LAB
OI - S.J. BAME LOS ALAMOS SCI LAB
OI - G. PASCHMANN MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS INSTRUMENT WAS DESIGNED TO MEASURE THE ANGULAR DISTRIBUTIONS AND ENERGY SPECTRA OF POSITIVE IONS IN THE SOLAR WIND. THE MAIN REGION OF INTEREST WAS OUTWARD FROM AND INCLUDING THE MAGNETOPAUSE (GREATER THAN 8 EARTH RADII). TWO HEMISPHERICAL ELECTROSTATIC ANALYZERS WERE USED TO COVER THE ENERGY RANGE 100 EV TO 10 KEV/8 IN UP TO 64 ENERGY CHANNELS. THERE WERE TWO OPERATING MODES: ONE FOR HIGH TIME RESOLUTION AND ONE FOR HIGH ENERGY RESOLUTION. ENERGY LEVELS WERE KEPT CONSTANT THROUGH A COMPLETE SPACECRAFT REVOLUTION.

----- ISEE 2, FRANK-----

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- 77-102B-03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - L.A. FRANK U OF IOWA
OI - V.R. VASYLIUNAS MPI-AERONOMY
OI - C.F. KEMMEL U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE MOTHER/DAUGHTER SPACECRAFT, THE SPATIAL AND TEMPORAL VARIATIONS OF THE SOLAR WIND AND MAGNETOSHEATH ELECTRONS AND IONS. PROTONS AND ELECTRONS IN THE ENERGY RANGE FROM 1 EV TO 45 KEV WERE MEASURED IN 64 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION (DELTA E/E) OF 0.16. A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA), EMPLOYING SEVEN CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS IN EACH OF ITS TWO (ONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS WAS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE 4 PI-SR SOLID-ANGLE WAS COVERED FOR PARTICLE VELOCITY VECTORS. A GR TUBE WAS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR WAS SENSITIVE TO ELECTRONS WITH E GREATER THAN OR EQUAL TO 45 KEV, AND PROTONS WITH E GREATER THAN OR EQUAL TO 600 KEV.

----- ISEE 2, GURNETT-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- 77-102B-05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.A. GURNETT U OF IOWA
OI - F.L. SCAFF TRW SYSTEMS GROUP
OI - E.J. SMITH NASA-JPL
OI - R.W. FREDERICKS TRW SYSTEMS GROUP

BRIEF DESCRIPTION

IN THIS EXPERIMENT, A SINGLE-AXIS SEARCH COIL MAGNETOMETER WITH A HIGH PERMEABILITY CORE AND TWO ELECTRIC FIELD DIPOLES (50 M AND 0.61 M) MEASURED WAVE PHENOMENON OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE MOTHER SPACECRAFT. THE ANTENNAS WERE MOUNTED PERPENDICULAR TO THE SPIN AXIS. THE INSTRUMENTATION WAS COMPOSED OF TWO ELEMENTS: (1) A HIGH TIME RESOLUTION SPECTRUM ANALYZER WITH 16 FREQUENCY CHANNELS (IDENTICAL TO THOSE ON ISEE 1) FROM 5.62 HZ TO 31.1 KHZ. ALL CHANNELS WERE SAMPLED 1 OR 4 TIMES PER S, DEPENDING ON BIT RATE; AND (2) A WIDE-BAND RECEIVER TO CONDITION ELECTRIC AND MAGNETIC WAVEFORMS FOR TRANSMISSION TO THE GROUND VIA THE SPECIAL-PURPOSE ANALOG TRANSMITTER. THERE WERE TWO BASIC FREQUENCY CHANNELS, FROM 10 HZ TO 1 KHZ AND FROM 650 HZ TO 10 KHZ. IN ADDITION, THE FREQUENCY RANGE COULD BE SHIFTED BY A FREQUENCY CONVERSION SCHEME TO ANY OF EIGHT RANGES UP TO 2.0 MHZ.

----- ISEE 2, HARVEY-----

INVESTIGATION NAME- RADIO PROPAGATION

NSSDC ID- 77-102B-06 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - C.C. HARVEY PARIS OBSERVATORY
OI - R.E. GENDRIN CNET
OI - J.R. MCAFEE NOAA-ERL
OI - M. PETIT CNET
OI - D. JONES ESA-ESTEC
OI - J.M. ETCHETO CNET
OI - R.J.L. GRARD ESA-ESTEC

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER WAS OBTAINED BY MEASURING THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 683 KHZ, TRANSMITTED FROM THE MOTHER (EXPERIMENT B) AND RECEIVED ON THE DAUGHTER. THE PHASE WAS COMPARED AGAINST A PHASE-COHERENT SIGNAL TRANSMITTED FROM THE MOTHER TO THE DAUGHTER BY MODULATION ONTO A CARRIER OF FREQUENCY HIGH ENOUGH (272.5 MHZ) TO BE UNAFFECTED BY THE AMBIENT PLASMA.

----- ISEE 2, PASCHMANN-----

INVESTIGATION NAME- FAST PLASMA

NSSDC ID- 77-102B-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - G. PASCHMANN	MPI-EXTRATERR PHYS
O1 - W.C. FELDMAN	LOS ALAMOS SCI LAB
O1 - E.W. HONES, JR.	LOS ALAMOS SCI LAB
O1 - K. SCHINDLER	RUMR-U BOCHUM
O1 - H. HIGGENRIEDER	MPI-EXTRATERR PHYS
O1 - S.J. BAME	LOS ALAMOS SCI LAB
O1 - H. VOLK	MPI-NUCLEAR PHYS
O1 - H.R. ROSENBAUER	MPI-AERONOMY
O1 - M.D. MONTGOMERY	LOS ALAMOS SCI LAB
O1 - J.R. ASURIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE PLASMA VELOCITY DISTRIBUTIONS AND THEIR SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, AND MAGNETOTAIL (WITHIN THE MAGNETOSPHERE). ONE-, TWO-, AND THREE-DIMENSIONAL VELOCITY DISTRIBUTIONS FOR POSITIVE IONS AND ELECTRONS WERE MEASURED USING TWO 90-DEG SPHERICAL ELECTROSTATIC ANALYZER WITH CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS. IN CONJUNCTION WITH SIMILAR INSTRUMENTATION PROVIDED BY S. J. BAME/LASL FOR THE MOTHER SPACECRAFT, PROTONS FROM 50 EV TO 40 KEV (AND ELECTRONS FROM 5 EV TO 20 KEV) WERE MEASURED WITH 10 PERCENT ENERGY RESOLUTION IN TWO RANGES EACH.

----- ISEE 2, RUSSELL-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102B-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL	U OF CALIF, LA
O1 - R.L. MCPHERSON	U OF CALIF, LA
O1 - P.C. HEDGECOCK	IMPERIAL COLLEGE
O1 - E.W. GREENSTADT	TRW SYSTEMS GROUP
O1 - M.G. KIVELSON	U OF CALIF, LA

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD WERE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT WAS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAD TWO OPERATING RANGES OF PLUS OR MINUS 8192 NT AND PLUS OR MINUS 256 NT IN EACH VECTOR COMPONENT. THE DATA WERE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE WERE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION, 16-BIT SAMPLES OF DATA WERE TRANSMITTED. THIS PROVIDED A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 NT OR 1/128 NT IN THE LOW- AND HIGH-SENSITIVITY RANGES.

----- ISEE 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 77-102B-07 INVESTIGATIVE PROGRAM
CCDE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
O1 - T.A. FRITZ	NOAA-ERL
O1 - C.O. BOSTROM	APPLIED PHYSICS LAB
O1 - E. KEPPLER	MPI-AERONOMY
O1 - B. WILKEN	MPI-AERONOMY
O1 - G.H. WIBBERENZ	U OF KIEL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO IDENTIFY AND TO STUDY PLASMA INSTABILITIES RESPONSIBLE FOR ACCELERATION, SOURCE AND LOSS MECHANISMS, AND BOUNDARY AND INTERFACE PHENOMENA THROUGHOUT THE ORBITAL RANGE OF MOTHER/ DAUGHTER SATELLITES. A PROTON TELESCOPE AND AN ELECTRON SPECTROMETER WERE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRA AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USED SILICON, SURFACE-BARRIER, TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 2 MEV AND ELECTRONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 300 KEV (UP TO 1.2 MEV FOR 90 DEG) WERE MEASURED. DATA WAS ACCUMULATED IN UP TO 32 SECTORS PER SPIN.

***** ISEE 3*****

SPACECRAFT COPRON NAME- ISEE 3
ALTERNATE NAMES- STP PROBE, ISE-H
HELIOCENTRIC, INTNL SUN EARTH EXPL-C
ISEE-C

NSSDC ID- 78-079A

LAUNCH DATE- 08/12/78 WEIGHT- 469. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-CSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC	EPOCH DATE- 11/25/78
ORBIT PERIOD- 365. DAYS	INCLINATION- 0. DEG
PERIAPSIS- 0.99 AU RAD	APOAPSIS- 0.99 AU RAD

PERSONNEL

MG - J.P. CORRIGAN	NASA-GSFC
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PP - R.O. WALES	NASA-GSFC
PS - T.T. VON ROSENVINGE	NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS HELIOCENTRIC SPACECRAFT WAS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION WERE (1) TO INVESTIGATE SOLAR/TERRRESTRIAL RELATIONSHIPS AT THE OUTERMOST BOUNDARIES OF THE EARTH'S MAGNETOSPHERE, (2) TO EXAMINE IN DETAIL THE STRUCTURE OF THE SOLAR WIND NEAR THE EARTH AND THE SHOCK WAVE THAT FORMS THE INTERFACE BETWEEN THE SOLAR WIND AND EARTH, AND (3) TO CONTINUE THE INVESTIGATION OF COSMIC RAYS AND SOLAR FLARES IN THE INTERPLANETARY REGION NEAR 1 AU. THE MISSION THUS EXTENDED THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE LAUNCH OF THREE COORDINATED SPACECRAFT IN THIS MISSION PERMITTED THE SEPARATION OF SPATIAL AND TEMPORAL EFFECTS. THE HELIOCENTRIC SPACECRAFT HAD A SPIN AXIS NORMAL TO THE ECLIPTIC PLANE AND A SPIN RATE OF ABOUT 20 RPM. IT WAS PLACED INTO AN ELLIPTICAL HALO ORBIT ABOUT THE LIBRATION POINT (L1) 235 EARTH RADII ON THE SUN SIDE OF THE EARTH, WHERE IT CONTINUOUSLY MONITORED CHANGES IN THE NEAR-EARTH INTERPLANETARY MEDIUM. BECAUSE BOTH THE MOTHER AND DAUGHTER SPACECRAFT HAD ECCENTRIC GEOCENTRIC ORBITS, IT WAS HOPED THAT THIS MISSION WOULD MEASURE THE CAUSE/EFFECT RELATIONSHIPS BETWEEN THE INCIDENT SOLAR PLASMA AND THE MAGNETOSPHERE. FINALLY, THE HELIOCENTRIC SPACECRAFT ALSO PROVIDED A NEAR-EARTH BASE FOR MAKING COSMIC-RAY AND OTHER PLANETARY MEASUREMENTS FOR COMPARISON WITH COINCIDENT MEASUREMENTS FROM DEEP-SPACE PROBES. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE IEEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-16, NO. 3, JULY, 1978.

----- ISEE 2, ANDERSON-----

INVESTIGATION NAME- INTERPLANETARY AND SOLAR ELECTRONS

NSSDC ID- 78-079A-09 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - K.A. ANDERSON	U OF CALIF, BERKELEY
O1 - R.P. LIN	U OF CALIF, BERKELEY
O1 - D.F. SMITH	HIGH ALTITUDE OBS
O1 - S.R. KANE	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY SPECTRA AND ANISOTROPIES OF INTERPLANETARY AND SOLAR ELECTRONS (2 TO 1000 KEV) IN THE TRANSITION ENERGY RANGE BETWEEN SOLAR WIND AND LOW-ENERGY COSMIC RAYS. THE ELECTRONS WERE MEASURED BY A PAIR OF PASSIVELY COOLED, SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (APPROXIMATELY 15 KEV TO APPROXIMATELY 1 MEV) AND BY A HEMISPHERICAL PLATE ELECTROSTATIC ANALYZER WITH CHANNEL-MULTIPLIER DETECTORS (2-18 KEV). COUNTING RATES WERE SECTORED INTO ANGULAR SECTORS ABOUT EITHER THE MAGNETIC FIELD OR THE SUN DIRECTION. THE TELESCOPE YIELDED 8 OR 16 SECTORS AND THE ANALYZER YIELDED 16 SECTORS.

----- ISEE 3, ANDERSON-----

INVESTIGATION NAME- X- AND GAMMA-RAY BURSTS
 NSSDC ID- 78-079A-14 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 X-RAY ASTRONOMY
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - K.A. ANDERSON U OF CALIF, BERKELEY
 OI - S.R. KANE U OF CALIF, BERKELEY
 OI - W.D. EVANS LOS ALAMOS SCI LAB
 OI - R.W. KLEBESADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO PROVIDE CONTINUOUS COVERAGE OF SOLAR FLARE X RAYS AND TRANSIENT COSMIC GAMMA-RAY BURSTS. DETECTORS WERE A XENON-FILLED PROPORTIONAL COUNTER (5-14 KEV IN 6 CHANNELS) AND A SODIUM IODIDE SCINTILLATOR (12-1250 KEV IN 12 CHANNELS). THERE WERE FOUR OPERATING MODES: NORMAL, FLARE-1, FLARE-2, AND GAMMA BURST. IN NORMAL MODE, TIME RESOLUTION WAS 0.5 TO 4 S, DEPENDING ON THE CHANNEL. IN GAMMA BURST MODE, BEST TIME RESOLUTION WAS IN STORED DATA, WITH 0.25 TO 125 MS RESOLUTION.

----- ISEE 3, BAME-----

INVESTIGATION NAME- SOLAR WIND PLASMA
 NSSDC ID- 78-079A-01 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE PLASMAS

PERSONNEL
 PI - S.J. BAME LOS ALAMOS SCI LAB
 OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB
 OI - E.W. HONES, JR. LOS ALAMOS SCI LAB
 OI - M.D. MONTGOMERY LOS ALAMOS SCI LAB
 OI - W.C. FELDMAN LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MAKE AN INTEGRATED STUDY OF THE NATURE, ORIGIN AND EVOLUTION OF STRUCTURE IN THE INTERPLANETARY MEDIUM. ALSO, THE THERMAL STATE OF THE INTERPLANETARY PLASMA WAS STUDIED, UNPERTURBED BY THE EARTH'S BOW SHOCK. ION VELOCITY DISTRIBUTIONS WERE MEASURED BY A 135-DEG SPHERICAL ELECTROSTATIC ANALYZER IN BOTH TWO AND THREE DIMENSIONS. STEP ENERGY RESOLUTION FOR EACH ENERGY WINDOW WAS 4.2 PERCENT. ELECTRON VELOCITY DISTRIBUTIONS WERE MEASURED BY A 90-DEG SPHERICAL ELECTROSTATIC ANALYZER, ALSO IN TWO AND THREE DIMENSIONS. THE ENERGY WINDOW PER STEP FOR ELECTRONS WAS 10 PERCENT. CHANNELTRON ELECTRON MULTIPLIERS WERE USED AS DETECTORS FOR EACH OF THE ANALYZERS. SOLAR WIND ELECTRONS WERE MEASURED IN 15 CONTIGUOUS CHANNELS FROM 8.5 TO 1140 EV. A SPECIAL PHOTOELECTRON RANGE OF 1.6 TO 220 EV COULD BE COMMANDED. VARIOUS MIXTURES OF DATA FOR 2-D AND 3-D DISTRIBUTION FUNCTIONS COULD BE SELECTED. IONS WERE MEASURED IN 32 CHANNELS FROM 237 EV PER CHARGE TO 10.7 KEV PER CHARGE. VARIOUS MODES WERE AVAILABLE FOR BASIC SWEEP, SEARCH, AND TRACKING OF THE PEAK OF THE DISTRIBUTION.

----- ISEE 3, HECKMAN-----

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAY
 NSSDC ID- 78-079A-05 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - H.H. HECKMAN LAWRENCE BERKELEY LAB
 OI - D.E. GREINER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE ISOTOPIC ABUNDANCE IN THE PRIMARY COSMIC RAYS FOR HYDROGEN THROUGH NICKEL. THE INSTRUMENT USED A 10-ELEMENT, SOLID-STATE, PARTICLE TELESCOPE CONSISTING OF LITHIUM-DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED RAN FROM APPROXIMATELY 20 TO APPROXIMATELY 500 MEV PER NUCLEON. DIRECTION OF INCIDENT NUCLEI WAS OBTAINED FROM A SIX-PLANE DRIFT CHAMBER WITH 2-DEG RESOLUTION.

----- ISEE 3, HOVESTADT-----

INVESTIGATION NAME- LOW-ENERGY COSMIC RAYS
 NSSDC ID- 78-079A-03 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - D.K. HOVESTADT MPI-EXTRATERR PHYS
 OI - J.J. O'GALLAGHER U OF MARYLAND
 OI - C.V. FAN U OF ARIZONA
 OI - G. GLOECKLER U OF MARYLAND
 OI - M. SCHOLER MPI-EXTRATERR PHYS
 OI - L.A. FISK U OF NEW HAMPSHIRE

BRIEF DESCRIPTION
 THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, WAS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/NUCLEON TO 80 MEV/NUCLEON, AND ELECTRONS IN FOUR CONTIGUOUS BANDS FROM 75 TO 1300 KEV. AT THE LOWER ENERGIES, CHARGE STATES OF HEAVY IONS IN THE HIGH SPEED (GREATER THAN 500 KM/S) SOLAR WIND WERE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS WERE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE WAS POSSIBLE. THE INSTRUMENT CONSISTED OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) WAS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE WAS APPROXIMATELY 3 TO 560 KEV/CHARGE. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) WAS A DE/DX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZEG (ULTRALOW-ENERGY Z, E, AND #) WAS A COMBINATION OF AN ELECTROSTATIC ANALYZER AND A DE/DX - E SYSTEM WITH A THIN-WINDOW PROPORTIONAL COUNTER AND A POSITION-SENSITIVE SOLID STATE DETECTOR. THE ENERGY RANGE WAS 0.4 TO 6 MEV/NUCLEON. DATA COULD BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 3, HYNDS-----

INVESTIGATION NAME- ENERGETIC PROTONS
 NSSDC ID- 78-079A-08 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL
 PI - R.J. HYNDS IMPERIAL COLLEGE
 OI - J.J. VAN ROOIJEN U OF UTRECHT
 OI - J.M. VAN GILS U OF UTRECHT
 OI - R.M. VAN DEN NIEUWENHOF U OF UTRECHT
 OI - K.P. MENZEL ESA-ESTEC
 OI - A.C. BURNEY ESA-ESTEC
 OI - T.R. SANDBERSON ESA-ESTEC
 OI - V. DOMINGO ESA-ESTEC
 OI - D.E. PAGE ESA-ESTEC
 OI - A. BALOGH IMPERIAL COLLEGE
 OI - C. DE JAGER U OF UTRECHT
 OI - H. ELLIOT IMPERIAL COLLEGE

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO STUDY LOW-ENERGY SOLAR PROTON ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. THE INSTRUMENT MEASURED THE ENERGY SPECTRUM IN 8 CHANNELS, AND THE 3-DIMENSIONAL ANGULAR DISTRIBUTION OF PROTONS IN THE ENERGY RANGE 0.035 TO 1.6 MEV WITH A BASIC TIME RESOLUTION OF 16 S. COUNTS OF EACH CHANNEL WERE GROUPED INTO EIGHT 45-DEG SECTORS. THE INSTRUMENT CONSISTED OF THREE IDENTICAL TELESCOPES MOUNTED AT 30, 60, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS, EACH CONTAINING TWO SURFACE BARRIER DETECTORS, A MECHANICAL COLLIMATOR, AND A 'BROOM' MAGNET TO SWEEP AWAY ELECTRONS.

----- ISEE 3, MEYER-----

INVESTIGATION NAME- COSMIC-RAY ELECTRONS AND NUCLEI
 NSSDC ID- 78-079A-06 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - P. MEYER U OF CHICAGO
 OI - P. EVENSON U OF CHICAGO

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO STUDY PARTICLE PROPAGATION WITHIN THE SOLAR SYSTEM AND THE PROPERTIES OF THE INTERPLANETARY MEDIUM. THE FOLLOWING SPECIES WERE RESOLVED: (1) ELECTRONS (DIFFERENTIAL SPECTRUM FROM 5 TO 400 MEV); (2) NUCLEI FROM PROTONS TO THE IRON GROUP (DIFFERENTIAL SPECTRA AND RELATIVE ABUNDANCES FROM 30 TO 15,000 MEV/NUCLEON); AND (3) HELIUM THROUGH SULFUR. A CHARGE PARTICLE TELESCOPE WAS USED TO MAKE THESE MEASUREMENTS. IT CONSISTED OF THREE SOLID-STATE DETECTORS, A GAS CERENKOV COUNTER, A CESIUM IODIDE SCINTILLATION DETECTOR, TWO PLASTIC SCINTILLATION COUNTERS, AND A QUARTZ CERENKOV COUNTER. THE DESIGN OF THE TELESCOPE WAS BASED ON THAT USED IN EXPERIMENT 68-014A-09 FOR OGO 5.

----- ISEE 3, OGILVIE-----

INVESTIGATION NAME- SOLAR WIND ION COMPOSITION
NSSDC ID- 78-079A-11 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - K.W. OGILVIE NASA-GSFC
OI - J. GEISS U OF BERNE
OI - M.W. ACUNA NASA-GSFC
OI - M.A. COPLAN U OF MARYLAND
OI - D.L. LIND NASA-JSC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ENERGY ANALYZER AND A HIGH VELOCITY FILTER CONFIGURED AS A MASS SPECTROMETER TO DETERMINE THE CHARGE STATE AND ISOTOPIC CONSTITUTION OF THE SOLAR WIND. THE INSTRUMENT HAD AN ENERGY PER UNIT CHARGE RANGE OF 0.84 TO 11.7 KEV PER CHARGE, A MASS PER UNIT CHARGE RANGE OF 1.5 TO 5.6 U PER CHARGE, AND A VELOCITY RANGE OF 300 TO 600 KM/S.

----- ISEE 3, SCARF-----

INVESTIGATION NAME- PLASMA WAVES
NSSDC ID- 78-079A-07 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - F.L. SCARF TRW SYSTEMS GROUP
OI - D.A. GURNETT U OF IOWA
OI - E.J. SMITH NASA-JPL
OI - R.W. FREDERICKS TRW SYSTEMS GROUP

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO PROVIDE DATA FOR PLASMA WAVE STUDIES UNDERTAKEN TO GAIN A BETTER UNDERSTANDING OF THE WAVE PARTICLE INTERACTION AND PLASMA INSTABILITIES, WHICH LEAD TO THE EQUIVALENT COLLISION PHENOMENA THAT PRODUCE APPARENT FLUID-LIKE BEHAVIOR IN THE SOLAR WIND NEAR 1 AU. TWO ELECTRIC DIPOLES AND A MAGNETIC SEARCH COIL, BOOM-MOUNTED, WERE USED TO MEASURE MAGNETIC AND ELECTRIC FIELD WAVE LEVELS FROM 17 HZ TO 1 KHZ IN EIGHT CHANNELS AND ELECTRIC FIELD LEVELS FROM 17 HZ TO 100 KHZ IN 16 CHANNELS. IN ADDITION, A THIRD SPECTRUM ANALYZER WITH 3 BANDS BETWEEN 0.316 AND 8.8 HZ WAS INCLUDED FOR MEASUREMENT OF THE MAGNETIC FIELD. THIS UNIT USED THE SEARCH COIL, BUT WAS LOCATED WITHIN THE ELECTRONICS UNIT OF EXPERIMENT 78-079A-02.

----- ISEE 3, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS
NSSDC ID- 78-079A-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY MAGNETIC FIELDS
PARTICLES AND FIELDS

PERSONNEL
PI - E.J. SMITH NASA-JPL
OI - L. DAVIS, JR. CALIF INST OF TECH
OI - G.L. SISCOE U OF CALIF, LA
OI - D.E. JONES BRIGHAM YOUNG U
OI - B.T. TSURUTANI NASA-JPL

BRIEF DESCRIPTION
THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTED OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS WERE MADE OF THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. EIGHT FIELD AMPLITUDE RANGES (MINUS TO PLUS 4, 14, 42, 144, 640, 4000, 22,000, AND 140,000 NT) WERE AVAILABLE. THE INSTRUMENT RANGED UP AND DOWN AUTOMATICALLY OR COULD BE COMMANDED INTO A SPECIFIC RANGE. THE FIELD EQUIVALENT NOISE POWER SPECTRAL DENSITY WAS 2.E-4 NT SQUARED PER HERTZ (INDEPENDENT OF FREQUENCY), OR 0.01 NT RMS IN THE PASSBAND 0 TO 0.5 HZ. A SINGLE-AXIS SPECTRUM ANALYZER MEASURED FLUCTUATIONS PARALLEL TO THE SPACECRAFT SPIN AXIS IN THREE FREQUENCY BANDS CENTERED AT 0.33, 3.2, AND 8.8 HZ.

----- ISEE 3, STEINBERG-----

INVESTIGATION NAME- RADIO MAPPING
NSSDC ID- 78-079A-10 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS
SOLAR PHYSICS

PERSONNEL
PI - J.L. STEINBERG PARIS OBSERVATORY
OI - P. COUTURIER PARIS OBSERVATORY
OI - R. KNOLL PARIS OBSERVATORY
OI - J. FAIBERG NASA-GSFC
OI - R.G. STONE NASA-GSFC
OI - S.R. MOSIER NATL SCIENCE FOUND

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIRECTION (2 ANGLES) OF TYPE III SOLAR BURSTS AT 24 FREQUENCIES STEPPED FROM 30 KMZ TO 2 MHZ. RELYING ON SOLAR ROTATION, ONE COULD OBTAIN THE 3-D MAP OF THE MAGNETIC LINES OF FORCE, WHICH GUIDE THE ELECTRONS THAT PRODUCE TYPE III SOLAR BURSTS FROM 10 SOLAR RADII TO 1 AU IN OR OUT OF THE ECLIPTIC. THE INSTRUMENT CONSISTED PRIMARILY OF TWO BIPOLE ANTENNAS AND A FOUR-CHANNEL RADIOMETER, WITH BANDWIDTHS OF 3 KHZ AND 10 KHZ. FREQUENCY SEQUENCE WAS 72 STEPS COVERING 10R S. SELF-CALIBRATION OCCURRED EVERY 18 H.

----- ISEE 3, STONE-----

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAYS
NSSDC ID- 78-079A-12 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - E.C. STONE CALIF INST OF TECH
OI - R.E. VOGT CALIF INST OF TECH

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO STUDY THE ISOTOPIC CONSTITUTION OF SOLAR MATTER AND GALACTIC COSMIC-RAY SOURCES, THE PROCESSES OF NUCLEOSYNTHESIS IN THE SUN AND IN THE GALAXY, AND THE ASTROPHYSICAL PARTICLE ACCELERATION PROCESSED. THE FOLLOWING SPECIES WERE RESOLVED -- LITHIUM THROUGH NICKEL (2 FROM 3 THROUGH 28 AND A FROM 6 THROUGH 64) IN THE ENERGY RANGE FROM 5 TO 250 MEV/NUCLEON. THE MASS RESOLUTION WAS LESS THAN OR APPROXIMATELY EQUAL TO 0.3 U FOR Z LESS THAN OR EQUAL TO 30.

----- ISEE 3, TEEGARDEN-----

INVESTIGATION NAME- GAMMA-RAY BURSTS
NSSDC ID- 78-079A-15 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - B.J. TEEGARDEN NASA-GSFC
OI - D.K. NOVSTADT MPI-EXTRATERR PHYSS
OI - T.L. CLINE NASA-GSFC
OI - G. GLOECKLER U OF MARYLAND

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS, AND TO PROVIDE HIGH-RESOLUTION SPECTRA OF GAMMA-RAY BURST PHOTONS BETWEEN 0.05 AND 6.5 MEV. THE DETECTORS WERE: (1) A 4 CM DIAM BY 3 CM THICK GERMANIUM CRYSTAL, RADIATIVELY COOLED TO OPERATE AT APPROXIMATELY 101 DEGREES K. ENERGY RESOLUTION WAS LESS THAN 3.5 KEV AT 1 MEV. A 4096-CHANNEL ADC DIGITIZED THE SIGNALS FOR INPUT TO THE GAMMA-BURST DIGITAL INSTRUMENTATION, WHICH WAS IN THE LOW-ENERGY COSMIC RAY EXPERIMENT, 78-079A-03; (2) THE CESIUM IODIDE AND SURROUNDING DETECTORS IN THE COSMIC RAY ELECTRONS AND NUCLEI EXPERIMENT, 78-079A-06. BOTH TEMPORAL AND SPECTRAL INFORMATION WERE OBTAINED FROM THIS DETECTOR; AND (3) A SMALLER CESIUM IODIDE CRYSTAL IN EXPERIMENT 78-079A-03. TWO TIME HISTORY MEMORIES OF 2000 12-BIT WORDS WERE USED, FED FROM ANY OF THE 3 DETECTORS BY COMMAND. THE STORED VALUES WERE TIME INTERVALS OVER WHICH A FIXED NUMBER (1-128) OF COUNTS WAS ACCUMULATED. THE TIME INTERVAL CLOCK FREQUENCY WAS SELECTABLE FROM 1 TO 8 KHZ. SPECTRAL INFORMATION FROM EITHER OF DETECTORS (1) AND (2) WAS STORED IN A THIRD MEMORY OF 3072 16-BIT WORDS. TWELVE BITS WERE USED FOR PULSE HEIGHT DATA AND FOUR BITS FOR TIME. THE COUNTING RATES INPUT TO THE TIME HISTORY MEMORIES CAUSED A TRIGGER TO OCCUR IF RATES EXCEEDED A COMMANDABLE VALUE. WHEN THIS OCCURRED, ALL THREE MEMORIES WERE ALLOWED TO FILL. THEY COULD BE DUMPED AT A VERY LOW BIT RATE EITHER AUTOMATICALLY OR BY COMMAND.

----- ISEE 3, VON ROSENVINGE-----

INVESTIGATION NAME- MEDIUM ENERGY COSMIC RAY
NSSDC ID- 78-079A-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - T.T. VON ROSENGE
 OI - L.A. FISK
 OI - P.B. McDONALD
 OI - J.H. TRINOR
 OI - M.A. VAN HOLLEBEKE

NASA-GSFC
 U OF NEW HAMPSHIRE
 NASA-GSFC
 NASA-GSFC
 U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY THE COMPOSITION OF SOLAR COSMIC RAYS FROM HYDROGEN THROUGH IRON AND THE ELEMENTAL ABUNDANCE OF GALACTIC COSMIC RAYS. THREE COSMIC RAY TELESCOPES, PLUS A PROPORTIONAL COUNTER FOR MEASUREMENT OF ELECTRONS AND X RAYS, COMPRISED THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 30 WERE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 1 TO 500 MEV/NUCLEON. UNIT MASS RESOLUTION WAS OBTAINED FOR ISOTOPES WITH Z EQUAL 1, 2, AND 3 TO 7 IN THE ENERGY RANGES 4 TO 70, 1 TO 70, AND 30 TO 140 MEV/NUCLEON, RESPECTIVELY. ELECTRONS WERE MEASURED IN THE ENERGY RANGE APPROXIMATELY 2 TO 10 MEV. ANISOTROPY INFORMATION WAS OBTAINED FOR THE ELECTRONS AND NUCLEI WITH Z EQUAL 1 TO 26.

----- 18EE 3, WILCOX-----

INVESTIGATION NAME- GROUND BASED SOLAR STUDIES

NSSDC ID- 76-079A-13

INVESTIGATIVE PROGRAM
 CODE S1/CO-0P

INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - J.P. WILCOX

STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THE MEASUREMENT OF LARGE-SCALE SOLAR MAGNETIC AND VELOCITY FIELDS WITH THE STANFORD GROUND-BASED SOLAR TELESCOPE, AND THE COMPARISON OF THESE MEASUREMENTS WITH MEASUREMENTS OF THE INTERPLANETARY MAGNETIC FIELD AND SOLAR WIND MADE BY OTHER EXPERIMENTS ON THIS SPACECRAFT. THE PURPOSE OF THE EXPERIMENT WAS TO STUDY THE LARGE-SCALE STRUCTURE OF THE SOLAR MAGNETIC FIELD AND ITS EXTENSION INTO INTERPLANETARY SPACE BY THE SOLAR WIND.

***** ISIS 1*****

SPACECRAFT COMMON NAME- ISIS 1
 ALTERNATE NAMES- ISIS-A, 03669

NSSDC ID- 69-009A

LAUNCH DATE- 01/30/69
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- DELTA

WEIGHT- 241. KG

SPONSORING COUNTRY/AGENCY

CANADA
 UNITED STATES

CRC
 NASA-055

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 128.42 MIN
 PERIAPSIS- 578. KM ALT

EPOCH DATE- 02/04/69
 INCLINATION- 88.42 DEG
 APOAPSIS- 3526. KM ALT

PERSONNEL

PI - M.B. WEINREB
 PI - C.A. FRANKLIN
 PI - L.H. BRACE
 PI - L.H. BRACE

NASA HEADQUARTERS
 COMMUN RESEARCH CENTRE
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

ISIS 1 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH SWEEP- AND FIXED-FREQUENCY IONOSPHERES, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ION MASS SPECTROMETER, AN ELECTROSTATIC PROBE, AN ELECTROSTATIC ANALYZER, A BEACON TRANSMITTER, AND A COSMIC NOISE EXPERIMENT. THE SOUNDER USED TWO DIPOLE ANTENNAS (73 AND 18.7 M LONG, RESPECTIVELY). THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.0 RPM AFTER ANTENNA DEPLOYMENT. SOME CONTROL COULD BE EXERCISED OVER THE SPIN RATE AND ATTITUDE BY USING MAGNETICALLY INDUCED TORQUES TO CHANGE THE SPIN RATE AND TO PRECESS THE SPIN AXIS. A TAPE RECORDER WITH 1-MH CAPACITY WAS INCLUDED ON THE SATELLITE. THE SATELLITE COULD BE PROGRAMMED TO TAKE RECORDED OBSERVATIONS FOR FOUR DIFFERENT TIME PERIODS FOR EACH FULL RECORDING PERIOD. THE RECORDER DATA WERE DUMPED ONLY AT OTTAWA. FOR NON-TAPE-RECORDED OBSERVATIONS, DATA FOR THE SATELLITE AND SUBSATELLITE REGIONS COULD BE ACQUIRED AND TELEMETERED WHEN THE SPACECRAFT WAS IN THE LINE OF SIGHT OF TELEMETRY STATIONS. THE SELECTED TELEMETRY STATIONS WERE IN AREAS THAT PROVIDED PRIMARY DATA COVERAGE NEAR THE 90 DEG W MERIDIAN AND IN AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA. NASA SUPPORT OF THE ISIS PROJECT WAS TERMINATED ON 1 OCTOBER 1979. A SIGNIFICANT AMOUNT OF EXPERIMENTAL DATA, HOWEVER, WAS ACQUIRED AFTER THIS DATE BY THE CANADIAN PROJECT TEAM.

----- ISIS 1, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 69-009A-03

INVESTIGATIVE PROGRAM
 CODE S1/CO-0P

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - R.E. BARRINGTON
 OI - F.H. PALMER

COMMUN RESEARCH CENTRE
 COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLURES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT AN ATTEMPT WAS MADE TO STIMULATE THE ION RESONANCES OF THE AMBIENT PLASMA BY USING SIGNALS FROM A VLF SWEEP-FREQUENCY EXCITER, CONTAINED WITHIN THE SPACECRAFT. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY, BROADBAND RECEIVER THAT SENSED SIGNALS RECEIVED BY THE 73 M BIPOLE (SPLIT MONOPOLE) ANTENNA, BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING FREQUENCIES BELOW 5 MHZ ON THE IONOSPHERE. THE RECEIVER HAD A WIDE DYNAMIC RANGE (80 DB) THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THIS VLF EXPERIMENT INCLUDED AN OPTIONAL-USE ONBOARD EXCITER THAT OPERATED OVER A FREQUENCY CYCLE FROM 0 TO 0.3 TO 0 TO 11 TO 0 KHZ OVER A 3.2-S 'FRAME' PERIOD. THE FRAMES SEQUENCED THROUGH FOUR STEPS WHERE THE TRANSMISSIONS WERE ATTENUATED BY 0, 20, 20, THEN 40 DB, THUS REQUIRING 14 S FOR ONE COMPLETE CYCLE OF EXCITER OPERATION. THE EXCITER TRANSMITTED ON THE SHORT ANTENNAS AND THE RECEIVER SENSED THE SIGNALS COUPLED BETWEEN THE TWO ANTENNAS BY THE AMBIENT PLASMA, PLUS ANY NOISE SIGNALS WHICH WERE EXCITED IN THE PLASMA. THIS VLF EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.08-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE RECORDER CHANNELS DURING THE TIME THE TAPE RECORDER OPERATED. TAPE-RECORDED (AND BACK-UP REAL-TIME) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 1, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 69-009A-07

INVESTIGATIVE PROGRAM
 CODE S1/CO-0P

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - L.H. BRACE
 OI - J.A. FINDLAY

NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY THE GLOBAL VARIATIONS OF ELECTRON TEMPERATURE AND ELECTRON CONCENTRATION AT SPACECRAFT (SC) ALTITUDES DURING SOLAR MAXIMUM, AND TO STUDY CHARACTERISTICS OF THE SC ION SHEATH. THE MEASUREMENTS WERE MADE WITH TWO CYLINDRICAL PROBES, OPERATING AS LANGMUIR PROBES. FROM THE PROBE CURRENT-VERSUS-VOLTAGE DATA, THE ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE. THE AXIAL PROBE EXTENDED 46.3 CM FROM THE SC, ALONG THE SPIN AXIS, AND WAS CENTERED AMONG THE FOUR TELEMETRY ANTENNAS ON THE UNDERSIDE OF THE SC. THIS PROBE WAS CAPABLE OF MEASUREMENTS UNDISTURBED BY THE SATELLITE MOTION ONLY WHEN THE PROBE PRECEDED THE SC IN ITS MOTION THROUGH THE PLASMA. THE BOOM PROBE EXTENDED HORIZONTALLY AND OUTWARD (IN SC FRAME OF REFERENCE) FROM A BOOM 1 M LONG, WHICH IN TURN EXTENDED FROM AN UPPER SURFACE OF THE SATELLITE AT AN ANGLE OF ABOUT 45 DEG TO THE SPIN AXIS. THIS PROBE PROVIDED SOME OBSERVATIONS DURING EACH SC SPIN CYCLE THAT WAS FREE OF SC WAKE EFFECTS. THE PROBES CONSISTED OF THREE CONCENTRIC, ELECTRICALLY ISOLATED, STAINLESS STEEL TUBES. THE OUTER (0.24-CM DIAM AND 23-CM LONG) TUBE FLOATED AT ITS OWN EQUILIBRIUM POTENTIAL AND SERVED TO PLACE THE COLLECTOR WELL AWAY FROM THE SC PLASMA SHEATH. THE CENTER TUBE (0.165-CM DIAM) EXTENDING 23 CM OUTWARD FROM THE OUTER TUBE ACTED AS AN ELECTRICAL GUARD FOR THE COLLECTOR. ITS ELECTRICAL POTENTIAL WAS CONTROLLED. THE COLLECTOR (0.058-CM DIAM) EXTENDED 23 CM OUTWARD FROM THE DRIVEN GUARD. DURING EACH 2-MIN SEQUENCE, A VOLT-AMPERE CURVE WAS OBTAINED FROM THE SAWTOOTH VOLTAGE (-2 TO +10V) APPLIED TO THE COLLECTOR. THIS CAN BE INTERPRETED IN ELECTRON DENSITIES OVER A RANGE FROM 1.E2 TO 1.5E6 ELECTRONS PER CUBIC CM, AND TEMPERATURES FROM ABOUT 400 TO 50,000 DEG K.

----- ISIS 1, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 69-009A-02

INVESTIGATIVE PROGRAM
 CODE S1/CO-0P

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS

ORIGINAL PAGE IS
 OF POOR QUALITY.

PERSONNEL

PI - W. CALVERT LOCKHEED PALO ALTO
OI - R.D. NORTON NOAA-ERL
OI - J.M. WARNOCK NOAA
OI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
OI - C.E. PETRIE COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER, AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE REFLECTED PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION.

----- ISIS 1, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 69-009A-10 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S) ASTRONOMY IONOSPHERES AND RADIO PHYSICS

PERSONNEL PI - T.R. HARTZ COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEEPED FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 10.7-M AND 73-M DIPOLES.

----- ISIS 1, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 69-009A-04 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S) IONOSPHERES AND RADIO PHYSICS PARTICLES AND FIELDS

PERSONNEL PI - I.D. MCDIARMID NATL RES COUNC OF CAN
OI - J.R. BURROWS NATL RES COUNC OF CAN
OI - R.C. ROSE NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE DATA THAT WILL AID IN UNDERSTANDING (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONE, (2) THE RELATED PROBLEMS OF PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD, AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET, COMPRISING FOUR GEIGER COUNTERS, MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV AND PROTONS GREATER THAN 300 AND 500 KEV PARALLEL AND PERPENDICULAR TO THE SATELLITE SPIN AXIS.

----- ISIS 1, SAGALYN-----

INVESTIGATION NAME- SPHERICAL ELECTROSTATIC ANALYZER

NSSDC ID- 69-009A-0E INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S) IONOSPHERES PARTICLES AND FIELDS ATOSPHERIC PHYSICS

PERSONNEL PI - R.C. SAGALYN USAF GEOPHYS LAB
OI - M. SMIDDY USAF GEOPHYS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THE SPHERICAL ELECTROSTATIC ANALYZER EXPERIMENT WAS TO MEASURE THE TEMPORAL AND SPATIAL VARIATIONS IN THE CONCENTRATION AND ENERGY DISTRIBUTION OF THE CHARGED PARTICLES THROUGHOUT THE ORBIT. SPECIFICALLY, THE OBJECTIVES WERE TO MEASURE THE FOLLOWING PARAMETERS -- (A) THE DENSITY OF POSITIVE IONS HAVING THERMAL ENERGY IN THE CONCENTRATION RANGE FROM 1.E1 TO 1.E6 IONS PER CUBIC CM, (B) THE KINETIC TEMPERATURE OF THE THERMAL IONS IN THE RANGE FROM 700 TO 4000 DEG K, (C) THE FLUX AND ENERGY SPECTRUM OF PROTONS IN THE RANGE FROM 0 TO 2 KEV, AND (D) THE SATELLITE POTENTIAL WITH RESPECT TO THE UNDISTURBED PLASMA.

----- ISIS 1, WHITTEKER-----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 69-009A-01 INVESTIGATIVE PROGRAM CODE ST/CO-UP
INVESTIGATION DISCIPLINE(S) IONOSPHERES AND RADIO PHYSICS

PERSONNEL PI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
OI - J.E. JACKSON NASA-GSFC
OI - J. TURNER IONOSPHERIC PRED SERV
OI - M. SYLVAIN LGF
OI - O. HOLT AURORAL ORS
OI - Y. CGATA RADIO RESEARCH LAB
OI - R. RAGHAVARAO PHYSICAL RESEARCH LAB
OI - R.R. NORTON NOAA-ERL
OI - C.E. PETRIE COMMUN RESEARCH CENTRE
OI - K.L. CHAN NASA-ARC
OI - R.S. UNWIN DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO INVESTIGATE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 3500 KM FOR A FULL SOLAR CYCLE (BY COMBINING THE ISIS 1 MEASUREMENTS WITH THE ALOUETTE 2 DATA). ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 1 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 1 IONOSONDE WAS A RADIO TRANSMITTER/RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND A RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED ONCE EVERY 19 OR 29 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO SOUNDED FOR A PERIOD OF 3 TO 5 S DURING THIS 19- OR 29-S PERIOD.

***** ISIS 2*****

SPACECRAFT COPPON NAME- ISIS 2
ALTERNATE NAMES- ISIS-B, PL-701F
05104

NSSDC ID- 71-024A

LAUNCH DATE- 04/01/71 WEIGHT- 256. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY CANADA CRC
UNITED STATES NASA-CSS

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04.02/71
ORBIT PERIOD- 113.6 MIN INCLINATION- 48.1 DEG
PERIAPSIS- 1358. KM ALT APOAPSIS- 1426. KM ALT

PERSONNEL NG - M.D. WEINREH NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - C.A. FRANKLIN COMMUN RESEARCH CENTRE
PH - L.M. BRACE NASA-GSFC
PS - L.M. RHACE NASA-GSFC

BRIEF DESCRIPTION

ISIS 2 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP AND A FIXED-FREQUENCY IONOSONDE, A VLF RECEIVER, ENERGETIC AND SOFT PARTICLE DETECTORS, AN ION MASS SPECTROMETER, AN ELECTROSTATIC PROBE, A RETARDING POTENTIAL ANALYZER, A BEACON TRANSMITTER, A COSMIC NOISE EXPERIMENT, AND TWO PHOTOMETERS. THE SOUNDER USED TWO LONG CROSSED-DIPOLE ANTENNAS (73 AND 18.7 M LONG) FOR THE SOUNDING, VLF, AND COSMIC NOISE EXPERIMENTS. THE SPACECRAFT WAS SPIN-STABILIZED TO ABOUT 2 RPM AFTER ANTENNA DEPLOYMENT. THERE WERE TWO BASIC ORIENTATION MODES FOR THE SPACECRAFT, CARTWHEEL AND ORBIT-ALIGNED. THE SPACECRAFT OPERATED APPROXIMATELY THE SAME LENGTH OF TIME IN EACH MODE, REMAINING IN ONE MODE TYPICALLY 3 TO 5 HO. THE CARTWHEEL MODE WITH THE AXIS PERPENDICULAR TO THE ORBIT PLANE WAS MADE AVAILABLE TO PROVIDE RAM AND WAKE DATA FOR SOME EXPERIMENTS FOR EACH SPIN PERIOD, RATHER THAN EACH ORBIT PERIOD. ATTITUDE AND SPIN INFORMATION WAS OBTAINED FROM A THREE-AXIS MAGNETOMETER AND A SUN SENSOR. CONTROL OF ATTITUDE AND SPIN WAS POSSIBLE BY MEANS OF MAGNETIC TORQUING. THE EXPERIMENT PACKAGE ALSO INCLUDED A PROGRAMMABLE TAPE RECORDER WITH A 1-M CAPACITY. FOR NONRECORDED OBSERVATIONS, DATA FROM SATELLITE AND SUBSATELLITE LOCATIONS WERE TELEMETERED WHEN THE SPACECRAFT WAS IN LINE OF SIGHT OF A TELEMETRY STATION. TELEMETRY STATIONS WERE LOCATED SO THAT PRIMARY DATA COVERAGE WAS NEAR THE 80 DEG W MERIDIAN AND NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, FRANCE, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA. NASA SUPPORT OF THE ISIS PROJECT WAS TERMINATED ON 1 OCTOBER 1979. A SIGNIFICANT AMOUNT OF EXPERIMENTAL DATA, HOWEVER, WAS ACQUIRED AFTER THIS DATE BY THE CANADIAN PROJECT TEAM.

----- ISIS 2, CALVERT-----

THE VLF RECEIVER HAD A WIDE DYNAMIC RANGE THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL SYSTEM. THE EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.00-MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE RECORDER CHANNELS WHEN THE SPACECRAFT TAPE RECORDER WAS OPERATING. TAPE RECORDED (AND BACKUP REAL-TIME CAPABILITY) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 2, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER
 NSSDC ID- 71-024A-02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PERSONNEL
 PI - W. CALVERT LOCKHEED PALO ALTO
 OI - R.B. NORTON NOAA-ERL
 OI - C.E. PETRIE COMMUN RESEARCH CENTRE
 OI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
 OI - J.M. WARNOCK NOAA

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE PULSE) AND TIME. THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF A TELEMETRY STATION. THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 3 TO 5 S DURING THE FREQUENCY FLYBACK PERIOD OF THE SWEEP-FREQUENCY OPERATION WHICH WAS EVERY 14 OR 21 S. ONE OF SIX FREQUENCIES (0.12, 0.40, 1.00, 1.95, 4.00, OR 9.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER, AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY AND A SPECIAL MIXED MODE WITH TRANSMISSION AT A SELECTED ONE OF THE SIX FIXED FREQUENCIES AND SWEEP RECEPTION.

----- ISIS 2, ANGER-----

INVESTIGATION NAME- 3914- AND 5577-A PHOTOMETER
 NSSDC ID- 71-024A-11 INVESTIGATIVE PROGRAM CODE ST/CO-CP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PARTICLES AND FIELDS
 PLANETARY ATMOSPHERES
 ATMOSPHERIC PHYSICS
 PERSONNEL
 PI - C.D. ANGER U OF CALGARY

BRIEF DESCRIPTION
 THIS DUAL-WAVELENGTH SCANNING AURORAL PHOTOMETER WAS DESIGNED TO MAP THE DISTRIBUTION OF AURORAL EMISSIONS AT 5577 AND 3914 A OVER THE PORTION OF THE DARK EARTH VISIBLE TO THE SPACECRAFT. A COMBINATION OF INTERNAL ELECTRONIC SCANNING PERFORMED BY AN IMAGE DISSECTOR AND OF THE NATURAL ORBITAL AND ROTATIONAL MOTIONS OF THE SPACECRAFT PERMITTED THE SENSOR TO SYSTEMATICALLY SCAN ACROSS THE EARTH. THE DETECTOR SYSTEM WAS CONSTRUCTED TO ALLOW INCIDENT RADIATION TO BE ACCEPTED FROM TWO DIRECTIONS 120 DEG APART, AND THEN TO FOCUS THIS LIGHT AT A COMMON POINT ON THE SINGLE IMAGE DISSECTOR PHOTOMETER TUBE. ONLY ONE OF THE TWO OPTICAL SYSTEMS POINTED AT THE EARTH AT ANY ONE TIME, WHILE THE OTHER FACED INTO SPACE. WHEN THE SPACECRAFT SPIN AXIS WAS ORIENTED TO LIE IN THE ORBITAL PLANE, EACH ROTATION OF THE SPACECRAFT RESULTED IN AN EARTH SCAN 5 DEG WIDE. THIS WIDTH SIZE WAS CHOSEN TO INSURE OVERLAP WITH THE PREVIOUS SCAN. THE IMAGE DISSECTOR REPEATIVELY SCANNED AT A HIGH SPEED ACROSS THE NARROW DIMENSION OF EACH 5-DEG BAND AND DIVIDED IT INTO SEPARATELY RESOLVING REGIONS 0.4 DEG BY 0.4 DEG. SIMILAR STRIPS WERE SCANNED AT EACH OF THE TWO WAVELENGTHS, BUT AT TIMES THAT DIFFERED BY HALF THE ROTATION PERIOD OF ABOUT 10 S. A CALIBRATION LIGHT SOURCE FOR EACH WAVELENGTH WAS BUILT INTO THE OPTICAL ASSEMBLY, AND A CALIBRATE CYCLE WAS INITIATED AUTOMATICALLY WHENEVER A 'POWER ON' COMMAND WAS GIVEN. TO MINIMIZE THE PROBLEMS ARISING FROM SOLAR ILLUMINATION OF THE OPTICS AND THE DIRECT VIEWING OF THE SUNLIT EARTH, A SUNLIGHT PROTECTION SYSTEM WAS INCLUDED. COMPLETE DETAILS ABOUT THE EXPERIMENT CAN BE FOUND IN THE REPORT 'THE ISIS-2 SCANNING AURORAL PHOTOMETER,' C. D. ANGER, J. FANCOTT, J. MCNALL, AND H. S. KERR, APPLIED OPTICS, 12, 6, 1753-1766, AUGUST 1973.

----- ISIS 2, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE
 NSSDC ID- 71-024A-10 INVESTIGATIVE PROGRAM CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 IONOSPHERES AND RADIO PHYSICS
 PERSONNEL
 PI - T.R. HARTZ COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
 THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEEP FROM 0.1 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 18.7-M AND 73-M DIPOLES.

----- ISIS 2, HOFFMAN-----

INVESTIGATION NAME- ION-MASS SPECTROMETER
 NSSDC ID- 71-024A-06 INVESTIGATIVE PROGRAM CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PLANETARY ATMOSPHERES
 ATMOSPHERIC PHYSICS
 PERSONNEL
 PI - J.H. HOFFMAN U OF TEXAS, DALLAS

BRIEF DESCRIPTION
 THIS MAGNETIC ION-MASS SPECTROMETER EXPERIMENT WAS FLOWN TO MEASURE THE DISTRIBUTION OF THE CONCENTRATIONS OF THE POSITIVE ION SPECIES AS A FUNCTION OF TIME AND POSITION, WITH PARTICULAR INTEREST FOCUSED ON THE POLAR WIND PARTICLES. THE INSTRUMENT HAD TWO ION DETECTOR SYSTEMS, AND MASS SCANNING THROUGH THE RANGE FROM 1 TO 64 AMU WAS ACCOMPLISHED IN TWO SECTIONS -- 1 TO 8 U AND 8 TO 64 U. TWO ION BEAMS EMERGED FROM THE MAGNETIC SECTOR OF THE INSTRUMENT AND WERE SIMULTANEOUSLY DETECTED BY ELECTRON MULTIPLIERS AND LOG ELECTROMETER AMPLIFIERS. A CIRCUIT FOLLOWING EACH AMPLIFIER DETECTED THE PEAK AMPLITUDE OF THE ION CURRENT. THIS PEAK VALUE, RATHER THAN THE ENTIRE MASS SPECTRUM, WAS TRANSMITTED IN ORDER TO REDUCE THE REQUIRED TELEMETRY BANDWIDTH. IN THIS MODE OF OPERATION, THE COMPLETE MASS RANGE WAS SCANNED IN 1 S. A BACKUP MODE WAS PROVIDED THAT PRODUCED AN ANALOG OUTPUT WITH A SWEEP PERIOD OF 6 S. THIS EXPERIMENT OPERATED NOMINALLY AFTER LAUNCH WITH MOST OF THE DATA OBTAINED IN THE PEAK MODE AND WHILE THE SATELLITE OPERATED IN THE CARTWHEEL MODE. FOR ABOUT 2 MIN PER PASS OVER OTTAWA, CANADA, THE EXPERIMENT OPERATED IN THE ANALOG MODE. IN-FLIGHT CALIBRATION WAS ACHIEVED BY COMPARING ION CONCENTRATION MEASUREMENTS AT APPROPRIATE ALTITUDES, I.E., WHERE A SINGLE ION SPECIES PREDOMINATED, WITH ELECTRON DENSITY DATA FROM THE SOUNDER ON BOARD. OTHER COMPARISONS WERE MADE

----- ISIS 2, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER
 NSSDC ID- 71-024A-03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PERSONNEL
 PI - R.E. BARRINGTON COMMUN RESEARCH CENTRE
 OI - F.H. PALMER COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
 THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY NATURAL AND MANMADE VLF SIGNALS. SPECIFIC OBJECTIVES INCLUDED THE INVESTIGATION OF VLF PROPAGATION PHENOMENA, ION AND HYBRID PLASMA RESONANCES, AND CORRELATIONS BETWEEN VLF EMISSIONS AND INTENSE FLUXES OF ENERGETIC PARTICLES. IN THIS EXPERIMENT A SWEEP-FREQUENCY EXCITER, COVERING THE RANGE 15 TO 0.05 KHZ IN 1.0 S, WAS USED TO STIMULATE ION-RESONANCES IN THE PLASMA. THE INSTRUMENTATION CONSISTED OF A LOW-FREQUENCY BROADBAND RECEIVER THAT OBSERVED SIGNALS FROM THE 73-M LONG DIPOLE (SPLIT MONOPOLE) ANTENNA BETWEEN 0.05 AND 30 KHZ. THIS SAME ANTENNA WAS USED FOR RECEIVING SIGNALS BELOW 5 MHZ ON THE IONOSONDE.

BETWEEN THE SPECTROMETER OUTPUT AND MEASUREMENTS OBTAINED FROM OTHER RELATED EXPERIMENTS ON BOARD.

----- ISIS 2, MAIER-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 71-024A-00 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - E.J. MAIER NASA-GSFC
OI - B.E. TROY, JR. US NAVAL RESEARCH LAB
OI - J.L. DONLEY NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE THE POSITIVE ION DENSITY, COMPOSITION, AND TEMPERATURE IN VICINITY OF THE SPACECRAFT. A SECONDARY OBJECTIVE WAS TO MEASURE THE THERMAL ELECTRON DENSITY AND TEMPERATURE, AND THE FLUX OF SUPRATHERMAL ELECTRONS. THIS RETARDING POTENTIAL ANALYZER CONSISTED OF THREE GRIDS (APERTURE GRID, RETARDING GRID AND A SUPPRESSOR GRID) THAT PROVIDED A VOLT-AMPERE CURVE RELATING SWEEP VOLTAGE ON THE RETARDING GRID TO CURRENT FLOW TO THE COLLECTOR. ANALYSIS OF THE VOLT-AMPERE CURVES PROVIDED ION/ELECTRON TEMPERATURES AND DENSITIES. THIS EXPERIMENT WAS DESIGNED TO OPERATE ONLY WITH THE SATELLITE IN A CARTWHEEL MODE OF OPERATION. IN THIS MODE, THE SPIN AXIS IS PERPENDICULAR TO THE ORBIT PLANE. THIS ALLOWS THE ANALYZER APERTURE TO FACE THE DIRECTION OF SATELLITE MOTION ONCE EACH SPIN PERIOD.

----- ISIS 2, MCDIARMID-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 71-024A-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I.D. MCDIARMID NATL RES COUNC OF CAN
OI - J.R. BURROWS NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE OBJECTIVES OF THE ENERGETIC PARTICLE EXPERIMENT WERE TO PROVIDE DATA THAT WOULD AID IN THE UNDERSTANDING OF: (1) THE MECHANISMS RESPONSIBLE FOR THE PRODUCTION AND CONTROL OF THE OUTER RADIATION ZONES; (2) THE RELATED PROBLEM OF SOLAR-FLARE PARTICLE ENTRY INTO THE EARTH'S MAGNETIC FIELD; AND (3) INTERACTIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND THE SOLAR WIND. THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST SET CONSISTED OF THREE GEIGER COUNTERS (OF WHICH ONE FAILED AFTER LAUNCH) AND MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV PERPENDICULAR AND PARALLEL TO THE SPIN AXIS. THESE GEIGER COUNTERS WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 240 AND 600 KEV, RESPECTIVELY. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF TWO SOLID-STATE SILICON JUNCTION DETECTORS. BOTH DETECTORS WERE OPERATED IN LOW- AND HIGH-THRESHOLD MODE, WHILE ONE COULD ADDITIONALLY BE SWITCHED TO ANOTHER DISCRIMINATION LEVEL. THEY MEASURED ELECTRONS WITH ENERGIES GREATER THAN 40, 60, 90, 120, 150, AND 200 KEV. THEY WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 150, 200, AND 750 KEV. THE SWITCHABLE DETECTOR EXPERIENCED CONTINUOUS SATURATION. THE THIRD SET CONSISTED OF THREE SILICON JUNCTION DETECTORS THAT MEASURED PROTONS IN THE ENERGY RANGES 0.8 TO 4.8, 3.2 TO 12.7, AND 12.9 TO 28.0 MEV, ALPHA PARTICLES IN THE ENERGY RANGE 2.5 TO 16.0 MEV, AND ELECTRONS IN THE ENERGY RANGE 1.0 TO 2.0 MEV. THE FOURTH SET WAS COMPOSED OF TWO CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS (CHANNELTRONS WITH CYLINDRICAL ELECTROSTATIC ANALYZERS) STEPPED THROUGH EIGHT ENERGIES IN 64/60 OF A SECOND. THESE DIFFERENTIAL SPECTROMETERS MEASURED ELECTRONS AT 9.6, 7.8, 6.0, 4.1, 3.0, 2.2, 1.3, AND 0.15 KEV, AND MEASURED PROTONS AT 26-27.6, 17.0, 12.4, 9.4, 7.6, 5.2, AND 2.2 KEV.

----- ISIS 2, SHEPHERD-----

INVESTIGATION NAME- 6300-A PHOTOMETER

NSSDC ID- 71-024A-12 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.G. SHEPHERD YORK U

BRIEF DESCRIPTION

A TWO-CHANNEL PHOTOMETER WAS USED TO MEASURE DIRECTLY AND TO MAP THE INTENSITY OF THE ATOMIC OXYGEN RED LINE AT 6300 A IN DAY, TWILIGHT, AND NIGHT AIRGLOW AND AURORA. EACH CHANNEL HAD ITS OWN OPTICAL INPUT, AND THE TWO INPUTS WERE MOUNTED AT THE SAME END OF THE SPACECRAFT, SEPARATED BY 180 DEG, WITH THEIR AREAS AT 90 DEG TO THE SPACECRAFT'S SPIN AXIS. ONE OPTICAL INPUT WAS CHARACTERIZED BY A SPECTRAL BANDWIDTH OF 12 A CENTERED AROUND THE 6300-A LINE OF ATOMIC OXYGEN, AND THE OTHER INPUT WAS USED FOR WHITE LIGHT MEASUREMENTS. THE SPINNING SATELLITE CAUSED THE PHOTOMETER TO ALTERNATELY VIEW THE EARTH AND THEN THE SKY, I.E., WHEN ONE SENSOR VIEWED THE EARTH, THE OTHER SENSOR SAW THE SKY. BOTH SENSORS HAD A 2.5-DEG CIRCULAR FIELD OF VIEW. WITH THE USE OF A BEAM-COMBINER ARRANGEMENT, THE SAME PHOTOMULTIPLIER ACCEPTED THE TWO INPUTS. THE DYNAMIC RANGE OF INTENSITY MEASUREMENTS WAS FROM ABOUT 1.631 PHOTONS PER SQ M PER S (10 RAYLEIGHS) TO MORE THAN 1.616 PHOTONS PER SQ M PER S. SUNLIGHT COULD ENTER THE OPTICAL SYSTEMS DIRECTLY IN ADDITION TO EARTH-REFLECTED LIGHT. THE INSTRUMENT SHAFFLE WAS ILLUMINATED BY THE SUN ONLY FOR THE OFF-AXIS ANGLES LESS THAN 47 DEG. OUTSIDE THIS LIMIT, THE DATA WERE NOT DEGRADED BY SUNLIGHT, PERMITTING NORMAL OPERATION IN THE REGION OF THE ORBIT WHERE THE SPACECRAFT WAS IN SUNLIGHT, BUT THE PORTION OF THE EARTH BENEATH IT WAS DARK. AN EXTERNAL LIGHT SOURCE 'SAW' THE FILTER ONLY WHEN IT WAS 7.5 DEG OR LESS OFF AXIS. IN THE RANGE 7.5 TO 47 DEG, GOOD DATA WERE STILL OBTAINED WHEN THE SUNLIT EARTH WAS THE ORIGIN OF THE CONTAMINATION. TO PERFORM THE DATA ANALYSIS, IT WAS NECESSARY, AMONG OTHER OPERATIONS, TO EVALUATE DIFFERENT GEOMETRICAL SITUATIONS, AND TO LOCATE THE ON-EARTH LIMB CROSSING OF THE 12-A BANDPASS PHOTOMETER SO THAT THE DATA COULD BE ORGANIZED INTO SPIN MAPS. FOR MORE DETAILS SEE, 'ISIS-2 ATOMIC OXYGEN RED LINE PHOTOMETER,' G.G. SHEPHERD, ET AL, 'APPLIED OPTICS,' 12, 4, 1767-1774, AUGUST 1973.

----- ISIS 2, WHITTEKER-----

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 71-024A-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.M. WHITTEKER COMMUN RESEARCH CENTRE
OI - J. TURNER IONOSPHERIC PHED SERV
OI - M. SYLVAIN LGE
OI - D. MOLT AURORAL OBS
OI - Y. OGATA RADIO RESEARCH LAB
OI - R. RAGHAVARAO PHYSICAL RESEARCH LAB
OI - J.E. JACKSON NASA-GSFC
OI - C.E. PETRIE COMMUN RESEARCH CENTRE
OI - H.B. KORTON NOAA-ERL
OI - K.I. CHAN NASA-ARC
OI - R.S. UNWIN DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE IONOSPHERIC ELECTRON DENSITY IN THE ALTITUDE RANGE 300 TO 1400 KM. ANOTHER IMPORTANT FUNCTION OF THE SOUNDER WAS TO PROVIDE CORRELATIVE DATA FOR THE OTHER ISIS 2 EXPERIMENTS, PARTICULARLY THOSE MEASURING IONOSPHERIC PARAMETERS. THE ISIS 2 IONOSONDE WAS A RADIO TRANSMITTER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED EVERY 14 OR 21 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO USED FOR SOUNDING FOR A FEW SECONDS DURING EACH 14- OR 21-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS AVAILABLE IN WHICH THE TRANSMITTER FREQUENCY WAS FIXED AT ONE OF SIX POSSIBLE FREQUENCIES WHILE THE RECEIVER SWEEP. SEVERAL VIRTUAL RANGE (DELAY TIME) TRACES RESULTING FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC., WERE NORMALLY OBSERVED. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORMAT WAS AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO FREQUENCY.

***** 155-B*****

SPACECRAFT COMMON NAME- ISS-B
ALTERNATE NAMES- IONOSP SOUNDING SAT 2, 10674
UMF 2, 155-2

NSSDC ID- 78-018A

LAUNCH DATE- 02/16/78 WEIGHT- 135. KG
LAUNCH SITE- TANEGASHIMA, JAPAN
LAUNCH VEHICLE- NU

SPONSORING COUNTRY/AGENCY
JAPAN RRL

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/17/78
ORBIT PERIOD- 107. MIN INCLINATION- 69.6 DEG
PERIAPSIS- 972. KM ALT APOAPSIS- 1225. KM ALT

PERSONNEL
 PI - N. WAKAI
 PS - N. MATSUURA
 RADIO RESEARCH LAB
 RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THE IONOSPHERE SOUNDING SATELLITE (ISS) WAS PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). ITS OBJECTIVES WERE TO ACCUMULATE DATA FOR STUDY OF THE TOPSIDE IONOSPHERE AND TO SURVEY RADIO NOISE AT FOUR FREQUENCIES, FROM BOTH EARTH AND COSMIC SOURCES. IT PREPARED WORLD-WIDE MAPS OF F2 CRITICAL FREQUENCY FROM THE IONOSPHERE SOUNDING DATA. THE ISS 2 WAS A SMALL OBSERVATORY WITH FOUR EXPERIMENTS ON BOARD. THE SPACECRAFT, A RIGHT CYLINDER, 82 CM LONG AND 93.8 CM IN DIAMETER, WAS SPIN STABILIZED AT ABOUT 10 RPM WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC PLANE. TWO PAIRS OF CROSSED DIPOLE ANTENNAS EXTENDED FROM THE CENTRAL PART OF THE SATELLITE AND LAY PERPENDICULAR TO THE SPIN AXIS. THESE ANTENNAE, 36.8 AND 11.4 M LONG, WERE UNFURLED IN ORBIT AND WERE SHARED BY IONOSPHERIC SOUNDING AND RADIO NOISE EXPERIMENTS. A SPHERICAL RETARDING POTENTIAL TRAP SENSOR WAS MOUNTED ON A BOOP PERPENDICULAR TO THE SPIN AXIS. A MAGNETIC ATTITUDE SENSOR WAS MOUNTED ON A SIMILAR BOOM ON THE OPPOSITE SIDE OF THE SPACECRAFT. THE REMAINING EXPERIMENT INVOLVED A BENNETT-TYPE MASS SPECTROMETER WITH TWO SENSORS FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT. SPACECRAFT ATTITUDE WAS DETERMINED BY MEANS OF A MAGNETOMETER, A SOLAR SENSOR, AND AN EARTH HORIZON SENSOR. SMALL TELEMETRY AND COMMAND ANTENNAS EXTENDED FROM THE SPACECRAFT. THE SPACECRAFT WAS POWERED FROM A BATTERY SOLAR-CELL SYSTEM WITH SOLAR CELLS COVERING MOST OF THE CYLINDRICAL SURFACE. ONE RECORDER ON BOARD PERMITTED SPACECRAFT OPERATION IN EITHER A RECORDED (FOR UP TO 112 MIN) OR REAL-TIME MODE. READOUT AND REAL-TIME OPERATION WAS DONE FROM KAGOSHIMA, JAPAN, AND SYOVA STATION, ANTARCTICA.

----- ISS-B, AIKYO-----
 INVESTIGATION NAME- SWEEP FREQUENCY TOPSIDE IONOSPHERIC
 SOUNDER (TOP)

NSDDC ID- 78-010A-01 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES

PERSONNEL
 PI - K. AIKYO RADIO RESEARCH LAB
 PI - R. MAEDA RADIO RESEARCH LAB
 PI - Y. TAKENOSHITA RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THE IONOSPHERE SOUNDING SATELLITE (ISS) IONOSPHERE WAS A PULSED RADIO TRANSMITTER AND RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED PULSE AND ITS RETURN. FREQUENCIES BETWEEN 0.5 AND 14.8 MHZ WERE SAMPLED IN 0.1-MHZ STEPS TO PROVIDE VIRTUAL RANGE (DELAY TIME) OF SIGNAL REFLECTIONS. MORE THAN ONE VIRTUAL RANGE VS FREQUENCY TRACE WAS OFTEN OBSERVED. THESE RESULTED FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL RANGE AT A GIVEN FREQUENCY WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL. ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORM, AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO PULSE FREQUENCY, WAS USED TO DISPLAY THESE OBSERVATIONS. TWO OTHER FORMS OF DATA WERE PREPARED FROM THESE IONOGRAMS. THEY WERE DIGITAL (FREQUENCY OF VIRTUAL RANGE) VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES READ DIRECTLY FROM THE IONOGRAM AND COMPUTED PROFILES OF ELECTRON DENSITY. THIS SOUNDING MODE OF OPERATION, CALLED TOP-B, REQUIRED 16 S TO SAMPLE ALL FREQUENCIES (ONE IONOGRAM). A TOP-A MODE WAS ALSO AVAILABLE. IN THE TOP-A MODE, AN ITERATIVE LOGIC WAS EMPLOYED WITH THE PULSED TRANSMISSION TO DETERMINE THE F2 REGION CRITICAL FREQUENCY, ITS CORRESPONDING VIRTUAL HEIGHT, AND OTHER RELATED SUPPORTING DATA. WITH DATA FROM THE TOP-A MODE, WORLD-WIDE MAPS OF CRITICAL FREQUENCY WERE PREPARED. FOR BOTH THE TOP-A AND TOP-B MODES, THE COMPLETE CYCLE TIME BETWEEN SUCCESSIVE IONOGRAMS OR SUCCESSIVE CRITICAL FREQUENCY OBSERVATIONS WAS 64 S.

----- ISS-B, IWAMOTO-----
 INVESTIGATION NAME- ION MASS SPECTROMETER

NSDDC ID- 78-016A-04 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PARTICLES AND FIELDS

PERSONNEL
 PI - I. IWAMOTO RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS FLOWN TO MEASURE THE POSITIVE ION COMPOSITION OVER THE SPACECRAFT ORBIT. TWO BENNETT-TYPE ION MASS SPECTROMETERS WERE FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT TO LOOK IN OPPOSITE DIRECTIONS ALONG THE SPIN AXIS. THE INSIDE DIAMETER OF THESE CYLINDRICAL SENSORS WAS 36 MM. THE MASS RANGE COVERED WAS 1 TO 20 U, AND THE ION CONCENTRATIONS WERE MEASURED OVER THE RANGE FROM 1 TO 1.24 IONS PER CU CM.

----- ISS-B, KOTAKI-----
 INVESTIGATION NAME- RADIO NOISE NEAR 2.0, 5, 10, AND 25 MHZ
 NSDDC ID- 78-018A-02 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE

PERSONNEL
 PI - R. KOTAKI RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS EXPERIMENT WERE TO OBSERVE AND STUDY -- (1) THE GLOBAL DISTRIBUTION OF SPHERICS AND (2) THE TIME VARIATION OF SPHERICS AND COSMIC NOISE. RADIO NOISE IN THE FREQUENCY CHANNELS -- 2.497, 4.997, 9.997, 10.003, 24.996, AND 25.006 MHz -- WERE OBSERVED. CHARACTERISTICS TO BE OBSERVED AT EACH FREQUENCY WERE NOISE INTENSITY (RESOLUTION OF 1/12.8 S) AND OCCURRENCE FREQUENCY OF IMPULSIVE NOISE (.67. 19 DB ABOVE RESOLVED INTENSITY).

----- ISS-B, OGAWA-----
 INVESTIGATION NAME- RETARDING POTENTIAL TRAP

NSDDC ID- 78-019A-03 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PARTICLES AND FIELDS

PERSONNEL
 PI - Y. OGAWA KYOTO U

BRIEF DESCRIPTION
 THIS PROBE WAS A SPHERICAL RETARDING POTENTIAL TRAP DESIGNED TO OBSERVE AMBIENT ION AND ELECTRON DENSITIES RANGING FROM 10.13 TO 10.16 PER CU CM. AMBIENT ION AND ELECTRON TEMPERATURES IN THE RANGE 500 TO 5000 DEG K WERE DETERMINED. AS WITH ALL RETARDING POTENTIAL INSTRUMENTS, THESE PARAMETERS ARE DERIVED FROM INTERPRETATION OF THE CURRENT FLOW MEASUREMENT WITH A GIVEN VOLTAGE SEQUENCE APPLIED TO THE COLLECTOR AND SCREEN GRIDS. THE SENSOR WAS MOUNTED ON A BOOM EXTENDING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. IT CONSISTED OF A 2 CM DIAMETER COLLECTOR, CONCENTRICALLY ENVELOPED BY 6- AND 10-CM DIAMETER SPHERICAL WIRE GRIDS. THE CURRENT VOLTAGE ANALOG DATA WERE TELEMETERED AND SUBSEQUENTLY ANALYZED BY THE EXPERIMENTER.

***** IUE*****

SPACECRAFT COMMON NAME- IUE
 ALTERNATE NAMES- INT ULTRAVIOLET EXPL, SAS-D
 10637

NSDDC ID- 78-012A
 LAUNCH DATE- 01/26/78 WEIGHT- 669. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS
 INTERNATIONAL ESA
 UNITED KINGDOM SBC

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/27/78
 ORBIT PERIOD- 1435.7 MIN INCLINATION- 28.6 DEG
 PERIAPSIS- 25669. KM ALT APOAPSIS- 45877. KM ALT

PERSONNEL
 PI - M.J. AUCREMANNE NASA HEADQUARTERS
 PI - E.J. WEILER NASA HEADQUARTERS
 PI - J.P. CORRIGAN NASA-GSFC
 PS - E.J. WEILER NASA-GSFC

BRIEF DESCRIPTION
 THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-D) SATELLITE WAS A SPACEBORNE ULTRAVIOLET ASTRONOMICAL OBSERVATORY FOR USE AS AN INTERNATIONAL FACILITY. THE IUE CONTAINED A 45-CM TELESCOPE SOLELY FOR SPECTROSCOPY IN THE WAVELENGTH RANGE OF 110 TO 330 NM. THE SATELLITE AND OPTICAL INSTRUMENTATION WERE PROVIDED BY THE GODDARD SPACE FLIGHT CENTER (GSFC). THE TELEVISION CAMERAS USED AS DETECTORS WERE PROVIDED BY THE UNITED KINGDOM SCIENCE RESEARCH COUNCIL (UKSRC). THE EUROPEAN SPACE AGENCY (ESA, FORMERLY ESRO) SUPPLIED SOLAR PADDLES FOR THE SATELLITE AND A EUROPEAN CONTROL CENTER. AFTER LAUNCH, TWO-THIRDS OF THE OBSERVING TIME WAS DIRECTED FROM A CONTROL CENTER AT GSFC, AND ONE-THIRD OF THE TIME THE SATELLITE WAS OPERATED FROM THE EUROPEAN CONTROL CENTER NEAR MADRID. THE IUE OBSERVATORY WAS IN A SYNCHRONOUS ORBIT. THE 45-CM RITCHEY-CRETIEN F/15 TELESCOPE FED A SPECTROGRAPH PACKAGE. THE SPECTROGRAPH PACKAGE, USING SEC VIDICON CAMERAS AS DETECTORS, COVERED THE SPECTRAL RANGE FROM 110 TO 330 NM. IT OPERATED IN EITHER A HIGH- OR LOW-RESOLUTION MODE, WITH RESOLUTIONS OF APPROXIMATELY .02 AND .6 NM, RESPECTIVELY. THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO MANY HOURS. THIS INTEGRATION TIME LIMITED DETECTION IN THE HIGH- AND LOW-RESOLUTION MODES TO

ORIGINAL PAGE IS
 OF POOR QUALITY

APPROXIMATELY 50 AND 0.3 PHOTONS/(SQ CM S NM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER, IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND, 20771 U.S.A.

----- IUE, GUEST INVESTIGATORS -----

INVESTIGATION NAME- LOW/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE

NSSDC ID- 78-012A-01 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - GUEST INVESTIGATORS SEE EXPR. DESCRIPT.

BRIEF DESCRIPTION

THIS EXPERIMENT INCLUDED THE ULTRAVIOLET SPECTROGRAPH PACKAGE CARRIED BY THE IUE, CONSISTING OF TWO PHYSICALLY DISTINCT ECHELLE-SPECTROGRAPH/CAMERA UNITS (CAPABLE OF ASTRONOMICAL OBSERVATIONS). EACH SPECTROGRAPH WAS A THREE-ELEMENT ECHELLE SYSTEM, COMPOSED OF AN OFF-AXIS PARABOLOIDAL COLLIMATOR, AN ECHELLE GRATING, AND A SPHERICAL FIRST-ORDER GRATING THAT WAS USED TO SEPARATE THE ECHELLE ORDERS AND FOCUS THE SPECTRAL DISPLAY ON AN IMAGE CONVERTER-PLUS-SEC VIDICON CAMERA. FOR EACH UNIT THERE WAS A SPARE CAMERA. THE CAMERA UNITS WERE ABLE TO INTEGRATE THE SIGNAL. THE READOUT/PREPARATION CYCLE FOR THE CAMERAS TOOK APPROXIMATELY 20 MIN. WAVELENGTH CALIBRATION WAS PROVIDED BY THE USE OF A HOLLOW CATHODE COMPARISON LAMP. THE PHOTOMETRIC CALIBRATION WAS ACCOMPLISHED BY OBSERVING STANDARD STARS WHOSE SPECTRAL FLUXES HAD BEEN PREVIOUSLY CALIBRATED BY OTHER MEANS. BOTH ECHELLE-SPECTROGRAPH/CAMERA UNITS WERE CAPABLE OF HIGH-RESOLUTION (0.2 Å) OR LOW-RESOLUTION (6Å) PERFORMANCE. THE DUAL HIGH/LOW RESOLUTION CAPABILITY WAS IMPLEMENTED BY THE INSERTION OF A FLAT MIRROR IN FRONT OF THE ECHELLE GRATING, SO THAT THE ONLY DISPERSION WAS PROVIDED BY THE SPHERICAL GRATING. AS THE SEC VIDICONS COULD INTEGRATE THE SIGNAL FOR UP TO MANY HOURS, DATA WITH A SIGNAL-TO-NOISE RATIO OF 50 COULD BE OBTAINED FOR A 80 STAR OF THE 9th AND 10th MAGNITUDE IN THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. THE DISTINGUISHING CHARACTERISTICS OF THE UNITS WERE THEIR WAVELENGTH COVERAGE. ONE UNIT COVERED THE WAVELENGTH RANGE FROM 119.2 TO 192.4 NM IN THE HIGH-RESOLUTION MODE, AND 113.5 TO 288.5 NM IN THE LOW-RESOLUTION MODE. FOR THE OTHER UNIT, THE RANGES WERE FROM 189.3 TO 303.1 NM AND 180 TO 325.5 NM FOR THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. EACH UNIT ALSO HAD ITS OWN CHOICE OF ENTRANCE APERTURES EITHER FOR A 3-ARC S HOLE OR A 10-BY 20-ARC S SLOT. THE 10- BY 20-ARC S SLOTS COULD BE BLOCKED BY A COMMON SHUTTER, BUT THE 3-ARC S APERTURE WAS ALWAYS OPEN. AS A RESULT, TWO APERTURE CONFIGURATIONS WERE POSSIBLE -- (1) BOTH 3-ARC S APERTURES OPEN AND BOTH 10- BY 20-ARC S SLOTS CLOSED, OR (2) ALL FOUR APERTURES OPEN. WITH THIS INSTRUMENTATION, THE OBSERVATIONAL OPTIONS OPEN TO AN OBSERVER WERE LONG-WAVELENGTH AND/OR SHORT-WAVELENGTH SPECTROGRAPH, HIGH OR LOW RESOLUTION, AND LARGE OR SMALL APERTURES. EXPOSURES COULD BE MADE WITH THE TWO SPECTROGRAPHS SIMULTANEOUSLY, BUT REMEMBERING THAT THE ENTRANCE APERTURES FOR EACH WERE DISTINCT AND SEPARATED IN THE SKY BY ABOUT 1 ARC MIN. AN ADDITIONAL RESTRICTION WAS THAT DATA COULD BE READ OUT FROM ONLY ONE CAMERA AT A TIME. HOWEVER, ONE CAMERA COULD BE EXPOSING WHILE THE OTHER CAMERA WAS BEING READ OUT. THE CHOICE OF HIGH OR LOW RESOLUTION COULD BE MADE INDEPENDENTLY FOR THE TWO SPECTROGRAPHS SO THAT THE OPERATIONAL MODES OF THE UNITS NEED NOT HAVE BEEN THE SAME. LISTINGS OF GUEST OBSERVERS AND THEIR INVESTIGATIONS CAN BE OBTAINED FROM THE IUE NEWSLETTER, IUE OBSERVATORY, CODE 685, GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND, 20771, U.S.A.

----- IUE, NONE ASSIGNED -----

INVESTIGATION NAME- PARTICLE FLUX MONITOR (SPACECRAFT)

NSSDC ID- 78-012A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - NONE ASSIGNED

BRIEF DESCRIPTION

THE PARTICLE FLUX MONITOR EXPERIMENT WAS PLACED IN IUE TO MONITOR THE TRAPPED ELECTRIC FLUXES THAT AFFECTED THE SENSITIVITY OF THE ULTRAVIOLET SENSOR IN THE IUE SPECTROGRAPH PACKAGE EXPERIMENT. NSSDC ID 78-012A-01. THE PARTICLE FLUX MONITOR WAS A LITHIUM-DRIPTED SILICON DETECTOR WITH A HALF-ANGLE CONICAL FIELD OF VIEW OF 16 DEG. IT HAD AN ALUMINUM ABSORBER OF 0.357 6/50 CM IN FRONT OF THE COLLIMATOR AND A BRASS SHIELDING HAVING A MINIMUM THICKNESS OF 2.31 6/50 CM. THE EFFECTIVE ENERGY THRESHOLD FOR ELECTRON MEASUREMENTS WAS 1.3 MEV. THE EXPERIMENT WAS ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 15 MEV. DATA CAN BE PROVIDED TO INTERESTED PERSONS IN THE FORM OF DAILY STRIP CHARTS BY THE IUECC. THE INSTRUMENT WAS USED AS AN OPERATIONAL TOOL TO AID IN DETERMINING BACKGROUND RADIATION AND ACCEPTABLE CAMERA EXPOSURE TIME. IT WAS PROVIDED BY DR. C. BOSTROM OF THE APPLIED PHYSICS LABORATORY.

***** JIKIKEN *****

SPACECRAFT COMMON NAME- JIKIKEN
ALTERNATE NAME- EROSPHERIC SAT. 5, ER05-5
11027

NSSDC ID- 78-087A

LAUNCH DATE- 09/16/78
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- H-3H

WEIGHT- 92. K6

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 533. MIN
PERIAPSEIS- 230. KM ALT

EPOCH DATE- 09/16/78
INCLINATION- 31. DEG
APOAPSIS- 30556. KM ALT

PERSONNEL

PI - T.	GHAYASHI	U OF TOKYO
PS - N.	KAWASHIMA	U OF TOKYO
PS - H.	OYA	U OF TOKYO
PS - A.	NISHIDA	U OF TOKYO

BRIEF DESCRIPTION

THIS MISSION WAS PART OF THE JAPANESE CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY AND CARRIED OUT COORDINATED OBSERVATIONS WITH KYOKKO. INVESTIGATIONS OF CORRELATED MECHANISMS BETWEEN PARTICLES AND FIELDS AND PLASMA TURBULENCE WERE MADE BY MAKING OBSERVATIONS OF THE DETAILED STRUCTURE OF THE PLASMASPHERE WITH IN SITU MEASUREMENT TECHNIQUES USING PLASMA WAVE PHENOMENA AND ELECTROSTATIC PARTICLE ANALYZERS. THE SPACECRAFT, A 12-SIDED POLYGON, CARRIED DIPOLE EXTENDABLE ANTENNAS WITH LENGTHS OF 103 M AND 69.6 M AND A 1-P POOR FOR A VECTOR MAGNETOMETER. A SOLAR PANEL ARRAY PROVIDED 30 W INTO A BATTERY AND REGULATOR SYSTEM. THE SPACECRAFT SPIN STABILIZED AT 150 RPM, DROPPING TO 3 RPM WHEN THE TWO SETS OF ANTENNAS WERE EXTENDED. ATTITUDE WAS MEASURED WITH A SUN SENSOR TO AN ACCURACY OF 0.5 DEG. A 0.5-W 136-MHZ PCM/PM TELEMETRY SYSTEM HANDLED 256 OR 1024 BPS AND A 2-W 400-MHZ PM SYSTEM HANDLED WIDEBAND 10-KHZ OR 3-KHZ DATA. DATA ACQUISITION WAS REAL TIME EXCEPT FOR A 10K-BYTE MEMORY FOR HOUSEKEEPING AND PLASMA PARAMETER DATA.

----- JIKIKEN, (JIRI) -----

INVESTIGATION NAME- IMPEDANCE AND ELECTRIC FIELD (IEF)

NSSDC ID- 78-087A-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M.	EJIRI	U OF TOKYO
OI - A.	NISHIDA	U OF TOKYO
OI - Y.	WATANABE	U OF TOKYO
OI - T.	OGAWA	KYOTO U

BRIEF DESCRIPTION

A SWEEP FREQUENCY IMPEDANCE PROBE MEASURED FROM 107 TO 3 MHZ USING A 103-M (TIP-TO-TIP) ANTENNA. THIS PROVIDED BASIC DATA FOR CALIBRATION OF NATURAL PLASMA WAVE DETECTIONS AND DATA FOR THE ESTIMATION OF THE TRANSMISSION EFFICIENCY FOR PLASMA WAVE STIMULATIONS. ELECTRON DENSITY WAS MEASURED INDEPENDENTLY OF ALL OTHER TECHNIQUES AND MEASURED ACCURATELY BY CANCELING STRAY CAPACITANCE. USING THIS SAME ANTENNA, ELECTRIC FIELDS FROM DC TO 3 MHZ WERE MEASURED. THE SPACECRAFT BODY WAS COATED WITH CONDUCTIVE MATERIALS TO AVOID THE GENERATION OF LOCAL ELECTRIC FIELDS SO ACCURATE MEASUREMENTS OF NATURAL FIELDS COULD BE MADE.

----- JIKIKEN, KAWASHIMA -----

INVESTIGATION NAME- CONTROLLED ELECTRON BEAM EMISSIONS (CBE)

NSSDC ID- 78-087A-07 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMA

PERSONNEL

PI - M.	KAWASHIMA	U OF TOKYO
OI - S.	MURASATO	U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT PROVIDED IMPORTANT EFFECTS FOR THE ANALYSES OF WAVE/PARTICLE INTERACTIONS. SPACECRAFT POTENTIAL WAS CONTROLLED BY THE EMISSION OF ELECTRON BEAMS THAT COULD BE VARIED IN ENERGY FROM 100 TO 200 eV IN 4 STEPS TO ALLOW OTHER INSTRUMENTS TO MAKE ACCURATE MEASUREMENTS OF LOW ENERGY IONS AND ELECTRONS. THE BEAMS COULD ALSO CAUSE PLASMA INSTABILITIES THAT RESULTED IN THE PRODUCTION OF MANY KINDS OF PLASMA WAVES. BEAM CURRENTS OF 0.75, 0.5, 0.75, AND 1.0 MA COULD BE SELECTED FOR ANY ENERGY OR AN AUTOMATIC MODE COULD BE SELECTED WHERE ENERGY AND BEAM CURRENT WERE CHANGED EVERY P OR 32 S.

----- JIKIKEN, KIMURA-----

INVESTIGATION NAME- VLF DOPPLER PROPAGATION (DPL)

NSSDC ID- 78-087A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - I. KIMURA KYOTO U
OI - K. NASHIMOTO KYOTO U

BRIEF DESCRIPTION
THIS EXPERIMENT INVOLVED DETECTING THE NUC 22.3 MHz SIGNAL TRANSMITTED REGULARLY FROM AUSTRALIA WITH ONE OF THE TWO LONG DIPOLE ANTENNAS (69.6 M AND 103 M TIP-TO-TIP) EXTENDED PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THIS SIGNAL WAS HETERODYNED DOWN TO 500 MHz, AMPLIFIED WITH A BAND WIDTH OF 100 MHz AND TRANSMITTED TO THE GROUND ON A WIDE BAND ANALOG CHANNEL. THE ELECTRIC FIELD INTENSITY OF THE NUC SIGNAL WAS TELEMETERED VIA THE PCM SYSTEM. THE ANTENNA IMPEDANCE WAS ALSO OBSERVED.

----- JIKIKEN, KUBO-----

INVESTIGATION NAME- ENERGY SPECTRUM OF PARTICLES (ESP)

NSSDC ID- 78-087A-06 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - M. KURO U OF TOKYO
OI - N. KAWASHIMA U OF TOKYO
OI - T. MUKAI U OF TOKYO
OI - T. ANAKAWA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A HEMISPHERICAL ELECTROSTATIC ANALYZER FOR ELECTRONS AND A CYLINDRICAL ONE FOR IONS. THE ENERGY RANGE FOR ELECTRONS WAS 5 eV TO 11 KEV AND FOR IONS WAS 0.02 TO 30 REV/0. THE ENERGY RESOLUTION FOR BOTH ANALYZERS (DELTA E/E) WAS 0.6. MESHES BEING USED TO OBTAIN SPECTRA, THE INSTRUMENT WAS USED TO INVESTIGATE WAVE-PARTICLE INTERACTIONS AND DETERMINE THE RESPONSE OF THE MAGNETOSPHERIC PLASMA WHEN EITHER THE STIMULATED PLASMA WAVE TRANSMITTER OR THE CONTROLLED ELECTRON BEAM EXPERIMENT WERE OPERATING.

----- JIKIKEN, OYA-----

INVESTIGATION NAME- STIMULATED PLASMA WAVE (SPW)

NSSDC ID- 78-087A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - M. OYA U OF TOKYO
OI - T. KAMADA NAGOYA U
OI - T. UNO U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO EXCITE PLASMA WAVES BY TRANSMITTING 300-W PULSES FROM A 103-M (TIP-TO-TIP) ANTENNA IN THE FREQUENCY RANGE .02 TO 3 MHz. THE FREQUENCY COULD BE CHANGED IN A CONTINUOUS SWEEP OR STEPPED THROUGH FINED FREQUENCIES TO OBTAIN ELECTRON TEMPERATURE, TEMPERATURE ANISOTROPY, AND ELECTRON DENSITY. PLASMA INSTABILITIES AND NONLINEAR WAVE/PARTICLE INTERACTIONS WERE STUDIED.

----- JIKIKEN, OYA-----

INVESTIGATION NAME- NATURAL PLASMA WAVES (NPW)

NSSDC ID- 78-087A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - M. OYA U OF TOKYO
OI - M. MATSUMOTO KYOTO U
OI - J. OHTSU NAGOYA U
OI - A. MORIOKA U OF TOKYO
OI - Y. MIYATAKE U OF ELECTRO-COMMUN
OI - I. KIMURA KYOTO U
OI - M. MIYAOKA U OF TOKYO

BRIEF DESCRIPTION

THIS EXPERIMENT USED A 103-M (TIP-TO-TIP) DIPOLE ANTENNA OR A CORED LOOP ANTENNA CONSISTING OF 76 SLEEPS WITH A DIAMETER OF 10.5 CM FOR DETECTING VLF WAVES FROM 0.75 TO 10 MHz WITH A WIDEBAND RECEIVER, HECTOMETRIC, DECAHETRIC, AND KILOHETRIC WAVES IN THE RANGE FROM .01 TO 3 MHz. CONSEQUENTLY, VLF WAVES IN THE PLASMASPHERE, ELECTROSTATIC PLASMA WAVES IN THE MAGNETOSPHERE, AND RADIO WAVES FROM THE EARTH AND PLANETS WERE DETECTED. CORRELATED OBSERVATIONS WITH THE VLF TRANSMITTER AT SIMPLE STATION WERE PLANNED. FLUCTUATIONS OF THE ELECTRIC FIELD UP TO 450 Hz WERE OBTAINED WITH A LANGMUIR PROBE. THE BANDWIDTH AND SWEEP TIME OF THE FREQUENCY ANALYZER COULD BE SELECTED BY CHOOSING ONE OF FOUR MODES: NPW-A, -V, -UL, AND -S.

----- KYOKKO-----

SPACECRAFT COPRON NAME- KYOKKO
ALTERNATE NAMES- EXOSPHERIC SAT. A, EROS 1
EROS A, 10664

NSSDC ID- 78-014A

LAUNCH DATE- 02/04/78 WEIGHT- 130. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3H

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/06/78
ORBIT PERIOD- 134. MIN INCLINATION- 65.4 DEG
PERIAPSIS- 642. KM ALT APOAPSIS- 5677. KM ALT

PERSONNEL
PM - R. HIRAO U OF TOKYO
PS - T. ITOH U OF TOKYO

BRIEF DESCRIPTION
THIS SATELLITE WAS A PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE MISSION OBJECTIVES WERE TO OBSERVE THE AURORA BOREALIS, STUDY AURORA-RELATED PHENOMENA, AND STUDY THE IONOSPHERE AND MAGNETOSPHERE. THE MAIN BODY OF THE SPACECRAFT WAS A CYLINDER 0.946 M IN DIAMETER WITH SHALLOW TRUNCATED CONES ATTACHED AT BOTH ENDS. MOST OF THE SURFACE WAS COVERED WITH SOLAR CELLS THAT PRODUCED 25 W. TWO BOOMS OF ROUGHLY 1.9 M EACH EXTENDED OUTWARD FROM THE EQUATOR OF THE MAIN BODY. AT THE TIP OF EACH BOOM WAS A PERMANENT MAGNET (50 A-50 H) TO PROVIDE ALIGNMENT OF THE SPACECRAFT CENTER AXIS ALONG THE LOCAL GEOMAGNETIC FIELD LINE. TWO SETS OF CIRCULARLY POLARIZED QUADRUPOLE ANTENNAE, ONE FOR UHF (400 MHz) AND ANOTHER FOR VHF, EXTENDED FROM OPPOSITE ENDS OF THE SPACECRAFT. THE UHF ANTENNA WAS DIPLIED FOR TELEMETRY (136 MHz) AND COMMAND (148 MHz). OTHER ATTITUDE SENSORS INCLUDED A VECTOR MAGNETOMETER AND A SOLAR SENSOR. THE SPACECRAFT CONTAINED A TAPE RECORDER TO STORE 160 MIN OF DATA AT 512 BPS OR 40 MIN AT 2048 BPS WITH READOUT IN 10 MIN AT 8192 BPS. BESIDES THE SOLAR CELLS, THERE WAS A NICKEL-CADMIUM BATTERY FOR NIGHTTIME OPERATION.

----- KYOKKO, IWAMOTO-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-014A-06 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL
PI - I. IWAMOTO RADIO RESEARCH LAB
OI - F. SAGAMA RADIO RESEARCH LAB

BRIEF DESCRIPTION
THE INSTRUMENT MEASURED UPPER-ATMOSPHERE IONS IN THE RANGES 1 TO 4 AND 14 TO 16 AMU AND CONSISTED OF A QUADRUPOLE MASS FILTER AND A CHANNEL ELECTRON MULTIPLIER. THE ION INLET WAS LOCATED ON THE FORWARD END OF THE SPACECRAFT MAIN BODY.

----- KYOKKO, KANEDA-----

INVESTIGATION NAME- UV AURORAL TV IMAGING

NSSDC ID- 78-014A-05 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - I. KANEDA U OF TOKYO
OI - M. NIWA U OF TOKYO
OI - P. TAKAGI U OF TOKYO

BRIEF DESCRIPTION

THE INSTRUMENT WAS A TV CAMERA THAT CONSISTED OF AN IMAGE-MEMORY TUBE WITH A SLOW-SCAN READOUT. THE PHOTOELECTRIC SURFACE WAS POTASSIUM BROMIDE WITH A MAGNESIUM FLUORIDE FACEPLATE THAT MADE IT SENSITIVE TO PHOTONS AROUND 1300 A. A PAIR OF SPHERICAL MIRRORS PRODUCED AN IMAGE ON THE PHOTOELECTRIC SURFACE. AN AURORAL PATTERN WAS MEASURED EVERY 128 S WHEN THE SATELLITE WAS OVER THE ARCTIC. THE NUMBER OF PIXELS IN AN IMAGE FRAME WAS 178 X 198 AND THE CAMERA FIELD OF VIEW WAS 60 DEG.

----- KYOKKO, MUKAI-----

INVESTIGATION NAME- ELECTRON ENERGY ANALYZER

NSSDC ID- 78-014A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL

PI - T. MUKAI U OF TOKYO

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF TWO SPHERICAL ELECTROSTATIC ANALYZERS, ONE MOUNTED AT THE FRONT AND ONE AT THE BACK OF THE SPACECRAFT TO VIEW THE ELECTRONS STREAMING EITHER DOWN THE MAGNETIC FIELD LINE OR TOWARD THE EQUATOR. EACH ANALYZER COVERED THE ENERGY RANGE FROM 4.5 EV TO 11.3 KEV IN NINE SPECTRAL BANDS.

----- KYOKKO, NAKAMURA-----

INVESTIGATION NAME- UV GLOW SPECTROPHOTOMETER

NSSDC ID- 78-014A-05

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - M. NAKAMURA TSUKUBA U
OI - T. WATANABE TSUKUBA U

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF A GRATING SPECTROGRAPH WITH A RESOLUTION OF 10 A AND VIBRATING SLIT. THE SPECTRUM WAS SCANNED IN A WIDTH OF PLUS OR MINUS 15 A AROUND THE FOLLOWING SPECTRAL LINES: 304 A (HE PLUS), 584 A (HE), 833 A (O PLUS), 1216 A (H, LYMAN-ALPHA) AND 1304 A (O). FIVE CHANNEL MULTIPLIERS, ONE FOR EACH SPECTRAL LINE, WERE USED TO MEASURE INTENSITY. THE UV GLOW FROM THE ATMOSPHERE, MAGNETOSPHERE, AND INTERPLANETARY SPACE WAS OBSERVED.

----- KYOKKO, OYAMA-----

INVESTIGATION NAME- ELECTRON PROBES

NSSDC ID- 78-014A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - K. OYAMA U OF TOKYO
OI - K. HIRAO U OF TOKYO

BRIEF DESCRIPTION

THE EXPERIMENT WAS COMPRISED OF SEVERAL INSTRUMENTS DESIGNED TO MEASURE ELECTRON TEMPERATURE AND DENSITY AS WELL AS IONIC COMPOSITION. THE ELECTRON TEMPERATURE PROBE WAS AN RF-RECTIFIER TYPE, AND A LANGMUIR PROBE WAS USED TO OBTAIN ELECTRON DENSITY.

----- KYOKKO, YOSHINO-----

INVESTIGATION NAME- ELECTROSTATIC PLASMA WAVE MEASUREMENT

NSSDC ID- 78-014A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - T. YOSHINO U OF ELECTRO-COMMUN
OI - R. NAKAMURA U OF TOKYO
OI - T. ITOH U OF TOKYO

BRIEF DESCRIPTION

THIS INVESTIGATION INVOLVED ELECTROSTATIC WAVES IN THE MAGNETOSPHERE IN THE FREQUENCY RANGE 0.4 TO 30 KHZ AND RADIO WAVES BETWEEN 0.045 AND 3 MHZ. TWO FARADAY CUPS WERE EMPLOYED TO PICK UP ELECTROSTATIC WAVES, WHILE A DIPOLE ANTENNA WAS USED TO RECEIVE RADIO WAVES. THE DIPOLE ANTENNA CONSISTED OF A PAIR OF THIN WIRES 1.9 M LONG AND WAS ATTACHED ALONG THE EXTENDABLE STABILIZATION BOOMS. ONE FARADAY CUP WAS MOUNTED TO LOOK PARALLEL TO THE SPIN AXIS AND THE OTHER PERPENDICULAR TO THE SPIN AXIS. WAVES IN THE 0.4 TO 30 KHZ RANGE WERE RECEIVED BY

WIDEBAND RECEIVERS AND TELEMETERED IN ANALOG FORM. THE WAVE STRENGTH IN THE 0.045 TO 3 MHZ RANGE WAS MEASURED IN 11 BANDS.

***** LANDSAT 2*****

SPACECRAFT COMMON NAME- LANDSAT 2
ALTERNATE NAMES- EARTH RES TECH SAT.-B, PL-733D
ERTS-B, 07619

NSSDC ID- 75-004A

LAUNCH DATE- 01/22/75 WEIGHT- 816. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103.28 MIN
PERIAPSIS- 907. KM ALT

EPOCH DATE- 01/25/75
INCLINATION- 99.09 DEG
APUAPSIS- 918. KM ALT

PERSONNEL

MG - B.T. NOLAN NASA HEADQUARTERS
SC - R.I. WHITMAN NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - S.C. FREDEN NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 2 WAS THE SECOND OF A SERIES OF MODIFIED NIMBUS SATELLITES. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A THREE-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 2 CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR) CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH A FREON GAS PROPULSION SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 0.7 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM OPERATING AT 154.2 AND 2106.4 MHZ AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 137.86 MHz, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE THREE-CAMERA RBV SYSTEM WAS TRANSMITTED IN BOTH REAL TIME AND FROM WBVTR AT 2276.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 2, BALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 75-004A-02

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL

PI - J.A. BALLA NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 2 MULTISPECTRAL SCANNER (MSS) WAS DESIGNED TO PROVIDE REPEITIVE DAY-NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN INFORMATION IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A 22.86-CM DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETER, BAND 2 - 0.6 TO 0.7 MICROMETER, BAND 3 - 0.7 TO 0.8 MICROMETER, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 2 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS ON LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATED 2.89 DEG TO EITHER SIDE OF NAZIR AND SCANNED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SIX DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 4 USED PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USED SILICON PHOTODIODES, AND BAND 5 USED

MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLIED AND THEN CONVERTED TO A PULSE-CODE MODULATED SIGNAL BY AN A/D CONVERTER. THE DATA WERE THEN TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT COMES WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS MAY OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** LANDSAT 3*****

SPACECRAFT COMMON NAME- LANDSAT 3
ALTERNATE NAMES- EARTH RES TECH SAT.-C, ERTS-C
10702, LANDSAT-C

NSSDC ID- 78-026A

LAUNCH DATE- 03/05/78 WEIGHT- 960. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY NASA-OSTA
UNITED STATES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/06/78
ORBIT PERIOD- 103.1 MIN INCLINATION- 99.1 DEG
PERIAPSIS- 897. KM ALT APOAPSIS- 914. KM ALT

PERSONNEL
MG - B.T. NOLAN NASA HEADQUARTERS
SC - R.I. WHITMAN NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - S.C. FREDEN NASA-GSFC

BRIEF DESCRIPTION
LANDSAT 3 WAS A MODIFIED VERSION OF THE NIMBUS SATELLITE, WITH THE GENERAL MISSION OBJECTIVES OF EXTENDING THE PERIOD OF SPACE-DATA ACQUISITION FOR EARTH RESOURCES INITIATED BY LANDSAT 1 (FORMERLY ERTS 1) AND CONTINUED BY LANDSAT 2. THE NEAR-POLAR ORBITING SPACECRAFT SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES, THE SPACECRAFT WAS EQUIPPED WITH (1) A FIVE-CHANNEL MULTISPECTRAL SCANNER (MSS) AND A TWO-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, AND (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 3 CARRIED TWO WIDE-BAND VIDEO TAPE RECORDERS (WBVTR) CAPABLE OF STORING UP TO 30 MIN OF SCANNER OR CAMERA DATA TO GIVE THE SPACECRAFT'S SENSORS A NEAR-GLOBAL COVERAGE CAPABILITY. AN ADVANCED ATTITUDE CONTROL SYSTEM CONSISTING OF HORIZON SCANNERS, SUN SENSORS, AND A COMMAND ANTENNA COMBINED WITH FREON GAS PROPULSION SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1.0 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDED A COMMAND SUBSYSTEM OPERATING AT 154.2 AND 2106.4 MHZ AND A PCM NARROW-BAND TELEMETRY SUBSYSTEM, OPERATING AT 2287.5 AND 157.86 MHZ, FOR SPACECRAFT HOUSEKEEPING, ATTITUDE, AND SENSOR PERFORMANCE DATA. VIDEO DATA FROM THE TWO-CAMERA RBV SYSTEM WERE TRANSMITTED IN BOTH REAL TIME AND FROM THE WIDE-BAND RECORDER SYSTEM AT 2265.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 3, BALLA-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 78-026A-02 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - J.A. BALLA NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT 3 MULTISPECTRAL SCANNER (MSS) PROVIDED REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION WAS TO OBTAIN DATA IN VARIOUS AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY, THE MSS SYSTEM WAS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTED OF A DOUBLE REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATED IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETER, BAND 2 - 0.6 TO 0.7 MICROMETER, BAND 3 - 0.7 TO 0.8 MICROMETER, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LAY

IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, GAVE LANDSAT 3 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS IN LANDSAT 1. INCOMING RADIATION WAS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATED 2.89 DEG TO EITHER SIDE OF NADIR AND SCANNED CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN WAS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE WAS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL WAS ACCOMPLISHED. OPTICAL FILTERS WERE USED TO PRODUCE THE DESIRED SPECTRAL SEPARATION. SiD DETECTORS WERE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USED SILICON PHOTODIODES, AND BAND 5 USED MERCURY-CADMIUM-TELLURIDE DETECTORS. THE MINIMUM DIMENSIONS THAT WERE RESOLVED BY THE MSS WERE 80 M FOR BANDS 1 THROUGH 4 AND 240 M FOR BAND 5. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLIED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA WERE TRANSMITTED (AT 2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR STORED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK THE NEXT TIME THE SPACECRAFT CAME WITHIN COMMUNICATION RANGE OF AN ACQUISITION STATION. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT 3, GILBERT-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-026A-03 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
EARTH RESOURCES SURVEY

PERSONNEL
PI - E.L. GILBERT NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT 3 DATA COLLECTION SYSTEM (DCS) PROVIDED USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS WAS COMPOSED OF: (1) THE DATA COLLECTION PLATFORMS (DCP'S) WHICH MIGHT HAVE BEEN OCEAN BUOYS, CONSTANT PRESSURE BALLOONS, OR AUTOMATIC GROUND STATIONS, (2) THE SATELLITE EQUIPMENT, AND (3) THE GROUND DATA CENTERS INCLUDING REMOTE RECEIVING SITES AND THE GROUND DATA HANDLING SYSTEM AT GSFC. USE OF THE LANDSAT 3 SPACEBORNE DCS PROVIDED A CONTINUAL FLOW OF INFORMATION FOR BETTER MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES AND LED TO IMPROVED WEATHER FORECASTS, POLLUTION CONTROL, AND EARTHQUAKE PREDICTION AND WARNING. THE ENVIRONMENTAL SENSORS MOUNTED ON A DCP WERE SELECTED BY INDIVIDUAL INVESTIGATORS TO SATISFY THEIR PARTICULAR REQUIREMENTS. FROM A PLANNED ORBIT OF 912 KM, THE SPACECRAFT WAS CAPABLE OF ACQUIRING DATA FROM DCP'S WITHIN A RADIUS OF APPROXIMATELY 3100 KM FROM THE SUBSATELLITE POINT, THUS ALLOWING DATA TO BE OBTAINED FROM ANY REMOTE PLATFORM AT LEAST ONCE EVERY 12 H. THE DCP'S TRANSMIT AT 401.55 MHZ. THE DCS EQUIPMENT, ESSENTIALLY A RECEIVER, RECEIVED AND RETRANSMITTED DATA (AT 2287.5 MHZ) TO SELECTED GROUND RECEIVING STATIONS. THERE WAS NO SIGNAL MULTIPLEXING OR DATA PROCESSING ON THE SATELLITE. THE LANDSAT 3 DCS ACCOMMODATED UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL US. DATA FROM THIS EXPERIMENT WERE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

----- LANDSAT 3, WILSON-----

INVESTIGATION NAME- RETURN BEAM VIDICON CAMERA (RBV)

NSSDC ID- 78-026A-01 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - L. WILSON NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT 3 RETURN BEAM VIDICON (RBV) CAMERA SYSTEM CONTAINED TWO IDENTICAL CAMERAS COVERING THE SPECTRAL BAND FROM 0.55 TO 0.75 MICROMETER. THE TWO EARTH-ORIENTED CAMERAS WERE MOUNTED TO A COMMON BASE, STRUCTURALLY ISOLATED FROM THE SPACECRAFT TO MAINTAIN ACCURATE ALIGNMENT. EACH CAMERA CONTAINED AN OPTICAL LENS, A RBV SENSOR, A THERMOELECTRIC COOLER, DEFLECTION AND FOCUS COILS, A MECHANICAL SHUTTER, ERASE LAMPS, AND SENSOR ELECTRONICS. THE CAMERAS WERE ALIGNED TO VIEW ADJACENT 84-KM SQUARE GROUND SCENES WHICH OVERLAPPED SLIGHTLY SO THAT THE TOTAL WIDTH OF THE GROUND SCENE WAS 185 KM. THE CAMERAS WERE OPERATED EVERY 12.5 S TO PRODUCE OVERLAPPING IMAGES ALONG THE DIRECTION OF SPACECRAFT MOTION. AFTER SHUTTERING, THE IMAGE WAS SCANNED BY AN ELECTRON BEAM TO PRODUCE A VIDEO OUTPUT SIGNAL. THE TIMING CYCLE WAS ARRANGED SO THAT A 3.5-S OFFSET WAS INTRODUCED BETWEEN THE READOUTS OF THE TWO CAMERAS, PERMITTING SEQUENTIAL READOUT OF THE CAMERAS, ALLOWING THE SAME TAPE RECORDER AND COMMUNICATIONS CHANNEL TO BE USED. VIDEO DATA FROM THE RBV WERE TRANSMITTED (AT 2265.5

ORIGINAL PAGE IS
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HN2) IN BOTH REAL-TIME AND TAPE-RECORDER MODES. FROM A NOMINAL SPACECRAFT ALTITUDE OF 912 KM, THE RBV HAD A GROUND RESOLUTION OF 40 M (TWICE THE LANDSAT 1 RESOLUTION OF 80 M). DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE MADE AVAILABLE TO APPROVED INVESTIGATORS AND AGENCIES THROUGH ITS LANDSAT USERS SERVICES SECTION. ALL OTHER INTERESTED INDIVIDUALS CAN OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

***** MAGION*****

SPACECRAFT COMMON NAME- MAGION
ALTERNATE NAMES- 11110

NSSDC ID- 78-099C

LAUNCH DATE- 10/24/78 WEIGHT- 15. KG
LAUNCH SITE- PLESETSK, U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R. INTERCOS
CZECHOSLOVAKIA CAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/25/78
ORBIT PERIOD- 96.4 MIN INCLINATION- 82.96 DEG
PERIAPSIS- 407. KM ALT APOAPSIS- 768. KM ALT

PERSONNEL
PS - P. TRISKA GEOPHYS INST CAS

BRIEF DESCRIPTION
MAGION WAS A CZECHOSLOVAKIAN SUBSATELLITE THAT SEPARATED FROM INTERCOSMOS 18 ON NOV. 14, 1978. IT WAS DESIGNED TO CARRY IONOSPHERIC-TYPE EXPERIMENTS RELATED TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). MAGION HAD A PRISM SHAPE (.3 X .3 X .15 M) AND FOLLOWED THE ORBIT OF INTERCOSMOS 18. CZECHOSLOVAK PARTICIPATION IN STUDIES OF MUTUAL RELATIONS BETWEEN THE EARTH'S MAGNETOSPHERE AND IONOSPHERE CONSISTED MAINLY IN MEASURING OF THE VLF PHENOMENA ON BOARD OF THE CZECHOSLOVAK-MADE MAGION MOVING SLOWLY AWAY FROM INTERCOSMOS 18 AND IN COOPERATION ON MEASUREMENTS OF PLASMA PROPERTIES IN THE VICINITY OF THIS SATELLITE. THE ION COMPOSITION ESTIMATED WITH THE AID OF A BENNET MASS-SPECTROMETER AND THE ELECTRON TEMPERATURE TAKEN WITH THE USE OF A RADIOFREQUENCY PLANE PROBE HAVE BEEN RECORDED. INFORMATION ON THE EXPERIMENTS HAS BEEN REQUESTED FROM TRISKA (6/79) BUT NOT YET RECEIVED.

***** MAGSAT*****

SPACECRAFT COMMON NAME- MAGSAT
ALTERNATE NAMES- AER-C, GLOBAL MAGNETIC SURV MSN
MAGSAT-A, 11604

NSSDC ID- 79-094A

LAUNCH DATE- 10/30/79 WEIGHT- 158. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/31/79
ORBIT PERIOD- 93.9 MIN INCLINATION- 96.8 DEG
PERIAPSIS- 351.9 KM ALT APOAPSIS- 578.4 KM ALT

PERSONNEL
MG - J.P. MURPHY NASA HEADQUARTERS
SC - J.V. TARANIK NASA HEADQUARTERS
PM - G.W. DUSLEY NASA-GSFC
PS - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION
THE MAGSAT PROJECT WAS A JOINT NASA/UNITED STATES GEOLOGICAL SURVEY (USGS) EFFORT TO MEASURE NEAR-EARTH MAGNETIC FIELDS ON A GLOBAL BASIS. OBJECTIVES INCLUDED OBTAINING AN ACCURATE DESCRIPTION OF THE EARTH'S MAGNETIC FIELD, OBTAINING DATA FOR USE IN THE UPDATE AND REFINEMENT OF WORLD AND REGIONAL MAGNETIC CHARTS, COMPILATION OF A GLOBAL CRUSTAL MAGNETIC ANOMALY MAP AND INTERPRETATION OF THAT MAP IN TERMS OF GEOLOGIC/GEOPHYSICAL MODELS OF THE EARTH'S CRUST. THE SPACECRAFT WAS LAUNCHED INTO A LOW EARTH, NEAR POLAR, ORBIT BY THE SCOUT VEHICLE. THE BASIC SPACECRAFT WAS MADE UP OF TWO DISTINCT PARTS -- THE INSTRUMENT MODULE THAT CONTAINED A VECTOR AND A SCALAR MAGNETOMETER AND THEIR UNIQUE SUPPORTING GEAR; AND THE BASE MODULE THAT CONTAINED THE NECESSARY DATA HANDLING, POWER, COMMUNICATIONS, COMMAND, AND ATTITUDE CONTROL SUBSYSTEMS TO SUPPORT THE INSTRUMENT MODULE. THE BASE MODULE COMPLETE WITH ITS SUBSYSTEMS WAS COMPRISED OF RESIDUAL SMALL ASTRONOMY SATELLITE (SAS-C) HARDWARE. THE MAGNETOMETERS WERE DEPLOYED AFTER LAUNCH TO A POSITION 6 M BEHIND THE SPACECRAFT. AT THIS DISTANCE, THE INFLUENCE OF MAGNETIC MATERIALS FROM THE INSTRUMENT AND BASE MODULE (CHIEFLY FROM THE STAR CAMERAS) WAS LESS THAN 1 NT. FOR A LIST OF INVESTIGATORS AND THEIR INVESTIGATIONS, WHO WILL USE ONE OR BOTH OF THE EXPERIMENTS LISTED BELOW, SEE APPENDIX B.

***** MAGSAT, LANGEL*****

INVESTIGATION NAME- SCALAR MAGNETOMETER

NSSDC ID- 79-094A-01 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL
PI - R.A. LANGEL NASA-GSFC
OI - W.M. FARTHING NASA-GSFC

BRIEF DESCRIPTION
THE SCALAR MAGNETOMETER HAD TWO DUAL-CELL, CESIUM-VAPOR SENSOR HEADS WHOSE OUTPUT FREQUENCY WAS PROPORTIONAL TO THE TOTAL MAGNETIC FIELD. WITH THIS SENSOR CONFIGURATION, ONLY TWO SMALL DIAMOND-SHAPED DEAD ZONES EXIST. THESE LIE ALONG THE ORBIT NORMAL (THE EAST-WEST DIRECTION) FOR THE ORBIT AND ATTITUDE CHOSEN FOR THIS MISSION AND A DIRECTION IN WHICH THE MAGNETIC FIELD WILL NEVER LIE. THE SCALAR MAGNETOMETER'S BASIC ACCURACY WAS ON THE ORDER OF 0.5 NT. A PERIOD COUNT SYSTEM CONVERTED THE MAGNETOMETER OUTPUT FREQUENCY TO A DIGITAL WORD ACCEPTABLE TO THE SPACECRAFT TELEMETRY SYSTEM. THIS DIGITAL DATA HAD A RESOLUTION AND ACCURACY OF BETWEEN 0.5 AND 1.0 NT IN THE RANGE 15,000 TO 64,000 NT. NOISE ON THE SPACECRAFT RESULTED IN OPERATION OF ONLY ONE SENSOR AT A TIME MOST OF THE TIME.

***** MAGSAT, LANGEL*****

INVESTIGATION NAME- VECTOR MAGNETOMETER

NSSDC ID- 79-094A-02 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL
PI - R.A. LANGEL NASA-GSFC
OI - W.M. ACUNA NASA-GSFC

BRIEF DESCRIPTION
THE VECTOR MAGNETOMETER CONSISTED OF THREE FLUXGATE SENSING ELEMENTS ALIGNED ALONG ORTHOGONAL AXES. THE OUTPUT OF EACH VECTOR SENSOR WAS CONVERTED TO A DIGITAL WORD BY AN ANALOG TO DIGITAL CONVERTER. THE OUTPUT OF ALL THESE AXES WAS SAMPLED ESSENTIALLY SIMULTANEOUSLY. EACH VECTOR MEASUREMENT HAD A RESOLUTION OF BETTER THAN 1 NT AND AN ABSOLUTE ACCURACY OF BETTER THAN 6 NT R.M.S. WHEN REFERENCED TO A GEOCENTRIC COORDINATE SYSTEM. THE MEASUREMENT RANGE WAS PLUS OR MINUS 64,000 NT.

***** METEOSAT 1*****

SPACECRAFT COMMON NAME- METEOSAT 1
ALTERNATE NAMES- METEOROLOGICAL SAT-A, METOSAT
10489

NSSDC ID- 77-108A

LAUNCH DATE- 11/23/77 WEIGHT- 625.8 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/24/77
ORBIT PERIOD- 1411.5 MIN INCLINATION- 0.7 DEG
PERIAPSIS- 34913. KM ALT APOAPSIS- 35692. KM ALT

PERSONNEL
PM - D. LEVERINGTON ESA

BRIEF DESCRIPTION
METOSAT WAS A GEOSTATIONARY SPACECRAFT AND SERVED AS PART OF EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPED TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPERATION WERE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIED (1) A VISIBLE-IR RADIOMETER TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM TO DISSEMINATE IMAGE DATA TO USER STATIONS, TO COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND TO RELAY DATA FROM POLAR ORBITING SATELLITES. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURED 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS WERE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE WAS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE CENTRAL TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER.

LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPOUNDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT ATTAINED SYNCHRONOUS ORBIT. METEOSAT 1 WAS PLACED IN GEOSYNCHRONOUS ORBIT NEAR THE PRIME MERIDIAN AT AN ALTITUDE OF 35800 KM.

----- METEOSAT 1, ESA STAFF-----

INVESTIGATION NAME- IMAGING RADIOMETER

NSSDC ID- 77-108A-01

INVESTIGATIVE PROGRAM APPLICATIONS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI -

ESA STAFF

ESA

BRIEF DESCRIPTION

THE VISIBLE-IR RADIOMETER FLOWN ON METEOSAT WAS CAPABLE OF PROVIDING DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED SATELLITE FOR USE IN (1) OPERATIONAL WEATHER ANALYSIS AND FORECASTING AND (2) SUPPORT TO GARP. THE FIVE-CHANNEL INSTRUMENT WAS ABLE TO TAKE FULL PICTURES OF THE EARTH'S DISK. THE THREE IR CHANNELS (TWO IN THE 10.5- TO 12.5-MICROMETER REGION AND ONE IN THE 5.7- TO 7.1-MICROMETER REGION), AND THE TWO VISIBLE CHANNELS (0.5 TO 0.9 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY A SCAN MIRROR AND COLLECTED BY AN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE RADIOMETER OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR AT THE COMPLETION OF EACH SPIN. RESOLUTION AT THE SUBSATELLITE POINT WAS 2.5 KM FOR THE VISIBLE, 5 KM FOR THE IR AND WATER VAPOR CHANNELS.

----- METEOSAT 1, ESA STAFF-----

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- 77-108A-02

INVESTIGATIVE PROGRAM APPLICATIONS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI -

ESA STAFF

ESA

BRIEF DESCRIPTION

THE DATA COLLECTION PLATFORM WAS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR-ORBITING SATELLITES. THIS EXPERIMENT WAS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (WEFAX) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATED ON S-BAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

***** NIMBUS 4 *****

SPACECRAFT COMMON NAME- NIMBUS 4
ALTERNATE NAMES- NIMBUS-D, PL-701E
04362

NSSDC ID- 70-025A

LAUNCH DATE- 04/08/70 WEIGHT- 620. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/09/70
ORBIT PERIOD- 107.2 MIN INCLINATION- 80.114 DEG
PERIAPSIS- 1092. KM ALT APOAPSIS- 1108. KM ALT

PERSONNEL
ML - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - A.J. FLEIG NASA-GSFC

BRIEF DESCRIPTION

NIMBUS 4, THE FOURTH IN A SERIES OF SECOND-GENERATION METEOROLOGICAL B AND D SATELLITES, WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS AND COLLECTING METEOROLOGICAL DATA. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES -- (1) A RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) THE CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND THE CONTROL SYSTEM CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 4 WAS NEARLY 3.7 M TALL, 1.45 M IN DIAMETER AT THE BASE, AND ABOUT 3 M ACROSS WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS RING PROVIDED MOUNTING SPACE FOR SENSORS AND TELEMETRY ANTENNAS. AN H-FRAME STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER EXPERIMENTS AND TAPE RECORDERS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, GAS NOZZLES FOR ATTITUDE CONTROL, AND A COMMAND ANTENNA. USE OF AN ADVANCED ATTITUDE CONTROL SUBSYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG FOR ALL THREE AXES (PITCH, ROLL, AND YAW). PRIMARY EXPERIMENTS CONSISTED OF (1) AN IMAGE DISSECTOR CAMERA SYSTEM (IDCS) FOR PROVIDING DAYTIME CLOUDCOVER PICTURES BOTH IN REAL-TIME AND RECORDED MODES, (2) A TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAYTIME AND NIGHTTIME SURFACE AND CLOUDTOP TEMPERATURES AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (3) AN INFRARED INTERFEROMETER SPECTROMETER (IRIS) FOR MEASURING THE EMISSION SPECTRA OF THE EARTH/ATMOSPHERE SYSTEM, (4) A SATELLITE INFRARED SPECTROMETER (SIRS) FOR DETERMINING THE VERTICAL PROFILES OF TEMPERATURE AND WATER VAPOR IN THE ATMOSPHERE, (5) A MONITOR OF ULTRAVIOLET SOLAR ENERGY (MUSE) FOR DETECTING SOLAR UV RADIATION, (6) A BACKSCATTER ULTRAVIOLET (BUV) FOR MONITORING THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE, (7) A FILTER WEDGE SPECTROMETER (FWS) FOR ACCURATE MEASUREMENT OF IR RADIANCE AS A FUNCTION OF WAVELENGTH FROM THE EARTH/ATMOSPHERE SYSTEM, (8) A SELECTIVE CHOPPER RADIOMETER (SCR) FOR DETERMINING THE TEMPERATURES OF SIX SUCCESSIVE 10-KM LAYERS IN THE ATMOSPHERE FROM ABSORPTION MEASUREMENTS IN THE 15-MICROMETER CO2 BAND, AND (9) AN INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS) FOR LOCATING, INTERROGATING, RECORDING, AND RETRANSMITTING METEOROLOGICAL AND GEOPHYSICAL DATA FROM REMOTE COLLECTION STATIONS.

----- NIMBUS 4, HEATH-----

INVESTIGATION NAME- BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER

NSSDC ID- 70-025A-05

INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS

PERSONNEL

PI - D.F. HEATH

NASA-GSFC

O1 - J.V. DAVE

IBM CORPORATION

O1 - A.J. KRUEGER

NASA-GSFC

O1 - C.L. MATEER

ENVIRONMENT CANADA

BRIEF DESCRIPTION

THE NIMBUS 4 BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER EXPERIMENT WAS DESIGNED TO MONITOR THE VERTICAL DISTRIBUTION AND TOTAL AMOUNT OF ATMOSPHERIC OZONE ON A GLOBAL SCALE BY MEASURING THE INTENSITY OF UV RADIATION BACKSCATTERED BY THE EARTH/ATMOSPHERE SYSTEM DURING DAY AND NIGHT IN THE 2500- TO 3400-A SPECTRAL BAND. THE PRIMARY INSTRUMENTATION CONSISTED OF A DOUBLE MONOCHROMATOR CONTAINING ALL REFLECTIVE OPTICS AND A PHOTOMULTIPLIER DETECTOR. THE DOUBLE MONOCHROMATOR WAS COMPOSED OF TWO FASTIE-EBERT-TYPE MONOCHROMATORS IN TANDER. EACH MONOCHROMATOR HAD A 64- BY 64-MM GRATING WITH 2400 LINES PER MM. LIGHT FROM A 0.05-SR SOLID ANGLE (SUBTENDING APPROXIMATELY A 222-KM-SQUARE AREA ON THE EARTH'S SURFACE FROM A SATELLITE HEIGHT OF APPROXIMATELY 1100 KM) ENTERED THE NADIR-POINTING INSTRUMENT THROUGH A DEPOLARIZING FILTER. A MOTOR-DRIVEN CAM STEP ROTATED THE GRATINGS TO MONITOR THE INTENSITY OF 12 OZONE ABSORPTION WAVELENGTHS. THE DETECTOR WAS A PHOTOMULTIPLIER TUBE. FOR BACKGROUND READINGS, A FILTER PHOTOMETER MEASURED THE REFLECTED UV RADIATION IN AN OZONE-FREE ABSORPTION AREA NEAR 3800 A. SIGNALS FROM BOTH UNITS WERE READ BY SEPARATE RANGE-SWITCHING ELECTROMETERS WITH SEVEN RANGES. THE BUV EXPERIMENT CYCLE REQUIRED 6144 S. EACH CYCLE, IN TURN, WAS DIVIDED INTO 192 BUV FRAMES OF 32 S DURATION. CALIBRATION BY ONBOARD LIGHT SOURCES WAS PERFORMED IN 26 OF THE 192 FRAMES. THE OTHER FRAMES WERE USED FOR EXPERIMENTAL DATA. DURING EACH OF THESE DATA FRAMES, THE MONOCHROMATOR MEASURED THE INTENSITY OF THE UV RADIATION IN EACH OF THE 12 WAVELENGTH BANDS WHILE THE PHOTOMETER MEASURED THE UV INTENSITY IN A SINGLE WAVELENGTH BAND. THE DWELL TIME AT EACH WAVELENGTH WAS 1.8 S, AND, DURING THIS INTERVAL, FOUR ANALOG UV INTENSITY MEASUREMENTS WERE TAKEN AT 400-MS INTERVALS IN ADDITION TO AN INTEGRATED PULSE COUNT MEASUREMENT OF THE UV INTENSITY AND ENERGETIC PARTICLE FLUX. ONCE EACH ORBIT, THE FIELD OF VIEW WAS CHANGED TO MONITOR THE SUN OR MOON DIRECTLY. THE MEASUREMENT RANGE OF THE SIGNAL CURRENT WAS FROM 0.2 TO 3000 MICROAMPS. THE VERTICAL DISTRIBUTION OF OZONE WAS OBTAINED BY MATHEMATICAL INVERSION TECHNIQUES. FOR A COMPLETE DESCRIPTION OF THE BUV EXPERIMENT, SEE SECTION 7 IN 'THE NIMBUS IV USER'S GUIDE.'

***** NIMBUS 5 *****

SPACECRAFT COMMON NAME- NIMBUS 5
ALTERNATE NAMES- NIMBUS-E, PL-7210
06305

NSSDC ID- 72-097A

LAUNCH DATE- 12/11/72 WEIGHT- 770. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/11/72
ORBIT PERIOD- 107.2 MIN INCLINATION- 99.9 DEG
PERIAPSIS- 1009. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL
SC - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - A.J. FLEIG NASA-GSFC

BRIEF DESCRIPTION
THE NIMBUS 5 R AND D SATELLITE WAS DESIGNED TO SERVE AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED METEOROLOGICAL SENSOR SYSTEMS AND COLLECTING METEOROLOGICAL AND GEOLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW RING-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL SYSTEM HOUSING. THE SOLAR PADDLES AND CONTROL SYSTEM HOUSING WERE CONNECTED TO THE SENSOR MOUNT BY A TRUSS STRUCTURE, GIVING THE SATELLITE THE APPEARANCE OF AN OCEAN BUOY. NIMBUS 5 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE TORUS-SHAPED SENSOR MOUNT, WHICH FORMED THE SATELLITE BASE, HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL SYSTEM HOUSING, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES. PRIMARY EXPERIMENTS INCLUDED (1) A TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) FOR MEASURING DAY AND NIGHT SURFACE AND CLOUDTOP TEMPERATURES, AS WELL AS THE WATER VAPOR CONTENT OF THE UPPER ATMOSPHERE, (2) AN ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) FOR MAPPING THE THERMAL RADIATION FROM THE EARTH'S SURFACE AND ATMOSPHERE, (3) AN INFRARED TEMPERATURE PROFILE RADIOMETER (ITPR) FOR OBTAINING VERTICAL PROFILES OF TEMPERATURE AND MOISTURE, (4) A MICROWAVE SPECTROMETER (NEMS) FOR DETERMINING TROPOSPHERIC TEMPERATURE PROFILES, ATMOSPHERIC WATER VAPOR ABUNDANCES, AND CLOUD LIQUID WATER CONTENTS, (5) A SELECTIVE CHOPPER RADIOMETER (SCR) FOR OBSERVING THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE, AND (6) A SURFACE COMPOSITION MAPPING RADIOMETER (SCMR) FOR MEASURING THE DIFFERENCES IN THE THERMAL EMISSION CHARACTERISTICS OF THE EARTH'S SURFACE.

----- NIMBUS 5, HOUGHTON-----

INVESTIGATION NAME- SELECTIVE CHOPPER RADIOMETER (SCR)

NSSDC ID- 72-097A-02 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - J.T. HOUGHTON OXFORD U
OI - S.D. SMITH READING U

BRIEF DESCRIPTION
THE NIMBUS 5 SELECTIVE CHOPPER RADIOMETER (SCR) WAS DESIGNED TO (1) OBSERVE THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE UP TO 50 KM IN ALTITUDE, (2) MAKE SUPPORTING OBSERVATIONS OF WATER VAPOR DISTRIBUTION, AND (3) DETERMINE THE DENSITY OF ICE PARTICLES IN CIRRUS CLOUDS. TO ACCOMPLISH THESE OBJECTIVES, THE SCR MEASURED EMITTED RADIATION IN 16 SPECTRAL INTERVALS SEPARATED INTO THE FOLLOWING FOUR GROUPS -- (1) FOUR CO2 CHANNELS BETWEEN 13.8 AND 14.8 MICROMETERS (2) AN IR WINDOW CHANNEL AT 11.1 MICROMETERS AND A WATER VAPOR CHANNEL AT 18.6 MICROMETERS, (3) TWO CHANNELS AT 49.5 AND 133.3 MICROMETERS, AND (4) 2.08, 2.59, 2.65, AND 3.5 MICROMETERS. FROM AN AVERAGE SATELLITE ALTITUDE OF 1100 KM, THE RADIOMETER VIEWED A 40-KM CIRCLE ON THE EARTH'S SURFACE WITH A GROUND RESOLUTION OF ABOUT PLUS OR MINUS 1 DEG C. A SIMILAR EXPERIMENT WAS FLOWN ON NIMBUS 4.

----- NIMBUS 5, WILHEIT, JR.-----

INVESTIGATION NAME- ELECTRICALLY SCANNING MICROWAVE
RADIOMETER (ESMR)

NSSDC ID- 72-097A-04

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - T.T. WILHEIT, JR. NASA-GSFC
OI - P. GLOERSEN NASA-GSFC

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVES OF THE NIMBUS 5 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) WERE (1) TO DERIVE THE LIQUID WATER CONTENT OF CLOUDS FROM BRIGHTNESS TEMPERATURES OVER OCEANS, (2) TO OBSERVE DIFFERENCES BETWEEN SEA ICE AND THE OPEN SEA OVER THE POLAR CAPS, AND (3) TO TEST THE FEASIBILITY OF INFERRING SURFACE COMPOSITION AND SOIL MOISTURE, TO ACCOMPLISH THESE OBJECTIVES, THE ESMR WAS CAPABLE OF CONTINUOUS GLOBAL MAPPING OF THE 1.55-CM (19.36 GHZ) RADIO THERMAL (MICROWAVE) RADIATION EMITTED BY THE EARTH/ATMOSPHERE SYSTEM AND COULD FUNCTION EVEN IN THE PRESENCE OF CLOUD CONDITIONS THAT BLOCK CONVENTIONAL SATELLITE INFRARED SENSORS. A 90-CM BY 90-CM RADIOMETER ANTENNA SYSTEM, DEPLOYED AFTER LAUNCH, SCANNED THE EARTH SUCCESSIVELY AT VARIOUS ANGLES IN A PLANE PERPENDICULAR TO THE SPACECRAFT ORBITAL TRACK, PRODUCING A BRIGHTNESS TEMPERATURE MAP OF THE SURFACE OF THE EARTH AND ITS ATMOSPHERE. THE SCANNING PROCESS WAS CONTROLLED BY A COMPUTER ON BOARD AND CONSISTED OF 78 SYMMETRICALLY DISTRIBUTED INDEPENDENT SCAN SPOTS EXTENDING 50 DEG TO EITHER SIDE OF NADIR. ANGULAR SEPARATION OF THE SCAN SPOTS ALLOWED FOR AN 0.5 PERCENT OVERLAP BETWEEN VIEW POSITIONS. FROM A NEAR ORBITAL HEIGHT OF 1100 KM, THE RADIOMETER HAD AN ACCURACY OF ABOUT PLUS OR MINUS 1 DEG C WITH A SPATIAL RESOLUTION OF ABOUT 25 KM. THE ESMR DATA WERE STORED ON MAGNETIC TAPE FOR TRANSMISSION TO GROUND ACQUISITION STATIONS.

***** NIMBUS 6 *****

SPACECRAFT COMMON NAME- NIMBUS 6
ALTERNATE NAMES- PL-7310, NIMBUS-F
07924

NSSDC ID- 75-052A

LAUNCH DATE- 06/12/75 WEIGHT- 585. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/12/75
ORBIT PERIOD- 107.3 MIN INCLINATION- 100. DEG
PERIAPSIS- 1093. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL
SC - R.J. ARNOLD NASA HEADQUARTERS
PM - C.M. MACKENZIE NASA-GSFC
PS - A.J. FLEIG NASA-GSFC

BRIEF DESCRIPTION
THE NIMBUS 6 R AND D SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR TESTING ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 6 WAS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMED THE SATELLITE BASE HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS SUPPORTED THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). THE NINE EXPERIMENTS SELECTED FOR NIMBUS 6 ARE THE (1) EARTH RADIATION BUDGET (ERB), (2) ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR), (3) HIGH-RESOLUTION INFRARED RADIATION SOUNDER (HIRS), (4) LIMB RADIANCE INVERSION RADIOMETER (LRIR), (5) PRESSURE MODULATED RADIOMETER (PMR), (6) SCANNING MICROWAVE SPECTROMETER (SCAMS), (7) TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR), (8) SATELLITE TRACKING AND DATA RELAY EXPERIMENT, AND (9) TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE). THIS COMPLEMENT OF ADVANCED SENSORS IS CAPABLE OF (1) MAPPING TROPOSPHERIC TEMPERATURE, WATER VAPOR ABUNDANCE, AND CLOUD WATER CONTENT, (2) PROVIDING VERTICAL PROFILES OF TEMPERATURE, OZONE, AND WATER VAPOR, (3) TRANSMITTING REAL-TIME DATA TO A GEOSTATIONARY SPACECRAFT (ATS 6), AND (4) YIELDING DATA ON THE EARTH'S RADIATION BUDGET.

----- NIMBUS 6, HOUGHTON-----

INVESTIGATION NAME- PRESSURE-MODULATED RADIOMETER (PMR)

NSSDC ID- 75-052A-09

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON	OXFORD U
O1 - C.D. RODGERS	OXFORD U
O1 - E.J. WILLIAMSON	OXFORD U
O1 - G.D. PESKETT	OXFORD U
O1 - P. CURTIS	OXFORD U

BRIEF DESCRIPTION

THE NIMBUS 6 PRESSURE MODULATED RADIOMETER (PMR) EXPERIMENT TOOK RADIOMETRIC MEASUREMENTS IN THE 15-MICROMETER CO2 BAND AT ALTITUDES BETWEEN 45 AND 70 KM ON A GLOBAL SCALE. BY APPROPRIATE MATHEMATICAL RETRIEVAL METHODS, THE TEMPERATURE STRUCTURES OF THE UPPER STRATOSPHERE AND LOWER MESOSPHERE WERE THEN DEDUCED. THE PRESSURE MODULATION TECHNIQUE PERMITTED THE EXTENSION OF SELECTIVE CHOPPING TECHNIQUES TO HIGHER ALTITUDES WHERE THE PRESSURE-BROADENED EMISSION LINES IN THE 15-MICROMETER CO2 BAND BECAME SO NARROW THAT CONVENTIONAL SPECTROMETERS AND INTERFEROMETERS HAD INSUFFICIENT SPECTRAL RESOLUTION. IN ADDITION TO PRESSURE SCANNING (IN DISCRETE STEPS), THE RADIOMETER ALSO EMPLOYED DOPPLER SCANNING ALONG THE DIRECTION OF FLIGHT. THE PMR COMPRISED TWO SIMILAR RADIOMETER CHANNELS, EACH CONSISTING OF A PLANE SCANNING MIRROR, REFERENCE BLACKBODY, PRESSURE MODULATOR CELL, AND DETECTOR ASSEMBLY. THE PLANE MIRROR WAS GOLD-COATED AND MOUNTED AT 45 DEG ON A 90-DEG STEPPING MOTOR SO THAT THE FIELD OF VIEW OF THE CHANNEL COULD BE DIRECTED TO SPACE OR TO THE INTERNAL REFERENCE BLACKBODY FOR INFLIGHT RANGE AND ZERO CALIBRATION. THE MOTOR WAS MOUNTED ON A PAIR OF FLEXIBLE PIVOTS SO THAT THE MIRROR CAN BE ROTATED THROUGH PLUS OR MINUS 7-1/2 DEG FROM ITS REST POSITION TO GIVE THE REQUIRED DOPPLER SCAN. MAJOR COMPONENTS IN THE PRESSURE MODULATOR CELL WERE A MOVABLE PISTON, A DIAPHRAGM, AND A MAGNETIC DRIVE COIL. THE DETECTOR ASSEMBLY CONSISTED OF A FIELD LENS, A CONDENSING LIGHT PIPE, AND A PYROELECTRIC FLAKE BOLOMETER. EACH RADIOMETER HAD A FIELD OF VIEW THAT WAS 20 DEG WHOLE ANGLE ACROSS THE SPACECRAFT'S LINE OF FLIGHT AND 40 DEG WHOLE ANGLE PARALLEL TO THE LINE OF FLIGHT. THE REDUCED TEMPERATURE VALUES WERE WITHIN PLUS OR MINUS 2 DEG K AT 65 KM AND ABOUT PLUS OR MINUS 0.2 DEG K NEAR 50 KM.

----- NIMBUS 6, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 75-052A-05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - H. JACOBOWITZ	NOAA-NESS
O1 - A.J. DRUMMOND	EPPLEY LAB, INC
O1 - I. RUFF	NOAA-NESS
O1 - J.R. HICKEY	EPPLEY LAB, INC
O1 - W.J. SCHLES	EPPLEY LAB, INC
O1 - L.L. STOWE	NOAA-NESS

BRIEF DESCRIPTION

THE NIMBUS 6 EARTH RADIATION BUDGET (ERB) EXPERIMENT MEASURED REFLECTED AND EMITTED TERRESTRIAL RADIATION FLUXES IN CONJUNCTION WITH SOLAR RADIATION. THE RESULTS WERE USED (1) TO DETERMINE THE EARTH RADIATION BUDGET, (2) TO DETERMINE THE ANGULAR DISTRIBUTION OF TERRESTRIAL RADIATION FOR VARIOUS METEOROLOGICAL AND GEOGRAPHIC REGIMES, AND (3) TO CORRELATE MEASUREMENTS MADE USING IDENTICAL BUT INDEPENDENT CHANNELS CALIBRATED TO THE SAME STANDARD. INCOMING SOLAR RADIATION FROM 0.2 TO 50 MICROMETERS WAS NORMALLY MONITORED IN 10 SPECTRAL INTERVALS SEVERAL TIMES EACH DAY AND EVERY ORBIT DURING PERIODS OF SOLAR ACTIVITY. TERRESTRIAL RADIATION MEASUREMENTS WERE TAKEN CONTINUOUSLY IN THE 0.2 AND 4 MICROMETER, 0.7 TO 3 MICROMETER, AND 4 TO 50 MICROMETER INTERVALS. THE MEASUREMENTS WERE TAKEN IN TWO WAYS. FOUR CHANNELS, USING WIDE-ANGLE OPTICS (133.3-DEG FIELD OF VIEW), MEASURED THE TOTAL OUTGOING RADIATION INTEGRATED OVER THE ENTIRE EARTH DISK. THE SECOND SET OF MEASUREMENTS WAS OBTAINED FOR EIGHT HIGH-RESOLUTION SCANNING CHANNELS THAT MEASURED THE TERRESTRIAL RADIATION EMANATING FROM RELATIVELY SMALL AREA OVER A RANGE OF VARIOUS ZENITH AND AZIMUTH ANGLES. THE MULTICHANNEL RADIOMETER EMPLOYED A BI-AXIAL SCANNING MECHANISM WHICH ENABLED MEASUREMENTS TO BE OBTAINED FROM THE FORWARD HORIZON TO THE AFT HORIZON IN A 64-S INTERVAL. EACH AXIS OF THE SCANNING MECHANISM CONTAINED FOUR SHORTWAVE CHANNELS (0.2 TO 4.0 MICROMETER) AND FOUR LONGWAVE CHANNELS (4.0 TO 50 MICROMETER) WITH A 0.25- BY 5.14-DEG FIELD OF VIEW. THE CHANNELS WERE ORIENTED IN A DIRECTIONAL FAN TO COVER 20 DEG TO EACH SIDE OF THE ORBITAL PLANE. THE 64-S SCAN PERIOD ALLOWED AN AREA TO BE MEASURED FROM UP TO 17 DIFFERENT ANGLES AS THE SPACECRAFT PASSED OVERHEAD.

----- NIMBUS 6, JULIAN-----

INVESTIGATION NAME- TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE)

NSSDC ID- 75-052A-01

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - P. JULIAN	NATL CTR FOR ATMOS RES
O1 - W.W. KELLOGG	NATL CTR FOR ATMOS RES
O1 - V.E. SUOMI	U OF WISCONSIN
O1 - C.R. LAUGHLIN	NASA-GSFC
O1 - R.L. TALLEY	SIGMA DATA SERV CORP
O1 - W.R. BANDEEN	NASA-GSFC
O1 - C.E. COTE	NASA-GSFC

BRIEF DESCRIPTION

THE GOALS OF THE NIMBUS 6 TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE) WERE CLOSELY ASSOCIATED WITH THE OBJECTIVES OF GARP AND INCLUDED (1) MEASURING UPPER ATMOSPHERIC WINDS OVER REMOTE REGIONS, (2) STUDYING THE RELATIVE AIR MOTION ALONG ISOBARIC SURFACES TO DETERMINE THE RATE OF CONVERSION OF ATMOSPHERIC POTENTIAL ENERGY INTO KINETIC ENERGY, AND (3) PROVIDING DIRECT MEASUREMENTS OF VARIOUS METEOROLOGICAL PARAMETERS THAT CAN SERVE AS REFERENCE POINTS IN ADJUSTING INDIRECT TEMPERATURE SOUNDINGS MADE FROM SATELLITES. THE EXPERIMENT CONSISTED OF TWO BASIC COMPONENTS: (1) APPROXIMATELY 300 CONSTANT LEVEL METEOROLOGICAL BALLOONS TO YIELD MEASUREMENTS OF WINDS, TEMPERATURE, AND PRESSURE IN THE TROPICS AND AT SOUTHERN HEMISPHERE MIDLATITUDES AT 150 MB (ABOUT 13.6-KM ALTITUDE), AND (2) THE NIMBUS 6 RANDOM ACCESS MEASUREMENTS SYSTEM (RAMS) TO PROVIDE DATA COLLECTION AND LOCATION DETERMINATIONS FROM THE BALLOONS. THE 3.5-M-DIAM POLYESTER-MYLAR BALLOONS WERE EQUIPPED WITH A TRANSMITTER PACKAGE, SOLAR POWER SUPPLY, DIGITIZER/MODULATOR, AND SENSORS. THE SENSORS CONSISTED OF A RADIO ALTIMETER HAVING AN ACCURACY OF BETTER THAN PLUS OR MINUS 20 M, A BEAD THERMISTOR MONITORING THE AMBIENT AIR TEMPERATURE TO AN ACCURACY OF PLUS OR MINUS 0.5 DEG C, AND A PRESSURE SENSOR MEASURING THE 150-MB FLIGHT ALTITUDE TO AN ACCURACY OF PLUS OR MINUS 0.5 MB. A MAGNETIC CUTOFF DEVICE WAS ALSO INCLUDED ON EACH BALLOON TO ELIMINATE ANY ACCIDENTAL OVERFLIGHTS INTO REGIONS OF THE NORTHERN HEMISPHERE NORTH OF 20 DEG N LATITUDE. THE RAMS ON BOARD THE SPACECRAFT HAD NO COMMAND OR CONTROL CAPABILITY OVER THE BALLOONS (THE BALLOONS WERE NOT INTERROGATED). IT MERELY DETECTED EACH BALLOON SIGNAL (401.2 MHZ) AND EXTRACTED THE CARRIER FREQUENCY, BALLOON IDENTIFICATION, AND SENSOR DATA. THIS INFORMATION, ALONG WITH TIME REFERENCES, WAS STORED IN DIGITAL FORM FOR SUBSEQUENT RELAY TO A GROUND ACQUISITION STATION. THE BALLOON'S POSITION AND VELOCITY WERE DERIVED FROM THE RELATIVE MOTION BETWEEN THE PLATFORM AND THE SATELLITE BY MEASURING DOPPLER SHIFTS IN THE CARRIER SIGNAL RECEIVED FROM THE BALLOON. TWERLE WAS CAPABLE OF A LOCATION ACCURACY OF 5 KM AND A PLATFORM VELOCITY ACCURACY OF 1 M/S.

***** NIMBUS 7*****

SPACECRAFT COMMON NAME- NIMBUS 7
ALTERNATE NAMES- 11080, NIMBUS-G

NSSDC ID- 78-098A

LAUNCH DATE- 10/24/78 WEIGHT- 832. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/25/78
ORBIT PERIOD- 104.0 MIN INCLINATION- 99.3 DEG
PERIAPSIS- 938. KM ALT APOAPSIS- 953. KM ALT

PERSONNEL

SC - R.J. ARNOLD	NASA HEADQUARTERS
PM - C.M. MACKENZIE	NASA-GSFC
PS - A.J. FLEIG	NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 7 RESEARCH AND DEVELOPMENT SATELLITE SERVED AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR THE TESTING OF ADVANCED SYSTEMS FOR SENSING AND COLLECTING METEOROLOGICAL DATA ON A GLOBAL SCALE. THE POLAR-ORBITING SPACECRAFT CONSISTED OF THREE MAJOR STRUCTURES: (1) A HOLLOW TORUS-SHAPED SENSOR MOUNT, (2) SOLAR PADDLES, AND (3) A CONTROL HOUSING UNIT THAT IS CONNECTED TO THE SENSOR MOUNT BY A TRIPOD TRUSS STRUCTURE. CONFIGURED SOMEWHAT LIKE AN OCEAN BUOY, NIMBUS 7 IS NEARLY 3.7 M TALL, 1.5 M IN DIAMETER AT THE BASE, AND ABOUT 3 M WIDE WITH SOLAR PADDLES EXTENDED. THE SENSOR MOUNT THAT FORMS THE SATELLITE BASE HOUSED THE ELECTRONICS EQUIPMENT AND BATTERY PODDLES. THE LOWER SURFACE OF THE TORUS PROVIDED MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDED SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH WAS LOCATED ON TOP OF THE SPACECRAFT, WERE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITTED THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED

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OF POOR QUALITY

TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). EIGHT EXPERIMENTS WERE SELECTED: (1) LIMB INFRARED MONITORING OF THE STRATOSPHERE LIMS, (2) STRATOSPHERIC AND MESOSPHERIC SOUNDER SAMS, (3) COASTAL ZONE COLOR SCANNER CZCS, (4) STRATOSPHERIC AEROSOL MEASUREMENT II SAMS II, (5) EARTH RADIATION BUDGET ERB, (6) SCANNING MULTICHANNEL MICROWAVE RADIOMETER SMRR, (7) SOLAR BACKSCATTER UV AND TOTAL OZONE MAPPING SPECTROMETER SBUV/TOMS, AND (8) TEMPERATURE-HUMIDITY INFRARED RADIOMETER THIR. THESE SENSORS WERE CAPABLE OF OBSERVING SEVERAL PARAMETERS OF IMPORTANCE AT AND BELOW THE MESOSPHERIC LEVELS. A NEW CAPABILITY OF IMPORTANCE WAS DIRECTED TOWARD OBSERVATION OF ATMOSPHERIC AND OCEAN POLLUTANTS. SUFFICIENT RUNTIME WAS PLANNED FOR SEQUENTIAL MAPS (IMAGERY) OF THE PARAMETERS AVAILABLE FOR STUDY.

----- NIMBUS 7, ALLISON-----

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- 78-098A-10 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - L.J. ALLISON NASA-GSFC

BRIEF DESCRIPTION
THE THIR EXPERIMENT OBJECTIVES WERE TO MEASURE THE INFRARED RADIATION FROM THE EARTH IN TWO SPECTRAL BANDS DURING BOTH DAY AND NIGHT PORTIONS OF THE ORBIT TO PROVIDE PICTURES OF THE CLOUD COVER, THREE-DIMENSIONAL MAPPINGS OF THE CLOUD COVER, AND TEMPERATURE MAPPINGS OF THE CLOUDS, LAND AND OCEAN SURFACES, CIRRUS CLOUD CONTENT, AND ATMOSPHERIC CONTAMINATION AND MOISTURE. THE NIMBUS 7 TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) DETECTED EMITTED THERMAL RADIATION IN BOTH THE 10.5- TO 12.5-MICROMETER REGION (IR WINDOW) AND THE 6.5- TO 7.0-MICROMETER REGION (WATER VAPOR). THE WINDOW CHANNEL MEASURED CLOUDTOP TEMPERATURES AND WAS CAPABLE OF PRODUCING HIGH-RESOLUTION PICTURES OF CLOUDCOVER AND THERMAL GRADIENTS ON LAND AND WATER SURFACES IN CLOUD-FREE AREA DURING BOTH THE DAY AND NIGHT PORTIONS OF THE ORBIT. THE OTHER CHANNEL OPERATED TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND STRATOSPHERE. DATA FROM THESE TWO CHANNELS WERE USED PRIMARILY TO SUPPORT OTHER, MORE SOPHISTICATED, METEOROLOGICAL EXPERIMENTS ONBOARD NIMBUS 7. THE INSTRUMENT CONSISTED OF A 12.7-CM CASSEGRAIN SYSTEM AND SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BOLOMETERS. IN CONTRAST TO TV, NO IMAGE WAS FORMED WITHIN THE RADIOMETER. INCOMING RADIANT ENERGY WAS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATES THROUGH 360 DEG AT 48 RPM AND SCANNED IN A PLANE NORMAL TO THE SPACECRAFT VELOCITY. THE ENERGY THEN WAS FOCUSED ON A DICHOIC BEAM SPLITTER WHICH DIVIDED THE ENERGY SPECTRALLY AND SPATIALLY. THE TWO CHANNELS OF THIS SENSOR TRANSFORMED THE RECEIVED RADIATION INTO ELECTRIC OUTPUT (VOLTAGES), WHICH WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- NIMBUS 7, GLOERSEN-----

INVESTIGATION NAME- SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMRR)

NSSDC ID- 78-098A-08 INVESTIGATIVE PROGRAM CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S) METEOROLOGY ATMOSPHERIC PHYSICS OCEANOGRAPHY

PERSONNEL TL - P. GLOERSEN NASA-GSFC
TM - R.O. RAMSEIR ENVIRONMENT CANADA
TM - D.H. STAELIN MASS INST OF TECH
TM - W.J. CAMPBELL US GEOLOGICAL SURVEY
TM - D.B. ROSS NOAA-ERL
TM - P. GUDMANSSEN TECH U OF DENMARK
TM - F.T. BARATH NASA-JPL
TM - T.T. WILHEIT, JR. NASA-GSFC

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMRR) WAS TO OBTAIN AND USE OCEAN MOMENTUM AND ENERGY-TRANSFER PARAMETERS ON A NEARLY ALL-WEATHER OPERATIONAL BASIS. WINDS, WATER VAPOR, LIQUID WATER CONTENT, AND MEAN CLOUD DROPLET SIZE, ALL AT LOW ALTITUDES, WERE PARAMETERS WHICH WERE DERIVED. OCEAN ICE VS WATER WAS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES WERE OBSERVED WITH A 10-CHANNEL (FIVE-FREQUENCY DUAL POLARIZED) SCANNING RADIOMETER OPERATION AT 0.8-, 1.4-, 1.7-, 2.8-, AND 4.6-CM WAVELENGTHS (37, 21, 18, 10.69, 6.433 GHZ). THE ANTENNA WAS A PARABOLIC REFLECTOR OFFSET FROM NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDED OBSERVATIONS FROM WITHIN CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THE SAME INSTRUMENT WAS ON SEASAT 1.

----- NIMBUS 7, HEATH-----

INVESTIGATION NAME- SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)

NSSDC ID- 78-098A-09 INVESTIGATIVE PROGRAM CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS SOLAR PHYSICS

PERSONNEL TL - D.F. HEATH NASA-GSFC
TM - C.L. MATEER ENVIRONMENT CANADA
TM - A.D. BELMONT CONTROL DATA CORP
TM - A.J. MILLER NOAA-NMC
TM - A.E.S. GREEN U OF FLORIDA
TM - D.W. CUMMOLD GEORGIA INST OF TECH
TM - W.L. IMHOF LOCKHEED PALO ALTO
TM - A.J. KRUEGER NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE SBUV/TOMS WERE TO DETERMINE THE VERTICAL DISTRIBUTION OF OZONE, MAP THE TOTAL OZONE AND 200-MB HEIGHT FIELDS, AND MONITOR THE INCIDENT SOLAR ULTRAVIOLET (UV) IRRADIANCE AND ULTRAVIOLET RADIATION BACKSCATTERED FROM THE EARTH. THE SBUV SPECTROMETER MEASURED SOLAR UV THAT IS BACKSCATTERED BY THE EARTH'S ATMOSPHERE AT 12 WAVELENGTHS BETWEEN 2500 AND 3300 A WITH A SPECTRAL BAND PASS OF 10 A. THE INSTRUMENT FOV OF 0.20 RAD WAS DIRECTED AT THE NADIR. A PARALLEL PHOTOMETER CHANNEL AT 3400 A MEASURED THE REFLECTIVITY OF THE ATMOSPHERE'S LOWER BOUNDARY IN THE SAME 0.21-RAD FOV. BOTH CHANNELS ALSO VIEWED THE SUN FOR CALIBRATION THROUGH THE USE OF A DIFFUSER PLATE DEPLOYED NEAR THE TERMINATOR. THE CONTRIBUTION FUNCTIONS FOR THE EIGHT SHORTEST WAVELENGTHS WERE CENTERED AT LEVELS RANGING FROM 55 TO 28 KM AND WERE USED TO INFER THE VERTICAL OZONE PROFILE. THE FOUR LONGEST WAVELENGTHS HAD CONTRIBUTION FUNCTIONS IN THE TROPOSPHERE WHICH WERE USED TO COMPUTE THE TOTAL OZONE AMOUNT. THE SBUV SPECTROMETER HAD A SECOND MODE OF OPERATION THAT ALLOWED A CONTINUOUS SPECTRAL SCAN FROM 1600 TO 4000 A FOR DETAILED EXAMINATION OF THE EXTRATERRESTRIAL SOLAR SPECTRUM AND THEIR TEMPORAL VARIATIONS. THE TOMS SYSTEMS, OPERATING IN PARALLEL WITH THE SBUV, STEP SCANNED ACROSS A 105-DEG FOV NORMAL TO THE ORBITAL TRACK WITH AN FOV OF APPROXIMATELY 0.052 RAD. AT EACH SCAN POSITION THE EARTH RADIANCE WAS MONITORED AT SIX WAVELENGTHS BETWEEN 3100 AND 3800 A TO INFER THE TOTAL OZONE AMOUNT. THE INSTRUMENT CONSISTED PRINCIPALLY OF THREE EBERT-FASTIE MONOCHROMETERS, TWO OF WHICH WERE OPERATED IN TANDEM FOR STRAY LIGHT REJECTION. TOMS USED THE THIRD MONOCHROMETER, WHICH WAS EQUIPPED WITH A SPATIAL SCAN MECHANISM AT THE ENTRANCE SLIT. THE SIGNAL-TO-NOISE RATIO OF THE SBUV WAS GREATER THAN 5.E3. THE TOMS SIGNAL-TO-NOISE RATIO WAS GREATER THAN 1.E5.

----- NIMBUS 7, HOUGHTON-----

INVESTIGATION NAME- STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)

NSSDC ID- 78-098A-02 INVESTIGATIVE PROGRAM CODE EB/CO-CP

INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS METEOROLOGY

PERSONNEL PI - J.T. HOUGHTON OXFORD U
OI - G.D. PESKETT OXFORD U
OI - C.D. RODGERS OXFORD U
OI - E.J. WILLIAMSON OXFORD U

BRIEF DESCRIPTION
THE OBJECTIVE OF SAMS WAS TO OBSERVE EMISSION FROM THE LIMB OF THE ATMOSPHERE THROUGH VARIOUS PRESSURE MODULATOR RADIOMETERS AND TO DETERMINE TEMPERATURE AND VERTICAL CONCENTRATIONS OF H2O, N2O, CH4, CO, AND NO IN THE STRATOSPHERE AND MESOSPHERE TO APPROXIMATELY 90 KM. MEASUREMENTS OF ZONAL WIND IN THIS REGION WERE ATTEMPTED BY OBSERVING THE DOPPLER SHIFT OF ATMOSPHERIC EMISSION LINES. RADIATION FROM THE LIMB OF THE ATMOSPHERE WAS INCIDENT ON A TELESCOPE OF 15-CM APERTURE. IN FRONT OF THE TELESCOPE A PLANE MIRROR SCANNED THE LIMB, VIEWED SPACE FOR CALIBRATION, AND VIEWED THE ATMOSPHERE OBLIQUELY TO OBTAIN VERTICAL PROFILES. THREE ADJACENT FIELDS OF VIEW, EACH 28 BY 2.8 MRAD (CORRESPONDING TO 100 KM BY 10 KM AT THE LIMB), FOCUSED ONTO A FIELD-SPLITTING MIRROR WHICH DIRECTED RADIATION TO SIX DETECTORS. THE REMAINING DIVISION INTO CHANNELS WAS ACCOMPLISHED THROUGH DICHOIC BEAM SPLITTERS. THERE WERE SEVEN PRESSURE MODULATOR CELLS (PMC), TWO CONTAINING CO2, THE REMAINDER H2O, NO, CH4, CO, H2O. PRESSURE IN THE CELLS COULD BE VARIED ON COMMAND BY CHANGING THE TEMPERATURE OF A SMALL CONTAINER OF MOLECULAR SIEVE MATERIAL ATTACHED TO EACH PMC. THE SPECTRAL PARAMETERS FOR THE H2O CHANNEL WERE 2.7 MICROMETERS AND 25 TO 100 MICROMETERS. ALL OTHER CHANNELS LAY WITHIN THE RANGE OF 4.1 TO 15 MICROMETERS. WITHIN THE TELESCOPE, A CHOPPER OPERATING AT 250 HZ ALLOWED MEASUREMENT OF TWO SEPARATE SIGNALS FROM ALL DETECTORS, ONE AT 250 HZ AND ONE AT THE PMC FREQUENCY. COMPARISON OF THESE SIGNALS PERMITTED ELIMINATING EMISSION FROM INTERFERING GASES WITHIN A PARTICULAR SPECTRAL INTERVAL. IN FRONT OF THE CHOPPER A SMALL BLACK BODY AT KNOWN TEMPERATURE COULD BE INTRODUCED FOR CALIBRATION. ACCURATE MEASUREMENT OF THE ATMOSPHERIC PRESSURE AT THE LEVEL

BEING VIEWED WAS OBTAINED FROM THE TWO SIGNALS FROM ONE CO2 CHANNEL.

----- NIMBUS 7, HOVIS-----

INVESTIGATION NAME- COASTAL ZONE COLOR SCANNER (CZES)

NSSDC ID- 78-098A-03

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

TL - W.A. HOVIS	NOAA-NESS
TM - H.L. RICHARD	NASA-GSFC
TM - C.S. YENTSCH	BIGELOW LAB OCEAN SCI
TM - D. CLARK	NOAA-NESS
TM - J.R. APEL	NOAA-PMEL
TM - S.J. EL-SAYED	TEXAS A&M
TM - H.R. GORDON	NOAA-PMEL
TM - R.C. WRIGLEY	NASA-ARC
TM - F.P. ANDERSON	NATL RES INST OCEANOL
TM - R. AUSTIN	SCRIPPS INST OCEANOGR

BRIEF DESCRIPTION

THE COASTAL ZONE COLOR SCANNER EXPERIMENT WAS DESIGNED TO MAP CHLOROPHYLL CONCENTRATION IN WATER, SEDIMENT DISTRIBUTION, GELBSTOFFE CONCENTRATIONS AS A SALINITY INDICATOR, AND TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS. REFLECTED SOLAR ENERGY WAS MEASURED IN SIX CHANNELS TO SENSE COLOR CAUSED BY ABSORPTION DUE TO CHLOROPHYLL, SEDIMENTS, AND GELBSTOFFE IN COASTAL WATERS. SPECTRAL BANDS AT 443 AND 670 NANOMETERS CENTER ON THE MOST INTENSE ABSORPTION BANDS OF CHLOROPHYLL, WHILE THE BAND AT 550 NANOMETERS CENTERS ON THE 'HINGE POINT,' THE WAVELENGTH OF MINIMUM ABSORPTION. RATIOS OF MEASURED ENERGIES IN THESE CHANNELS WERE SHOWN TO CLOSELY PARALLEL SURFACE CHLOROPHYLL CONCENTRATIONS. DATA FROM THE SCANNING RADIOMETER WERE PROCESSED, WITH ALGORITHMS DEVELOPED FROM THE FIELD EXPERIMENT DATA, TO PRODUCE MAPS OF CHLOROPHYLL ABSORPTION. THE TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS WAS MEASURED IN A SPECTRAL BAND CENTERED AT 11.5 MICROMETERS. OBSERVATIONS WERE ALSO MADE IN TWO OTHER SPECTRAL BANDS, THE FIRST AT 520 NANOMETERS FOR CHLOROPHYLL CORRELATION AND 750 NANOMETERS FOR SURFACE VEGETATION. TO AVOID SUN GLINT, THE SCANNER MIRROR COULD BE TILTED ABOUT THE SENSOR PITCH AXIS ON COMMAND SO THAT THE LINE OF SIGHT OF THE SENSOR WAS MOVED PLUS OR MINUS 0.35 RAD IN STEPS OF 0.035 RAD WITH RESPECT TO NAIR.

----- NIMBUS 7, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 78-098A-07

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - H. JACOBOWITZ	NOAA-NESS
TM - T.H. VONDERHAAR	COLORADO STATE U
TM - F.B. HOUSE	DREXEL INST OF TECH
TM - K.L. COULSON	U OF CALIF, DAVIS
TM - J.R. HICKEY	EPPLEY LAB, INC
TM - L.L. STOWE	NOAA-NESS
TM - A.P. INGERSOLL	CALIF INST OF TECH
TM - G.L. SMITH	NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EARTH RADIATION BUDGET (ERB) EXPERIMENT, A CONTINUATION OF NIMBUS 6 ERB, WAS TO DETERMINE, OVER A PERIOD OF A YEAR, THE EARTH RADIATION BUDGET ON BOTH SYNOPSIS AND PLANETARY SCALES BY SIMULTANEOUS MEASUREMENT OF INCOMING SOLAR RADIATION AND OUTGOING EARTH REFLECTED (SHORTWAVE) AND EMITTED (LONGWAVE) RADIATION. BOTH FIXED WIDE-ANGLE SAMPLING OF TERRESTRIAL FLUXES AT THE SATELLITE ALTITUDE AND SCANNED NARROW-ANGLE SAMPLING OF THE RADIANCE COMPONENTS DEPENDENT ON ANGLE WERE USED TO DETERMINE OUTGOING RADIATION (REFLECTED AND EMITTED). THE ERB SUBSYSTEM CONSISTED OF A 22-CHANNEL RADIOMETER CONTAINING SEPARATE SUBASSEMBLIES TO PERFORM THE REQUIRED SOLAR, EARTH-FLUX (WIDE ANGLE), AND SCANNED EARTH RADIANCE NARROW ANGLE MEASUREMENTS. THE SYSTEMS USED OPTICAL FILTERS FOR SPECTRAL DISCRIMINATIONS, AS WELL AS UNCOOLED THERMAL DETECTORS, THERMOPILE DETECTORS IN THE SOLAR AND FIXED-EARTH-FLUX CHANNELS, AND PYROELECTRIC DETECTORS IN THE SCANNING CHANNELS. THE 10 SOLAR CHANNELS VIEWED IN FRONT OF THE OBSERVATORY IN THE X-Y PLANE. THE SOLAR CHANNELS OBTAINED USABLE SOLAR DATA ONLY DURING A PERIOD OF ABOUT 3 MIN IN EACH ORBIT WHEN THE SPACECRAFT WAS OVER THE ANTARCTIC REGION. THEIR FULL RESPONSE FIELD OF VIEW (FOV) WAS 0.18 RAD. THE SOLAR CHANNEL SUBASSEMBLY WAS PIVOTED PLUS OR MINUS 0.35 RAD IN THE X-Y PLANE TO COMPENSATE FOR SUN ANGLE DEVIATION WHEN REQUIRED. THE FOUR EARTH-FLUX CHANNELS WERE MOUNTED SO THEY CAN CONTINUOUSLY VIEW THE TOTAL EARTH DISK AND WERE CONTINUOUSLY SAMPLED AT FOUR PER S. DEMODULATOR OUTPUT SIGNALS WERE INTEGRATED FOR PERIODS OF AT LEAST 3.8 S. THERE WERE EIGHT NARROW FOV CHANNELS (FOUR SHORTWAVE AND FOUR LONGWAVE) MOUNTED IN THE SCANNING HEAD. THE HEAD WAS GIMBAL MOUNTED IN THE RADIOMETER UNIT MAIN FRAME. THE FOV OF THE TELESCOPES WERE ASYMMETRIC (4.4 BY 89.4 MRAD) AND THE FOV OF THE SHORTWAVE AND LONGWAVE CHANNELS WERE COINCIDENT. THE 89.4 MRAD FOV OF THE

FOUR PAIR OF CHANNELS WAS NOT CONTIGUOUS, BUT COVERED ONLY ALTERNATE 89.4 MRAD ANGULAR INTERVALS ALONG THE HORIZON.

----- NIMBUS 7, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)

NSSDC ID- 78-098A-06

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

TL - R.P. MCCORMICK	NASA-LARC
TM - T.J. PEPIN	U OF WYOMING
TM - G.W. GRAMS	GEORGIA INST OF TECH
TM - D.M. HERRAN	U OF ARIZONA
TM - P.B. RUSSELL	SRI INTERNATIONAL

BRIEF DESCRIPTION

THE OBJECTIVE OF SAM-II WAS TO MAP THE CONCENTRATION AND OPTICAL PROPERTIES OF STRATOSPHERIC AEROSOLS AS A FUNCTION OF ALTITUDE, LATITUDE, AND LONGITUDE. WHEN NO CLOUDS WERE PRESENT IN THE INSTRUMENT FIELD OF VIEW (IFOV), THE TROPOSPHERIC AEROSOLS COULD ALSO BE MAPPED. THE INSTRUMENT, BASICALLY A SUN PHOTOMETER, MEASURED THE EXTINCTION OF SOLAR RADIATION AT 1.0-MICROMETER WAVELENGTH DURING SPACECRAFT SUNRISE AND SUNSET. THE PHOTOMETER VIEWED A PORTION OF THE SOLAR DISK WITH A 0.145-MRAD IFOV AND A SAMPLING RATE OF 90 SAMPLES PER SECOND. AS THE SPACECRAFT FIRST VIEWED THE SUNRISE, THE PHOTOMETER-POINTING AXIS WAS DEPRESSED APPROXIMATELY 0.52 RAD WITH RESPECT TO THE SPACECRAFT HORIZONTAL. THE PHOTOMETER CONTINUED LOOKING AT THE SUN UNTIL ITS DEPRESSION ANGLE WAS ON THE ORDER OF 0.44 RAD (APPROXIMATELY 1.4 MIN OBSERVING TIME). BEFORE SUNSET, THE PHOTOMETER HEAD ROTATED 3.14 RAD IN AZIMUTH AND VIEWED THE SUN FROM A DEPRESSION OF APPROXIMATELY 0.44 TO 0.52 RAD AS THE SPACECRAFT ORBITED TO THE DARK SIDE OF THE EARTH. FOR THE EXPECTED HIGH NOON ORBIT, LATITUDES OF BETWEEN 1.32 AND 1.40 RAD IN BOTH HEMISPHERES WERE SCANNED FOR 3 MONTHS. THE EXTINCTION MEASUREMENTS WERE INVERTED FOR THE NUMBER-DENSITY TIMES THE AEROSOL SCATTERING CROSS SECTION BY USING THE LAMBERT-BEER LAW AND ASSUMING THE ATMOSPHERE TO BE COMPOSED OF LAYERS. TO DETERMINE THE STRATOSPHERIC AEROSOL OPTICAL PROPERTIES, GROUND-TRUTH IN SITU BALLOON-BORNE AEROSOL MEASUREMENTS WERE ALSO MADE.

***** NOAA 6*****

SPACECRAFT COMMON NAME- NOAA 6
ALTERNATE NAMES- NOAA-A, 11416

NSSDC ID- 79-057A

LAUNCH DATE- 06/27/79 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES

NOAA-NESS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTR	EPOCH DATE- 06/28/79
ORBIT PERIOD- 101.5 MIN	INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT	APOAPSIS- 833. KM ALT

PERSONNEL

MG - R. ARNOLD	NASA HEADQUARTERS
PM - J. FULLER, JR.	NASA-GSFC

BRIEF DESCRIPTION

NOAA 6, A TIROS-N TYPE SPACECRAFT, WAS THE FIRST IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURED THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCLS), WHICH PROCESSED AND RELATED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 5D SPACECRAFT (DMSP-F1) OR TG-091A) BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NESSDC ID- 79-057A-01 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.65 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, HAD A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NESSDC ID- 79-057A-02 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA 6 OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAD 14 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHI OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH WERE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDED SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM

NESSDC ID- 79-057A-03 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA 6 WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT CAME IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS

OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA 6, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NESSDC ID- 79-057A-04 INVESTIGATIVE PROGRAM CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL CI - R. SEALE NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATs VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON CMBIDIRECTIONAL DETECTOR (POD) MEASURED PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 KEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-B*****

SPACECRAFT COMMON NAME- NOAA-B ALTERNATE NAMES- 11819

NESSDC ID- 80-043A

LAUNCH DATE- 05/29/80 WEIGHT- 588.9 KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY UNITED STATES NOAA-NESS UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPDCH DATE- 05/30/80 ORBIT PERIOD- 102.2 MIN INCLINATION- 92.3 DEG PERIAPSIS- 273. KM ALT APOAPSIS- 1453. KM ALT

PERSONNEL

MG - M.L. GARBACZ HEADQUARTERS PM - G.A. BRANCHFLOWER NASA-GSFC PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-B IS THE SECOND IN A SERIES OF THIRD-GENERATION, OPERATIONAL PETEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S. DUE TO A MALFUNCTION IN THE LAUNCH VEHICLE, NOAA-B DID NOT ACHIEVE THE PROPER ORBIT.

----- NOAA-B, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NESSDC ID- 80-043A-01 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

FAILED AT LAUNCH

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-B ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, NESS STAFF -----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER
NSSDC ID- 80-043A-02 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-B OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 5.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 20.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GME OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, NESS STAFF -----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)
NSSDC ID- 80-043A-03 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-B IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-B, WILLIAMS -----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR
NSSDC ID- 80-043A-04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
O1 - H.M. SAUER NOAA-ERL
O2 - C.G. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 KEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 KEV/M. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 KEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 700 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 30-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 KEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 KEV/M. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** OAO 3 *****

SPACECRAFT COMMON NAME- OAO 3
ALTERNATE NAMES- PL-7010, OAO-C
COPERNICUS, 06153

NSSDC ID- 72-065A

LAUNCH DATE- 08/21/72 WEIGHT- 2150. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/21/72
ORBIT PERIOD- 99.7 MIN INCLINATION- 35.0 DEG
PERIAPSIS- 730. KM ALT APOAPSIS- 791. KM ALT

PERSONNEL
MG - M.E. McDONALD NASA HEADQUARTERS
SC - E.J. WEILER NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - J.E. KUPPERIAN, JR. NASA-GSFC

BRIEF DESCRIPTION
THIS MISSION WAS THE THIRD IN THE OAO PROGRAM AND ITS SECOND SUCCESSFUL SPACECRAFT TO OBSERVE THE CELESTIAL SPHERE FROM ABOVE THE EARTH'S ATMOSPHERE. A UV TELESCOPE WITH A SPECTROMETER MEASURED HIGH-RESOLUTION SPECTRA OF STARS, GALAXIES, AND PLANETS WITH THE MAIN EMPHASIS ON THE DETERMINATION OF INTERSTELLAR ABSORPTION LINES. THREE X-RAY TELESCOPES AND A COLLIMATED, PROPORTIONAL COUNTER PROVIDED MEASUREMENTS OF COSMIC X-RAY SOURCES AND INTERSTELLAR ABSORPTION BETWEEN .1 AND 7 MP. THE OAO-3 SPACECRAFT WAS AN OCTAGONALLY-SHAPED, ALUMINUM STRUCTURE WITH A 1.21-M HOLLOW, CENTRAL, TUBULAR AREA, WHICH HOUSED THE EXPERIMENT CONTAINER. SOLAR PANELS WERE MOUNTED ON EACH SIDE OF THE SPACECRAFT AT ANGLES OF 34 DEG AND HAD AN AREA OF 38.2 SQ M. A SUN Baffle PROTECTED THE EXPERIMENTS AND INCREASED THE LENGTH OF THE SPACECRAFT TO 4.9 M. TWO INERTIAL BALANCE DOORS, ONE FORWARD AND ONE AFT, EXTENDED APPROXIMATELY 2.0 M. THE SPACECRAFT WAS EQUIPPED WITH AN INTERNAL REFERENCE UNIT (A HIGH-PRECISION, THREE-AXIS GYRO INERTIAL SYSTEM), SUN SENSORS, A MAGNETOMETER, AND STAR TRACKERS, WHICH ENABLED SPACECRAFT POINTING TO BE DETERMINED IN MANY DIFFERENT WAYS. A FORESIGHT STAR TRACKER, SENSITIVE TO SIXTH MAGNITUDE, CONTROLLED PITCH AND YAW TO WITHIN 5 ARC S. IN ADDITION, THE HIGH-RESOLUTION TELESCOPE EXPERIMENT HAD A FINE POINTING CONTROL, WHICH COULD CONTROL THE PITCH AND YAW TO WITHIN ONE TENTH ARC S ON BRIGHT STARS. SPACECRAFT ATTITUDE WAS CONTROLLED BY INERTIA WHEELS AND THRUSTERS. REDUNDANT TRACKING BEACONS FACILITATED GROUND TRACKING OF THE SPACECRAFT. TWO UHF (400.55 MHZ) TRANSMITTERS PROVIDED WIDEBAND TELEMETRY FOR TRANSMITTING DIGITAL DATA TO THE GROUND STATIONS. TWO REDUNDANT VHF (136.76 MHZ) TRANSMITTERS WERE USED IN A NARROW-BAND TELEMETRY LINK USED PRIMARILY FOR TRANSMITTING SPACECRAFT HOUSEKEEPING DATA, ALTHOUGH THEY SERVED AS BACKUPS FOR THE WIDEBAND TELEMETRY SYSTEM. TWO REDUNDANT PAIRS OF VHF COMMAND RECEIVERS WERE CARRIED AS PART OF A COMMAND SYSTEM CAPABLE OF STORING 1200 COMMANDS. DATA WERE STORED ON AN ON-BOARD TAPE RECORDER AND IN CORE STORAGE. AN ON-BOARD PROCESSOR MONITORED TELEMETRY DATA, ISSUED COMMANDS, AND WAS PROGRAMMED VIA THE COMMAND RECEIVER UPLINK. GUEST INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX W.

ORIGINAL PAGE IS
OF POOR QUALITY

----- OAO 3, BOYD-----

INVESTIGATION NAME- STELLAR X-RAYS

NSSDC ID- 72-065A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD
OI - P.W. SANFORD

U COLLEGE LONDON
U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT USED THREE TELESCOPES AND A COLLIMATED PROPORTIONAL COUNTER TO OBSERVE COSMIC X-RAY SOURCES BETWEEN .01 AND 7 NM. BETWEEN .1 AND .3 NM, A PROPORTIONAL COUNTER LOCATED BEHIND A COLLIMATOR WAS USED IN CONJUNCTION WITH PULSE-SHAPE DISCRIMINATION TO REJECT BACKGROUND COUNTS. FROM .3 TO .9 NM AND .6 TO 1.8 NM, PROPORTIONAL COUNTERS LOCATED AT THE FOCUS OF TWO GRAZING-INCIDENCE REFLECTING TELESCOPES (5.2 SQ CM AND 12 SQ CM, RESPECTIVELY) WERE USED, WITH AN ANTI-COINCIDENCE SCINTILLATOR ALSO EMPLOYED TO REJECT BACKGROUND COSMIC-RAY COUNTS. AN OPEN-CHANNEL MULTIPLIER LOCATED AT THE FOCUS OF A GRAZING-INCIDENCE TELESCOPE (23 SQ CM) WAS USED TO OBSERVE BETWEEN 2 AND 7 NM. DATA FROM THIS EXPERIMENT WERE USED TO DETERMINE THE INTERSTELLAR ABSORPTION OF SOFT X-RAYS.

----- OAO 3, SPITZER-----

INVESTIGATION NAME- HIGH-RESOLUTION TELESCOPES

NSSDC ID- 72-065A-01

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - L. SPITZER
OI - J. ROBERSON, JR.

PRINCETON U
PRINCETON U

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MAKE QUANTITATIVE OBSERVATIONS OF INTERSTELLAR ABSORPTION LINES IN THE SPECTRAL REGION 100 TO 330 NM. THE SECONDARY OBJECTIVE WAS TO OBSERVE UV SPECTRA OF SELECTED BRIGHTER STARS. THE PRIME OPTICAL SYSTEM WAS AN 80-CM-DIAP CASSEGRAIN TELESCOPE WITH A 16-M FOCAL LENGTH (F/20). THIS TELESCOPE WAS COUPLED TO A PASCHEN-RUNGE SPECTROMETER CAPABLE OF 0.1-A RESOLUTION IN FIRST ORDER AND 0.05-A RESOLUTION IN SECOND ORDER. THE PHOTONS WERE DETECTED BY FOUR EMR PHOTOTUBES, EACH EQUIPPED WITH ITS OWN EXIT S.L.T. AND MOVABLE IN PAIRS ALONG THE ROWLAND CIRCLE. A GUIDANCE ERROR SENSOR ATTACHED TO THE PRIME OPTICS CONTROLLED THE SPACECRAFT ATTITUDE TO WITHIN 0.1 ARC S. THIS GUIDANCE SYSTEM LOCKED ONTO A STAR AS FAINT AS 7TH MAGNITUDE. THE OVERALL SYSTEM COULD MAKE USEFUL MEASUREMENTS ON O- AND B-TYPE STARS TO 7TH MAGNITUDE.

***** PIONEER 6*****

SPACECRAFT COMMON NAME- PIONEER 6
ALTERNATE NAMES- PIONEER-A, 01841

NSSDC ID- 65-105A

LAUNCH DATE- 12/16/65 WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OS5

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 07/12/75
ORBIT PERIOD- 311.1 DAYS INCLINATION- 0.168 DEG
PERIAPSIS- 0.813 AU RAD APOAPSIS- 0.983 AU RAD

PERSONNEL

MG - P.D. KOCHENDORFER
SC - A.G. OPP
PM - C.F. WALL
PS - J.H. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER 6 WAS THE FIRST IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS ON A CONTINUING BASIS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE. ITS EXPERIMENTS STUDIED THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, AND THE INTERPLANETARY MAGNETIC FIELD. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 512, 256, 64, 16, AND 8 BPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS FOR USE AT THE TWO HIGHEST BIT

RATES. ANOTHER WAS FOR USE AT THE THREE LOWEST BIT RATES. THE THIRD CONTAINED DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL TIME, TELEMETRY STORE, DUTY CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME INTERVAL BETWEEN THE COLLECTION AND STORAGE OF SUCCESSIVE FRAMES COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS UP TO 19 H, AS LIMITED BY THE BIT STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 65-105A-07

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON

NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO USE THE TRACKING DATA FROM THE MISSION TO OBTAIN PRIMARY DETERMINATIONS OF THE MASSES OF THE EARTH AND MOON, THE ASTRONOMICAL UNIT, AND THE OSCILLATING ELEMENTS OF THE ORBIT OF THE EARTH. THIS WAS APPROPRIATE BECAUSE OF THE ABSENCE OF MIDCOURSE ORBIT CORRECTIONS AND NEAR-PLANETARY ENCOUNTERS. ALSO, SOLAR RADIATION PRESSURE EFFECTS WERE SMALL. THE EXPERIMENT USED THE ONBOARD RECEIVER AND TRANSMITTER EQUIPMENT IN CONJUNCTION WITH DEEP SPACE NETWORK STATION EQUIPMENT TO OBTAIN DOPPLER MEASUREMENTS.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- RELATIVITY INVESTIGATION

NSSDC ID- 65-105A-10

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.D. ANDERSON

NASA-JPL

BRIEF DESCRIPTION

THE PIONEER 6 SPACECRAFT PRESENTED THE FIRST OPPORTUNITY TO INVESTIGATE THE RELATIVISTIC CONTRIBUTION OF THE SUN TO THE DOPPLER SHIFTING OF THE SPACECRAFT TRANSMITTER SIGNAL. THE DOPPLER TRANSFONDER SEGMENT OF THE SPACECRAFT TRANSMITTER WAS TO BE USED FOR THIS PURPOSE. HOWEVER, THE CORONAL NOISE PRODUCED A MUCH LARGER CONTRIBUTION TO THE TRANSMITTER SIGNAL THAN DID THE RELATIVISTIC DOPPLER EFFECT. THUS, ALTHOUGH THE EXPERIMENT FAILED IN ITS PRIMARY PURPOSE, IT DID CONTRIBUTE THE FIRST MEASURE OF THE RELATIVE EFFECT OF CORONAL NOISE ON DOPPLER SHIFTING OF RADIO SIGNALS.

----- PIONEER 6, BRIDGE-----

INVESTIGATION NAME- SOLAR WIND PLASMA FARADAY CUP

NSSDC ID- 65-105A-02

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - M.S. BRIDGE
OI - A.J. LAZARUS
OI - F. SCHERM

MASS INST OF TECH
MASS INST OF TECH
U OF WISCONSIN

BRIEF DESCRIPTION

A MULTIGRID FARADAY CUP WITH TWO SEMICIRCULAR, COPLANAR COLLECTORS WAS USED TO STUDY SOLAR WIND IONS AND ELECTRONS. THE INSTRUMENT HAD 14 CONTIGUOUS, ENERGY-PER-CHARGE (E/Q) CHANNELS BETWEEN 75 AND 9485 V FOR POSITIVE IONS AND FOUR ENERGY-PER-CHARGE CHANNELS BETWEEN 90 AND 1500 V FOR ELECTRONS. THE INSTRUMENT VIEW AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS AND PARALLEL TO THE ECLIPTIC PLANE. THE LINE SEPARATING THE TWO COLLECTORS LAY IN THE ECLIPTIC PLANE, ENABLING A ROUGH DETERMINATION OF SOLAR WIND BULK FLOW PERPENDICULAR TO THE ECLIPTIC PLANE. DURING EVERY SECOND SPACECRAFT ROTATION AND AT ONE VOLTAGE LEVEL, THE SUM OF THE CURRENTS FROM THE COLLECTORS WAS OBTAINED IN 28 CONTIGUOUS 11.25-DEG ANGULAR SECTORS (FROM -45 DEG TO 270 DEG, WITH 0 DEG BEING THE SPACECRAFT-SUN LINE). THE EIGHT MEASUREMENTS ABOUT THE SUN-EARTH LINE (-45 DEG TO +45 DEG) WERE TELEMETERED, BUT ONLY THE LARGEST MEASUREMENT IN EACH SUCCEEDING 45-DEG INTERVAL (+45 DEG TO 270 DEG) WAS TELEMETERED. IN ADDITION, DURING THIS ROTATION, THE CURRENT FROM ONE OF THE COLLECTORS WAS MEASURED IN ALL TWENTY-EIGHT 11.25-DEG SECTORS, AND THE LARGEST WAS

IDENTIFIED AND TELEMETERED (OBTAIN MAGNITUDE AND SECTOR). A COMPLETE SET OF POSITIVE ION MEASUREMENTS AND ONE ENERGY CHANNEL OF ELECTRON MEASUREMENTS WERE COMPLETED EVERY 32 SEC. THE TIME BETWEEN EACH 32-S GROUP OF MEASUREMENTS, ALSO WITH THE BIT RATE. FOR A MORE COMPLETE DESCRIPTION, SEE 'J. GEOPHYS. RES.', VOL 71, 3787-3791, AUGUST 1966.

----- PIONEER 6, FAN-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 65-105A-03 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - C.T. FAN U OF ARIZONA
OI - J.A. SIMPSON U OF CHICAGO
OI - J.C. LAMPSON U OF CHICAGO

BRIEF DESCRIPTION
THIS EXPERIMENT USED A CHARGED PARTICLE TELESCOPE COMPOSED OF FOUR SILICON SOLID-STATE DETECTORS TO STUDY THE ANISOTROPY AND FLUCTUATIONS OF SOLAR PROTONS AND ALPHA PARTICLES. THE PROTON ENERGY RANGES SAMPLED WERE 0.6 TO 13.9 MEV, 13.9 TO 73.2 MEV, 73.2 TO 175 MEV, AND E.G.T. 175 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.4 TO 55.6 MEV, 55.6 TO 293 MEV, AND E.G.T. 290 MEV. THE TIME RESOLUTION RANGED FROM ABOUT ONE MEASUREMENT PER 0.4 S TO ABOUT ONE MEASUREMENT PER 28 S DEPENDING ON THE TELEMETRY BIT RATE. THE DETECTOR WAS MOUNTED SO THAT IT MADE A 360-DEG SCAN IN THE ECLIPTIC PLANE ABOUT ONCE PER SECOND. PULSE HEIGHT ANALYSIS OF DETECTOR D1 OUTPUT (12B CHANNEL) AND D3 OUTPUT (52 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. FOR FURTHER DETAILS, SEE FAN ET AL., JGR, 73, 1955, 1968.

----- PIONEER 6, GOLDSTEIN-----

INVESTIGATION NAME- SPECTRAL BROADENING

NSSDC ID- 65-105A-09 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS
SOLAR PHYSICS

PERSONNEL
PI - R.M. GOLDSTEIN NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO EXPLORE THE STRUCTURE OF THE CORONA AND SOLAR EVENTS BY USING TELEMETRY SIGNALS AND THEIR SPECTRAL LINE BROADENING AS THEY PASSED THROUGH THE SOLAR CORONA AND APPROACHED THE SUN'S LIMB DURING SUPERIOR CONJUNCTION OCCULTATION. NORMALLY THE SIGNALS CONSISTED OF VERY NARROW-BAND (MONOCHROMATIC) AND SPECTRALLY PURE CARRIER WAVES AND A SET OF MODULATION SIDE BANDS. THE CARRIER WAVE FREQUENCY WAS NOMINALLY 2295 MHz AND THE SIDE BANDS WERE SEPARATED BY MULTIPLES OF 2 MHz AND WERE REMOVED BY FILTERING. DATA WERE COLLECTED IN THE FORM OF SPECTROGRAMS, EACH CONSISTING OF A 15-MIN OBSERVATION. THE THREE PARAMETERS OF INTEREST WERE THE SIGNAL POWER, CENTER FREQUENCY, AND BANDWIDTH. THE INSTRUMENTATION CONSISTED OF THE SPACECRAFT S-BAND TELEMETRY SYSTEM AND JPL'S 64-M RECEIVER ANTENNA, WHICH HAD A BEAMWIDTH OF ONLY 0.14 DEG AT 2300 MHz (S-BAND). IT WAS EXTREMELY SENSITIVE, HAVING AN EQUIVALENT NOISE TEMPERATURE OF ONLY 25 DEG K. THE RECEIVER WAS TUNED CONTINUOUSLY ACCORDING TO AN EPHEMERIS, WITH AN ACCURACY TO 0.05 MHz. THIS WAS NECESSARY IN ORDER TO COMPENSATE FOR FREQUENCY SHIFTS RESULTING FROM ORBITAL VELOCITIES OF THE SPACECRAFT AND EARTH'S SPIN. THE FREQUENCY BANDWIDTH WAS 100 MHz FOR EACH SPECTRUM, DEFINED BY A FILTER AT THE LAST STAGE OF THE RECEIVER. FREQUENCY RESOLUTION WAS 0.2 MHz OVER THE 100-MHz BANDWIDTH.

----- PIONEER 6, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 65-105A-05 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - K.G. MCCracken CSIRO
OI - W.C. BARTLEY NATL ACADEMY OF SCI
OI - U.R. RAO ISRO SATELLITE CENTER

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED PRIMARILY TO MEASURE THE DIRECTIONAL CHARACTERISTICS OF GALACTIC AND SOLAR COSMIC-RAY FLUXES. THE PARTICLE DETECTOR WAS A CSI (7L) SCINTILLATOR CRYSTAL THAT WAS SET INTO AN ANTICINCIDENCE PLASTIC SCINTILLATOR COLLIMATOR CUP. SEPARATE PHOTOMULTIPLIER TUBES VIEWED THE TWO SCINTILLATORS. PULSES FROM THE CSI CRYSTAL UNACCOMPANIED BY PULSES FROM THE PLASTIC SCINTILLATOR WERE SORTED BY A THREE-WINDOW PULSE HEIGHT ANALYZER. THE WINDOWS

CORRESPONDING TO ENERGY DEPOSITIONS OF 7.4 TO 44.0, 44.0 TO 77.1, AND 133.0 TO 303.0 MEV. COUNTS IN THE TWO LOWER ENERGY WINDOWS WERE DUE MAINLY TO PROTONS WITH THE WINDOW ENERGIES, WHILE ONLY PARTICLES OF 2 GREATER THAN OR EQUAL TO 2 CONTRIBUTED TO THE HIGHEST ENERGY WINDOW COUNT RATE. (PROTONS ABOVE 90 MEV GAVE ANTICINCIDENCE PULSES.) FOR EACH ENERGY WINDOW, COUNTS WERE SEPARATELY ACCUMULATED IN EACH OF FOUR ANGULAR SECTORS AS THE SPACECRAFT SPUN. EACH ANGULAR SECTOR WAS NORMALLY 89.5 DEG IN WIDTH, WITH THE SUN IN THE MIDDLE OF ONE SECTOR. HOWEVER, WHEN LARGE FLUXES WERE ENCOUNTERED, EACH ANGULAR SECTOR WAS REDUCED TO 11.2 DEG, WITH THE SUN NEAR THE MIDPOINT BETWEEN TWO SECTORS. A SPIN-INTEGRATED (ISOTROPIC) MODE, IN WHICH ALL PARTICLES DEPOSITING 7.4 MEV IN THE CSI CRYSTAL (NO ANTICINCIDENCE REQUIREMENT) WERE COUNTED, WAS ALSO USED. ACCUMULATION TIMES FOR EACH OF THE 12 DIRECTIONAL MODES AND FOR THE UNIDIRECTIONAL MODE VARIED BETWEEN 14 S AND 112 S (SPACECRAFT SPIN PERIOD WAS ABOUT 1 S) DEPENDING ON THE TELEMETRY BIT RATE. SEE BARTLEY ET AL., 'REV. SCI. INSTRUM.', 38, 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 6, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 65-105A-06 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.M. WOLFE NASA-ARC

BRIEF DESCRIPTION
A QUADRISPHERICAL ELECTROSTATIC ANALYZER WITH EIGHT CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 16 LOGARITHMICALLY EQUISPACED ENERGY-PER-CHARGE (E/Q) STEPS FROM 200 TO 10,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 1 TO 500 V. THE EIGHT COLLECTORS MEASURED PARTICLES INCIDENT FROM EIGHT DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). THERE WERE FOUR 15-DEG INTERVALS, TWO 20-DEG INTERVALS, AND TWO 30-DEG INTERVALS. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 15 AZIMUTHAL ANGULAR SECTORS. EIGHT OF THESE SECTORS WERE 5-5/8 DEG WIDE, WERE CONTIGUOUS, AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SEVEN SECTORS WERE 45 DEG WIDE. THREE DIFFERENT MODES OF DATA COLLECTION WERE USED. AT THE HIGHEST BIT RATE (912 BPS), THE FULL SCAN MODE WAS ALTERNATED WITH THE MAXIMUM FLUX MODE AT EACH E/Q STEP. IN THE FULL SCAN MODE, THE MAXIMUM FLUX OBSERVED IN EACH OF THE 15 AZIMUTHAL SECTORS AS THE SPACECRAFT ROTATED WAS RECORDED FOR A GIVEN SINGLE COLLECTOR AT A GIVEN E/Q STEP. DURING 24 SUCCESSIVE OPERATIONS OF THE FULL SCAN MODE (40 SPACECRAFT REVOLUTIONS), THE 16 ION E/Q STEPS AND EIGHT ELECTRON E/Q STEPS WERE EXERCISED FOR A GIVEN COLLECTOR. DURING EIGHT SUCCESSIVE SUCH PERIODS, EACH OF THE EIGHT COLLECTORS WAS EXERCISED. THE FULL CYCLE OF FULL SCAN MODE DATA REQUIRED 400 SPACECRAFT REVOLUTIONS (ABOUT 400 S). SUCH CYCLES WERE REPEATED WITHOUT INTERRUPTION AT THE HIGH BIT RATE. IN THE MAXIMUM FLUX MODE, FOR THE E/Q STEP USED IN THE PRECEDING REVOLUTION OF FULL SCAN MODE OPERATION, ALL COLLECTORS WERE OBSERVED FOR ONE REVOLUTION, AND THE MAXIMUM FLUX OBSERVED WAS REPORTED ALONG WITH THE NUMBER OF THE COLLECTOR THAT OBSERVED IT AND THE ANGULAR DIRECTION (2-13/16-DEG RESOLUTION) OF THE OBSERVATION. AT THE NEXT HIGHEST BIT RATE (256 BPS), THE SHORT SCAN MODE WAS ALTERNATED EVERY SPACECRAFT REVOLUTION WITH THE MAXIMUM FLUX MODE. THE SHORT SCAN MODE WAS THE SAME AS THE FULL SCAN MODE EXCEPT THAT ONLY THE PEAK FLUX IN EACH OF THE EIGHT 5-5/8-DEG-WIDE AZIMUTHAL SECTORS WAS RECORDED. THUS, THIS CYCLE ALSO TOOK 400 SPACECRAFT REVOLUTIONS. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE ALONE WAS USED. THUS, NO AZIMUTHAL DISTRIBUTIONS WERE MEASURED. AT THE LOW BIT RATES, IT TOOK 32 S FOR A COMPLETE SET OF ION MEASUREMENTS AND 16 S FOR A COMPLETE SET OF ELECTRON MEASUREMENTS. AT 64 BPS, THE ION AND ELECTRON MEASUREMENTS WERE TAKEN AND TELEMETERED EVERY 84 S. AT 16 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 336 S. AT 8 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 672 S.

***** PIONEER 9*****

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-D, PL-684K
03533

NSSDC ID- 68-100A

LAUNCH DATE- 11/08/68 WEIGHT- 147. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 297.6 DAYS
PERIAPSIS- 0.704 AU RAD

EPOCH DATE- 02/27/76
INCLINATION- 0.006 DEG
APOAPSIS- 0.990 AU RAD

PERSONNEL

MS - F.O. KOCHENDORFER
SC - A.G. OPP
PM - C.F. HALL
PS - J.M. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER 9 WAS THE FOURTH IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, AND SOLAR-CELL AND BATTERY-POWERED SATELLITES DESIGNED TO OBTAIN MEASUREMENTS OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE ON A CONTINUING BASIS. THE SPACECRAFT CARRIED EXPERIMENTS TO STUDY THE POSITIVE IONS AND ELECTRONS IN THE SOLAR WIND, THE INTERPLANETARY ELECTRON DENSITY (RADIO PROPAGATION EXPERIMENT), SOLAR AND GALACTIC COSMIC RAYS, THE INTERPLANETARY MAGNETIC FIELD, COSMIC DUST, AND ELECTRIC FIELDS. ALSO, A NEW CODING PROCESS WAS IMPLEMENTED FOR PIONEER 9. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 60 RPM, AND THE SPIN AXIS WAS PERPENDICULAR TO THE ECLIPTIC PLANE AND POINTED TOWARD THE SOUTH ECLIPTIC POLE. BY GROUND COMMAND, ONE OF FIVE BIT RATES, ONE OF FOUR DATA FORMATS, AND ONE OF FOUR OPERATING MODES COULD BE SELECTED. THE FIVE BIT RATES WERE 512, 256, 64, 16, AND 8 OPS. THREE OF THE FOUR DATA FORMATS CONTAINED PRIMARILY SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS USED AT THE TWO HIGHEST BIT RATES, ANOTHER WAS USED AT THE THREE LOWEST BIT RATES, AND THE THIRD CONTAINED DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT CONTAINED MAINLY ENGINEERING DATA. THE FOUR OPERATING MODES WERE REAL TIME, TELEMETRY STORE, DUTY CYCLE STORE, AND MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 OPS. THE TIME PERIOD BETWEEN WHICH SUCCESSIVE FRAMES WERE COLLECTED AND STORED COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS OF UP TO 19 H, AS LIMITED BY THE BIT STORAGE CAPACITY. IN THE MEMORY READOUT MODE, DATA WERE READ OUT AT WHATEVER BIT RATE WAS APPROPRIATE TO THE SATELLITE DISTANCE FROM THE EARTH.

----- PIONEER 9, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 68-100A-08

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL

PI - J.O. ANDERSON

NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO: (1) OBTAIN PRIMARY DETERMINATIONS OF THE MASSES OF THE EARTH AND MOON AND THE DISTANCE BETWEEN THE EARTH AND SUN (AU), (2) USE THE TRACKING DATA FROM THE WHOLE SERIES OF PIONEER PROBES IN A PROGRAM DESIGNED TO IMPROVE THE EPHEMERIS OF THE EARTH, AND (3) INVESTIGATE THE POSSIBILITY OF A TEST OF GENERAL RELATIVISTIC MECHANICS USING THE PIONEER ORBITS AND DATA. THE INSTRUMENTATION WAS A TWO-WAY S-BAND DOPPLER TRACKING MECHANISM USING HIGH-GAIN ANTENNAS WITH DISK-LIKE PATTERNS IN A PLANE PERPENDICULAR TO THE SPIN-AXIS OF THE SPACECRAFT. WHEN THE SPIN-AXIS WAS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATE THE EARTH. DATA WERE TRANSMITTED CONTINUOUSLY AND WERE RECEIVED AT GROUND-BASED DEEP SPACE NETWORK STATIONS WITH 26.5-M DIAMETER ANTENNAS AND WITH THE 64-M ANTENNA IN CALIFORNIA.

----- PIONEER 9, BERG-----

INVESTIGATION NAME- COSMIC DUST DETECTOR

NSSDC ID- 68-100A-04

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - O.E. BERG (RETIRED)

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO (1) MEASURE THE COSMIC DUST FLUX DENSITY IN THE SOLAR SYSTEM, (2) DETERMINE THE DISTRIBUTION OF COSMIC DUST CONCENTRATIONS IN THE EARTH'S ORBIT, (3) DETERMINE THE GRADIENT, FLUX DENSITY, AND SPEED OF PARTICLES IN METEOR STREAMS, AND (4) PERFORM AN IN-FLIGHT CONTROL EXPERIMENT ON THE RELIABILITY OF THE MICROPHONE AS A COSMIC DUST SENSOR. THE EXPERIMENT INSTRUMENTATION WAS IDENTICAL TO THAT CARRIED ON PIONEER 8, CONSISTING ESSENTIALLY OF TWO THIN FILM-GRID DETECTORS (SEPARATED BY A DISTANCE OF 4 CM) THAT PRODUCED AN ELECTRICAL SIGNAL WHEN THE FILM WAS PENETRATED BY A MICROMETEOROID. EACH FILM HAD A SENSITIVE AREA OF 100 SQ CM AND WAS COMPOSED OF 16 SEGMENTS THAT PROVIDED BOTH

THE DIRECTION AND THE TIME-OF-FLIGHT NEEDED FOR THE METEOROID TO TRAVERSE THE 5-CM DISTANCE BETWEEN THE FRONT FILM AND REAR FILM SENSOR. THE COMBINED RESULTS OF THE PIONEER 8 AND 9 COSMIC DUST EXPERIMENTS LENT STRONG SUPPORT TO THE HYPOTHESIS THAT THE BULK OF METEOROID DUST IS OF COMETARY ORIGIN.

----- PIONEER 9, ESHLEMAN-----

INVESTIGATION NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 68-100A-03

INVESTIGATIVE PROGRAM
CODE 5L

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - V.R. ESHLEMAN
O1 - T.A. CROFT
O2 - M.T. HOWARD
O3 - A.L. LEADABRAND
O4 - R.A. LONG
O5 - A.M. PETERSON

STANFORD U
SRI INTERNATIONAL
STANFORD U
SRI INTERNATIONAL
SRI INTERNATIONAL
STANFORD U

BRIEF DESCRIPTION

BOTH 423.5-MHZ AND ITS 2/17 SUBHARMONIC 49.8-MHZ SIGNALS WERE TRANSMITTED FROM A 4.6-M STEERABLE PARABOLIC ANTENNA AT STANFORD UNIVERSITY TO THE TWO-FREQUENCY RADIO RECEIVER ON THE SPACECRAFT. THE HIGH-FREQUENCY SIGNAL SERVED AS A REFERENCE SIGNAL SINCE ITS PROPAGATION TIME WAS NOT APPRECIABLY DELAYED. THE LOW-FREQUENCY SIGNAL WAS DELAYED IN PROPORTION TO THE TOTAL ELECTRON CONTENT IN THE PROPAGATION PATH. ON THE SPACECRAFT, A PHASE-LOCKED RECEIVER COUNTED THE BEAT FREQUENCY ZERO CROSSINGS OF THE RECEIVED SIGNALS TO OBTAIN MEASUREMENTS OF PHASE-PATH DIFFERENCES. DIFFERENTIAL DELAY OF THE GROUP VELOCITY WAS ALSO OBSERVED, AND THESE VALUES WERE TELEMETERED TO THE GROUND STATION AND USED TO CALCULATE THE TOTAL ELECTRON CONTENT. THE IONOSPHERIC CONTRIBUTION (UP TO A SELECTED ALTITUDE OBTAINED FROM OTHER EXPERIMENTAL TECHNIQUES) COULD BE SUBTRACTED TO PRODUCE DATA DESCRIBING THE INTERPLANETARY ELECTRON CONTENT OF THE SOLAR WIND AND ITS VARIATIONS. MORE DETAILED DESCRIPTIONS OF THE EXPERIMENT CAN BE FOUND IN J. GEOPHYS. RES., 71, 3325-3327, AND IN RADIO SCIENCE, 6, 51-63.

----- PIONEER 9, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 68-100A-05

INVESTIGATIVE PROGRAM
CODE 5L/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - R.G. MCCracken
O1 - U.R. RAO
O2 - W.C. BARTLEY

CSIRO
ISRO SATELLITE CENTER
NATL ACADEMY OF SCI

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A CSI SCINTILLATOR AND THREE SOLID-STATE TELESCOPES. THE CSI SCINTILLATOR WAS COLLIMATED BY AN ANTI-COINCIDENCE PLASTIC SCINTILLATOR AND HAD A ONICAL APERTURE WITH A 30.2-DEG HALF-ANGLE. THE SCINTILLATOR LOOK DIRECTION WAS CENTERED IN THE ECLIPTIC PLANE. THREE SOLID-STATE DETECTORS WERE ORIENTED IN A FAN ARRANGEMENT WITH RESPECT TO A FOURTH SOLID-STATE DETECTOR SUCH THAT EACH OF THE FIRST THREE DETECTORS FORMED A TELESCOPE WITH THE FOURTH DETECTOR. EACH OF THE THREE TELESCOPES THUS FORMED HAD AN ACCEPTANCE CONE OF 23-DEG HALF-ANGLE. THE BEAM VIEWING DIRECTIONS OF THE TELESCOPES WERE IN THE ECLIPTIC PLANE AND 40 DEG ABOVE AND BELOW THAT PLANE, RESPECTIVELY. TWO CONCURRENT MODES OF COUNTING WERE EMPLOYED. IN THE FIRST MODE, COUNTS WERE ACCUMULATED IN EIGHT SEPARATE 45-DEG INTERVALS DURING THE SPACECRAFT SPIN, WHILE, IN THE SECOND, SPIN-INTEGRATED COUNTS WERE ACQUIRED. IN THE FIRST MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES WITH ENERGIES IN THE RANGES 7.0 TO 21.5 MEV/NUCLEON AND 19.7 TO 63.0 MEV/NUCLEON (NO SPECIES DISCRIMINATION) WHILE EACH SOLID-STATE TELESCOPE SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 3.3 TO 3.6 MEV AND 3.6 TO 6.7 MEV. IN THE SECOND MODE, THE SCINTILLATOR SEPARATELY MEASURED PARTICLES IN SIX CONTIGUOUS ENERGY INTERVALS BETWEEN 4.5 AND 48 MEV/NUCLEON (INTERVAL LOWER LIMITS AT 4.5, 7.0, 9.4, 13, 21, AND 28 MEV/NUCLEON), WHILE EACH OF THE SOLID-STATE TELESCOPES SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 1 TO 8, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV AND ALPHA PARTICLES IN THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 224-BIT MAIN TELEMETRY FRAME, TWO FIRST-MODE 9-BIT ACCUMULATORS AND ONE SECOND-MODE 9-BIT ACCUMULATOR WERE READ OUT. IN-FLIGHT CALIBRATION OF THE SCINTILLATOR AND OF SOME OF THE ELECTRONICS WAS PERFORMED DAILY. SEE DUKATA ET AL, IEEE TRANS. NUC. SCI., NS-17, 18-24, 1970, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 9, SCARF-----

INVESTIGATION NAME- PLASMA WAVE DETECTOR

NSDDC ID- 68-100A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF
OI - I.M. GREEN
OI - G.W. CROOK
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
TRW SYSTEMS GROUP
GAINES M. CROOK ASSOC
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTROSTATIC AND ELECTROMAGNETIC PLASMA WAVES WERE MEASURED IN THE SOLAR WIND NEAR 1 AU USING AN UNBALANCED ELECTRIC DIPOLE ANTENNA. THE 423-MHZ STANFORD UNIVERSITY ANTENNA, WHICH SERVED AS THE SENSOR, WAS CAPACITIVELY COUPLED TO THREE TELEMETRY CHANNELS. CHANNEL 1 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 400 KHZ. CHANNEL 2 WAS A 15-PERCENT BANDPASS FILTER CENTERED AT 30 KHZ. THESE CHANNELS WERE EACH SAMPLED 64 TIMES PER TELEMETRY SEQUENCE. CHANNEL 3 WAS A BROADBAND 100-MHZ TO 100-KHZ CHANNEL. THE BROADBAND CHANNEL WAS FED INTO A COUNT RATE METER THAT MEASURED THE NUMBER OF POSITIVE-GOING PULSES PER UNIT TIME HAVING AMPLITUDES LARGE ENOUGH TO CROSS THE PRESENT TRIGGER LEVEL. THE TRIGGER LEVEL WAS VARIED THROUGH EIGHT STEPS, EIGHT TIMES PER TELEMETRY SEQUENCE. THE TRIGGER LEVELS, TOGETHER WITH THE COUNT RATE AT EACH LEVEL, GAVE A MEASURE OF THE BROADBAND POWER SPECTRUM, DUE TO AMBIENT CONDITIONS. THESE DATA USUALLY REPRESENT THE POWER AT ABOUT 100 MZ. THE TELEMETRY SEQUENCE WAS REPEATED OVER TIME INTERVALS FROM 7 MIN 29 S TO 472 MIN 52 S.

----- PIONEER 9, SONETT-----

INVESTIGATION NAME- TRIAXIAL MAGNETOMETER

NSDDC ID- 68-100A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.P. SONETT
OI - D.S. COLBURN

U OF ARIZONA
NASA-ARC

BRIEF DESCRIPTION

A BOOM-MOUNTED, TRIAXIAL FLUXGATE MAGNETOMETER WAS USED TO STUDY THE INTERPLANETARY MAGNETIC FIELD AND ITS FLUCTUATIONS. THE SENSORS WERE ORTHOGONALLY MOUNTED WITH ONE AXIS PARALLEL TO THE SPACECRAFT SPIN AXIS. UPON COMMAND, A MOTOR INTERCHANGED A SENSOR IN THE SPIN PLANE WITH THE SENSOR ALONG THE SPIN AXIS, ENABLING IN-FLIGHT DETERMINATION OF ZERO LEVELS. EVERY 70 HOURS, THE INSTRUMENT WAS COMMANDED INTO A SELF-CALIBRATE SEQUENCE, AND THIS WAS OFTEN REPEATED AFTER THE SENSORS WERE FLIPPED. THE INSTRUMENT, WHICH HAD A DYNAMIC RANGE OF PLUS OR MINUS 200 NT WITH A RESOLUTION OF PLUS OR MINUS 0.2 NT, WAS CAPABLE OF INFLIGHT DEMODULATION OF THE SIGNALS RECEIVED FROM THE TWO SENSORS IN THE SPIN PLANE. EACH MAGNETIC FIELD COMPONENT WAS DIGITIZED INTO A 10-BIT TELEMETRY WORD. NINE MAGNETIC FIELD COMPONENTS, COMPRISING THREE MAGNETIC FIELD VECTORS, WERE TRANSMITTED IN EACH SPACECRAFT TELEMETRY FRAME.

----- PIONEER 9, WEBBER-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE

NSDDC ID- 68-100A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.A. WEBBER

U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED A TELESCOPE COMPRISED OF FIVE SOLID-STATE SENSORS, A CERENKOV DETECTOR, AND AN ANTICOINCIDENCE SHIELD. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. AS DETERMINED BY TWO COINCIDENCE MODES AND ELECTRONIC DISCRIMINATION OF SENSOR OUTPUT PULSES, PARTICLES MEASURED WERE ELECTRONS IN THREE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.31 AND 5.1 MEV, PROTONS IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 2.2 AND 42 MEV, AND ALPHA PARTICLES IN THREE CONTIGUOUS ENERGY INTERVALS BETWEEN 5.8 AND 42 MEV/NUCLEON. A THIRD COINCIDENCE MODE MEASURED THE SUM OF COUNTS DUE TO ELECTRONS ABOVE 0.6 MEV AND NUCLEI ABOVE 14 MEV/NUCLEON. A FOURTH COINCIDENCE MODE MEASURED THE SUM OF NUCLEI ABOVE 42 MEV/NUCLEON AND ELECTRONS ABOVE 5.1 MEV. SPACECRAFT SPIN-INTEGRATED DIRECTIONAL FLUXES WERE MEASURED IN THE VARIOUS MODES. ACCUMULATION TIMES AND READOUT INTERVALS WERE DEPENDENT ON THE TELEMETRY BIT RATE AND WERE TYPICALLY IN TENS OF SECONDS. IN ALL CASES, THEY WERE LONGER THAN THE SPACECRAFT SPIN PERIOD.

----- PIONEER 9, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSDDC ID- 68-100A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE
OI - D.D. MCNEIDIN

NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

A TRUNCATED HEMISPHERICAL ELECTROSTATIC ANALYZER (120-DEG TOTAL PARALLEL PLATE CURVATURE) WITH THREE CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF THE ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 30 LOGARITHMICALLY EQUISPACED ENERGY PER UNIT CHARGE (E/Q) STEPS FROM 150 TO 15,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN 14 LOGARITHMICALLY EQUISPACED E/Q STEPS RANGING FROM 17 TO 1000 V. THERE WAS ALSO A ZERO E/Q, OR BACKGROUND, STEP. THE THREE COLLECTORS MEASURED PARTICLES INCIDENT FROM THREE DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). TWO COLLECTORS MEASURED FLUX FROM 10 TO 81 DEG ON EITHER SIDE OF THE SPACECRAFT EQUATORIAL PLANE, AND THE THIRD MEASURED FLUX IN A 20-DEG INTERVAL CENTERED ON THE SPACECRAFT EQUATORIAL PLANE. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 23 POSSIBLE 2-13/16-DEG WIDE AZIMUTHAL ANGULAR SECTORS. SEVENTEEN OF THESE SECTORS WERE CONTIGUOUS AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SIX SECTORS WERE WIDELY SPACED. THE INSTRUMENT HAD THREE MODES OF DATA COLLECTION -- POLAR SCAN, AZIMUTHAL SCAN, AND MAXIMUM FLUX. AT THE TWO HIGHEST BIT RATES (512 AND 256 BPS), THE POLAR SCAN MODE WAS ALTERNATED WITH THE AZIMUTHAL SCAN MODE AT EACH E/Q STEP. IN THE POLAR SCAN MODE, ALL THREE COLLECTORS WERE OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED FOR EACH COLLECTOR. IN THE AZIMUTHAL SCAN MODE, THE PEAK FLUX OBSERVED IN THE 23 AZIMUTHAL SECTORS WAS RECORDED FOR THE CENTRAL COLLECTOR AT EACH E/Q STEP. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE WAS USED AT EACH E/Q STEP FOLLOWED BY EITHER (1) FOR IONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT THAT E/Q STEP WHERE THE PEAK FLUX MEASUREMENT DURING THE MAXIMUM FLUX MODE WAS OBTAINED, OR (2) FOR ELECTRONS, A POLAR SCAN AND AN AZIMUTHAL SCAN AT E/Q = 100 V. IN THE MAXIMUM FLUX MODE, ONLY THE CENTRAL COLLECTOR WAS OBSERVED, AND THE PEAK FLUX OBTAINED AND THE AZIMUTHAL DIRECTION (TO 2-13/16 DEG) OF THE OBSERVATION WERE REPORTED. A COMPLETE SET OF MEASUREMENTS CONSISTED OF SEVEN SETS OF ION MEASUREMENTS (AT EACH E/Q STEP) AND ONE SET OF ELECTRON MEASUREMENTS (AT EACH E/Q STEP). AT THE HIGH BIT RATES (512 AND 256 BPS) ONE SET OF ION MEASUREMENTS TOOK 67 S AND ONE SET OF ELECTRONS MEASUREMENTS 30 S. AT THE LOW BIT RATES (64, 16, AND 8 BPS), ONE SET OF ION MEASUREMENTS TOOK 37 S AND ONE SET OF ELECTRON MEASUREMENTS 20 S. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETTERED EVERY 402.5 S. AT 16 BPS, IT TOOK 1610 S, AND, AT 8 BPS, IT TOOK 3220 S.

***** PIONEER 10*****

SPACECRAFT COPRON NAME- PIONEER 10
ALTERNATE NAMES- PIONEER-F, PL-7230
05P60

NSDDC ID- 72-012A

LAUNCH DATE- 05/03/72 WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS
ORBIT TYPE- JUPITER FLYBY

PERSONNEL

MG - F.D. KOCHENDORFER
SC - A.G. OPP
PR - C.F. WALL
PS - J.H. WOLFE

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

THIS MISSION WAS THE FIRST TO BE SENT TO THE OUTER SOLAR SYSTEM, AND AFTER ENCOUNTERING THE PLANET JUPITER IT ASSUMED A TRAJECTORY THAT WOULD ESCAPE FROM THE SOLAR SYSTEM. THE SPACECRAFT PCBV WAS MOUNTED BEHIND A 2.70-M-DIAMETER PARABOLIC DISH ANTENNA THAT WAS 46 CM DEEP. THE SPACECRAFT STRUCTURE WAS A 36-CM-DEEP FLAT EQUIPMENT COMPARTMENT. THE TOP AND BOTTOM BEING REGULAR HEXAGONS, ITS SIDES WERE 71 CM LONG. ONE SIDE JOINED A SMALLER COMPARTMENT THAT CARRIED THE SCIENTIFIC EXPERIMENTS. THE HIGH-GAIN ANTENNA FEED WAS SITUATED ON THREE SHUTS, WHICH PROJECTED FORWARD ABOUT 1.2 M. THIS FEED WAS TOPPED WITH A MEDIUM-GAIN ANTENNA. A LOW-GAIN OMNI-DIRECTIONAL ANTENNA EXTENDED ABOUT 0.76 M BEHIND THE EQUIPMENT COMPARTMENT AND WAS MOUNTED BELOW THE HIGH GAIN ANTENNA. POWER FOR THE SPACECRAFT WAS OBTAINED BY FOUR SNAP 19 RADIOISOTOPE THERMOELECTRIC GENERATORS (RTG), WHICH WERE HELD ABOUT 5 M FROM

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OF POOR QUALITY

THE CENTER OF THE SPACECRAFT BY TWO THREE-ROD TRUSSES 120 DEG APART. A THIRD BOOM EXTENDED 6.6 M FROM THE EXPERIMENT COMPARTMENT TO HOLD THE MAGNETOMETER AWAY FROM THE SPACECRAFT. THE FOUR RTG'S GENERATED ABOUT 155 WATTS AT LAUNCH AND DECAYED TO APPROXIMATELY 140 WATTS BY THE TIME THE SPACECRAFT REACHED JUPITER, 21 MONTHS AFTER LAUNCH IN DECEMBER 1973. THERE WERE THREE REFERENCE SENSORS -- STAR SENSOR FOR CANOPUS, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTIONS TO THE EARTH AND THE SUN WITH THE KNOWN DIRECTION TO CANOPUS AS A BACKUP. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN RATE CONTROL (MAINTAINED AT 6.8 RPM) AND CHANGED THE VELOCITY OF THE SPACECRAFT. THESE THRUSTERS COULD BE PULSED OR FIRED STEADILY BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNIDIRECTIONAL AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO ANOTHER RECEIVER. THESE RECEIVERS COULD BE INTERCHANGED BY COMMAND TO PROVIDE SOME REDUNDANCY. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING WAVE TUBE AMPLIFIERS, PRODUCED 8 WATTS AT 2292 MHZ EACH. UPLINK WAS ACCOMPLISHED AT 2110 MHZ WHILE DATA TRANSMISSION DOWNLINK WAS AT 2292 MHZ. THE DATA WERE RECEIVED BY NASA'S DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE-CONTROLLED BETWEEN MINUS 23 DEG C AND PLUS 3R DEG C. FIFTEEN EXPERIMENTS WERE CARRIED TO STUDY THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PARAMETERS; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; ATMOSPHERE OF JUPITER AND SOME OF ITS SATELLITES, PARTICULARLY IO; AND TO PHOTOGRAPH JUPITER AND ITS SATELLITES. EQUIPMENT CARRIED FOR THESE EXPERIMENTS WERE -- MAGNETOMETER, PLASMA ANALYZER, CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEOROIDS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING THE PENETRATION OF METEOROIDS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AND MEASURED POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE TRACKING AND OCCULTATION DATA. THE SPACECRAFT ACHIEVED ITS CLOSEST APPROACH ON DECEMBER 3, 1973, WHEN IT REACHED APPROXIMATELY 3 JOVIAN RADII (ABOUT 210,000 KM). THE SPACECRAFT CONTAINS PLAQUES THAT HAVE DRAWINGS DEPICTING A MAN, A WOMAN, AND THE LOCATION OF THE SUN AND THE EARTH IN OUR GALAXY.

----- PIONEER 10, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 72-012A-09 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETOLOGY
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON NASA-JPL
OI - G.W. NULL NASA-JPL

BRIEF DESCRIPTION

TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBIT OF JUPITER, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, AND THE GALILEAN SATELLITES.

----- PIONEER 10, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 72-012A-05 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.W. FILLIUS U OF CALIF, SAN DIEGO
OI - C.E. MCILWAIN U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND C4) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 6, 9, 13, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIPUP IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS, M1 SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV, M2 THAT MEASURED BACKGROUND, AND M3 THAT WAS SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATOR DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THUS, THE SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THREE OF THE CHANNELS (CDC, SPDC, AND SEDC) WERE READ OUT THROUGH A COMMON ELECTROMETER.

DUE TO A MALFUNCTION THAT OCCURRED BETWEEN LAUNCH AND JOVIAN ENCOUNTER, THESE THREE CHANNELS PRODUCED NO USABLE ENCOUNTER DATA. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READ-OUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 9 RPM, PITCH ANGLE MEASUREMENTS WERE OBTAINED. WHILE THE EXPERIMENT WAS PRIMARILY DESIGNATED FOR ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 10, GEHRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 72-012A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - T. GEHRELS U OF ARIZONA
OI - D.L. COFFEEN NASA-GISS
OI - J. HAMEEN-ANTILLA U OF ARIZONA
OI - C.E. KENKAIGHT U OF ARIZONA
OI - R.F. HUMMER SANTA BARBARA RES CTR
OI - M.G. TOMASKO U OF ARIZONA
OI - W. SWINDELL U OF ARIZONA

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT WAS USED DURING THE JOVIAN ENCOUNTER TO MAKE SIMULTANEOUS TWO-COLOR (BLUE - 3900 TO 4900 A, RED - 5800 TO 7000 A) POLARIMETRIC AND RADIO-METRIC MEASUREMENTS, AND MODERATE-RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES. THE POLARIMETRIC AND RADIO-METRIC WORK WAS PERFORMED USING AN 8-X 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE STOP. RELATIVE RADIO-METRIC CALIBRATION WAS DERIVED USING AN INTERNAL YONGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSER/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE; I.E., PRIMARY RADIO-METRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLITTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSU TOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A MOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHO-MATIC MIRROR THAT REFLECTED WAVELENGTHS LESS THAN 5500 A (BLUE BEAM) AND TRANSMITTED ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS), A FILTERING COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FOR EACH SPECTRAL BEAM, TWO BENDIX CHANNELTRON DETECTORS (BLUE BIALKALI S-11 PHOTOCATHODES RED S-20 PHOTOCATHODES) TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 10, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 72-012A-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.L. JUDGE U OF SOUTHERN CALIF
OI - R.W. CARLSON NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, CONSISTING OF A BROADBAND PHOTOMETER SENSITIVE BETWEEN 200 AND 800 A, OBSERVED EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC TO SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 10, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H. KINARD
 OI - R.E. TURNER
 OI - J.M. ALVAREZ
 OI - D.M. HUMES
 OI - R.L. O'NEAL

NASA-LARC
 NASA-MSFC
 NASA-LARC
 NASA-LARC
 NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MEASURE THE NUMBER OF METEOROID IMPACTS ON THE PIONEER 10 SPACECRAFT BY MEANS OF 12 PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, MOUNTED ON THE BACK OF THE ANTENNA DISK. THE TOTAL EXPOSED AREA WAS 0.465 SQ M. EACH PANEL OF GAS-FILLED CELLS CONSISTED OF A 2.54E-5 M (1-MIL) THICK AND A 5.08E-5 M (2-MIL) THICK SHEET OF STAINLESS STEEL WELDED TOGETHER IN SUCH A WAY THAT MANY SMALL POCKETS OF GAS WERE LEFT BETWEEN THEM. WHENEVER A POKET WAS PUNCTURED, THE GAS ESCAPED AND A COLD CATHODE DEVICE DETECTED THE LOSS. THE RATE OF PRESSURE LOSS INDICATED THE SIZE OF THE HOLE MADE, AND THUS THE PARTICLE'S MASS AND INCIDENT ENERGY COULD BE DETERMINED. THE COMBINATION OF THESE DATA WITH TRAJECTORY DATA PROVIDED AN INDICATION OF THE SPATIAL DENSITY OF THE PARTICLES. THE 2.54E-5 M THICK SIDE OF THE GAS PANEL WAS EXPOSED TO THE INTERPLANETARY MEDIUM, AND PENETRATIONS OF THE CELLS FROM THAT SIDE INDICATED ENCOUNTERS WITH PARTICLES HAVING MASSES OF 1 NANOGRAM OR MORE. SOME 300 TO 400 HITS WERE EXPECTED BY THE TIME THE SPACECRAFT COMPLETED ITS 200-DAY JOURNEY THROUGH THE ASTEROID BELT.

----- PIONEER 10, KLIORE-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 72-012A-10

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIORE
 OI - G. FJELDBO
 OI - D.L. CAIN
 OI - B.L. SEIDEL
 OI - S.I. RASOOL

NASA-JPL
 NASA-JPL
 NASA-JPL
 NASA-JPL
 NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO. ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION, PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 10, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 72-012A-12

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL

PI - F.R. McDONALD
 OI - K.G. MCCracken
 OI - W.P. WEBBER
 OI - E.G. ROELOF
 OI - J.H. TRAINOR
 OI - B.J. TEEGARDEN

NASA-GSFC
 CSIRO
 U OF NEW HAMPSHIRE
 APPLIED PHYSICS LAB
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE MULTI-ELEMENT SOLID-STATE TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. THE HIGH-ENERGY TELESCOPE (HET) CONSISTED OF FIVE COLINEAR SENSORS AND MEASURED STOPPING PARTICLES (Z = 1 TO 8) IN THE ENERGY RANGE 20 TO 50 MEV/NUCLEON AND PENETRATING PARTICLES IN THE RANGE 50 TO 800 MEV/NUCLEON. CHARGE RESOLUTION FOR PENETRATING PARTICLES WAS POSSIBLE UP TO 200 MEV/NUCLEON. THE FIRST LOW-ENERGY TELESCOPE (LET-I) HAD FOUR ELEMENTS AND MEASURED STOPPING (Z = 1 TO 8) PARTICLES IN THE ENERGY RANGE 3 TO 32 MEV/NUCLEON. THE SECOND LOW-ENERGY TELESCOPE (LET-II) HAD THREE ELEMENTS AND MEASURED STOPPING ELECTRONS BETWEEN 50 AND 1000 KEV AND STOPPING PROTONS BETWEEN 50 KEV AND 20 MEV. FOR EACH TELESCOPE, COUNT RATES WERE OBTAINED FOR EACH OF SEVERAL SENSOR COINCIDENCE-ANTICOINCIDENCE MODES. SOME OF THE RATES FROM EACH TELESCOPE WERE SECTORED INTO EIGHT OCTANTS IN THE SPACECRAFT SPIN PLANE. IN ADDITION, THREE-SENSOR PULSE HEIGHT ANALYSIS, WITH PRIORITY SCHEMES FAVORING THE ANALYSIS OF HEAVIER PARTICLES, WAS ASSOCIATED WITH EACH TELESCOPE.

----- PIONEER 10, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 72-012A-02

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL

PI - J.A. SIMPSON
 OI - J.J. O'GALLAGHER
 OI - A. TUZZOLINO

U OF CHICAGO
 U OF MARYLAND
 U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED CHARGED-PARTICLE COMPOSITION AND SPECTRA USING FOUR DETECTOR SYSTEMS: (1) THE MAIN TELESCOPE, CONSISTING OF SEVEN ELEMENTS AND PROVIDING ENERGY SPECTRA (APPROXIMATELY 3 TO 68 MEV FOR PROTONS AND 10 TO 150 MEV/M FOR OXYGEN), ELEMENT RESOLUTION (THROUGH OXYGEN), AND ISOTOPE RESOLUTION (FOR H AND HE); (2) THE LOW-ENERGY SUBSYSTEM TELESCOPE, CONSISTING OF TWO ELEMENTS AND USING A VERY SMALL THIN FIRST ELEMENT TO EXTEND THE HIGH-SENSITIVITY PROTON MEASUREMENTS BELOW 1 MEV (0.3 TO 9 MEV) IN THE PRESENCE OF A HIGH GAMMA-RAY BACKGROUND ABOARD THE SPACECRAFT; (3) THE ELECTRON-CURRENT DETECTOR (OR EGG), CONSISTING OF A BERYLLIUM-SHIELDED SILICON DETECTOR OPERATED IN CURRENT MODE TO MEASURE HIGH FLUXES OF ELECTRONS WITH ENERGIES ABOVE 3 MEV; AND (4) THE FISSION CELL DETECTOR, RECORDING FISSION FRAGMENTS FROM THE NUCLEON-INDUCED FISSION OF THORIUM 232 SANDWICHED BETWEEN TWO LARGE-AREA SILICON DETECTORS TO MEASURE FLUXES OF PROTONS (ABOVE 30 MEV) IN THE PRESENCE OF HIGH FLUXES OF ELECTRONS. THE EXPERIMENT SAMPLE TIME WAS SYNCHRONIZED WITH THE SPACECRAFT SPIN, PERMITTING SECTORING OF THE READOUT OF THE MAIN AND LOW-ENERGY TELESCOPES INTO EIGHT OCTANTS ABOUT THE SPIN AXIS.

----- PIONEER 10, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 72-012A-11

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN

U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES IN INTERPLANETARY SPACE AND IN THE VICINITY OF JUPITER. DETECTOR GROUPINGS WERE AS FOLLOWS -- (1) A THREE-ELEMENT (A, B, AND C) DIFFERENTIALLY SHIELDED TELESCOPE, WITH TUBE C SHIELDED OMNIDIRECTIONALLY AND USED FOR BACKGROUND SUBTRACTION TO PROVIDE DIRECTIONAL RATES SUCH AS A-C (ELECTRONS OF 5-21 MEV AND PROTONS OF 30-77.5 MEV) AND B-C (ELECTRONS OF 0.55-21 MEV AND PROTONS OF 6.6-77.5 MEV), (2) A THREE-ELEMENT (D, E, AND F) TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV, AND (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE APERTURE WHICH ADMITS SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. SINGLE ELEMENT AND COINCIDENCE RATES WERE TELEMETERED FROM THE FIRST TWO TELESCOPES. THE TELEMETRY BIT RATE PREVAILING DURING THE JUPITER ENCOUNTER PERMITTED DIRECTIONAL SAMPLING IN INTERVALS OF ABOUT 14 DEG OF ROLL ABOUT THE SPIN AXIS. FOR FURTHER DETAILS SEE BAKER AND VAN ALLEN, 'J. GEOPHYS. RES.' 81, 617, 1976.

----- PIONEER 10, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 72-012A-13

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 SPACE PLASMAS
 PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE
 OI - L.A. FRANK
 OI - R. LUST
 OI - D.S. INTRILIGATOR
 OI - D.D. MCKIBBIN
 OI - V.T. ZAVIENTSEFF
 OI - F.L. SCARF
 OI - H.R. COLLARD
 OI - W.C. FELDMAN
 OI - Z.A. SMITH

NASA-ARC
 U OF IOWA
 WPI-HEADQUARTERS
 U OF SOUTHERN CALIF
 NASA-ARC
 NASA-ARC
 TRW SYSTEMS GROUP
 NASA-ARC
 LOS ALAMOS SCI LAB
 NOAA-SEL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90 DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE OF 0.3 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH RESOLUTION ANALYZER WITH A COUNTOUT OF 9 KEV/D PER KV APPLIED TO THE

PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 75 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN ONE HALF A SPIN PERIOD THE WHOLE CONE OF HALF ANGLE 51 DEG CENTERED ON THE SUN WAS SWEEPED OUT. A MEDIUM ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1 CM PLATE SEPARATION (CONSTANT OF 6 KEV/Q PER KV APPLIED) WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH- AND MEDIUM-RESOLUTION ANALYZERS OPERATED INDEPENDENTLY SO A CROSS-CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM $1.0E+2$ TO $3.0E+9/50$ CM⁻²S AND THE PROTON TEMPERATURE DOWN TO $2.0E+3$ DEG K COULD BE ASCERTAINED.

***** PIONEER 11*****

SPACECRAFT COMMON NAME- PIONEER 11
ALTERNATE NAMES- PIONEER-G, PL-733C
6421

NSSDC ID- 73-019A

LAUNCH DATE- 04/06/73 WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - C.F. HALL NASA-ARC
PS - J.H. WOLFE NASA-ARC

BRIEF DESCRIPTION
THIS WAS THE SECOND MISSION TO INVESTIGATE JUPITER AND THE OUTER SOLAR SYSTEM. PIONEER 11, LIKE PIONEER 10, USED JUPITER'S GRAVITATIONAL FIELD TO ALTER ITS TRAJECTORY RADICALLY. IT PASSED CLOSE TO SATURN AND THEN AN ESCAPE TRAJECTORY FROM THE SOLAR SYSTEM WAS FOLLOWED. THE SPACECRAFT WAS 2.9-M (9.5-FT) LONG AND CONTAINED A 2.74-M (9-FT) DIAMETER HIGH-GAIN ANTENNA OF ALUMINUM HONEYCOMB SANDWICH MATERIAL WHOSE FEED WAS TOPPED WITH A MEDIUM-GAIN ANTENNA. A LOW-GAIN, OMNI-ANTENNA WAS MOUNTED BELOW THE HIGH-GAIN DISH. IT CONTAINED TWO NUCLEAR ELECTRIC-POWER GENERATORS, WHICH GENERATED 144 W AT JUPITER, BUT DECREASED TO 100 W AT SATURN. THERE WERE THREE REFERENCE SENSORS -- A STAR (CANOPUS) SENSOR, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTION TO EARTH AND THE SUN, WITH THE KNOWN DIRECTION TO CANOPUS AS BACKUP. PIONEER 11'S STAR SENSOR GAIN AND THRESHOLD SETTINGS WERE MODIFIED BASED ON EXPERIENCE FROM THAT OF PIONEER 10. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN AXIS CONTROL (AT 4.8 RPM) AND CHANGE OF THE SPACECRAFT VELOCITY. THE THRUSTERS COULD BE FIRED STEADILY OR PULSED, BY COMMAND. COMMUNICATIONS WERE MAINTAINED VIA THE OMNI- AND MEDIUM-GAIN ANTENNAS, WHICH OPERATED TOGETHER, CONNECTED TO ONE RECEIVER, WHILE THE HIGH-GAIN ANTENNA WAS CONNECTED TO THE OTHER RECEIVER. THE RECEIVERS COULD BE INTERCHANGED BY COMMAND. TWO RADIO TRANSMITTERS, COUPLED TO TWO TRAVELING WAVE TUBE AMPLIFIERS, PRODUCED 8 W POWER EACH IN S-BAND. COMMUNICATION UPLINK (EARTH TO SPACECRAFT) OPERATED AT 2110 MHZ, AND DOWNLINK (SPACECRAFT TO EARTH) AT 2292 MHZ. AT JUPITER'S DISTANCE, ROUND-TRIP COMMUNICATION TIME TOOK 92 MIN. DATA WERE RECEIVED AT THE DEEP SPACE NETWORK. THE SPACECRAFT WAS TEMPERATURE-CONTROLLED TO BETWEEN -23 AND +38 DEG C (-10 TO +100 DEG F). AN ADDITIONAL EXPERIMENT, A LOW SENSITIVITY FLUXGATE MAGNETOMETER, WAS ADDED TO THE PIONEER 11 PAYLOAD. INSTRUMENTS STUDIED THE INTERPLANETARY AND PLANETARY MAGNETIC FIELDS; SOLAR WIND PROPERTIES; COSMIC RAYS; TRANSITION REGION OF THE HELIOSPHERE; NEUTRAL HYDROGEN ABUNDANCE; DISTRIBUTION, SIZE, MASS, FLUX, AND VELOCITY OF DUST PARTICLES; JOVIAN AURORAE; JOVIAN RADIO WAVES; PLANETS' AND SATELLITES' ATMOSPHERES; AND SURFACES OF JUPITER, SATURN, AND SOME OF THEIR SATELLITES. EQUIPMENT CARRIED FOR THESE EXPERIMENTS WERE -- MAGNETOMETER, PLASMA ANALYZER (FOR SOLAR WIND), CHARGED PARTICLE DETECTOR, IONIZING DETECTOR, NON-IMAGING TELESCOPES WITH OVERLAPPING FIELDS OF VIEW TO DETECT SUNLIGHT REFLECTED FROM PASSING METEORIODS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING PENETRATION OF METEORIODS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AS WELL AS MEASURING THE

POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE CELESTIAL MECHANICS AND OCCULTATION PHENOMENA. THIS SPACECRAFT, LIKE PIONEER 10, CONTAINED PLATES THAT HAD DRAWINGS DEPICTING MAN, WOMAN, AND LOCATION OF THE SUN AND EARTH IN THE GALAXY. PIONEER 11 WAS 36,800 KM FROM JUPITER DURING ITS CLOSEST APPROACH. IT PASSED BY SATURN AUG. 5, 1979.

***** PIONEER 11, ACUNA*****

INVESTIGATION NAME- JOVIAN MAGNETIC FIELD

NSSDC ID- 73-019A-14 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY MAGNETIC FIELD

PERSONNEL
PI - M.H. ACUNA NASA-GSFC
OI - R.F. AESS NASA-GSFC

BRIEF DESCRIPTION
THIS INSTRUMENT, DESIGNED TO MEASURE THE JOVIAN AND SATURNIAN MAGNETIC FIELD, CONSISTED OF A SINGLE-RANGE TRIANGULAR FLUXGATE MAGNETOMETER SENSOR AND ASSOCIATED ELECTRONICS CAPABLE OF MEASURING FIELDS FROM $1.E-6$ TO $1.E-3$ T (0.01 TO 10 GAUSS) ALONG EACH ORTHOGONAL AXIS. INSTANTANEOUS VECTOR MEASUREMENTS, USING A 10-BIT A-TO-D CONVERTER, YIELDED A QUANTIZATION STEP SIZE OF MINUS TO PLUS 600 NT FOR FIELDS LESS THAN $2.E-4$ T. THESE ARE MADE ONCE EVERY THREE REVOLUTIONS OF THE SPACECRAFT (36 S) AND TRANSMITTED TO THE GROUND WITH NO FURTHER ON-BOARD PROCESSING. MORE INSTRUMENTAL DETAILS ARE GIVEN IN 'SP. SCI. INSTRUM.' 1, 177, 1975. PRINCIPAL JOVIAN SCIENTIFIC RESULTS CAN BE FOUND IN 'JGR.' 21, 2917, 1976.

***** PIONEER 11, ANDERSON*****

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 73-019A-09 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ASTRONOMY
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON NASA-JPL
OI - G.W. NULL NASA-JPL

BRIEF DESCRIPTION
TWO-WAY DOPPLER TRACKING OF THE SPACECRAFT WAS USED TO MAKE MORE PRECISE DETERMINATIONS OF PLANETARY MASSES, THE HELIOCENTRIC ORBITS OF JUPITER AND SATURN, AND THE GRAVITATIONAL FIELDS OF THE SUN, JUPITER, SATURN, AND THE GALILEAN AND SATURNIAN SATELLITES.

***** PIONEER 11, FILLIUS*****

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 73-019A-05 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETOLOGY

PERSONNEL
PI - R.W. FILLIUS U OF CALIF, SAN DIEGO
OI - C.E. MCILWAIN U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF AN ARRAY OF FIVE PARTICLE DETECTORS WITH ELECTRON THRESHOLDS IN THE RANGE .01 TO 35 MEV AND PROTON THRESHOLDS IN THE RANGE 0.15 TO 80 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND C4) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 5, 8, 12, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A MINIMUM IONIZATION COUNTER (M) HAD THREE OUTPUT CHANNELS, M1 SENSITIVE TO ELECTRONS HAVING ENERGIES GREATER THAN 35 MEV, M2 THAT MEASURED BACKGROUND, AND M3 THAT WAS SENSITIVE TO PROTONS HAVING ENERGIES GREATER THAN 80 MEV. THE LAST TWO SENSORS WERE SCINTILLATOR DETECTORS (SP AND SE), BOTH OF WHICH HAD ENERGY THRESHOLDS OF 10 KEV FOR ELECTRONS AND 150 KEV FOR PROTONS. THE SENSITIVITY OF THE SE DETECTOR TO PROTONS WAS ABOUT A FACTOR OF 10 LOWER THAN ITS SENSITIVITY TO ELECTRONS. THE SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READ-OUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 105 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPM, PITCH ANGLE MEASUREMENTS WERE OBTAINED WHILE THIS EXPERIMENT WAS PRIMARILY DESIGNED FOR

ENCOUNTER STUDIES, SOME DATA WERE OBTAINED AT LOW RATES IN INTERPLANETARY SPACE. A DESCRIPTION OF THE INSTRUMENTATION AND INITIAL PIONEER 10 RESULTS WAS PUBLISHED IN JGR, 79, 3589, 1974.

----- PIONEER 11, GEHRELS-----

INVESTIGATION NAME- IMAGING PHOTOPOLARIMETER (IPP)
 NSSDC ID- 73-019A-07 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 PLANETARY ATMOSPHERES
 PLANETOLOGY

PERSONNEL
 PI - T. GEHRELS U OF ARIZONA
 OI - D.L. COFFEEN NASA-GISS
 OI - J. HAMEEN-ANTTILA U OF ARIZONA
 OI - C.E. KENNKIGHT U OF ARIZONA
 OI - R.F. HUMMER SANTA BARBARA RES CTR
 OI - M.G. TOMASKO U OF ARIZONA
 OI - W. SWINDELL U OF ARIZONA

BRIEF DESCRIPTION
 THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT USED DURING JOVIAN AND SATURNIAN ENCOUNTER MADE SIMULTANEOUS, TWO COLOR (BLUE - 3900 TO 4900 Å, RED - 5800 TO 7000 Å) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE RESOLUTION (ABOUT 200 KP AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES AND SATURN AND SOME OF ITS SATELLITES. THE POLARIMETRIC AND RADIOMETRIC WORK WAS PERFORMED USING AN 8- BY 8-MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSOR/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE. PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKUSOV TELESCOPE OF FOCAL RATIO F/3.4, (2) A FOCAL PLANE WHEEL CONTAINING FOV APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT THE LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTS WAVELENGTHS OF LESS THAN 5500 Å (BLUE BEAM) AND TRANSMITS ALL LIGHT OF GREATER WAVELENGTH (RED BEAM), (5) FOR EACH SPECTRAL BEAM (TWO POLARIZATIONS ARE SEPARATED) A FILTERING-COATED RELAY LENS AND FOLDING MIRRORS, AND (6) FINALLY, FOR EACH SPECTRAL BEAM TWO BENDIX CHANNELTRON (BLUE - BIALKALI 5-11 PHOTOCATHODES, RED - 5-20) PHOTOCATHODES TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT.

----- PIONEER 11, INGERSOLL-----

INVESTIGATION NAME- INFRARED RADIOMETER
 NSSDC ID- 73-019A-08 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 PLANETARY ATMOSPHERES
 PLANETOLOGY

PERSONNEL
 PI - A.P. INGERSOLL CALIF INST OF TECH
 OI - R.W. BOESE NASA-ARC
 OI - S.C. CHASE, JR. SANTA BARBARA RES CTR
 OI - G. NEUGEBAUER CALIF INST OF TECH
 OI - L.M. TRAFYON U OF TEXAS, AUSTIN

BRIEF DESCRIPTION
 THE PIONEER 11 INFRARED RADIOMETER EXPERIMENT MEASURED THE JOVIAN AND SATURNIAN THERMAL BALANCE, TEMPERATURE DISTRIBUTION IN THE OUTER ATMOSPHERE, GENERAL SURFACE COMPOSITION, INCLUDING THE OVERALL HYDROGEN-TO-HELIUM RATIO, AND DARK SIDE TEMPERATURE. THE INSTRUMENT CONSISTED OF A 7.62-CM (3-IN.) REFLECTING CASSEGRAIN TELESCOPE WITH A 1-DEG BY 3-DEG FIELD-OF-VIEW THAT ILLUMINATES A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOPILES IN TWO BANDS OF THE IR SPECTRUM (14 TO 25 MICROMETERS AND 19 TO 56 MICROMETERS) TO MEASURE THE IRRADIANCE. THE TWO-CHANNEL RADIOMETER WAS SIMILAR TO THOSE FLOWN ON MARINER 6 AND 7, BUT WAS MORE ACCURATE AND HAD BETTER SPATIAL RESOLUTION.

----- PIONEER 11, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY
 NSSDC ID- 73-019A-06 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 PLANETARY ATMOSPHERES
 PLANETOLOGY
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.L. JUDGE U OF SOUTHERN CALIF
 OI - R.W. CARLSON NASA-JPL

BRIEF DESCRIPTION
 THIS EXPERIMENT, A BROADBAND PHOTOMETER SENSITIVE BETWEEN 200 AND 800 Å, OBSERVED EVIDENCE OF HELIUM, WHICH IN TURN INDICATED INTERACTIONS BETWEEN CHARGED PARTICLES AND NEUTRAL HYDROGEN. DURING THE CRUISE PHASE OF THE MISSION, THIS EXPERIMENT WAS USED TO SEARCH FOR THE SUPERSONIC TO SUBSONIC TRANSITION REGION IN THE SOLAR WIND. DURING THE JOVIAN ENCOUNTER, THIS EXPERIMENT WAS USED TO LOOK FOR EVIDENCE OF AN AURORAL OVAL ON THE JOVIAN DAYSIDE, TO FIND THE RATIO OF HYDROGEN TO HELIUM IN THE JOVIAN ATMOSPHERE, AND TO FIND THE TEMPERATURE OF THE OUTER PORTION OF THE JOVIAN ATMOSPHERE.

----- PIONEER 11, KINARD-----

INVESTIGATION NAME- METEOROID DETECTORS
 NSSDC ID- 73-019A-04 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 INTERPLANETARY DUST

PERSONNEL
 PI - W.H. KINARD NASA-LARC
 OI - J.M. ALVAREZ NASA-LARC
 OI - D.H. HUMES NASA-LARC

BRIEF DESCRIPTION
 THE PIONEER 11 METEOROID DETECTION EXPERIMENT ATTEMPTED TO DETECT THE DISTRIBUTION IN INTERPLANETARY SPACE OF METEORIODS TOO SMALL TO BE SEEN BY LIGHT-SCATTERING TECHNIQUES. TWELVE PANELS, EACH CONTAINING 18 PRESSURIZED CELLS, WERE MOUNTED ON THE BACK OF THE SPACECRAFT ANTENNA DISH. THE PRESSURIZED CELLS CONSISTED OF A 5.08E-5 M THICK STAINLESS STEEL OUTER LAYER WELDED TO A 2.54E-5 M THICK STAINLESS STEEL INNER LAYER WITH A LARGE NUMBER OF SMALL POCKETS OF GAS TRAPPED BETWEEN THEM. LOSS OF GAS PRESSURE FROM ANY OF THE CELLS INDICATED A HIT, AND THE RATE OF GAS LOSS INDICATED THE SIZE OF THE HOLE MADE. THUS THE MASS AND INCIDENT ENERGY OF THE METEOROID PARTICLE COULD BE OBTAINED, AND WHEN COMBINED WITH THE TRAJECTORY DATA, ALLOWED THE SPATIAL DENSITY OF THE METEORIODS TO BE DETERMINED. THE PANELS DETECTED IMPACTS WITH PARTICLES HAVING A MASS OF GREATER THAN 1.E-8 G. THE PANELS COVERED 0.46 SQ M. OF EXPOSED AREA ON PIONEER 11. RESULTS FROM THIS EXPERIMENT WERE COMBINED WITH THOSE FROM A SIMILAR EXPERIMENT FLOWN ON PIONEER 10 TO DETERMINE THE RANGE IN MASS OF SMALL PARTICLES ON BOTH THE INNER AND OUTER BOUNDARIES AND WITHIN THE ASTEROID BELT.

----- PIONEER 11, KLIORE-----

INVESTIGATION NAME- S-BAND OCCULTATION
 NSSDC ID- 73-019A-10 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - A.J. KLIORE NASA-JPL
 OI - G. FJELDRO NASA-JPL
 OI - D.L. CAIN NASA-JPL
 OI - B.L. SEIDEL NASA-JPL
 OI - S.J. RASOOL NASA HEADQUARTERS

BRIEF DESCRIPTION
 THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHz, 8 W) SPACECRAFT RADIO TRANSMITTER SIGNAL CHARACTERISTICS TO OBTAIN INFORMATION ABOUT THE IONOSPHERES AND ATMOSPHERES OF JUPITER AND ITS SATELLITE IO, AND SATURN ENTRANCE INTO AND EXIT FROM JUPITER AND IO OCCULTATION, PROVIDED CHANGES IN THE SIGNAL CHARACTERISTICS FROM WHICH ATMOSPHERIC TEMPERATURE, PRESSURE, AND ELECTRON DENSITY PROFILES COULD BE CALCULATED. TEMPERATURE AND PRESSURE PROFILES WERE LIMITED TO LEVELS ABOVE THE PRESSURE OF ONE EARTH ATMOSPHERE. SIGNAL OCCULTATION ALSO PROVIDED A DETERMINATION OF THE PLANETARY DIAMETER.

----- PIONEER 11, McDONALD-----

INVESTIGATION NAME- COSMIC-RAY SPECTRA
 NSSDC ID- 73-019A-12 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - F.B. McDONALD NASA-GSFC
 OI - K.G. MCCracken CSIRO
 OI - W.R. WEBBER U OF NEW HAMPSHIRE
 OI - E.C. ROELOF APPLIED PHYSICS LAB
 OI - B.J. TEEGARDEN NASA-GSFC
 OI - J.H. TRAINOR NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF THREE 3-ELEMENT TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. A BIDIRECTIONAL TELESCOPE MEASURED 20- TO 800-MEV/NUCLEON PARTICLES WITH 5 TO 10 PERCENT ENERGY RESOLUTION. ANOTHER TELESCOPE MEASURED 3- TO 22-MEV/NUCLEON PARTICLES WITH 5 PERCENT RESOLUTION. THESE TWO TELESCOPES MEASURED PARTICLES WITH Z VALUES BETWEEN 1 AND 8. THE THIRD TELESCOPE MEASURED 50-KEV TO 1-MEV ELECTRONS AND 50-KEV TO 20-MEV PROTONS WITH 20 PERCENT RESOLUTION.

----- PIONEER 11, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 73-019A-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
CCSPIC RAYS

PERSONNEL

PI - J.A. SIMPSON U OF CHICAGO
OI - J.J. O'GALLAGHER U OF MARYLAND
OI - A. TUZZOLINO U OF CHICAGO

BRIEF DESCRIPTION

THIS EXPERIMENT USED TWO TELESCOPES TO MEASURE THE COMPOSITION AND ENERGY SPECTRA OF SOLAR (AND GALACTIC) PARTICLES ABOVE ABOUT 0.5 MEV/NUCLEON. THE MAIN TELESCOPE CONSISTED OF FIVE COLINEAR ELEMENTS (THREE SOLID STATE, ONE CSI, AND ONE SAPPHIRE CERENKOV) SURROUNDED BY A PLASTIC ANTICOINCIDENCE SHIELD. THE TELESCOPE HAD A 60-DEG, FULL-ANGLE ACCEPTANCE CONE WITH ITS AXIS APPROXIMATELY NORMAL TO THE SPACECRAFT SPIN AXIS PERMITTING 8-SECTORED INFORMATION ON PARTICLE ARRIVAL DIRECTION. FOUR ELEMENTS OF THE MAIN TELESCOPE WERE PULSE-HEIGHT ANALYZED, AND LOW- AND HIGH-GAIN MODES COULD BE SELECTED BY COMMAND TO PERMIT RESOLUTION OF THE ELEMENTS THROUGH MEASUREMENT OF THE ELECTRONS AND THE ISOTOPES OF H AND HE AND LIGHT NUCLEI. A SELECTION-PRIORITY SCHEME WAS INCLUDED TO PERMIT SAMPLING OF LESS ABUNDANT PARTICLE SPECIES UNDER NORMAL AND SOLAR-FLARE CONDITIONS. THE LOW-ENERGY TELESCOPE WAS ESSENTIALLY A TWO-ELEMENT, SHIELDED, SOLID-STATE DETECTOR WITH A 70-DEG, FULL-ANGLE ACCEPTANCE CONE. THE FIRST ELEMENT WAS PULSE-HEIGHT ANALYZED, AND DATA WERE RECORDED BY SECTORS.

----- PIONEER 11, SMITH-----

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 73-019A-01 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS

PERSONNEL

PI - E.J. SMITH NASA-JPL
OI - D.S. COLBURN NASA-ARC
OI - P. DYAL NASA-ARC
OI - C.P. SNETT U OF ARIZONA
OI - P.J. COLEMAN, JR. U OF CALIF, LA
OI - L. DAVIS, JR. CALIF INST OF TECH
OI - D.E. JONES BRIGHAM YOUNG U

BRIEF DESCRIPTION

THE MAGNETOMETER ON PIONEER 11 WAS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 NT TO PLUS OR MINUS 1.0E-3 T. THE LINEARITY WAS 0.1 PERCENT. THE NOISE THRESHOLD WAS 0.01 NT RMS FOR 0-1 HZ. THE ACCURACY WAS 0.5 PERCENT OF FULL SCALE RANGE. THE EXPERIMENTER USED RTN COORDINATES IN HIS DATA ANALYSIS. IN THIS SYSTEM, R (OR X) IS RADIIALLY OUTWARD FROM THE SUN, T (OR Y) WAS PARALLEL TO THE SUN'S EQUATORIAL PLANE AND HAD ITS DIRECTION GIVEN BY THE CROSS PRODUCT OF THE SUN'S SPIN VECTOR INTO THE RADIAL DIRECTION (I.E., INTO R) AND M (OR Z) COMPLETED THE RIGHT HANDED ORTHOGONAL SYSTEM (POSITIVE NORTHWARD). A DETAILED INSTRUMENT DESCRIPTION MAY BE FOUND IN SMITH ET AL., 'IEEE TRANS. ON MAGNETICS,' VOL. M-11, P 962, JULY 1975.

----- PIONEER 11, VAN ALLEN-----

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 73-019A-11 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT USED SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES NEAR JUPITER AND SATURN. DETECTOR GROUPINGS ARE AS FOLLOWS -- (1) A THREE-ELEMENT (A, B AND C) DIFFERENTIALLY SHIELDED TELESCOPE. TUBE C IS SHIELDED OMNIDIRECTIONALLY AND IS USED FOR BACKGROUND SUBTRACTION TO PROVIDE RATES SUCH AS A-C (ELECTRONS OF 5 TO 21 MEV AND PROTONS OF 30 TO 77.5 MEV) AND B-C (ELECTRONS OF 0.55 TO 21 MEV AND PROTONS OF 6.6 TO 77.5 MEV), (2) A THREE-ELEMENT TRIANGULAR ARRAY, EACH ELEMENT RESPONDING TO ELECTRONS ABOVE 31 MEV AND PROTONS ABOVE 77.5 MEV, (3) A THIN-WINDOW TUBE (G) WITH A GOLD-PLATED ELBOW AS THE ENTRANCE APERTURE TO ADMIT SCATTERED ELECTRONS ABOVE 0.06 MEV WHILE DISCRIMINATING STRONGLY AGAINST PROTONS. FOR A DESCRIPTION OF THE SIMILAR EXPERIMENT ON PIONEER 10 SEE VAN ALLEN ET AL., JGR, 79, 3395, 1974. EARLY RESULTS ARE GIVEN IN SCIENCE, 188, 459, 1975.

----- PIONEER 11, WOLFE-----

INVESTIGATION NAME- PLASMA

NSSDC ID- 73-019A-13 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE NASA-ARC
OI - L.A. FRANK U OF IOWA
OI - R. LUST MPI-HEADQUARTERS
OI - D.S. INTRILIGATOR U OF SOUTHERN CALIF
OI - V.T. ZAVIENTSEFF NASA-ARC
OI - Z.A. SMITH NOAA-SEL
OI - F.L. SCARF TRW SYSTEMS GROUP
OI - H.B. COLLARD NASA-ARC
OI - W.C. FELDMAN LOS ALAMOS SCI LAB
OI - D.D. RICKIBBIN NASA-ARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF DUAL 90 DEG QUADRISPHERICAL ELECTROSTATIC ANALYZERS, ONE WITH 26 INDIVIDUAL PARTICLE DETECTORS AND THE OTHER WITH 5 CURRENT COLLECTORS. THE SYSTEM WAS CAPABLE OF MEASURING INCIDENT PLASMA DISTRIBUTION PARAMETERS OVER THE ENERGY RANGE OF 0.1 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH RESOLUTION ANALYZER WITH A COUNTOUT OF 9 KEV/0 PER KV APPLIED TO THE PLATES, HAD A MEAN PLATE RADIUS OF 9 CM AND SEPARATION OF 0.5 CM. THIS ANALYZER WAS USED TO MEASURE IONS ONLY AND HAD 26 CHANNELTRONS MOUNTED ON THE SEMICIRCULAR EXIT TO THE ANALYZER. THE APERTURE POINTED THROUGH A WIDE SLIT IN THE BACK OF THE SPACECRAFT HIGH-GAIN ANTENNA REFLECTOR AND POINTED ALONG THE SPIN AXIS TOWARD THE EARTH (AND THEREFORE THE SUN). THE EDGES OF THE ANTENNA REFLECTOR LIMITED THE VIEWING OF THE INSTRUMENT TO 73 DEG WITH RESPECT TO THE SPIN AXIS. THE CHANNELTRONS COVERED A RANGE OF PLUS OR MINUS 51 DEG. EACH CHANNELTRON NEAR THE CENTER COVERED 3 DEG AND APPROXIMATELY 8 DEG NEAR THE EDGES OF THE ANALYZER. THE ANGULAR WIDTH PERPENDICULAR TO THE LONG ANGULAR WIDTH WAS ABOUT 2 DEG. IN ONE HALF A SPIN PERIOD THE WHOLE CONE OF HALF ANGLE 51 DEG CENTERED ON THE SUN WAS SWEEPED OUT. A MEDIUM ENERGY ANALYZER WITH A MEAN RADIUS OF 12 CM AND A 1 CM PLATE SEPARATION (CONSTANT OF 6 KEV/0 PER KV APPLIED) WAS USED TO DETECT BOTH IONS AND ELECTRONS. THE DETECTORS WERE FIVE FLAT-SURFACE CURRENT COLLECTORS. THE THREE CENTER COLLECTORS EACH COVERED 15 DEG AND COVERED THE ANGULAR RANGE OF PLUS OR MINUS 22.5 DEG FROM THE SPIN AXIS. THE TWO OUTSIDE COLLECTORS HAD AN ANGULAR WIDTH OF 47.5 DEG AND WERE LOCATED AT PLUS OR MINUS 46.25 DEG FROM THE CENTER OF THE ANALYZER. THERE WERE A VARIETY OF POSSIBLE OPERATING MODES FOR THE EXPERIMENT; HOWEVER, THE PRINCIPAL MODE UTILIZED DURING THE ENCOUNTER PHASE WAS ONE IN WHICH THE ANALYZER PLATE POTENTIAL WAS STEPPED THROUGH ITS RANGE EVERY ONE-HALF REVOLUTION OF THE SPACECRAFT AND ALL CURRENT COLLECTORS OR CHANNELTRONS WERE READ OUT AT THE PEAK FLUX ROLL ANGLE. THE HIGH AND MEDIUM RESOLUTION ANALYZERS OPERATED INDEPENDENTLY SO A CROSS CHECK BETWEEN THESE ANALYZERS WAS POSSIBLE. THE DYNAMIC RANGE FOR THE PARTICLE FLUXES WAS FROM 1.0E+2 TO 3.0E+9/CM-S AND THE PROTON TEMPERATURE DOWN TO 2.0E+3 DEG K COULD BE ASCERTAINED.

***** PIONEER VENUS 1*****

SPACECRAFT COPION NAME- PIONEER VENUS 1
ALTERNATE NAMES- PIONEER VENUS 1978 ORBIT, 10911
PIONEER VENUS ORBITER

NSSDC ID- 78-051A

LAUNCH DATE- 05/20/78 WEIGHT- 517. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- VENUS ORBITER EPOCH DATE- 12/04/78
ORBIT PERIOD- 1440. MIN INCLINATION- 105. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 66614. KM ALT

PERSONNEL
NG - F.O. KOCHENDORFER
SC - R.E. MURPHY
PM - C.F. HALL
PS - L. COLIN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-ARC
NASA-ARC

BRIEF DESCRIPTION

PIONEER VENUS 1 WAS THE FIRST OF TWO MISSIONS DESIGNED TO CONDUCT A COMPREHENSIVE INVESTIGATION OF VENUS' ATMOSPHERE. THE SPACECRAFT WAS A SOLAR-POWERED CYLINDER ABOUT 280 CM IN DIAMETER WHOSE SPIN AXIS WAS SPIN-STABILIZED PERPENDICULAR TO THE ECLIPTIC PLANE. A HIGH-GAIN ANTENNA WAS MECHANICALLY DESPUN TO REMAIN FOCUSED ON THE EARTH. THE INSTRUMENTS WERE MOUNTED ON A SHELVE WITHIN THE SPACECRAFT EXCEPT FOR A MAGNETOMETER MOUNTED AT THE END OF A BOOM TO INSURE AGAINST MAGNETIC INTERFERENCE FROM THE SPACECRAFT. PIONEER VENUS 1 WAS TO MEASURE THE DETAILED STRUCTURE OF VENUS' UPPER ATMOSPHERE AND IONOSPHERE, INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH VENUS' IONOSPHERE AND THE MAGNETIC FIELD IN THE VICINITY OF THE PLANET, DETERMINE THE CHARACTERISTICS OF THE ATMOSPHERE AND SURFACE OF VENUS ON A PLANETARY SCALE, DETERMINE THE PLANET'S GRAVITATIONAL FIELD HARMONICS FROM PERTURBATIONS OF THE SPACECRAFT ORBIT, AND DETECT GAMMA-RAY BURSTS.

----- PIONEER VENUS 1, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- 78-051A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - L.M. BRACE
OI - M.B. MCELROY
OI - A. PEDERSEN
OI - A.F. NAGY
OI - T.M. DONAHUE

NASA-GSFC
HARVARD U
ESA-ESTEC
U OF MICHIGAN
U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A PAIR OF CYLINDRICAL LANGMUIR PROBES OF THE TYPE BEING USED ON AE. TWO PROBES WERE REQUIRED, SO THAT ONE WAS ALWAYS OUT OF THE WAKE OF THE SPACECRAFT. IN FLIGHT ANALYSIS, 56 MEASUREMENTS TAKEN AT A RATE OF ONE PER SECOND PROVIDED HIGH SPATIAL RESOLUTION FOR THE MEASUREMENTS OF NE AND TE. THE RESULTS OF THESE HIGH-RESOLUTION MEASUREMENTS WERE USED BOTH TO STUDY THE UPPER ATMOSPHERE AND IONOSPHERE AND TO INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH THE VENUSIAN IONOSPHERE. THIS EXPERIMENT PROVIDED MEASUREMENTS OVER THE WHOLE REGION TRAVERSED BY THE ORBITER, COVERING A LARGE RANGE OF SOLAR ASPECT ANGLES, TO YIELD A MORE COMPLETE CONFIGURATION OF THE PHYSICAL PROPERTIES OF THE IONPAUSE REGION.

----- PIONEER VENUS 1, CROFT-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-051A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

TL - T.A. CROFT
TM - G.M. KEATING
TM - A.J. KLIORRE
TM - R. PHILLIPS
TM - I.I. SHAPIRO
TM - R. WOO

SRI INTERNATIONAL
NASA-LARC
NASA-JPL
NASA-JPL
MASS INST OF TECH
NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM HAD THE RESPONSIBILITY FOR PLANNING, COORDINATING, AND RECOMMENDING SCIENTIFIC USES OF RADIO SIGNALS, EXECUTING APPROVED EXPERIMENTS, AND CONDUCTING THE DATA ANALYSIS REQUIRED. MAJOR FIELDS OF INTEREST INCLUDED THE GRAVITY FIELD OF VENUS, VERTICAL STRUCTURE OF THE DAYTIME AND NIGHTTIME IONOSPHERES, NEUTRAL ATMOSPHERE TEMPERATURE, PRESSURE AND DENSITY, HORIZONTAL GRADIENTS OF ATMOSPHERIC PROPERTIES, AND SMALL-SCALE TURBULENCE IN THE ATMOSPHERE.

----- PIONEER VENUS 1, DONAHUE-----

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- 78-051A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - T.M. DONAHUE

U OF MICHIGAN

BRIEF DESCRIPTION

THIS INVESTIGATION COMBINED RESULTS OBTAINED FROM THE ORBITER MISSION WITH RESULTS FROM THE MULTI-PROBE MISSION TO OBTAIN A UNIFIED PICTURE OF THE ATMOSPHERIC AND IONOSPHERIC CHEMISTRY AND TRANSPORT PROCESSES OCCURRING IN THE ATMOSPHERE OF VENUS.

----- PIONEER VENUS 1, EVANS-----

INVESTIGATION NAME- TRANSIENT GAMMA-RAY SOURCES

NSSDC ID- 78-051A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - W.D. EVANS
OI - J.P. CONNER
OI - P.R. HIGBIE
OI - R.W. KLEBSADEL
OI - R.A. OLSON
OI - I.W. STRONG
OI - R.E. SPALDING

LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB
LOS ALAMOS SCI LAB
SANDIA LABORATORIES

BRIEF DESCRIPTION

AN OMNIDIRECTIONAL GAMMA-RAY DETECTOR EMPLOYING TWO PHOSWICH SCINTILLATION SPECTROMETERS SENSITIVE TO PROTONS FROM 0.2 TO 2.0 MEV WERE USED WITH LOGIC CIRCUITRY TO DETECT THE BEGINNING OF A GAMMA EVENT AND TO INITIATE A PERIOD OF RAPID DATA COLLECTION. DATA WERE STORED IN A MEMORY UNIT FOR SUBSEQUENT TRANSMISSION TO EARTH. CONFIRMATION THAT A TRUE GAMMA EVENT HAD OCCURRED WAS OBTAINED BY COMPARISON WITH RESULTS FROM OTHER EXPERIMENTS IN EARTH SATELLITES. THIS EXPERIMENT PROVIDED THE LONG BASELINE TIME CORRELATIONS NECESSARY FOR CALCULATING ACCURATE SOURCE LOCATIONS.

----- PIONEER VENUS 1, HANSEN-----

INVESTIGATION NAME- CLOUD PHOTOPOLARIMETER

NSSDC ID- 78-051A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.E. HANSEN
OI - P.W. STONE
OI - A.A. LACIS
OI - D.L. COFFREN
OI - L. TRAVIS

NASA-GISS
MASS INST OF TECH
NASA-GISS
NASA-GISS
NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT USED A SIMPLIFIED VERSION OF THE IMAGING PHOTOPOLARIMETER FLOWN ON PIONEER 10 AND 11 TO PROVIDE LOW-RESOLUTION, FOUR-COLOR MAPS OF THE VENUSIAN CLOUD COVER WITH A HIGH-RESOLUTION IMAGING CAPABILITY NEAR APOCENTER. THE PRINCIPAL OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE PROPERTIES OF THE CLOUDS AND HAZE, INCLUDING THE VERTICAL AND HORIZONTAL DISTRIBUTION OF THE PARTICLES, CLOUD PARTICLE SIZE AND REFRACTIVE INDEX, THE CLOUD-TOP HEIGHT, AND THE NUMBER DENSITY OF PARTICLES.

----- PIONEER VENUS 1, KNUDSEN-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 78-051A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - W.C. KNUDSEN
OI - K. SPENNER
OI - R.C. WHITTEN

LOCKHEED PALO ALTO
INST FUR PHYS WELTRAUM
NASA-ARC

BRIEF DESCRIPTION

THIS INVESTIGATION USED A LANGMUIR-PROBE RETARDING-POTENTIAL ANALYZER DESIGNED TO MEASURE ELECTRON CONCENTRATION AND TEMPERATURE, MAJOR ION CONCENTRATIONS AND TEMPERATURES, ION DRIFT VELOCITIES, AND THE ENERGY DISTRIBUTION FUNCTION OF AMBIENT PHOTOELECTRONS. IT WAS AN ADAPTATION OF THE INSTRUMENT FLOWN ON THE GERMAN AEROS SATELLITE IN 1972. EITHER ONE OF TWO SENSOR HEADS COULD HAVE BEEN USED, EACH CONSISTING OF A MULTIGRID CUP AND ELECTROMETER, WHICH COULD OPERATE IN ELECTRON, ION, OR PHOTOELECTRON MODES, INITIATED BY SPACECRAFT ROLL PULSES. THE MEASUREMENTS TAKEN WHEN THE SENSOR AXIS WAS CLOSEST TO THE PLASMA FLOW VELOCITY VECTOR ARE TRANSMITTED. THE AIMS OF THE INVESTIGATION WERE TO IMPROVE KNOWLEDGE OF THE IMPORTANT IONIC REACTIONS IN THE VENUSIAN IONOSPHERE, TO STUDY THE PLASMA TRANSPORT PROCESSES AT DETERMINE IF VENUS HAS A POLAR WIND, TO STUDY THE PROCESSES AT THE SOLAR WIND-IONOSPHERE BOUNDARY, AND TO STUDY SIMILAR ASPECTS CONCERNING THE AMBIENT ELECTRON POPULATION.

----- PIONEER VENUS 1, MASURSKY-----

INVESTIGATION NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- 78-051A-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL
PI - H. MASURSKY US GEOLOGICAL SURVEY

BRIEF DESCRIPTION
SURFACE PROFILE, ROUGHNESS, AND ELECTRICAL PROPERTIES DATA FROM THE PIONEER VENUS RADAR ALTIMETER WERE ANALYZED IN CONJUNCTION WITH SPACECRAFT-DERIVED GRAVITY INFORMATION AND EARTH-BASED RADAR BACKSCATTER DATA TO PRODUCE A SERIES OF CARTOGRAPHIC AND GEOLOGIC MAPS. THE INITIAL MAPS INCLUDED GEOMETRIC ARRAYS OF RADAR PROFILES AND TOPOGRAPHIC CONTOUR DATA. THESE WERE THEN UTILIZED TO PRODUCE A SHADED RELIEF CARTOGRAPHIC MAP, SCALE 1 TO 25 MILLION, WITH SUPERIMPOSED CONTOUR INFORMATION. PRELIMINARY VENUSIAN GEOLOGIC INFORMATION, INFERRED FROM ALL AVAILABLE SPACECRAFT AND EARTH-BASED RADAR DATA SOURCES, WILL SUBSEQUENTLY BE ADDED TO THE CARTOGRAPHIC MAP BASE TO PRODUCE GEOLOGIC MAPS. IT IS ANTICIPATED THAT ONE TO THREE LARGER SCALE (1 TO 5 MILLION) CARTOGRAPHIC AND GEOLOGIC MAPS OF SCIENTIFICALLY INTERESTING VENUS SURFACE FEATURES ALSO WILL BE PRODUCED.

----- PIONEER VENUS 1, MCGILL-----

INVESTIGATION NAME- PARTICIPATING THEORIST MCGILL

NSSDC ID- 78-051A-09 INVESTIGATIVE PROGRAM
CCDE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - G.E. MCGILL U OF MASSACHUSETTS

BRIEF DESCRIPTION
INVESTIGATIONS OF THE TOPOGRAPHY AND GEOLOGY OF VENUS WERE UNDERTAKEN TO ASSURE CORRECT RECOGNITION OF TOPOGRAPHIC AND MATERIAL CHARACTERISTICS OF THE PLANET AND TO ARRIVE AT THE GEOLOGICAL AND GEOPHYSICAL INTERPRETATION OF THESE CHARACTERISTICS.

----- PIONEER VENUS 1, NAGY-----

INVESTIGATION NAME- PARTICIPATING THEORIST NAGY

NSSDC ID- 78-051A-10 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - A.F. NAGY U OF MICHIGAN

BRIEF DESCRIPTION
INVESTIGATIONS OF THE IONOSPHERE OF VENUS WERE OPTIMIZED BY EXTENDING CURRENT MODELS AND FORMULATING A MISSION PLAN BEST SUITED TO ADDRESS TOPICS INCLUDING THE PHYSICS OF THE SOLAR WIND-IONOSPHERE INTERACTION, ENERGETICS OF THE UPPER ATMOSPHERE, ION CHEMISTRY, AND THE PROCESSES RESPONSIBLE FOR THE GENERAL STRUCTURE OF THE IONOSPHERE, INCLUDING MECHANISMS RESPONSIBLE FOR THE MAINTENANCE OF THE NIGHTTIME IONOSPHERE.

----- PIONEER VENUS 1, NIEMANN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-051A-11 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY ATMOSPHERES

PERSONNEL
PI - H.B. NIEMANN NASA-GSFC
OI - G.R. CARRIGAN U OF MICHIGAN
OI - R.E. HARTLE NASA-GSFC
OI - M.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THE EXPERIMENT USED A QUADRUPOLE MASS SPECTROMETER WITH THREE ION SOURCE OPERATING MODES AND THREE MASS SCANNING MODES. THE ION SOURCE COULD BE OPERATED ALTERNATELY IN OPEN AND CLOSED CONFIGURATIONS TO INCREASE ACCURACY. AN ADAPTIVE MASS SCAN WAS USED TO REDUCE THE BIT RATE REQUIRED FOR A GIVEN INFORMATION RETURN RATE. THE RESOLUTION WAS 1.E-4 FOR ADJACENT MASSES, AND THE MASS RANGE WAS 1 TO 45 U. VERTICAL AND HORIZONTAL DENSITY VARIATIONS OF THE MAJOR NEUTRAL CONSTITUENTS OF THE UPPER ATMOSPHERE OF VENUS WERE DETECTED AND MEASURED TO DEFINE THE DYNAMIC, CHEMICAL, AND THERMAL STATES OF THE UPPER ATMOSPHERE. IMPORTANT CONSTITUENTS MEASURED WERE HE, O, O2, CO, CO2 AND/OR

N2, AND A. IT WAS ALSO POSSIBLE TO STUDY H, D AND/OR H2, C, AND NO.

----- PIONEER VENUS 1, PETTENGILL-----

INVESTIGATION NAME- RADAR ALTIMETER

NSSDC ID- 78-051A-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL
PI - G. PETTENGILL MASS INST OF TECH
OI - W.E. BROWN, JR. NASA-JPL
OI - W.P. KAULA U OF CALIF, LA
OI - D.H. STAELIN MASS INST OF TECH

BRIEF DESCRIPTION
A RADAR ALTIMETER WAS USED TO OBTAIN INFORMATION ON THE ORBITER ALTITUDE, PLANETARY SURFACE TEMPERATURE, AND RADAR SCATTERING PROPERTIES IN ORDER TO INFER THE SURFACE TOPOGRAPHY, GEOLOGY, AND THE THERMAL AND MECHANICAL PROPERTIES OF THE INTERIOR OF VENUS. THE WEIGHT OF THE INSTRUMENT WAS 9.0 KG (20 LB), AND THE POWER CONSUMPTION WAS 25 W.

----- PIONEER VENUS 1, RUSSELL-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-051A-12 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.T. RUSSELL U OF CALIF, LA
OI - P.J. COLEMAN, JR. U OF CALIF, LA
OI - F.V. CORONITI U OF CALIF, LA
OI - C.F. KENNEL U OF CALIF, LA
OI - R.L. MCPHERRON U OF CALIF, LA
OI - G.L. SISCOE U OF CALIF, LA

BRIEF DESCRIPTION
THIS EXPERIMENT USED A TRIAXIAL FLUXGATE MAGNETOMETER WITH TWO RING CORE SENSORS AT THE END OF A MAGNETOMETER BOOM AND ONE RING CORE SENSOR, AT 45 DEG TO THE SPIN AXIS, HALFWAY DOWN THE BOOM. THE DRIVE AND ELECTRONICS DESIGN HAD BEEN USED ON THE APOLLO 15 AND 16 SUBSATELLITES. THE OBJECTIVES WERE TO DETERMINE ANY PLANETARY AND REMANENT MAGNETIC FIELDS, TO DEDUCE THE LOCATION AND STRENGTH OF IONOSPHERIC CURRENT SYSTEM, TO DETERMINE THE ENERGY AND MASS BALANCE IN THE UPPER ATMOSPHERE OF VENUS, TO DETERMINE THE NATURE OF THE SOLAR WIND INTERACTION WITH VENUS, AND TO STUDY THE NEAR-WAKE REGION OF VENUS AND THE STRUCTURE OF THE VENUSIAN BOW SHOCK. INTERPLANETARY OBJECTIVES WERE TO DETERMINE THE PERTURBATION OF THE NEAR-PLANET REGION BY VENUS AND TO COMPARE THE PROPERTIES OF THE AVERAGE FIELD AT 0.7 AND 1.0 AU. THE INSTRUMENT WAS INTENDED TO, IN THE WORST CASE OF LOW-BIT AND LOW-SAMPLE RATES, MEASURE ONE VECTOR PER 32 S. WHILE IN VENUS ORBIT, WHEN THE SPACECRAFT WAS COASTING THROUGH THE INTERPLANETARY REGION IN THE APOAPSIS MODE, THE SAMPLE RATE WAS ONE VECTOR PER 8 SEC. WHILE THE SPACECRAFT WAS PASSING THROUGH THE VENUSIAN IONOSPHERE IN THE PERIAPSIS MODE, THE SAMPLE RATE WAS FOUR VECTORS PER S.

----- PIONEER VENUS 1, SCARF-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 78-051A-13 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - F.L. SCARF TRW SYSTEMS GROUP
OI - I.M. GREEN TRW SYSTEMS GROUP

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A MODIFIED VERSION OF THE PIONEER 8 AND PIONEER 9 EXPERIMENTS TO MEASURE THE ELECTRIC FIELD COMPONENTS IN FOUR 30 PERCENT NARROW-BAND CHANNELS CENTERED AT 100, 730, 7350, AND 30,000 HZ. THE AIMS OF THE INVESTIGATION WERE TO PERFORM THE FIRST ANALYSIS OF VLF ELECTRIC FIELDS AT VENUS TO ELUCIDATE THE PLASMA INTERACTIONS BETWEEN THE SOLAR WIND AND THE IONOSPHERIC OR EXOSPHERIC PLASMA. THE ROLE OF PLASMA INSTABILITIES IN MODIFYING THE HEATFLUX FROM THE SOLAR WIND AND IN THERMALIZING NEWLY BORN IONS FROM VENUS WERE ALSO STUDIED. A SELF-CONTAINED BALANCED V-TYPE ANTENNA WITH A DIFFERENTIAL PREAMPLIFIER WAS EMPLOYED TO MAKE THE MEASUREMENTS. AT THE 512-BPS SATELLITE MODE, ONE FREQUENCY SCAN PER S WAS OBTAINED.

----- PIONEER VENUS 1, SCHUBERT-----

INVESTIGATION NAME- PARTICIPATING THEORIST SCHUBERT

NSSDC ID- 78-051A-14

INVESTIGATIVE PROGRAM
CCDE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
PLANETOLOGY
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - G. SCHUBERT U OF CALIF, LA

BRIEF DESCRIPTION

MEASUREMENTS OF PLASMA TEMPERATURES, MAGNETIC FIELDS, COMPOSITION, AND OTHER DATA WERE USED TO DEVELOP AND TEST THEORIES OF ATMOSPHERIC CIRCULATION AND SOLAR WIND-IONOSPHERE INTERACTIONS. IN THE CASE OF THE TOPOGRAPHY AND GRAVITY, THE DATA (ALTIMETRY AND TRACKING) WERE USED BOTH IN DESCRIPTIVE FASHION, TO SIMPLY CHARACTERIZE THE SURFACE OF VENUS AND ITS GRAVITATIONAL FIELD, AND IN A MORE QUANTITATIVE WAY TO MODEL THE INTERNAL STRUCTURE OF THE PLANET.

----- PIONEER VENUS 1, STEWART-----

INVESTIGATION NAME- PROGRAMMABLE ULTRAVIOLET SPECTROMETER

NSSDC ID- 78-051A-15

INVESTIGATIVE PROGRAM
CCDE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
IONOSPHERES

PERSONNEL

PI - A.I. STEWART U OF COLORADO
OI - C.A. BARTH U OF COLORADO
OI - C.W. HORD U OF COLORADO
OI - G.E. THOMAS U OF COLORADO
OI - D. ANDERSON NOAA-SEL

BRIEF DESCRIPTION

THIS INVESTIGATION USED A 125-MM CASSEGRAIN TELESCOPE ON A 125-MM EBERT-FASTIE SPECTROMETER WITH A PROGRAMMABLE GRATING DRIVE. AIRGLOW, SCATTERED SUNLIGHT, AND HYDROGEN LYMAN ALPHA EMISSIONS WERE TO BE DETECTED IN THE THERMOSPHERE, MESOSPHERE, AND EXOSPHERE OF VENUS. THESE MEASUREMENTS WERE USED TO ESTABLISH AND MAP THE COMPOSITION, TEMPERATURE, AND PHOTOCHEMISTRY OF THE THERMOSPHERE AND IONOSPHERE, TO DETERMINE THE PRESSURE AT AND ABOVE THE VISIBLE CLOUD TOPS, AND TO ESTABLISH THE DISTRIBUTION AND ESCAPE RATE OF ATOMIC HYDROGEN. THE INSTRUMENT OPERATED IN THE 1100-3400 A REGION.

----- PIONEER VENUS 1, TAYLOR, JR.-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-051A-17

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.A. TAYLOR, JR. NASA-GSFC
OI - S.J. BAUER NASA-GSFC
OI - R.E. HARTLE NASA-GSFC
OI - H.C. BRINTON NASA-GSFC
OI - J.R. HERMAN U OF MICHIGAN
OI - T.W. DONAHUE RICE U
OI - P.A. CLOUTIER RICE U
OI - F.C. MICHEL RICE U

BRIEF DESCRIPTION

THE COMPOSITION AND CONCENTRATION OF THERMAL POSITIVE IONS IN THE IONOSPHERE OF VENUS WERE DETERMINED AND INTERPRETED IN TERMS OF VERTICAL AND HORIZONTAL COMPONENTS. THE INSTRUMENT USED WAS A BENNETT RADIO-FREQUENCY MASS SPECTROMETER BASED ON THE DESIGN OF THOSE FLOWN ON OGO AND ATMOSPHERIC EXPLORER SATELLITES. A MASS RANGE OF 1 TO 60 U WAS COVERED WITH A VARIETY OF AUTOMATIC SCAN-SEARCH MODES AVAILABLE.

----- PIONEER VENUS 1, WOLFE-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTOR

NSSDC ID- 78-051A-18

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE NASA-ARC
OI - A. BARNES NASA-ARC
OI - H.R. COLLARD NASA-ARC
OI - D.D. MCIBBIN NASA-ARC
OI - J.D. RINALOV NASA-ARC
OI - R.C. WHITTEN NASA-ARC
OI - D.S. INTRILIGATOR U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE INSTRUMENT FOR THIS EXPERIMENT WAS A QUADRISPHERICAL ELECTROSTATIC ANALYZER (DETECTOR B OF THE PIONEER'S 10-11 PLASMA INSTRUMENT), WITH FIVE CURRENT COLLECTORS AND ELECTROMETERS. THE ENERGY/CHARGE RANGE WAS 50-8000 (IONS) IN 32 STEPS AND 1-500 (ELECTRONS) IN 16 STEPS. THE ANGULAR RANGE COVERED WAS PLUS OR MINUS 85 DEG ELEVATION BY 360 DEG AZIMUTH, AND THE DETECTOR FIELD OF VIEW WAS 15 DEG TIMES 20 DEG OR 15 DEG TIMES 45 DEG, DEPENDING ON POSITION. THE LOGIC DESIGN WAS ESSENTIALLY THAT USED ON PIONEER B AND 9. THE OBJECTIVES WERE TO MEASURE SOLAR WIND CONDITIONS OUTSIDE THE VENUSIAN BOW SHOCK, INSIDE THE MAGNETOSHEATH FLOW FIELD, AND TO STUDY THE IONOPAUSE STRUCTURE. SOLAR WIND MEASUREMENTS WERE MADE DURING THE TRANSIT TO VENUS, PARTICULARLY TO STUDY MACROSCALE PROBLEMS AND TO DETERMINE AVERAGE GRADIENTS. THE NEAR-PLANET WAKE REGION WAS ALSO AVAILABLE FOR STUDY.

***** PROGNOZ 7*****

SPACECRAFT CCFPN NAME- PROGNOZ 7

ALTERNATE NAMES- 1102B

NSSDC ID- 78-101A

LAUNCH DATE- 10/30/78 WEIGHT- 915. KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R.

SAS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 5889. MIN
PERIAPSIS- 483. KM ALT

EPOCH DATE- 10/31/78
INCLINATION- 65. DEG
APOAPSIS- 202965. KM ALT

PERSONNEL

PS - A.A. GALEEV IKI

BRIEF DESCRIPTION

THIS SPACECRAFT WAS A MEMBER OF A CONTINUING SERIES TO MEASURE CHARGED PARTICLES, PLASMA, MAGNETIC FIELDS AND ELECTROMAGNETIC RADIATION. THIS MISSION WAS PART OF THE SOCIALIST COUNTRIES' CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE SPECIFIC SCIENTIFIC GOALS OF THIS MISSION WERE: (1) TO STUDY SOLAR UV, X-RAY, AND GAMMA-RAY EMISSIONS, (2) TO MONITOR ELECTRONS AND PROTONS IN INTERPLANETARY SPACE AND THE MAGNETOSPHERE, (3) TO INVESTIGATE THE NUCLEAR COMPOSITION OF SOLAR AND GALACTIC COSMIC RAYS, (4) TO MEASURE MAGNETIC FIELDS, (5) TO SEARCH FOR DISCRETE GAMMA-RAY LINES FROM THE SUN AND SPACE, (7) TO ANALYZE UV RADIATION FOR POSSIBLE EXCESS IN THE GALACTIC PLANE, AND (8) TO ANALYZE HEAVY HIGH-ENERGY IONS IN THE MAGNETOSPHERE.

----- PRGNOZ 7, DOLGINOV-----

INVESTIGATION NAME- THREE-AXIS FLUXGATE MAGNETOMETERS

NSSDC ID- 78-101A-04

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - SH.SH. DOLGINOV IZMIRAN

BRIEF DESCRIPTION

TWO THREE-AXIS FLUXGATE MAGNETOMETERS WERE USED TO MEASURE VECTOR MAGNETIC FIELDS FROM 1 TO 1,200 NT (GAMMAS) WITH AN INTENSITY RESOLUTION OF 0.5 NT. BOTH INTERPLANETARY AND GEOMAGNETIC TAIL FIELDS WERE CAPABLE OF BEING MEASURED.

----- PROGNOZ 7, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 78-101A-03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - I.V. ESTULIN IKI
PI - G. VEORENNE CESR

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CONCERNED WITH THE COSMIC GAMMA-RAY SPECTRUM AND GAMMA-RAY BURSTS. THE ENERGY RANGE COVERED WAS 0.05 TO 1 MEV IN SIX CHANNELS. ONE DETECTOR OBSERVED THE SUN AND ANOTHER WAS POINTED IN THE ANTI-SOLAR DIRECTION. THE MAIN DETECTOR WAS AN OMNIDIRECTIONAL PHOSWICH SYSTEM FROM WHICH PULSE HEIGHT ANALYSIS WAS OBTAINED. THE SOLAR VIEWING DETECTOR WAS USED TO OBTAIN SOLAR BURSTS AS WELL AS SERVING AS A DISCRIMINATOR FOR THE GAMMA-RAY BURST MEASUREMENTS. THE BURST MEASUREMENT HAD RAPID MEMORY TO ALLOW FOR 2 NS TIME RESOLUTION.

----- PROGNOZ 7, GRINGAUZ-----

INVESTIGATION NAME- ELECTRIC SCANNING PLASMA DETECTOR

NSSDC ID- 78-101A-05 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - K.I. GRINGAUZ IKI
OI - J.I. SHLAUER GEOPHYS INST CAS
OI - T.I. GOMBOSI HUNGARIAN ACAD OF SCI

BRIEF DESCRIPTION

THIS INVESTIGATION WAS INVOLVED WITH THE SOLAR WIND PLASMA AND THE COLD PLASMA IN THE MAGNETOSPHERE. LARGE-ANGLE FARADAY CUPS WERE EMPLOYED TO MEASURE BOTH IONS AND ELECTRONS. IONS WERE MEASURED IN THE ENERGY RANGE 0.001 TO 20 KEV IN 16 CHANNELS AND ELECTRONS WERE SENSED IN 16 CHANNELS IN THE RANGE 10 TO 300 EV. ION DENSITIES FROM 0.1 TO 50/CM³, TEMPERATURES FROM 20 TO 20,000 DEG K, AND BULK VELOCITY FROM 240 TO 870 KM/S WERE MEASURED. THE DENSITY OF ELECTRONS AND THEIR TEMPERATURES WERE ALSO MEASURED.

----- PROGNOZ 7, MULTOVIST-----

INVESTIGATION NAME- MAGNETOSPHERIC ION COMPOSITION SPECTROMETER

NSSDC ID- 78-101A-02 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G. MULTOVIST KIRUNA GEOPHYS INST
OI - N.F. PISARENKO IKI

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF THREE MASS ANALYZERS WITH WIEN FILTERS, THREE ION ELECTROSTATIC ANALYZERS, AND THREE ELECTRON ELECTROSTATIC ANALYZERS. MASSES BETWEEN 1 AND 20 U WITH ENERGIES BETWEEN 0.2 AND 16 KEV WERE MEASURED AND THE DISTRIBUTION OF ELECTRONS AND IONS BETWEEN 0.05 AND 40 KEV WERE OBTAINED.

----- PROGNOZ 7, KACHAROV-----

INVESTIGATION NAME- X-RAY SPECTROMETER

NSSDC ID- 78-101A-06 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - G.VE. KACHAROV LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

SOLAR X-RAYS IN THE PHOTON ENERGY RANGE FROM 2 TO 200 KEV WERE MEASURED AND THE SPECTRUM OBTAINED. STANDARD SODIUM IODIDE CRYSTALS AND ANTICOINCIDENCE TECHNIQUES WERE EMPLOYED.

----- PROGNOZ 7, KOVALEV-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSSDC ID- 78-101A-14 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - E.E. KOVALEV INST MED BIOLG PROB

BRIEF DESCRIPTION

THE SPECTRUM OF PROTONS FROM 0.5 TO 1000 MEV WAS OBTAINED. THE DETAILS OF THE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, KOVALEV-----

INVESTIGATION NAME- STANDARD DOSIMETER

NSSDC ID- 78-101A-15 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY
COSMIC RAYS

PERSONNEL

PI - E.E. KOVALEV INST MED BIOLG PROB

BRIEF DESCRIPTION

THE DOSE FOR PARTICLES ABOVE 30 MEV WAS MEASURED. THE DETAILS OF THE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, KULAGIN-----

INVESTIGATION NAME- UV DETECTOR

NSSDC ID- 78-101A-04 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY PHYSICS
ASTRONOMY

PERSONNEL

PI - YU.M. KULAGIN INST APPLIED GEOPHYS

BRIEF DESCRIPTION

THE INSTRUMENT MEASURED RADIATION FROM 100 TO 1300 A. THE DETAILS OF THIS INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, LICKIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 78-101A-07 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL

PI - O.B. LICKIN IKI
PI - B. VALNICEK ASTRONOMICAL INST

BRIEF DESCRIPTION

SOLAR X-RAYS IN THE 1 TO 100 KEV RANGE WERE MEASURED IN 5 CHANNELS. THE EXACT INSTRUMENTATION HAS NOT BEEN SPECIFIED BUT PROBABLY SODIUM IODIDE CRYSTALS AND PROPORTIONAL COUNTERS WERE USED. THE DETAILS OF THIS INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 78-101A-11 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - YU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION

THE SPECTRUM OF PROTONS AND ELECTRONS IN THE ENERGY RANGE 0.03 TO 100 MEV WAS MEASURED. THE DETAILS OF THE SOLID STATE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, LOGACHEV-----

INVESTIGATION NAME- ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION

NSSDC ID- 78-101A-12 INVESTIGATIVE PROGRAM SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - YU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THE ENERGY AND MASS COMPOSITION OF CHARGED PARTICLES WERE MEASURED IN THE RANGE 100 TO 800 MEV/NUCLEON. THE DETAILS OF THE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, LOGACHEV-----

INVESTIGATION NAME- GAS DISCHARGE COUNTER
NSSDC ID- 78-101A-13 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL
PI - YU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
MEASUREMENTS OF ENERGETIC PARTICLES FROM 15 TO 500 MEV/NUCLEON WERE OBTAINED. DETAILS OF THE INSTRUMENTATION HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, PISARENKO-----

INVESTIGATION NAME- ENERGETIC ELECTRON SPECTROMETER
NSSDC ID- 78-101A-09 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL
PI - N.F. PISARENKO IKI
PI - L. TREGER CENS

BRIEF DESCRIPTION
THE INSTRUMENT MEASURED ELECTRONS BETWEEN 3 AND 120 MEV. THE DETAILS OF THE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED.

----- PROGNOZ 7, SEVERNY-----

INVESTIGATION NAME- UV EMISSION SPECTROMETER
NSSDC ID- 78-101A-10 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
AERONOMY
SOLAR PHYSICS

PERSONNEL
PI - A.B. SEVERNY CRIMEAN ASTROPHYS OBS
PI - G.C. COURTES CNRS-LAS

BRIEF DESCRIPTION
AN ULTRAVIOLET EMISSION SPECTROMETER TO MEASURE BOTH ATMOSPHERIC AND INTERPLANETARY SPECTRA WAS USED. THE DETAILS OF THE INSTRUMENT HAVE BEEN REQUESTED FROM GALEEV (3/79) BUT NOT YET RECEIVED. IF THIS IS SIMILAR TO THE EXPERIMENT ON PROGNOZ 6, IT IS A SCANNING SPECTROMETER BETWEEN 1100 AND 1900 Å WITH A 6 BY 6 DEG FIELD OF VIEW. THE BANDWIDTH OF THE SPECTROMETER IS 200 Å AND THE SPECTRAL REGION IS SCANNED IN 53 STEPS.

----- PROGNOZ 7, VAISBERG-----

INVESTIGATION NAME- SELECTIVE COMBINED PLASMA SPECTROMETER (SCS)
NSSDC ID- 78-101A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - O.L. VAISBERG IKI

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF: (1) THREE CYLINDRICAL ELECTROSTATIC ANALYZERS FOR MEASURING THE ION SPECTRUM FROM 0.25 TO 5 KEV/CHARGE, (2) TWO COMBINED ANALYZERS WITH WIEN FILTERS AND ELECTROSTATIC ANALYZERS FOR SELECTIVE MEASUREMENTS OF PROTONS IN THE SAME ENERGY RANGE, (3) TWO CYLINDRICAL ELECTROSTATIC ANALYZERS FOR MEASURING ELECTRONS FROM 10 TO 200 EV, AND (4) THREE INTEGRAL ION FLUX DETECTORS LOOKING IN DIFFERENT DIRECTIONS SO THAT THE TOTAL SOLAR WIND FLUX AND DIRECTION COULD BE DETERMINED. PLASMA MEASUREMENTS IN THE INTERPLANETARY MEDIUM AND THE MAGNETOSPHERE WERE CARRIED OUT.

***** SAGE*****

SPACECRAFT COMMON NAME- SAGE
ALTERNATE NAMES- AEM-D, STRAT AERO AND GAS EXP
APPL EXPL MISSION #, 11270

NSSDC ID- 79-013A

LAUNCH DATE- 02/10/79 WEIGHT- 148.7 KG
LAUNCH SITE- Wallops Flight Center, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/19/79
ORBIT PERIOD- 96.8 MIN INCLINATION- 54.9 DEG
PERIAPSIS- 547.5 KM ALT APOAPSIS- 669.2 KM ALT

PERSONNEL
MG - D.S. DILLER NASA HEADQUARTERS
SC - R.A. SCHIFFER NASA HEADQUARTERS
PM - C.H. MACKENZIE NASA-GSFC
PS - R.S. FRASER NASA-GSFC

BRIEF DESCRIPTION
THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) SPACECRAFT SERVED AS A SMALL, VERSATILE, LOW-COST PLATFORM CARRYING A SINGLE EXPERIMENT DESIGNED TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. THE SAGE OBTAINED AEROSOL AND OZONE INFORMATION BY MEASURING THE ATTENUATION OF SOLAR RADIATION BY THE EARTH'S ATMOSPHERE AT FOUR SEPARATE WAVELENGTHS.

----- SAGE, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)

NSSDC ID- 79-013A-01 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL
PI - R.P. MCCORMICK NASA-LARC
O1 - D.M. CUNNOLD GEORGIA INST OF TECH
O1 - G.W. GRAMS GEORGIA INST OF TECH
O1 - B.M. HERMAN U OF ARIZONA
O1 - D.E. PILLEN METEOROLOGICAL OFFICE
O1 - D.G. MURCRAY U OF DENVER
O1 - T.J. PEPIN U OF WYOMING
O1 - W.G. PLANET NOAA-MESS
O1 - P.B. RUSSELL SRI INTERNATIONAL

BRIEF DESCRIPTION
THE OBJECTIVES OF THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) WERE TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. SPECIFIC OBJECTIVES WERE -- (1) TO DEVELOP A SATELLITE-BASED REMOTE SENSING TECHNIQUE FOR STRATOSPHERIC AEROSOLS AND OZONE, (2) TO MAP AEROSOL AND OZONE CONCENTRATIONS ON A TIME SCALE SHORTER THAN MAJOR STRATOSPHERIC CHANGES, (3) TO LOCATE STRATOSPHERIC AEROSOL AND OZONE SOURCES AND SINKS, (4) TO MONITOR CIRCULATION AND TRANSFER PHENOMENA, (5) TO OBSERVE HEMISPHERE DIFFERENCES, AND (6) TO INVESTIGATE THE OPTICAL PROPERTIES OF AEROSOLS AND ASSESS THEIR EFFECTS ON GLOBAL CLIMATE. THE SAGE INSTRUMENT CONSISTED OF A GREGORIAN TELESCOPE AND A DETECTOR SUBASSEMBLY WHICH MEASURED THE ATTENUATION OF SOLAR RADIATION AT FOUR WAVELENGTHS (.38, .45, .6, AND 1.0 MICROMETERS) DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGED FROM THE EARTH'S SHADOW, THE SENSOR SCANNED THE EARTH'S ATMOSPHERE FROM THE HORIZON UP, AND MEASURED THE ATTENUATION OF SOLAR RADIATION BY DIFFERENT ATMOSPHERIC LAYERS. THIS PROCEDURE WAS REPEATED DURING SPACECRAFT SUNSET. TWO VERTICAL SCANNINGS WERE OBTAINED DURING EACH ORBIT, WITH EACH SCAN REQUIRING APPROXIMATELY 3 MIN OF TIME TO COVER THE ATMOSPHERE ABOVE THE TROPOSPHERE. THE INSTRUMENT HAD A FIELD OF VIEW OF APPROXIMATELY 0.5 MIN OF ARC WHICH RESULTED IN A VERTICAL RESOLUTION OF LESS THAN 1 KM.

***** SMM*****

SPACECRAFT COMMON NAME- SMM
ALTERNATE NAMES- SOLAR MAXIMUM MISSION, 11703

NSSDC ID- 80-014A

LAUNCH DATE- 02/14/80 WEIGHT- 2315. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSG

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.12 MIN
PERIAPSIS- 371.9 KM ALT

EPOCH DATE- 02/15/80
INCLINATION- 28.5 DEG
APOAPSIS- 573.9 KM ALT

PERSONNEL

MS - M.E. McDONALD
SC - J.D. BONLIN
PM - P.T. BURR
PS - K.J. FROST

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE SOLAR MAXIMUM MISSION (SMM) IS DEDICATED TO COORDINATED OBSERVATIONS OF SPECIFIC SOLAR ACTIVITY AND SOLAR FLARE PROBLEMS. THE SPACECRAFT IS ORIENTED TOWARD THE SUN DURING THE DAYLIGHT PORTION OF THE ORBIT. THE SPACECRAFT ITSELF DOES NOT RASTER OVER THE SOLAR DISK, ALTHOUGH INDIVIDUAL INSTRUMENTS HAVE THIS CAPABILITY. THE SMM SPACECRAFT IS DESIGNED SO THAT IT CAN BE RETRIEVED BY AN EARLY SHUTTLE FLIGHT, RETURNED TO EARTH, REBURNISHED AND FITTED WITH AN UPDATE PAYLOAD, AND RETURNED TO ORBIT FOR ANOTHER SOLAR-ORIENTED MISSION.

----- SMM, ACTON-----

INVESTIGATION NAME- SOFT X-RAY POLYCHROMATOR (XRP)

NSSDC ID- 80-014A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - L.W. ACTON
PI - A.H. GABRIEL
PI - J.L. CULMINE
OI - R.C. CATURA
OI - J.M. PARKINSON
OI - C.G. RAPLEY
OI - B.D. JONES
OI - C. JORDAN
OI - C.J. WOLYSON
OI - B.C. FANCETT

LOCKHEED PALO ALTO
APPLETON LAB
U COLLEGE LONDON
LOCKHEED PALO ALTO
U COLLEGE LONDON
U COLLEGE LONDON
APPLETON LAB
OXFORD U
LOCKHEED PALO ALTO
APPLETON LAB

BRIEF DESCRIPTION

THIS EXPERIMENT USES X-RAY EMISSION LINES IN THE 0.1-0.25-NM SPECTRAL REGION AS DIAGNOSTIC TOOLS TO INVESTIGATE ASPECTS OF SOLAR ACTIVITY LEADING TO PLASMA TEMPERATURES IN THE 1.5 TO 50 MILLION DEG K RANGE. THE INSTRUMENTATION INCLUDES TWO SYSTEMS, A FLAT-CRYSTAL SPECTROMETER AND A BENT-CRYSTAL SPECTROMETER. THE FLAT-CRYSTAL SPECTROMETER COVERS FROM 0.14 TO 2.25 NM IN 7 RANGES, HAS A FIELD OF VIEW OF 10 BY 10 ARC S, AND CAN RASTER OVER A 7 BY 7 ARC MIN AREA. ITS BEST TIME RESOLUTION IS 0.25 S. THE BENT-CRYSTAL SPECTROMETER CONSISTS OF A SET OF BENT CRYSTALS COVERING SEVEN IRON LINES (BETWEEN .1769 AND .1945 NM) AND THE CALCIUM XIX LINE BETWEEN .3165 AND .3831 NM. THIS INSTRUMENT HAS A FIELD OF VIEW OF 6 BY 6 ARC MIN, IS NOT RASTERED AND HAS A MAXIMUM TIME RESOLUTION OF 0.1 S.

----- SMM, CHUPP-----

INVESTIGATION NAME- GAMMA RAY SPECTROMETER (GRE)

NSSDC ID- 80-014A-07

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - E.L. CHUPP
OI - D.J. FORREST
OI - K. PINKAU
OI - C. REPPIN
OI - E. RIEGER
OI - W.N. JOHNSON
OI - R.L. KINZER
OI - J.D. KURFESS
OI - G.M. SHARE
OI - A.S. JACOBSON

U OF NEW HAMPSHIRE
U OF NEW HAMPSHIRE
MPI-EXTRATERM PHYS
MPI-EXTRATERM PHYS
MPI-EXTRATERM PHYS
US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB
NASA-JPL

BRIEF DESCRIPTION

THE PRIMARY SCIENTIFIC GOAL OF THIS EXPERIMENT IS THE STUDY OF THE VERY HARD X-RAY CONTINUUM FROM THE SUN BEFORE AND DURING SOLAR FLARES. THE MAIN DETECTOR IS A SET OF SEVEN 7.6 BY 7.6-CM SODIUM IODIDE (NaI) INTEGRAL LINE DETECTORS COVERING THE ENERGY RANGE FROM 0.3 TO 9 MEV WITH AN ENERGY RESOLUTION OF BETTER THAN 7 PERCENT (FWHM) AT 0.662 MEV, AND TEMPORAL RESOLUTIONS RANGING FROM 16 S (FULL ENERGY RANGE) TO 1 S (SELECTED ENERGY INTERVAL) TO 0.064 S. SECONDLY, GAMMA RAYS AND NEUTRONS WITH ENERGIES GREATER THAN 10 MEV WILL BE DETECTED. THE DIFFERENT SIGNATURES OF THE LATTER IN THE DETECTOR COMBINED WITH THE NEUTRON TIME OF FLIGHT OVER 1 AU WILL ALLOW DIFFERENTIATION BETWEEN GAMMA RAYS AND NEUTRONS.

----- SPP, DE JAGER-----

INVESTIGATION NAME- HARD X-RAY IMAGING SPECTROMETER (HXIS)

NSSDC ID- 80-014A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - C. DE JAGER
OI - M.P. VAN BEEK
OI - A.P. WILLMORE

U OF UTRECHT
SPACE RESEARCH LAB
U OF BIRMINGHAM

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE THE POSITION, STRUCTURE, AND THERMODYNAMIC PROPERTIES OF HOT THERMAL AND NON-THERMAL SOURCES IN ACTIVE REGIONS AND FLARES. THIS INSTRUMENT PRODUCES TWO-DIMENSIONAL IMAGES WITH 8 ARC S RESOLUTION OVER A CIRCULAR AREA 2 MIN 40 S IN DIAMETER, OR 32 ARC S RESOLUTION OVER A 6 MIN 24 S BY 6 MIN 24 S AREA. THESE IMAGES ARE OBSERVED IN SIX ENERGY CHANNELS BETWEEN 3.5 AND 30 KEV, AND WITH A TEMPORAL RESOLUTION OF 0.5-7 S, DEPENDING ON THE MODE OF OPERATION. BY MEANS OF A FLARE FLAG, IT ALERTS ALL THE OTHER SMM INSTRUMENTS WHEN A FLARE BEGINS.

----- SMM, FROST-----

INVESTIGATION NAME- HARD X-RAY BURST SPECTROMETER (HXRBS)

NSSDC ID- 80-014A-06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K.J. FROST
OI - L.E. ORWIG
OI - B.R. DENNIS
OI - T.L. CLINE
OI - U.D. DESAI

NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES IMPULSIVE FLARE X-RAY EMISSION WITH 15-CHANNEL ENERGY ANALYSIS AND 0.1-S TIME RESOLUTION IN THE ENERGY RANGE OF 20 TO 260 KEV. A SEARCH FOR FINE TEMPORAL STRUCTURE IN THE IMPULSIVE X-RAY EMISSION WITH A PROGRAMMABLE TIME RESOLUTION OF UP TO 1 MS IS CONDUCTED USING ONE CHANNEL BETWEEN 20 AND 260 KEV. THE HARD X-RAY BURST SPECTROMETER (HXRBS) IS A COLLIMATED X-RAY SPECTROMETER SIMILAR TO THE TYPES PREVIOUSLY FLOWN ON OAO-A, OSO 2, AND OSO 5. THE DETECTOR IS VERY SIMILAR TO THAT OF OSO 5, DIFFERING ONLY IN THE CENTRAL DETECTOR AND CHARGED-PARTICLE DETECTOR DESIGNS AND THE ADDITION OF CALIBRATION LIGHT PULSERS TO THE SHIELD COLLIMATOR.

----- SMM, HOUSE-----

INVESTIGATION NAME- CORONAGRAPH/POLARIMETER

NSSDC ID- 80-014A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - L.L. HOUSE
OI - W.J. WAGNER
OI - E.G. HILDNER
OI - G.A. DULK
OI - C.B. SAWYER
OI - R. KOPP
OI - G.W. PNEUMAN
OI - C.W. QUERFELD
OI - M.U. SCHMIDT
OI - K.V. SHERIDAN

HIGH ALTITUDE OBS
HIGH ALTITUDE OBS
HIGH ALTITUDE OBS
U OF COLORADO
HIGH ALTITUDE OBS
LOS ALAMOS SCI LAB
HIGH ALTITUDE OBS
HIGH ALTITUDE OBS
MPI-PHYS ASTROPHYS
CSIRO, DIV OF RADIOPHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE THE RESPONSE OF THE ELECTRON DENSITY AND MAGNETIC FIELD STRUCTURE OF THE CORONA TO THE PASSAGE OF TRANSIENT PHENOMENA ON RAPID TIME SCALES. THE SECONDARY OBJECTIVE IS TO DETERMINE THE DENSITY AND ORIENTATION OF THE MAGNETIC FIELD STRUCTURE OF THE CORONA ON A SYNOPTIC BASIS. THE CORONAGRAPH/POLARIMETER IS EXTERNALLY OCCULDED BY THREE DISKS, WITH A 2.6-CM DIAMETER PRIMARY OBJECTIVE LENS, OF AIR-SPACED DOUBLET DESIGN. CORONAL QUADRANTS ARE IMAGED AT $f/34$ ON A RESOLVE VIDICON WITH A ROTATING MIRROR ARRANGEMENT AND ARE RECORDED ON A DEDICATED TAPE RECORDER FOR SUBSEQUENT TRANSMISSION TO THE EARTH. FIELDS OF VIEW RANGE FROM 1.5 TO 6 SO SOLAR RADII AND ARE SELECTABLE WITHIN THE CORONAL QUADRANT. SPATIAL RESOLUTION IS SELECTABLE BETWEEN 6.4 AND 12.8 ARC S. SEVEN FILTERS ARE AVAILABLE WITHIN THE RANGE OF 440 A TO 658.3 NM, AND POLARIZATION IS MEASURED BY A SEQUENCE OF THREE POLARIZERS ORIENTED 60 DEG APART (A CLEAR POSITION IS ALSO AVAILABLE). THE STRAY RADIANCE IS ABOUT 3.5-10 OF THE SOLAR BRIGHTNESS IN THE OUTER FIELD. THE INSTRUMENT IS ON AN INDEPENDENT GIMBAL MOUNT AND IS SUN-CENTERED TO WITHIN 10 ARC S.

----- SMS, TANDBERG-HANSEN -----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER AND POLARIMETER

NSSDC ID- 80-014A-02 INVESTIGATIVE PROGRAM CODE 5T

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS ATMOSPHERIC PHYSICS AERONOMY

PERSONNEL PI - E. TANDBERG-HANSEN NASA-MSFC 01 - R.G. ATHAY HIGH ALTITUDE OBS 01 - J.M. BECKERS SACRAMENTO PEAK OBS 01 - J.C. BRANDT NASA-GSFC 01 - E.C. BRUNER, JR. LOCKHEED PALO ALTO 01 - R.D. CHAPMAN NASA-GSFC 01 - B.E. WOODBATE NASA-GSFC

BRIEF DESCRIPTION THE OBJECTIVES OF THIS EXPERIMENT ARE TO STUDY SOLAR ULTRAVIOLET RADIATIONS FROM ACTIVE REGIONS, FLARES, AND THE CORONA IN ORDER TO DETERMINE THE PHYSICAL PARAMETERS OF TEMPERATURE, DENSITY, VELOCITY, AND MAGNETIC FIELD IN THE SUN'S ATMOSPHERE, AND TO CONDUCT AN AERONOMY PROGRAM TO MEASURE VARIOUS CONSTITUENTS IN THE EARTH'S ATMOSPHERE BY MEASURING THE ATMOSPHERIC EXTINCTION OF SUNLIGHT AT SPACECRAFT DUSK AND DAWN. THIS INSTRUMENT IS A MODIFIED VERSION OF THE TELESCOPE-SPECTROGRAPH SYSTEM FLOWN ON THE EIGHTH ORBITING SOLAR OBSERVATORY (OSO-B). THE INSTRUMENT COVERS THE 110- TO 300 NM REGION WITH A SPECTRAL RESOLUTION OF ABOUT .0010 NM FWHM, AND OBSERVES AN AREA OF 4 BY 4 ARC MIN IN SIZE AT A POINT DETERMINED BY THE SPACECRAFT POINTING SYSTEM, WITH A SPATIAL RESOLUTION COMMANDABLE BETWEEN 1 BY 1 ARC S AND 30 BY 30 ARC S. POLARIZATION IS MEASURED USING A ROTATING QUARTER-WAVE PLATE INSERTED IN THE LIGHT PATH SO ALL FOUR STOKES PARAMETERS CAN BE DETERMINED. IT IS POSSIBLE TO SELECT ANY OF SIX PAIRS OF LINES FOR POLARIMETRY AND ANY OF THREE SETS OF FOUR LINES FOR SPECTROSCOPY TO ALLOW SIMULTANEOUS ANALYSIS AT DIFFERENT HEIGHTS IN THE SOLAR ATMOSPHERE.

----- SMS, WILLSON -----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR

NSSDC ID- 80-014A-08 INVESTIGATIVE PROGRAM CODE 5T

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL PI - R.C. WILLSON NASA-JPL

BRIEF DESCRIPTION THE OBJECTIVE OF THIS EXPERIMENT IS THE MEASUREMENT OF THE TOTAL SOLAR IRRADIANCE WITH STATE-OF-THE-ART ACCURACY AND PRECISION. THE TOTAL SOLAR IRRADIANCE FROM THE FAR-ULTRAVIOLET THROUGH THE FAR-INFRARED WAVELENGTHS IS MEASURED BY THREE ACTIVE-CAVITY RADIOMETER (TYPE IV) DETECTORS. THESE DETECTORS ARE ELECTRICALLY SELF-CALIBRATED, CAVITY PYRHELIOMETERS AND ARE EACH CAPABLE OF DEFINING THE ABSOLUTE RADIATION SCALE WITH AN UNCERTAINTY OF 0.2 PERCENT IN THE INTERNATIONAL SYSTEM OF UNITS.

***** SMS 1 *****

SPACECRAFT COMMON NAME- SMS 1 ALTERNATE NAMES- SMS-A, SYNCH METEOROL SATELL A AEROS, MED1

NSSDC ID- 74-033A

LAUNCH DATE- 05/17/74 WEIGHT- 227. KG LAUNCH SITE- CAPE CANAVERAL, UNITED STATES LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY UNITED STATES NOAA-NESS UNITED STATES NASA-CSTA

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/23/74 ORBIT PERIOD- 1340.6 MIN INCLINATION- 1.9 DEG PERIAPSIS- 32345.0 KM ALT APOAPSIS- 35439.0 KM ALT

PERSONNEL PM - T.J. KARRAS NOAA-NESS PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION THE SMS 1 WAS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) WHICH PROVIDED HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND MADE RADIANCE TEMPERATURES OF THE EARTH/AT HERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION TRANSMISSION SYSTEM WHICH DELAYED PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND COLLECTED AND RETRANSMITTED DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A

SPACE ENVIRONMENTAL MONITOR (SEM) WHICH MEASURED PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 100.9 CM IN DIAMETER AND 270 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A NONCYCLOID EQUIPMENT SHELF AND A THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT AND PROVIDED THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATION KEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WERE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USED BOTH VHF AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAD ATTAINED SYNCHRONOUS ORBIT.

----- SMS 1, NESS STAFF -----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 74-033A-01 INVESTIGATIVE PROGRAM CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS 01 - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHIEY-CRÉTIEM OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 10.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEP BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAZIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAZIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 100 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WOLLOPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND WERE MAINTAINED AT NSSDC.

----- SMS 1, NESS STAFF -----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 74-033A-05 INVESTIGATIVE PROGRAM CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (OCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 OCP STATIONS COULD BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEXAT TYPE) DATA

ORIGINAL PAGE IS OF POOR QUALITY

TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE S-BAND CONSISTED OF APPROXIMATELY 3000 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 300K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR
NSSDC ID- 74-033A-02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE/ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURED PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURED ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURED ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR
NSSDC ID- 74-033A-03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
SCALAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE HAS BEEN CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS CAN BE CONTROLLED BY GROUND COMMAND TO INSURE THAT THE SUN IS VIEWED BY THE TELESCOPE ONCE DURING EVERY VEHICLE ROTATION. ONE ION CHAMBER WAS FILLED WITH ARGON AT 1 ATM FOR DETECTION OF 1- TO 8-A X RAYS, AND HAD A 1.27-E-M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM AND HAD A 1.27-E-M BERYLLIUM WINDOW FOR MEASUREMENTS OF X RAYS IN THE WAVELENGTH RANGE 0.5- TO 3-A.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR
NSSDC ID- 74-033A-04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
A BIAXIAL, SHORT BOOM-MOUNTED (2 FT) CLOSED-LOOP, FLUXGATE MAGNETOMETER WAS ORIENTED WITH ONE AXIS ALONG THE S/C SPIN AXIS, AND ONE IN THE SPIN PLANE. EACH SENSOR HAD A SELECTABLE RANGE (+50, 100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 40-NT STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** SMS 2*****

SPACECRAFT COMMON NAME- SMS 2
ALTERNATE NAMES- PL-731E, SYNCH METEOROL SATELL B
SMS-B, ME02

NSSDC ID- 75-011A
LAUNCH DATE- 02/06/75 WEIGHT- 243. KG
LAUNCH SITE- CAI, CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/01/75
ORBIT PERIOD- 1436.2 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 35770. KM ALT APOAPSIS- 35700. KM ALT

PERSONNEL
PM - T.J. KARRAS NOAA-NESS
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE SMS 2, A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT, CARRIED (1) A VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTE EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS, AND CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMB EQUIPMENT SHELL AND A THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELL AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIIALLY OUT FROM THE THRUST TUBE AND WAS AFFIXED TO THE SOLAR PANELS, WHICH FORMED THE OUTER WALLS OF THE SPACECRAFT. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS WERE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) WAS MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. BOTH UHF-BAND AND S-BAND FREQUENCIES WERE USED IN THE TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDED TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVED AS A BACKUP FOR THE PRIMARY SUBSYSTEM AFTER THE SYNCHRONOUS ORBIT WAS ATTAINED.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)
NSSDC ID- 75-011A-04 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 2 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHIEY-CRÉTIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 10.2 MIN TO COMPLETE AND ABOUT 7 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEEPED BY A LINEAR ARRAY OF EIGHT VISIBLE-SPECTRUM DETECTORS, EACH WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAHIN ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NAHIN ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURED RADIANCE TEMPERATURES BETWEEN 180 AND 316 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 DEG K. THE VISSR OUTPUT WAS DIGITIZED AND TRANSMITTED TO THE NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) COMMAND DATA ACQUISITION STATION (CDA), WALLEPS ISLAND, VA. THERE THE SIGNAL WAS FED INTO A 'LINE STRETCHER' WHERE IT WAS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR RE-BROADCAST TO DATA UTILIZATION STATIONS (DUS). THE VISSR DATA, AS WITH ALL OPERATIONAL TYPE DATA, WERE HANDLED BY NOAA AND THE MAJORITY OF DATA WERE ARCHIVED BY THE ENVIRONMENTAL DATA SERVICE, SATELLITE DATA SERVICE BRANCH, SUITLAND, MD. LIMITED AMOUNTS OF RESEARCH-ORIENTED DATA WERE COLLECTED BY NASA AND WERE MAINTAINED AT NSSDC.

----- SMS 2, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSDC ID- 75-011A-05 INVESTIGATIVE PROGRAM CODE ED/OPERATIONAL WEATHER OBS INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM, AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM OPERATING ON S-BAND FREQUENCIES, RECEIVED AND PROCESSED METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WAS RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (MEFAR TYPE) DATA TO EXISTING SMALL GROUND-BASED APT RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THE MINIMUM DATA COLLECTION FOR ONE SPACECRAFT CONSISTED OF APPROXIMATELY 3000 DCP STATIONS CONTACTED IN 4 H. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6 H WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT THE DCP STATION.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSDC ID- 75-011A-01 INVESTIGATIVE PROGRAM CODE ED/OPER ENVIRON MONITORING INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION A NUMBER OF SEPARATE SILICON SOLID-STATE DETECTORS, EACH WITH A TAILORED MODERATOR THICKNESS AND A SEPARATE ELECTRONICS UNIT FOR PULSE AMPLIFICATION AND PULSE HEIGHT DISCRIMINATION, WERE USED TO OBTAIN THE FOLLOWING PARTICLE TYPE AND ENERGY MEASUREMENTS -- SEVEN CHANNELS MEASURE PROTONS IN THE RANGE 1 TO 500 MEV, SIX CHANNELS MEASURE ALPHA PARTICLES IN THE RANGE 4 TO 400 MEV, AND ONE CHANNEL MEASURES ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSDC ID- 75-011A-02 INVESTIGATIVE PROGRAM CODE ED/OPER ENVIRON MONITORING INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION THE X-RAY COUNTER WAS COMPRISED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR. THE COLLIMATOR, MOUNTED SO ITS AXIS DECLINATION WAS CONTROLLED BY GROUND COMMAND, VIEWED THE SUN ONCE EVERY VEHICLE ROTATION. ONE ION CHAMBER, FILLED WITH ARGON AT 1 ATM, DETECTED 1- TO 8-A X RAYS, AND HAD A 1.27E-4 M BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH HELON AT 1.5 TO 2 ATM AND HAD A 1.27E-3 M BERYLLIUM WINDOW TO MEASURE X RAYS OF 0.5 TO 3 A.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSDC ID- 75-011A-03 INVESTIGATIVE PROGRAM CODE ED/OPER ENVIRON MONITORING INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION A SHORT BOOM DEPLOYED .61 M BIAXIAL, CLOSED-LOOP, FLURGATE MAGNETOMETER WITH ONE SENSOR ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS MEASURED THE VECTOR MAGNETIC FIELD. SELECTABLE RANGE (+50-100, 200, OR 400 NT), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 NT IN 60-NT STEPS), AND AN INFIGHT CALIBRATION CAPABILITY.

----- SOLRAD 11B-----

SPACECRAFT COMMON NAME- SOLRAD 11B ALTERNATE NAMES- SOLRAD XI-TRIP, SEEP P74-10 SP74-10, SEEP NO. NRL-111-0264 SRD-11B

NSDC ID- 76-023D

LAUNCH DATE- 02/19/76 WEIGHT- 302.35 KG LAUNCH SITE- CAPE CANAVERAL, UNITED STATES LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY UNITED STATES DOD-NAVY

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/01/76 ORBIT PERIOD- 7116.7 MIN INCLINATION- 29.6 DEG PERIAPSIS- 115720. KM ALT APOAPSIS- 116645. KM ALT

PERSONNEL PI - R.W. KREPLIN US NAVAL RESEARCH LAB PS - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION SOLRAD 11B WAS ONE OF A PAIR OF IDENTICAL SATELLITES THAT WERE PLACED IN A CIRCULAR EQUATORIAL ORBIT OF 20 EARTH RADII. THE SATELLITES, WHICH WERE ORIENTED TOWARDS THE SUN, PROVIDED 100 PERCENT REAL-TIME, CONTINUOUS MONITORING OF SOLAR X-RAY, UV, AND ENERGETIC PARTICLE EMISSIONS. EXPERIMENTS INCLUDED BROADBAND ION CHAMBERS OBSERVING SOLAR X RAYS BETWEEN 0.1 AND 40 A, PROPORTIONAL COUNTERS AND SCINTILLATORS OBSERVING SOLAR X RAYS BETWEEN 2 AND 150 KEV, AN EUV DETECTOR COVERING THREE BANDS BETWEEN 170 AND 1600 A, A VARIABLE RESOLUTION EBERT-FASTIE SPECTROMETER COVERING THE WAVELENGTH RANGE OF 100 TO 1600 A (RESOLUTION -- 1 TO 25 A), A SOLAR WIND MONITOR, SOLAR PROTON, ELECTRON, AND ALPHA PARTICLE MONITORS, TWO X-RAY POLARIMETERS (ONE UTILIZING BRAGG SCATTERING AND THE OTHER UTILIZING THOMPSON SCATTERING), A BRAGG SPECTROMETER OBSERVING MAGNESIUM-11 AND -12 LINES, A LARGE-AREA ANOMAL X-RAY DETECTOR, AND A PASSIVELY COOLED SOLID-STATE X-RAY DETECTOR TO MEASURE BACKGROUND X-RAY EMISSIONS.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 1- TO 8-A SOLAR X-RAY MONITOR

NSDC ID- 76-023D-04 INVESTIGATIVE PROGRAM SPACE TEST PROGRAM INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS X-RAY ASTRONOMY

PERSONNEL PI - R.W. KREPLIN US NAVAL RESEARCH LAB O1 - R.G. TAYLOR US NAVAL RESEARCH LAB O3 - D.M. MORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 1- TO 8-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 15-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMP COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 8- TO 16-A SOLAR X-RAY MONITOR

NSDC ID- 76-023D-05 INVESTIGATIVE PROGRAM SPACE TEST PROGRAM INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY X-RAY PHYSICS

PERSONNEL PI - R.W. KREPLIN US NAVAL RESEARCH LAB O1 - R.G. TAYLOR US NAVAL RESEARCH LAB O3 - D.P. MORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 8- TO 16-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 44- TO 60-A SOLAR X-RAY MONITOR

NSSDC ID- 76-0230-06 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - D.M. MORAN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF TWO COMPLETE SETS OF IONIZATION-CHAMBER AND ELECTROMETER-AMPLIFIER COMBINATIONS. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 44- TO 60-A RANGE. THE TWO SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES, ALTHOUGH ONLY ONE SET WAS SELECTED FOR TELEMETRY TRANSMISSION. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIERS WERE ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE ELECTROMETER-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR. THE DETECTORS COULD BE CALIBRATED IN FLIGHT BY COMMANDING A SHUTTER-MOUNTED RADIOACTIVE SOURCE INTO POSITION.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 170- TO 1050-A SOLAR EUV MONITOR

NSSDC ID- 76-0230-07 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB
OI - D.M. MORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE SETS OF LITHIUM FLUORIDE PHOTOSENSITIVE SURFACE DETECTORS COUPLED TO FOUR-RANGE ELECTROMETER-AMPLIFIERS. THE THREE SETS WERE NOT REDUNDANT DUE TO THE DIFFERENT FILTERS BEING USED. A BERYLLIUM FILTER LIMITED ONE DETECTOR'S RESPONSE TO WAVELENGTHS FROM 170 TO 500 A. A TIN FILTER LIMITED A SECOND DETECTOR'S RESPONSE TO WAVELENGTHS FROM 450 TO 850 A. AN INDIUM FILTER LIMITED THE THIRD DETECTOR'S RESPONSE TO WAVELENGTHS FROM 725 TO 1050 A. THE DETECTOR-ELECTROMETER SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES. EACH DETECTOR WAS READ EVERY 7.5 S. THE ELECTROMETERS COULD BE CALIBRATED DURING FLIGHT WITHOUT DETACHING THE DETECTOR, ALTHOUGH THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 0.5- TO 3-A SOLAR X-RAY MONITOR

NSSDC ID- 76-0230-12 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB
OI - D.M. MORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE IONIZATION CHAMBERS CONNECTED IN PARALLEL TO A SINGLE ELECTROMETER-AMPLIFIER. THE IONIZATION CHAMBERS WERE SENSITIVE TO SOLAR X RAYS IN THE 0.5- TO 3.0-A RANGE. DATA WERE TRANSMITTED WITH A 15-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIER WAS ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 2- TO 10-A SOLAR X-RAY MONITOR

NSSDC ID- 76-0230-13 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB
OI - D.M. MORAN US NAVAL RESEARCH LAB

PERSONNEL
OI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB
OI - D.M. MORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF AN IONIZATION CHAMBER AND ONE ELECTROMETER-AMPLIFIER. THE IONIZATION CHAMBER WAS SENSITIVE TO SOLAR X RAYS IN THE 1- TO 20-A RANGE. DATA WERE TRANSMITTED WITH A 30-S TIME RESOLUTION. THE ELECTROMETER-AMPLIFIER WAS ABLE TO CHANGE CURRENT RANGES AUTOMATICALLY OR MANUALLY. THE DETECTOR COULD NOT BE CALIBRATED IN FLIGHT, BUT THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, MEERKINS-----

INVESTIGATION NAME- CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR

NSSDC ID- 76-0230-03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL
PI - J.F. MEERKINS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
SOLAR X RAYS WERE OBSERVED IN THE MAGNESIUM-11 AND -12 LINES (9.17 A AND 8.42 A) AND IN THE CONTINUUM AT 8.8 A. THREE SHA CRYSTALS FIXED AT THREE DIFFERENT ANGLES ALLOWED SOLAR X RAYS TO UNDERGO FIRST-ORDER BRAGG REFLECTION INTO THREE PROPORTIONAL COUNTERS. IF THE SPACECRAFT SPIN AXIS HAD BECOME IMPROPERLY ORIENTED, THE SPECTROMETER WOULD HAVE FUNCTIONED PROPERLY IF THE ASPECT ANGLE HAD BEEN NO MORE THAN 1 DEG OFF NOMINAL, ALTHOUGH THE INSTRUMENT WOULD THEN HAVE FUNCTIONED AS A SCANNING SPECTROMETER WITH AN EXTREMELY SMALL SPECTRAL RANGE IN THE VICINITY OF THE TARGET WAVELENGTHS. DATA WERE ACCUMULATED OVER INTERVALS OF 1/64 OF A SPACECRAFT'S SPIN PERIOD, AND THE EXPERIMENT HAD A SAMPLING CYCLE OF APPROXIMATELY 1-MIN DURATION.

***** STP P78-1*****

SPACECRAFT COMMON NAME- STP P78-1
ALTERNATE NAMES- SPACE TEST PROGRAM P78-1, P78-1
1127B, SOLWIND
SOLWIND

NSSDC ID- 79-017A

LAUNCH DATE- 02/24/79 WEIGHT- 849.6 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/24/79
ORBIT PERIOD- 96.3 MIN INCLINATION- 97.9 DEG
PERIAPSIS- 560. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
PM - W. WALKER USAF SPACE DIVISION
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THE SPACE TEST PROGRAM (STP) P78-1 MISSION WAS DESIGNED TO OBTAIN SCIENTIFIC DATA FROM EARTH AND SUN-ORIENTED EXPERIMENTS. THE SPACECRAFT WAS SUN-ORIENTED AND HAD ITS SPIN AXIS PERPENDICULAR TO THE ORBIT PLANE AND THE SATELLITE-SUN LINE. THE INSTRUMENTATION CONSISTED OF (1) A GAMMA-RAY SPECTROMETER AND PARTICLE DETECTORS, (2) A WHITE-LIGHT CORONAGRAPH AND AN EXTREME-ULTRAVIOLET (XUV) HELIOGRAPH, (3) SOLAR X-RAY SPECTROMETER AND SPECTROHELIOGRAPH, (4) AN EXTREME-ULTRAVIOLET (XUV) SPECTROMETER, (5) A HIGH-LATITUDE PARTICLE SPECTROMETER, (6) AN X-RAY MONITOR, AND (7) A PRELIMINARY AEROSOL MONITOR.

----- STP P78-1, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET SPECTROMETER

NSSDC ID- 79-017A-04 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH

PERSONNEL
PI - C.S. BOWYER U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN EXTREME ULTRAVIOLET (EUV) SPECTROMETER TO MEASURE AIRGLOW RADIATION IN THE UPPER ATMOSPHERE. THE INSTRUMENT HAD A 6 DEG BY 6 DEG FIELD OF VIEW AND COULD MEASURE A SELECTED 600 A BANDWIDTH WITH 5 A RESOLUTION WITHIN THE 200 - 1400 A RANGE.

----- STP P78-1, IMHOF-----

INVESTIGATION NAME- GAMMA RAY SPECTROMETER

NSSDC ID- 79-017A-01 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - W.L. IMHOF LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION USED GAMMA-RAY SPECTROMETERS TO MEASURE THE DISTRIBUTION OF GAMMA-RAY SOURCES AND THE CHARACTERISTICS OF ENERGETIC PARTICLE FLUXES AT LOW ALTITUDES. THE INSTRUMENT CONSISTED OF THREE DIFFERENT TYPES OF DETECTORS. THERE WERE TWO GE DETECTORS, COOLED BY A MECHANICAL REFRIGERATOR, TWO CsI/PLASTIC PHOSWICH DETECTORS, AND AN ARRAY OF EIGHT CdTe DETECTORS. GE DETECTORS HAD A CONICAL FIELD OF VIEW (FOV) OF 45 DEG HALF ANGLE, WAS 80 CU CM IN VOLUME AND 15 50 CM IN FRONT AREA AND MEASURED ENERGY LOSS FROM 40 KEV TO 2.5 MEV IN 4096 CHANNELS. A FACTOR OF 3 GAIN CHANGE ALLOWED THE RANGE TO CHANGE TO 0.12 TO 7.5 MEV. THE INITIAL ENERGY RESOLUTION WAS 3.5 KEV AT 1 MEV BUT DUE TO RADIATION DAMAGE AND TEMPERATURE CYCLING CAUSED BY THE NECESSITY TO TURN OFF THE REFRIGERATOR FOR POWER CONSERVATION, THE RESOLUTION DEGRADED TO ABOUT 40 KEV AT THE 0.511 MEV LINE. THE PHOSWICH DETECTORS WERE 10.16 CM (4 IN.) DIAMETER DISKS OF 1.27 CM (0.5 IN.) THICKNESS AND MEASURED ENERGY LOSS FROM 40 KEV TO 2.5 MEV IN 256 CHANNELS. THE CdTe DETECTORS HAD A FAN SHAPED FOV OF 90 DEG BY 10 DEG AND WERE EQUALLY SPACED IN THE 10 DEG WIDTHS ARE THE CIRCLE. THE ENERGY LOSS RANGE WAS 20 - 200 KEV IN 6 CHANNELS.

----- STP P78-1, LANDECKER-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 79-017A-03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - P.B. LANDECKER AEROSPACE CORP
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - D.L. MCKENZIE AEROSPACE CORP
OI - G.A. BOSCHER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION WAS COMPRISED OF 4 PARTS: SOLEX, SOLFLEX, MONEX, AND MAGMAP. THE OBJECTIVE OF THESE 4 EXPERIMENTS WAS THE STUDY OF SOLAR FLARES AND ACTIVE REGIONS. SOLEX OBTAINED SPECTRA IN THE 3 TO 25 A WAVELENGTH INTERVAL WHILE POINTED AT A SPECIFIC SOLAR REGION AS WELL AS MAPS OF THE SUN IN INDIVIDUAL X-RAY SPECTRAL LINES USING MULTIGRID COLLIMATORS AND BRAGG CRYSTAL SPECTROMETERS. SOLFLEX OBTAINED FLARE SPECTRA IN 4 NARROW WAVELENGTH BANDS BETWEEN 1.8 AND 8.6 A USING UNCOLLIMATED BRAGG CRYSTAL SPECTROMETERS. MONEX RECORDED FULL SOLAR DISK INTENSITY WITH 32 MSEC TIME RESOLUTION FROM 0.1 TO 12 A USING UNCOLLIMATED PROPORTIONAL COUNTERS. MAGMAP OBTAINED FULL DISK SOLAR MAPS FROM 8 TO 12 A USING FILTERED COLLIMATED PROPORTIONAL COUNTERS.

----- STP P78-1, MICHELS-----

INVESTIGATION NAME- SOLAR WIND MONITOR

NSSDC ID- 79-017A-02 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - D.J. MICHELS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED A WHITE LIGHT CORONAGRAPH AND AN EXTREME ULTRAVIOLET (EUV) HELIOGRAPH TO MONITOR THE SUN'S INNER AND OUTER CORONA. THE PURPOSE OF THE INVESTIGATION WAS TO DETERMINE THE CHARACTER OF THE PLASMA OUTFLOW AT THE SOURCE OF THE SOLAR WIND. THE INVESTIGATION ALSO MEASURED THE FORM AND STRUCTURE OF SOLAR FLARES, CORONAL HOLES, AND ALFVEN WAVES. DUE TO BACKGROUND LIGHT PROBLEMS THE EUV HELIOGRAPH DATA WAS COMPLETELY COMPROMISED.

----- STP P78-1, PEPIN-----

INVESTIGATION NAME- PRELIMINARY AEROSOL MONITOR

NSSDC ID- 79-017A-07 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T.J. PEPIN U OF WYOMING

BRIEF DESCRIPTION

THIS INVESTIGATION USES AN AEROSOL MONITORING INSTRUMENT TO MEASURE THE CONCENTRATION AND VERTICAL DISTRIBUTION OF AEROSOLS AND OZONE IN THE EARTH'S STRATOSPHERE.

----- STP P78-1, SHULMAN-----

INVESTIGATION NAME- X-RAY MONITOR

NSSDC ID- 79-017A-06 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S.D. SHULMAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED AN X-RAY MONITOR TO DETERMINE THE FREQUENCY AND LOCATION OF SHORT-LIVED X-RAY BURSTS FROM SPACE. IT PROVIDED A LOW RESOLUTION MAPPING CAPABILITY FOR AURORAL X-RAY EMISSION.

----- STP P78-1, VANCOUR-----

INVESTIGATION NAME- HIGH LATITUDE PARTICLE SPECTROMETER

NSSDC ID- 79-017A-05 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - R.P. VANCOUR USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS INVESTIGATION USED TWO SETS OF DUAL ELECTROSTATIC ANALYZERS AT RIGHT ANGLES ACQUIRE ELECTRON DATA IN HIGH LATITUDE AURORAL ZONES, PRIMARILY DURING MAGNETIC STORM AND SUBSTORM PERIODS. THE ANALYZER IN EACH SET SWEEPS THROUGH ENERGY RANGE 50 - 1000 EV SIMULTANEOUSLY, THEN THE OTHER ANALYZER IN EACH SET SWEEPS FROM 1 - 20 KEV SIMULTANEOUSLY. THE TOTAL ENERGY RANGE 0.05 - 20 KEV IS DIVIDED INTO 16 CHANNELS.

***** STP P78-2*****

SPACECRAFT COMMON NAME- STP P78-2
ALTERNATE NAMES- SESP P78-2A, P78-2
SCATHA, 11256

NSSDC ID- 79-007A

LAUNCH DATE- 01/30/79 WEIGHT- 343. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY DOD-USAF
UNITED STATES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/01/79
ORBIT PERIOD- 794.8 MIN INCLINATION- 27.4 DEG
PERIAPSIS- 184. KM ALT APOAPSIS- 43905. KM ALT

PERSONNEL
PM - J.C. DURR USAF SPACE DIVISION

BRIEF DESCRIPTION

SPACECRAFT CHARGING AT HIGH ALTITUDES (SCATHA) WAS A SATELLITE PROGRAM FOR MEASURING THE CHARACTERISTICS OF THE PLASMASHEATH CHARGING PROCESS. THIS PROGRAM DETERMINED THE RESPONSE OF THE SATELLITE TO THIS CHARGING AND EVALUATED THE TECHNIQUES TO CORRECT THE PROBLEM. THE SPACECRAFT IS ESSENTIALLY A RIGHT CIRCULAR CYLINDER, 1.7 M IN DIAMETER AND 1.8 M HIGH. IT HAD A NEAR SYNCHRONOUS ORBIT AND SPUN ABOUT THE CYLINDER AXIS AT A RATE OF 1 RPM. THE SPIN VECTOR WAS NORMAL TO THE EARTH-SUN LINE AND IN THE EQUATORIAL PLANE OF THE EARTH. THERE WERE THREE 3-M BOOMS, A 2-M AND A 7-M BOOM ALL FOR DEPLOYMENT OF EXPERIMENTS. IN ADDITION THERE WAS A 100-M TIP-TO-TIP ELECTRIC FIELD ANTENNA. TELEMETRY CAPABILITY WAS BOTH PCM AND FM AND DATA COULD BE STORED UP TO 12 HOURS USING ON-BOARD TAPE RECORDERS. MISSION LIFE WAS ONE YEAR WITH POSSIBLE EXTENSION.

ORIGINAL PAGE IS
OF POOR QUALITY

----- STP P78-2, AGGSON-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- 79-007A-05

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERE
SPACE PLASMA
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - T.L. AGGSON

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC10) MEASURED THE ABSOLUTE POTENTIAL BETWEEN THE SATELLITE AND THE PLASMA USING A 100-M TIP-TO-TIP DIPOLE ANTENNA. THE ANTENNA ELEMENTS WERE COPPER-BERYLLIUM STEM EXTENDABLE ANTENNAS AND WERE 0.64 CM DIAMETER TUBES WHEN EXTENDED. TWO 50-M ELEMENTS PLUS THE 1.7-M SPACECRAFT BODY MADE TOTAL LENGTH 101.7M. THE ANTENNA ELEMENTS WERE INSULATED EXCEPT FOR 20 METERS AT THE ENDS. THUS FOR AMBIENT PLASMA CONDITIONS, THE CONDUCTING SEGMENTS OF THE ANTENNA WERE POSITIONED OUTSIDE THE SHEATH REGION. DC ELECTRIC FIELDS FROM 0.1 TO 20 MILLIVOLTS/M WERE MEASURED AND AC FIELDS IN THE FREQUENCY RANGE FROM 3 TO 200 HZ WERE MEASURED FROM 1 TO 100 MICROVOLTS/M.

----- STP P78-2, BLAKE-----

INVESTIGATION NAME- ENERGETIC PROTON DETECTOR

NSSDC ID- 79-007A-14

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.B. BLAKE

AEROSPACE CORP

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF SC2) MEASURED THE PROTON FLUX IN THE ENERGY RANGE FROM 20 TO 1000 KEV IN DIFFERENTIAL CHANNEL PLUS AN INTEGRAL FLUX IN THE RANGE FROM 1 TO 2 MEV.

----- STP P78-2, COHEN-----

INVESTIGATION NAME- ELECTRON GUN-ION GUN

NSSDC ID- 79-007A-07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - H.A. COHEN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC4) CONSISTED OF AN ELECTRON BEAM SYSTEM (EBS) AND A POSITIVE ION BEAM SYSTEM (PIBS), WHICH WERE FLOWN TO CONTROL THE EJECTION, RESPECTIVELY, OF NEGATIVE CHARGE (ELECTRONS) AND POSITIVE CHARGE (XENON IONS) FROM THE SPACE VEHICLE. THE EBS CONSISTED OF A CONTROL GRID AND AN INDIRECTLY HEATED OXIDE-COVERED CATHODE, WHICH WAS KEPT AT A CONTROLLED NEGATIVE POTENTIAL WITH RESPECT TO THE SPACE VEHICLE. THE CONTROLLED NEGATIVE POTENTIAL DETERMINED THE ENERGY OF EJECTED ELECTRONS AND VARIED IN STEPS AS FOLLOWS (IN VOLTS) -- 50, 150, 300, 500, 1500, AND 3000. THE CONTROL GRID WAS NORMALLY KEPT NEGATIVE WITH RESPECT TO THE CATHODE AND WAS PULSED POSITIVELY TO ALLOW ELECTRON EJECTION CURRENT. THE DURATION AND ELECTRON CURRENT LEVEL OF THE PULSE WERE CONTROLLED BY GROUND COMMAND. A FOCUSING ELEMENT BETWEEN THE CONTROL GRID AND THE GROUNDED EXIT ANODE SERVED TO REDUCE THE BEAM DIVERGENCE. THE MAGNITUDE OF THE BEAM CURRENT COULD VARY SIX STEPS (IN MILLIAMPERES = 0.001, 0.01, 0.10, 1.0, 6.0, AND 13). THE MAXIMUM POWER DRAWN WAS 42 W. MOUNTED IN BONDED ELECTRICAL CONTACT WITH THE SPACECRAFT FRAME GROUND, THE EBS WAS ORIENTED SO THAT THE BEAM AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. A PROTECTIVE APERTURE COVER WAS REMOVED BY GROUND COMMAND WHEN THE SPACECRAFT WAS IN ORBIT. THE PIBS CONSISTED OF A PENNING DISCHARGE-CHAMBER ION SOURCE AND A CONTROL GRID. THE ION SOURCE CONSISTS OF AN ION CHAMBER AND THE BEAM FORMATION ELECTRODES. A CYLINDER OF PRESSURED XENON CONSTITUTES THE GAS SOURCE AND WAS CONTROLLED BY A LEAK VALVE WITH THE FLOW RATE COMMANDABLE FROM THE GROUND. THE INTENSITY AND DURATION OF THE ION BEAM WAS ALSO DETERMINED BY GROUND COMMAND. THE TWO BEAM BIAS VOLTAGES ARE 1000 V D.C. AND 2000 V D.C., AND THE FIVE SELECTABLE BEAM INTENSITY LEVELS WERE (IN MILLIAMPERES) -- 0.3, 0.5, 1.0, 1.5, AND 2.0. DURING MAXIMUM BEAM EJECTION, THE POWER DRAWN WAS 60 W. THE PIBS NOZZLE WAS THE ELEMENT THAT CONTROLLED THE NATURE OF THE EJECTED BEAM, AND THE THIN WIRES MOUNTED ON TOP OF THE NOZZLE COULD NEUTRALIZE ALL OR A FRACTION (INCLUDING ZERO) OF THE BEAM, DEPENDING ON SATELLITE EXPERIMENT REQUIREMENTS. THE EXPPELLANT STORAGE TANK WAS CONNECTED TO THE ION SOURCE THROUGH A PRESSURE REGULATOR, A SOLENOID-OPERATED LATCHING, A POROUS PLUG, AND AN INSULATOR. THE ION SOURCE WAS

MAINTAINED UNDER VACUUM AND OPENED TO THE ATMOSPHERE IN ORBIT ON COMMAND.

----- STP P78-2, DEFOREST-----

INVESTIGATION NAME- UCSD CHARGED PARTICLE DETECTOR

NSSDC ID- 79-007A-11

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.E. DEFOREST

U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC9) MEASURED THE ELECTRON AND ION DIFFERENTIAL FLUX, ENERGY, AND PITCH ANGLE DISTRIBUTION. THIS PARTICLE DETECTOR MEASURED ENERGY SPECTRA IN 64 STEPS BETWEEN 1 AND 70,000 EV. THE ACCEPTANCE ANGLE OF THE TELESCOPE WAS \pm DEG HALF-ANGLE. THIS SAME TYPE INSTRUMENT FLEW ON THE ATS 5 AND ATS 6 SPACECRAFT.

----- STP P78-2, FENNEL-----

INVESTIGATION NAME- SPACECRAFT SHEATH FIELDS DETECTOR

NSSDC ID- 79-007A-06

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.F. FENNEL

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC2) CONTAINED THREE ELECTROSTATIC ANALYZERS -- TWO MOUNTED 180 DEG APART ON BOOMS, AND THE THIRD MOUNTED ON THE SPACECRAFT BODY. THE THREE SENSORS HAD THE SAME LOOK DIRECTION, SO THAT IF THERE WERE NO ELECTRIC FIELDS ABOUT THE SATELLITE, ALL THREE SENSORS WOULD MEASURE THE SAME FLUX, SPECTRUM, AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE ENERGY RANGE 1 TO 1000 EV. AN OPTICAL DATA TRANSMISSION SYSTEM WAS USED TO TELEMETER DIGITAL DATA FROM THE ANALYZERS TO THE SATELLITE DATA PROCESSING SYSTEM TO MAINTAIN ELECTRICAL ISOLATION AT THE ANALYZERS. THE POTENTIAL OF THE SPHERES RELATIVE TO THE SATELLITE REFERENCE POINT WAS ALSO MEASURED. POTENTIAL MEASUREMENTS AT THREE POSITIONS IN THE PLASMA SHEATH WERE OBTAINED. THE EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, HALL-----

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS

NSSDC ID- 79-007A-03

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.F. HALL
OI - D.E. PRINCE

AEROSPACE CORP
USAF MATERIALS LAB

BRIEF DESCRIPTION

IN THIS EXPERIMENT (PART OF ML12) TWO QUARTZ CRYSTAL MICROBALANCES WERE PLACED IN RETARDING POTENTIAL ANALYZERS, WITH ONE MICROBALANCE-ANALYZER SET MOUNTED ON THE SPACECRAFT SIDE, AND THE OTHER SET PLACED ON A SPACECRAFT END MAINTAINED IN CONTINUOUS SHADOW. THE RETARDING POTENTIAL ANALYZER WAS USED TO EXCLUDE IONS FROM THE MICROBALANCE AND TO MAINTAIN A ZERO ELECTRIC FIELD CONDITION AT THE SENSOR. TO DETERMINE THE DEPENDENCE OF CONTAMINATION RATE UPON SURFACE CHARGE, MEASUREMENTS WERE MADE WITH AND WITHOUT THE RETARDING POTENTIAL BIAS. THE QUARTZ SENSORS HAD AN ACTIVE TEMPERATURE CONTROL AND COULD BE OPERATED OVER A RANGE OF TEMPERATURES FROM -60 TO 60 DEG C.

----- STP P78-2, HALL-----

INVESTIGATION NAME- THERMAL CONTROL SAMPLE MONITOR

NSSDC ID- 79-007A-04

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.F. HALL
OI - D.E. PRINCE

AEROSPACE CORP
USAF MATERIALS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (PART OF PL12) EVALUATED THE PERFORMANCE OF THERMAL CONTROL MATERIALS AS A FUNCTION OF ORBIT CONTAMINATION CONDITIONS. THE SENSOR MEASURED THE BACKFACE TEMPERATURE OF EIGHT THERMAL CONTROL MATERIAL SAMPLES. THE INSTRUMENTS WERE POSITIONED CONTIGUOUS WITH THE QUARTZ CRYSTAL MONITORS. IT WAS POSSIBLE TO HEAT THE SAMPLES AND TO PURGE CONTAMINANTS WHICH FROZE OUT ON THE TEST SURFACE.

----- STP P78-2, HARDY-----

INVESTIGATION NAME- RAPID SCAN PARTICLE DETECTOR

NSSDC ID- 79-007A-12 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAMINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.A. HARDY

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC5) EMPLOYED CURVED PLATE ELECTROSTATIC ANALYZERS AND SOLID STATE SPECTROMETERS TO MEASURE THE FLUX OF ELECTRONS AND IONS. THE EXPERIMENT RETURNED A SPECTRUM FOR BOTH ELECTRONS AND IONS ONCE PER SECOND IN TWO ORTHOGONAL DIRECTIONS. THE ELECTRON FLUX WAS MEASURED IN 16 ENERGY RANGES SPANNING FROM 50 EV TO 1.1 MEV. THE ION FLUX WAS MEASURED IN 12 ENERGY RANGES SPANNING FROM 50 EV TO 35 MEV. ANY GIVEN ENERGY CHANNEL CAN BE READ OUT WITH A TIME RESOLUTION OF 240 MICROSECONDS.

----- STP P78-2, JOHNSON-----

INVESTIGATION NAME- ENERGETIC ION SPECTROMETER

NSSDC ID- 79-007A-13 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAMINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.G. JOHNSON

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC8) MEASURED THE FLUX OF IONS, WITH MASS RANGE 1 TO 150 U, IN THE ENERGY RANGE FROM 100 TO 20,000 EV. THE SENSOR WAS AN ENERGETIC ION MASS SPECTROMETER.

----- STP P78-2, KOONS-----

INVESTIGATION NAME- CHARGING ELECTRICAL EFFECTS ANALYZER

NSSDC ID- 79-007A-02 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAMINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
TECHNOLOGY
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - H.C. KOONS

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED ELECTROMAGNETIC INTERFERENCE IN THE RANGE 100 TO 1.67 HZ. THREE SEPARATE INSTRUMENTS WERE USED. THE FREQUENCY RANGE FROM 2 TO 30 MHZ WAS MEASURED WITH A SWEEPED FREQUENCY ANALYZER. THE FREQUENCY BAND 100 TO 50 KHZ WAS MONITORED BY A 10-CHANNEL, FIXED-FREQUENCY ANALYZER. THE CAPABILITY ALSO EXISTED TO TELEMETER BROADBAND SIGNALS FROM SENSORS IN THE FREQUENCY BAND 100 TO 5000 HZ. THE ANALYZER SAMPLED SIGNALS FROM A VARIETY OF SENSORS, INCLUDING SOLAR ARRAY BUS, POWER LINE BUS, TYPICAL COMMAND LINE, EXTERNAL SHORT DIPOLE, AND ELECTRIC FIELD DETECTOR BOOM. THIS EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, LEDLEY-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 79-007A-08 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE STINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.G. LEDLEY

NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT (SC11) OBTAINED TRIAXIAL MEASUREMENTS OF THE GEOMAGNETIC FIELD. A BOOM-MOUNTED (A 7-M BOOM) FLUXGATE MAGNETOMETER WAS USED. TIME RESOLUTION WAS FOUR VECTORS PER S. FIELD RESOLUTION WAS APPROXIMATELY 0.3 NT WITH A DYNAMIC RANGE OF PLUS AND MINUS APPROXIMATELY 450 NT PER AXIS. SENSOR RESPONSE WAS FROM DC TO 70 HZ.

----- STP P78-2, RIZERA-----

INVESTIGATION NAME- SPACECRAFT SURFACE POTENTIAL MONITOR

NSSDC ID- 79-007A-01 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAMINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
TECHNOLOGY
SPACE PLASMAS

PERSONNEL

PI - P.F. RIZERA

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURED THE SURFACE POTENTIAL OF SEVEN DIFFERENT TYPES OF MATERIALS RELATIVE TO A GOLD CYLINDRICAL COMMON REFERENCE POINT ON THE SATELLITE. THE SAMPLE WAS MOUNTED ON ONE SURFACE OF A DIELECTRIC SLAB, AND A CONDUCTING PLATE WAS MOUNTED ON THE OTHER SURFACE. THE SURFACE POTENTIAL WAS MEASURED FROM LEAKAGE CURRENTS AND BY A CHOPPED ELECTROMETER (MONROE DETECTORS). SOME OF THE MATERIALS USED WERE: SILICON, CLOTH FABRIC, SOLAR CELL COVER GLASSES, GOLD (REFERENCE), SILVER-TEFLON, AND KAPTON MULTILAYER INSULATION. FIVE OF THE SAMPLES WERE PLACED ON THE SIDES OF THE SATELLITE AND ROTATED IN AND OUT OF SUNLIGHT. FOUR SAMPLES WERE LOCATED AT THE END OF THE SPACECRAFT IN THE SHADOW. THIS EXPERIMENT WAS FUNDED BY SAMSO.

----- STP P78-2, REAGAN-----

INVESTIGATION NAME- HIGH-ENERGY PARTICLE DETECTOR

NSSDC ID- 79-007A-15 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAMINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.B. REAGAN

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC3) MEASURED THE ELECTRON FLUX IN THE 0.3 TO 2.1 MEV RANGE, THE PROTON FLUX IN THE 1 TO 100 MEV RANGE, AND ALPHA PARTICLES FROM 6 TO 60 MEV. A HIGH-ENERGY PARTICLE SPECTROMETER WAS USED TO DETERMINE FLUX AND PITCH ANGLE DISTRIBUTIONS.

***** TIP 1*****

SPACECRAFT COMMON NAME- TIP 1
ALTERNATE NAMES- TRIAD 1, TRIAD 01 IX
TRIAD A, D6173
TRIAD

NSSDC ID- 72-069A

LAUNCH DATE- 09/02/72 WEIGHT- 94. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUTSPONSORING COUNTRY/AGENCY
UNITED STATES DOD-NAVYINITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/04/72
ORBIT PERIOD- 100.7 MIN INCLINATION- 90.1 DEG
PERIAPSIS- 716.0 KM ALT APOAPSIS- 843.0 KM ALT

PERSONNEL

PM - J. DASSOULAS
PS - R.E. FISCHELLAPPLIED PHYSICS LAB
APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS THREE BODY SPACECRAFT WAS CONNECTED BY BOOMS WHICH SERVED AS GRAVITY GRADIENT STABILIZERS IN THE RADIAL DIRECTION. A MOMENTUM WHEEL WAS USED FOR STABILIZATION IN ROLL AND YAW. THE PRIMARY FUNCTION OF THE SPACECRAFT WAS TO TEST VARIOUS CONCEPTS FOR IMPROVING THE USN TRANSIT NAVIGATION SYSTEM. THE POWER WAS SUPPLIED BY A RADIO ISOTOPE THERMAL ELECTRIC GENERATOR (RTG).

----- TIP 1, POTEMRA-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-069A-01

INVESTIGATIVE PROGRAM
NAVIGATION TECHNOLOGY

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T.A. POTERRA

APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO MEASURE VECTOR FIELDS WITH MAGNITUDES UP TO 50,000 NT. MEASUREMENTS WERE MADE BY SAMPLING EACH AXIS SEQUENTIALLY AT A RATE OF 2.25 SAMPLES/S. DIGITIZATION RESOLUTION WAS ABOUT 10 NT AS GIVEN BY A 13-BIT ANALOG TO DIGITAL CONVERTER, BUT ZERO-LEVEL DRIFTS WERE NOT READILY CHECKED. AS SUCH, THE EXPERIMENT WAS MOST USEFUL IN STUDIES OF MAGNETIC FLUCTUATIONS, DUE TO THE REAL-TIME DATA TRANSMISSION AND THE LOCATIONS OF THE TRACKING STATIONS, MOST OF THE DATA OBTAINED RELATED TO NORTHERN AND SOUTHERN HEMISPHERE HIGH LATITUDES.

***** TIROS-N*****

SPACECRAFT COMMON NAME- TIROS-N
ALTERNATE NAMES- 11060

NSSDC ID- 78-096A

LAUNCH DATE- 10/13/78 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/14/78
ORBIT PERIOD- 102. MIN INCLINATION- 98.9 DEG
PERIAPSIS- 846. KM ALT APOAPSIS- 862. KM ALT

PERSONNEL
MG - R. ARNOLD NASA HEADQUARTERS
PM - J. FULLER, JR. NASA-GSFC

BRIEF DESCRIPTION

TIROS-N WAS AN OPERATIONAL METEOROLOGICAL SATELLITE FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND SUPPORTED THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDED AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDED AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSISTED OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSED AND RELAYED TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WAS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND WAS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- 78-096A-01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WAS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WERE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATED IN THE SCANNING MODE AND MEASURED EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAD A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAD A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WAS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WERE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH

(1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WERE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDED GLOBAL AREA COVERAGE (GAC) DATA, HAD A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINED DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WERE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- 78-096A-02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE TIROS-N OPERATIONAL SOUNDER CONSISTED OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE HIGH RESOLUTION INFRARED SPECTROMETER (HIRS/2), HAD 20 CHANNELS AND MADE MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAD THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAD FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS WERE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-096A-03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON TIROS-N WAS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVED LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS WERE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL WAS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS WAS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAD THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WERE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- 78-096A-04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R. SEALE NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTED OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURED IN FIVE ENERGY RANGES BOTH PHOTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE WERE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON COUNTERDIRECTIONAL DETECTOR (POD) MEASURED PROTONS

ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAD A 50-DEG VIEWING CONE, VIEWED IN THE ANTI-EARTH DIRECTION, AND MEASURED PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURED TOTAL ENERGY ABOVE 1 KEV.

***** UK *****

SPACECRAFT COMMON NAME- UK 5
ALTERNATE NAMES- UNITED KINGDOM-5, PL-732B
ARIEL 5

NSSDC ID- 74-077A

LAUNCH DATE- 10/15/74 WEIGHT- 135. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED KINGDOM SRC
UNITED STATES NASA-OS8

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/16/74
ORBIT PERIOD- 95.3 MIN INCLINATION- 2.9 DEG
PERIAPSIS- 512.0 KM ALT APOAPSIS- 557.0 KM ALT

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - J.P. CORRIGAN NASA-GSFC
PS - S.S. HOLT NASA-GSFC

BRIEF DESCRIPTION
THE UK 5 SPACECRAFT WAS DESIGNED TO CARRY SIX EXPERIMENTS THAT MEASURE THE SPECTRA, POLARIZATION, AND PULSAR FEATURES OF NONSOLAR X-RAY SOURCES. THE SPACECRAFT WAS SPIN STABILIZED, AND TWO EXPERIMENTS SCANNED THE SKY PERPENDICULAR TO THE SPIN AXIS, WHILE FOUR EXPERIMENTS POINTED PARALLEL TO THE SPIN AXIS. DATA WERE STORED ON BOARD THE SPACECRAFT IN A CORE STORAGE AND DUMPED TO GROUND STATIONS ONCE PER ORBIT.

----- UK 5, BOYD -----

INVESTIGATION NAME- 0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR

NSSDC ID- 74-077A-01 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.L.F. BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION
THIS EXPERIMENT COMBINED THE FUNCTION OF OBSERVING X-RAYS IN DIFFERENT ENERGY RANGES WITH THAT OF STAR TRACKING. THE EXPERIMENT CONTAINED A ROTATION COLLIMATOR, UTILIZING THE SATELLITE SPIN, BEHIND WHICH THERE WERE THREE DETECTORS. THE FIELD OF VIEW WAS A CONE WITH A SEPI-ANGLE OF 10 DEG TO 20 DEG, DEPENDING ON THE TYPE OF RADIATION VIEWED BY THE DIFFERENT DETECTORS. THE FIRST DETECTOR WAS A VISIBLE-LIGHT PHOTOMULTIPLIER THAT ENABLED THE SPIN AXIS TO BE ACCURATELY DETERMINED BY VIEWING THE BACKGROUND OF OPTICAL STARS. SECONDLY, THERE WAS AN ARRAY OF CHANNEL ELECTRON MULTIPLIERS, WITH SELECTABLE FILTERS, COVERING THE WAVELENGTH RANGE 0.3 TO 6 KEV. THIRDLY, THERE WAS A GROUP OF PROPORTIONAL COUNTERS COVERING THE RANGE 2.5 TO 30 KEV. IT WAS ESTIMATED THAT SOURCE POSITIONS COULD BE DETERMINED TO WITHIN 2 ARC MIN FOR BRIGHT SOURCES.

----- UK 5, BOYD -----

INVESTIGATION NAME- HIGH-RESOLUTION SOURCE SPECTRA

NSSDC ID- 74-077A-03 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.L.F. BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A HIGH-RESOLUTION, PROPORTIONAL-COUNTER SPECTROMETER WITH A 128-CHANNEL PULSE-HEIGHT ANALYZER, AND RESPONDED TO PHOTONS IN THE 2- TO 30-KEV ENERGY RANGE. THE SPECTRA OF SOURCES WERE EXAMINED IN GREATER DETAIL THAN HAD BEEN PREVIOUSLY POSSIBLE. LINE EMISSION FOR CERTAIN ELEMENTS (E.G., IRON) COULD ALSO BE IDENTIFIED. THE DETECTOR VIEWED IN A DIRECTION PARALLEL TO THE SPIN AXIS AND, THEREFORE, CONTINUED TO OBSERVE THE SAME PIECE OF SKY FOR AS LONG AS THE POSITION OF THE SATELLITE SPIN AXIS REMAINED UNALTERED. THE EXPERIMENT AXIS POINTED APPROXIMATELY

2 DEG OFF THE SPIN AXIS, SO THAT WHEN OBSERVING A SOURCE ALSO 2 DEG OFF THE SPIN AXIS THE SOURCE PASSED IN AND OUT OF THE FIELD OF VIEW DURING EACH ROTATION. THIS PERMITTED THE BACKGROUND FLUX TO BE SAMPLED EVERY SPIN PERIOD BY RECORDING THE SPECTRAL INFORMATION IN FOUR SETS OF LOCATIONS, EACH CORRESPONDING TO A QUADRANT OF THE SPIN CYCLE. THIS SHOULD HAVE OVERCOME THE LACK OF INFORMATION ON POSSIBLE FLUCTUATIONS IN THE BACKGROUND FLUX DURING AN ORBIT'S INTEGRATION. THE EXPERIMENT COULD ALSO HAVE BEEN OPERATED IN A MODE IN WHICH PERIODICITIES IN THE RANGE TYPICAL OF PULSAR FREQUENCIES WERE DETECTED.

----- UK 5, ELLIOT -----

INVESTIGATION NAME- HIGH-ENERGY COSMIC X-RAY SPECTRA

NSSDC ID- 74-077A-05 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - H. ELLIOT IMPERIAL COLLEGE
OI - J.J. QUENBY IMPERIAL COLLEGE
OI - A.R. ENGEL IMPERIAL COLLEGE

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO EXTEND THE SPECTRAL INFORMATION ON SELECTED X-RAY SOURCES IN THE ENERGY REGION ABOVE 20 KEV. MEASUREMENTS WERE POSSIBLE UP TO 2 MEV, ALTHOUGH THE EFFICIENCY OF THE DETECTOR FELL STEEPLY AT THIS ENERGY. THE DETECTOR AXIS WAS INCLINED A FEW DEG WITH RESPECT TO THE SATELLITE SPIN AXIS SO THAT IT CONED AS THE SATELLITE SPUN. THE COUNTING RATE RESULTING FROM A POINT SOURCE A FEW DEG FROM THE SPIN AXIS WAS THUS MODULATED WITH THE SPIN PERIOD. THIS MODULATION WAS DETECTED BY DIVIDING THE SPIN CYCLE INTO FOUR SECTORS AND ANALYZING THE DIFFERENT COUNTING RATES IN EACH. IN THIS WAY, THE SOURCE INTENSITY COULD BE DETERMINED FROM THE AMPLITUDE OF THE MODULATION. FOR PULSAR OBSERVATIONS, A LARGE ENERGY WINDOW AT THE LOWER END OF THE DETECTOR RANGE WAS USED. THE OBSERVATIONS IN THIS ENERGY REGION WERE ANALYZED FOR A PULSAR PERIODICITY IN A SPECIAL SYSTEM THAT WAS PART OF THE SPACECRAFT HANDLING ELECTRONICS.

----- UK 5, HOLT -----

INVESTIGATION NAME- ALL-SKY MONITOR

NSSDC ID- 74-077A-06 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - S.S. HOLT NASA-GSFC
OI - E.A. BOLDY NASA-GSFC
OI - P.J. SERLEMITOS NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT SCANNED THE X-RAY EMISSION FROM THE ENTIRE CELESTIAL SPHERE AT ALL TIMES, THEREBY COVERING THE LARGE AREAS THAT LAY OUTSIDE THE FIELD OF VIEW OF OTHER ONBOARD EXPERIMENTS. IT WAS A VALUABLE AID IN PROGRAMMING SATELLITE MANEUVERS SO THAT TRANSIENT EVENTS IN THE X-RAY SKY, SUCH AS NEARBY NOVAE AND X-RAY FLARES, COULD BE RAPIDLY MADE AVAILABLE FOR STUDY WITH GREATER RESOLUTION BY THE OTHER EXPERIMENTS.

----- UK 5, POUNDS -----

INVESTIGATION NAME- 2- TO 10-KEV SKY SURVEY

NSSDC ID- 74-077A-02 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - K.A. POUNDS U OF LEICESTER
OI - B.A. COOKE U OF LEICESTER
OI - D.J. ADAMS U OF LEICESTER
OI - R.E. GRIFFITHS U OF LEICESTER

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A LARGE-AREA PROPORTIONAL COUNTER ARRANGED TO VIEW IN A DIRECTION PERPENDICULAR TO THE SATELLITE SPIN AXIS. THE SATELLITE ROTATION, THEREFORE, ALLOWED A SCAN OF A 360-DEG BAND OF THE SKY. WHEN THE SATELLITE SPIN AXIS WAS ARRANGED TO POINT AT A GALACTIC POLE, THE WHOLE OF THE MILKY WAY COULD BE SCANNED AT ONCE. THE EXPERIMENT COVERED THE PHOTON ENERGY RANGE 1.5 TO 20 KEV AND EFFECTED A HIGH-SENSITIVITY SURVEY, OBTAINING SOURCE LOCATIONS, INTENSITY, AND SPECTRA. A NUMBER OF DIFFERENT MODES OF OPERATION WERE USED IN WHICH THE AVAILABLE STORAGE SPACE IN THE CORE STORE OBTAINED SPATIAL INFORMATION AT THE EXPENSE OF SPECTRAL RESOLUTION OR CONVERSELY. THE SENSITIVITY OF THE EXPERIMENT ALLOWED THE DETECTION OF SOURCES OF THE ORDER OF 1.E-4 TIMES THE INTENSITY OF SCO XR-1, WITHIN THE TIME OF ABOUT 1 DAY. THE ABILITY OF THE SURVEY INSTRUMENTS TO DETERMINE THE POSITIONS OF A SOURCE DEPENDED ON THE STRENGTH OF THE SOURCE AND THE NUMBER OF OTHER SOURCES IN A GIVEN PART OF THE SKY. A SOURCE OF 5.E-3 TIMES THE STRENGTH OF SCO XR-1 COULD BE LOCATED WITH A PRECISION OF ABOUT 15 ARC MIN.

----- UK 5, POUNDS-----

INVESTIGATION NAME- POLARIMETER/SPECTROMETER

NSSDC ID- 79-077A-04

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - K.A. POUNDS	U OF LEICESTER
O1 - B.A. COOKE	U OF LEICESTER
O1 - D.J. ADAMS	U OF LEICESTER
O1 - R.E. GRIFFITHS	U OF LEICESTER

BRIEF DESCRIPTION

THIS EXPERIMENT WAS A POLARIMETER/SPECTROMETER OPERATING IN THE 2- TO 8-KEV RANGE. IT USED TWO LARGE PLANE CRYSTALS, LITHIUM HYDRIDE AND GRAPHITE, IN A DRAGG SPECTROMETER WITH A HONEYCOMB COLLIMATOR. IT WAS MOUNTED TO VIEW ALONG THE SATELLITE SPIN AXIS AND TO EXAMINE THE RADIATION OF INDIVIDUAL X-RAY SOURCES FOR POSSIBLE POLARIZATION AND/OR THE EXISTENCE OF LINE EMISSIONS. IN A SOURCE OF THE BRIGHTNESS OF THE CRAB NEBULA, A POLARIZATION OF 2.5 PERCENT COULD BE DETECTED. THE EXPERIMENT ALSO CONDUCTED SEARCHES FOR PULSAR ACTIVITY. THE NATURE OF THE EXPERIMENT MADE IT POSSIBLE TO EXAMINE THE POLARIZATION OF THE PULSAR ITSELF BY LOOKING FOR DIFFERENT PULSAR BEHAVIOR IN THE SEPARATE POLARIZATION COMPONENTS.

***** UK 6*****

SPACECRAFT COMMON NAME- UK 6
ALTERNATE NAMES- UNITED KINGDOM-6, ARIEL 6
11382

NSSDC ID- 79-047A

LAUNCH DATE- 06/02/79 WEIGHT- 152. KG
LAUNCH SITE- WOLLOPS FLIGHT CENTER, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED KINGDOM SRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/02/79
ORBIT PERIOD- 97.3 MIN INCLINATION- 55. DEG
PERIAPSIS- 605. KM ALT APOAPSIS- 651. KM ALT

PERSONNEL
PM - J.E. FOSTER APPLETON LAB
PS - J.L. CULHANE U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS MISSION WAS TO UNDERTAKE STUDIES IN HIGH-ENERGY ASTROPHYSICS. TWO X-RAY EXPERIMENTS, ONE COSMIC-RAY EXPERIMENT, AND THREE TECHNOLOGY EXPERIMENTS WERE CARRIED. THE SPACECRAFT WAS SPIN STABILIZED, WITH THE SPIN AXIS COMMANDED INTO A SEQUENCE OF ORIENTATIONS TO ACCOMMODATE THE X-RAY EXPERIMENT REQUIREMENTS.

----- UK 6, BOYD-----

INVESTIGATION NAME- X-RAY GRAZING INCIDENCE SYSTEM

NSSDC ID- 79-047A-03

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - R.L.F. BOYD	U COLLEGE LONDON
O1 - A.P. WILLMORE	U OF BIRMINGHAM
O1 - A.M. CRUISE	U COLLEGE LONDON
O1 - C.V. GOODALL	U OF BIRMINGHAM

BRIEF DESCRIPTION

THIS SYSTEM CONSISTED OF FOUR GRAZING INCIDENCE HYPERBOLOID MIRRORS THAT REFLECTED X-RAYS THROUGH AN APERTURE/FILTER TO FOUR CONTINUOUS-FLOW PROPANE GAS DETECTORS COVERED WITH A ONE-MICROMETER POLYPROPYLENE WINDOW. THE INSTRUMENT WAS SENSITIVE TO X-RAYS FROM 0.1 TO 2 KEV AND HAD SEVEN SELECTABLE FIELDS OF VIEW FROM 0.2 TO 3.6 DEG. THE SYSTEM COULD BE OPERATED IN FOUR DIFFERENT MODES: SPECTRAL (32 CHANNELS OF PULSE HEIGHT), TIME (0.5 MS TO 16 S), PULSAR (PERIODS FROM 8 MS TO 4 H), AND AUTOCORRELATOR (PERIODIC VARIATIONS FROM 128 MS TO 2 S). THE DETECTORS POINTED ALONG THE SPACECRAFT SPIN AXIS.

----- UK 6, FOWLER-----

INVESTIGATION NAME- COSMIC RAY

NSSDC ID- 79-047A-01

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - P.M. FOWLER U OF BRISTOL

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF FOUR PI CERENKOV AND GAS SCINTILLATION COUNTERS WITH A GEOMETRIC FACTOR OF TWO SQ M-SR THAT WERE USED TO MEASURE THE CHARGE AND ENERGY SPECTRA OF THE ULTRAHEAVY COMPONENT OF COSMIC RADIATION WITH PARTICULAR EMPHASIS ON THE CHARGE REGION $Z \geq 30$.

----- UK 6, POUNDS-----

INVESTIGATION NAME- X-RAY PROPORTIONAL COUNTERS

NSSDC ID- 79-047A-02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - K.A. POUNDS U OF LEICESTER

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTED OF AN ARRAY OF PROPORTIONAL COUNTERS THAT OPERATED OVER THE ENERGY RANGE 1.3 TO 30 KEV. BRIGHT X-RAY SOURCES COULD BE MEASURED TO SEVERAL MICROSECONDS TIME RESOLUTION, AND SPECTRAL DATA WERE OBTAINED IN 32 CHANNELS.

***** VELA 5A*****

SPACECRAFT COMMON NAME- VELA 5A
ALTERNATE NAMES- VELA 9 (TRW), 03954

NSSDC ID- 69-046D

LAUNCH DATE- 05/23/69 WEIGHT- 259. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/24/69
ORBIT PERIOD- 6703. MIN INCLINATION- 32.8 DEG
PERIAPSIS- 110900. KM ALT APOAPSIS- 112210. KM ALT

PERSONNEL

PM - ARPA-STAFF	ARPA/WASH, DC
PH - SAMSO	USAF-LAS
PS - R.W. KLEBESADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 5A WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE FIFTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 5A, AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES, HAD BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY.

----- VELA 5A, GAME-----

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-046D-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J. GAME	LOS ALAMOS SCI LAB
O1 - J.R. ASBRIDGE	LOS ALAMOS SCI LAB
O1 - W.E. FELTHAUSER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE ANALYZER-MULTIPLIER UNIT STUDIED SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 V TO 5 KV. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 35 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KV AND 8.3 KV.

----- VELA 5A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-0460-07 INVESTIGATIVE PROGRAM
 NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - S.J. BAME LOS ALAMOS SCI LAB
 OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 5A, CHAMBERS-----

INVESTIGATION NAME- SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A,
 1 TO 8 A, 1 TO 16 A, 44 TO 60 A

NSSDC ID- 69-0460-02 INVESTIGATIVE PROGRAM
 NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
 X-RAY ASTRONOMY
 SOLAR PHYSICS

PERSONNEL
 PI - W.H. CHAMBERS LOS ALAMOS SCI LAB
 OI - J.C. FULLER LOS ALAMOS SCI LAB
 OI - W.E. KUNZ LOS ALAMOS SCI LAB
 OI - P.E. FEHLAU LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR AMBIENT AND FLARE-PRODUCED FLUX OF X RAYS IN THE 0.3- TO 60-A WAVELENGTH REGION. TWO IDENTICAL X-RAY SENSOR UNITS WERE MOUNTED AT DIAMETRICALLY OPPOSED APEX POSITIONS ON THE SATELLITE. EACH UNIT CONTAINED FOUR DETECTORS -- THREE ION CHAMBERS AND A SCINTILLATION (NAI(TL)) DETECTOR. SINCE EACH ION CHAMBER HAD A HEMISPHERICAL WINDOW, THE COMBINED OUTPUT SIGNALS FROM IDENTICAL CHAMBERS IN EACH SENSOR UNIT APPROXIMATED THE RESPONSE OF AN IDEAL DETECTOR WITH A 4-PI STERADIAN FIELD OF VIEW. THE ION CHAMBERS HAD THE FOLLOWING WINDOW MATERIALS, GAS FILLS, AND WAVELENGTH RESPONSES. CHAMBER 1 -- 0.127 MM OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 8 A. CHAMBER 2 -- 6.35 MICROMETERS OF MYLAR OVERCOATED WITH ABOUT AN 8500-A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 6.35 MICROMETERS OF MYLAR, 0.5 ATM OF NITROGEN, 1 TO 16 A AND 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1 TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE OBTAINED UPON SUITABLE ANALYSIS OF THE DATA. THE SCINTILLATION DETECTOR USED FOR THE .3- TO 3-A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NAI CRYSTAL OPTICALLY COUPLED TO A PMT, THE OUTPUT OF WHICH FED A FIVE-LEVEL, INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS, THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD A 1.27 CM-DIAMETER, 1 MM-THICK CRYSTAL COVERED BY A FLAT 0.25 MM-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.E-9 J/(CM-S)) HAD A 6.35 MM-DIAMETER, 1 MM-THICK CRYSTAL AND A 2.03 MM-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 0.25 MM WINDOW MOUNTED ON THE FACE OF THE CRYSTAL. BOTH ION CHAMBERS AND SCINTILLATION DETECTORS WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 S. THE AVERAGE DETECTION EFFICIENCIES FOR THE ION AND SCINTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 5A, KLEBASADEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 69-0460-08 INVESTIGATIVE PROGRAM
 NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - R.W. KLEBASADEL LOS ALAMOS SCI LAB
 OI - J.B. STRONG LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTED OF SIX 10 CU CM CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

***** VELA 5B*****

SPACECRAFT COMMON NAME- VELA 5B
 ALTERNATE NAMES- VELA 10 (TRW), 03955
 VELA 5B (USAF)

NSSDC ID- 69-046E

LAUNCH DATE- 05/23/69 WEIGHT- 259. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/25/69
 ORBIT PERIOD- 6709. MIN INCLINATION- 32.8 DEG
 PERIAPSIS- 110920. KM ALT APOAPSIS- 112283. KM ALT

PERSONNEL
 PI - ARPA-STAFF ARPA/WASH, DC
 MG - SAMS0 USAF-LAS
 PS - R.W. KLEBASADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
 VELA 5B WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE FIFTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE -- (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 5B, AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES, HAD BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMAND AND TELEMETRY.

----- VELA 5B, BAME-----

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-046E-05 INVESTIGATIVE PROGRAM
 NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - S.J. BAME LOS ALAMOS SCI LAB
 OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB
 OI - H.E. FELTHAUSER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS AND ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE DETECTOR UNIT WAS USED TO STUDY MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KEV/Q AND 8.3 KEV/Q. THE OTHER DETECTOR UNIT, WHICH FAILED, WAS DESIGNED TO STUDY SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 10.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 EV/Q TO 5 KEV/Q.

----- VELA 5B, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046E-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS**PERSONNEL**

PI - S.J. BAME	LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 5B, BELIAN-----

INVESTIGATION NAME- COSMIC X RAYS

NSSDC ID- 69-046E-06

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY**PERSONNEL**

PI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - W.D. EVANS	LOS ALAMOS SCI LAB
OI - J.P. CONNER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE COSMIC X-RAY DETECTOR WAS A LARGE-AREA 26 SQ CM SODIUM IODIDE SCINTILLATOR WITH A 5-MIL BERYLLIUM WINDOW. THE EXPERIMENT WAS DESIGNED TO PROVIDE MEASUREMENTS OF THE LOCATION, INTENSITY, AND INTENSITY VARIATIONS OF NONSOLAR X-RAY SOURCES OVER A LONG PERIOD OF TIME. THE DETECTOR WAS SENSITIVE TO X-RAY PHOTONS IN TWO ENERGY INTERVALS (3 TO 6 KEV AND 3 TO 12 KEV), AND WAS SUFFICIENTLY SENSITIVE TO MONITOR FROM 6 TO 12 GALACTIC X-RAY SOURCES. ANY ONE SOURCE WAS VIEWED FOR APPROXIMATELY 1 H, AND EVERY 2 DAYS EACH SOURCE WAS BACK IN VIEW. THREE MODES OF READOUT WERE AVAILABLE - (1) THE REAL TIME NORMAL MODE, IN WHICH COUNTS FROM EACH ENERGY CHANNEL WERE TRANSMITTED EVERY S, (2) THE HIGH RESOLUTION MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS TRANSMITTED EIGHT TIMES PER S, AND (3) THE STORE MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS STORED.

----- VELA 5B, HIGBIE-----

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 69-046E-03

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS**PERSONNEL**

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA 5B, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 69-046E-04

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS**PERSONNEL**

PI - P.R. HIGBIE	LOS ALAMOS SCI LAB
OI - R.D. BELIAN	LOS ALAMOS SCI LAB
OI - D.N. BAKER	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAY IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

----- VELA 5B, KLEBESADEL-----

INVESTIGATION NAME- GAMMA RAY ASTRONOMY

NSSDC ID- 69-046E-08

INVESTIGATIVE PROGRAM
NUCLEAR DETECTIONINVESTIGATION DISCIPLINE(S)
ASTRONOMY
GAMMA-RAY ASTRONOMY**PERSONNEL**

PI - R.W. KLEBESADEL	LOS ALAMOS SCI LAB
OI - I.B. STRONG	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10 CC CM CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGIC CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

***** VELA 6A*****

SPACECRAFT COMMON NAME- VELA 6A
ALTERNATE NAMES- PL-702B, VELA 11 (TRW)
04366

NSSDC ID- 70-027A

LAUNCH DATE- 04/08/70 WEIGHT- 261. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/09/70
ORBIT PERIOD- 6729. MIN INCLINATION- 32.43 DEG
PERIAPSIS- 111210. KM ALT APOAPSIS- 112160. KM ALT

PERSONNEL

MG - ARPA-STAFF	ARPA/WASH, DC
PM - SAMSO	USAF-LAS
PS - R.W. KLEBESADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 6A WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE SIXTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 45 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 6A WAS AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES HAVING BETTER COMMAND CAPABILITIES, INCREASED

DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 24 FACES. ROTATION RATES OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND 5B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

----- VELA 6A, BAME-----

INVESTIGATION NAME- SOLAR WIND EXPERIMENT

NSSDC ID- 70-027A-05 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB
OI - H.E. FELTHAUSER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE ANALYZER-MULTIPLIER UNIT STUDIED SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 EV/Q TO 5 KEV/Q. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 35 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KEV/Q AND 8.3 KEV/Q.

----- VELA 6A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-027A-07 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

----- VELA 6A, CHAMBERS-----

INVESTIGATION NAME- SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 16 A, 1 TO 16 A, 44 TO 60 A

NSSDC ID- 70-027A-02 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - W.H. CHAMBERS LOS ALAMOS SCI LAB
OI - J.C. FULLER LOS ALAMOS SCI LAB
OI - W.E. KUNZ LOS ALAMOS SCI LAB
OI - P.E. FEHLAU LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR AMBIENT AND FLARE-PRODUCED FLUX OF X RAYS IN THE 0.3- TO 60-A WAVELENGTH REGION. TWO IDENTICAL X-RAY SENSOR UNITS WERE MOUNTED AT DIAMETRICALLY OPPOSED APEX POSITIONS ON THE SATELLITE. EACH UNIT CONTAINED FOUR DETECTORS -- THREE ION CHAMBERS AND A SCINTILLATION (NAI(TL)) DETECTOR. AS EACH ION CHAMBER HAD A HEMISPHERICAL WINDOW, THE COMBINED OUTPUT SIGNALS FROM IDENTICAL CHAMBERS IN EACH SENSOR UNIT APPROXIMATED THE RESPONSE OF AN IDEAL DETECTOR WITH A 4-PI STERADIAN FIELD OF VIEW. THE ION CHAMBERS HAD THE FOLLOWING WINDOW MATERIALS, GAS FILLS, AND WAVELENGTH RESPONSES. CHAMBER 1 -- 0.127 MM OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 16 A. CHAMBER 2 -- 6.35 MICROMETER OF MYLAR OVERCOATED WITH ABOUT AN 8,500 A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 6.35 MICROMETER OF MYLAR, 0.5 ATM OF NITROGEN, 1 TO 16 A AND 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1

TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE OBTAINED UPON SUITABLE ANALYSIS OF THE DATA. THE SCINTILLATION DETECTOR USED FOR THE 0.3- TO 3-A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NA1 CRYSTAL OPTICALLY COUPLED TO A PMT, THE OUTPUT OF WHICH FED A FIVE-LEVEL, INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS, THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD A 1.27 CM-DIAMETER, 1 MM-THICK CRYSTAL COVERED BY A FLAT 0.25 MM-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.1-9 J/50 CM-S) HAD A 6.35 MM-DIAMETER, 1 MM-THICK CRYSTAL AND A 2.03 MM-THICK BERYLLIUM BORE WINDOW IN ADDITION TO THE FLAT 0.25 MM WINDOW MOUNTED ON THE FACE OF THE CRYSTAL. BOTH ION CHAMBERS AND SCINTILLATION DETECTORS WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 S. THE AVERAGE DETECTION EFFICIENCIES FOR THE ION AND SCINTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 6A, HIGBIE-----

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 70-027A-03 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.W. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

----- VELA 6A, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 70-027A-04 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.W. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELECTRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 MEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ITS ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT-VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAY IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

----- VELA 6A, KLEBESADEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 70-027A-08 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - R.W. KLEBESADEL LOS ALAMOS SCI LAB
OI - I.P. STRONG LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF SIX 10 CM CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.3 TO 1.5 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS

ORIGINAL PAGE IS
OF POOR QUALITY

TEMPORAL COVERAGE WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, WAS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 20 COUNTS/S.

***** VELA 6B *****

SPACECRAFT COMMON NAME- VELA 6B
ALTERNATE NAMES- PL-702C, VELA 12 (TRW)
04368, VELA 6B (USAF)

NSSDC ID- 70-0270

LAUNCH DATE- 04/08/70 WEIGHT- 261. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/11/70
ORBIT PERIOD- 6745. MIN INCLINATION- 39.52 DEG
PERIAPSIS- 111000. KM ALT APOAPSIS- 112210. KM ALT

PERSONNEL
PI - ARPA-STAFF ARPA/WASH, DC
PM - SARSO USAF-LAS
PS - R.W. KLEBSADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
VELA 6B WAS ONE OF TWO SPIN-STABILIZED, POLYHEDRAL SATELLITES THAT COMPRISED THE SIXTH LAUNCH IN THE VELA PROGRAM. THE ORBITS OF THE TWO SATELLITES ON EACH LAUNCH WERE BASICALLY CIRCULAR AT ABOUT 17 EARTH RADII, INCLINED AT 60 DEG TO THE ECLIPTIC, AND SPACED 180 DEG APART, THUS PROVIDING A MONITORING CAPABILITY OF OPPOSITE SIDES OF THE EARTH. THE OBJECTIVES OF THE SATELLITES WERE (1) TO STUDY SOLAR AND COSMIC X RAYS, EUV, SOLAR PROTONS, SOLAR WIND, AND NEUTRONS, (2) TO CARRY OUT RESEARCH AND DEVELOPMENT ON METHODS OF DETECTING NUCLEAR EXPLOSIONS BY MEANS OF SATELLITE-BORNE INSTRUMENTATION, AND (3) TO PROVIDE SOLAR FLARE DATA IN SUPPORT OF MANNED SPACE MISSIONS. VELA 6B WAS AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES HAVING BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT. POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. A ROTATION RATE OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

***** VELA 6B, BARE *****

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-0270-07 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 3.6 KG) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

***** VELA 6B, HIGBIE *****

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 70-0270-03 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.W. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE SOLAR TELESCOPE EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRUM AND ANGULAR DISTRIBUTION OF SOLAR PROTONS BETWEEN 0.3 AND 50 MEV AND OF SOLAR ALPHA PARTICLES BETWEEN 2 AND 100 MEV. IN ADDITION, THE EXPERIMENT WAS DESIGNED TO IDENTIFY AND MONITOR THE FLUX OF DEUTERIUM, TRITIUM, AND HELIUM-3 NUCLEI WHICH MAY BE EMITTED DURING A SOLAR PARTICLE FLARE AND TO MONITOR THE INTENSITY OF MORE HEAVILY IONIZED

PARTICLES. THERE WERE THREE TELESCOPES IN A SINGLE PLANE, ORIENTED AT ANGLES OF 45 DEG, 90 DEG, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EACH INSTRUMENT CONSISTED OF A COLLIMATING TUBE (PROVIDING AN ANGULAR VIEW OF 30 DEG) IN FRONT OF A SOLID-STATE DE/DX VS E PARTICLE DETECTOR.

***** VELA 6B, HIGBIE *****

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 70-0270-04 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.D. BELIAN LOS ALAMOS SCI LAB
OI - D.W. BAKER LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
TWO SETS OF THREE SOLID-STATE ELECTRON DETECTORS IN A TELESCOPIC ARRANGEMENT WITH AN ANGULAR VIEW OF 30 DEG WERE USED TO OBSERVE ELETRONS OVER THE RANGE 30 TO 150 KEV. PROTONS OF ENERGY LESS THAN 300 KEV AND GREATER THAN 50 KEV COULD ALSO BE DETECTED. ONE SET OF DETECTORS VIEWED THE PARTICLES DIRECTLY. THE OTHER UTILIZED A SCATTER GEOMETRY TO IMPROVE ITS ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT-VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAID IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

***** VELA 6B, KLEBSADEL *****

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 70-0270-08 INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - R.W. KLEBSADEL LOS ALAMOS SCI LAB
OI - I.B. STRONG LOS ALAMOS SCI LAB
OI - R.A. OLSON LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF SIX 10 CM CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.3 TO 1.5 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 90 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MPV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, WAS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 20 COUNTS/S.

***** VENERA 11 *****

SPACECRAFT COMMON NAME- VENERA 11
ALTERNATE NAMES- 11020

NSSDC ID- 7R-084A

LAUNCH DATE- 09/09/70 WEIGHT- KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMOPHROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
U.S.S.R. SAS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE-
ORBIT PERIOD- DAYS INCLINATION-
PERIAPSIS- AU RAD APOAPSIS- AU RAD

PERSONNEL
PM - UNKNOWN IKI
PS - O.L. VAISBERG IKI

BRIEF DESCRIPTION
VENERA 11 WAS PART OF A TWO SPACECRAFT MISSION TO STUDY VENUS AND THE INTERSOLAR MEDIUM. EACH OF THE TWO SPACECRAFT, VENERA 11 AND VENERA 12, CONSISTED OF A FLIGHT PLATFORM AND A LANDER PROBE. IDENTICAL INSTRUMENTS WERE CARRIED ON THE SPACECRAFT. THE FLIGHT PLATFORM HAD INSTRUMENTS TO STUDY SOLAR WIND COMPOSITION, GAMMA RAY BURSTS, ULTRAVIOLET RADIATION, AND THE ELECTRON COMPOSITION OF THE IONOSPHERE OF VENUS. THE LANDER PROBE CARRIED INSTRUMENTS TO STUDY THE CHARACTERISTICS AND COMPOSITION OF THE ATMOSPHERE OF VENUS. AFTER EJECTION OF

THE LANDER PROBE THE FLIGHT PLATFORM CONTINUED IN A HELIOCENTRIC ORBIT. NEAR ENCOUNTER WITH VENUS OCCURRED ON DECEMBER 25, 1978 AT APPROXIMATELY 34,000 KM ALTITUDE.

----- VENERA 11, ESTULIN -----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 78-084A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN IKI
PI - G. VEDRENNE CESR

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SOLAR AND COSMIC GAMMA-RAY BURSTS, TO ACCURATELY MEASURE THEIR POSITION IN CONJUNCTION WITH MEASUREMENTS FROM OTHER SPACECRAFT, AND TO DETERMINE THE ENERGY SPECTRA AND TEMPORAL CHARACTERISTICS OF THE BURSTS. THE INSTRUMENTATION CONSISTED OF TWO SCINTILLATION DETECTORS. ONE WAS POINTED TOWARDS THE SUN, THE OTHER WAS AT 180 DEG FROM THE FIRST. THE DETECTORS MEASURED 0.08 TO 2.5 MEV IN 7 CHANNELS. THE DETECTORS HAD A SENSITIVITY OF $5.0E-6$ ERGS/50 CM FOR EACH GAMMA-RAY BURST DETECTED.

----- VENERA 11, GRINGAUZ -----

INVESTIGATION NAME- RETARDING POTENTIAL TRAPS

NSSDC ID- 78-084A-02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO STUDY THE ENERGY SPECTRA OF THE ION AND ELECTRON COMPONENTS OF THE SOLAR WIND AT VARYING DISTANCES FROM THE SUN. THE INSTRUMENT WAS A RETARDING POTENTIAL ANALYZER WHICH MEASURED IONS FROM 0 TO 4.0 KEV AND ELECTRONS FROM 0 TO 300 EV. THE DETECTOR HAD A SENSITIVITY OF $3.0E+5$ TO $3.0E+9/50$ CM/S. IT WAS OPERATED AT INTERVALS DURING THE MISSION.

----- VENERA 11, KURT -----

INVESTIGATION NAME- UV GRATING MONOCHROMATOR

NSSDC ID- 78-084A-03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - V.G. KURT IKI
PI - J.L. BERTAUX CNRS-SA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SCATTERED UV RADIATION FROM INTERPLANETARY SPACE AND VENUS BY ANALYZING SPECTRA LINES AT 304, 384, 736, 864, 1048, 1216, 1300, 1356, AND 1500 Å. DETERMINATIONS OF LINE SPECTRA FOR H, H₂, He I, He II, O I, Ne I, Ar I, AND CO WERE MADE WHEN THE SPACECRAFT WAS CLOSE TO VENUS. LINE INTENSITY FOR H, He I, AND He II WERE DETERMINED WHILE THE SPACECRAFT WAS IN INTERPLANETARY SPACE. THE DETECTOR CONSISTED OF A MULTICHANNEL GRATING MONOCHROMATOR WITH THE OPTICAL AXIS ORIENTED IN THE ANTI-SOLAR DIRECTION. THIS INVESTIGATION WAS OPERATED AT SELECTED INTERVALS DURING THE MISSION INCLUDING A SCAN OF THE SOLAR ILLUMINATED VENUS' DISK.

----- VENERA 11, LOGACHEV -----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 78-084A-04 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - YU.I. LOGACHEV NUCLEAR PHYSICS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE THE SPECTRA AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE SOLAR WIND. IT USED PROPORTIONAL COUNTERS, GIGER COUNTERS, AND SEMICONDUCTOR AND SCINTILLATION DETECTORS. ELECTRONS FROM 5 TO 500 KEV AND PROTONS IN TWO RANGES - 0.05 TO 1 MEV AND 30 TO 200 MEV WERE MEASURED. THE INSTRUMENTATION HAD A SENSITIVITY UP TO $5.0E+5/50$ CM/S/SR.

----- VENERA 11, MAZETS -----

INVESTIGATION NAME- GAMMA-RAY BURST DETECTORS

NSSDC ID- 78-084A-05 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - E.P. MAZETS LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE COORDINATES OF GAMMA-RAY BURSTS TO WITHIN 2-3 DEG. THE INSTRUMENTATION CONSISTED OF SIX IDENTICAL SCINTILLATION DETECTORS WITH THEIR ORIENTATION ALONG THE GEOMETRIC AXIS OF THE SPACECRAFT. THEY HAD A MEASUREMENT RANGE OF 20 TO 300 KEV WITH A SENSITIVITY OF $1.0E-6$ ERGS/50 CM.

----- VENERA 11, PISARENKO -----

INVESTIGATION NAME- PROTON SPECTROMETER

NSSDC ID- 78-084A-06 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - N.P. PISARENKO IKI

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY PROTON ACCELERATION IN THE INTERPLANETARY MEDIUM AND THE SOLAR ACTIVITY PROCESSES INVOLVED IN THE ORIGIN OF CHARGED PARTICLES. THE INSTRUMENTATION CONSISTED OF A SEMICONDUCTOR SPECTROMETER WITH AN Si N-P DETECTOR. IT HAD 10 CHANNELS COVERING FROM 0.3 TO 100 MEV AND WAS SENSITIVE TO A FLUX OF $1.0E+4$ PROTONS/50 CM/S AT 10 MEV.

----- VENERA 11, SAVICH -----

INVESTIGATION NAME- TWO-FREQUENCY TRANSMITTERS

NSSDC ID- 78-084A-07 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - M.A. SAVICH IRE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY THE ELECTRON CONCENTRATION DISTRIBUTION IN THE IONOSPHERE OF VENUS AND TO STUDY FLUCTUATION OF ELECTRON CONCENTRATION IN INTERPLANETARY AND NEAR-SUN PLASMAS. THIS INVESTIGATION USED RADIO TRANSMISSIONS IN THE CENTIMETER AND DECIMETER RANGE.

----- VENERA 11, VAISBERG -----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTORS

NSSDC ID- 78-084A-08 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - O.L. VAISBERG IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE ENERGY SPECTRA OF THE SOLAR WIND ION AND ELECTRON COMPONENTS. IT ALSO MEASURED SEPARATELY PROTONS AND ALPHA PARTICLES AT VARYING DISTANCES FROM THE SUN. THE INVESTIGATION USED ELECTROSTATIC ANALYZERS, AND A PARADAY CYLINDER. ELECTRONS WERE MEASURED FROM 10 TO 200 EV IN 24 STEPS, TOTAL ION CONCENTRATIONS FROM 0.25 TO 5 KEV IN 24 STEPS, PROTONS FROM 0.25 TO 5 KEV IN 24 STEPS, AND ALPHA PARTICLES FROM 0.5 TO 10 KEV IN 24 STEPS. SPECTRAL MEASUREMENTS TOOK 192 S. THE FLUX SENSITIVITY WAS $5.0E+7$ TO $1.0E+10/50$ CM/S. THE INSTRUMENT WAS OPERATED AT INTERVALS DURING THE FLIGHT PATH.

***** VENERA 12 *****

SPACECRAFT COMMON NAME- VENERA 12
ALTERNATE NAMES- 11026

NSDC ID- 78-086A

LAUNCH DATE- 09/14/78 WEIGHT- KG
LAUNCH SITE- TYURATAY (BAIKONUR COSMOPHORE), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY SAS
U.S.S.R.

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE-
ORBIT PERIOD- DAYS INCLINATION- DEG
PERIAPSIS- AU RAD APOAPSIS- AU RAD

PERSONNEL
PI - UNKNOWN
PS - G.L. VAISBERG SOVIET ACAD OF SCI

BRIEF DESCRIPTION
VENERA 12 WAS PART OF A TWO SPACECRAFT MISSION TO STUDY VENUS AND THE INTERSOLAR MEDIUM. EACH OF THE TWO SPACECRAFT, VENERA 11 AND VENERA 12, CONSISTED OF A FLIGHT PLATFORM AND A LANDER PROBE. IDENTICAL INSTRUMENTS WERE CARRIED ON THE SPACECRAFT. THE FLIGHT PLATFORM HAD INSTRUMENTS TO STUDY SOLAR WIND COMPOSITION, GAMMA RAY BURSTS, ULTRAVIOLET RADIATION, AND THE ELECTRON COMPOSITION OF THE IONOSPHERE OF VENUS. THE LANDER PROBE CARRIED INSTRUMENTS TO STUDY THE CHARACTERISTICS AND COMPOSITION OF THE ATMOSPHERE OF VENUS. AFTER EJECTION OF THE LANDER PROBE, THE FLIGHT PLATFORM CONTINUED IN A HELIOCENTRIC ORBIT. NEAR ENCOUNTER WITH VENUS OCCURRED ON DECEMBER 21, 1978 AT APPROXIMATELY 34,000 KM ALTITUDE.

----- VENERA 12, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSDC ID- 78-086A-01 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN IKI
PI - G. VEDRENNE CESR

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SOLAR AND COSMIC GAMMA-RAY BURSTS, TO ACCURATELY MEASURE THEIR POSITION IN CONJUNCTION WITH MEASUREMENTS FROM OTHER SPACECRAFT, AND TO DETERMINE THE ENERGY SPECTRA AND TEMPORAL CHARACTERISTICS OF THE BURSTS. THE INSTRUMENTATION CONSISTED OF TWO SCINTILLATION DETECTORS. ONE WAS POINTED TOWARDS THE SUN, THE OTHER WAS AT 120 DEG FROM THE FIRST. THE DETECTORS MEASURED 0.0R TO 2.4 MEV IN 7 CHANNELS. THE DETECTORS HAD A SENSITIVITY OF $5.0E-6$ ERGS/50 CM FOR EACH GAMMA-RAY BURST DETECTED.

----- VENERA 12, GRINGAUZ-----

INVESTIGATION NAME- RETARDING POTENTIAL TRAPS

NSDC ID- 78-086A-02 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WAS TO STUDY THE ENERGY SPECTRA OF THE ION AND ELECTRON COMPONENTS OF THE SOLAR WIND AT VARYING DISTANCES FROM THE SUN. THE INSTRUMENT WAS A RETARDING POTENTIAL ANALYZER WHICH MEASURED IONS FROM 0 TO 4.5 KEV AND ELECTRONS FROM 0 TO 300 EV. THE DETECTOR HAD A SENSITIVITY OF $3.0E+5$ TO $3.0E+9/50$ CM/S. IT WAS OPERATED AT INTERVALS DURING THE MISSION.

----- VENERA 12, KURT-----

INVESTIGATION NAME- UV GRATING MONOCHROMATOR

NSDC ID- 78-086A-03 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - V.G. KURT IKI
PI - J.L. BERTAUD CNRS-SA

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE SCATTERED UV RADIATION FROM INTERPLANETARY SPACE AND VENUS BY ANALYZING SPECTRA LINES AT 304, 584, 756, 869, 1048, 1216, 1300, 1356, AND 1500 A. DETERMINATIONS OF LINE SPECTRA FOR H, HE I, HE II, O I, NE I, AR I, AND CO WERE MADE WHEN THE SPACECRAFT WAS CLOSE TO VENUS. LINE INTENSITY FOR H, HE I, AND HE II WERE DETERMINED WHILE THE SPACECRAFT WAS IN INTERPLANETARY SPACE. THE DETECTOR CONSISTED OF A MULTICHANNEL

GRATING MONOCHROMATOR WITH THE OPTICAL AXIS ORIENTED IN THE ANTI-SOLAR DIRECTION. THIS INVESTIGATION WAS OPERATED AT SELECTED INTERVALS DURING THE MISSION INCLUDING A SCAN OF THE SOLAR ILLUMINATED VENUS' DISK.

----- VENERA 12, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSDC ID- 78-086A-04 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - VU.I. LOGACHEV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO MEASURE THE SPECTRA AND ANGULAR DISTRIBUTION OF ELECTRONS AND PROTONS IN THE SOLAR WIND. IT USED PROPORTIONAL COUNTERS, GEIGER COUNTERS, AND SEMICONDUCTOR AND SCINTILLATION DETECTORS. ELECTRONS FROM 5 TO 500 KEV AND PROTONS IN TWO RANGES - 0.05 TO 1 MEV AND 30 TO 200 MEV WERE MEASURED. THE INSTRUMENTATION HAD A SENSITIVITY UP TO $5.0E+5/50$ CM/S/5R.

----- VENERA 12, MAZETS-----

INVESTIGATION NAME- GAMMA-RAY BURST DETECTORS

NSDC ID- 78-086A-05 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - E.P. MAZETS LENGRAD INST PHYS TECH

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WAS TO DETERMINE THE COORDINATES OF GAMMA-RAY BURSTS TO WITHIN 2-3 DEG. THE INSTRUMENTATION CONSISTED OF SIX IDENTICAL SCINTILLATION DETECTORS WITH THEIR ORIENTATION ALONG THE GEOMETRIC AXIS OF THE SPACECRAFT. THEY HAD A MEASUREMENT RANGE UP TO 300 KEV WITH A SENSITIVITY OF $1.0E-6$ ERGS/50 CM.

----- VENERA 12, PISARENKO-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSDC ID- 78-086A-06 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.F. PISARENKO IKI

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY PROTON ACCELERATION IN THE INTERPLANETARY MEDIUM AND THE SOLAR ACTIVITY PROCESSES INVOLVED IN THE ORIGIN OF CHARGED PARTICLES. THE INSTRUMENTATION CONSISTED OF A SEMICONDUCTOR SPECTROMETER WITH AN Si A-F DETECTOR. IT HAD 10 CHANNELS COVERING FROM 0.1 TO 100 MEV AND WAS SENSITIVE TO A FLUX OF $1.0E+4$ PROTONS/50 CM/S AT 10 MEV.

----- VENERA 12, SAVICH-----

INVESTIGATION NAME- PROTON SPECTROMETER

NSDC ID- 78-086A-07 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
ION SPES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - N.A. SAVICH IKI

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION WERE TO STUDY THE ELECTRON CONCENTRATION DISTRIBUTION IN THE IONOSPHERE OF VENUS AND TO STUDY FLUCTUATION OF ELECTRON CONCENTRATION IN INTERPLANETARY AND NEAR-SUN PLASMAS. THIS INVESTIGATION USED RADIO TRANSMISSIONS IN THE CENTIMETER AND DECIMETER RANGE.

----- VENERA 12, VAISBERG-----

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTORS

NSDC ID- 78-086A-08 INVESTIGATIVE PROGRAM
SCIENCE
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. VAISBERG

IKI

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WAS TO MEASURE THE ENERGY SPECTRA OF THE SOLAR WIND ION AND ELECTRON COMPONENTS. IT ALSO MEASURED SEPARATELY PROTONS AND ALPHA PARTICLES AT VARIOUS DISTANCES FROM THE SUN. THE INVESTIGATION USED ELECTROSTATIC ANALYSERS AND A PARADAY CYLINDER. ELECTRONS WERE MEASURED FROM 10 TO 200 EV IN 24 STEPS, TOTAL ION CONCENTRATIONS FROM 0.25 TO 5 KEV IN 24 STEPS, PROTONS FROM 0.25 TO 5 KEV IN 24 STEPS, AND ALPHA PARTICLES FROM 0.5 TO 10 KEV IN 24 STEPS. SPECTRAL MEASUREMENTS TOOK 192 S. THE FLUX SENSITIVITY WAS $5.0E+7$ TO $1.0E+10/50$ CM²/S. THE INSTRUMENT WAS OPERATED AT INTERVALS DURING THE FLIGHT PATH.

***** VIKING 1 LANDER *****

SPACECRAFT COMMON NAME- VIKING 1 LANDER
ALTERNATE NAMES- VIKING-B LANDER

NSSDC ID- 75-075C

LAUNCH DATE- 02/20/75 WEIGHT- 685. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL
MG - W. JAKOBOWSKI (RETIRED) NASA HEADQUARTERS
SC - R.S. YOUNG (RETIRED) NASA HEADQUARTERS
PM - K.S. WATKINS NASA-JPL
PS - C.W. SNYDER NASA-JPL

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON JULY 20, 1976, IN THE CHRYSE REGION OF MARS AT 22.27 DEG N LATITUDE AND 47.94 DEG W LONGITUDE. THE LANDER CARRIED INSTRUMENTS TO STUDY THE BIOLOGY, CHEMICAL COMPOSITION (ORGANIC AND INORGANIC), METEOROLOGY, SEISMOLOGY, MAGNETIC PROPERTIES, SURFACE APPEARANCE, AND PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ATMOSPHERE. THE LANDER HAD A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LB). SOME OF THE DATA COLLECTED WERE RETURNED BY DIRECT RADIO LINK TO EARTH, BUT MOST OF THE DATA WERE RETURNED BY RELAY THROUGH ONE OF THE ORBITERS. THE LANDER WAS APPROXIMATELY 3M ACROSS AND ABOUT 2M HIGH.

***** VIKING 1 LANDER, HESS *****

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-075C-07 INVESTIGATIVE PROGRAM
CCDE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
TL - S.L. HESS FLORIDA STATE U
TM - C.D. LEVY U OF WASHINGTON
PM - R.M. HENRY U OF WASHINGTON
YM - J.A. RYAN CALIF ST U, FULLERTON
JM - J.E. TILLMAN U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT ANALYZED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ATMOSPHERIC PARAMETERS DETERMINED WERE PRESSURE, TEMPERATURE, WIND SPEED, AND WIND DIRECTION. DIURNAL AND SEASONAL VARIATIONS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY (SOL) WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTED BOOM. THREE HOT-FILM ANEMOMETERS, THROUGH WHICH AN ELECTRIC CURRENT WAS PASSED TO HEAT TWO GLASS NEEDLES COATED WITH PLATINUM AND OVERCOATED WITH ALUMINUM OXIDE, WERE USED TO MEASURE WIND SPEED. THE ELECTRIC POWER NEEDED TO MAINTAIN THESE SENSORS AT A FIXED TEMPERATURE ABOVE THE SURROUNDING AIR WAS THE MEASURE OF WIND SPEED. ATMOSPHERIC TEMPERATURE WAS MEASURED BY THREE FINE-WIRE THERMOCOUPLES IN PARALLEL. A 1-IN METAL DIAPHRAGM, MOUNTED IN A VACUUM-SEALED CASE, WAS USED TO MEASURE ATMOSPHERIC PRESSURE.

***** VIKING 1 LANDER, MICHAEL, JR. *****

INVESTIGATION NAME- LANDER RADIO SCIENCE

NSSDC ID- 75-075C-11 INVESTIGATIVE PROGRAM
CCDE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL
TL - W.H. MICHAEL, JR.
TM - I.I. SHAPIRO
PM - G.F. LINDAL
YM - J.G. DAVIES
JM - D.L. CAIN
TM - W.D. GROSSI
TM - G.L. TYLER
TM - J.P. SHENKLE
TM - R.W. TOLSON
TM - C.T. STELZRIED
TM - G. BORN
TM - R. REISENBERG

NASA-LARC
MASS INST OF TECH
NASA-JPL
U OF MANCHESTER
NASA-JPL
STANFORD U
NASA-LARC
NASA-LARC
NASA-JPL
NASA-JPL
MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE LANDER S-BAND RADIO TRANSMITTER TO ACQUIRE DOPPLER AND RANGE FOR THE LANDER, UTILIZING THE SAME DEEP SPACE NETWORK FACILITIES THAT WERE USED BY THE ORBITERS. THE RESULTING DATA WERE USED TO DETERMINE THE LOCATION OF THE LANDER ON THE PLANET'S SURFACE. THEY ALSO PROVIDED MORE PRECISE INFORMATION ABOUT THE ORBITAL, POTENTIAL, AND PRECESSIONAL MOTION OF MARS THAN HAD PREVIOUSLY BEEN AVAILABLE. THE TWO PRINCIPAL DIFFERENCES BETWEEN ORBITER AND LANDER TRACKING DATA ARE: (1) LANDER TRACKING PERIODS ARE NEVER LONGER THAN 2 H AND ARE SOMETIMES MUCH SHORTER BECAUSE OF THERMAL CONSTRAINTS ON THE DURATION OF LANDER TRANSMITTER OPERATION; AND (2) LANDERS HAVE NO X-BAND SIGNALS TO PROVIDE THE CORRECTIONS TO RANGE DATA FOR THE INTERPLANETARY PLASMA EFFECTS. CONSEQUENTLY, LANDER RANGING SESSIONS WERE SCHEDULED TO BE NEARLY SIMULTANEOUS WITH ORBITER RANGING WHENEVER POSSIBLE, SO THAT THE ORBITER S- AND X-BAND DATA COULD SUPPLY THESE CORRECTIONS.

***** VIKING 1 LANDER, HUTCH *****

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-075C-06 INVESTIGATIVE PROGRAM
CCDF SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL
TL - T.A. HUTCH NASA HEADQUARTERS
TM - C. SAGAN CORNELL U
YM - A.B. BINDER U OF IEL
TM - E.C. MORRIS US GEOLOGICAL SURVEY
TM - F.O. HUCK NASA-LARC
TM - E.C. LEVINTHAL STANFORD U
TM - S. LIEFFS, JR. STANFORD U
TM - J.B. POLLACK NASA-ARC
TM - R.E. ARVIDSON WASHINGTON U

BRIEF DESCRIPTION

THE LANDER IMAGING EXPERIMENT VIEWED THE SCENE SURROUNDING THE LANDER, THE SURFACE SAMPLER AND OTHER PARTS OF THE LANDER, THE SUN, PHOBOS, AND DEIMOS TO PROVIDE DATA FOR OPERATIONAL PURPOSES AND FOR GEOLOGICAL AND METEOROLOGICAL INVESTIGATIONS. TWO SCANNING CAMERAS, CAPABLE OF RESOLVING 0.34 DEG (HIGH RESOLUTION) OR 0.12 DEG (LOW RESOLUTION, COLOR, AND IR) WERE USED ON EACH LANDER. EACH IMAGE ACQUIRED COVERED A VERTICAL FIELD OF 20 DEG (HIGH RESOLUTION) OR 60 DEG (LOW RESOLUTION, COLOR, AND IR) AND A HORIZONTAL FIELD THAT WAS COMMANDABLE FROM 2.5 DEG TO 342.5 DEG IN 2.5-DEG INCREMENTS. IMAGES WERE ACQUIRED FROM 40 DEG ABOVE THE NOMINAL HORIZON TO 60 DEG BELOW AND WERE COMMANDABLE IN 10-DEG INCREMENTS. THE CAMERAS WERE MOUNTED 1.3 M ABOVE THE NOMINAL LANDING PLANE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND MOST OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. THE TWO CAMERAS WERE SEPARATED BY 1.8 M AND STEREOSCOPIC PICTURES WERE OBTAINED OVER MOST OF THE SCENE. BLACK AND WHITE IMAGES IN EITHER LOW OR HIGH RESOLUTION INCLUDED RADIATION WAVELENGTHS FROM 0.4 TO 1.1 MICROMETERS. THE USE OF A SINGLE DETECTOR TO IMAGE AN ENTIRE FRAME ALLOWED A RELATIVE RADIOMETRIC ACCURACY OF PLUS OR MINUS 10 PERCENT. FOR MORE INFORMATION CONCERNING THE CAMERAS, SEE HUCK ET AL., "SPACE SCIENCE INSTRUMENTATION 1," 189-241 (1977).

***** VIKING 1 ORBITER *****

SPACECRAFT COMMON NAME- VIKING 1 ORBITER
ALTERNATE NAMES- PL-753B, VIKING-B ORBITER
VIKING-B

NSSDC ID- 75-075A

LAUNCH DATE- 08/20/75 WEIGHT- 1170. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORIGINAL PAGE IS
OF QUALITY

ORBIT PARAMETERS

ORBIT TYPE- AREOCENTRIC
ORBIT PERIOD- 1479. MIN
PERIAPSIS- 1513. KM ALT

EPOCH DATE- 06/21/76
INCLINATION- 37.9 DEG
APOAPSIS- 32600. KM ALT

PERSONNEL

MG - W. JAKOBOWSKI
SC - R.S. YOUNG
PM - K.S. WATKINS
PR - C.W. SNYDER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
NASA-JPL

BRIEF DESCRIPTION

THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. THE LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED JULY 20, 1976. SCIENTIFIC DATA WERE COLLECTED AND TRANSMITTED TO EARTH FROM THE LANDER DURING ENTRY AND WHILE IT WAS ON THE SURFACE, AND FROM THE ORBITER BEFORE AND AFTER LANDER SEPARATION. THE ORBITER WAS A SOLAR-CELL-POWERED SATELLITE STABILIZED IN THREE AXES USING INERTIAL AND CELESTIAL REFERENCES. THERE WAS A 900-W POWER CAPACITY FOR THE ORBITER. IT CARRIED INSTRUMENTS FOR CONDUCTING IMAGING, ATMOSPHERIC WATER VAPOR, THERMAL MAPPING, AND RADIO SCIENCE INVESTIGATIONS. THE SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS HAD A MASS OF APPROXIMATELY 72 KG (158 LB). THE ORBITER WAS AN OCTAGON APPROXIMATELY 2.5 M ACROSS. THE EIGHT SIDES OF THE RING-LIKE STRUCTURE WERE .457 M HIGH AND WERE ALTERNATELY 1.4 AND 0.6 WIDE.

----- VIKING 1 ORBITER, KIEFFER -----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-075A-01

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. CARR
TM - W.A. BAUM
TM - H. WASURSKY
TM - G.A. BRIGGS
TM - J.A. CUTTS
TM - T.C. DUXBURY
TM - K.R. BLASIUS
TM - R. GREELEY
TM - J.E. GUEST
TM - K.A. HOWARD
TM - B.A. SMITH
TM - L.A. SODERBLOM
TM - J. VEVERKA
TM - J.B. WELLMAN

US GEOLOGICAL SURVEY
LOVELL OBSERVATORY
US GEOLOGICAL SURVEY
NASA HEADQUARTERS
SCIENCE APPL, INC
NASA-JPL
SCIENCE APPL, INC
ARIZONA STATE U
U OF LONDON
US GEOLOGICAL SURVEY
U OF ARIZONA
US GEOLOGICAL SURVEY
CORNELL U
NASA-JPL

BRIEF DESCRIPTION

THE VIKING VISUAL IMAGING SUBSYSTEM (VIS) CONSISTED OF TWIN HIGH-RESOLUTION, SLOW-SCAN TELEVISION FRAMING CAMERAS MOUNTED ON THE SCAN PLATFORM OF EACH ORBITER WITH THE OPTICAL AXES OFFSET BY 1.38 DEG. EACH OF THE TWO IDENTICAL CAMERAS ON EACH ORBITER HAD A 475-MM FOCAL LENGTH TELESCOPE; A 37-MM DIAMETER VIDICON, THE CENTRAL SECTION OF WHICH WAS SCANNED IN A RASTER FORMAT OF 1056 LINES BY 1182 SAMPLES; AND SIX COLOR FILTERS TO RESTRICT THE SPECTRAL BANDPASS OF AN IMAGE TO LIMITED PORTIONS OF THE CAMERAS' NEAR-VISUAL RESPONSE CHARACTERISTICS. EACH FIELD OF VIEW WAS 1.54 DEG X 1.69 DEG WITH EACH PICTURE ELEMENT (PIXEL) SUBTENDING 25 MICRORADIANS. THE SLIGHT OFFSET OF THE OPTICAL AXES AND THE ALTERNATE SHUTTERING MODE OF OPERATION (THE INTERVAL BETWEEN FRAMES BEING 4.48 S) PROVIDED OVERLAPPING, WIDE-SWATH COVERAGE OF THE SURFACE. INDIVIDUAL IMAGES ARE IDENTIFIED BY PICTURE NUMBER (PICNO), WHICH IS A UNIQUE IDENTIFIER OF THE SCENE. ELEMENTS OF THE PICNO ARE AS FOLLOWS: THE FIRST THREE DIGITS DENOTE THE REVOLUTION (REV) DURING WHICH THE IMAGE WAS SHUTTERED; THE LETTER A IS VIKING ORBITER 1; B IS VIKING ORBITER 2; AND THE LAST TWO DIGITS ARE THE FRAME NUMBER.

----- VIKING 1 ORBITER, FARMER -----

INVESTIGATION NAME- MARS ATMOSPHERIC WATER DETECTION (MAWD)

NSSDC ID- 75-075A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER
TM - D.D. LAPORTE
TM - D.W. DAVIES

NASA-JPL
SANTA BARBARA RES CTR
NASA-JPL

BRIEF DESCRIPTION

THE MAWD USED AN INFRARED GRATING SPECTROMETER MOUNTED ON THE ORBITER SCAN PLATFORM THAT WAS BORESIGHTED WITH THE TELEVISION CAMERAS AND THE IRTM. THE INSTRUMENT MEASURED SOLAR INFRARED RADIATION REFLECTED FROM THE SURFACE THROUGH THE ATMOSPHERE TO THE SPACECRAFT. SPECTRAL INTERVALS WERE SELECTED COINCIDENT WITH THE WAVELENGTH OF WATER VAPOR ABSORPTION LINES IN THE 1.4-MICROMETER BAND. THE QUANTITY OF WATER VAPOR ALONG THE LINE OF SIGHT WAS MEASURED FROM 1 TO 100 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 5 PERCENT OR BETTER. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT WAS 2 X 17

MILLIRADIANS, AND A STEPPING MIRROR ROTATED THE LINE OF SIGHT THROUGH 15 POSITIONS TO PROVIDE A ROUGHLY RECTANGULAR FIELD OF VIEW OF 17 X 31 MILLIRADIANS.

----- VIKING 1 ORBITER, KIEFFER -----

INVESTIGATION NAME- INFRARED THERMAL MAPPING (IRTM)

NSSDC ID- 75-075A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. KIEFFER
TM - G. MUNCH
TM - E.D. MINER
TM - G. NEUGEBAUER
TM - S.C. CHASE, JR.
TM - F.D. PALLUCONI

US GEOLOGICAL SURVEY
CALIF INST OF TECH
NASA-JPL
CALIF INST OF TECH
SANTA BARBARA RES CTR
NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THE IRTM EXPERIMENT WAS TO MEASURE THE TEMPERATURES OF THE ATMOSPHERE AND AREAS ON THE SURFACE OF MARS. THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET WAS ALSO MEASURED. THE IRTM WAS A MULTICHANNEL RADIOPETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS, AND MADE OBSERVATIONS EVERY 1.12 S. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 C THROUGHOUT A TEMPERATURE RANGE OF -130 DEG C TO +57 DEG C. THE FIELD OF VIEW WAS CIRCULAR, 5 MILLIRADIANS IN DIAMETER.

----- VIKING 1 ORBITER, MICHAEL, JR. -----

INVESTIGATION NAME- ORBITER RADIO SCIENCE

NSSDC ID- 75-075A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - M.H. MICHAEL, JR.
TM - I.I. SHAPIRO
TM - G.F. LINDAL
TM - J.G. DAVIES
TM - D.L. CAIN
TM - M.D. GROSSI
TM - G.L. TYLER
TM - J.P. BREKLE
TM - R.H. TOLSON
TM - C.T. STELZRIED
TM - R. BORN
TM - G. REASENBERG

NASA-LARC
MASS INST OF TECH
NASA-JPL
U OF MANCHESTER
NASA-JPL
RAYTHEON CORP
STAMFORD U
NASA-JPL
NASA-LARC
NASA-JPL
NASA-JPL
MASS INST OF TECH

BRIEF DESCRIPTION

THERE ARE FOUR DISTINCT SETS OF VIKING RADIO SCIENCE DATA -- THREE USING ORBITER DATA AND ONE PRIMARILY USING LANDER DATA WITH CALIBRATIONS FROM ORBITER DATA. THE ORBITER TRACKING DATA, OBTAINED FROM THE TWO-WAY ORBITER-EARTH S-BAND AND X-BAND RADIO LINKS, CONSIST OF DOPPLER FREQUENCIES AND TIME-OF-FLIGHT RANGE MEASUREMENTS. THESE DETERMINED THE POSITION AND MOTION OF THE ORBITERS, AND CAN BE USED TO STUDY THE MARS GRAVITATIONAL FIELD, THE PLASMA IN INTERPLANETARY SPACE, AND THE STRUCTURE OF THE SOLAR CORONA. THE OCCULTATION DATA WERE OBTAINED FROM THESE SAME RADIO LINKS BY ANALOG RECORDING OF THE SIGNAL WHEN A SPACECRAFT WAS PASSING INTO OR OUT OF OCCULTATION WITH MARS. THE DATA CAN BE USED TO PRODUCE ALTITUDE PROFILES OF THE TEMPERATURE, DENSITY, AND PRESSURE OF THE ATMOSPHERE (INCLUDING THE IONOSPHERE) AND TO MEASURE THE RADIUS OF THE PLANET USING A LARGE NUMBER OF SURFACE POINTS. THE SURFACE PROPERTIES ASPECT OF THIS INVESTIGATION UTILIZED THE UHF (381 MHZ) SIGNAL ON WHICH THE LANDERS TRANSMITTED DATA TO THE ORBITERS. AT THE BEGINNING OR END OF A DATA TRANSMISSION SESSION, WHEN THE ORBITER WAS NEAR THE LANDER'S HORIZON, THE STRENGTH OF THE RECEIVED SIGNAL WAS RECORDED AS A FUNCTION OF TIME. THESE SIGNAL "FADING PATTERNS," RESULTING FROM INTERACTION OF THE RADIO WAVES WITH THE MARTIAN SURFACE, CONTAIN INFORMATION ABOUT THE PHYSICAL PROPERTIES OF THE SURFACE NEAR THE LANDERS. THE LANDER TRACKING DATA FROM THE TWO-WAY DIRECT LANDER-EARTH S-BAND LINKS PERMIT DETERMINATION OF THE LOCATION OF THE LANDERS AND STUDIES OF THE MOTION OF THE PLANET.

***** VIKING 2 LANDER *****

SPACECRAFT COMMON NAME- VIKING 2 LANDER
ALTERNATE NAMES- VIKING-A LANDER

NSSDC ID- 75-083C

LAUNCH DATE- 09/09/75 WEIGHT- 598. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

C-2

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL

MG - W. JAKOBOWSKI (RETIRED)	NASA HEADQUARTERS
SC - R.S. YOUNG (RETIRED)	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	NASA-JPL

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON SEPTEMBER 3, 1976, IN THE UTOPIA REGION OF MARS AT 47.67 DEG N LATITUDE AND 225.71 DEG W LONGITUDE. THE LANDER CARRIED INSTRUMENTS TO STUDY THE BIOLOGY, CHEMICAL COMPOSITION (ORGANIC AND INORGANIC), METEOROLOGY, SEISMOLOGY, MAGNETIC PROPERTIES, SURFACE APPEARANCE, AND PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ATMOSPHERE. THE LANDER HAD A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LB). SOME OF THE DATA COLLECTED WERE RETURNED BY DIRECT RADIO LINK TO EARTH, BUT MOST OF THE DATA WERE RETURNED BY RELAY THROUGH ONE OF THE ORBITERS. THE LANDER WAS APPROXIMATELY 3 M ACROSS AND ABOUT 2M HIGH.

----- VIKING 2 LANDER, HESS-----

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-083C-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - S.L. HESS	FLORIDA STATE U
TM - C.B. LEOVY	U OF WASHINGTON
TM - R.W. HENRY	U OF WASHINGTON
TM - J.A. RYAN	CALIF ST U, FULLERTON
TM - J.E. TILLMAN	U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT ANALYZED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ATMOSPHERIC PARAMETERS DETERMINED WERE PRESSURE, TEMPERATURE, WIND SPEED, AND WIND DIRECTION. DIURNAL AND SEASONAL VARIATIONS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY (SOL) WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTED BOOM. THREE HOT-FILM ANEMOMETERS, THROUGH WHICH AN ELECTRIC CURRENT WAS PASSED TO HEAT TWO GLASS NEEDLES COATED WITH PLATINUM AND OVERCOATED WITH ALUMINUM OXIDE, WERE USED TO MEASURE WIND SPEED. THE ELECTRIC POWER NEEDED TO MAINTAIN THESE SENSORS AT A FIXED TEMPERATURE ABOVE THE SURROUNDING AIR WAS THE MEASURE OF WIND SPEED. ATMOSPHERIC TEMPERATURE WAS MEASURED BY THREE FINE-WIRE THERMOCOUPLES IN PARALLEL. A THIN METAL DIAPHRAGM, MOUNTED IN A VACUUM-SEALED CASE, WAS USED TO MEASURE ATMOSPHERIC PRESSURE.

----- VIKING 2 LANDER, MUTCH-----

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-083C-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL

TL - T.A. MUTCH	NASA HEADQUARTERS
TM - C. SAGAN	CORNELL U
TM - A.B. BINDER	U OF KIEL
TM - E.C. MORRIS	US GEOLOGICAL SURVEY
TM - F.O. HUCK	NASA-LARC
TM - E.C. LEVINTHAL	STANFORD U
TM - S. LIEBES, JR.	STANFORD U
TM - J.B. POLLACK	NASA-ARC
TM - R.E. ARVIDSON	WASHINGTON U

BRIEF DESCRIPTION

THE LANDER IMAGING EXPERIMENT VIEWED THE SCENE SURROUNDING THE LANDER, THE SURFACE SAMPLER AND OTHER PARTS OF THE LANDER, THE SUN, AND PHOBOS TO PROVIDE DATA FOR OPERATIONAL PURPOSES AND FOR GEOLOGICAL AND METEOROLOGICAL INVESTIGATIONS. TWO SCANNING CAMERAS, CAPABLE OF RESOLVING 0.04 DEG (HIGH RESOLUTION) OR 0.12 DEG (LOW RESOLUTION, COLOR, AND IR) WERE USED ON EACH LANDER. EACH IMAGE ACQUIRED COVERED A VERTICAL FIELD OF 20 DEG (HIGH RESOLUTION) OR 60 DEG (LOW RESOLUTION, COLOR, AND IR) AND A HORIZONTAL FIELD THAT WAS COMMANDABLE FROM 2.5 DEG TO 342.5 DEG IN 2.5-DEG INCREMENTS. IMAGES WERE ACQUIRED FROM 40 DEG ABOVE THE NOMINAL HORIZON TO 60 DEG BELOW, AND WERE COMMANDABLE IN 10-DEG INCREMENTS. THE CAMERAS WERE MOUNTED 1.3 M ABOVE THE NOMINAL LANDING PLANE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND MOST OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. THE TWO CAMERAS WERE SEPARATED BY 0.8 M, AND STEREOSCOPIC PICTURES WERE OBTAINED OVER MOST OF THE SCENE. BLACK AND WHITE IMAGES IN EITHER LOW OR HIGH RESOLUTION

INCLUDED RADIATION WAVELENGTHS FROM 0.4 TO 1.1 MICROMETERS. THE USE OF A SINGLE DETECTOR TO IMAGE AN ENTIRE FRAME ALLOWED A RELATIVE RADIOMETRIC ACCURACY OF PLUS OR MINUS 10 PERCENT. FOR MORE INFORMATION CONCERNING THE CAMERAS, SEE HUCK ET AL., 'SPACE SCIENCE INSTRUMENTATION 1,' 189-241 (1975).

***** VOYAGER 1*****

SPACECRAFT COMMON NAME- VOYAGER 1
ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A, MJS 77A
10321

NSSDC ID- 77-084A

LAUNCH DATE- 09/05/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - E.J. MONTOYA	NASA HEADQUARTERS
SC - M.A. MITZ	NASA HEADQUARTERS
PM - R.L. HEACOCK	NASA-JPL
PS - E.C. STONE	CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND BODY CHARACTERISTICS OF THE PLANETS AND ONE OR MORE OF THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE ATTAINED BY USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOPIETER, UV SPECTROMETER, FLUXGATE MAGNETOMETERS, FARADAY CUPS, A CHARGED PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA WAVE RADIO RECEIVER, COSMIC RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP FREQUENCY RADIO RECEIVER. VOYAGER 1 HAD ITS CLOSEST ENCOUNTER WITH JUPITER ON MARCH 5, 1979.

----- VOYAGER 1, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-084A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - M.S. BRIDGE	MASS INST OF TECH
CI - J.W. BELCHER	MASS INST OF TECH
CI - C.K. GOERTZ	MPI-AERONOMY
CI - A.J. LAZARUS	MASS INST OF TECH
CI - S. OLBERT	MASS INST OF TECH
CI - V.M. VASTLIUNAS	MPI-AERONOMY
CI - L.F. BURLAGA	NASA-GSFC
CI - R.E. PARTL	NASA-GSFC
CI - K.W. OGILVIE	NASA-GSFC
CI - G.L. SISCOE	U OF CALIF, LA
CI - A.J. HUNDHAUSEN	NATL CTR FOR ATMOS RES
CI - J.D. SULLIVAN	MASS INST OF TECH
CI - C.W. YEATES	NASA-JPL
CI - J.D. SCUDDER	NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 20, 7.2, AND 1.8 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 1, BROADFOOT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-084A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL

PI - A.L. BROADFOOT	U OF SOUTHERN CALIF
CI - H.U. MOOS	JOHNS HOPKINS U
CI - W.J.S. DELTON	KITT PEAK NATL OBS
CI - D.F. STROBEL	US NAVAL RESEARCH LAB
CI - T.M. DONAHUE	U OF MICHIGAN
CI - M.B. MCELROY	HARVARD U
CI - J.C. MCCONNELL	YORK U
CI - R.M. GOODY	HARVARD U
CI - A. DALGARNO	SAO
CI - J.E. BLARNEY	CNRS-SA
CI - J.L. BERTAUX	CNRS-SA
CI - S.K. ATREY	U OF MICHIGAN
CI - G.R. SANDEL	U OF SOUTHERN CALIF
CI - D.E. SHERANSKY	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURE RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 Å. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE-SCATTERED SOLAR RADIATION, WHERE THE SCATTERING IS BY MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, HYDROGEN (1216 Å) OR HELIUM (584 Å). IN THE OCCULTATION MODE SUNLIGHT IS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVED BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERIC THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 1, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-084A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.A. HANEL	NASA-GSFC
CI - V.G. KUNDE	NASA-GSFC
CI - D.P. CRUIKSHANK	U OF HAWAII
CI - W.C. MAGUIRE	NASA-GSFC
CI - J.C. PEARL	NASA-GSFC
CI - J.A. PIRAGLIA	NASA-GSFC
CI - R.E. SAMUELSON	NASA-GSFC
CI - P.J. GIERASCH	CORNELL U
CI - C.A. PONNAMPERUMA	U OF MARYLAND
CI - D. GAUTIER	PARIS OBSERVATORY
CI - F.M. FLASAR	NASA-GSFC
CI - S. KUMAR	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H₂/HE RATIO, AND THE ABUNDANCE OF CH₂ AND NH₃. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WILL BE CONDUCTED. THE INTERFEROMETER HAS A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERS 5000 TO 33,000 1/CM. THE INSTRUMENT USES A SINGLE PRIMARY MIRROR 51 CM IN DIAM WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 1, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-084A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS	APPLIED PHYSICS LAB
CI - C.T. FAN	U OF ARIZONA
CI - G. GLOECKLER	U OF MARYLAND
CI - L.J. LANZUOTTI	BELL TELEPHONE LAB
CI - T.P. ARMSTRONG	U OF KANSAS
CI - W.L. AKFORD	MPI-AERONOMY
CI - C.O. BOSTROM	APPLIED PHYSICS LAB
CI - E.P. KEATH	APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND RING SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 1, LANE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER, 2200-7300 Å

NSSDC ID- 77-084A-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. LANE	NASA-JPL
CI - K. PANG	SCIENCE APPL. INC
CI - J.E. HANSEN	NASA-GISS
CI - D.L. COFFEEN	NASA-GISS
CI - L. ESPOSITO	U OF COLORADO
CI - M. SATO	NASA-GISS
CI - R. WEST	U OF COLORADO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN 8 IN. F/1.1 TELESCOPE THAT COULD SEND ITS OBSERVATIONS THROUGH A POLARIZER AND A FILTER FOR ONE OF EIGHT BANDS IN THE 2200- TO 7300-Å SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLIER TUBE. BY STUDY OF THESE EMISSION INTENSITY DATA, INFORMATION ON SURFACE TEXTURE AND COMPOSITION OF BOTH PLANETS (JUPITER AND SATURN) COULD BE OBTAINED, ALONG WITH INFORMATION ON SIZE DISTRIBUTION AND COMPOSITION OF THE SATURN RINGS AND INFORMATION ON ATMOSPHERIC SCATTERING PROPERTIES AND DENSITY FOR BOTH PLANETS. MOLECULAR SCALF HEIGHTS FOR BOTH PLANETS COULD ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 1, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- 77-084A-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - W.F. NESS	NASA-GSFC
CI - M.H. ACUNA	NASA-GSFC
CI - K.W. BEMANNON	NASA-GSFC
CI - L.F. BURLAGA	NASA-GSFC
CI - R.P. LEPPING	NASA-GSFC
CI - F.M. NEUBAUER	BRUNNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE THE MAGNETIC FIELDS OF JUPITER AND SATURN, THE SOLAR WIND INTERACTION WITH THE MAGNETOSPHERES OF THESE PLANETS, AND THE INTERPLANETARY MAGNETIC FIELD TO THE EXTENT OF THE SOLAR WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 NT TO 2.E-3 T.

----- VOYAGER 1, SCARF-----

INVESTIGATION NAME- PLASMA WAVE (.01-56 KHZ)

NSSDC ID- 77-084A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
PLANETARY IONOSPHERES

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
CI - D.A. GURNETT	U OF IOWA

BRIEF DESCRIPTION
 THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTION REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 MZ TO 56 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 1, SMITH-----
 INVESTIGATION NAME- IMAGING

NSSDC ID- 77-084A-01 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 PLANETARY ATMOSPHERES
 PLANETOLOGY
 ATMOSPHERIC PHYSICS

PERSONNEL

TL - B.A. SMITH	U OF ARIZONA
DT - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA HEADQUARTERS
TM - A.F. COOK	SAO
TM - G.E. DANIELSON	CALIF INST OF TECH
TM - M.E. DAVIES	RAND CORP
TM - G.E. MUNT	U COLLEGE LONDON
TM - T. OWEN	STATE U OF NEW YORK
TM - C. SAGAN	CORNELL U
TM - V.E. SUOMI	U OF WISCONSIN
TM - T.V. JOHNSON	NASA-JPL
TM - H. MASURSKY	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION
 THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG FOCAL LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDED ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT THE RESOLUTION WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION WAS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIN AXIS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY FLUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSIPATION, MORPHOLOGY, AND VERTICAL STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CHROMOPHORES, THEIR STRUCTURE AND DEVELOPMENT, AND HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED: (1) GROSS CHARACTERISTICS - SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MASSES, (2) GEOLOGY -- MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIMB STRATIFICATION OF AEROSOLS, (3) SURFACE PROPERTIES - COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS INCLUDED: (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULTATION - OPTICAL DEPTH, AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 1, TYLER-----
 INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-084A-02 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 CELESTIAL MECHANICS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - G.L. TYLER	STANFORD U
TM - V.R. ESHLEMAN	STANFORD U
TM - J.D. ANDERSON	NASA-JPL
TM - T.A. CROFT	SRI INTERNATIONAL
TM - G.F. LINDAL	NASA-JPL
TM - G.S. LEVY	NASA-JPL
TM - G.E. WOOD	NASA-JPL

BRIEF DESCRIPTION
 THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEM OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE: (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION AND EMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS, AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE DISTRIBUTION OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION, AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

----- VOYAGER 1, VOGT-----
 INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY
 COSMIC-RAY TELESCOPE

NSSDC ID- 77-084A-08 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS
 MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT	CALIF INST OF TECH
CI - J.R. JOKIPIII	U OF ARIZONA
CI - E.C. STONE	CALIF INST OF TECH
CI - F.B. McDONALD	NASA-GSFC
CI - J.H. TRAINOR	NASA-GSFC
CI - M.R. WEBBER	U OF NEW HAMPSHIRE
CI - A.W. SCHARDT	NASA-GSFC

BRIEF DESCRIPTION
 THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESS, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON WERE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 1, WARRICK-----
 INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- 77-084A-10 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 SPACE PLASMAS

PERSONNEL

PI - J.W. WARRICK	RADIOPHYSICS, INC
CI - J.K. ALEXANDER, JR.	NASA-GSFC
CI - T.D. CARR	U OF FLORIDA
CI - F.T. HADDOCK	U OF MICHIGAN
CI - D.H. STAELIN	MASS INST OF TECH
CI - A. BOISCHOT	PARIS OBSERVATORY
CI - C.C. HARVEY	PARIS OBSERVATORY
CI - Y. LEBLANC	PARIS OBSERVATORY
CI - W.E. BROWN, JR.	NASA-JPL
CI - S. GULKIS	NASA-JPL
CI - R. PHILLIPS	NASA-JPL
CI - J.B. PEARCE	RADIOPHYSICS, INC
CI - A.C. RIDDLE	U OF COLORADO
CI - R.G. PELTZER	MARTIN-MARIETTA AEROSP
CI - M.L. KAISER	NASA-GSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. STUDY OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES YIELDED DATA CONCERNING THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NONTHERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS.

***** VOYAGER 2*****
 SPACECRAFT COMMON NAME- VOYAGER 2
 ALTERNATE NAMES- MARINER JUPITER/SATURN B, OUTER PLANETS B
 MARINER 77B, MJS 77B
 10271

NSSDC ID- 77-076A

LAUNCH DATE- 08/29/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SATURN FLYBY

PERSONNEL

MG - E.J. MONTYO NASA HEADQUARTERS
SC - M.A. RITZ NASA HEADQUARTERS
PM - R.L. HEACOCK NASA-JPL
PS - E.C. STONE CALIF INST OF TECH

BRIEF DESCRIPTION

THE OVERALL OBJECTIVES OF VOYAGER 2 WERE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WAS PLACED ON COMPARATIVE STUDIES OF THESE TWO PLANETARY SYSTEMS BY OBTAINING (1) MEASUREMENTS OF THE ENVIRONMENT, ATMOSPHERE, AND BODY CHARACTERISTICS OF THE PLANETS AND ONE OR MORE OF THE SATELLITES OF EACH PLANET, (2) STUDIES OF THE NATURE OF THE RINGS OF SATURN, AND (3) EXPLORATION OF THE INTERPLANETARY (OR INTERSTELLAR) MEDIUM AT INCREASING DISTANCES FROM THE SUN. THESE OBJECTIVES WERE MET USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING IMAGING, A COHERENT S- AND X-BAND RF RECEIVER, AN IR INTERFEROMETER AND RADIOMETER, A UV SPECTROMETER, FLUXGATE MAGNETOMETERS, FARADAY CUPS, A CHARGED PARTICLE ANALYZER, PLASMA DETECTOR, PLASMA WAVE RADIO RECEIVER, COSMIC-RAY TELESCOPES, PHOTOPOLARIMETER, AND A SWEEP FREQUENCY RADIO RECEIVER. JUPITER CLOSE ENCOUNTER WAS ACHIEVED ON JULY 9, 1979.

----- VOYAGER 2, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-076A-06

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - M.S. BRIDGE MASS INST OF TECH
CI - A.J. LAZARUS MASS INST OF TECH
CI - S. OLBERT MASS INST OF TECH
CI - J.W. BELCHER MASS INST OF TECH
CI - V.M. VASYLIUNAS MPI-AERONOMY
CI - L.F. BURLAGA NASA-GSFC
CI - C.K. GOERTZ MPI-AERONOMY
CI - G.L. SISCOE U OF CALIF, LA
CI - A.J. HUNDHAUSEN NATL CTR FOR ATMOS RES
CI - R.E. HARTLE NASA-GSFC
CI - K.W. OGILVIE NASA-GSFC
CI - J.D. SULLIVAN MASS INST OF TECH
CI - C.W. YEATES NASA-JPL
CI - J.D. SCUDDER NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MADE USE OF TWO FARADAY CUP DETECTORS, ONE POINTED ALONG THE EARTH-SPACECRAFT LINE AND ONE AT RIGHT ANGLES TO THIS LINE. THE EARTH-POINTING DETECTOR DETERMINED THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WERE EMPLOYED WITH (DELTA E)/E EQUAL TO 29, 7.2, AND 1.8 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURED ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV.

----- VOYAGER 2, BROADFOOT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- 77-076A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. BROADFOOT U OF SOUTHERN CALIF
CI - A. DALGARNO SAO
CI - J.C. MCCONNELL YORK U
CI - R.M. GOODY HARVARD U
CI - T.M. DONAHUE U OF MICHIGAN
CI - M.B. WCELROY HARVARD U
CI - M.J.S. BELTON KITT PEAK NATL OBS
CI - D.F. STROBEL US NAVAL RESEARCH LAB
CI - H.W. MOOS JOHNS HOPKINS U
CI - J.E. BLAMONT CNRS-SA
CI - J.L. BERTAUX CNRS-SA
CI - S.K. ATREYA U OF MICHIGAN
CI - B.R. SANDEL U OF SOUTHERN CALIF
CI - D.E. SHERMANSKY U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE UV SPECTROMETER WAS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURED RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION WERE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WAS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE-SCATTERED SOLAR RADIATION, WHERE THE SCATTERING WILL BE BY THE MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, FOR EXAMPLE, HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE SUNLIGHT WAS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WAS RECORDED. AS THE ATMOSPHERE MOVES BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WERE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WAS USED TO IDENTIFY THE ABSORBER AS WELL AS TO MEASURE ITS ABUNDANCE IN THE LINE OF SIGHT TO THE SUN. IN ADDITION, THE ATMOSPHERE'S THERMAL STRUCTURE COULD BE INFERRED.

----- VOYAGER 2, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-076A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.A. HANEL NASA-GSFC
CI - C.A. PONNAMPERUMA U OF MARYLAND
CI - P.J. GIERASCH CORNELL U
CI - J.A. PIRAGLIA NASA-GSFC
CI - R.E. SAMUELSON NASA-GSFC
CI - W.C. MAGUIRE NASA-GSFC
CI - J.C. PEARL NASA-GSFC
CI - V.G. KUNDE NASA-GSFC
CI - D.P. CRUIKSHANK U OF HAWAII
CI - B.J. CONRATH NASA-GSFC
CI - D. GAUTIER PARIS OBSERVATORY
CI - F.M. FLASAR NASA-GSFC
CI - S. KUMAR U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS INVESTIGATION WAS CARRIED OUT USING AN INFRARED RADIOMETER AND AN INTERFEROMETER SPECTROMETER SIMILAR IN DESIGN TO THE MARINER MARS-71 IRIS, COMBINED INTO A SINGLE INSTRUMENT. THE INVESTIGATION STUDIED BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WAS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H2/HE RATIO, AND THE ABUNDANCE OF CH2 AND NH3. VERTICAL TEMPERATURE PROFILES WERE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WERE CONDUCTED. THE INTERFEROMETER HAD A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE COVERED 5000 TO 33,000 1/CM. THE INSTRUMENT USED A SINGLE PRIMARY MIRROR 51 CM IN DIAM WITH A FIELD OF VIEW OF 0.25 DEG.

----- VOYAGER 2, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-076A-07

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS APPLIED PHYSICS LAB
CI - C.O. BOSTROM APPLIED PHYSICS LAB
CI - T.P. ARMSTRONG U OF KANSAS
CI - W.I. AXFORD MPI-AERONOMY
CI - G. GLOECKLER U OF MARYLAND
CI - L.J. LANZEROTTI BELL TELEPHONE LAB
CI - C.Y. FAN U OF ARIZONA
CI - E.P. KEATH APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MADE MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND RING SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR WAS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WAS 10 KEV TO 1.1 MEV FOR ELECTRONS AND 10 KEV TO 150 MEV FOR IONS. DURING THE INTERPLANETARY CRUISE PERIOD, PROTONS, ALPHA PARTICLES, AND HEAVIER NUCLEI (Z FROM 3 TO 26) WERE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 2, LANE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSSDC ID- 77-076A-11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. LANE	NASA-JPL
CI - K. PANG	SCIENCE APPL. INC
CI - J.E. HANSEN	NASA-GISS
CI - D.L. COFFEEN	NASA-GISS
CI - L. ESPOSITO	U OF COLORADO
CI - M. SATO	NASA-GISS
CI - R. WEST	U OF COLORADO

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF AN 8-IN. F/1.1 TELESCOPE THAT SENT ITS OBSERVATIONS THROUGH A POLARIZER AND A FILTER FOR ONE OF EIGHT BANDS IN THE 2200- TO 7300-A SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLIER TUBE. BY STUDY OF THESE EMISSION INTENSITY DATA, INFORMATION ON SURFACE TEXTURE AND COMPOSITION OF BOTH PLANETS (JUPITER AND SATURN) COULD BE OBTAINED, ALONG WITH INFORMATION OF SIZE DISTRIBUTION AND COMPOSITION OF SATURN'S RINGS AND INFORMATION ON ATMOSPHERIC SCATTERING PROPERTIES AND DENSITY FOR BOTH PLANETS. MOLECULAR SCALE HEIGHTS FOR BOTH PLANETS COULD ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 2, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- 77-076A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-UP

INVESTIGATION DISCIPLINE(S)
PLANETARY MAGNETIC FIELD
PARTICLES AND FIELDS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - N.F. NESS	NASA-GSFC
CI - R.P. LEPPING	NASA-GSFC
CI - F.M. NEUBAUER	BRAUNSCHWEIG TECH U
CI - K.W. BEHANNON	NASA-GSFC
CI - L.F. BURLAGA	NASA-GSFC
CI - M.M. ACUNA	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO INVESTIGATE THE MAGNETIC FIELDS OF JUPITER AND SATURN, THE SOLAR WIND INTERACTION WITH THE MAGNETIC FIELDS OF THESE PLANETS, AND THE INTERPLANETARY MAGNETIC FIELD TO THE EXTENT OF THE SOLAR WIND BOUNDARY WITH THE INTERSTELLAR MAGNETIC FIELD, AND BEYOND, IF CROSSED. THE INVESTIGATION WAS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WAS PLUS OR MINUS 0.1 NT, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 NT TO 2.E-5 T.

----- VOYAGER 2, SCARF-----

INVESTIGATION NAME- PLASMA WAVE (.01-56 KHZ)

NSSDC ID- 77-076A-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
CI - D.A. GURNETT	U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDED CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GAVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTED OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WAS FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT SHARED THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 2, SMITH-----

INVESTIGATION NAME- IMAGING

NSSDC ID- 77-076A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - B.A. SMITH	U OF ARIZONA
DT - L.A. SCDERBLOM	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA HEADQUARTERS
TM - A.F. CUDK	SAO
TM - G.E. DANIELSON	CALIF INST OF TECH
TM - M.E. DAVIES	RAND CORP
TM - G.E. HUNT	U COLLEGE LONDON
TM - T. GWEN	STATE U OF NEW YORK
TM - C. SAGAN	CORNELL U
TM - V.E. SUCMI	U OF WISCONSIN
TM - T.V. JOHNSON	NASA-JPL
TM - H. MASURSKY	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE PHOTOGRAPHIC EXPERIMENT USED A TWO-CAMERA SYSTEM, BASED ON THE MARINEP 10 SYSTEM. THIS SYSTEM INCLUDED ONE NARROW-ANGLE, LONG FOCAL-LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL-LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDED GREATLY ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT WAS AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION WAS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WERE TO PHOTOGRAPH GLOBAL MOTIONS AND CLOUD DISTRIBUTIONS ON JUPITER AND SATURN, GROSS DYNAMICAL PROPERTIES, ZONAL ROTATION, ORIENTATION OF SPIN AXIS, ZONAL SHEAR, VERTICAL SHEAR, FLOW INSTABILITIES, SPOTS, AND SPECTRUM OF SCALE OF ATMOSPHERIC MOTIONS IN TIME AND SPACE. ADDITIONAL OBJECTIVES INCLUDED THE STUDY OF THE MODE OF RELEASE OF INTERNAL ENERGY FLUX (SEARCH FOR CONVECTION CELLS AND ROLLS), STUDY OF GROWTH, DISSIPATION, MORPHOLOGY, AND VERTICAL STRUCTURE OF CLOUD COMPLEXES, GROSS OPTICAL PROPERTIES, GLOBAL AND LOCALIZED SCATTERING FUNCTION IN THE VISIBLE SPECTRUM, POLARIMETRY, NATURE OF CHROMOPHORES, THEIR STRUCTURE AND DEVELOPMENT, HIGH RESOLUTION OF THE GREAT RED SPOT. THE OBJECTIVES OF THE SATELLITE ENCOUNTERS INCLUDED: GROSS CHARACTERISTICS -- SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPROVED EPHEMERIDES AND MASSES; (2) GEOLOGY -- MAJOR PHYSIOGRAPHIC PROVINCES, IMPACT AND VOLCANIC FEATURES, LINEAMENTS, POLAR CAPS, EROSION PROCESSES, AND LOW- AND HIGH-DENSITY SATELLITE COMPARATIVE STUDIES, DETECTION OF ATMOSPHERES, FROSTS, AND LIMB STRATIFICATION OF AEROSOLS; (3) SURFACE PROPERTIES - COLORIMETRY, SCATTERING FUNCTION, NATURE OF BRIGHTNESS VARIATION, AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS ARE TO BE CARRIED OUT. OBJECTIVES INCLUDE: (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OF CLUMPS OF MATERIAL; (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION; (3) SCATTERING FUNCTION; (4) COARSE POLARIMETRY; (5) OCCULTATION - OPTICAL DEPTH; AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WERE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- VOYAGER 2, TYLER-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-076A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - G.L. TYLER	STANFORD U
TM - G.F. LINDAL	NASA-JPL
TM - G.S. LEVY	NASA-JPL
TM - T.A. CROFT	SRI INTERNATIONAL
TM - V.R. ESHLEMAN	STANFORD U
TM - J.D. ANDERSON	NASA-JPL
TM - G.E. WOOD	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USED THE TELECOMMUNICATIONS SYSTEMS OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WAS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION WERE: (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL DURING IMMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS AND DENSITIES BY PRECISE TRACKING OF A DUAL-FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE DISTRIBUTIONS OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL-FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

----- VOYAGER 2, VOGT-----

INVESTIGATION NAME- HIGH- AND MODERATELY LOW-ENERGY
COSMIC-RAY TELESCOPE

NSSDC ID- 77-076A-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. VOGT	CALIF INST OF TECH
CI - J.R. JOKIPII	U OF ARIZONA
CI - E.C. STONE	CALIF INST OF TECH
CI - F.D. McDONALD	NASA-GSFC
CI - J.H. TRAINOR	NASA-GSFC
CI - W.R. WEBBER	U OF NEW HAMPSHIRE
CI - A.U. SCHARDT	NASA-GSFC

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIED THE ORIGIN AND ACCELERATION PROCESS, LIFE HISTORY, AND DYNAMIC CONTRIBUTION OF INTERSTELLAR COSMIC RAYS, THE NUCLEOSYNTHESIS OF ELEMENTS IN COSMIC-RAY SOURCES, THE BEHAVIOR OF COSMIC RAYS IN THE INTERPLANETARY MEDIUM, AND THE TRAPPED PLANETARY ENERGETIC PARTICLE ENVIRONMENT. THE INSTRUMENTATION INCLUDED A HIGH-ENERGY TELESCOPE SYSTEM (NETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE NETS COVERED AN ENERGY RANGE BETWEEN 6 AND 500 MEV/NUCLEON FOR NUCLEI RANGING IN ATOMIC NUMBERS FROM 1 THROUGH 30. IN ADDITION ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURED THE ENERGY AND DETERMINED THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURED THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV WERE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 2, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- 77-076A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - J.W. WARWICK	RADIOPHYSICS, INC
CI - W.E. BROWN, JR.	NASA-JPL
CI - S. GULKIS	NASA-JPL
CI - C.C. HARVEY	PARIS OBSERVATORY
CI - Y. LEDLANC	PARIS OBSERVATORY
CI - D.H. STAELIN	MASS INST OF TECH
CI - A. BOISCHOT	PARIS OBSERVATORY
CI - T.D. CARR	U OF FLORIDA
CI - F.T. HADDOCK	U OF MICHIGAN
CI - J.K. ALEXANDER, JR.	NASA-GSFC
CI - R. PHILLIPS	NASA-JPL
CI - R.G. PELTZER	MARTIN-MARIETTA AEROSP
CI - J.B. PEARCE	RADIOPHYSICS, INC
CI - A.C. RIDDLE	U OF COLORADO
CI - M.L. KAISER	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WAS RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NON-THERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS WAS STUDIED BY INVESTIGATION OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES.

3

DESCRIPTIONS OF PLANNED SPACECRAFT
AND EXPERIMENTS

3. DESCRIPTIONS OF PLANNED SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments pertinent to this report that were planned as of May 31, 1980, had progressed beyond the experiment or investigation selection stage, and for which NSSDC has at least minimal documentation. A few changes subsequent to this date may appear, depending on availability. The descriptions are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. If the common name, as used by NSSDC, is not known, it can be found by referring to an alternate name found in the Index of Active and Planned Spacecraft and Experiments (Section 4).

Each spacecraft or experiment entry in this section is composed of two parts, a heading and brief description. The headings list characteristics of satellites and experiments. Many of the terms used in this section are defined in Appendix C.

3.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of planned initial orbit parameters: orbit type, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, or probe missions. In addition, the heading contains the spacecraft weight, launch date (as provided by the project office; actual date may change), site, and vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel codes as follows:

CODE CO (general contact)
CODE MG (program manager)
CODE MM (mission manager)
CODE MS (mission scientist)
CODE PC (project coordinator)
CODE PD (project director)
CODE PE (project engineer)
CODE PM (project manager)
CODE PS (project scientist)
CODE SC (program scientist)
CODE TD (technical director)

This terminology is standard for NASA missions; the equivalent functions for the missions of other countries or agencies have been given the same position names. The spacecraft brief description is immediately below each heading.

3.2 Contents of Experiment Entries

Each experiment entry heading includes the experiment name, the NSSDC ID code, the investigative program, the investigation discipline, and the name and affiliation or location of the principal investigator (PI) or team leader

(TL) for the experiment as well as other investigators (OI), team members (TM), deputy team leader (DT), co-investigator (CI), or general contact (CO) associated with the experiment. The investigators are not listed in any particular order within each experiment. The experiment brief description is immediately below each heading.

The investigative program may include one of the following NASA Headquarters division codes:

CODE EB (Environmental Observations)
CODE EC (Communications)
CODE EM (Space Processing)
CODE ER (Resource Observations)
CODE RS (Space Systems)
CODE SB (Life Sciences)
CODE SC (Astrophysics)
CODE SL (Planetary)
CODE ST (Solar Terrestrial)

The addition of /CO-OP to any code indicates a cooperative effort between NASA and another agency.

3.3 Planned Spacecraft and Experiment Descriptions

A spacecraft is included in the planned section of this report if it is an approved or a proposed mission where the experiments or investigations have already been selected.

***** ASTRO-A*****

SPACECRAFT COMMON NAME- ASTRO-A
ALTERNATE NAMES- ASTRONOMICAL SATELLITE-A

NSSDC ID- ASTRO-A

LAUNCH DATE- 02/08/81 WEIGHT- 100. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3B

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 31. DEG
ORBIT PERIOD- 94.2 MIN APORAPSIS- 600. KM ALT
PERIAPSIS- 300. KM ALT

PERSONNEL
PI - Y. TANAKA U OF TOKYO
PS - Z. SUEROTO U OF TOKYO

BRIEF DESCRIPTION
THE MAIN OBJECTIVE OF THE ASTRO-A MISSION IS THE DETAILED STUDY OF SOLAR FLARES DURING THE NEXT SOLAR MAXIMUM PERIOD. PRINCIPAL INVESTIGATIONS ARE: (1) IMAGING OF SOLAR FLARE X-RAYS IN THE RANGE 10-60 KEV BY MEANS OF ROTATING MODULATION COLLIMATORS, AND (2) SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES IN THE RANGE 1.5-2.0 A BY MEANS OF A BRAGG SPECTROMETER. WAVE LENGTH SCANNING IS ACHIEVED BY THE SPACECRAFT REVOLUTION WITH AN OFFSET POINTING OF THE SPIN AXIS WITH RESPECT TO THE SUN. INVESTIGATIONS (1) AND (2) EACH HAVE A TIME RESOLUTION OF 6 S. IN ADDITION, THE FOLLOWING INVESTIGATIONS ARE INCLUDED: THREE SOLAR FLARE X-RAY MONITORS THAT RECORD THE TIME PROFILE AND SPECTRUM OF THE X-RAY FLARES IN THE RANGE 2-60 KEV, A SOLAR FLARE GAMMA-RAY DETECTOR FOR THE RANGE 0.4-7.0 MEV, A PARTICLE DETECTOR THAT MONITORS ELECTRON FLUX ABOVE 100 KEV, AND PLASMA PROBES FOR THE MEASUREMENT OF ELECTRON DENSITY AND TEMPERATURE.

***** ASTRO-A, MIRAD*****

INVESTIGATION NAME- ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES

NSSDC ID- ASTRO-A-06 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
SPACE PLASMAS

PERSONNEL
PI - K. MIRAD U OF TOKYO
PS - H. OYA U OF TOKYO
OI - K. OYAMA U OF TOKYO
OJ - T. TAKAHASHI U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES PLASMA PROBES TO MEASURE ELECTRON DENSITY AND ELECTRON TEMPERATURE DURING THE SOLAR MAXIMUM PERIOD.

***** ASTRO-A, KONDO*****

INVESTIGATION NAME- SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE

NSSDC ID- ASTRO-A-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - I. KONDO U OF TOKYO
PS - K. OKUDAIRA RIKKYO U
OI - Y. HIRASHIMA RIKKYO U
OJ - M. YOSHIMORI RIKKYO U

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES GAMMA RAYS FROM SOLAR FLARES IN THE ENERGY RANGE OF 0.4-7.0 MEV.

***** ASTRO-A, MATSUOKA*****

INVESTIGATION NAME- TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE

NSSDC ID- ASTRO-A-05 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - M. MATSUOKA U OF TOKYO
OI - K. KUYAMA U OF TOKYO
OJ - M. INOUE U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES X-RAY MONITORS TO RECORD TIME PROFILES AND SPECTRUM OF SOLAR X-RAY FLARES IN THE ENERGY RANGE OF 2-60 KEV.

***** ASTRO-A, NISHI*****

INVESTIGATION NAME- SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE

NSSDC ID- ASTRO-A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - K. NISHI U OF TOKYO
OI - F. MORIYAMA U OF TOKYO
OJ - K. TANAKA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES A BRAGG SPECTROMETER TO STUDY THE SPECTROSCOPY OF X-RAY EMISSION LINES FROM HIGHLY IONIZED IRON IN SOLAR FLARES. THE SPECTRUM COVERED IS IN THE RANGE OF 1.5-2.0 A. WAVE-LENGTH SCANNING IS ACHIEVED BY SPACECRAFT ROTATION WITH THE SPIN-AXIS OFFSET SLIGHTLY FROM THE SUN. THE TIME RESOLUTION IS 6 S.

***** ASTRO-A, TAKAKURA*****

INVESTIGATION NAME- SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING

NSSDC ID- ASTRO-A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - T. TAKAKURA U OF TOKYO
OI - S. MIYAZONO OSAKA CITY U
OI - Y. OGAWARA U OF TOKYO
OI - K. OHI U OF TOKYO
OJ - T. NAKARAMI U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT USES ROTATING MODULATION COLLIMATORS TO IMAGE SOLAR FLARE X RAYS IN THE ENERGY RANGE OF 10 TO 60 KEV. THE TIME RESOLUTION IS 6 S.

***** ASTRO-A, TAKEUCHI*****

INVESTIGATION NAME- ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR

NSSDC ID- ASTRO-A-05 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - M. TAKEUCHI INST PHYS + CHEM RES
OI - T. IMAI INST PHYS + CHEM RES

BRIEF DESCRIPTION
THIS EXPERIMENT USES A PARTICLE DETECTOR TO MONITOR SOLAR ELECTRON FLUX ABOVE 100 KEV.

***** CCE*****

SPACECRAFT COMMON NAME- CCE
ALTERNATE NAMES- AMPTE/CHARGE COMP EXPL, CHARGE COMPOSITION EXP

NSSDC ID- CCE

LAUNCH DATE- 09/13/83 WEIGHT- 140. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 2. DEG
ORBIT PERIOD- 900. MIN APORAPSIS- 51000. KM ALT
PERIAPSIS- 300. KM ALT

PERSONNEL

MG - F.W. BAYANO
 SC - E.H. SCHMERLING
 PH - G.W. GUSLEY
 PS - H.H. ACUNA

NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSES OF THIS MISSION ARE TO STUDY THE ACCESS OF SOLAR WIND IONS TO THE MAGNETOSPHERE AND THE CONVECTIVE-DIFFUSIVE TRANSPORT AND ENERGIZATION OF MAGNETOSPHERIC PARTICLES. THE PROGRAM CONSISTS OF THIS SPACECRAFT AND THE ION SPACECRAFT USED TO PROVIDE MULTIPLE ION RELEASES, WHICH WILL BE DETECTED BY INSTRUMENTS ON THE CCR. THE SPACECRAFT IS POWERED BY FOUR SOLAR CELL PANELS THAT PROVIDE 140 W, AND HAS A BATTERY. THE SPACECRAFT IS SPIN STABILIZED AT 10 RPM WITH THE SPIN AXIS IN THE ORBIT PLANE. THE ATTITUDE SYSTEM CONSISTS OF A SUN SENSOR AND A 3-AXIS MAGNETOMETER. THE THERMAL CONTROL IS PASSIVE. THE TELEMETRY SYSTEM IS A 1-W, S-BAND TRANSMITTER WITH TWO OPPOSITELY POLARIZED ANTENNAS. THE VECTOR MAGNETOMETER IS ALSO USED TO DETERMINE THE PITCH ANGLES OF THE PARTICLES MEASURED BY THE THREE INSTRUMENTS, WHICH ARE PROVIDED BY THE INVESTIGATORS. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX D.

----- CCE, GLOECKLER-----

INVESTIGATION NAME- CHARGE-ENERGY-MASS SPECTROMETER (CHERM)

NSDC ID- CCE -03 INVESTIGATIVE PROGRAM
 CODE ST/CO-0P

INVESTIGATION DISCIPLINE(S)
 SPACE PLASMAS
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER
 OI - D.K. HOVESTADT
 OI - G. PASCHMANN
 OI - G. WILKEN
 OI - W.I. ANFORD

U OF MARYLAND
 MPI-EXTRATERR PHYS
 MPI-EXTRATERR PHYS
 MPI-AERONOMY
 MPI-AERONOMY

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND AN ELECTROSTATIC ANALYZER SECTION, FOLLOWED BY A TIME-OF-FLIGHT AND TOTAL ENERGY MEASUREMENT SECTION. THE ENERGY RANGE COVERED IS FROM 2 TO 200 KEV/0 WITH A GEOMETRIC FACTOR OF 2.0-03 50 CM-SR. ENERGY RESOLUTION IS 5 TO 10 PERCENT, AND ALL CHARGE STATES AND ISOTOPIES OF H AND HE, LI WITH ITS CHARGE STATES, AND MAJOR ELEMENTS AND CHARGE STATES UP TO AND INCLUDING FE ARE RESOLVED.

----- CCE, MCENTIRE-----

INVESTIGATION NAME- MEDIUM ENERGY PARTICLE ANALYZER (MEPA)

NSDC ID- CCE -02 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS
 SPACE PLASMAS

PERSONNEL

PI - R.W. MCENTIRE
 OI - S.M. KIRIIGIS

APPLIED PHYSICS LAB
 APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS INSTRUMENT HAS THE CAPABILITY OF RELIABLY MEASURING VERY SMALL FLUXES OF LITHIUM TRACER IONS OVER A WIDE ENERGY RANGE IN THE PRESENCE OF THE INTENSE BACKGROUND OF PROTONS, ALPHA PARTICLES AND ELECTRONS, WHILE MAINTAINING AS LARGE A GEOMETRY FACTOR AND AS LOW AN ENERGY THRESHOLD AS POSSIBLE. IN ADDITION, IT HAS THE CAPABILITY OF MONITORING THE NATURAL TRACER IONS (2 GREATER THAN OR EQUAL TO 3 NUCLEI) WITH CHARGE, ENERGY PITCH ANGLE AND TEMPORAL RESOLUTION. THE INSTRUMENT CONSISTS OF A THIN FOIL SOLID STATE DETECTOR TELESCOPE WITH A VERY THIN FRONT ELEMENT AND A 10 CM SEPARATION BETWEEN THE FRONT AND REAR DETECTORS. PARTICLE TIME OF FLIGHT (TOF) IS MEASURED BETWEEN THE FRONT AND REAR DETECTORS, AND RESIDUAL PARTICLE ENERGY IS MEASURED IN THE REAR DETECTOR. TWO PARAMETER ANALYSIS (TOF AND ENERGY) IS PERFORMED ON PARTICLES PENETRATING THE FRONT DETECTOR, PROVIDING PRECISE CHARGE RESOLUTION WITH UNPRECEDENTED IMMUNITY TO ACCIDENTAL EVENTS OVER AN ENERGY RANGE (FOR Z FROM 1 TO 16) FROM APPROXIMATELY 0.06 TO 20 MEV/M.

----- CCE, SMELLEY-----

INVESTIGATION NAME- PLASMA COMPOSITION

NSDC ID- CCE -03 INVESTIGATIVE PROGRAM
 CODE ST/CO-0P

INVESTIGATION DISCIPLINE(S)
 SPACE PLASMAS
 MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E.G. SMELLEY
 OI - R.D. SHARP
 OI - G. HAERENDEL
 OI - W.G. ROSENDAUER
 OI - R.G. JOHNSON
 OI - P.H. EDENHARDT
 OI - M. BALSIGER
 OI - J. GEISS
 OI - D.T. YOUNG
 OI - A. GHISETTI

LOCKHEED PALO ALTO
 LOCKHEED PALO ALTO
 MPI-EXTRATERR PHY
 MPI-AERONOMY
 LOCKHEED PALO ALTO
 U OF BERNE
 U OF BERNE
 U OF BERNE
 U OF BERNE

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ENTRANCE COLLIMATOR AND RETARDING POTENTIAL ANALYZER, A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER, AND A COMBINED ELECTROSTATIC-MAGNETIC MASS ANALYZER IN SERIES. THE ENERGY RANGE COVERED IS 0.05 TO 17 KEV/0 WITH A GEOMETRIC FACTOR RANGING FROM 1 TO 5 H 1.0-02 50 CM SR. AN ENERGY RESOLUTION FROM 5 TO 10 PERCENT, AND A MASS/0 RESOLUTION OF 10 PERCENT. THIS INSTRUMENT CLEARLY SEPARATES LI+ AND MA+ TRACER IONS FROM THE BACKGROUND. IT IS NEARLY IDENTICAL TO THE ONE FLOWN ON ISEE 1 BY THE SAME GROUP OF INVESTIGATORS, AND TO THE ONE DEVELOPED FOR THE DYNAMIC EXPLORER SPACECRAFT.

----- CODE-----

**SPACECRAFT COMMON NAME- CODE
 ALTERNATE NAMES- COSMIC BACKGROUND EXPL**

NSDC ID- CODE

LAUNCH DATE- 10/01/85 WEIGHT- 1200. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-CSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 103. MIN INCLINATION- 96. DEG
 PERIAPSIS- 900. KM ALT APOAPSIS- 900. KM ALT

PERSONNEL

MG - J.D. ROSENDAUER
 SC - L. DONDY
 PH - M.W. BOGESS
 PS - G.W. LONGNECKER
 PS - J.C. MATHER

NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE CODE MISSION IS TO TAKE PRECISE MEASUREMENTS OF THE DIFFUSE RADIATION BETWEEN 1 MICROMETER AND 13 MM OVER THE WHOLE CELESTIAL SPHERE. THE FOLLOWING QUANTITIES ARE MEASURED: (1) THE SPECTRUM OF THE 3 K RADIATION OVER THE RANGE 0.1 TO 10 MM, (2) THE ISOTROPY OF THIS RADIATION FROM 3.3 TO 13 MM, AND (3) THE SPECTRUM AND ANGULAR DISTRIBUTION FROM 1 TO 300 MICROMETERS. THE SPACECRAFT CONSISTS OF A 1000-KG BASE MODULE TO WHICH A 600-KG EXPERIMENT MODULE IS ATTACHED. THE EXPERIMENT MODULE CONTAINS A LIQUID NE DEWAR FILLED WITH 70 KG OF 2 K SUPERFLUID, WITH A CONICAL SUN SHADE/GROUND PLANE. THE TWO MODULES ROTATE AT ONE RPM ABOUT THE AXIS OF SYMMETRY; THE ORIENTATION OF THE SPIN AXIS IS MAINTAINED ANTI-EARTH AND AT 91 DEG TO THE SUN/EARTH LINE. THE SPACECRAFT IS A 12-SIDED POLYHEDRON THAT HAS SOLAR PANELS ON EACH SIDE TO SUPPLY AN ORBIT-AVERAGED POWER OF 400 W. THE COMMUNICATIONS AND DATA HANDLING SYSTEM PROVIDES FOR CONTROL OF ALL SPACECRAFT AND EXPERIMENT FUNCTIONS. A NASA STANDARD IONS TRANSDUCER IS USED FOR COMMAND, TELEMETRY, AND TRACKING. TRANSMISSION OF DATA IS THROUGH A BOOM-MOUNTED S-BAND PHASED-ARRAY ANTENNA DEPLOYED ALONG THE SPIN AXIS, EITHER IN REAL TIME OR FROM A TAPE RECORDER. THE SPACECRAFT ALSO HOUSES A PROPULSION SYSTEM THAT BOOSTS IT FROM ITS 300-KM ALTITUDE SHUTTLE PARKING ORBIT TO THE 900-KM ALTITUDE OPERATIONAL VALUE. THE OPERATIONAL ORBIT IS A DAWN-DUSK SUN-SYNCHRONOUS ONE SO THAT THE SUN IS ALWAYS TO THE SIDE AND CAN BE SHIELDED FROM THE INSTRUMENTS. WITH THIS ORBIT AND THE SPIN AXIS ORIENTATION, THE INSTRUMENTS PERFORM A COMPLETE SCAN OF THE CELESTIAL SPHERE EVERY 4 MONTHS OR TWICE DURING THE 1-YR LIFETIME OF THE LIQUID NE. THE SPIN AND SYMMETRICAL CONFIGURATION ELIMINATE LOCAL THERMAL EFFECTS THAT COULD BIAS THE DATA. LOW-CONDUCTANCE SUPPORTS AND MULTILAYERED INSULATION ARE USED TO DECOUPLE THE SPACECRAFT AND EXPERIMENT MODULES.

----- CODE, HAUSER-----

INVESTIGATION NAME- DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIBGE)

NSDC ID- CODE -02 INVESTIGATIVE PROGRAM
 CODE SC

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL

PI - M.G. HAUSER	NASA-GSFC
O1 - J.C. MATHER	NASA-GSFC
O1 - D.T. WILKINSON	PRINCETON U
O1 - S. GULKIS	NASA-JPL
O1 - R. WEISS	MASS INST OF TECH
O1 - G.P. SHOOT	LAWRENCE BERKELEY LAB

BRIEF DESCRIPTION

THE DIFFUSE IR BACKGROUND EXPERIMENT (DIRBE) CONSISTS OF A CRYOGENICALLY COOLED (TO 2 K) MULTIBAND RADIOMETER USED TO INVESTIGATE DIFFUSE INFRARED RADIATION FROM 1 TO 300 MICROMETERS. THE INSTRUMENT MEASURES THE ABSOLUTE FLUX IN 10 WAVELENGTH BANDS WITH A 1-DEG FIELD OF VIEW POINTED 30 DEG OFF THE SPIN AXIS. DETECTORS (PHOTOCONDUCTORS) AND FILTERS FOR THE 8-120 MICROMETER CHANNELS ARE THE SAME AS FOR THE IRAS MISSION. SOLOMETERS ARE USED FOR THE LONGEST WAVELENGTH CHANNEL. SENSITIVITY OF THE DEVICE IS 1.E-19 W/SQ CM-MICROMETER-80 ROOT HZ AT 300 MICROMETERS, RISING TO 5.E-14 W/SQ CM-MICROMETER-80 ROOT HZ AT 8 MICROMETERS. THE TELESCOPE IS WELL BAFFLED TO PREVENT STRAY LIGHT FROM ENTERING THE INSTRUMENT.

----- CODE, MATHER-----

INVESTIGATION NAME- FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)

NSSDC ID- CODE -01 INVESTIGATIVE PROGRAM CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. MATHER	NASA-GSFC
O1 - R. WEISS	MASS INST OF TECH
O1 - M.G. HAUSER	NASA-GSFC
O1 - D.T. WILKINSON	PRINCETON U
O1 - G.P. SHOOT	LAWRENCE BERKELEY LAB
O1 - S. GULKIS	NASA-JPL

BRIEF DESCRIPTION

THE FAR IR ABSOLUTE SPECTROPHOTOMETER (FIRAS) IS A CRYOGENICALLY COOLED POLARIZING MICHELSON INTERFEROMETER USED AS A FOURIER TRANSFORM SPECTROMETER. THE INSTRUMENT POINTS ALONG THE SPIN AXIS AND HAS A 7-DEG FIELD OF VIEW. THIS DEVICE MEASURES THE SPECTRUM TO A PRECISION OF 1/1000 OF THE PEAK FLUX AT 1.67 MM FOR EACH 7-DEG FIELD OF VIEW ON THE SKY (COVER THE RANGE 0.1 TO 10 MM). THE FIRAS USES A SPECIAL FLARED TRUMPET HORN FLUX COLLECTOR HAVING VERY LOW SIDELOBE LEVELS, AN INTERNAL CALIBRATOR COVERING THE ENTIRE BEAM, AND REQUIRES PRECISE TEMPERATURE REGULATION AND CALIBRATION. THE INSTRUMENT HAS A DIFFERENTIAL INPUT TO COMPARE THE SKY WITH AN INTERNAL REFERENCE AT 3 K. THIS FEATURE PROVIDES IMMUNITY FROM SYSTEMATIC ERRORS IN THE SPECTROMETER AND CONTRIBUTES SIGNIFICANTLY TO THE ABILITY TO DETECT SMALL DEVIATIONS FROM A BLACKBODY SPECTRUM. THE INSTRUMENT WEIGHS 40 KG, USES 1W, AND HAS A DATA RATE OF 1000 BPS.

----- CODE, SHOOT-----

INVESTIGATION NAME- DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)

NSSDC ID- CODE -03 INVESTIGATIVE PROGRAM CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - G.P. SHOOT	LAWRENCE BERKELEY LAB
O1 - S. GULKIS	NASA-JPL
O1 - D.T. WILKINSON	PRINCETON U
O1 - J.C. MATHER	NASA-GSFC
O1 - M.G. HAUSER	NASA-GSFC
O1 - R. WEISS	MASS INST OF TECH

BRIEF DESCRIPTION

THE DIFFERENTIAL MICROWAVE RADIOMETER (DMR) INVESTIGATION USES FOUR DIFFERENTIAL RADIOMETERS TO MAP THE SKY AT 23.5, 31.4, 53, AND 90 GHZ. THE RADIOMETERS ARE DISTRIBUTED AROUND THE OUTER SURFACE OF THE CRYOSTAT. EACH RADIOMETER EMPLOYS A PAIR OF HORN ANTENNAS VIEWING AT 30 DEG FROM THE SPIN AXIS OF THE SPACECRAFT, MEASURING THE DIFFERENTIAL TEMPERATURE BETWEEN POINTS IN THE SKY SEPARATED BY 60 DEG. AT EACH FREQUENCY THERE ARE TWO CHANNELS FOR DUAL POLARIZATION MEASUREMENTS, FOR IMPROVED SENSITIVITY, AND FOR RELIABILITY. EACH RADIOMETER IS A MICROWAVE RECEIVER, WHOSE INPUT IS SWITCHED RAPIDLY BETWEEN THE TWO HORN ANTENNAS, OBTAINING THE DIFFERENCE IN BRIGHTNESS OF TWO FIELDS OF VIEW 7 DEG IN DIAMETER LOCATED 60 DEG APART AND 30 DEG FROM THE AXIS OF THE SPACECRAFT. HIGH SENSITIVITY IS ACHIEVED BY TEMPERATURE STABILIZATION (AT 300 DEG K), BY SPACECRAFT SPIN, AND BY THE ABILITY TO INTEGRATE OVER THE ENTIRE YEAR. SENSITIVITY TO LARGE-SCALE ANISOTROPIES IS ABOUT 1.E-5 DEG K.

***** DMR 50-1/75*****

SPACECRAFT COMMON NAME- DMRP 50-1/75
ALTERNATE NAMES- DMRP BLOCK 50-1, DMRP001
DMRP-75

NSSDC ID- DMRP-75

LAUNCH DATE-
LAUNCH SITE- VANDENBERG AFB, UNITED STATES WEIGHT- 450. KG
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC			
ORBIT PERIOD-	MIN	INCLINATION-	DEG
PERIAPSBIS-	KM ALT	APDAPSIS-	KM ALT

PERSONNEL

PI - M.G. HAUSER USAF SPACE DIVISION

BRIEF DESCRIPTION

DMRP 50-1/75 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSP). THIS PROGRAM, PREVIOUSLY KNOWN AS DAPP (DATA ACQUISITION AND PROCESSING PROGRAM), WAS CLASSIFIED UNTIL MARCH 1975. THE OBJECTIVES OF THIS PROGRAM ARE TO PROVIDE GLOBAL VISUAL AND INFRARED CLOUD COVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTS OF TWO SATELLITES IN 850-KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE IN EARLY MORNING AND THE OTHER AT LOCAL NOON. THE 5.4-M LONG SPACECRAFT IS SEPARATED INTO FOUR SECTIONS -- (1) A PRECISION MOUNTING PLATFORM (PPP) FOR SENSORS AND EQUIPMENT REQUIRING PRECISE ALIGNMENT, (2) AN EQUIPMENT SUPPORT MODULE (ESM) CONTAINING THE ELECTRONICS, REACTION WHEELS, AND SOME METEOROLOGICAL SENSORS, (3) A REACTION CONTROL EQUIPMENT (RCE) SUPPORT STRUCTURE (THAT HAS THE THIRD-STAGE MOTOR, HYDRAZINE REACTION CONTROL SYSTEM) THAT SUPPORTS (4) A 9.29 50 M SOLAR CELL PANEL. THE SPACECRAFT STABILIZATION IS CONTROLLED BY A COMBINATION (GYMEL AND MAGNETIC CONTROL COIL SYSTEM) SO SENSORS ARE MAINTAINED IN THE DESIRED 'EARTH-LOOKING' MODE. ONE FEATURE IS THE PRECISION-POINTING ACCURACY OF THE PRIMARY IMAGER TO 0.01 DEG PROVIDED BY A STAR SENSOR AND UPDATED EPHEMERIS NAVIGATION SYSTEM. THIS ALLOWS AUTOMATIC GEOGRAPHICAL MAPPING OF THE DIGITAL IMAGERY TO THE NEAREST PICTURE ELEMENT. THE OPERATIONAL LINE SCAN SYSTEM (OLS) BUILT BY WESTINGHOUSE, IS THE PRIMARY DATA ACQUISITION SYSTEM THAT PROVIDES REAL-TIME OR STORED, MULTI-ORBIT, DAY-AND-NIGHT VISUAL AND INFRARED IMAGERY AT 0.59 KM (1/3 NAUTICAL MILE) RESOLUTION FOR ALL MAJOR LAND MASSES, 2.7 KM (1-1/2 NAUTICAL MILE) RESOLUTION FOR COMPLETE GLOBAL COVERAGE, AND PROVIDES WITH THIS DATA CALIBRATION, TIMING, AND OTHER AUXILIARY SIGNALS TO THE SPACECRAFT FOR DIGITAL TRANSMISSION TO THE GROUND. A SUPPLEMENTARY SENSOR PACKAGE, THE SPECIAL SENSOR M (SSM), A STEP-SCANNING RADIOMETER, IS THE INFRARED TEMPERATURE-MODULITY-OFONE SOUNDER. THE DATA PROCESSING SYSTEM, WHICH INCLUDES THREE HIGH-DENSITY TAPE RECORDERS, IS CAPABLE OF STORING A TOTAL OF 400 MB OF DATA, EACH ALLOWING FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES BY TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, VA, AND RELAYED BY SATECOM TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND IN THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 10, 4, JULY - AUGUST 1975.

----- DMRP 50-1/75, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMRP-75-01 INVESTIGATIVE PROGRAM OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMRP-75 SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT IS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUD COVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE OLS EMPLOYS A SCANNING OPTICAL TELESCOPE DRIVEN IN AN OSCILLATING MOTION, WITH OPTICAL COMPENSATION FOR IMAGE MOTION, WHICH RESULTS IN NEAR-CONSTANT RESOLUTION THROUGHOUT THE SENSOR FIELD OF VIEW. THE RADIOMETER OPERATES IN TWO ('LIGHT' AND 'THERMAL') SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1 MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE RADIOMETER PRODUCES, WITH ONBOARD PROCESSING, DATA IN FOUR MODES -- LF (LIGHT FINE) AND TF (THERMAL FINE) DATA WITH A RESOLUTION OF .56 KM AND LS (LIGHT SMOOTHED) AND TS (THERMAL SMOOTHED) DATA WITH A RESOLUTION OF 2.3 KM. EACH OF THREE ONBOARD RECORDERS HAS A STORAGE CAPABILITY OF 400 MB OF BOTH LS AND TS DATA OR 20 MB OF LF AND TF DATA. FOR DIRECT READOUT TO TACTICAL LITES, THE EXPERIMENT IS PROGRAMMED SO THAT LF AND TS DATA ARE OBTAINED AT NIGHT. THE INFRARED DATA (TF AND TS) COVERS A TEMPERATURE RANGE OF 210 TO 310 DEG K WITH AN ACCURACY OF 1 DEG C. THE LS DATA MODE PROVIDES VISUAL DATA THROUGH A DYNAMIC RANGE FROM FULL SUNLIGHT DOWN TO A QUARTER MOON. THIS MODE ALSO AUTOMATICALLY ADJUSTS THE GAIN ALONG SCAN TO ALLOW USEFUL DATA

TO BE OBTAINED ACROSS THE TERMINATOR. ADDITIONAL INFORMATION ON THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSP,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSP 5D-1/F5, AFGMC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- DMSP-F5-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGMC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSH) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VYPR). THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN VERTICAL TEMPERATURE, WATER VAPOR, AND OZONE PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSH IS A 16-CHANNEL SENSOR WITH ONE CHANNEL (1022 CM-1) IN THE 10-MICROMETER OZONE ABSORPTION BAND, ONE CHANNEL (835 CM-1) IN THE 12-MICROMETER ATMOSPHERIC WINDOW, SIX CHANNELS (747, 725, 708, 699, 676, 668.5 CM-1) IN THE 15-MICROMETER CO2 ABSORPTION BAND, AND EIGHT CHANNELS (535, 408.5, 441.5, 420, 374, 397.5, 355, 353.5 CM-1) IN THE 22- TO 30-MICROMETER ROTATIONAL WATER VAPOR ABSORPTION BAND. THE EXPERIMENT CONSISTS OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR IS STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSH TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 2000 KM. WHILE THE SCANNING MIRROR IS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS ARE SEQUENCED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION IS APPROXIMATELY 39 KM AT NADIR. THE RADIANCE DATA ARE TRANSFORMED INTO TEMPERATURE WATER VAPOR AND OZONE PROFILES BY A MATHEMATICAL INVERSION TECHNIQUE. A MORE COMPLETE DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN THE REPORT, 'DMSP SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP 5D-1/F5, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- DMSP-F5-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SPECTROMETER CONSISTS OF TWO DIFFERENT-SIZED CYLINDRICAL ELECTROSTATIC ANALYZERS (ESA) USING CHANNELTRON ELECTRON MULTIPLIERS. THE ESA'S POINT TOWARD THE ZENITH IN ORDER TO MEASURE PRECIPITATING ELECTRONS. THE LARGE ESA HAS A FIELD OF VIEW (FOV) OF 1.6 BY 8.0 DEG WITH A DELTA E/E OF 0.04, WHILE THE SMALL ONE HAS A FOV OF 3.7 BY 4.8 DEG WITH A DELTA E/E OF 0.072. THE LARGE ESA COVERS THE RANGE FROM 1 TO 20 KEV AND THE OTHER ONE FROM 50 TO 1000 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

----- DMSP 5D-1/F5, SAGALYN-----

INVESTIGATION NAME- IONOSPHERIC PLASMA MONITOR

NSSDC ID- DMSP-F5-05 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF ONE SPHERICAL (SEA) AND ONE PLANAR (PEA) ELECTROSTATIC ANALYZER. THE SEA PROVIDES MEASUREMENTS OF ELECTRON DENSITIES FROM 10 TO 1.6E7/CM IN THE TEMPERATURE RANGE FROM 200 TO 15,000 DEG K. THE PEA MEASURES ION TEMPERATURES IN THE SAME RANGE AS WELL AS THE AVERAGE ION MASS OVER THE RANGE 1 TO 35 U. THE PEA IS ORIENTED IN THE DIRECTION OF THE POSITIVE SPACECRAFT VELOCITY VECTOR, WHILE THE SEA IS ORIENTED AT RIGHT ANGLES TO THIS DIRECTION AND AWAY FROM THE SUN TO MINIMIZE THE EFFECT OF PHOTOELECTRONS. THE DEVICE ALSO PROVIDES A MEASUREMENT OF THE SPACECRAFT POTENTIAL.

----- DMSP 5D-1/F5, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- DMSP-F5-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - A.L. SNYDER USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF A HIGH-FREQUENCY RADIO RECEIVER CONNECTED TO A SHORT ANTENNA THAT SWEEPS FROM 1.3 TO 13.9 MHZ IN 100-KHZ STEPS. THE DEVICE IS USED TO MONITOR THE IONOSPHERIC BREAKTHROUGH FREQUENCY OF NOISE GENERATED BY MAN-MADE OR NATURAL SOURCES BELOW THE F2 LAYER TO OBTAIN THE CRITICAL FREQUENCY OF THIS LAYER (FOF2). THE FOF2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT CAN DETECT ELECTRIC FIELDS DOWN TO 10 MICROVOLTS/M.

***** DYNAMICS EXPLORER-A*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-A
ALTERNATE NAMES- DE-A

NSSDC ID- DE-A

LAUNCH DATE- 07/31/81 WEIGHT- 283. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 440. MIN INCLINATION- 90.0 DEG
PERIAPSIS- 675. KM ALT APOAPSIS- 24875. KM ALT

PERSONNEL
RG - M.B. WEINREB NASA HEADQUARTERS
SC - E.R. SCHNERLING NASA HEADQUARTERS
PM - G.D. HOGAN NASA-GSFC
PS - R.A. HOFFMAN NASA-GSFC

BRIEF DESCRIPTION
THE GENERAL OBJECTIVE OF THE DYNAMICS EXPLORER (DE) MISSION IS TO INVESTIGATE THE STRONG INTERACTIVE PROCESSES COUPLING THE HOT, TENUOUS, CONVECTING PLASMAS OF THE MAGNETOSPHERE AND THE COOLER, DENSER PLASMAS AND GASES CO-ROTATING IN THE EARTH'S IONOSPHERE, UPPER ATMOSPHERE, AND PLASMASPHERE. TWO SATELLITES, LAUNCHED TOGETHER, DE-A AND -B, ARE PLACED IN POLAR COPLANAR ORBITS TO PERMIT SIMULTANEOUS MEASUREMENTS AT HIGH AND LOW ALTITUDES ON THE SAME FIELD LINES. THE DE-A SPACECRAFT (HIGH ALTITUDE MISSION) USES AN ELLIPTICAL ORBIT SELECTED TO ALLOW: (1) MEASUREMENTS EXTENDING FROM THE HOT MAGNETOSPHERIC PLASMA THROUGH THE PLASMASPHERE TO THE COOL IONOSPHERE; (2) GLOBAL AURORAL IMAGING, WAVE MEASUREMENTS IN THE HEART OF THE MAGNETOSPHERE, AND CROSSING OF AURORAL FIELD LINES AT SEVERAL EARTH RADII, AND (3) MEASUREMENTS FOR SIGNIFICANT PERIODS ALONG A MAGNETIC FIELD FLUX TUBE. THE SPACECRAFT APPROXIMATES A SHORT RIGHT CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE ANTENNAS IN THE X-Y PLANE ARE 215-M TIP-TO-TIP, AND ON THE Z-AXIS ARE 15-M TIP-TO-TIP. TWO 3-M BOOMS ARE PROVIDED FOR REMOTE MEASUREMENTS. THE TOTAL MASS OF THE INSTRUMENTS IS 95 KG. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT IS SPIN STABILIZED. THE SPIN AXIS IS 90 DEG FROM THE ORBIT NORMAL AND THE PLANNED SPIN RATE IS 64 (PLUS OR MINUS 10 PERCENT) RPM. A PULSE CODE MODULATION (PCM) TELEMETRY DATA SYSTEM IS USED THAT OPERATES IN REAL TIME OR A TAPE RECORDER MODE. DATA ARE ACQUIRED ON A SCIENCE PROBLEM ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES, AND SUPPORTIVE EXPERIMENTS.

----- DYNAMICS EXPLORER-A, BURCH-----

INVESTIGATION NAME- HIGH ALTITUDE PLASMA INSTRUMENT

NSSDC ID- DE-A -05 INVESTIGATIVE PROGRAM
CODE 5T
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - J.L. BURCH SOUTHWEST RES INST
OI - R.F. HOFFMAN NASA-GSFC
OI - J.D. WINNINGHAM U OF TEXAS, DALLAS
OI - D.M. KLUMPAR U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE HIGH-ALTITUDE PLASMA INSTRUMENT (HAPI) CONSISTS OF AN ARRAY OF ELECTROSTATIC ANALYZERS CAPABLE OF MAKING MEASUREMENTS OF THE PHASE-SPACE DISTRIBUTIONS OF ELECTRONS AND POSITIVE IONS FROM 5 EV TO 32 KEV AS A FUNCTION OF PITCH ANGLE. THIS INVESTIGATION PROVIDES DATA CONTRIBUTING TO THE STUDIES OF: (1) THE COMPOSITION AND ENERGY OF BIRKELAND CURRENT CHARGE CARRIERS, (2) THE DYNAMIC CONFIGURATION OF HIGH-LATITUDE MAGNETIC FLUX TUBES, (3) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (4) THE ROLE OF E PARALLEL TO B, AND E PERPENDICULAR TO B IN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, (5) THE SOURCES AND THE EFFECT OF POLAR CAP PARTICLE FLUXES, (6) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CLEFTS, (7) WAVE-PARTICLE INTERACTIONS, AND (8) HOT-COLD PLASMA INTERACTIONS. THIS INSTRUMENT CONSISTS OF FIVE IDENTICAL DETECTOR HEADS, EACH HAVING AN ELECTROSTATIC ANALYZER (OF THE 1S18-2 TYPE) AND TWO SENSORS (ONE ELECTRON CHANNEL AND ONE ION CHANNEL). THE DETECTOR HEADS ARE MOUNTED ON THE MAIN BODY. THREE OF THE DETECTOR HEADS ARE MOUNTED IN THE SPIN PLANE, AND THE OTHER TWO ARE OFFSET BY PLUS AND MINUS 12 DEG. ONE DETECTOR SWEEPS WITHIN A FEW DEG OF THE FIELD LINE DURING EACH ROTATION OF THE SPACECRAFT, EXCEPT WHEN THE MAGNETIC FIELD IS GREATLY DEFORMED FROM ITS MERIDIAN PLANE. THE BASIC MODE OF OPERATION PROVIDES A 32-POINT ENERGY SPECTRUM FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZERS ARE PROGRAMMABLE TO ALLOW FOR OPERATION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM, OR AT HIGHER TIME RESOLUTION WITH REDUCED ENERGY RESOLUTION.

----- DYNAMICS EXPLORER-A, CHAPPELL-----

INVESTIGATION NAME- RETARDING ION MASS SPECTROMETER

NSSDC ID- DE-A -04 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.R. CHAPPELL	NASA-MSFC
O1 - P.M. BANKS	UTAH STATE U
O1 - W.B. HANSON	U OF TEXAS, DALLAS
O1 - J.H. HOFFMAN	U OF TEXAS, DALLAS
O1 - A.F. NAGY	U OF MICHIGAN
O1 - G.R. CARIGNAN	U OF MICHIGAN

BRIEF DESCRIPTION

THE RETARDING ION MASS SPECTROMETER (RIMS) CONSISTS OF A RETARDING POTENTIAL ANALYZER FOR ENERGY ANALYSIS IN SERIES WITH A MAGNETIC ION MASS SPECTROMETER FOR MASS ANALYSIS. THIS INSTRUMENT IS DESIGNED TO OPERATE IN TWO BASIC COMMANDABLE MODES: A HIGH-ALTITUDE MODE IN WHICH THE DENSITY, TEMPERATURE, AND BULK FLOW CHARACTERISTICS OF H+, HE+, AND O+ IONS ARE MEASURED, AND A LOW-ALTITUDE MODE THAT CONCENTRATES ON THE COMPOSITION IN THE 1- TO 32-U RANGE. THIS INVESTIGATION PROVIDES INFORMATION ON: (1) THE DENSITIES OF H+, HE+, AND O+ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (INCLUDING THE DENSITY DISTRIBUTION ALONG THE MAGNETIC VECTOR IN THE VICINITY OF THE SATELLITE APOGEE); (2) THE TEMPERATURE OF H+, HE+, AND O+ IONS IN THE IONOSPHERE, PLASMASPHERE, PLASMA TROUGH, AND POLAR CAP (ENERGY RANGE 0-45 EV); (3) THE BULK FLOW VELOCITIES OF H+, HE+, AND O+ IN THE PLASMAPAUSE, PLASMA TROUGH AND POLAR CAP; (4) THE CHANGING CHARACTER OF THE COLD PLASMA DENSITY, TEMPERATURE, AND BULK FLOW IN REGIONS OF INTERACTION WITH HOT PLASMA SUCH AS AT THE BOUNDARY BETWEEN THE PLASMASPHERE AND THE RING CURRENT; AND (5) THE DETAILED COMPOSITION OF IONOSPHERIC PLASMA IN THE 1- TO 32-U RANGE. THE INSTRUMENT CONSISTS OF THREE DETECTOR HEADS. ONE LOOKS OUT IN THE RADIAL DIRECTION, AND THE OTHER TWO ARE ALONG THE PLUS AND MINUS SPIN AXIS DIRECTION. EACH DETECTOR HAS A 55 DEG HALF-CONE ACCEPTANCE ANGLE. THE DETECTOR HEADS HAVE A GRIDDED WEAKLY COLLIMATING APERTURE WHERE THE RETARDING ANALYSIS IS PERFORMED, FOLLOWED BY A PARALLEL PLATE CERAMIC MAGNETIC MASS ANALYZER WITH THREE SEPARATE EXIT SLITS CORRESPONDING TO ION MASSES IN THE RATIO 1:4:16. IONS EXITING FROM THESE SLITS ARE DETECTED WITH ELECTRON MULTIPLIERS. IN THE APOGEE MODE THE THERMAL PARTICLE FLUXES ARE MEASURED AS THE POTENTIAL ON A SET OF RETARDING GRIDS THAT ARE STEPPED THROUGH A SEQUENCE OF SETTINGS. IN THE PERIGEE MODE, THE RETARDING GRIDS ARE GROUNDED AND THE DETECTOR UTILIZES A CONTINUOUS ACCELERATION POTENTIAL SWEEP THAT FOCUSES THE MASS RANGES FROM 1 TO 2, 4 TO 10, AND 14 TO 34 U ON THE LOW-, MID-, AND HIGH-MASS SENSORS, RESPECTIVELY.

----- DYNAMICS EXPLORER-A, CORONITI-----

INVESTIGATION NAME- AURORAL PHYSICS

NSSDC ID- DE-A -07 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
UPPER ATMOSPHERE RESEARCH

PERSONNEL

PI - F.V. CORONITI	U OF CALIF, LA
O1 - C.F. KENNEL	U OF CALIF, LA
O1 - J.E. HAGGS	U OF CALIF, LA

BRIEF DESCRIPTION

THE PRIMARY GOAL OF THIS INVESTIGATION IS TO USE THE RESULTS FROM OTHER EXPERIMENTS, PARTICULARLY DE-A-03 (FRANK) TO TEST PREVIOUS THEORETICAL MODELS AND TO DEVELOP NEW ONES, WITH EMPHASIS ON RESEARCH AREAS RELATED TO AURORAL ARCS, FIELD-ALIGNED CURRENTS, PLASMA WAVE TURBULENCE ASSOCIATED WITH ANOMALOUS RESISTANCE, GENERATION OF AURORAL ELECTRON BEAMS, PRODUCTION OF KILOMETRIC AND VLF MISS RADIATION, AND SPREAD-F. IN ADDITION, CORRELATION STUDIES ARE ORGANIZED BY SELECTING EVENTS THAT ARE INTERESTING TO THE VARIOUS INVESTIGATORS AND DATA REDUCTION PROCEDURES ARE SUGGESTED TO FACILITATE COMPARISON AND INTERPRETATION OF THE DATA.

----- DYNAMICS EXPLORER-A, FRANK-----

INVESTIGATION NAME- GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS

NSSDC ID- DE-A -03 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
IONOSPHERES

PERSONNEL

PI - L.A. FRANK	U OF IOWA
O1 - K.L. ACKERSON	U OF IOWA
O1 - R.L. CAROVILLANO	BOSTON COLLEGE
O1 - R.N. EATHER	BOSTON COLLEGE

BRIEF DESCRIPTION

THE SPIN-SCAN AURORAL IMAGER (SAI) PROVIDES GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS. IT ACQUIRES: (1) IMAGES AT SEVERAL VISIBLE WAVELENGTHS; (2) IMAGES WITHIN A VACUUM ULTRAVIOLET 'WINDOW', WHICH ALLOWS USABLE IMAGING OF THE AURORA IN THE SUNLIT IONOSPHERE; AND (3) PHOTOMETRIC MEASUREMENTS OF THE HYDROGEN CORONA. THIS INVESTIGATION PROVIDES DATA THAT SIGNIFICANTLY ADVANCE THE KNOWLEDGE OF (1) THE SPATIAL AND TEMPORAL CHARACTER OF THE ENTIRE AURORAL OVAL AT BOTH VISIBLE AND VACUUM ULTRAVIOLET WAVELENGTHS (WITH GOOD TIME RESOLUTION); (2) THE ASSOCIATION OF AURORAL AND MAGNETOSPHERIC PLASMAS WITH THE DIVERSE AURORAL EMISSION FEATURES; (3) THE RELATIONSHIP OF THE AURORAL EMISSIONS WITH FIELD-ALIGNED CURRENTS; (4) THE ENERGY DEPOSITED IN THE AURORAL IONOSPHERE BY CHARGED PARTICLES; (5) THE ACCELERATION MECHANISM RESPONSIBLE FOR 'INVERTED-V' PRECIPITATION EVENTS; (6) THE ROLE OF THE POLAR CAP AND MAGNETOTAIL IN AURORAL AND MAGNETOSPHERIC DYNAMICS, AND (7) THE TIME-DEPENDENT DISTRIBUTION OF NEUTRAL HYDROGEN IN THE RING CURRENT AND POLAR REGIONS. FOR VISIBLE WAVELENGTHS, THE PHOTOMETERS HAVE A WIDE-ANGLE COLLIMATOR; A SUPER-REFLECTING SCANNING MIRROR; A MIRROR DRIVE MOTOR; A QUARTZ FIELD LENS; AN IMAGE-VIEWING ASSEMBLY OF FIELD-STOP, PINHOLE AND COLLIMATING LENS; A FILTER WHEEL WITH NARROW-BAND INTERFERENCE FILTERS WITH HALF-POWER BANDWIDTHS OF 8 A CENTERED AT 5577 A, 6300 A, AND 3914 A; AND A SMALL PHOTOMULTIPLIER TUBE WITH AN EXTENDED RED PHOTOCATHODE. THE VACUUM ULTRAVIOLET IMAGING PHOTOMETER IS A SPIN-SCAN NEWTONIAN TELESCOPE. THE FIRST OPTICAL ELEMENT IS AN ALUMINUM SCANNING MIRROR WITH A MgF2 OVERCOAT. THE COLLIMATION AND MIRROR DRIVE ARE SIMILAR TO THAT DESCRIBED PREVIOUSLY FOR THE VISIBLE IMAGING PHOTOMETER. A FILTER WHEEL WITH MgF2, CaF2, AND BaF2 FILTERS ALLOWS GLOBAL IMAGING FROM 1570 A TO 1700 A, AT 1304 A, 1356 A, AND 1216 A. THE DETECTOR IS A PHOTOMULTIPLIER TUBE WITH A CSI PHOTOCATHODE AND A MgF2 WINDOW.

----- DYNAMICS EXPLORER-A, HELLIWELL-----

INVESTIGATION NAME- CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS

NSSDC ID- DE-A -08 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
RADIO PHYSICS

PERSONNEL

PI - R.A. HELLIWELL	STANFORD U
O1 - T.F. BELL	STANFORD U
O1 - D.L. CARPENTER	STANFORD U
O1 - C.G. PARK	STANFORD U
O1 - J.B. REAGAN	LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION USES A GROUND-BASED VERY-LOW-FREQUENCY/LOW-FREQUENCY (VLF/LF) (0.5-200 KHZ) TRANSMITTER LOCATED AT SIPLE, ANTARCTICA, AT AN L VALUE OF ABOUT 4, AND THE BROAD-BAND MAGNETIC FIELD DETECTOR FROM EXPERIMENT DE-A-02. THE PRIMARY OBJECTIVE OF THE INVESTIGATION IS TO DETERMINE THE RELATIONSHIP BETWEEN VLF/LF WAVES AND ENERGETIC ELECTRONS IN THE MAGNETOSPHERE WITH EMPHASIS ON WAVE GROWTH, STIMULATED EMISSIONS, AND WAVE-INDUCED PERTURBATIONS OF THE ENERGETIC ELECTRONS. OTHER OBJECTIVES ARE TO: (1) DETERMINE HOW WAVE PROPAGATION FROM BOTH GROUND AND MAGNETOSPHERIC SOURCES IS AFFECTED BY FIELD-ALIGNED PLASMA STRUCTURES SUCH AS THE PLASMAPAUSE AND DUCTS OF ENHANCED IONIZATION, (2) USE THE WAVE DATA TO DESCRIBE THE STRUCTURE OF THE PLASMAPAUSE AND THE DISTRIBUTION OF IONIZATION ALONG FIELD-ALIGNED DUCTS, AND (3) STUDY THE EFFECTS OF EARTH POWER-LINE RADIATION AND OTHER VLF WAVE ACTIVITY. THE BROAD-BAND MAGNETIC FIELD DATA ARE OBTAINED FROM THE LOOP

ORIGINAL PAGE IS
OF POOR QUALITY

ANTENNA, SELECTABLE IN THREE BANDS; 2 TO 4, 4 TO 8, AND 8 TO 16 KHZ.

----- DYNAMICS EXPLORER-A, SHAWHAN-----

INVESTIGATION NAME- PLASMA WAVES

NSSDC ID- DE-A -02 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - S.D. SHAWHAN U OF IOWA
OI - D.A. GURNETT U OF IOWA

BRIEF DESCRIPTION

THE PLASMA WAVE INSTRUMENT (PWI) MEASURES ELECTRIC FIELDS FROM 1 HZ TO 2 MHZ, MAGNETIC FIELDS FROM 1 HZ TO 400 KHZ, AND THE DC POTENTIAL DIFFERENCE BETWEEN THE ELECTRIC DIPOLE ELEMENTS. THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE SPATIAL, TEMPORAL, SPECTRAL, AND WAVE CHARACTERISTICS (PARTICULARLY THE POINTING VECTOR COMPONENT ALONG THE MAGNETIC FIELD LINE) AND THE WAVE POLARIZATION FOR EXTREMELY-LOW-FREQUENCY (ELF), VERY-LOW-FREQUENCY (VLF), AND HIGH-FREQUENCY (HF) NOISE PHENOMENA. OF SPECIAL INTEREST ARE THE AURORAL KILOMETRIC RADIATION AND VLF HISS, AND A VARIETY OF ELECTROSTATIC WAVES THAT MAY CAUSE FIELD-ALIGNED ACCELERATION OF PARTICLES. THE INVESTIGATION MAKES USE OF THE LONG DIPOLE ANTENNAS AND A MAGNETIC LOOP ANTENNA. A SINGLE-AXIS SEARCH COIL MAGNETOMETER AND A SHORT ELECTRIC ANTENNA ARE INCLUDED FOR LOW-FREQUENCY MEASUREMENTS AND ELECTROSTATIC NOISE AT SHORT WAVELENGTHS. THE ELECTRONICS CONSISTS OF: (1) A WIDEBAND/LONG BASELINE RECEIVER WITH A BANDWIDTH OF 10 OR 40 KHZ FROM 0-2 MHZ; (2) A SWEEP-FREQUENCY CORRELATOR, CONTAINING TWO SWEEP-FREQUENCY RECEIVERS AND PHASE DETECTORS, SWEEPING 100 HZ TO 400 KHZ IN 32 SECONDS, GIVES THE PHASE BETWEEN MAGNETIC AND ELECTRIC COMPONENTS OF THE FIELDS; (3) A LOW-FREQUENCY CORRELATOR CONTAINING TWO FILTER RECEIVERS AND PHASE DETECTORS. EIGHT FILTERS IN THE RANGE 1.78-100 HZ ARE SWEEPED IN 8 S; (4) DC MONITORS TO MEASURE THE VOLTAGE DIFFERENCE BETWEEN THE TWO SETS OF LONG DIPOLE ANTENNAS; (5) A LINEAR WIDEBAND RECEIVER, SELECTABLE FROM 2- TO 4-, 4- TO 8-, OR 8- TO 16-KHZ BANDS.

----- DYNAMICS EXPLORER-A, SHELLEY-----

INVESTIGATION NAME- HOT PLASMA COMPOSITION

NSSDC ID- DE-A -06 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - E.G. SHELLEY LOCKHEED PALO ALTO
OI - R.G. JOHNSON LOCKHEED PALO ALTO
OI - R.D. SHARP LOCKHEED PALO ALTO
OI - J. GEISS U OF BERNE
OI - P.X. EBERHARDT U OF BERNE
OI - H. BALSIGER U OF BERNE
OI - D.T. YOUNG U OF BERNE
OI - A. GHIUZZETTI U OF BERNE
OI - B.A. WHALEN NATL RES COUNC OF CAN

BRIEF DESCRIPTION

THE ENERGETIC ION COMPOSITION SPECTROMETER (EICS) HAS HIGH SENSITIVITY AND HIGH RESOLUTION, AND COVERS THE ENERGY RANGE FROM 0 TO 17 KEV PER UNIT CHARGE AND THE MASS RANGE FROM 1 TO 138 U. THIS INVESTIGATION PROVIDES DATA USED IN INVESTIGATING THE STRONG COUPLING MECHANISM BETWEEN THE MAGNETOSPHERE AND THE IONOSPHERE THAT RESULTS IN LARGE FLUXES OF ENERGETIC O+ IONS BEING ACCELERATED FROM THE IONOSPHERE AND INJECTED INTO THE MAGNETOSPHERE DURING MAGNETIC STORMS. THE PROPERTIES OF THE MINOR IONIC SPECIES SUCH AS HE+ AND HE++ RELATIVE TO THE MAJOR CONSTITUENTS OF THE ENERGETIC MAGNETOSPHERE PLASMA ARE ALSO STUDIED IN ORDER TO EVALUATE THE RELATIVE IMPORTANCE OF THE DIFFERENT SOURCES OF THE PLASMA AND OF VARIOUS ENERGIZATION, TRANSPORT, AND LOSS PROCESSES THAT MAY BE MASS- OR CHARGE-DEPENDENT. THE INSTRUMENT IS SIMILAR TO ONE FLOWN ON THE ISEE 1 SATELLITE. IT CONSISTS OF A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL ELECTROSTATIC-MAGNETIC PASS ANALYZER WITH ELECTRON MULTIPLIERS USED AS DETECTORS. THE ENERGY ANALYZER CAN BE OPERATED IN TWO BASIC ENERGY RANGES, LOW AND HIGH. IN THE HIGH-ENERGY RANGE, THE PLATE POTENTIALS ARE PROGRAMMABLE IN 32 STEPS SUCH THAT THE ENERGY-PER-UNIT CHARGE IS MEASURED IN THE RANGE BETWEEN 0.10 AND 17 KEV WITH NEARLY EQUAL LOGARITHMIC STEPS. AT THE LOWEST STEP THE ANALYZER BECOMES TRANSPARENT TO ALL IONS WITH ENERGY LESS THAN ABOUT 150 EV. IN THIS LOW-ENERGY RANGE, THE ANALYZER IS HELD ON THIS STEP AND INTEGRAL ENERGY ANALYSIS BETWEEN ZERO AND 150 EV IS PERFORMED WITH A RETARDING POTENTIAL ANALYZER THAT PRECEDES THE PREACCELERATION SECTION. THE PASS ANALYZER CONSISTS OF A CYLINDRICAL-PLATE ELECTROSTATIC ANALYZER BETWEEN THE POLES OF A PERMANENT MAGNET. OPEN MULTIPLIERS ARE USED WITH PULSE-AMPLITUDE DISCRIMINATION AS THE MASS ANALYZER DETECTORS IN ORDER TO IMPROVE THE MASS SEPARATION CHARACTERISTICS OF THE SPECTROMETER.

----- DYNAMICS EXPLORER-A, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- DE-A -01 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - M. SUGIURA NASA-GSFC
OI - B.G. LEDLEY NASA-GSFC
OI - W.M. FARTHING NASA-GSFC
OI - L.J. CAHILL, JR. U OF MINNESOTA

BRIEF DESCRIPTION

THIS INVESTIGATION USES A TRIAXIAL FLUXGATE MAGNETOMETER (MAG-A), SIMILAR TO ONE ON BOARD DE-B, TO OBTAIN VECTOR MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO OBTAIN MEASUREMENTS OF FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES. THIS IS ACCOMPLISHED USING THE TWO SPACECRAFT AND CORRELATIONS OF THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL PARTICLES, AND WITH AURORAL IMAGES OBTAINED FROM INVESTIGATION DE-A-03. THE MAGNETOMETER INCORPORATES ITS OWN 12-BIT A-D CONVERTER, A 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL TO GENERATE A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THE THREE MAGNETOMETER AXES. TRACK AND HOLD MODULES ARE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. INSTRUMENT BANDWIDTH IS 25 HZ. THE INSTRUMENT RANGE IS UP TO 61,000 NT. THE ACCURACY IS PLUS OR MINUS 4 NT, AND THE RESOLUTION IS: PLUS OR MINUS 1.5 NT IN THE 61,000 NT RANGE, PLUS OR MINUS 0.25 NT IN THE 1,000 NT RANGE, AND PLUS OR MINUS 0.02 NT IN THE 80 NT RANGE. THE MAGNETOMETER'S DIGITAL COMPENSATION OF THE AMBIENT FIELD IS IN PRECISE 8000 NT INCREMENTS.

----- DYNAMICS EXPLORER-B-----

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-B
ALTERNATE NAMES- DE-B

NSSDC ID- DE-B

LAUNCH DATE- 07/31/81 WEIGHT- 310. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101. MIN INCLINATION- 90.0 DEG
PERIAPSIS- 305. KM ALT APOAPSIS- 1300. KM ALT

PERSONNEL
MG - H.B. WEINREB NASA HEADQUARTERS
SC - E.W. SCHMERLING NASA HEADQUARTERS
PM - G.D. HOGAN NASA-GSFC
PS - R.A. HOFFMAN NASA-GSFC

BRIEF DESCRIPTION

THE DE-B SPACECRAFT (LOW-ALTITUDE MISSION) COMPLEMENTS THE HIGH-ALTITUDE MISSION (DE-A) AND IS PLACED INTO AN ORBIT WITH A PERIGEE SUFFICIENTLY LOW TO PERMIT MEASUREMENTS OF NEUTRAL COMPOSITION, TEMPERATURE, AND WIND. THE APOGEE IS HIGH ENOUGH TO PROVIDE DE-B WITH A LIFETIME OF GREATER THAN 18 MONTHS AND PERMITS MEASUREMENTS ABOVE THE INTERACTION REGIONS OF SUPRATHERMAL IONS AND PLASMA FLOW MEASUREMENTS AT THE LIST OF THE MAGNETOSPHERIC FIELD LINES. THE SPACECRAFT APPROXIMATES A SHORT RIGHT CYLINDER 137 CM IN DIAMETER AND 115 CM HIGH. THE TRIAXIAL ANTENNAS ARE 23 M TIP-TO-TIP. ONE 3-M BOOM IS PROVIDED FOR REMOTE MEASUREMENTS. THE INSTRUMENT PACKAGE HAS A MASS OF 75 KG. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT IS THREE-AXIS STABILIZED WITH THE YAW AXIS ALIGNED TOWARD THE CENTER OF THE EARTH TO WITHIN 1 DEG. THE SPIN AXIS IS NORMAL TO THE ORBIT PLANE WITHIN 1 DEG WITH A SPIN RATE OF ONE REVOLUTION PER ORBIT. A SINGLE-AXIS SCAN PLATFORM WAS INCLUDED IN ORDER TO MOUNT THE LOW-ALTITUDE PLASMA INSTRUMENT (DE-B-08). THE PLATFORM ROTATES ABOUT THE SPIN AXIS. A PCM TELEMETRY DATA SYSTEM IS USED THAT OPERATES IN REAL TIME OR IN A TAPE RECORDER MODE. DATA ARE ACQUIRED ON A SCIENCE PROBLEM ORIENTED BASIS, WITH CLOSELY COORDINATED OPERATIONS OF THE VARIOUS INSTRUMENTS, BOTH SATELLITES, AND SUPPORTIVE EXPERIMENTS.

----- DYNAMICS EXPLORER-B, BRACE-----

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- DE-B -09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - L.N. BRACE
OI - W.R. HOEY
OI - R.F. THEIS
OI - K.D. COLE
OI - G.R. CARIGNAN

NASA-GSFC
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LA TROBE U
U OF MICHIGAN

BRIEF DESCRIPTION

THE LANGMUIR PROBE INSTRUMENT (LANG) IS A CYLINDRICAL ELECTROSTATIC PROBE THAT OBTAINS MEASUREMENTS OF ELECTRON TEMPERATURE, TE, AND ELECTRON OR ION CONCENTRATION, NE OR NI, RESPECTIVELY, DENSITY IRREGULARITIES, AND SPACECRAFT POTENTIAL. DATA FROM THIS INVESTIGATION ARE USED TO PROVIDE TEMPERATURE AND DENSITY MEASUREMENTS ALONG MAGNETIC FIELD LINES RELATED TO THERMAL ENERGY AND PARTICLE FLOWS WITHIN THE MAGNETOSPHERE-IONOSPHERE SYSTEM, TO PROVIDE THERMAL PLASMA CONDITIONS FOR WAVE-PARTICLE INTERACTIONS, AND TO MEASURE LARGE-SCALE AND FINE-STRUCTURE IONOSPHERIC EFFECTS OF ENERGY DEPOSITION IN THE IONOSPHERE. THE LANGMUIR PROBE INSTRUMENT IS IDENTICAL TO THAT USED ON THE AE SATELLITES AND THE PIONEER VENUS ORBITER. THE INSTRUMENT EMPLOYS TWO INDEPENDENTLY OPERATED CYLINDRICAL COLLECTORS, EACH MOUNTED AT THE END OF A .5 M LONG BOOM. EACH COLLECTOR IS 5 CM LONG AND 0.3 CM IN DIAMETER. AN ELECTRONIC UNIT APPLIES APPROPRIATE VOLTAGE WAVEFORMS TO EACH PROBE AND MEASURES THE RESULTING CURRENTS THAT ARE DRAWN FROM THE IONOSPHERIC PLASMA SURROUNDING THE SPACECRAFT. THESE CURRENTS ARE INTRODUCED TO CIRCUITS THAT ARE ABLE TO PERFORM AN IN-FLIGHT ANALYSIS OF THE DATA FOR TE, NE, AND NI. THIS GREATLY REDUCES THE REQUIREMENT FOR HIGH TELEMETRY DATA RATES AND PERMITS INCREASED SPATIAL RESOLUTION OF THE MEASUREMENTS. SPACECRAFT POTENTIAL CAN ALSO BE DETERMINED FROM THESE MEASUREMENTS. THE INSTRUMENT HAS SELECTABLE MODES OF OPERATION THAT PROVIDE VARIOUS DEGREES OF SPATIAL RESOLUTION. MAXIMUM RESOLUTION FOR NE OR NI IS OBTAINED BY FIXING THE POTENTIAL OF ONE PROBE AND CONTINUOUSLY SAMPLING THE RESULTING RESPECTIVE ELECTRON OR ION CURRENT. THE RESOLUTION IS LIMITED ONLY BY THE SAMPLING RATE ASSIGNED TO THE INSTRUMENT. SIMULTANEOUSLY, THE OTHER PROBE CAN MEASURE NI AT A RATE OF UP TO 50 TO 100 PER SECOND, DEPENDING ON THE TELEMETRY RATE AVAILABLE. AT NOMINAL RATES (1000 BPS) TE AND NE ARE MEASURED ABOUT ONE OR TWO TIMES PER SECOND.

----- DYNAMICS EXPLORER-B, CARIGNAN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION
SPECTROMETER

NSSDC ID- DE-B -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.R. CARIGNAN
OI - N.W. SPENCER
OI - C.A. REBER
OI - A.E. HEDIN

U OF MICHIGAN
NASA-GSFC
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (NACS) IS DESIGNED TO OBTAIN IN SITU MEASUREMENTS OF THE NEUTRAL ATMOSPHERIC COMPOSITION AND TO STUDY THE VARIATIONS OF THE NEUTRAL ATMOSPHERE IN RESPONSE TO ENERGY COUPLED INTO IT FROM THE MAGNETOSPHERE. BECAUSE TEMPERATURE ENHANCEMENTS, LARGE-SCALE CIRCULATION CELLS, AND WAVE PROPAGATION ARE PRODUCED BY ENERGY INPUT (EACH OF WHICH POSSESSES A SPECIFIC SIGNATURE IN COMPOSITION VARIATION), THE MEASUREMENTS PERMIT THE STUDY OF THE PARTITION, FLOW, AND DEPOSITION OF ENERGY FROM THE MAGNETOSPHERE. THE QUADRUPOLE MASS SPECTROMETER USED IS A NEARLY IDENTICAL FOLLOW-ON TO THOSE FLOWN ON THE AE-C, -D, AND -E MISSIONS. THE ELECTRON IMPACT ION SOURCE IS USED IN A CLOSED MODE. ATMOSPHERIC PARTICLES ENTER INTO AN ANTICHAMBER THROUGH A KNIFE-EDGED ORIFICE, WHERE THEY ARE THERMALIZED TO THE INSTRUMENT TEMPERATURE. THE IONS WITH THE SELECTED CHARGE-TO-MASS RATIOS HAVE STABLE TRAJECTORIES THROUGH THE HYPERBOLIC ELECTRIC FIELD AND EXIT THE ANALYZER AND ENTER INTO THE DETECTION SYSTEM. AN OFF-AXIS BERYLLIUM-COPPER DYNODE MULTIPLIER OPERATING AT A GAIN OF 2.E6 PROVIDES AN OUTPUT PULSE OF ELECTRONS FOR EACH ION ARRIVAL. THE DETECTOR OUTPUT IS A PULSE RATE PROPORTIONAL TO THE NEUTRAL DENSITY IN THE ION SOURCE OF THE SELECTED MASS. THE INSTRUMENT ALSO INCLUDES TWO Baffles THAT SCAN ACROSS THE INPUT ORIFICE FOR OPTIONAL MEASUREMENT OF THE TRANSVERSE COMPONENTS OF THE NEUTRAL WIND. THE INSTRUMENT COVERS THE ENTIRE MASS RANGE FROM 1 TO 48 U, BUT NORMALLY IS USED IN A SELECTED MASS STEPPING MODE WHERE MASS NUMBERS 4, 28, 30, 32, AND 40 ARE SAMPLED SEQUENTIALLY WITH A SPATIAL RESOLUTION OF 4 KM. THE TIME RESOLUTION NEEDED TO DETERMINE THE ABUNDANCE OF GAS AT A SINGLE MASS IS 16 MILLISECONDS. OPERATIONAL ALTITUDES ARE BETWEEN 200 KM AND 500 KM WITH REDUCED CAPABILITY AS LOW AS 150 KM AND AS HIGH AS 600 KM.

----- DYNAMICS EXPLORER-B, HANSON-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- DE-B -07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
ATMOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL

PI - W.B. HANSON
OI - R.A. WELLS
OI - D.R. ZUCCARO
OI - C.R. LIPPENCOTT

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U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE RETARDING POTENTIAL ANALYZER (RPA) PROVIDES DATA ON TEMPERATURE, COMPOSITION, CONCENTRATION, AND THE BULK VELOCITY OF POSITIVE IONS NOMINALLY PARALLEL TO THE VEHICLE VELOCITY. THE MEASURED PARAMETERS OBTAINED FROM THIS INVESTIGATION ARE BASIC TO THE UNDERSTANDING OF MECHANISMS THAT INFLUENCE THE PLASMA; I.E., TO UNDERSTAND THE COUPLING BETWEEN THE SOLAR WIND AND THE EARTH'S ATMOSPHERE. THE ANALYZER DEFINES THE ION TEMPERATURE IN THE REGIONS WHERE THE CONCENTRATION, N(I), IS GREATER THAN 100 IONS PER CU CM, AND DETERMINES THE VALUE OF N(I) FROM ITS MAXIMUM VALUE DOWN TO APPROXIMATELY 50 IONS PER CU CM. THE RPA PROVIDES THE BEST ABSOLUTE VALUE FOR N(I) OF THE IN SITU MEASURING INSTRUMENTS ON THE SPACECRAFT, AND IS ALSO CAPABLE OF MEASURING FRACTIONAL CHANGES IN N(I) OF LESS THAN 0.1 PERCENT WITH HIGH SPATIAL RESOLUTION. THE FRACTIONAL CHANGES IN N(I) ARE CALLED THE IRREGULARITY INDEX. THE MEASUREMENTS ARE MADE WITH A MULTIGRIDDED PLANAR RETARDING POTENTIAL ANALYZER VERY SIMILAR IN CONCEPT AND GEOMETRY TO THE INSTRUMENTS CARRIED ON THE AE SATELLITES. THE DUCT SENSOR HAS A SEPARATE APERTURE. A PAIR OF APERTURE GRIDS ARE HELD AT SPACECRAFT GROUND AND A SECOND PAIR OF GRIDS COMPRISES THE RETARDING SWEEP GRID. THE POTENTIAL ON THESE GRIDS DETERMINES THE ENERGY OF THE IONS IN THE SPACECRAFT FRAME OF REFERENCE THAT CAN REACH THE ELECTROMETER COLLECTOR. THE RETARDING POTENTIAL IS VARIED IN DIFFERENT SEQUENCES TO PROVIDE INFORMATION ON THE ION THERMAL ENERGY DISTRIBUTION. THE ELECTRICALLY NEGATIVE SUPPRESSOR GRID BETWEEN THE SWEEP GRID AND THE COLLECTOR SERVES TO SUPPRESS SOLAR UV EJECTED PHOTOELECTRONS BY SENDING THEM BACK TO THE COLLECTOR AND ALSO SHIELDS THE COLLECTOR FROM AMBIENT ELECTRONS. THE ION CURRENT-RETARDING VOLTAGE CHARACTERISTICS ARE ANALYZED BY FITTING THEORETICAL CURVES TO THE DATA ON A COMPUTER USING LEAST SQUARES TECHNIQUES. PARAMETERS THAT ARE DEDUCED FROM THIS PROCESS ARE: ION TEMPERATURE; VEHICLE POTENTIAL; RAM COMPONENT OF THE ION DRIFT VELOCITY; THE ION AND ELECTRON CONCENTRATION IRREGULARITY SPECTRUM; AND THE CONCENTRATION OF H+, HE+, O+, AND FE+, AND MOLECULAR IONS O2+, NO+, AND N2+.

----- DYNAMICS EXPLORER-B, HAYS-----

INVESTIGATION NAME- FABRY-PEROT INTERFEROMETER

NSSDC ID- DE-B -05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS
OI - R.G. BOBLE
OI - G.R. CARIGNAN
OI - A.F. NAGY
OI - D. REES

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U COLLEGE LONDON

BRIEF DESCRIPTION

THE FABRY-PEROT INTERFEROMETER (FPI) IS A HIGH RESOLUTION INSTRUMENT DESIGNED TO MEASURE THE DRIFT AND TEMPERATURE OF NEUTRAL AND IONIC ATOMIC OXYGEN USING THE DOPPLER TECHNIQUE. ZENITH ANGLE SCANNING PROVIDES WIND DETERMINATIONS AT VARIOUS ALTITUDES BELOW THE SPACECRAFT. THE INFORMATION OBTAINED FROM THIS INVESTIGATION IS USED TO STUDY THE DYNAMIC RESPONSE OF THE THERMOSPHERE TO THE ENERGY SOURCES CAUSED BY MAGNETOSPHERIC ELECTRIC FIELDS AND THE ABSORPTION OF SOLAR ULTRAVIOLET LIGHT IN THE THERMOSPHERE. THE INSTRUMENT IS BASED ON THE VISIBLE AIRGLOW EXPERIMENT (VAE) USED IN THE AE PROGRAM. THE ADDITION OF A SCANNING MIRROR, THE FABRY-PEROT ETALON, AN IMAGE PLANE DETECTOR, AND A CALIBRATION LAMP ARE THE PRINCIPAL DIFFERENCES. FOUR BAND-PASS FILTERS ISOLATE LINES AT 5577 A, 6300 A, 7319-7330 A, AND THE SPECTRAL CALIBRATION LINE. THE BASIC SENSOR IS A FLAT-PLATE FABRY-PEROT INTERFEROMETER, WITH A PLATE DIAMETER OF 3.1 CM AND A PLATE SEPARATION OF 1.27 CM. BECAUSE THE FABRY-PEROT PROVIDES ALL THE NEEDED SPECTRAL INFORMATION IN A CONCENTRIC RING PATTERN ON AN IMAGE PLANE, A SINGLE PHOTON-COUNTING IMAGE DETECTOR IS USED TO ACQUIRE SIMULTANEOUS SPECTRAL INFORMATION. THIS DETECTOR CONSISTS OF A PHOTOCATHODE MICROCHANNEL-PLATE GAIN STAGE AND CONCENTRIC RING ANODES MATCHED TO THE FABRY-PEROT OUTPUT IMAGE. THE RESOLUTION IS 0.0196 A PER RING, ALLOWING ABSOLUTE MEASUREMENT ACCURACY OF ABOUT 10 M/S FOR THE DRIFT VELOCITY OF NEUTRAL ATOMIC OXYGEN. THE HEIGHT RESOLUTION IS 1 KM.

----- DYNAMICS EXPLORER-B, HEELIS-----

INVESTIGATION NAME- ION DRIFT METER
 NSSDC ID- DE-B -06 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - R.A. HEELIS U OF TEXAS, DALLAS
 OI - W.B. HANSON U OF TEXAS, DALLAS
 OI - D.R. ZUCCARO U OF TEXAS, DALLAS
 OI - C.R. LIPPENCOTT U OF TEXAS, DALLAS

BRIEF DESCRIPTION
 THE ION DRIFT METER (IDM) MEASURES THE BULK MOTIONS OF THE IONOSPHERIC PLASMA PERPENDICULAR TO THE SATELLITE VELOCITY VECTOR. THE MEASURED PARAMETERS, HORIZONTAL AND VERTICAL ION DRIFT VELOCITIES, HAVE A NOMINAL RANGE OF PLUS OR MINUS 4 KM/S. THE ACCURACY OF THE MEASUREMENT IS DEPENDENT ON S/C ATTITUDE DETERMINATION. THIS INVESTIGATION YIELDS INFORMATION ON: (1) THE ION CONVECTION (ELECTRIC FIELD) PATTERN IN THE AUROREAL AND POLAR IONOSPHERES; (2) THE FLOW OF PLASMA ALONG MAGNETIC FIELD LINES WITHIN THE PLASMASPHERE, WHICH DETERMINES WHETHER THIS MOTION IS SIMPLY A BREATHING OF THE PROTONOSPHERE, A REFILLING OF THIS REGION AFTER A STORM, OR AN INTERHEMISPHERIC TRANSPORT OF PLASMA; (3) THE THERMAL ION CONTRIBUTION TO FIELD-ALIGNED ELECTRIC CURRENTS; (4) VELOCITY FIELDS ASSOCIATED WITH SMALL-SCALE PHENOMENA THAT ARE IMPORTANT AT BOTH LOW AND HIGH LATITUDES; (5) THE MAGNITUDE AND VARIATION OF THE TOTAL CONCENTRATION ALONG THE ORBITAL FLIGHT PATH. THE ION DRIFT METER MEASURES THE PLASMA MOTION PARALLEL TO THE SENSOR FACE BY USING A GRIDDED COLLIMATOR AND MULTIPLE COLLECTORS TO DETERMINE THE DIRECTION OF ARRIVAL OF THE PLASMA. THE INSTRUMENT GEOMETRY IS VERY SIMILAR TO THAT USED ON THE AE-C SATELLITE. TWO LOGARITHMIC AMPLIFIERS AND ONE LINEAR DIFFERENCE AMPLIFIER ARE USED WITH THE DRIFT METER. THE LOGARITHMIC AMPLIFIERS CAN BE CONNECTED TO DIFFERENT PAIRS OF THE COLLECTOR SEGMENTS AND PROVIDE THE INPUT TO THE DIFFERENCE AMPLIFIER. THE OUTPUT FROM THE DIFFERENCE AMPLIFIER IS PROPORTIONAL TO THE RATIO OF THE CURRENTS TO THE PAIRS OF COLLECTOR SEGMENTS. IF THE DIRECTION OF ARRIVAL OF THE PLASMA IS NOT NORMAL TO THE SENSOR FACE, THEN THE ION CURRENT IS ASYMMETRICALLY DISTRIBUTED OVER THE FOUR COLLECTOR SEGMENTS. IN THE ABSENCE OF ANY EXTERNAL ELECTRIC FIELDS OR NEUTRAL WINDS, THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE IS DETERMINED SOLELY BY THE ATTITUDE OF THE SENSOR RELATIVE TO THE SPACECRAFT VELOCITY VECTOR. IF THE SPACECRAFT ATTITUDE, VELOCITY, AND THE POSITION OF THE SENSOR ON THE SURFACE ARE ACCURATELY KNOWN, THEN ANY DEVIATION (RECORDED BY THE DRIFT METER) FROM THE EXPECTED ANGLE OF ARRIVAL OF THE PLASMA MAY BE INTERPRETED IN TERMS OF PLASMA MOTION CAUSED BY ELECTRIC FIELDS OR NEUTRAL WINDS. IN ADDITION TO MEASURING THE ANGLE OF ARRIVAL OF THE PLASMA AT THE SENSOR FACE, IT IS POSSIBLE TO MONITOR THE TOTAL ION CONCENTRATION BECAUSE THE SUM OF THE CURRENTS TO THE TWO LOGARITHMIC AMPLIFIERS IS VERY NEARLY PROPORTIONAL TO THIS QUANTITY.

----- DYNAMICS EXPLORER-B, HOFFMAN-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INVESTIGATION HIGH
 ANGULAR RESOLUTION

NSSDC ID- DE-B -13 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - R.A. HOFFMAN NASA-GSFC
 OI - J.D. WINNINGHAM U OF TEXAS, DALLAS
 OI - D.M. KLUMPAR U OF TEXAS, DALLAS
 OI - J.L. BURCH SOUTHWEST RES INST

BRIEF DESCRIPTION
 THIS INVESTIGATION USES THE SUPRATHERMAL PARTICLE DISTRIBUTION FUNCTIONS MEASURED BY BOTH THE HIGH (DE-A-05) AND LOW (DE-B-08) ALTITUDE PLASMA INSTRUMENTS. THE PURPOSES ARE TO: (1) STUDY THE PROPERTIES AND LOCATIONS OF AUROREAL ACCELERATION MECHANISMS, (2) DETERMINE THE NATURE AND DISTRIBUTION OF ELECTRIC FIELDS PARALLEL TO THE MAGNETIC FIELD, (3) IDENTIFY THE CHARGE CARRIERS OF THE MAJOR ELECTRIC CURRENT SYSTEMS COUPLING THE MAGNETOSPHERE AND IONOSPHERE, AND (4) DETERMINE RELATIONS BETWEEN THESE QUANTITIES, AND THE CONVECTION ELECTRIC FIELD AND AUROREAL LIGHT EMISSION PATTERNS.

----- DYNAMICS EXPLORER-B, MAYNARD-----

INVESTIGATION NAME- ELECTRIC FIELD INVESTIGATIONS

NSSDC ID- DE-B -02 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL
 PI - M.C. MAYNARD
 OI - J.P. NEPPNER

NASA-GSFC
 NASA-GSFC

BRIEF DESCRIPTION

THE VECTOR ELECTRIC FIELD INSTRUMENT (VEFI) USES FLIGHT-PROVEN DOUBLE-PROBE TECHNIQUES WITH 20-M BASELINES TO OBTAIN VECTOR MEASUREMENTS OF DC ELECTRIC FIELDS. THIS ELECTRIC FIELD INVESTIGATION PROVIDES THE DATA NECESSARY TO MEET THE FOLLOWING OBJECTIVES: (1) TO OBTAIN ACCURATE AND COMPREHENSIVE TRIAXIAL DC ELECTRIC FIELD MEASUREMENTS AT IONOSPHERIC ALTITUDES IN ORDER TO REFINE THE BASIC SPATIAL PATTERNS, DEFINE THE LARGE-SCALE TIME HISTORY OF THESE PATTERNS, AND STUDY THE SMALL-SCALE TEMPORAL AND SPATIAL VARIATIONS WITHIN THE OVERALL PATTERNS; (2) TO STUDY THE DEGREE TO WHICH AND IN WHAT REGION THE ELECTRIC FIELD PROJECTS TO THE EQUATORIAL PLANE; (3) TO OBTAIN MEASUREMENTS OF ELF AND LOWER-FREQUENCY IRREGULARITY STRUCTURES; AND (4) TO PERFORM NUMEROUS CORRELATIVE STUDIES. THE INSTRUMENT CONSISTS OF SIX CYLINDRICAL ELEMENTS 11 M LONG AND 28 MM IN DIAMETER. EACH ANTENNA IS INSULATED FROM THE PLASMA EXCEPT FOR THE OUTER 2 M OF THE BASELINE, OR DISTANCE BETWEEN THE MIDPOINTS OF THESE 2-M ACTIVE ELEMENTS IS 20 M. THE ANTENNAS ARE INTERLOCKED ALONG THE EDGES TO PREVENT OSCILLATION (CAUSED BY THERMAL PUMPING) AND TO INCREASE THEIR RIGIDITY AGAINST DRAG FORCES. THE BASIC ELECTRONIC SYSTEM IS VERY SIMILAR IN CONCEPT TO THAT USED ON IMP-J AND ISEE 1, BUT MODIFIED FOR A THREE-AXIS MEASUREMENT ON A NONSPINNING SPACECRAFT. AT THE CORE OF THE SYSTEM ARE THE HIGH IMPEDANCE (1.E12 OHM) PREAMPLIFIERS WHOSE OUTPUTS ARE ACCURATELY SUBTRACTED AND DIGITIZED (14-BIT A-D CONVERSION FOR SENSITIVITY TO 0.1 MICROVOLT/M) TO MAINTAIN HIGH RESOLUTION FOR SUBSEQUENT REMOVAL OF THE CROSS-PRODUCT OF THE VECTORS V AND B IN DATA PROCESSING. THIS PROVIDES THE BASIC DC MEASUREMENT. OTHER CIRCUITRY IS USED TO AID IN INTERPRETING THE DC DATA AND TO MEASURE RAPID VARIATIONS IN THE SIGNALS DETECTED BY THE ANTENNAS. THE DC ELECTRIC FIELD RANGE IS PLUS OR MINUS 1 V/M, THE RESOLUTION IS 0.1 MV/M, AND THE VARIATIONAL ELECTRIC FIELD WILL BE MEASURED FROM 4 HZ TO 512 HZ.

----- DYNAMICS EXPLORER-B, MAYR-----

INVESTIGATION NAME- ATMOSPHERIC DYNAMICS AND ENERGETICS
 INVESTIGATION

NSSDC ID- DE-B -12 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - M.G. MAYR NASA-GSFC
 OI - G.P. NEWTON NASA HEADQUARTERS

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO STUDY THE DYNAMIC RESPONSES OF THE THERMOSPHERE AND IONOSPHERE TO ENERGY DEPOSITION IN THE FORM OF JOULE HEATING, PARTICLE PRECIPITATION, AND MOMENTUM TRANSFER BY ELECTRIC FIELD-GENERATED DRIFTS. THE OBJECTIVE IS TO DETERMINE THE RELATIVE IMPORTANCE OF THE VARIOUS PHENOMENA AND THE CONDITIONS UNDER WHICH ORDERING OCCURS, BECAUSE THE RELATIVE IMPORTANCE OF THE DIFFERENT PROCESSES VARIES WITH GEOMAGNETIC ACTIVITY, BOTH GEOMAGNETICALLY QUIET AND DISTURBED CONDITIONS ARE EXAMINED. USING THEORETICAL MODELS AS TOOLS, THE PRINCIPAL GOAL IS TO QUANTITATIVELY ANALYZE THE PHYSICAL PROCESSES INVOLVED IN THE ENERGY COUPLING BETWEEN THE MAGNETOSPHERE AND THE THERMOSPHERE. IN ADDITION TO DATA OBTAINED FROM VARIOUS DE SATELLITE INSTRUMENTS, THE INVESTIGATION USES GROUND-BASED CORRELATIVE MEASUREMENTS.

----- DYNAMICS EXPLORER-B, NAGY-----

INVESTIGATION NAME- MAGNETOSPHERIC ENERGY COUPLING TO THE
 ATMOSPHERE INVESTIGATION

NSSDC ID- DE-B -10 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - A.F. NAGY U OF MICHIGAN

BRIEF DESCRIPTION

THIS INVESTIGATION, USING VARIOUS DATA FROM VARIOUS SPACECRAFT INSTRUMENTS, STUDIES: (1) GLOBAL THERMOSPHERIC DYNAMICS (THE EFFECTS OF ENERGY INPUT TO THE THERMOSPHERE FROM THE MAGNETOSPHERE BY CONVECTION, JOULE HEATING, PARTICLE PRECIPITATION AND TIDAL ENERGY), (2) THE CONVECTIVE COUPLING OF THE THERMAL PLASMA BETWEEN THE IONOSPHERE AND MAGNETOSPHERE; AND (3) THE ENERGY-LOSS MECHANISMS OF IONOSPHERIC PHOTOELECTRONS IN THE PLASMASPHERE.

----- DYNAMICS EXPLORER-B, ROBLE-----

INVESTIGATION NAME- NEUTRAL-PLASMA INTERACTIONS
 INVESTIGATION

NSSDC ID- DE-B -11

INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.G. ROBLE

NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THIS INVESTIGATION, USING DATA FROM VARIOUS SPACECRAFT INSTRUMENTS, STUDIES THE LARGE-SCALE NEUTRAL-PLASMA INTERACTIONS IN THE THERMOSPHERE CAUSED BY MAGNETOSPHERIC-IONOSPHERIC AND THERMOSPHERIC COUPLING PROCESSES. MODELS ARE USED TO PROVIDE A THEORETICAL FRAMEWORK IN WHICH CERTAIN IMPORTANT IONOSPHERIC AND ATMOSPHERIC PROPERTIES NEEDED FOR COUPLING PROCESSES (SUCH AS THE PEDERSEN AND HALL CONDUCTIVITIES) MAY BE CONSISTENTLY CALCULATED USING SATELLITE DATA MEASURED AT A GIVEN HEIGHT. THESE MODELS ARE USED TO CALCULATE VERTICAL PROFILES OF IONOSPHERIC PROPERTIES THAT ARE USEFUL FOR COMPARISON WITH INCOHERENT SCATTER RADAR MEASUREMENTS AND OTHER GROUND-BASED SUPPORTING DATA. THE DATA ARE USED TO IDENTIFY AND EVALUATE THE NEUTRAL THERMOSPHERIC HEAT AND MOMENTUM SOURCES, AND TO DETERMINE THE EFFECTIVENESS OF HIGH LATITUDE DYNAMIC PROCESSES IN CONTROLLING THE GLOBAL THERMOSPHERIC CIRCULATION AND THERMAL STRUCTURE.

----- DYNAMICS EXPLORER-B, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE SPECTROMETER

NSSDC ID- DE-B -04

INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - N.W. SPENCER
OI - A.E. MEDIN
OI - W.R. HOEGY
OI - H.B. NIEMANN
OI - R.F. THEIS
OI - G.R. CARRIGAN

NASA-GSFC
NASA-GSFC
NASA-GSFC
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U OF MICHIGAN

BRIEF DESCRIPTION
THE WIND AND TEMPERATURE SPECTROMETER (WATS) MEASURES THE IN SITU NEUTRAL WINDS, THE NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATIONS OF SELECTED GASES. THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE INTERRELATIONSHIPS AMONG THE WINDS, TEMPERATURES, PLASMA DRIFT, ELECTRIC FIELDS, AND OTHER PROPERTIES OF THE THERMOSPHERE THAT ARE MEASURED BY OTHER INSTRUMENTS ON THE SPACECRAFT. KNOWLEDGE OF HOW THESE PROPERTIES ARE INTERRELATED HELPS IN EXPLAINING THE CONSEQUENCES OF THE ACCELERATION OF NEUTRAL PARTICLES BY THE CREATING ELECTRIC FIELDS, AND THE RELATED ENERGY TRANSFER BETWEEN THE IONOSPHERE AND THE MAGNETOSPHERE. THREE COMPONENTS OF THE WIND, ONE NORMAL TO THE SATELLITE VELOCITY VECTOR IN THE HORIZONTAL PLANE, ONE VERTICAL, AND ONE IN THE SATELLITE DIRECTION ARE MEASURED. A RETARDING POTENTIAL QUADRUPOLE MASS SPECTROMETER, COUPLED TO THE ATMOSPHERE THROUGH A PRECISELY ORIFICED ANTICHAMBER, IS USED. IT CAN BE OPERATED IN EITHER OF TWO MODES, ONE EMPLOYING THE RETARDING CAPABILITY AND THE OTHER USING THE ION SOURCE AS A CONVENTIONAL NONRETARDING SOURCE. TWO SCANNING BAFFLES ARE USED IN FRONT OF THE MASS SPECTROMETER, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR AND ONE MOVING HORIZONTALLY. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR ARE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION IS MEASURED DIRECTLY BY THE SPECTROMETER SYSTEM THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL. AT ALTITUDES TOO HIGH FOR NEUTRAL SPECIES MEASUREMENTS, THE INSTRUMENT MAY OPERATE TO MEASURE THE THERMAL ION SPECIES ONLY.

----- DYNAMICS EXPLORER-B, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD OBSERVATIONS

NSSDC ID- DE-B -01

INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. SUGIURA
OI - B.G. LEDLEY
OI - W.H. FARTHING
OI - L.J. CAMILL, JR.

NASA-GSFC
NASA-GSFC
NASA-GSFC
U OF MINNESOTA

BRIEF DESCRIPTION
A FLUXGATE MAGNETOMETER (MAG-B) SIMILAR TO ONE ON BOARD DE-A (DE-A-01), IS USED TO OBTAIN MAGNETIC FIELD DATA NEEDED TO STUDY THE MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE COUPLING. THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE FIELD-ALIGNED CURRENTS IN THE AURORAL OVAL AND OVER THE POLAR CAP AT TWO DIFFERENT ALTITUDES USING THE TWO SPACECRAFT, AND TO CORRELATE THESE MEASUREMENTS WITH OBSERVATIONS OF ELECTRIC FIELDS, PLASMA WAVES, SUPRATHERMAL PARTICLES, THERMAL

PARTICLES, AND AURORAL IMAGES OBTAINED FROM INVESTIGATION DE-A-03. THE SENSOR IS A THREE-AXIS FLUXGATE MAGNETOMETER WITH DIGITAL COMPENSATION OF THE AMBIENT FIELD IN PRECISE 0.03 NT (0.03 GAMMAS) INCREMENTS. THE INSTRUMENT INCORPORATES ITS OWN 12-BIT A-D CONVERTER, 4-BIT DIGITAL COMPENSATION REGISTER FOR EACH AXIS, AND A SYSTEM CONTROL TO GENERATE A 48-BIT DATA WORD CONSISTING OF A 16-BIT REPRESENTATION OF THE FIELD MEASURED ALONG EACH OF THREE MAGNETOMETER AXES, TRACK AND HOLD MODULES ARE USED TO OBTAIN SIMULTANEOUS SAMPLES ON ALL THREE AXES. THE INSTRUMENT BANDWIDTH IS 25 HZ. THE ANALOG RANGE IS PLUS OR MINUS 60,000 NT, THE ACCURACY IS 4 NT, AND THE RESOLUTION IS 1.5 NT.

----- DYNAMICS EXPLORER-B, WINNINGHAM-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INSTRUMENT

NSSDC ID- DE-B -08

INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - J.O. WINNINGHAM
OI - B.H. KLUMPAR
OI - R.A. HOFFMAN
OI - J.L. BUNCH

U OF TEXAS, DALLAS
U OF TEXAS, DALLAS
NASA-GSFC
SOUTHWEST RES INST

BRIEF DESCRIPTION
THE LOW ALTITUDE PLASMA INSTRUMENT (LAPI) PROVIDES HIGH-RESOLUTION MEASUREMENTS OF POSITIVE IONS AND ELECTRONS FROM 5 EV TO 30 KEV, WITH AN ENERGY RESOLUTION DELTA E/E EQUAL TO 32 PERCENT. DATA FROM THIS INVESTIGATION AND SUPPORTING MEASUREMENTS ARE USED TO STUDY: (1) THE IDENTIFICATION AND INTENSITIES OF BIRKELAND CURRENTS, (2) AURORAL PARTICLE SOURCE REGIONS AND ACCELERATION MECHANISMS, (3) THE EXISTENCE AND ROLE OF E PARALLEL TO B, (4) SOURCES AND EFFECTS OF POLAR CAP PARTICLE FLUXES, (5) THE TRANSPORT OF PLASMA WITHIN AND THROUGH THE MAGNETOSPHERIC CUSPS, (6) DYNAMIC CONFIGURATIONS OF HIGH LATITUDE FLUX TUBES, (7) LOSS CONE EFFECTS OF WAVE-PARTICLE INTERACTIONS, (8) HOT-COLD PLASMA INTERACTIONS, (9) IONOSPHERIC EFFECTS OF PARTICLE PRECIPITATION, AND (10) PLASMA CONVECTION AT HIGH ALTITUDES. THE INSTRUMENT CONTAINS AN ARRAY OF 15 ELECTROSTATIC ANALYZERS OF THE ISIS 2 TYPE, EACH WITH AN ELECTRON CHANNEL AND MOST WITH AN ION CHANNEL, IN ORDER TO OBTAIN DETAILED PITCH ANGLE DISTRIBUTIONS AS A FUNCTION OF ENERGY. THE BASIC MODE OF OPERATION PROVIDES A 32-POINT ENERGY SPECTRUM EVERY SECOND FROM EACH SENSOR, BUT THE VOLTAGES ON THE ELECTROSTATIC ANALYZER ARE PROGRAMMABLE TO ALLOW FOR HIGHER TIME RESOLUTION OVER LIMITED PORTIONS OF THE ENERGY SPECTRUM. THE INSTRUMENT IS MOUNTED ON A SIMPLE ONE-AXIS SCAN PLATFORM ORIENTED SO THAT ONE DETECTOR IS ALWAYS MEASURING PARTICLES WITH PITCH ANGLES OF LESS THAN 1 DEG.

***** ERBS-A*****

SPACECRAFT COMMON NAME- ERBS-A
ALTERNATE NAMES- AEM-D, EARTH RAD BUDGET SAT

NSSDC ID- ERBS-A

LAUNCH DATE- 11/00/83
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE
WEIGHT- 170. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.6 MIN
PERIAPSIS- 600. KM ALT
INCLINATION- 46. DEG
APOAPSIS- 600. KM ALT

PERSONNEL
MG - D.S. DILLER
SC - R.A. SCHIFFER
PM - C.L. WAGNER, JR.
PS - R. CURRAN
NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION
THE EARTH RADIATION BUDGET SATELLITE (ERBS) IS A 2-YR MISSION TO GATHER REQUIRED RADIATION BUDGET DATA, AEROSOL DATA, OZONE DATA (RELATED TO THE CHLORINE CHEMISTRY PROCESS), AND TO ASSESS CLIMATE CHANGE AND OZONE DEPLETION. THE EXPERIMENTS ARE THE EARTH RADIATION BUDGET EXPERIMENT (ERBE), THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT II AND THE HALOGEN OCCULTATION EXPERIMENT (HALOE). THE ERBE WILL BE CARRIED ON TWO TIROS-M SERIES MISSIONS.

----- ERBS-A, BROOKE-----
INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

ORIGINAL PAGE IS
OF POOR QUALITY

NSDDC ID- ERBS-A -01

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

TL - G.C. BROOME
TN - A.A. RUDNANN

NASA-LARC
NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 135 DEG. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 80 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH AN 88-DEG FIELD OF VIEW, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- ERBS-A, MCCORMICK -----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS (SAGE)

NSDDC ID- ERBS-A -02

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - M.P. MCCORMICK
OI - J.E. PLEASANTS

NASA-LARC
NASA-LARC

BRIEF DESCRIPTION

THE SAGE SENSOR IS A MULTI-SPECTRAL CHANNEL RADIOMETER WHICH MEASURES THE EXTINCTION OF SOLAR RADIATION INTENSITY DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGES FROM THE EARTH'S SHADOW DURING EACH ORBIT, THE SENSOR WILL ACQUIRE THE SUN AND MEASURE THE SOLAR INTENSITY IN WAVELENGTH BANDS CENTERED BETWEEN 0.385 AND 1.0 MICROMETERS AS IT SCANS THE SUN VERTICALLY. AS THE SPACECRAFT CONTINUES IN ORBIT, THE LINE OF SIGHT FROM THE SPACECRAFT TO THE RISING SUN WILL SCAN THE EARTH'S ATMOSPHERE, RESULTING IN A MEASUREMENT OF THE ATTENUATED SOLAR INTENSITY AT DIFFERENT ATMOSPHERIC LAYERS. THE PROCEDURE WILL THEN BE REPEATED IN A REVERSE SENSE DURING SPACECRAFT SUNSET. EACH SUNRISE AND SUNSET EVENT WILL BE MONITORED FROM THE TOP OF THE CLOUDS TO APPROXIMATELY 150 KP ABOVE THE EARTH'S SURFACE. THE SENSOR WILL HAVE AN INSTANTANEOUS FIELD OF VIEW OF APPROXIMATELY 0.5 KM MEASURED AT THE HORIZON FOR A 600-KM ORBIT. THE DYNAMIC RANGE OF EACH RADIOMETRIC CHANNEL IS APPROXIMATELY 4000 AND THE UNCERTAINTY IN ANY RADIOMETRIC MEASUREMENT IS SPECIFIED TO BE LESS THAN 0.1 PERCENT OF THE UNATTENUATED SOLAR INTENSITY (THE SENSOR IS PARTIALLY SELF-CALIBRATING IN THAT A MEASUREMENT OF THE UNATTENUATED SOLAR INTENSITY IS MADE PRIOR TO EACH SPACECRAFT SUNSET AND FOLLOWING EACH SPACECRAFT SUNRISE). FURTHERMORE, ZERO INTENSITY LEVELS ARE REACHED EVERY TIME THE ELEVATION MIRROR SCANS OFF THE SUN. THE INSTRUMENT MODULE CONSISTS OF OPTICAL AND ELECTRONIC SUBASSEMBLIES MOUNTED SIDE BY SIDE. THE OPTICAL SUBASSEMBLY CONSISTS OF A FLAT SCANNING MIRROR, CASSEGRAIN OPTICS, AND A DETECTOR PACKAGE. THE ENTIRE OPTICAL SUBASSEMBLY IS GIMBALED IN AZIMUTH. THE AZIMUTH SERVO EMPLOYS SUN SENSORS DRIVEN TO NULL ON THE CENTER OF THE SUN TO A TOLERANCE OF PLUS OR MINUS 1 ARC MIN. AT THE BEGINNING OF A SUNRISE OR SUNSET EVENT, THE INSTRUMENT SLEWS IN AZIMUTH TO A POSITION TO ACQUIRE THE SUN. UPON ACQUISITION IN AZIMUTH, THE MIRROR SERVO SCANS IN ELEVATION UNTIL THE SUN IS ACQUIRED. THE

SCAN RANGE IS THEN REDUCED TO SCANNING BACK AND FORTH ACROSS THE SOLAR IMAGE ONLY. THE SOLAR INPUT IS REFLECTED FROM THE SCAN MIRROR THROUGH THE CASSEGRAIN TELESCOPE WHICH PRODUCES A SOLAR IMAGE UPON THE SCIENCE DETECTOR APERTURE. THIS IMAGE IS SCANNED ACROSS THE APERTURE BY THE MOTION OF THE SCAN MIRROR. THE RADIATION THROUGH THE APERTURE IS DISPERSED AND THE BEAMS REPRESENTING THE WAVELENGTH BANDS ARE THEN COLLECTED AND APPLIED TO SILICON PIN DIODE DETECTORS. THE OUTPUTS OF THE DETECTORS ARE FED TO SIGNAL CONDITIONING AMPLIFIERS WHOSE OUTPUTS GO TO THE PCM ENCODER. THE PCM ENCODER MULTIPLIES AND DIGITIZES THE SIGNALS AND THEN TRANSFERS THE DIGITAL DATA TO THE ERBS DATA SYSTEM. THE RADIOMETRIC DATA FOR EACH WAVELENGTH CHANNEL WILL BE SAMPLED 64 TIMES PER 5 OR APPROXIMATELY 4 TIMES PER KM OF TANGENT ALTITUDE, AND DIGITIZED TO 12 BITS; THESE DATA PLUS SCIENCE SUPPORTING DATA AND INSTRUMENT MODULE HOUSEKEEPING DATA TOTAL APPROXIMATELY 6 KBPS.

----- ERBS-A, RUSSELL, JR -----

INVESTIGATION NAME- HALOGEN OCCULTATION (HALOE)

NSDDC ID- ERBS-A -03

INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - J.M. RUSSELL, JR
OI - C.W. COFFEE, JR.

NASA-LARC
NASA-LARC

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN OPTICS UNIT, SUPPORTED ON A TWO-AXIS GIMBAL, AND AN ELECTRONICS UNIT. THE OPTICS UNIT CONTAINS THE OPTICS, MODULATORS, DETECTORS, AND PREAMPS FOR THE GAS DETECTION CHANNELS AND RADIOMETER CHANNELS. THE GIMBAL ASSEMBLY PROVIDES AZIMUTH AND ELEVATION ROTATION OF THE OPTICS UNIT WITH PLUS OR MINUS 185 DEG AZIMUTH RANGE AND A 38 DEG RANGE OF ELEVATION ANGLE CONTROL, AND IS CONTROLLED BY COARSE AND FINE SUN SENSORS INCLUDED IN THE OPTICS UNIT. THE ELECTRONICS UNIT PROVIDES SIGNAL PROCESSING, MOTOR DRIVES, SEQUENCE TIMING, MODE CONTROL, POWER CONDITIONING, AND DATA HANDLING. A 16-CM-DIAMETER REFLECTIVE CASSEGRAIN TELESCOPE COLLECTS ENERGY FOR THE GAS DETECTION CHANNELS. THE INSTANTANEOUS FIELD OF VIEW (IFOV) IS DETERMINED BY A FIELD STOP AT THE FOCAL POINT OF THE TELESCOPE, AND THE ENERGY IS MODULATED BY A CHOPPER SIMILAR TO THAT OF THE MONITORING AIR POLLUTION FROM SATELLITES (MAPS) INSTRUMENT. A HOT REFERENCE BLACKBODY SOURCE IS USED TO APPROXIMATELY BALANCE THE SOLAR ENERGY LEVELS WHEN THE CHOPPER DISC IS IN THE CLOSED (REFLECTIVE) POSITION. AN OPTICAL SIGNAL PROVIDED AND PROCESSED IN A SIMILAR MANNER AS THE MAPS INSTRUMENT IS USED TO MAINTAIN GAIN BALANCE OF THE DETECTOR BRANCHES. THE OPTICAL BEAM IS SEPARATED BY BEAMSPLITTERS INTO THE GAS CORRELATION AND RADIOMETER MODULES. THE OUTPUT SIGNALS FROM THE GAS CORRELATION MODULES ARE SENT TO THE SIGNAL PROCESSOR, WHICH IS SIMILAR TO THE MAPS SIGNAL PROCESSOR DESIGN. THE OUTPUT SIGNALS FROM THE RADIOMETER MODULES ARE SENT TO A STANDARD RADIOMETER SIGNAL PROCESSOR. A STEPPER DRIVEN CALIBRATION WHEEL IS PROVIDED IN FRONT OF THE TELESCOPE FIELD STOP TO PROVIDE MEASUREMENTS OF GAS RESPONSE, RADIOMETRIC CALIBRATION, AND INSTRUMENT BALANCE, USING THE EXOSPHERIC SUN AS AN ENERGY SOURCE. THE CALIBRATION WHEEL CONTAINS THREE GAS CELLS AND A NEUTRAL DENSITY FILTER FOR THESE MEASUREMENTS. THE SIGNAL PROCESSING AND MOTOR DRIVE ELECTRONICS ARE SIMILAR TO THOSE OF THE MAPS INSTRUMENT. THE REMAINING ELECTRONICS ARE CONVENTIONAL AND STRAIGHT FORWARD WITH NO CRITICAL DESIGN AREAS. THE PROPOSED GIMBAL ASSEMBLY IS A STEPPER DRIVEN, TWO-AXIS (AZIMUTH, ELEVATION) ASSEMBLY THAT SUPPORTS THE OPTICS UNIT NEAR THE CENTER OF GRAVITY OF THE INSTRUMENT. THE GIMBALS PROVIDE A CAPABILITY FOR FINE TRACKING. TRACKING CONTROL SIGNALS FOR THE GIMBALS ARE DERIVED FROM THE SUN SENSORS. THE FINE SUN SENSOR IS A TWO-AXIS DIGITAL SENSOR USING RETICON LINEAR ARRAY DETECTORS WITH 256 ELEMENTS PER AXIS GIVING .33 ARC MIN RESOLUTION. THE COARSE SUN SENSOR IS AN ANALOG TWO-AXIS DEVICE SIMILAR TO AN EXISTING ADOLE SUN SENSOR. THE COARSE SENSOR PROVIDES SUN ACQUISITION SIGNALS OVER A PLUS OR MINUS 10 DEG FOV.

***** EUVE*****

SPACECRAFT COMMON NAME- EUVE
ALTERNATE NAMES- EXTREME UV EXPLORER, BERKSAT

NSDDC ID- EUVE

LAUNCH DATE- 10/00/85 WEIGHT- 400. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.0 MIN INCLINATION- 28.5 DEG
PERIAPSIS- 550. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL
 MG - L. DONDY
 SC - A.G. OPP
 PH - S.E. WILLIS
 PB - C.S. BOWYER

NASA HEADQUARTERS
 NASA HEADQUARTERS
 NASA-GSFC
 U OF CALIF, BERKELEY

BRIEF DESCRIPTION
 EXTREME ULTRAVIOLET EXPLORER (EUVE) IS A DOME-SHAPED SPINNING SPACECRAFT DESIGNED TO ROTATE ABOUT THE EARTH/SUN LINE. THE DIRECTION OF THE SPIN AXIS IS ALTERED THROUGH MAGNETIC TORQUING. THE SPACECRAFT OBJECTIVE IS TO CARRY OUT A FULL-SKY SURVEY IN THE EXTREME ULTRAVIOLET RANGE OF THE SPECTRUM BETWEEN 7.5 AND 55 NM, FOR PURPOSES OF DISCOVERING AND STUDYING ULTRAVIOLET SOURCES RADIATING IN THIS REGION AND TO ANALYZE EFFECTS ON THE RADIATION FROM THESE SOURCES CAUSED BY THE INTERSTELLAR MEDIUM.

----- EUVE, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET FULL SKY SURVEY

NSSDC ID- EUVE -01 INVESTIGATIVE PROGRAM
 CODE SC

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - C.S. BOWYER U OF CALIF, BERKELEY
 O1 - W. CASH, JR. U OF CALIF, BERKELEY
 O1 - F. PARESE U OF CALIF, BERKELEY

BRIEF DESCRIPTION
 THIS INVESTIGATION IS DESIGNED TO PERFORM A FULL-SKY SURVEY, SEARCHING FOR EXTREME ULTRAVIOLET (EUUV) SOURCES. THE INSTRUMENT PACKAGE CONTAINS FOUR WOLTER-SCHWARZSCHILD GRAZING INCIDENCE TELESCOPES (WITH EUV THIN-FILM FILTERS) TO COLLECT AND ISOLATE RADIATION. THE DETECTOR SYSTEM IS A RESISTOR ANODE IMAGE CONVERTER (RANICON) CONSISTING OF A MICROCHANNEL PLATE, A RESISTOR, AND DETECTOR AMPLIFIERS DESIGNED TO PRODUCE IMAGES OF SKY FIELDS IN SELECTED WAVELENGTH RANGES. THREE TELESCOPES ARE DESIGNED TO OPERATE AT RIGHT ANGLES TO THE SPIN AXIS AND TO CARRY OUT THE SKY SURVEY, OBSERVING IN THE WAVELENGTH RANGES 7.5 - 18 NM, 16 - 32 NM, AND 39 - 55 NM. THE FOURTH TELESCOPE OPERATES AT APPROXIMATELY 10 DEG FROM THE SPIN AXIS, IN THE WAVELENGTH RANGE 15 - 35 NM, AND IS DESIGNED TO OBSERVE SELECTED INTERESTING OBJECTS.

***** EXOS-C*****

SPACECRAFT COMMON NAME- EXOS-C
 ALTERNATE NAMES- EXOSPHERIC SAT. C

NSSDC ID- EXOS-C

LAUNCH DATE- 1982 WEIGHT- 100. KG
 LAUNCH SITE- KAGOSHIMA, JAPAN
 LAUNCH VEHICLE- M-45

SPONSORING COUNTRY/AGENCY ISAS
 JAPAN

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 94.5 MIN INCLINATION- DEG
 PERIAPSIS- 500. KM ALT APOAPSIS- 500. KM ALT

PERSONNEL
 PH - M. ODA U OF TOKYO

BRIEF DESCRIPTION
 THE PURPOSE OF THIS SPACECRAFT IS TO MONITOR CHARGED PARTICLES AND X-RAY, GAMMA-RAY, UV, AND IR RADIATION FROM THE SUN AND GALAXIES. THE SPACECRAFT IS PUT INTO A CIRCULAR ORBIT OF 500 KM ALTITUDE AND IS CAPABLE OF PRECISE ATTITUDE CONTROL. FIVE DETECTOR SYSTEMS ARE USED TO ATTAIN THE GOALS OF THIS MISSION -- X-RAY TELESCOPES, A GAMMA-RAY TELESCOPE, A UV TELESCOPE, AN IR TELESCOPE, AND ENERGETIC PARTICLE DETECTORS. ADDITIONAL INFORMATION HAS BEEN REQUESTED FROM ODA (3/79) BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- X-RAY AND GAMMA-RAY ASTRONOMICAL TELESCOPES

NSSDC ID- EXOS-C -01 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
 X-RAY ASTRONOMY
 GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - UNKNOWN

BRIEF DESCRIPTION
 THIS EXPERIMENT OBSERVES ASTRONOMICAL SOURCES WITH X-RAY AND GAMMA-RAY TELESCOPES. ADDITIONAL INFORMATION HAS BEEN REQUESTED FROM ODA (3/79) BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- ULTRAVIOLET TELESCOPE

NSSDC ID- EXOS-C -02 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - UNKNOWN

BRIEF DESCRIPTION
 THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE UV REGION OF THE SPECTRUM. ADDITIONAL INFORMATION HAS BEEN REQUESTED FROM ODA (3/79) BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- INFRARED TELESCOPE

NSSDC ID- EXOS-C -03 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - UNKNOWN

BRIEF DESCRIPTION
 THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE INFRARED REGION OF THE SPECTRUM. ADDITIONAL INFORMATION HAS BEEN REQUESTED FROM ODA (3/79) BUT NOT YET RECEIVED.

----- EXOS-C, UNKNOWN-----

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- EXOS-C -04 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC RAYS

PERSONNEL
 PI - UNKNOWN

BRIEF DESCRIPTION
 THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE ENERGETIC CHARGED PARTICLES OF BOTH SOLAR AND GALACTIC ORIGIN. ADDITIONAL INFORMATION HAS BEEN REQUESTED FROM ODA (3/79) BUT NOT YET RECEIVED.

***** EXOSAT*****

SPACECRAFT COMMON NAME- EXOSAT
 ALTERNATE NAMES- HI.ECCEN LUN OCCULT.SAT., EUROPEAN X-RAY OBS S
 HELOS

NSSDC ID- EXOSAT

LAUNCH DATE- 11/00/81 WEIGHT- 500. KG
 LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
 LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY ESA
 INTERNATIONAL

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 5767. MIN INCLINATION- 70. DEG
 PERIAPSIS- 300. KM ALT APOAPSIS- 200000. KM ALT

PERSONNEL
 PH - G. ALTMANN ESA-ESTEC
 PS - R.D. ANDRESEN ESA-ESTEC
 PS - A. PEACOCK ESA-ESTEC

BRIEF DESCRIPTION
 THE SCIENTIFIC MISSION OF THE EUROPEAN X-RAY OBSERVATORY SATELLITE (EXOSAT) IS TO MEASURE THE POSITION, STRUCTURAL FEATURES AND SPECTRAL AND TEMPORAL CHARACTERISTICS OF COSMIC X-RAY SOURCES IN THE RANGE FROM APPROXIMATELY 0.1 KEV TO 50 KEV. EXOSAT USES TWO OPERATIONAL MODES: (A) THE OCCULTATION MODE, FOR THE PRECISE DETERMINATION AND IDENTIFICATION OF SOURCES AND THE OBSERVATION OF STRUCTURAL FEATURES, USING PRIMARILY THE MOON OR THE EARTH AS THE OCCULTING BODY, AND (B) THE ARBITRARY POINTING MODE FOR THE STUDY OF THE TEMPORAL AND SPECTRAL VARIABILITY OF SOURCES OVER LONG UNINTERRUPTED TIME INTERVALS AND THE MAPPING OF LOW ENERGY SOURCES. THE OBSERVATORY, PLACED IN A HIGHLY ECCENTRIC ORBIT WITH ITS APOGEE AT 200,000 KM AND AT A HIGH LATITUDE, IS CAPABLE OF OBSERVING LUNAR OCCULTATIONS OVER 20 PERCENT OF THE CELESTIAL SPHERE WITHIN A YEAR. THE POSITIONAL ACCURACY OF BRIGHT SOURCES ($6.7 \cdot 10^{-2}$ PHOTONS/SQ CM-S IN THE RANGE GREATER THAN 1.5 KEV) IS

LIMITED TO ABOUT 1 ARC-S BY THE INACCURACY OF MEASUREMENT OF THE POSITION OF THE SATELLITE AND THE UNCERTAINTY OF THE TOPOGRAPHY OF THE LUNAR LIND. FOR WEAKER SOURCES, THE ACCURACY IS LIMITED BY STATISTICS, I.E., THE TOTAL NUMBER OF X-RAY QUANTA RECEIVED DURING THE TIME OF THE CORRESPONDING ANGULAR DISPLACEMENT OF THE MOON. WHEN NOT ENGAGED IN OCCULTATION OBSERVATIONS, THE OBSERVATORY CAN VIEW THE SKY UNINTERRUPTEDLY IN ANY CHOSEN DIRECTION (EXCEPT 60 DEG ABOUT THE SOLAR DIRECTION) FOR AS LONG AS THE ORBITAL PERIOD ABOVE THE VAN ALLEN BELTS (APPROXIMATELY 80 H). WITH ACCURATE TIMEKEEPING ON BOARD, AND WITH THIS CAPABILITY OF LONG CONTINUOUS OBSERVATION, EXOSAT CAN DETERMINE REGULAR AND IRREGULAR VARIATIONS OF THE INTENSITY OF X-RAY SOURCES ON A TIME SCALE RANGING FROM TENS OF MICROSECONDS TO TENS OF HOURS. THE TRIAXIAL STABILIZED SPACECRAFT IS A CYLINDER WITH A DIAMETER OF 192 CM AND A HEIGHT OF 117 CM. A ROTATABLE SOLAR ARRAY WITH AN AREA OF 3 50 M² IS MOUNTED ON TOP OF THE SPACECRAFT. THE STAR TRACKERS ARE MOUNTED ON THE OPTICAL BENCHES OF THE TWO IMAGING TELESCOPES TO FACILITATE ALIGNMENT AND STABILITY. IN THE OCCULTATION AND ARBITRARY POINTING MODES, THE OBSERVATORY IS ABLE TO VIEW ALL OF THE CELESTIAL SPHERE EXCLUDING A CONE OF 35 AND 60 DEG HALF ANGLE CENTERED ON THE SUN, RESPECTIVELY. CONSUMABLES ARE DIMENSIONED TO ENABLE SOME 100 ORBITAL MANEUVERS FOR LUNAR OCCULTATION TO BE UNDERTAKEN AND OVER 2000 TARGETS TO BE OBSERVED. THE SCIENTIFIC PAYLOAD IS FUNDED BY ESA AND ITS DEVELOPMENT MANAGED BY ESA. USE OF THE OBSERVATORY IS OPEN TO THE SCIENTIFIC COMMUNITY FOLLOWING SELECTION OF OBSERVATIONAL PROPOSALS.

----- EXOSAT, BOVD-----

INVESTIGATION NAME- LOW-ENERGY X-RAY IMAGING TELESCOPES

NSSDC ID- EXOSAT -02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - R.L.F. BOVD	U COLLEGE LONDON
TM - P.M. SANFORD	U COLLEGE LONDON
TM - B.N. SWANENBURG	U OF LEIDEN
TM - J.A.M. BLEEKER	U OF LEIDEN
TM - C. DE JAGER	U OF UTRECHT
TM - A.C. BRINKMAN	U OF UTRECHT

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF TWO IDENTICAL IMAGING TELESCOPES MADE BY SETS OF TWO NESTED GRAZING-INCIDENCE PARABOLIC/HYPERBOLIC REFLECTORS WITH A FOCAL-PLANE ASSEMBLY INCORPORATING A GAS-FLOW POSITION-SENSITIVE PROPORTIONAL COUNTER AND A CHANNEL-MULTIPLIER ARRAY, COVERING THE ENERGY RANGE FROM THE EUV TO 2.5 KEV, WHICH IS LIMITED BY THE REFLECTING OPTICS. AT THE EXIT PLANE OF THE MIRROR A TRANSMISSION GRATING IS LOCATED FOR SPECTROSCOPIC MEASUREMENTS.

----- EXOSAT, TAYLOR-----

INVESTIGATION NAME- GAS SCINTILLATION X-RAY SPECTROMETER

NSSDC ID- EXOSAT -03 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - D.G. TAYLOR	ESA-ESTEC
TM - R.D. ANDRESEN	ESA-ESTEC
TM - R.L.F. BOVD	U COLLEGE LONDON
TM - P.M. SANFORD	U COLLEGE LONDON
TM - L. SCARSI	U OF PALERMO
TM - S. SALEMI	U OF PALERMO
TM - G. BOELLA	U OF MILAN
TM - G. VILLA	U OF MILAN
TM - A. PEACOCK	ESA-ESTEC

BRIEF DESCRIPTION

A GAS SCINTILLATION PROPORTIONAL COUNTER SPECTROMETER IS USED TO STUDY DETAILED SPECTRAL FEATURES IN THE ENERGY RANGE FROM 2.5 TO 50 KEV. THE DEVICE HAS AN EFFECTIVE AREA OF 250 50 CM AND AN ENERGY RESOLUTION OF BETTER THAN 30 PERCENT AT 6 KEV. THE COUNTER WINDOW IS A 400-MICROMETER BERYLLIUM FOIL AND THE GAS FILLING IS 70 PERCENT KE AND 30 PERCENT AR.

----- EXOSAT, TRUMPER-----

INVESTIGATION NAME- MEDIUM-ENERGY COSMIC X-RAY PACKAGE

NSSDC ID- EXOSAT -01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

TL - J. TRUMPER	MPI-EXTRATERM PHYS
TM - H. ZIMMERMAN	MPI-EXTRATERM PHYS
TM - R. STAUBERT	U OF TUBINGEN
TM - K.A. POUNDS	U OF LEICESTER
TM - R. TURNER	U OF LEICESTER

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF AN ARRAY OF ARGON-FILLED PROPORTIONAL COUNTERS BACKED UP BY KEMON-FILLED COUNTERS WITH AN EFFECTIVE AREA OF 2,000 50 CM COVERING THE ENERGY RANGE FROM 1.2 TO 50 KEV. THE ARRAY IS DIVIDED INTO FOUR SECTIONS, EACH OF WHICH CAN BE OFFSET FROM THE POINTING DIRECTION TO PROVIDE FOR A VARIABLE FLAT TOP COLLIMATOR RESPONSE. THE COLLIMATORS PROVIDE A FIELD OF VIEW OF 45 ARC MINUTES AND THE DETECTORS HAVE AN ENERGY RESOLUTION OF 20 PERCENT AT 6 KEV FOR ARGON AND AT 22 KEV FOR KEMON.

***** FIREWHEEL*****

SPACECRAFT COMMON NAME- FIREWHEEL
ALTERNATE NAMES- FEUERRAD

NSSDC ID- FIRE-A

LAUNCH DATE- 05/23/80 WEIGHT- 1000. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 MIN
PERIAPSIS- 200. KM ALT

INCLINATION- 17. DEG
APC- 50+22. KM ALT

PERSONNEL

PM - B. HAUSLER	MPI-EXTRATERM PHYS
PS - G. HAERENDEL	MPI-EXTRATERM PHYS
PS - R. ACUNA	NASA-GSFC

BRIEF DESCRIPTION

THIS SPACECRAFT IS DESIGNED TO MAKE BARIUM AND LITHIUM ION RELEASES IN THE NIGHT MAGNETOSPHERE AT 9.5 AND 7 RE, RESPECTIVELY, AND OVER NORTH AND SOUTH AMERICA. THE MAIN SPACECRAFT CARRIES 12 EJECTABLE ION RELEASE CONTAINERS. DIAGNOSTIC MEASUREMENTS WILL BE MADE ON THE MAIN SPACECRAFT AND ON FOUR EJECTABLE SUB-PAYLOADS. THESE SUB-PAYLOADS TOTAL APPROXIMATELY 200 KG. OPTICAL MEASUREMENTS WILL BE MADE FROM THE GROUND AND FROM AIRCRAFT. THE SCIENTIFIC OBJECTIVES ARE: (1) STUDY OF THE PLASMA PROCESSES CONTROLLING THE FORMATION AND DECAY OF A MAGNETIC CAVITY; (2) STUDY OF THE MOMENTUM EXCHANGE WITH THE AMBIENT DILUTE PLASMA AND OF THE LONG-RANGE MAGNETOSPHERIC PERTURBATIONS GENERATED THEREBY; (3) MODIFICATION OF THE INTERACTION OF TRAPPED ENERGETIC PARTICLES WITH SELF-GENERATED WHISTLER MODE AND ION CYCLOTRON WAVES; AND (4) TRACING OF ACCELERATION AND REDISTRIBUTION OF THE INJECTED IONS IN THE INNER MAGNETOSPHERE. THE SPACECRAFT IS BATTERY-POWERED, WITH A LIFETIME OF LESS THAN 48 HOURS.

----- FIREWHEEL, ACUNA-----

INVESTIGATION NAME- DC MAGNETOMETER

NSSDC ID- FIRE-A -02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M.H. ACUNA	NASA-GSFC
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BRIEF DESCRIPTION

THIS EXPERIMENT IS MOUNTED ON A 2-M BOOM AND PROVIDES THREE-AXIS MAGNETIC FIELD MEASUREMENTS, WITH A RESOLUTION OF 4.E-5 NT IN THE HIGHEST SENSITIVITY RANGE.

----- FIREWHEEL, FOPPL-----

INVESTIGATION NAME- ION RELEASE

NSSDC ID- FIRE-A -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M. FOPPL	MPI-EXTRATERM PHYS
OI - A. VALENZUELA	MPI-EXTRATERM PHYS
OI - G. HAERENDEL	MPI-EXTRATERM PHYS
OI - E. RIEGER	MPI-EXTRATERM PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO RELEASE BARIUM AND LITHIUM ION CLOUDS. THE BARIUM RELEASED IS FROM A TOTAL OF EIGHT CONTAINERS, EACH FILLED WITH 20 KG OF BARIUM-COPPER OXIDE MIXTURE. THE LITHIUM IS RELEASED FROM FOUR CONTAINERS, EACH WITH 10 KG OF LITHIUM-COPPER OXIDE MIXTURE. THE BARIUM AND LITHIUM RELEASES INJECT A TOTAL OF APPROXIMATELY 1.0E26 IONS INTO THE MAGNETOSPHERE.

----- FIREWHEEL, HAUSLER-----

INVESTIGATION NAME- AC MAGNETOMETER

NSSDC ID- FIRE-A -04 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D. HAUSLER MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
THIS EXPERIMENT (A ONE-AXIS SEARCH COIL) MEASURES MAGNETIC FIELD FLUCTUATIONS IN THE RANGE FROM APPROXIMATELY 10 HZ TO 6 KHZ. THE SENSITIVITY OF THE COIL IS APPROXIMATELY 7 MICROVOLTS/NT HZ.

----- FIREWHEEL, MCENTIRE-----

INVESTIGATION NAME- ION COMPOSITION TELESCOPE

NSSDC ID- FIRE-A -03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - R.W. MCENTIRE APPLIED PHYSICS LAB
OI - S.M. KRIMIGIS APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS INSTRUMENT (ICT) LOOKS RADIIALLY OUTWARD FROM THE FIREWHEEL MAIN BUS AND COMBINES MEASUREMENT OF ION TIME-OF-FLIGHT AND TOTAL ENERGY TO PROVIDE GOOD ELEMENTAL RESOLUTION FOR ENERGETIC MAGNETOSPHERIC NUCLEI OVER THE ENERGY RANGE 25 TO 500 KEV/NUCLEON, WITH A GEOMETRY FACTOR OF 6.E-03 SQ CM SR. THE TELESCOPE CONSISTS OF A THIN FOIL FRONT ELEMENT, A 10 CM TIME-OF-FLIGHT PATH, AND A SOLID STATE DETECTOR REAR ELEMENT, WITH TIMING SIGNALS DERIVED FROM SECONDARY ELECTRONS. EVENTS ARE RECORDED IN 8 SPECIES/ENERGY RATE CHANNELS, EACH SECTORED BY 16, AND HIGH-PRIORITY EVENTS ARE PULSE HEIGHT ANALYZED.

***** FIREWHEEL SUB-SAT 1*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-SAT 1
ALTERNATE NAMES- MPE SUB-PAYLOAD

NSSDC ID- FIRE-E

LAUNCH DATE- 05/23/80 WEIGHT- 49. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 MIN
PERIAPSIS- 200. KILOMETERS INCLINATION- 17. DEG
APOAPSIS- 58422. KM ALT

PERSONNEL
PM - G. PASCHMANN MPI-EXTRATERM PHYS
PS - G. PASCHMANN MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 4096 BPS AT 136.26 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS. AN ANTENNA WITH APPROXIMATELY 42 M TIP-TO-TIP WILL BE DEPLOYED.

----- FIREWHEEL SUB-SAT 1, ACUNA-----

INVESTIGATION NAME- DC MAGNETOMETER

NSSDC ID- FIRE-E -01 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - M.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A 3-AXIS FLUNGATE MAGNETOMETER WITH A RANGE OF -256 TO +256 NT.

----- FIREWHEEL SUB-SAT 1, GURNETT-----

INVESTIGATION NAME- PLASMA WAVE

NSSDC ID- FIRE-E -04 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.A. GURNETT U OF IOWA
OI - R.R. ANDERSON U OF IOWA
OI - M.C. KELLEY CORNELL U
OI - P.M. KINTNER CORNELL U
OI - R. BOSWELL ESA-ESTEC
OI - D. HAUSLER MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
DESCRIPTION OF THE EXPERIMENT HAS NOT BEEN RECEIVED.

----- FIREWHEEL SUB-SAT 1, PASCHMANN-----

INVESTIGATION NAME- LOW-ENERGY ELECTRON AND ION DETECTOR

NSSDC ID- FIRE-E -02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - G. PASCHMANN MPI-EXTRATERM PHYS
OI - S.J. BARE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
DESCRIPTION OF THE EXPERIMENT HAS NOT BEEN RECEIVED.

----- FIREWHEEL SUB-SAT 1, SPENNER-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- FIRE-E -03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. SPENNER INST FUR PHYS MELTRAHM
OI - W. OTT INST FUR PHYS MELTRAHM

BRIEF DESCRIPTION
DESCRIPTION OF THE EXPERIMENT HAS NOT BEEN RECEIVED.

***** FIREWHEEL SUB-SAT 2*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-SAT 2
ALTERNATE NAMES- SRC SUB-PAYLOAD

NSSDC ID- FIRE-B

LAUNCH DATE- 05/23/80 WEIGHT- 48. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 MIN
PERIAPSIS- 200. KILOMETERS INCLINATION- 17. DEG
APOAPSIS- 58422. KM ALT

PERSONNEL
PM - R.W. MASON APPLETON LAB
PS - D.A. BRYANT APPLETON LAB

BRIEF DESCRIPTION
THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 6.4 KBPS AT 2206.5 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS.

----- FIREWHEEL SUB-SAT 2, ACUNA-----

INVESTIGATION NAME- DC MAGNETOMETER

NSSDC ID- FIRE-B -01 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

FAILED AT LAUNCH

FAILED AT LAUNCH

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
PI - R.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A 3-AXIS FLURGATE MAGNETOMETER WITH A RANGE OF -256 TO +256 NT, WITH A SAMPLING RATE OF 25 MEASUREMENTS PER SECOND FOR EACH AXIS.

----- FIREWHEEL SUB-SAT 2, BRYANT-----
INVESTIGATION NAME- ENERGETIC PARTICLE

NSSDC ID- FIRE-B -02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.A. BRYANT APPLETON LAB
OI - D.S. HALL APPLETON LAB

BRIEF DESCRIPTION
THIS INVESTIGATION USES OGIVAL ELECTROSTATIC ANALYZERS WITH CHANNEL ELECTRON MULTIPLIER DETECTORS. THERE ARE 4 POSITIVE ION ANALYZERS, VIEWING AT 0, 45, 90, AND 180 DEG WITH RESPECT TO THE SPIN AXIS. THERE ARE 3 ELECTRON ANALYZERS, VIEWING AT 45, 90, AND 180 DEG WITH RESPECT TO THE SPIN AXIS. THE ENERGY RANGE FOR BOTH ELECTRONS AND IONS IS 0.5 TO 25 KEV, WITH 128 LEVELS, SCANNED IN 5 S AND 10 S PERIODS. THE SAMPLING RATES ARE 25 AND 50 PER S.

----- FIREWHEEL SUB-SAT 2, JOHNSTONE-----
INVESTIGATION NAME- SUPRATHERMAL ELECTRONS

NSSDC ID- FIRE-B -03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - A.D. JOHNSTONE HULLARD SPACE SCI LAB

BRIEF DESCRIPTION
THIS INVESTIGATION USES HEMISPHERICAL ELECTROSTATIC ANALYZERS AND CHANNEL ELECTRON MULTIPLIERS. THERE ARE 3 POSITIVE ION ANALYZERS, VIEWING AT 10, 90, AND 170 DEG WITH RESPECT TO THE SPIN AXIS. THERE IS A SINGLE ELECTRON ANALYZER VIEWING AT 90 DEG TO THE SPIN AXIS. THE ENERGY RANGE FOR BOTH ELECTRONS AND IONS IS 5 TO 500 EV, WITH 50 LEVELS, SCANNED IN 0.5 S.

----- FIREWHEEL SUB-SAT 2, WRENN-----
INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- FIRE-B -04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. WRENN U COLLEGE LONDON

BRIEF DESCRIPTION
THIS INVESTIGATION IS DESIGNED TO DETERMINE THE NUMBER DENSITY AND TEMPERATURE OF THE THERMAL PLASMA. SAMPLING RATE IS 25 PER SECOND.

***** FIREWHEEL SUB-SAT 3*****
SPACECRAFT COMMON NAME- FIREWHEEL SUB-SAT 3
ALTERNATE NAMES- UCB SUB-PAYLOAD

NSSDC ID- FIRE-C

LAUNCH DATE- 05/23/80 WEIGHT- 50. KG
LAUNCH SITE- KOURDU (CENTRE S GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AG- ESA
INTERNATIONAL

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 MIN
PERIAPSIS- 200. KM ALT INCLINATION- 1. DEG
APOAPSIS- 58422. KM ALT

FAILED AT LAUNCH

PERSONNEL
PI - M. HEETBERKS U OF CALIF, BERKELEY
PS - P.S. POZER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 8192 OPS AT 2205.0 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS. WIRE BOOMS WITH APPROXIMATELY 50 M TIP-TO-TIP WILL BE DEPLOYED.

----- FIREWHEEL SUB-SAT 3, ACUNA-----
INVESTIGATION NAME- DC/AC MAGNETOMETER

NSSDC ID- FIRE-C -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - R.H. ACUNA NASA-GSFC
OI - R.D. VORBERT U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A 3-AXIS FLURGATE MAGNETOMETER WITH A RANGE OF -256 TO +256 NT. A FAST WAVEFORM DIGITIZING CHANNEL IS USED TO OBTAIN HIGH TIME RESOLUTION (256 NZ) SNAPSHOTS OF MAGNETIC FIELD DATA.

----- FIREWHEEL SUB-SAT 3, BUSH-----
INVESTIGATION NAME- ENERGETIC ION MASS SPECTROMETER

NSSDC ID- FIRE-C -03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - R. BUSH U OF CALIF, BERKELEY
OI - C.W. CARLSON U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT CAN IDENTIFY IONS UP THROUGH BARIUM, WITH ENERGIES LESS THAN 3 KEV.

----- FIREWHEEL SUB-SAT 3, CARLSON-----
INVESTIGATION NAME- LOW-ENERGY ELECTRON DETECTOR

NSSDC ID- FIRE-C -05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - C.W. CARLSON U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT IS A RETARDING POTENTIAL ANALYZER, WITH AN ENERGY RANGE OF 0-500 EV.

----- FIREWHEEL SUB-SAT 3, CARLSON-----
INVESTIGATION NAME- ELECTRON DENSITY MEASUREMENT

NSSDC ID- FIRE-C -06 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - C.W. CARLSON U OF CALIF, BERKELEY
OI - C. CAYTEL U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZES A LANGMUIR PROBE AND MEASURES THE DENSITY AND THE LOW FREQUENCY FLUCTUATIONS IN THE DENSITY OF LOW ENERGY ELECTRONS, IN THE RANGE APPROXIMATELY 0-50 EV. DENSITY FLUCTUATIONS UP TO APPROXIMATELY 10 HZ CAN BE OBSERVED.

----- FIREWHEEL SUB-SAT 3, HALLINCKRODT-----
INVESTIGATION NAME- PROTON/ELECTRON ELECTROSTATIC ANALYZER

NSSDC ID- FIRE-C -04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - J. MALLINCKRODT U OF CALIF, BERKELEY
OI - R. BUSH U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES IONS AND ELECTRONS WITHIN THE ENERGY RANGE 0-20 KEV.

----- FIREWHEEL SUB-SAT 3, MOZER-----

INVESTIGATION NAME- DC/AC ELECTRIC FIELD
NSSDC ID- FIRE-C -02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - F.B. MOZER U OF CALIF, BERKELEY
OI - R.P. TORBERT U OF CALIF, BERKELEY
OI - C. CATTIL U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT EMPLOYS A DOUBLE PROBE ELECTRIC FIELD SENSOR. DC FIELDS FROM 0.1 TO 100 MV/M ARE MEASURED. THE AC FIELD MEASUREMENT HAS A THRESHOLD OF APPROXIMATELY 1 MICRORVOLT/M (SQUARE ROOT HZ) A DYNAMIC RANGE OF APPROXIMATELY 1.6, AND A FREQUENCY RESPONSE TO 5 MHZ.

***** FIREWHEEL SUB-SAT 4*****

SPACECRAFT COMMON NAME- FIREWHEEL SUB-SAT 4
ALTERNATE NAMES- NRC SUN-PAYLOAD

NSSDC ID- FIRE-D
LAUNCH DATE- 05/23/80 WEIGHT- 52.6 KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1118.4 INCLINATION- 17. DEG
PERIAPSIS- 200. APOAPSIS- 58422. KM ALT

PERSONNEL
PM - R.D. BRAUN SED SYSTEMS, LTD
PS - B.A. MUALEN NATL RES COUNC OF CAN

BRIEF DESCRIPTION
THIS SUB-PAYLOAD IS EJECTED FROM FIRE-A, AND CARRIES DIAGNOSTIC INSTRUMENTS FOR OBSERVATION OF THE ION RELEASES IN THE NIGHT MAGNETOSPHERE. TELEMETRY IS 4800 BPS AT 2207.0 MHZ. THE SPACECRAFT IS BATTERY-OPERATED, WITH A LIFETIME OF LESS THAN 48 HOURS. THE INSTRUMENTS WILL MEASURE THE CHARGED PARTICLE DISTRIBUTIONS AND THE LOCAL VECTOR MAGNETIC FIELD.

----- FIREWHEEL SUB-SAT 6, ACUNA-----

INVESTIGATION NAME- DC MAGNETOMETER
NSSDC ID- FIRE-D -01 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - R.M. ACUNA NASA-65FC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A 3-AXIS FLUXGATE MAGNETOMETER WITH A RANGE OF -512 TO +512 NT. IT WILL MONITOR THE AMBIENT MAGNETIC FIELD AS WELL AS THE MAGNETIC PERTURBATIONS INDUCED BY THE CHEMICAL RELEASES.

----- FIREWHEEL SUB-SAT 4, MCNAMARA-----

INVESTIGATION NAME- LANGMUIR PROBE
NSSDC ID- FIRE-D -02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - A.G. MCNAMARA NATL RES COUNC OF CAN

BRIEF DESCRIPTION
THIS EXPERIMENT, WHICH MEASURES THE LOCAL ELECTRON DENSITY AND TEMPERATURES, WILL GIVE HIGH TEMPORAL RESOLUTION MEASUREMENTS ON THE PASSAGE OF THE SHOCK FRONT ASSOCIATED WITH THE BARIUM RELEASE. IT WILL ALSO PROVIDE MEASUREMENTS ON THE AMBIENT CONDITIONS WHERE POSSIBLE. ENERGY RANGES MEASURED ARE 0-5 EV FOR ELECTRONS AND 0-3 EV FOR POSITIVE IONS.

----- FIREWHEEL SUB-SAT 4, MUALEN-----

INVESTIGATION NAME- ENERGETIC CHARGED PARTICLE DETECTORS
NSSDC ID- FIRE-D -03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B.A. MUALEN NATL RES COUNC OF CAN

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF ARRAYS OF SOLID STATE DETECTORS, SPHERICAL AND CYLINDRICAL PLATE ELECTROSTATIC ANALYZERS, AND AN R.F. TYPE ENERGETIC ION MASS SPECTROMETER. TWO SOLID STATE PARTICLE DETECTORS WITH DEPLETION DEPTHS OF 700 MICROMETERS AND 10 MICROMETERS WILL BE USED, IN CONJUNCTION WITH ALUMINUM ABSORBERS, TO MEASURE THE ELECTRON FLUX IN THE 20 TO 500 KEV RANGE AND IONS FROM 100 TO 500 KEV. BOTH SENSORS WILL LOOK AT 90 DEG TO THE SUBSATELLITE SPIN AXIS. PITCH ANGLE DISTRIBUTIONS, WHICH WILL BE DERIVED FROM THE SPINNING MOTION OF THE SUBSATELLITE, WILL BE PARTICULARLY RELEVANT TO THE COLD PLASMA (LI+) SEEDING EXPERIMENT. THE ANGULAR RESOLUTION WILL BE 8 DEGREES FOR THE ELECTRONS AND 10 DEGREES FOR THE ION MEASUREMENTS. AN ARRAY OF THREE SPHERICAL PLATE ELECTROSTATIC ANALYZERS WILL SAMPLE THE 3 DIMENSIONAL POSITIVE ION DISTRIBUTION FUNCTION IN THE ENERGY/CHARGE RANGE 2 EV/O TO 20 KEV/O. THESE ANALYZERS, MOUNTED TO LOOK AT 45, 90, AND 135 DEG TO THE SPIN AXIS, WILL SUPPLY INFORMATION ON THE VECTOR ION DRIFT VELOCITY EVERY SUBSATELLITE ROTATION (APPROXIMATELY 10 SECONDS). A CYLINDRICAL PLATE ELECTROSTATIC ANALYZER MOUNTED AT 90 DEG TO THE SPIN AXIS WILL MONITOR THE ELECTRON SPECTRUM AND PITCH ANGLE DISTRIBUTIONS IN THE 210 EV/O TO 25 KEV/O RANGE. THE R.F. TYPE ION MASS SPECTROMETER WILL MEASURE THE ION MASS COMPOSITION IN THE ENERGY PER UNIT CHARGE RANGE FROM 5 EV/O TO 5 KEV/O AND A MASS/UNIT CHARGE RANGE FROM 1 (H+) UP TO 137 (BA+) WITH A MASS RESOLUTION DELTA M/M = 0.25. THE DESIGN OF THE ANALYZER IS SIMILAR IN PRINCIPLE TO THE BENNETT MASS SPECTROMETER BUT HAS BEEN MODIFIED TO OPERATE UP TO 5 KEV/O. DIFFERENTIAL ENERGY ANALYSIS IS PERFORMED BY A SERIES OF PLANAR GRIDS AND MASS ANALYSIS BY AN R.F. SECTION WHICH REQUIRES A LARGE AMPLITUDE R.F. SIGNAL (300 KHZ TO 4 MHZ). THE DEVICE WILL LOOK AT 90 DEG TO THE SPIN AXIS. THE MAJOR OBJECTIVE FOR THIS DEVICE WILL BE TO STUDY THE TRANSPORT AND ENERGIZATION OF LI+ AND BA+ IONS.

***** GALILEO ORBITER*****

SPACECRAFT COMMON NAME- GALILEO ORBITER
ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP GALILEO

NSSDC ID- JOPD

LAUNCH DATE- 02/20/84 WEIGHT- 480. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-055

PLANNED ORBIT PARAMETERS
ORBIT TYPE- JUPITER ORBITER
ORBIT PERIOD- 86800. MIN INCLINATION- 6.8 DEG
PERIAPSIS- 425000. KM ALT APOAPSIS- 986000. KM ALT

PERSONNEL
MS - D.D. MCCULLAR NASA HEADQUARTERS
SC - R.E. MURPHY NASA HEADQUARTERS
PM - J. CASANI NASA-JPL
PM - W.S. SHIPLEY NASA-JPL
PS - T.V. JOHNSON NASA-JPL

BRIEF DESCRIPTION
THE GALILEO MISSION CONSISTS OF A JUPITER ORBITER AND A SEPARATE JUPITER ATMOSPHERIC ENTRY PROBE. THE ORBITER WILL BE LAUNCHED FROM THE SHUTTLE WITH THE IUS AND WILL USE A WARS POWERED FLYBY. THE ORBITER SERVES AS A RELAY LINK TO EARTH FROM THE PROBE. THE ORBITER POWER SOURCE IS A MODULAR 500-W SELENIIDE ISOTOPE GENERATOR (SIG) THAT PROVIDES 20 V OF DC CURRENT TO ALL SUBSYSTEMS. THE TWO SIG'S ARE RATED AT 250 W EACH. TEMPERATURE IS CONTROLLED BY RADIOISOTOPE HEATER UNITS (RHU'S). TELEMETRY IS BY A TWO-CHANNEL DOWNLINK, ONE FOR CONTINUOUS TRANSMISSION OF FIRED FORMAT (6.25 OPS) ON THE S-BAND, AND THE OTHER FOR REAL-TIME PLAYBACK DATA AT RATES BETWEEN 2 AND 120 KPS ON THE X-BAND.

FAILED AT LAUNCH

----- GALILEO ORBITER, ANDERSON-----

INVESTIGATION NAME- RADIO SCIENCE

NSDDC ID- JOPO -11

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
RADIO PHYSICS
PLANETARY ATMOSPHERES
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PL - J.D. ANDERSON	NASA-JPL
TM - V.R. ESMLEMAN	STANFORD U
TM - F.O. ESTABROOK	NASA-JPL
TM - G. FJELDDO	NASA-JPL
TM - G. GERARD	PARIS OBSERVATORY
TM - S. GULRIS	NASA-JPL
TM - A.J. KLIONE	NASA-JPL
TM - R. MOO	NASA-JPL
TM - G.P. LINDAL	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE THE HIGH-ALTITUDE NEUTRAL ATMOSPHERE OF JUPITER, USING OCCULTATION TECHNIQUES TO MEASURE PRESSURE, TEMPERATURE, MOLECULAR WEIGHT, AND TURBULENCE; (2) INVESTIGATE THE IONOSPHERE OF JUPITER AND ITS INTERACTION WITH THE MAGNETOSPHERE, USING OCCULTATION TECHNIQUES TO DETERMINE ELECTRON NUMBER DENSITY AND PLASMA SCALE HEIGHTS; (3) DETERMINE THE SIZE AND SHAPE OF THE GALILEAN SATELLITES; (4) SEARCH FOR AND CHARACTERIZE ATMOSPHERES AND IONOSPHERES OF THE GALILEAN SATELLITES AND STUDY THEIR INTERACTIONS WITH THE JOVIAN MAGNETOSPHERE; (5) DETERMINE THE STRUCTURE OF THE GRAVITATIONAL FIELD OF JUPITER FROM DOPPLER TRACKINGS; (6) DETERMINE THE MASSES AND GRAVITATIONAL MOMENTS OF THE GALILEAN SATELLITES AND IMPROVE KNOWLEDGE OF THEIR ORBITS; (7) STUDY TURBULENCE, ELECTRON DENSITY FLUCTUATIONS, AND WINDS IN THE JOVIAN ATMOSPHERE; (8) INVESTIGATE MICROWAVE EMISSION FROM THE ATMOSPHERE AND TRAPPED RADIATION BELTS OF JUPITER; AND (9) SEARCH FOR VLF GRAVITATIONAL WAVES INCIDENT ON THE SOLAR SYSTEM TO A LEVEL OF STRAIN AMPLITUDE APPROXIMATELY 1.E-10. INVESTIGATORS USE THE SIGNALS TRANSMITTED BETWEEN THE EARTH AND THE ORBITER AND BETWEEN THE PROBE AND THE ORBITER TO CARRY OUT THEIR INVESTIGATIONS. THE EARTH-ORBITER COMMUNICATIONS USE AN S-BAND (2115 MHz) UPLINK AND TRANSDUCER TO GENERATE A COHERENT S-W BAND DOWNLINK (2297 MHz AND 2422 MHz), USING AN EARTH-ORIENTED 3-M DISH ANTENNA. THE FREQUENCY STABILITY IS APPROXIMATELY 1 PART IN 1.E+11. THE PROBE-TO-ORBITER TRANSMISSION IS AT A FREQUENCY BETWEEN 1 AND 2 GHz, USING A WIDE-BAND RECEIVER AND BODY-FIXED 1-M DISH ANTENNA. FOLLOWING THE PROBE MISSION THIS RECEIVER AND ANTENNA ARE AVAILABLE TO CARRY OUT ADDITIONAL INVESTIGATIONS. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, BELTON-----

INVESTIGATION NAME- ORBITER IMAGING

NSDDC ID- JOPO -10

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PL - R.J.E. BELTON	KITT PEAK NATL OBS
TM - C.D. ANGER	U OF CALGARY
TM - C.R. CHAPMAN	PLANETARY SCIENCE INST
TM - M.E. DAVIES	RAND CORP
TM - R. GREELEY	ARIZONA STATE U
TM - R. GREENBERG	PLANETARY SCIENCE INST
TM - J.W. HEAD, 3RD	BROWN U
TM - G. NEUKUM	MPI-MUCIPAN PHYS
TM - G. SCHUBERT	U OF CALIF, LA
TM - C.D. PILGERA	U OF HAWAII
TM - J. VEVERKA	CORNELL U
TM - M.H. CARB	US GEOLOGICAL SURVEY
TM - J.D. WELLMAN	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO STUDY JUPITER AND ITS SATELLITES THROUGH MULTI-SPECTRAL, HIGH-RESOLUTION IMAGING WITH A CCD CAMERA. SPECIFIC SCIENCE OBJECTIVES ARE TO: (1) INVESTIGATE THE STRUCTURE OF THE JOVIAN ATMOSPHERE AND CLOUDS THROUGH MULTI-SPECTRAL PHOTOMETRY AND POLARIMETRY; (2) INVESTIGATE THE DYNAMICS OF THE JOVIAN ATMOSPHERE THROUGH SYNOPSIS IMAGING OF CLOUD STRUCTURES; (3) MEASURE THE SIZES AND SHAPES OF THE GALILEAN SATELLITES AND DETERMINE THEIR LIBRATIONS; (4) MAP THE SURFACE MORPHOLOGY OF THE GALILEAN SATELLITES AT SPATIAL RESOLUTION BETTER THAN 1 KM AND OVER A RANGE OF VIEWING AND LIGHTING ANGLES IN ORDER TO INVESTIGATE THE GEOLOGICAL PROCESSES THAT HAVE ACTED ON THEIR SURFACES; (5) USE MULTISPECTRAL IMAGING TO IDENTIFY AND MAP THE DISTRIBUTION OF ICES AND MINERALS ON THE SURFACES OF THE SATELLITES; (6) SEARCH FOR AURORAL OR OTHER ATMOSPHERIC EMISSION ON THE NIGHT SIDE OF JUPITER, ON THE SATELLITES, AND IN CIRCUM-JOVIAN SPACE; AND (7) SEEK TARGETS OF OPPORTUNITY FOR IMAGING THE IRREGULAR SATELLITES OF JUPITER. THE IMAGING INVESTIGATION USES A SINGLE CAMERA CONSISTING OF A 1500-NANOMETER FOCAL LENGTH CATADIOPTRIC TELESCOPE IMAGING ONTO AN 800 X 800 ELEMENT CHARGE-COUPLED

DEVICE (CCD). OPTICS ARE FUSED SILICON. AN EIGHTY-POSITION FILTER WHEEL (FILTERS NOT SPECIFIED) IS USED. THE SPECTRAL RESPONSE IS 350 TO 1100 NANOMETERS, RESOLUTION IS 20 MICRONS PER LINE PAIR, THE FIELD OF VIEW IS 0.006 RAD (0.36 DEG), THE MINIMUM EXPOSURE IS 9 MILLISECONDS, AND THE MAXIMUM FRAME RATE IS ABOUT 1/30 MIN. THE LINEAR DYNAMIC RANGE EXCEEDS 1000, WITH 8 BIT/PIXEL ENCODING. THE INSTRUMENT IS MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. THE TOTAL MASS IS 23 KG AND THE TOTAL CONTINUOUS POWER IS 23 W. INDIVIDUAL INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- GALILEO ORBITER, CARLSON-----

INVESTIGATION NAME- NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER

NSDDC ID- JOPO -01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - R.W. CARLSON	NASA-JPL
O1 - T.V. JOHNSON	NASA-JPL
O1 - G.E. DANIELSON	CALIF INST OF TECH
O1 - F.P. FANALE	NASA-JPL
O1 - M.H. WIEFFER	US GEOLOGICAL SURVEY
O1 - J.S. LEWIS	MASS INST OF TECH
O1 - M. MASURSKY	US GEOLOGICAL SURVEY
O1 - D.L. RATSON	NASA-JPL
O1 - T.D. RECORD	U OF HAWAII
O1 - L.A. SODERBLON	US GEOLOGICAL SURVEY
O1 - P. TAYLOR	NASA-JPL

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) MAP THE MINERAL DISTRIBUTION ON THE SURFACES OF THE SATELLITES OF JUPITER AT A SPATIAL RESOLUTION OF 5 TO 30 KM, (2) IDENTIFY THE INDIVIDUAL PHASES AND MIXTURES PRESENT, (3) RELATE THE MINERALOGICAL PROVINCES TO GEOLOGICAL PROVINCES OBSERVED WITH THE IMAGING SYSTEM, AND (4) MAP REGIONS OF THE JOVIAN ATMOSPHERE OVER A WIDE RANGE OF PHASE ANGLES TO DETERMINE CLOUD MORPHOLOGY AND VERTICAL STRUCTURE. THE INSTRUMENT IS A HIGH-SPEED SCANNING REFLECTION GRATING SPECTROMETER MOUNTED ON THE SCAN PLATFORM OF THE ORBITER. IMAGING IS DONE BY A 20-CM APERTURE TELESCOPE ONTO AN INSD DETECTOR ARRAY IN ORDER TO PRODUCE MULTI-SPECTRAL LINE IMAGES OF SOURCES WITHOUT EXTERNAL SCANNING. ANGULAR RESOLUTION IS 0.5 MILLIRAD AND THE SPECTRAL RANGE IS 0.9 TO 3.0 MICROMETERS IN 144 CHANNELS AT A SPECTRAL RESOLUTION OF 0.03 MICROMETERS. THE TOTAL MASS OF THE SPECTROMETER IS 11 KG AND THE TOTAL POWER IS 8 W.

----- GALILEO ORBITER, FANALE-----

INVESTIGATION NAME- FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES

NSDDC ID- JOPO -12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - F.P. FANALE	NASA-JPL
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BRIEF DESCRIPTION

THIS INVESTIGATION UTILIZES GALILEO ORBITER REMOTE SENSING DATA, PRIMARILY FROM THE IMAGING, NIMS, AND UVS INVESTIGATIONS, TO STUDY THE FORMATIONAL CONDITIONS AND SUBSEQUENT GEOLOGICAL EVOLUTION OF THE GALILEAN SATELLITES, INCLUDING THE INTERACTION OF THESE BODIES WITH THEIR SPACE ENVIRONMENTS.

----- GALILEO ORBITER, FRANK-----

INVESTIGATION NAME- PLASMA

NSDDC ID- JOPO -04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMA
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - L.A. FRANK	U OF IOWA
O - T.V. CORONITI	U OF CALIF, LA
O - V.M. VASYLIUNAS	MPI-AERONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: ESTABLISH THE SOURCES OF JOVIAN PLASMA; INVESTIGATE PLASMA INTERACTIONS WITH THE JOVIAN SATELLITES; INVESTIGATE THE ROLE OF PLASMA AS A SOURCE FOR ENERGETIC CHARGED PARTICLES IN THE RADIATION ZONES; DETERMINE THE NATURE OF THE EQUATORIAL CURRENT SHEET; AND EVALUATE THE ROLES OF MAGNETIC MERGING, CO-ROTATIONAL FORCES AND FIELD-ALIGNED CURRENTS IN THE DYNAMICS OF THE JOVIAN MAGNETOSPHERE. THE INVESTIGATION USES AN ELECTROSTATIC

ANALYZER (QUADRISPHERICAL LEPEDEA) IN DETERMINING DIFFERENTIAL ENERGY SPECTRA OF BOTH POSITIVE IONS AND ELECTRONS WITH ESSENTIALLY COMPLETE ANGULAR COVERAGE IN 63 CONTIGUOUS PASSBANDS. THE FRACTIONAL ENERGY RESOLUTION IS 0.17 AND THE RANGE IS 1 EV TO 50 KEV. THREE MINIATURE MASS SPECTROMETERS AT THE ANALYZER GRID APERTURE ARE USED FOR MASS ANALYSIS, WITH A FRACTIONAL MASS RESOLUTION OF 0.10, SUFFICIENT TO IDENTIFY H⁺, HE⁺, NE⁺, NA⁺, K⁺, AND S⁺. THE ANALYZER IS MOUNTED ON A SHORT BOOM ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS (EXCLUDING THE BOOM) IS 6.9 KG, AND THE TOTAL POWER IS 7.2 W.

----- GALILEO ORBITER, GIERASCH-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC DYNAMICS

NSDDC ID- JOPO -13 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - P.J. GIERASCH CORNELL U

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO UTILIZE DATA FROM THE IMAGING AND WIND INVESTIGATIONS ON THE ORBITER, TOGETHER WITH IN SITU ATMOSPHERE DATA FROM THE PROBE, TO STUDY DYNAMICS OF THE ATMOSPHERE WITH PARTICULAR EMPHASIS ON THE NATURE AND CAUSE OF THE HORIZONTAL TEMPERATURE GRADIENTS BENEATH THE CLOUDS.

----- GALILEO ORBITER, GRAD-----

INVESTIGATION NAME- ELECTRON EMITTER

NSDDC ID- JOPO -05 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL
PI - R.J.L. GRAD ESA-ESTEC U OF CALIF, SAN DIEGO
OI - S.E. DEFOREST NASA-JPL
OI - R.M. GOLDBSTEIN ESA-ESTEC
OI - A. GONFALONE ESA-ESTEC
OI - D. JONES ESA-ESTEC
OI - K. KNOTT ESA-ESTEC
OI - A. PEDERSEN ESA-ESTEC

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO CLAMP THE POTENTIAL OF THE SPACECRAFT TO THAT OF THE SURROUNDING PLASMA AND MEASURE ELECTRON SATURATION CURRENT COLLECTED BY THE SPACECRAFT, AND TO INVESTIGATE THE LOW ENERGY ELECTRON DENSITY AND TEMPERATURE, THE FLOATING POTENTIAL OF THE SPACECRAFT, AND THE CONDUCTION CURRENT OF ELECTROMAGNETIC AND ELECTROSTATIC WAVES UP TO THE LOCAL PLASMA FREQUENCY. THREE INDIRECTLY HEATED CATHODES WITH APPROPRIATE ELECTRONICS ARE MOUNTED ON THE DESPUN SECTION OF THE ORBITER, WITH CATHODES ON A SHORT (90-CM) BOOM. THE TOTAL MASS (EXCLUDING THE BOOM) IS 3.0 KG AND THE TOTAL POWER IS 2.9 W.

----- GALILEO ORBITER, GRUN-----

INVESTIGATION NAME- DUST

NSDDC ID- JOPO -09 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
PARTICLES AND FIELDS

PERSONNEL
PI - E. GRUN MPI-NUCLEAR PHYS
OI - M. FECHTIG MPI-NUCLEAR PHYS
OI - J. KISSEL MPI-NUCLEAR PHYS
OI - B.A. LINDBLAD LUND OBS
OI - G. MORFILL MPI-NUCLEAR PHYS
OI - H.A. ZOOK NASA-JSC

BRIEF DESCRIPTION
THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE PHYSICAL AND DYNAMICAL PROPERTIES OF SMALL DUST PARTICLES IN THE JOVIAN ENVIRONMENT, WITH EMPHASIS ON THE INTERACTION OF DUST WITH THE MAGNETOSPHERE AND SATELLITE SURFACES. PARAMETERS MEASURED INCLUDE MASS, DIRECTION OF MOTION, AND CHARGE. THE INSTRUMENT PACKAGE CONSISTS OF ENTRANCE GRIDS FOR SENSING CHARGE, AN IMPACT PLASMA DETECTOR TO MEASURE PULSE HEIGHT AND RISE TIME FOR BOTH ELECTRONS AND IONS GENERATED BY IMPACT, AND APPROPRIATE ELECTRONICS. MASS AND VELOCITY ARE DERIVED FROM MEASUREMENTS BY EMPIRICAL RELATIONSHIPS DETERMINED IN GROUND-BASED CALIBRATIONS. THE IMPACT RATE RANGE IS 1.E-7 TO 1.E-2 PER SECOND, THE PARTICLE MASS RANGE IS 1.E-16 TO 1.E-6 G, AND THE CHARGE RANGE IS 1.E-14 TO 1.E-10 C. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. ITS TOTAL MASS IS 4.2 KG, AND THE TOTAL POWER IS 1.7 W.

----- GALILEO ORBITER, HURNETT-----

INVESTIGATION NAME- PLASMA WAVE SPECTROMETER

NSDDC ID- JOPO -07 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - S.A. HURNETT U OF IOWA
OI - R.G. GENDRIN CNET
OI - C.P. KENNEL U OF CALIF, LA
OI - F.L. SCARF TRW SYSTEMS GROUP
OI - S.D. SHAWHAN U OF IOWA

BRIEF DESCRIPTION
THE PURPOSES OF THIS INVESTIGATION ARE TO MEASURE THE VARYING ELECTRIC AND MAGNETIC FIELDS IN THE JOVIAN PLASMA IN ORDER TO DETERMINE THE CHARACTERISTICS AND ORIGIN OF PLASMA WAVES IN THE MAGNETOSPHERE AND TO ANALYZE VARIOUS WAVE-PARTICLE INTERACTION PHENOMENA IN THE MAGNETOSPHERE INTERACTIONS. THE INSTRUMENT PACKAGE INCLUDES A 2-M ELECTRIC DIPOLE ANTENNA FOR ELECTRIC FIELD MEASUREMENT AND TWO 27-CM SEARCH COIL MAGNETOMETERS, ONE FOR LOW FREQUENCY (LESS THAN 10 KHZ) AND THE OTHER FOR HIGH FREQUENCY MAGNETIC FIELD MEASUREMENTS. THERE IS ALSO A 20-CHANNEL SPECTRUM ANALYZER COVERING THE RANGE 5.0 HZ TO 311 KHZ, WITH 4 CHANNELS PER DECADE AND A HIGH DATA RATE WAVEFORM RECEIVER TO BE USED DURING SELECTED PERIODS. SENSORS ARE MOUNTED AS A SINGLE UNIT IN A BOOM APPROXIMATELY 2-M LONG ON THE SPINNING SECTION OF THE ORBITER. ELECTRONICS ARE MOUNTED NEAR THE BASE OF THE BOOM. THE TOTAL MASS OF THE PACKAGE IS 3.1 KG (1.2 W) FOR THE SENSORS AND 1.9 KG FOR ELECTRONICS. THE TOTAL POWER IS 2.0 W.

----- GALILEO ORBITER, HURNETT-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER (UVS)

NSDDC ID- JOPO -02 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL
PI - C.W. HORD U OF COLORADO
OI - C.A. BARTH U OF COLORADO
OI - K.W. KELLY U OF COLORADO
OI - A.L. LANE NASA-JPL
OI - A.I. STEWART U OF COLORADO
OI - G.E. THOMAS U OF COLORADO

BRIEF DESCRIPTION
THIS INVESTIGATION STUDIES THE COMPOSITION AND STRUCTURE OF THE HIGH NEUTRAL ATMOSPHERES OF JUPITER AND THE GALILEAN SATELLITES TO DETERMINE ATMOSPHERIC LOSS RATES FROM SATELLITES, STUDY MIXING RATIOS ON JUPITER OF H⁺ AND OF UV-ACTIVE TRACE CONSTITUENTS, AND INVESTIGATE AURORAL EMISSIONS AND INTERACTIONS BETWEEN ATMOSPHERES AND THE JOVIAN MAGNETOSPHERE. INSTRUMENTATION CONSISTS OF A FAST-EXPOSURE UV SPECTROMETER (WAVELENGTH RANGE OF 110 TO 430 NANOMETERS) WITH A CALSOTRAIN TELESCOPE HAVING A 9-CM APERTURE, 28-CM FOCAL LENGTH, AND A PROGRAMMABLE GRATING. THE SPECTRUM IS MEASURED WITH MICROCHANNEL DETECTORS AT A FOV RESOLUTION OF 1.0 KM (1 NAUTICAL MILE) AT PERIAPSIS. THE SPECTROMETER IS MOUNTED ON THE ORBITER SCAN PLATFORM AND HAS A TOTAL MASS OF 3.4 KG. THE TOTAL POWER IS 4.2 W.

----- GALILEO ORBITER, HUNTEN-----

INVESTIGATION NAME- STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES

NSDDC ID- JOPO -14 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - D.P. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE HEAT BALANCE OF JUPITER'S ATMOSPHERE, TO ESTIMATE THE EDDY DIFFUSION COEFFICIENTS IN THE ATMOSPHERE, AND TO STUDY THE AERONOMY OF NEUTRAL AND IONIZED ATMOSPHERES (INCLUDING THOSE OF THE SATELLITES) BY USING DATA FROM A WIDE VARIETY OF PROBE AND ORBITER INSTRUMENTS.

----- GALILEO ORBITER, EIVELSON-----

INVESTIGATION NAME- MAGNETOMETER

ORIGINAL PAGE IS
OF POOR QUALITY

NSDC ID- JOPO -03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETOLGY
MAGNETOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL

PI - M.G. KIVELSON *	U OF CALIF, LA
OI - P.J. COLEMAN, JR.	U OF CALIF, LA
OI - C.F. KENNEL	U OF CALIF, LA
OI - R.L. MCPHERSON	U OF CALIF, LA
OI - C.T. RUSSELL	U OF CALIF, LA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO STUDY THE JOVIAN MAGNETIC FIELD IN ORDER TO MAP THE CONFIGURATION OF THE MAGNETOSPHERE AND ANALYZE ITS DYNAMICS, INVESTIGATE MAGNETOSPHERIC-IONOSPHERIC COUPLING, MEASURE MAGNETIC FLUCTUATIONS, SEARCH FOR MAGNETIC FIELDS ON THE SATELLITES, AND INVESTIGATE THE PROPERTIES OF THE SATELLITES AND THEIR INTERACTIONS WITH THE AMBIENT MEDIUM. THE INSTRUMENT PACKAGE INCLUDES DUAL TRIAXIAL FLUXGATE MAGNETOMETERS WITH A DYNAMIC RANGE OF 2.5E-12 TO 1.6E-5 TESLAS (0.0025 TO 1.6E4 GAMMAS) MOUNTED ON A BOOM ON THE SPINNING PART OF THE ORBITER SPACECRAFT. EACH SENSOR TRIAD CAN BE MECHANICALLY FLIPPED ABOUT THE BOOM AXIS. OUTBOUND SENSORS ARE WOUND FOR LOW FIELD READINGS OF 1.E-12 TO 5.12E-7 TESLAS (1 MILLIGAMMA TO 512 GAMMAS), INBOUND SENSORS FOR HIGH FIELD READINGS OF 3.1E-11 TO 1.6E-5 TESLAS (31 MILLIGAMMAS TO 16 KILOGAMMAS). ELECTRONICS ARE MOUNTED ON THE SPINNING SECTION AND INCLUDE OPTIMUM AVERAGING CAPABILITY. THE MASS, EXCLUDING THE BOOM, IS 5.2 KG (1.0 FOR THE SENSORS, 2.2 FOR THE ELECTRONICS). THE TOTAL POWER IS 3.7 W.

----- GALILEO ORBITER, LACIS-----

INVESTIGATION NAME- PHOTOPOLARIMETER RADIOMETER

NSDC ID- JOPO -08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.A. LACIS	NASA-GISS
OI - D.L. COFFEEN	NASA-GISS
OI - J.E. HANSEN	NASA-GISS
OI - P.H. STONE	MASS INST OF TECH
OI - L. TRAVIS	NASA-GISS
OI - W.-C. WANG	NASA-GISS
OJ - Y.L. YUNG	CALIF INST OF TECH

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION, PHOTOPOLARIMETER RADIOMETER (PPR), ARE TO DETERMINE THE CLOUD AND HAZE PROPERTIES (VERTICAL AND HORIZONTAL DISTRIBUTION AND MICROSTRUCTURE) AND RADIATION BUDGET (INCLUDING VERTICAL PROFILE OF SOLAR HEATING) OF JUPITER AND TO INVESTIGATE THE PHOTOMETRIC AND THERMAL PROPERTIES OF SATELLITE SURFACES. THE INSTRUMENT IS A 10-CM DALL-KIRKHAM TELESCOPE FOLLOWED BY A 16-POSITION FILTER WHEEL, GIVING POLARIMETRY IN THREE SPECTRAL BANDS FROM 410 TO 1050 NANOMETERS AND PHOTOMETRY IN SEVEN SPECTRAL BANDS FROM 560 TO 890 NANOMETERS. SILICON PHOTODIODES ARE USED FOR PHOTOPOLARIMETRY AND A THERMOPILE DETECTOR FOR RADIOMETRY. MEASUREMENT ACCURACY IS 0.1 PERCENT ABSOLUTE POLARIMETRY; 1 PERCENT RELATIVE PHOTOMETRY AND 3 PERCENT ABSOLUTE PHOTOMETRY; 1 PERCENT RELATIVE RADIOMETRY AND 5 PERCENT ABSOLUTE RADIOMETRY. THE INSTRUMENT IS MOUNTED ON THE ORBITER SCAN PLATFORM. THE TOTAL MASS IS 3.6 KG AND THE TOTAL POWER IS 7.5 W.

----- GALILEO ORBITER, MASURSKY-----

INVESTIGATION NAME- GEOLOGY OF THE GALILEAN SATELLITES

NSDC ID- JOPO -15

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLGY

PERSONNEL

PI - H. MASURSKY US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO USE ORBITER IMAGING AND NIMS DATA TO INVESTIGATE GEOLOGICAL PROCESSES ON THE GALILEAN SATELLITES, WITH EMPHASIS ON THE IDENTIFICATION AND DISTRIBUTION OF SURFACE MATERIALS, THE MORPHOLOGIES AND DENSITIES OF IMPACT CRATERS, AND THE SEARCH FOR STRUCTURE INDICATIVE OF GLACIAL AND PERIGLACIAL PROCESSES.

----- GALILEO ORBITER, MCELROY-----

INVESTIGATION NAME- INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES

NSDC ID- JOPO -16

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - M.B. MCELROY HARVARD U

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM A VARIETY OF PROBE AND ORBITER INVESTIGATIONS TO STUDY THE COMPOSITION AND STRUCTURE OF PLANETARY AND SATELLITE ATMOSPHERES, WITH EMPHASIS ON PHOTOCHEMISTRY AND INTERACTION OF THE ATMOSPHERES WITH THE MAGNETOSPHERE.

----- GALILEO ORBITER, ORTON-----

INVESTIGATION NAME- GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER

NSDC ID- JOPO -17

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - G.S. ORTON NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE STRUCTURE OF THE ATMOSPHERE OF JUPITER USING DATA FROM THE PROBE STRUCTURE, COMPOSITION, NEPHELOMETER, AND NET-FLUX RADIOMETER INVESTIGATIONS, TOGETHER WITH ORBITER PHOTOPOLARIMETER/RADIOMETER AND NIMS REMOTE SENSING DATA. RESULTS INCLUDE AN ANALYSIS OF RADIATIVE EQUILIBRIUM IN THE UPPER TROPOSPHERE AND STRATOSPHERE AND AN ASSESSMENT OF THE INFORMATION REQUIRED IN GENERAL FOR SUCCESSFUL REMOTE RECOVERY OF ATMOSPHERIC CONDITIONS ON THE OUTER PLANETS.

----- GALILEO ORBITER, OWEN-----

INVESTIGATION NAME- COMPOSITION OF THE JOVIAN ATMOSPHERE

NSDC ID- JOPO -18

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - T. OWEN STATE U OF NEW YORK

BRIEF DESCRIPTION

THIS INVESTIGATION IS BASED ON DATA FROM THE MASS SPECTROMETER AND HELIUM INTERFEROMETER INVESTIGATIONS AND THE NIMS AND OTHER ORBITER INVESTIGATIONS TO ESTABLISH A DIRECT CALIBRATION OF PREVIOUS REMOTE MEASUREMENTS OF THE COMPOSITION OF JUPITER BY VOYAGER IRIS AND EARTH-BASED SPECTROSCOPIC OBSERVATIONS.

----- GALILEO ORBITER, POLLACK-----

INVESTIGATION NAME- THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE

NSDC ID- JOPO -19

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.B. POLLACK NASA-ARC

BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO DETERMINE THE VERTICAL TEMPERATURE STRUCTURE AND DYNAMICS OF THE JOVIAN ATMOSPHERE USING DATA FROM ALL OF THE PROBE INVESTIGATIONS TO CHARACTERIZE THE ROLES OF RADIATIVE HEATING, THERMAL CONVECTION, LATENT HEAT RELEASE, AND THE INTERNAL ENERGY SOURCE.

----- GALILEO ORBITER, RUSSELL-----

INVESTIGATION NAME- JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS

NSDC ID- JOPO -20

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS
INTERPLANETARY PHYSICS

PERSONNEL

PI - C.T. RUSSELL

U OF CALIF, LA

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER MAGNETOMETER, PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLES INVESTIGATIONS TO: (1) STUDY THE JOVIAN MAGNETOSPHERE AND SATELLITE-MAGNETOSPHERE INTERACTIONS (WITH EMPHASIS ON REFINING MODELS OF THE JOVIAN MAIN FIELD); (2) STUDY THE INTERNAL STRUCTURE OF THE GALILEAN SATELLITES FROM THEIR INTERACTIONS WITH THE AMBIENT MEDIUM; (3) INVESTIGATE THE DYNAMICS OF THE MAGNETOSPHERE; AND (4) EXAMINE CRITICALLY THE OBSERVATIONAL DATA PERTAINING TO ENERGETIC PARTICLE TRANSPORT, ACCELERATION, AND LOSS IN THE JOVIAN MAGNETOSPHERE.

----- GALILEO ORBITER, SAGAN-----

INVESTIGATION NAME- ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE

NSSDC ID- JOPO -21

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL

PI - C. SAGAN

CORNELL U

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER NIMS AND UVS INVESTIGATIONS, TOGETHER WITH THE PROBE COMPOSITION AND NEPHELOMETER INVESTIGATIONS, TO STUDY THE ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE, WITH EMPHASIS ON THE NATURE OF THE ORGANIC AND INORGANIC CHROMOPHORES THAT PRODUCE THE COLORS OF THE JOVIAN CLOUDS.

----- GALILEO ORBITER, SCARF-----

INVESTIGATION NAME- WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER

NSSDC ID- JOPO -22

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL

PI - F.L. SCARF

TRW SYSTEMS GROUP

BRIEF DESCRIPTION

THIS INVESTIGATION USES MAGNETOSPHERIC DATA FROM THE ORBITER PLASMA, PLASMA WAVE, AND ENERGETIC PARTICLE INVESTIGATIONS TO STUDY WAVE-PARTICLE INTERACTION PHENOMENA, WITH EMPHASIS ON EVALUATING THE EFFECTIVE TRANSPORT COEFFICIENTS (ANOMALOUS CONDUCTIVITY, PITCH-ANGLE DIFFUSION COEFFICIENT, ETC.) ASSOCIATED WITH THE MAGNETOSPHERIC PLASMA INSTABILITIES AND SATELLITE-MAGNETOSPHERE INTERACTIONS.

----- GALILEO ORBITER, SCHUBERT-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION

NSSDC ID- JOPO -23

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL

PI - G. SCHUBERT

U OF CALIF, LA

BRIEF DESCRIPTION

THIS INVESTIGATION USES DATA FROM THE ORBITER IMAGING INVESTIGATION AND FROM ALL OF THE PROBE INVESTIGATIONS TO STUDY THE THERMAL AND DYNAMICAL PROCESSES RESPONSIBLE FOR THE GLOBAL ATMOSPHERIC CIRCULATION OF JUPITER AND THE WAYS THAT THESE PROCESSES ARE INFLUENCED BY THE STRUCTURE OF THE CLOUD LAYERS.

----- GALILEO ORBITER, SONETT-----

INVESTIGATION NAME- INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES+JOVIAN MAGNETOSPHERE

NSSDC ID- JOPO -24

INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS INTERPLANETARY PHYSICS

PERSONNEL

PI - C.P. SONETT

U OF ARIZONA

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO USE DATA FROM THE ORBITER MAGNETOMETER, PLASMA, AND PLASMA WAVE INVESTIGATIONS TO MEASURE ANY INTRINSIC MAGNETIC FIELDS THAT MAY EXIST ON THE GALILEAN SATELLITES AND TO INVESTIGATE THE PROCESSES WHEREBY THESE SATELLITES INTERACT WITH THE MAGNETOSPHERE AND MAIN FIELD OF JUPITER, INCLUDING COMPARISONS TO SIMILAR INTERACTIONS INVOLVING THE MOON.

----- GALILEO ORBITER, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- JOPO -06

INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - T.P. ARMSTRONG
OI - T.A. FRITZ
OI - S.M. KRINIGIS
OI - L.J. LANZUOTTI
OI - R.W. MCENTIRE
OI - J.G. ROEPERER
OI - E.C. ROELOF
OI - W. STUBENMANN
OI - B. WILKEN

NOAA-ERL
U OF KANSAS
NOAA-ERL
APPLIED PHYSICS LAB
BELL TELEPHONE LAB
APPLIED PHYSICS LAB
U OF ALASKA
APPLIED PHYSICS LAB
MPI-AERONOMY

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: STUDY THE DETAILED ENERGY AND ANGULAR DISTRIBUTION AND STABILITY OF TRAPPED PROTONS, ELECTRONS, AND IONS AND DETERMINE ION COMPOSITION; INVESTIGATE THE INTERACTIONS OF THESE PARTICLES WITH THE SATELLITES AND THE SOLAR WIND; MEASURE THERMAL PLASMA FLOW VELOCITIES AND TEMPERATURES; AND INVESTIGATE ADIABATIC AND NONADIABATIC PROCESSES IN THE TRAPPED RADIATION. THE INSTRUMENT PACKAGE CONSISTS OF A LOW-ENERGY MAGNETOSPHERIC MEASUREMENT SYSTEM (LEMS), A COMPOSITION MEASUREMENT SYSTEM (CMS), AND AN INSTRUMENT STEPPING PLATFORM. THE LEMS ENERGY RANGE AND CHARGE RESPONSE (MAGNETIC DEFLECTION AND DE/DX, E TECHNIQUES) ARE, FOR ELECTRONS, 0.015 - 11 MEV, AND 0.02 - 55 MEV/NUCLEON FOR PROTONS AND IONS. THE CMS ENERGY RANGE AND CHARGE RESPONSE (DE/DX, E, TIME OF FLIGHT, AND PULSE HEIGHT ANALYSIS TECHNIQUES) MEASURES HE THROUGH FE WITH VARYING ENERGY RESPONSES IN THE 0.15 - 100 MEV/NUCLEON RANGE. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. THE TOTAL MASS IS 7.4 KG AND THE TOTAL POWER IS 7.4 W.

***** GALILEO PROBE*****

SPACECRAFT COMMON NAME- GALILEO PROBE
ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP
GALILEO

NSSDC ID- JOP

LAUNCH DATE- 03/22/84 WEIGHT- 250. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- JUPITER PROBE

PERSONNEL

MG - D.R. MCCULLAR NASA HEADQUARTERS
SC - R.E. MURPHY NASA HEADQUARTERS
PH - J. CASANI NASA-JPL
PM - J. SPERANS NASA-ARC
PS - L. COLIN NASA-ARC
PS - T.V. JOHNSON NASA-JPL

BRIEF DESCRIPTION

THE PROBE IS A STAGED-VENTED SYSTEM COMPRISED OF A DECELERATION MODULE AND A DESCENT MODULE. IT WILL BE LAUNCHED FROM THE SHUTTLE WITH THE IUS SEPERATELY FROM THE ORBITER. ITS MASS AND DIAMETER ARE 250 KG AND 1.2 M, RESPECTIVELY. THE DECELERATION MODULE CONSISTS OF STRUCTURE AND HEAT SHIELDS. THE DESCENT MODULE CONTAINS THE SCIENCE INSTRUMENTS. PROBE ELECTRONICS AND POWER SOURCES ARE VENTED TO THE JOVIAN ATMOSPHERE. A PARACHUTE IS USED TO SEPARATE THE DESCENT MODULE FROM THE DECELERATION MODULE AND TO CONTROL THE PROBE DESCENT RATE. IT MAY BE JETTISONED NEAR THE TERMINATION OF THE MISSION (AT A PRESSURE OF 10 BARS) TO ALLOW A MORE RAPID DESCENT AT THE HIGHER PRESSURES AND TEMPERATURES. IN SITU SCIENCE MEASUREMENTS ARE MADE PRIOR TO AND DURING HIGH SPEED ENTRY AND DESCENT. POWER IS SUPPLIED BY A BATTERY. DATA ARE TELEMETERED TO THE ORBITER, WHICH IN TURN RELAYS THEM TO EARTH. THE IN SITU MEASUREMENTS GIVE INFORMATION ON THE PHYSICAL STRUCTURE, CHEMICAL COMPOSITION, LOCATION OF CLOUDS IN THE TROPOSPHERE, AND THE THERMAL BALANCE OF THE PLANET. DATA ARE STORED IN A MEMORY UNIT FOR THE PERIOD OF COMMUNICATION BLACKOUT DURING ENTRY THEN TRANSMITTED TO THE ORBITER INTERLEAVED WITH REAL-TIME DATA.

----- GALILEO PROBE, BOESE-----

INVESTIGATION NAME- NET FLUX RADIOMETER

NSSDC ID- JOP -04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.W. BOESE NASA-ARC
OI - J.B. POLLACK NASA-ARC
OI - P.W. SILVAGGIO NASA-ARC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) MEASURE VERTICAL DISTRIBUTION OF NET FLUX OF SOLAR ENERGY AND PLANETARY EMISSION IN THE REGION OF THE ATMOSPHERE FROM 0.1 TO 10 BARS, (2) DETERMINE THE LOCATION OF CLOUD LAYERS, AND (3) OBTAIN EVIDENCE ON THE MIXING RATIOS OF SELECTED CONSTITUENTS AND THE OPACITY OF CLOUDS AND AEROSOLS IN THE INFRARED. A MULTICHANNEL RADIOMETER MEASURES FLUX IN ABOUT 30-DEG CONES ALTERNATELY CENTERED PLUS OR MINUS 45 DEG FROM THE PROBE HORIZONTAL. IT HAS AN ON-BOARD CALIBRATION SYSTEM (2 BLACK BODIES), A MULTIDETECTOR ARRAY (WITH CHANNELS AT APPROXIMATELY 0.3 - 3.0, 0.3 - 2000, 20-30, 30-40, AND 40 - 60 MICROMETERS), AND A SIX PYROELECTRIC DETECTOR ARRAY. IT IS MOUNTED ON THE PROBE WITH EXTERNAL VIEWING AFTER SHIELD DEPLOYMENT. THE TOTAL MASS IS 2.3 KG AND THE TOTAL POWER IS 4.6 W.

----- GALILEO PROBE, LANZEROTTI-----

INVESTIGATION NAME- LIGHTNING

NSSDC ID- JOP -06 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SPACE PLASMAS
PLANETARY MAGNETIC FIELD

PERSONNEL

PI - L.J. LANZEROTTI BELL TELEPHONE LAB
OI - G. DEHREL BRAUNSCHWEIG TECH U
OI - F.O. GLEIM BRAUNSCHWEIG TECH U
OI - E.P. KRIDER U OF ARIZONA
OI - K. RINNERT MPI-AERONOMY
OI - N. UMAN U OF FLORIDA

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) VERIFY THE EXISTENCE OF LIGHTNING ON JUPITER AND MEASURE ITS BASIC PHYSICAL CHARACTERISTICS, AND (2) MEASURE RF NOISE LEVELS AND ONE MAGNETIC FIELD COMPONENT NEAR JUPITER. TWO INSTRUMENTS ARE USED FOR THIS INVESTIGATION - AN ELECTROMAGNETIC SENSOR AND AN OPTICAL SENSOR. THE ELECTROMAGNETIC SENSOR HAS A FERRITE CORE ANTENNA WITH A PREAMPLIFIER AS AN RF SENSOR. THE FREQUENCY DOMAIN IS 3, 15, AND 100 KHZ NARROW-BAND. THE TIME DOMAIN IS 1 HZ TO 100 Hz, AND THE RESOLUTION IS 16 S. THE OPTICAL SENSOR HAS A PHOTODIODE WITH FISHEYE LENS. THERE IS COINCIDENCE AND ANTICOINCIDENCE BETWEEN THE RF AND OPTICAL SENSORS. THE ELECTROMAGNETIC SENSOR IS MOUNTED UNDER THE PROBE AFTER BODY WHILE THE OPTICAL SENSOR IS MOUNTED ON THE PROBE ENVELOPE LOOKING OUT PERPENDICULAR TO THE PROBE SPIN AXIS. THE TOTAL MASS IS 1.1 KG AND THE TOTAL CONTINUOUS POWER IS 1.0 W.

----- GALILEO PROBE, NIEMANN-----

INVESTIGATION NAME- MASS SPECTROMETER

NSSDC ID- JOP -03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B. NIEMANN NASA-GSFC
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARRIGAN U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN
OI - R.E. HARTLE NASA-GSFC
OI - B.M. HUNTEN U OF ARIZONA
OI - T. OWEN STATE U OF NEW YORK
OI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE CHEMICAL AND ISOTOPIC COMPOSITION AND PHYSICAL STATE OF THE JOVIAN ATMOSPHERE, INCLUDING VERTICAL VARIATIONS FROM 0.1 TO 10 BARS OR GREATER. MIXING RATIOS ARE DETERMINED OF HE TO ONE PERCENT ACCURACY AND OF H₂O, CH₄, AND NH₃ TO FIVE PERCENT ACCURACY. THE ISOTOPIC RATIO OF NE20 TO NE22 IS MEASURED TO AN ACCURACY OF TWO PERCENT. ALL SPECIES WITH MASS NUMBERS 1-52, PLUS SELECTED SPECIES AT HIGHER MASS NUMBERS (INCLUDING KRYPTON AND XENON) ARE MEASURED. THE INSTRUMENT IS A QUADRUPOLE MASS SPECTROMETER WITH AN ELECTRON IMPACT ION SOURCE HAVING REDUNDANT ELECTRON BEAM GUNS OF VARIABLE KINETIC ENERGY AND A SECONDARY ELECTRON MULTIPLIER ION DETECTOR. THE DUAL-CHANNEL SAMPLE INLET SYSTEM INCLUDES AN ENRICHMENT SYSTEM FOR TRACE GAS

AND ISOTOPE DETERMINATION, A TANDER GETTER, AND A SPUTTER ION PUMP. THE MASS RANGE IS 1-52, 84, AND 131 U. THE DYNAMIC RANGE IS 1.E+8. OTHER SPECIES WITH MASSES GREATER THAN 52 CAN BE SOUGHT AT THE SACRIFICE OF INTEGRATION TIME BELOW 52 U. THE SCAN PERIOD IS 3 TO 60 S. THE INSTRUMENT IS MOUNTED ON THE PROBE WITH THE SAMPLE INLET PORT NEAR THE STAGNATION POINT WITH THE SAMPLE CUTLET PORT NEAR THE MINIMUM PRESSURE POINT. THE TOTAL MASS IS 7.1 KG AND THE TOTAL POWER IS 15 W.

----- GALILEO PROBE, RAGENT-----

INVESTIGATION NAME- NEPHELOMETER

NSSDC ID- JOP -05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - B. RAGENT NASA-ARC
OI - J.E. BLAMONT CNRS-SA
OI - G.W. GRAMS GEORGIA INST OF TECH
OI - J.B. POLLACK NASA-ARC

BRIEF DESCRIPTION

THIS INVESTIGATION IS TO DETERMINE VERTICAL EXTENT, STRUCTURE, AND MICROPHYSICAL CHARACTERISTICS (PARTICLE SIZE DISTRIBUTION, NUMBER DENSITY, AND PHYSICAL STRUCTURE) OF JUPITER'S CLOUDS OVER THE RANGE 0.1 TO 10 BARS. A SINGLE-WAVELENGTH, MULTIPLE-ANGLE (5) SCATTERING NEPHELOMETER, WITH A GALLIUM-ARSENIC LED (9000 A) SOURCE AND SOLID STATE DETECTORS IS MOUNTED ON THE PROBE WITH APPROPRIATE EXTERNAL VIEWING GEOMETRY. DEPLOYMENT TAKES PLACE AFTER THE HEAT SHIELD IS REMOVED. THE TOTAL MASS IS 1.8 KG AND THE TOTAL CONTINUOUS POWER IS 3.0 W.

----- GALILEO PROBE, SIEFF-----

INVESTIGATION NAME- ATMOSPHERIC STRUCTURE

NSSDC ID- JOP -02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A. SIEFF NASA-ARC
OI - R.C. BLANCHARD NASA-LARC
OI - D.B. KIRK NASA-ARC
OI - G. SCHUBERT U OF CALIF, LA
OI - S.C. SOMMER NASA-ARC
OI - R.E. YOUNG NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE STATE PROPERTY PROFILES (TEMPERATURE, PRESSURE, DENSITY, MOLECULAR WEIGHT) OVER AN ALTITUDE RANGE FROM A THRESHOLD OF ABOUT 1000 KM ABOVE THE CLOUD DECK DOWN TO PROBE FAILURE (DEEPER THAN 10 BAR PRESSURE). THE INSTRUMENT PACKAGE CONSISTS OF ACCELERATION, TEMPERATURE, AND PRESSURE SENSORS AND ASSOCIATED ELECTRONICS. THEY ARE MOUNTED IN THE PROBE WITH ACCELEROMETERS NEAR THE PROBE CENTER OF GRAVITY. THE TEMPERATURE SENSING HEAD AND PRESSURE INLET ARE DEPLOYED OUTSIDE THE PROBE BOUNDARY LAYER. THE TOTAL MASS IS 1.9 KG AND THE TOTAL CONTINUOUS POWER IS 5.5 W.

----- GALILEO PROBE, VON ZAHN-----

INVESTIGATION NAME- HELIUM ABUNDANCE INTERFEROMETER

NSSDC ID- JOP -01 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - U. VON ZAHN U OF BONN
OI - H.-J. HOFFMAN U OF BONN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS THE PRECISE (0.1 PERCENT) DETERMINATION OF THE HELIUM ABUNDANCE IN THE JOVIAN ATMOSPHERE FROM 3 TO 8 BARS. A TWO-ARM DOUBLE PATHLENGTH OPTICAL INTERFEROMETER THAT INCLUDES AN IR LIGHT-EMITTING DIODE (LED) LIGHT SOURCE, AN INTERFERENCE FILTER, AND A PHOTODETECTOR ARRAY IS USED TO MEASURE THE REFRACTIVE INDEX DIFFERENCE BETWEEN AN ATMOSPHERE SAMPLE AND A REFERENCE GAS MIXTURE. IT IS MOUNTED ON THE PROBE WITH AN INLET PIPE TO THE AMBIENT ATMOSPHERE. THE TOTAL MASS IS 1.0 KG AND THE TOTAL CONTINUOUS POWER IS 0.7 W.

***** GAMMA-RAY OBSERVATORY*****

SPACECRAFT COMMON NAME- GAMMA-RAY OBSERVATORY
ALTERNATE NAMES-

NSSDC ID- GRO

LAUNCH DATE- 08/01/85 WEIGHT- 12000. KG
LAUNCH SITE- CAPE CARAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 92.5 MIN INCLINATION- 28.5 DEG
PERIAPSIS- 400. KM ALT APOAPSIS- 400. KM ALT

PERSONNEL
MG - D.P. BUDROWBRIDGE NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - J.J. MADDEN NASA-GSFC
PS - D.A. KNIFFEN NASA-GSFC

BRIEF DESCRIPTION
THE GRO IS DESIGNED AS A FREE-FLYING SATELLITE LAUNCHED FROM THE SPACE SHUTTLE, CARRYING FIVE GAMMA-RAY INSTRUMENTS THAT REQUIRE SUSTAINED POINTING TOWARD GAMMA-RAY SOURCES IN SPACE. THE SPACECRAFT IS STABILIZED IN THREE AXES. GRO IS SUPPORTED BY A MECHANICAL STRUCTURE WHICH, IN ADDITION TO THE SCIENTIFIC INSTRUMENTS, HOUSES AN ATTITUDE-CONTROL SYSTEM, A POWER SYSTEM, AND A COMMAND AND COMMUNICATIONS SYSTEM. ALL THE MAIN SUBSYSTEMS ARE REDUNDANT FOR INCREASED RELIABILITY OF THE MISSION. THE PLANNED OPERATING LIFE IN ORBIT IS 2 YEARS. DATA WILL BE RETRIEVED THROUGH THE TBSS.

----- GAMMA-RAY OBSERVATORY, FICHTEL-----

INVESTIGATION NAME- HIGH-ENERGY GAMMA-RAY TELESCOPE

NSSDC ID- GRO -04 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - C.E. FICHTEL NASA-GSFC
PI - R. HOFSTADTER STANFORD U
PI - K. PINKAU MPI-EXTRATERR PHYS
OI - D.L. BERTSCH NASA-GSFC
OI - A.J. FAVALE GRUMMAN AEROSPACE CORP
OI - R.C. HARTMAN NASA-GSFC
OI - E.B. HUGHES STANFORD U
OI - D.A. KNIFFEN NASA-GSFC
OI - H.A. MAYER-HASSELWANDER MPI-EXTRATERR PHYS
OI - H. ROTHERMEL MPI-EXTRATERR PHYS
OI - E.J. SCHNEID GRUMMAN AEROSPACE CORP
OI - M.R. SOMMER MPI-EXTRATERR PHYS
OI - D.B. THOMPSON NASA-GSFC

BRIEF DESCRIPTION
THE INSTRUMENT IS A PICTORIAL-TYPE TELESCOPE USING A DIGITIZED SPARK CHAMBER TO IDENTIFY THE ELECTRON PAIR PRODUCED BY A GAMMA-RAY INTERACTION, AND A LARGE NAI (TL) SCINTILLATOR CRYSTAL TO DETERMINE THE GAMMA-RAY ENERGY. THE SPECIFIC OBJECTIVES OF THE EXPERIMENT ARE: (1) TO SEARCH FOR LOCALIZED SOURCES (E.G., NEUTRON STARS, BLACK HOLES) IN THE 20 REV-30 GEV RANGE AND STUDY THEIR PROPERTIES, (2) TO IMPROVE LOCATION ACCURACY OF KNOWN SOURCES, (3) TO SEARCH FOR EVIDENCE OF COSMIC-RAY PARTICLE ACCELERATION IN SUPERNOVA REMNANTS, (4) TO STUDY GAMMA-RAY BURSTS AND LINE EMISSION FROM SOLAR FLARES, (5) TO OBTAIN A DETAILED PICTURE OF THE DIFFUSE GAMMA-RAY EMISSION FROM OUR GALAXY, AND STUDY GALACTIC DYNAMICS, COSMIC-RAY COMPOSITION, AND MAGNETIC FIELDS, (6) TO STUDY OTHER GALAXIES, BOTH NORMAL AND PECULIAR, AND (7) TO STUDY THE DIFFUSE CELESTIAL RADIATION AS IT RELATES TO COSMOLOGY.

----- GAMMA-RAY OBSERVATORY, FISHMAN-----

INVESTIGATION NAME- TRANSIENT-EVENT MONITOR

NSSDC ID- GRO -05 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - G.J. FISHMAN NASA-MSFC
OI - C.A. MEEGAN NASA-MSFC
OI - T.A. PARNELL NASA-MSFC

BRIEF DESCRIPTION
THE DETECTOR ARRAY OF THE TRANSIENT EVENT MONITOR PROVIDES DEFINITIVE DATA ON: (1) DISTRIBUTION OF BURST SIZES (LOG N - LOG S CURVE) DOWN TO 0.0E-15 J/50 CM, (2) THE PRECISE DIRECTION OF MANY SOURCES THROUGH INTERPLANETARY TIMING, (3) THE GENERAL LOCATION OF NUMEROUS ADDITIONAL BURST SOURCES, AND (4) FLUCTUATIONS AND SPECTRAL CHANGES ON TIME SCALES OF 1 MS OR LESS. THESE DATA NOT ONLY CONSTRAIN THEORIES OF BURST SOURCES AND THEIR EMISSION MECHANISM, BUT MAY PROVIDE IDENTIFICATIONS

WITH OPTICAL OR X-RAY OBJECTS. THIS EXPERIMENT CONSISTS OF SIX 40-CM-DIAMETER, 1.27-CM THICK NAI (TL) DISCS WITH ANTI-COINCIDENCE SHIELDS.

----- GAMMA-RAY OBSERVATORY, KURFESS-----

INVESTIGATION NAME- SCINTILLATION SPECTROMETER

NSSDC ID- GRO -02 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - J.D. KURFESS US NAVAL RESEARCH LAB
OI - R. ULMER NORTHWESTERN U
OI - W.W. JOHNSON US NAVAL RESEARCH LAB
OI - R.L. KINZER US NAVAL RESEARCH LAB
OI - G.W. SHADE US NAVAL RESEARCH LAB
OI - C. DYER ROYAL NAVAL COLLEGE
OI - D.D. CLAYTON RICE U

BRIEF DESCRIPTION
THE INSTRUMENT IS COMPRISED OF FOUR IDENTICAL HIGH-SENSITIVITY SCINTILLATION DETECTORS THAT ARE INDEPENDENTLY MOUNTED ON ONE-AXIS ORIENTATION SYSTEMS. FOR MOST OBSERVATIONS, TWO DETECTORS ARE POINTED AT THE SOURCE, WHILE THE OTHER TWO ARE OFFSET BY 15 DEG FOR SIMULTANEOUS BACKGROUND MEASUREMENTS. FOR TIME-VARIABLE PHENOMENA, ALL FOUR DETECTORS CAN BE POINTED AT THE SOURCE FOR MAXIMUM SENSITIVITY. OF PARTICULAR INTEREST ARE OBSERVATIONS OF NUCLEAR LINE RADIATION FROM SUPERNOVAE, NOVAE, NEUTRON STARS, ACCRETION ONTO BLACK HOLES, SOLAR FLARES AND CONTINUUM RADIATION FROM ALL OF THE ABOVE, PLUS SEYFERT GALAXIES, QUASARS, PULSARS, X-RAY BURSTERS, AND KNOWN HIGH-ENERGY GAMMA-RAY SOURCES. TRANSIENT PHENOMENA OCCURRING ANYWHERE IN THE SKY CAN BE DETECTED.

----- GAMMA-RAY OBSERVATORY, PETERSON-----

INVESTIGATION NAME- GAMMA-RAY SPECTROSCOPY

NSSDC ID- GRO -01 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - L.E. PETERSON U OF CALIF, SAN DIEGO
OI - P. BURROUCHOUX CENS
OI - R. ROCCHIA CENS
OI - K.C. HURLEY CESR
OI - M. NIEL CESR
OI - G. VEDRENNE CESR
OI - T.L. CLINE NASA-GSFC
OI - R. RANATY NASA-GSFC
OI - B.J. TEEGARDEN NASA-GSFC
OI - A.S. JACOBSON NASA-JPL
OI - W.A. HANONEY NASA-JPL
OI - G.R. NIEGLER NASA-JPL
OI - L. KOCH CENS
OI - J.L. MATTESON U OF CALIF, SAN DIEGO
OI - M. LEVENTHAL BELL TELEPHONE LAB
OI - C.J. RACCALLUM SANDIA LABORATORIES

BRIEF DESCRIPTION
GAMMA RAYS ARE DETECTED IN THE ENERGY RANGE FROM 0.3 TO 10 MEV, BY A MOSAIC OF 18 COOLED HIGH-PURITY GERMANIUM SOLID-STATE COUNTERS. THE OBSERVATIONAL OBJECTIVES ARE: (1) MEASUREMENT OF GAMMA-RAY LINE INTENSITIES AND THEIR TIME EVOLUTION FROM DISCRETE GALACTIC AND EXTRAGALACTIC SOURCES, (2) MEASUREMENT OF SPECTRA AND TIME VARIATIONS OF CONTINUUM EMISSION FROM THESE AND OTHER DISCRETE SOURCES, (3) MEASUREMENT OF TRANSIENT LINE AND CONTINUUM EMISSION DUE TO TIME-VARYING PHENOMENA FROM OBJECTS SUCH AS X-RAY AND GAMMA-RAY BURST SOURCES AND PULSARS, (4) DETERMINATION OF THE EXTENT AND LUMINOSITY OF LINE AND CONTINUUM EMISSION FROM THE GALACTIC PLANE, AND (5) MEASUREMENT OF THE LINE AND CONTINUUM SPECTRA OF THE DIFFUSE COSMIC BACKGROUND. THESE OBSERVATIONS SHOULD BE USEFUL IN UNDERSTANDING ACCELERATION OF NUCLEONS AND ELECTRONS IN COSMIC PLASMAS, NUCLEOSYNTHESIS AND SUPERNOVAE EXPLOSIONS, ORIGIN AND PROPAGATION OF COSMIC RAYS IN OUR GALAXY, AND THE NATURE OF COMPACT STELLAR OBJECTS AND GALACTIC NUCLEI.

----- GAMMA-RAY OBSERVATORY, SCHONFELDER-----

INVESTIGATION NAME- IMAGING COMPTON TELESCOPE

NSSDC ID- GRO -05 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - V. SCHONFELDER MPI-EXTRATERR PHYS
OI - B.N. SWANENBURG U OF LEIDEN
OI - J.A. LOCKWOOD U OF NEW HAMPSHIRE
OI - B.G. TAYLOR ESA-ESTEC
OI - G. KANBACH MPI-EXTRATERR PHYS
OI - F. MELZNER MPI-EXTRATERR PHYS
OI - J.A.M. BLEEKER U OF LEIDEN
OI - A.J.M. DEERENBERG U OF LEIDEN

ORIGINAL PAGE IS
OF POOR QUALITY

01 - W. HERNSEN
01 - W.R. WEBBER
01 - K. BENNETT
01 - R.O. WILLS

U OF LEIDEN
U OF NEW HAMPSHIRE
ESA-ESTEC
ESA-ESTEC

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE INVESTIGATION EMPLOYS AN IMAGING COMPTON TELESCOPE THAT COVERS THE 1-TO 30-MEV ENERGY RANGE. THIS INSTRUMENT IS ABLE TO OVERCOME BACKGROUND PROBLEMS AND PROVIDE UNPRECEDENTED SENSITIVITY AND SPATIAL RESOLUTION. THE SCIENTIFIC OBJECTIVES OF THIS EXPERIMENT ARE: (1) STUDY OF INTENSITIES, SPECTRA, SPATIAL DISTRIBUTION OF LOCALIZED SOURCES TO AN INTENSITY ABOUT 1/50 OF THE CRAB NEBULA, (2) STUDY OF THE DIFFUSE GALACTIC EMISSION IN THE ENERGY RANGE WHERE ELECTROMAGNETIC PROCESSES ARE EXPECTED TO DOMINATE, (3) STUDY OF THE DIFFUSE COSMIC EMISSION, AND (4) STUDY OF BROADENED LINE EMISSION FROM EXCITED NUCLEI IN THE DIFFUSE GALACTIC EMISSION AND FROM LOCALIZED SOURCES, INCLUDING THE SUN, USING THE 1-SM-M NAI DETECTORS WITH AN ENERGY RESOLUTION OF ABOUT 10 PERCENT.

***** GMS-2 *****

SPACECRAFT COMMON NAME- GMS-2
ALTERNATE NAMES- GEOSTATION.METEORO.SAT.2

NSSDC ID- GMS-2

LAUNCH DATE- 08/00/81 WEIGHT- 647. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
JAPAN NASDA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 28.5 DEG
ORBIT PERIOD- 1440. MIN APOAPSIS- 36000. KM ALT
PERIAPSIS- 36000. KM ALT

PERSONNEL
PM - N. KODAIRA METEOROL SATELLITE CTR
PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GEOSTATIONARY METEOROLOGICAL SATELLITES (GMS) ARE JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ONE MAJOR OBJECTIVE OF GARP WAS TO OBTAIN SYNOPSIS GLOBAL METEOROLOGICAL DATA SETS FOR ONE YEAR'S DURATION (TO INCLUDE TWO OPTIMIZED OBSERVING PERIODS OF A FEW WEEKS EACH). THESE DATA WILL CONTINUE TO SERVE AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT WAS HOPED THAT DETERMINATION COULD BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT IS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE IS COVERED WITH SOLAR CELLS WHICH WILL PROVIDE 225 W. THE SATELLITE WILL BE SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE IS POSITIONED NEAR 140 DEG E AND DESIGNED TO OPERATE FOR 5 YEARS. THIS IS A FOLLOW-ON GMS TYPE SPACECRAFT TO BE LAUNCHED AND CONTROLLED BY NASDA OF JAPAN.

----- GMS-2, JMA STAFF -----

INVESTIGATION NAME- VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- GMS-2 -01 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE VISIBLE IR SPIN-SCAN RADIOMETER (VISSR) IS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1 AND GMS. IT WILL MAKE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR, PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30 MIN INTERVALS. THE VISIBLE CHANNEL HAD A RESOLUTION OF ABOUT 1.25 KM AND THE IR CHANNEL HAD A RESOLUTION OF ABOUT 5 KM AT NADIR. REAL-TIME TRANSMISSION IS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH ADDITIONAL DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEDED.

----- GMS-2, JMA STAFF -----

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- GMS-2 -03 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
COMMUNICATIONS

BRIEF DESCRIPTION

THE GMS-2 INCLUDES A COMMUNICATIONS FACILITY. THE OBJECTIVES OF THIS EQUIPMENT ARE (1) TO COLLECT AND RELAY WEATHER OBSERVATIONS FROM REMOTE STATIONS, INCLUDING BUOYS, SHIPS, AND UNMANNED STATIONS, AND (2) TO TRANSMIT WEATHER INFORMATION AND ANALYSES FROM THE CENTRAL WEATHER FACILITY TO OTHER WEATHER STATIONS.

----- GMS-2, KOHNO -----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- GMS-2 -02 INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. KOHNO METEOROL RES INST

BRIEF DESCRIPTION

THE SPACE ENVIRONMENT MONITOR (SEM) EXPERIMENT OBSERVES THE IN SITU CHARGED PARTICLE ENVIRONMENT. SOLAR PROTONS (1 TO 500 MEV), ALPHA PARTICLES (8 TO 390 MEV) AND SOLAR ELECTRONS (GREATER THAN 2 MEV) ARE DISCRIMINATED, AND THEIR RESPECTIVE ENERGIES MONITORED BY MEANS OF A NUMBER OF SOLID-STATE DETECTORS.

***** GOES-D *****

SPACECRAFT COMMON NAME- GOES-D
ALTERNATE NAMES-

NSSDC ID- GOES-D

LAUNCH DATE- 09/09/80 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHTL-SSUS

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 1. DEG
ORBIT PERIOD- 1440. MIN APOAPSIS- 35786. KM ALT
PERIAPSIS- 35786. KM ALT

PERSONNEL
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.M. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES-D IS THE FOURTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISSR (VISIBLE INFRARED SPIN SCAN RADIOMETER) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- GOES-D, NESS STAFF -----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS)

NSSDC ID- GOES-D -01

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF
OI - W.E. SNEEK

NOAA-NESS
NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) OPERATES IN THREE DISTINCT MODES TO PROVIDE PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC LOCATION, AND S/N RATIO. THE VISSR MODE IS THE SAME AS THE VISSR SYSTEM ON BOARD GOES 1, 2, 3. BOTH THE IR CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.95 TO 0.75 MICROMETERS) USE COMMON OPTICS. INCOMING RADIATION IS COLLECTED BY A RICHEY-CRISTIAN OPTICAL SYSTEM. THE SPINNING MOTION OF THE SPACECRAFT (100 RPM) PROVIDES A WEST TO EAST (W TO E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDES A NORTH TO SOUTH (N TO S) SCAN MOTION. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR NEXT IMAGE. EIGHT VISIBLE-SPECTRUM DETECTORS (0.9 KM HORIZONTAL RESOLUTION) AND ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9 HORIZONTAL RESOLUTION) SWEEP THE EARTH DURING EACH SCAN. THE DWELL-SOUNDING MODE USES UP TO 12 SPECTRAL FILTERS IN A WHEEL COVERING THE RANGE 678.7 PER CM (14.74 MICROMETERS) THROUGH 2555 PER CM (3.94 MICROMETERS) POSITIONED INTO THE OPTICAL TRAIN WHILE THE SCANNER IS DWELLING ON A SINGLE N TO S SCAN LINE. THE FILTER WHEEL CAN BE PROGRAMMED SO THAT EACH SPECTRAL BAND FILTER CAN DWELL ON A SINGLE SCAN LINE FOR FROM 0 TO 255 SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM RESOLUTION DETECTORS CAN BE SELECTED FOR THE SEVEN FILTER POSITIONS OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25 MICROMETERS) THROUGH 1487 PER CM (6.725 MICROMETERS). FOR THE REMAINING FIVE SPECTRAL BANDS THE 13.8-KM RESOLUTION DETECTORS ARE USED. SELECTABLE FRAME SIZE, POSITION AND SCAN DIRECTION ARE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS DEMONSTRATION, 10-BIT REDUCED RESOLUTION (3.5 KM) VISIBLE DATA ARE PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS, MULTIPLE-LINE DATA ARE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE (S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N TO S SCAN LINE POSITION ARE REQUIRED TO OBTAIN THE DESIRED SOUNDING DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL IMAGING (MSI) MODE CAN PROVIDE NORMAL VISSR IN IMAGING PLUS DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TAKES ADVANTAGE OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N TO S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY PRODUCES A COMPLETE INFRARED MAP WHEN THEY ARE OPERATED EVERY OTHER SCAN LINE. THIS ALLOWS USING THE LARGER DETECTORS DURING HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N TO S FRAME SIZE AND POSITION SELECTION, WITHIN THE MAXIMUM N TO S FOV SCAN DIRECTION, CAN BE SELECTED. VISIBLE DATA ARE NOT AVAILABLE IN THIS MODE SINCE THE VAS IS CONSTRAINED TO THE LDR SYSTEM. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL-TYPE DATA, THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING, SINCE WALLOPS ISLAND IS COMMITTED TO NOAA OPERATIONAL SUPPORT DATA FROM THE VAS MSI MODE AND THE DWELL SOUNDING MODE WILL NOT BE 'STRETCHED'.

----- GOES-D, NESS STAFF -----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-D -05

INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI - NESS STAFF

NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEPAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES-D, WILLIAMS -----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-D -02

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - H.W. SAUER

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE RANGE .GE. 500 KEV.

----- GOES-D, WILLIAMS -----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-D -03

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.J. WILLIAMS
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A-1.0E-13 J PER CM PER S AND 1 TO 8A, 1.0E-12 J PER CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-D, WILLIAMS -----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-D -04

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS
OI - J.W. BARFIELD

NOAA-ERL
SOUTHWEST RES INST

BRIEF DESCRIPTION

THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** GOES-E *****

SPACECRAFT COMMON NAME- GOES-E
ALTERNATE NAMES-

NSSDC ID- GOES-E

LAUNCH DATE- 03/12/81 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SMTLE-SSUS

SPONSORING COUNTRY/AGENCY
UNITED STATES
UNITED STATES

NOAA-NESS
NASA-OSTA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
PERIAPSIS- 35786. KM ALT

INCLINATION- 1. DEG
APOAPSIS- 35786. KM ALT

PERSONNEL

MG - A.J. CERVENKA
PM - R.H. PICKARD
PS - W.E. SNEEK

NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

GOES-E IS THE FIFTH IN A SERIES OF NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) ATMOSPHERIC SOUNDER (VAS) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR

X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURES 190.0 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALLS OF THE SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- GOES-E, NESS STAFF-----

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS)

NSDDC ID- GOES-E -01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
OI - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) OPERATES IN THREE DISTINCT MODES TO PROVIDE PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC LOCATION, AND SIGNAL-TO-NOISE (S/N) RATIO. THE VISSR MODE IS THE SAME AS THE VISSR SYSTEM ON BOARD GOES 1, 2, 3. BOTH THE IR CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.55 TO 0.75 MICROMETERS) USE COMMON OPTICS. INCOMING RADIATION IS COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SPINNING MOTION OF THE SPACECRAFT (100 RPM) PROVIDES A WEST TO EAST (W TO E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDES A NORTH TO SOUTH (N TO S) SCAN MOTION. A FULL PICTURE TAKES 19.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR NEXT IMAGE. EIGHT VISIBLE-SPECTRUM DETECTORS (0.9 KM HORIZONTAL RESOLUTION) AND ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9 HORIZONTAL RESOLUTION) SWEEP THE EARTH DURING EACH SCAN. THE DWELL-SOUNDING MODE USES UP TO 12 SPECTRAL FILTERS IN A WHEEL COVERING THE RANGE 678.7 PER CM (14.74 MICROMETERS) THROUGH 2555 PER CM (3.94 MICROMETERS) POSITIONED INTO THE OPTICAL TRAIN WHILE THE SCANNER IS DWELLING ON A SINGLE N TO S SCAN LINE. THE FILTER WHEEL CAN BE PROGRAMMED SO THAT EACH SPECTRAL BAND FILTER CAN DWELL ON A SINGLE SCAN LINE FOR FROM 0 TO 255 SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM RESOLUTION DETECTORS CAN BE SELECTED FOR THE SEVEN FILTER POSITIONS OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25 MICROMETERS) THROUGH 1487 PER CM (6.725 MICROMETERS). FOR THE REMAINING FIVE SPECTRAL BANDS THE 13.8-KM RESOLUTION DETECTORS ARE USED. SELECTABLE FRAME SIZE, POSITION AND SCAN DIRECTION ARE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS DEMONSTRATION, 10-BIT REDUCED RESOLUTION (3.5 KM) VISIBLE DATA IS PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS, MULTIPLE-LINE DATA ARE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE (S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N TO S SCAN LINE POSITION ARE REQUIRED TO OBTAIN THE DESIRED SOUNDING DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL IMAGING (MSI) MODE CAN PROVIDE NORMAL VISSR IR IMAGING PLUS DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TAKES ADVANTAGE OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N TO S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY PRODUCES A COMPLETE INFRARED MAP WHEN THEY ARE OPERATED EVERY OTHER SCAN LINE. THIS ALLOWS USING THE LARGER DETECTORS DURING HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N TO S FRAME SIZE AND POSITION SELECTION, WITHIN THE MAXIMUM N TO S FOV SCAN DIRECTION, CAN BE SELECTED. VISIBLE DATA ARE NOT AVAILABLE IN THIS MODE SINCE THE VAS IS CONSTRAINED TO THE LDR SYSTEM. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS WITH ALL OPERATIONAL-TYPE DATA, THE VISSR DATA ARE HANDLED BY NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING, SINCE WALLOPS ISLAND IS COMMITTED TO NOAA OPERATIONAL SUPPORT DATA FROM THE VAS MSI MODE AND THE DWELL SOUNDING MODE WILL NOT BE 'STRETCHED'.

----- GOES-E, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSDDC ID- GOES-E -05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WIFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO EXISTING SMALL, GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSDDC ID- GOES-E -02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - M.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .01. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .01. 500 KEV RANGE.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSDDC ID- GOES-E -03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER SQ CM PER S AND 1 TO 8A, 1.0E-12 J PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSDDC ID- GOES-E -04 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.W. BARFIELD SOUTHWEST RES INST

BRIEF DESCRIPTION

THE MAGNETOMETER WILL HAVE A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** GOES-F*****

SPACECRAFT COMMON NAME- GOES-F
ALTERNATE NAMES-

NSSDC ID- GOES-F

LAUNCH DATE- 09/16/82 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHTLE-SSUS

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 1. DEG
PERIAPSIS- 35786. KM ALT APOAPSIS- 35786. KM ALT

PERSONNEL
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
GOES-F IS THE SIXTH IN A SERIES OF NASA-DEVELOPED,
NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED,
EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE INFRARED
SPIN SCAN RADIOMETER (VISR) ATMOSPHERIC SOUNDER (VAS) TO
PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA, TO TAKE
RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, AND TO
DETERMINE ATMOSPHERIC TEMPERATURE AND WATER CONTENT AT VARIOUS
LEVELS, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION
SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES
TO SMALL AUTOMATIC PICTURE TRANSMISSION (APT)-EQUIPPED REGIONAL
STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTELY
LOCATED EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT
MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR
X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICAL SHAPED
SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH,
EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM
BEYOND THE CYLINDRICAL SHELL. THE PRIMARY STRUCTURAL MEMBERS
ARE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISR
TELESCOPE IS MOUNTED ON THE EQUIPMENT SHELF AND VIEWS THE EARTH
THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT
STRUCTURE EXTENDS RADIALLY FROM THE THRUST TUBE AND IS AFFIXED
TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALL OF THE
SPACECRAFT TO PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER.
LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE THRUST TUBE AND
THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL
EQUIPMENT, BATTERIES, AND MOST OF THE SEM EQUIPMENT. PROPER
SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE
MAINTAINED BY TWO SEPARATE SETS OF JET THRUSTERS MOUNTED AROUND
THE SPACECRAFT'S EQUATOR AND ACTIVATED BY GROUND COMMAND. THE
SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS
TELEMETRY AND COMMAND SUBSYSTEM. A LOW-POWER VHF TRANSDUCER
PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS
A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS
ATTAINED SYNCHRONOUS ORBIT.

***** GOES-F, NESS STAFF*****

INVESTIGATION NAME- VISIBLE-INFRARED SPIN SCAN RADIOMETER
ATMOSPHERIC SOUNDER (VAS)

NSSDC ID- GOES-F -01 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS
O1 - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE VISIBLE INFRARED SPIN-SCAN RADIOMETER ATMOSPHERIC
SOUNDER (VAS) OPERATES IN THREE DISTINCT MODES TO PROVIDE
PARAMETER FLEXIBILITY, SPECTRAL BAND SELECTION, GEOGRAPHIC
LOCATION, AND SIGNAL TO NOISE RATIO. THE VISR MODE IS THE
SAME AS THE VISR SYSTEM ON BOARD GOES 1, 2, 3. BOTH THE IR
CHANNEL (10.5 TO 12.5 MICROMETERS) AND VISIBLE CHANNEL (0.55 TO
0.75 MICROMETERS) USE COMMON OPTICS. INCOMING RADIATION IS
COLLECTED BY A RICHY-CHEYEN OPTICAL SYSTEM. THE SPINNING
MOTION OF THE SPACECRAFT (100 RPP) PROVIDES A WEST TO EAST (W
TO E) SCAN MOTION. SCAN MISSION TILT AFTER EACH SPIN PROVIDES
A NORTH TO SOUTH (N TO S) SCAN MOTION. A FULL PICTURE TAKES
18.2 MIN TO COMPLETE AND 2 MIN TO RESET FOR NEXT IMAGE. EIGHT
VISIBLE-SPECTRUM DETECTORS (0.9 KM HORIZONTAL RESOLUTION) AND
ONE MERCURY-CADMIUM TELLURIDE IR DETECTOR (6.9 HORIZONTAL
RESOLUTION) SWEEP THE EARTH DURING EACH SCAN. THE
DWELL-SOUNDING MODE USES UP TO 12 SPECTRAL FILTERS IN A WHEEL
COVERING THE RANGE 678.7 PER CM (14.74 MICROMETERS) THROUGH
2535 PER CM (3.94 MICROMETERS) POSITIONED ON TO THE OPTICAL
TRAIN WHILE THE SCANNER IS DWELLING ON A SINGLE N TO S SCAN
LINE. THE FILTER WHEEL CAN BE PROGRAMMED SO THAT EACH SPECTRAL
BAND FILTER CAN DWELL ON A SINGLE SCAN LINE FOR FROM 0 TO 255
SPACECRAFT SPINS. EITHER THE 6.9-KM OR 13.8-KM RESOLUTION
DETECTORS CAN BE SELECTED FOR THE SEVEN FILTER POSITIONS
OPERATING IN THE SPECTRAL REGION 701.6 PER CM (14.25
MICROMETERS) THROUGH 1487 PER CM (6.725 MICROMETERS). FOR THE
REMAINING FIVE SPECTRAL BANDS THE 13.8-KM RESOLUTION DETECTORS

ARE USED. SELECTABLE FRAME SIZE, POSITION AND SCAN DIRECTION
ARE ALSO PROGRAMMABLE VIA GROUND COMMAND. FOR THE VAS
DEMONSTRATION, 10-BIT REDUCED RESOLUTION (3.9KM) VISIBLE DATA
IS PROVIDED FOR IMAGING. IN SOME OF THE SPECTRAL REGIONS,
MULTIPLE-LINE DATA ARE REQUIRED TO ENHANCE THE SIGNAL-TO-NOISE
(S/N) RATIO. TYPICALLY, 167 SATELLITE SPINS AT THE SAME N TO S
SCAN LINE POSITION ARE REQUIRED TO OBTAIN THE DESIRED SOUNDING
DATA. THIS NUMBER OF SPINS PER LINE SHOULD BE ADEQUATE TO
OBTAIN SOUNDINGS HAVING A 30- X 30-KM RESOLUTION AND REQUIRE
APPROXIMATELY 1.9 MINUTES ON THE AVERAGE. THE MULTISPECTRAL
IMAGING (MSI) MODE CAN PROVIDE NORMAL VISIR IMAGING PLUS
DATA IN ANY TWO SELECTED SPECTRAL BANDS HAVING A SPATIAL
RESOLUTION OF 13.8 KM. THIS MODE OF OPERATION TAKES ADVANTAGE
OF THE SMALL MERCURY-CADMIUM TELLURIDE DETECTOR OFFSET IN THE N
TO S PLANE. USING THE DATA FROM THESE DETECTORS SIMULTANEOUSLY
PRODUCES A COMPLETE INFRARED MAP WHEN THEY ARE OPERATED EVERY
OTHER SCAN LINE. THIS ALLOWS USING THE LARGER DETECTORS DURING
HALF OF THE IMAGING/SCANNING SEQUENCE PERIOD TO OBTAIN
ADDITIONAL SPECTRAL INFORMATION. UNLIMITED N TO S FRAME SIZE
AND POSITION SELECTION, WITHIN THE MAXIMUM N TO S FOV SCAN
DIRECTION, CAN BE SELECTED. VISIBLE DATA ARE NOT AVAILABLE IN
THIS MODE SINCE THE VAS IS CONSTRAINED TO THE LDR SYSTEM. THE
VISIR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND
DATA ACQUISITION STATION, WALLOPS ISLAND, VA. THERE THE SIGNAL
IS FED INTO A 'LINE STRETCHER,' WHERE IT IS STORED AND
TIME-STRETCHED FOR TRANSMISSION BACK TO THE SATELLITE AT
REDUCED BANDWIDTH FOR REBROADCAST TO APT USER STATIONS. AS
WITH ALL OPERATIONAL-TYPE DATA, THE VISIR DATA ARE HANDLED BY
NOAA AND EVENTUALLY SENT TO THE NATIONAL CLIMATIC CENTER AT
ASHEVILLE, NORTH CAROLINA, FOR ARCHIVING. SINCE WALLOPS ISLAND
IS COMMITTED TO NOAA OPERATIONAL SUPPORT DATA FROM THE VAS MSI
MODE AND THE DWELL SOUNDING MODE WILL NOT BE 'STRETCHED'.

***** GOES-F, NESS STAFF*****

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND
TRANSMISSIONS SYSTEM

NSSDC ID- GOES-F -05 INVESTIGATIVE PROGRAM
CODE ED/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION
SYSTEM IS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING
SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA
COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION
(OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA ARE
RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED,
REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP
STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS
FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM
CENTRALIZED WEATHER FACILITIES TO SMALL GROUND-BASED APT
RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON
S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE
SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500
DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT
OF DATA COLLECTED DURING THE 6-H PERIOD IS BETWEEN 350K AND
600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED
FROM INDIVIDUAL STATIONS VARY FROM 50 TO 3000 BITS, DEPENDING
ON THE TYPE AND VARIETY OF SENSORS USED AT AN INDIVIDUAL DCP
STATION.

***** GOES-F, WILLIAMS*****

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-F -02 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
O1 - H.M. SAUER NOAA-ERL

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR
ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY
SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN
SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA
PARTICLES IN SIX RANGES BETWEEN 4 AND .67. 400 MEV. THERE IS
ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .6E.
500 KEV RANGE.

***** GOES-F, WILLIAMS*****

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-F -03 INVESTIGATIVE PROGRAM
CODE ED/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS
OI - R.F. DONNELLY

NOAA-ERL
NOAA-ERL

BRIEF DESCRIPTION

THE X-RAY MONITOR CONSISTS OF ION CHAMBER DETECTORS. THE RANGES AND MINIMUM USEFUL THRESHOLD SENSITIVITY ARE 0.5 TO 3A, 1.0E-13 J PER SQ CM PER S AND 1 TO 8A, 1.0E-12 J PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-F -04

INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS
OI - J.N. BARFIELD

NOAA-ERL
SOUTHWEST RES INST

BRIEF DESCRIPTION

THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 NT (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 NT OVER A RANGE OF PLUS OR MINUS 50 NT.

***** ICEX*****

SPACECRAFT COMMON NAME- ICEX
ALTERNATE NAMES- ICE + CLIMATE EXPERIMENT

NSSDC ID- ICEX-A

LAUNCH DATE- 10/00/85
LAUNCH SITE-
LAUNCH VEHICLE-

WEIGHT- KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 98.9 MIN
PERIAPSIS- 707.8 KM ALT

INCLINATION- 87. DEG
APOAPSIS- 707.8 KM ALT

PERSONNEL
PM - S.T. WILLIS

NASA-GSFC

BRIEF DESCRIPTION

THE ICE AND CLIMATE EXPERIMENT (ICEX) PROVIDES A TEST BED FOR EXPERIMENTAL AND APPLICATION REMOTE SENSORS TO MEASURE PARAMETERS OF THE EARTH'S CRYOSPHERE FOR RESEARCH IN ICE DYNAMICS, THE PROCESSES, AND CLIMATE; AND FOR MANAGEMENT/PLANNING OF OCEAN OPERATIONS OF PETROLEUM RESOURCE EXTRACTION AND OF WATER RESOURCES. THE ICEX SENSOR SYSTEM INCORPORATES BOTH ACTIVE AND PASSIVE INSTRUMENTS AND UTILIZES MANY BANDS OF THE ELECTROMAGNETIC SPECTRUM RANGING FROM RADIO FREQUENCIES TO VISIBLE LIGHT. THE ICEX SENSOR SYSTEM CONTAINS SIX REMOTE SENSING INSTRUMENTS: 1) LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMRA); 2) WIDE SWATH IMAGING RADAR (WSIR); 3) SCATTEROMETER (SCAT); 4) ICE ELEVATION ALTIMETER SYSTEM (IEAS); RADAR; 5) ICE ELEVATION ALTIMETER SYSTEM (IEAS); LASER; AND 6) POLAR ICE MAPPING RADIOMETER (PIMR). A DATA COLLECTION AND LOCATION SYSTEM (DCLS) IS INCLUDED ON THE ICEX MISSION TO ACCOMMODATE ICE SCIENCE AND APPLICATION REQUIREMENTS FOR IN SITU SURFACE MEASUREMENTS. THE DCLS IS COMPATIBLE WITH EXISTING DATA COLLECTION SYSTEM (DCS) ON BOARD PRESENT TIROS-N TYPE SPACECRAFT.

----- ICEX, BARATH-----

INVESTIGATION NAME- WIDE SWATH IMAGING RADIOMETER (WSIR)

NSSDC ID- ICEX-A -02

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - F.J. BARATH

NASA-JPL

BRIEF DESCRIPTION

THE WIDE SWATH IMAGING RADAR (WSIR) IS AN X-BAND (9.6 GHZ) IMAGING RADAR SYSTEM USING SYNTHETIC APERTURE RADAR TECHNIQUES TO OBTAIN HIGH-RESOLUTION RADAR IMAGERY. THE SYSTEM IS DESIGNED TO OBTAIN CONTINUOUS IMAGERY WITH A 360-KM SWATH AND A 100-M PIXEL SIZE FROM A 700-KM ORBIT. IN ADDITION, A 25-X 25-M PIXEL SIZE WITH A 90-KM SWATH WIDTH MAY ALSO BE SELECTED. THE SPACEBORNE PORTION OF THE RADAR SYSTEM CONSISTS OF A DUAL ANTENNA SUBSYSTEM AND A SENSOR SUBSYSTEM. EACH OF THE TWO ANTENNAS CONSISTS OF A PAIR OF 19-X 0.6-M PLANAR ARRAYS ORIENTED PARALLEL TO THE SPACECRAFT VELOCITY VECTOR. THEIR NORMAL AXES ARE FORESIGHTED AT ANGLES OF 28.6 AND 37.9 DEG TO THE LOCAL NADIR. ONE OF THE ANTENNA PAIRS IS ORIENTED TO THE RIGHT OF THE SPACECRAFT AND IMAGES ONE OF THE POLAR REGIONS. THE OTHER PAIR IS USED TO IMAGE THE OTHER POLE. THE FOV OF EACH ANTENNA ARRAY IS ABOUT 9.25 DEG AND THE TWO ARRAYS OF EACH PAIR ARE TIME SHARED TO GENERATE TWO 180-KM WIDE

CONTINUOUS SWATHS OF RADAR IMAGERY. A PROCESSOR ON THE GROUND MERGES THE TWO 180-KM IMAGES INTO A SINGLE CONTINUOUS-SWATH IMAGE. THE PULSED COHERENT RADAR SENSOR EMPLOYS LINEAR FM CODING (CHIRP) TO ACHIEVE HIGH-RANGE RESOLUTION. DIGITAL GROUND PROCESSING EFFECTIVELY (SYNTHETICALLY) ACHIEVES A HIGHER AZIMUTHAL RESOLUTION THAN WOULD BE EXPECTED FROM THE ANTENNA'S PHYSICAL SIZE. THE NOMINAL PEAK RADIATED POWER IS 4 KW AND IS EITHER APPROXIMATELY 900 OR 1050 HZ, DEPENDING ON THE ANTENNA USED. THE ANTENNA IN USE AND THE PRF ARE ALTERNATED EVERY 75 MS.

----- ICEX, BARNES-----

INVESTIGATION NAME- POLAR ICE MAPPING RADIOMETER (PIMR)

NSSDC ID- ICEN-A -05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - M.L. BARNES

NASA-GSFC

BRIEF DESCRIPTION

THE POLAR ICE MAPPING RADIOMETER (PIMR) IS A FIVE-CHANNEL SCANNING INFRARED RADIOMETER. IT HAS FOUR NEAR-INFRARED CHANNELS WHICH MEASURE REFLECTED SOLAR RADIATION IN SPECTRAL BANDS OPTIMIZED FOR THE STUDY OF CLOUDS, SNOW, AND ICE THE FIFTH CHANNEL, A THERMAL INFRARED CHANNEL AT 11 MICROMETERS, PROVIDES TEMPERATURE MAPS OF THE EARTH'S SURFACE WITH A RADIOMETRIC RESOLUTION OF 0.1 DEG K. THE PIXEL SIZE IS APPROXIMATELY 1 KM FOR THE THERMAL CHANNEL AND FOR ONE OF THE NEAR IR CHANNELS; IT IS 3 KM FOR THE REMAINING NEAR-IR CHANNELS. THE FIVE CHANNELS ARE CENTERED AT 0.754, 0.863, 1.14, 1.64, AND 11 MICROMETERS. THE FIRST CHANNEL (.754) HAS A VERY NARROW BANDPASS AND IS LOCATED ON THE EDGE OF AN OXYGEN ABSORPTION LINE. IT IS USED TO INFER THE ALTITUDE OF CLOUDTOPS. THE SECOND CHANNEL (.863) IS USED FOR FINE-RESOLUTION NEAR-IR IMAGES AND AS A REFERENCE FOR INTERPRETING THE OTHER CHANNELS. THE CHANNELS AT 1.14 AND 1.64 MICROMETERS ARE IMPORTANT FOR THE DIFFERENTIATION OF SNOW, CLOUD, AND ICE. CLOUDS HAVE A VERY HIGH REFLECTANCE IN ALL OF THE NEAR-IR CHANNELS. SNOW AND ICE HAVE RELATIVELY HIGH REFLECTANCES IN THE 0.754-MICROMETER CHANNELS AND LOW REFLECTANCES (TYPICALLY 0.1 TO 0.2) IN THE FOURTH CHANNEL. THE PI-MR IS A MODIFIED VERSION OF THE EXISTING AVHRR-2. IT HAS A 20-CM APERTURE AND USES A BERYLLIUM ELLIPTICAL SCAN MIRROR ROTATING AT 360 RPM. THE PI-MR REQUIRES A TWO-STAGE PASSIVE RADIANT COOLER TO OPERATE THREE OF THE IR DETECTORS AT A TEMPERATURE OF 105 DEG K.

----- ICEX, FITZMAURICE-----

INVESTIGATION NAME- ICE ELEVATION ALTIMETER SYSTEM (IEAS)

NSSDC ID- ICEX-A -04

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - M.W. FITZMAURICE
PI - J.T. MCGOOGAN
PI - M.F. TOWNSEND

NASA-GSFC
NASA-WFC
NASA-WFC

BRIEF DESCRIPTION

THE ICE ELEVATION ALTIMETER SYSTEM (IEAS) CONSISTS OF TWO COMPLEMENTARY SUBSYSTEMS: A RADAR ALTIMETER AND A LASER ALTIMETER/RANGEER. THE RADAR ALTIMETER IS A NADIR-DIRECTED SENSOR THAT GENERATES A CONTINUOUS PROFILE OF THE ICE AND PROVIDES MEASUREMENTS OF ICE TOPOGRAPHY, SURFACE SLOPE, AND ROUGHNESS. THE LASER SUBSYSTEM PERFORMS HIGH-PRECISION ALTIMETRY IN BOTH NADIR AND OFF-AXIS MODES, AND IT PRODUCES CORRELATIVE DATA USEFUL FOR CALIBRATING THE RADAR ALTIMETER AND FOR RESOLVING AMBIGUITIES. IN ADDITION, THE LASER CAN BE COMMANDED TO TRACK RETROREFLECTORS PLACED ON ICE SHEETS AND AT OTHER LOCATIONS THROUGHOUT THE WORLD. THIS WOULD PROVIDE DATA FOR BOTH ICE MOTION TRACKING AND ACCURATE ORBIT DETERMINATION. THE RADAR ALTIMETER DESIGN DRAWS HEAVILY UPON THE SEASAT ALTIMETER DESIGN. THE RADAR ALTIMETER OPERATES AT 13.5 GHZ. IT UTILIZES A PARABOLICAL REFLECTOR ANTENNA 2 M IN DIAMETER, WHICH PRODUCES A 3-DB GROUND FOOTPRINT THAT IS 9.3 KM IN DIAMETER. THE TRANSMITTER GENERATES CHIRPED 25.6-MICRO S PULSES WITH 20 W OF PEAK POWER. THE FREQUENCY MODULATION OF THE PULSES AND THE DIGITAL PROCESSING OF RETURNS ARE UNDER MICROPROCESSOR CONTROL WHICH CONTINUOUSLY OPTIMIZES THE RADAR ALTIMETER SYSTEM TO PROVIDE THE BEST HIGH RESOLUTION CONSISTENT WITH THE SURFACE TOPOGRAPHY. THE LASER SUBSYSTEMS OF THE IEAS OPERATE IN TWO MODES: (1) HIGH-PRECISION ON-NADIR ALTIMETRY, AND (2) CROSS-TRACK RANGING TO THE ICE SURFACE AND TO RETROREFLECTIVE TARGETS. IN THE ALTIMETER MODE, THE LASER ALTIMETER PROVIDES HEIGHT AND SURFACE-ROUGHNESS MEASUREMENTS. THE NDYAG LASER GENERATES SHORT (200 PS) PULSES OF 25 M ENERGY. IT OPERATES WITH A .532-MICROMETER WAVELENGTH AT A 10- TO 20-PS RATE. THE TRANSMITTED BEAM DIVERGENCE IS 20 ARC-SECONDS, WHICH FROM A 700-KM ALTITUDE PRODUCES A NADIR GROUND FOOTPRINT 70 M IN DIAMETER. THE RECEIVER USES 28-CM OPTICS AND TWO SENSORS: A CIRCULAR-SCAN STREAK TUBE WITH 40 PS TIMING PRECISION AND A COARSE-TIMING PHOTOMULTIPLIER WITH COUNTER. THE LATTER RESOLVES THE AMBIGUITIES OF THE STREAK TUBE. THE TIMING OF BOTH THE TRANSMITTED AND RECEIVED PULSES IS MEASURED BY THE SAME RECEIVER SYSTEM TO MINIMIZE MEASUREMENT BIASES. THE

SYSTEM WILL PROVIDE MEASUREMENTS OF AVERAGE SURFACE HEIGHT TO A 5- TO 10-CM ACCURACY. FOR THE CROSS-TRACK RANGING FUNCTION, A TWO-AXIS GIMBALED MIRROR POINTS THE BEAM OVER A WIDE FOV. POINTING ACCURACY OF BETTER THAN SIX ARC-SECONDS IS ACHIEVABLE USING 20-BIT ENCODERS TOGETHER WITH A SENSITIVE INTEGRAL SYNC PACKAGE AND PERIODIC ON-ORBIT CALIBRATIONS.

----- ICER, JONES, JR. -----

INVESTIGATION NAME- SCATTEROMETER (SCAT)
 NSSDC ID- ICER-A -03 INVESTIGATIVE PROGRAM CODE ED
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - W.L. JONES, JR. NASA-LARC
 PI - W.L. GRANTHAM NASA-LARC

BRIEF DESCRIPTION
 THE ICER SCATTEROMETER (SCAT) IS AN ACTIVE MICROWAVE INSTRUMENT FOR MEASURING THE NORMALIZED RADAR CROSS SECTION OF THE SURFACE IN THE POLAR REGIONS. THE BASIC SCATTEROMETER DESIGN IS AN UPGRADED VERSION OF THE SEASAT SCATTEROMETER. THE OPERATING FREQUENCY IS 14.6 GHZ. THE SCATTEROMETER GENERATES ACTIVE MEASUREMENTS THAT ARE COLOCATED WITH THE PASSIVE MEASUREMENTS OF THE LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMMR). THE DATA OBTAINED ALSO PROVIDE A LIBRARY OF THE NORMALIZED RADAR CROSS SECTION VERSUS INCIDENCE ANGLE FOR VARIOUS TYPES OF ICE SURFACE. THE SCATTEROMETERS ELECTRONICALLY-STEERABLE ANTENNAS WILL TOGETHER COVER A SWATH NEARLY 1500 KM WIDE, WITH RESOLUTION CELL SIZE OF 10 TO 25 KM. THE OVERLAPPING SWATH FROM SEQUENTIAL ORBITS WILL ENABLE MEASUREMENTS OF THE NORMALIZED RADAR CROSS SECTION OF THE SAME AREA AT UP TO FIVE DIFFERENT INCIDENCE ANGLES. THE BASIC SCATTEROMETER'S ANTENNAS ARE FIVE 3-M X 15-CM RODS, ORIENTED PARALLEL TO THE GROUND AT EITHER 90 OR 45 DEG TO THE SPACECRAFT VELOCITY VECTOR. THE PATTERN OF EACH ANTENNA IS AN ELECTRONICALLY STEERABLE NARROW FAN BEAM. RESOLUTION CELL SIZE IS UNDER SOFTWARE CONTROL. THE ANTENNA PATTERN PRODUCES A SWATH WIDTH OF 1400 KM, WHICH OVERLAPS BOTH THE LAMMR AND WSIR SWATHS.

----- ICER, KING -----

INVESTIGATION NAME- LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMMR)
 NSSDC ID- ICER-A -01 INVESTIGATIVE PROGRAM CODE ED
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - J.L. KING NASA-GSFC

BRIEF DESCRIPTION
 THE LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMMR) PROVIDES DUAL-POLARIZATION RADIOMETRIC MEASUREMENTS IN SEVEN FREQUENCY BANDS BETWEEN 1.4 AND 91 GHZ OVER A SWATH 1400 KM WIDE. ITS GROUND INSTANTANEOUS FIELD-OF-VIEW (FOV) VARIES BETWEEN 7 AND 103 KM, DEPENDING ON FREQUENCY. THE SENSOR CONSISTS OF SEVEN CHANNELS FEEDING A COMMON 3- TO 6-M ANTENNA. THE ANTENNA AXIS IS POINTED 45 DEG AWAY FROM NADIR. THE LAMMR SCAN IS PRODUCED BY ROTATING THE ENTIRE ANTENNA ABOUT THE NADIR AXIS. AN OFFSET CASSEGRAIN PARABOLOIDAL REFLECTOR ANTENNA DESIGN WAS SELECTED BECAUSE OF ITS COMPACT CONFIGURATION AND ITS ABILITY TO FUNCTION OVER A WIDE FREQUENCY RANGE WITH HIGH BEAM EFFICIENCY AND LOW RF LOSSES. THE CASSEGRAIN FEED DESIGN PLACES THE FEEDHORN CLUSTER AND ELECTRONICS PACKAGE NEAR THE DRIVE MECHANISM. THIS TENDS TO ALLEVIATE THE PROBLEM OF DYNAMICALLY BALANCING THE ESTIMATED 136 KG STRUCTURE, WHICH ROTATED AT ONE REV/S. THE RADIOMETERS ARE OPERATED DURING A 120 DEG SEGMENT OF THE 360-DEG SCAN WHICH IS CENTERED ON THE SPACECRAFT VELOCITY VECTOR. CALIBRATION OCCURS ONCE PER SCAN DURING 30 DEG OF THE REMAINING 240 DEG. EACH RADIOMETER CHANNEL CONTAINS TWO RECEIVERS, ONE FOR EACH POLARIZATION. EXCEPT FOR THE 1.4 GHZ CHANNEL, THE RECEIVERS ARE OF THE TOTAL POWER TYPE, AND CALIBRATION IS ACCOMPLISHED BY SWITCHING THE INPUTS ALTERNATELY TO AN AMBIENT LOAD AND COLD SKY HORN DURING THE CALIBRATION INTERVAL. THE 1.4 GHZ CHANNEL USES A NULL BALANCED NOISE INJECTION SYSTEM FOR CALIBRATION TO MINIMIZE WEIGHT AND VOLUME. THE RECEIVERS BELOW 18 GHZ ARE A TUNED RADIO FREQUENCY USING FIELD-EFFECT TRANSISTOR AMPLIFIERS. THE RECEIVERS (.67. 18 GHZ) USE BALANCED MIXERS FOLLOWED BY LOW-NOISE IF AMPLIFIERS. THIS APPROACH AND NEAR-STATE-OF-THE-ART DESIGN IS TO MEET THE EXTREME TEMPERATURE SENSITIVITY REQUIREMENTS (SIGNAL 1 DEG K) DEMANDED BY THE SHORT INTEGRATION TIMES ASSOCIATED WITH HIGH SURFACE RESOLUTION.

----- ICER, KING -----

INVESTIGATION NAME- DATA COLLECTION AND LOCATION SYSTEM (DCLS)

NSSDC ID- ICER-A -06 INVESTIGATIVE PROGRAM CODE ED
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - R.A. KING NASA-GSFC

BRIEF DESCRIPTION
 THE DATA COLLECTION AND LOCATION SYSTEM (DCLS) IS INCLUDED ON THE ICER MISSION TO ACCOMMODATE ICE SCIENCE AND APPLICATION REQUIREMENTS FOR IN SITU SURFACE MEASUREMENTS. THE DCLS SATISFIES REQUIREMENTS FOR BOTH DATA TRANSFER AND POSITION LOCATION OF REMOTE, UNATTENDED PLATFORMS AND BALLOONS. IN ADDITION, THE SYSTEM IS USED TO PROVIDE AN ESTIMATE OF THE VELOCITY OF PLATFORMS AVERAGED OVER A PERIOD OF APPROXIMATELY 100 MINUTES. DCLS IS GENERALLY RELATED TO THE NIMBUS/RAMS AND TIROS-N/RARGOS SYSTEMS. DCLS IS COMPATIBLE WITH EXISTING ARGOS PLATFORMS PRESENTLY USING THE TIROS-N DATA COLLECTION SYSTEM.

***** INSAT-1A*****

SPACECRAFT COMMON NAME- INSAT-1A
 ALTERNATE NAMES- INDIAN NATIONAL SAT.

NSSDC ID- INSAT-1
 LAUNCH DATE- 12/21/82 WEIGHT- KG
 LAUNCH SITE- BHIMARIKOTA (ANDHRA PRADESH), INDIA
 LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
 INDIA ISRO

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 1440. MIN INCLINATION- DEG
 PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
 PM - UNKNOWN UNKNOWN
 PS - UNKNOWN UNKNOWN

BRIEF DESCRIPTION
 THE INSAT-1 SATELLITE PROGRAM INCORPORATES TWO THREE-AXIS STABILIZED SPACECRAFT IN GEO-STATIONARY ORBIT (INSAT-1A AT 94 DEGREES E AND INSAT-1B AT 74 DEGREES E) WITH A HOST OF GROUND STATIONS THROUGHOUT INDIA. THE INSAT-1A SATELLITE, BUILT BY THE FORD AEROSPACE AND COMMUNICATIONS CORPORATION, PROVIDES A COMBINED TELECOMMUNICATIONS, DIRECT TV BROADCAST, AND METEOROLOGICAL SERVICE TO INDIA'S CIVILIAN COMMUNITY OVER A 7 YEAR IN-ORBIT LIFESPAN. THE TELECOMMUNICATIONS PACKAGE PROVIDES TWO-WAY LONG DISTANCE TELEPHONE CIRCUITS AND DIRECT RADIO AND TV BROADCASTING TO THE REMOTE AREAS OF INDIA. THE METEOROLOGY PACKAGE IS COMPRISED OF A SCANNING VERY HIGH RESOLUTION TWO-CHANNEL RADIOMETER (VHRR) TO PROVIDE FULL FRAME, FULL EARTH COVERAGE EVERY 30 MINUTES. THE VISUAL CHANNEL (0.55-0.75 MICROMETERS) HAS A 2.75 KM RESOLUTION WHILE THE IR (10.5-12.5 MICROMETERS) CHANNEL HAS AN 11 KM RESOLUTION. USING THE INSAT TV CAPABILITY, EARLY WARNINGS OF IMPENDING DISASTERS, I.E., FLOODS, STORMS, ETC., CAN DIRECTLY REACH THE CIVILIAN POPULATION IN REMOTE AREAS. THE INSAT-1A ALSO HAS A DATA CHANNEL FOR RELAYING METEOROLOGICAL, HYDROLOGICAL, AND OCEANOGRAPHIC DATA FROM UNATTENDED LAND-BASED OR OCEAN-BASED DATA COLLECTION AND TRANSMISSION PLATFORMS.

***** INSAT-1B*****

SPACECRAFT COMMON NAME- INSAT-1B
 ALTERNATE NAMES- INDIAN NATIONAL SAT.

NSSDC ID- INSAT1B
 LAUNCH DATE- 1983 WEIGHT- KG
 LAUNCH SITE-
 LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
 INDIA ISRO

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 1440. MIN INCLINATION- DEG
 PERIAPSIS- 36000. KM ALT APOAPSIS- 36000. KM ALT

PERSONNEL
 BRIEF DESCRIPTION
 THE INSAT-1 SATELLITE PROGRAM INCORPORATES TWO THREE-AXIS STABILIZED SPACECRAFT IN GEOSTATIONARY ORBIT (INSAT-1A AT 94 DEGREES E AND INSAT-1B AT 74 DEGREES E) WITH A HOST OF GROUND STATIONS THROUGHOUT INDIA. THE INSAT-1B SATELLITE, BUILT BY THE FORD AEROSPACE AND COMMUNICATIONS CORPORATION, PROVIDES A COMBINED TELECOMMUNICATIONS, DIRECT TV BROADCAST, AND METEOROLOGICAL SERVICE TO INDIA'S CIVILIAN COMMUNITY OVER A 7 YEAR IN-ORBIT LIFESPAN. THE TELECOMMUNICATIONS PACKAGE WILL PROVIDE TWO-WAY LONG-DISTANCE TELEPHONE CIRCUITS AND DIRECT RADIO AND TV BROADCASTING TO THE REMOTE AREAS OF INDIA. THE METEOROLOGY PACKAGE IS COMPRISED OF A SCANNING VERY HIGH RESOLUTION TWO-CHANNEL RADIOMETER (VHRR) TO PROVIDE FULL FRAME, FULL EARTH COVERAGE EVERY 30 MINUTES. THE VISUAL CHANNEL

(0.55-0.75 MICROMETERS) HAS A 2.75 KM RESOLUTION WHILE THE IR (10.5-12.5 MICROMETERS) CHANNEL HAS AN 11 KM RESOLUTION. USING THE INSAT-Y CAPABILITY, EARLY WARNINGS OF IMPENDING DISASTERS, I.E., FLOODS, STORMS, ETC., CAN DIRECTLY REACH THE CIVILIAN POPULATION EVEN IN REMOTE AREAS. THE INSAT-1B ALSO HAS A DATA CHANNEL FOR RELAYING METEOROLOGICAL, HYDROLOGICAL, AND OCEANOGRAPHIC DATA FROM UNATTENDED LAND-BASED OR OCEAN-BASED DATA COLLECTION AND TRANSMISSION PLATFORMS.

***** IR ASTRON. SAT.*****

SPACECRAFT COMMON NAME- IR ASTRON. SAT.
ALTERNATE NAMES- INFRA-RED ASTRONOMY SAT, IRAS

NSSDC ID- IRAS

LAUNCH DATE- 02/18/82 WEIGHT- 1000. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
THE NETHERLANDS NIVR
UNITED STATES NASA-OSS
UNITED KINGDOM SRC

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 99. DEG
ORBIT PERIOD- 103.1 MIN APOAPSIS- 900. KM ALT
PERIAPSIS- 900. KM ALT

PERSONNEL
PG - W.S. LOGAN, JR. NASA HEADQUARTERS
SC - N.W. BOGCESS NASA HEADQUARTERS
PM - E.K. CASANI NASA-JPL
PS - H.M. AUMANN NASA-JPL

BRIEF DESCRIPTION
THE INFRARED ASTRONOMICAL SATELLITE (IRAS) IS A MISSION WITH JOINT EXECUTION BY THE UNITED STATES (NASA), THE NETHERLANDS, AND THE UNITED KINGDOM. THE BASIC GOAL OF THIS PLANNED 1-YEAR MISSION IS TO OBTAIN A DEEP, FULL-SKY SURVEY OVER THE APPROXIMATE WAVELENGTH RANGE 8-300 MICROMETERS WITH FIVE BROAD-BAND PHOTOMETRY CHANNELS. THE IRAS CONTAINS A 0.6-METER RITCHIEY-CRUIKRIEN TELESCOPE COOLED BY HELIUM TO A TEMPERATURE OF NEAR 10 DEG K. AN ARRAY OF ABOUT 100 DETECTORS IS USED TO DETECT THE INFRARED FLUX IN BANDS CENTERED AT 10, 20, 30, AND 100 MICROMETERS. THE SENSITIVITY OF THE INSTRUMENT IS RESTRICTED BY THE PHOTON FLUCTUATIONS FROM THE ZODIACAL LIGHT. THE POSITIONS OF GALACTIC AND EXTRAGALACTIC SOURCES ARE DETERMINED TO AN ACCURACY OF 0.5 ARC MIN. IN ADDITION TO THE FOCAL-PLANE DETECTOR ARRAY USED FOR THE ALL-SKY SURVEY, BOTH A LOW-RESOLUTION SPECTROGRAPHIC AND A LONG-WAVELENGTH (GREATER THAN 100 MICROMETERS) PHOTOMETRIC CAPABILITY ARE INCLUDED ON THE IRAS. THE IRAS IS FLOWN IN A 900-KM ORBIT, WITH AN INCLINATION NEAR 99 DEG. TO EFFECT THE SCANNING OF THE SKY NEEDED FOR THE SURVEY, THE SATELLITE IS ROTATED AT A CONSTANT ANGULAR VELOCITY AROUND THE SUN VECTOR IN THE DIRECTION OF THE ORBITAL ANGULAR VELOCITY. THE IRAS IS ALSO ABLE TO DO POINTED OBSERVATIONS. HERE THE IRAS CAN BE POINTED AT A SELECTED CELESTIAL OBJECT FOR UP TO 17 MIN. THIS POINTING ABILITY PERMITS VERY SENSITIVE MEASUREMENTS ON THE FAINTER GALACTIC AND EXTRAGALACTIC SOURCES. THE SCIENCE WORKING GROUP IS LISTED IN APPENDIX B.

***** IRM*****

SPACECRAFT COMMON NAME- IRM
ALTERNATE NAMES- ION RELEASE MODULE, AMPTE/ION RELEASE MODULE

NSSDC ID- IRM

LAUNCH DATE- 09/15/83 WEIGHT- 600. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
FED REP OF GERMANY MPI

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC INCLINATION- 28.5 DEG
ORBIT PERIOD- 3102.3 MIN APOAPSIS- 127560. KM ALT
PERIAPSIS- 300. KM ALT

PERSONNEL
PM - U. JONELEIT DFVLR
PH - G.W. OUSLEY NASA-GSFC
PS - G. HAERENDEL MPI-EXTRATERR PHYS

BRIEF DESCRIPTION
THIS SPACECRAFT CARRIES SIX LI AND FOUR BA ION RELEASE CANNISTERS ALONG WITH A SUN SENSOR AND 3-AXIS MAGNETOMETER ATTITUDE DETERMINATION SYSTEM. THE POWER SYSTEM CONSISTS OF SOLAR PANELS TO PROVIDE 80 W, AND A BATTERY. THE SPACECRAFT SPIN STABILIZES AT 30 RPM. THE THERMAL SYSTEM EMPLOYS ACTIVE HEATERS AND MULTILAYER INSULATION. THE TELEMETRY SYSTEM IS A 0.5 W S-BAND TRANSMITTER. THE SCHOENSTEDT MAGNETOMETER IS SENSITIVE TO FIELDS FROM 0.5 TO 1.04 nT AND IS THE ONLY DETECTION INSTRUMENT ON BOARD. IONS RELEASED ARE TO BE DETECTED BY INSTRUMENTS ON THE CCE SPACECRAFT. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

***** IRM, HAERENDEL*****

INVESTIGATION NAME- LI AND BA RELEASE MODULE

NSSDC ID- IRP -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - G. HAERENDEL MPI-EXTRATERR PHYS
OI - H. FOPPL MPI-EXTRATERR PHYS
OI - B. HAUSLER MPI-EXTRATERR PHYS
OI - A. VALENZUELA MPI-EXTRATERR PHYS

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF SIX LI AND FOUR BA ION RELEASE CANNISTERS, CONTAINING A TOTAL OF 350 KG OF CHEMICALS. ONE LI RELEASE OF APPROXIMATELY 1.026 ATOMS, OCCURRING OUTSIDE THE MAGNETOSPHERE NEAR THE SUBSOLAR POINT, IS DETECTED INSIDE THE MAGNETOSPHERE BY INSTRUMENTS ON THE CCE SPACECRAFT. ADDITIONAL LI RELEASES, BA RELEASES, AND AN ARTIFICIAL COMET RELEASE WILL BE MADE AS THE ORBIT PRECESSES TO THE MAGNETOSPHERIC TAIL.

***** ISPR/ESA*****

SPACECRAFT COMMON NAME- ISPR/ESA
ALTERNATE NAMES- ISPR-B, ISP
INT SOLAR POLAR, SOLAR POLAR

NSSDC ID- ISPESA

LAUNCH DATE- 04/16/85 WEIGHT- 450. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC INCLINATION- 70. DEG
ORBIT PERIOD- 2020. DAYS APOAPSIS- 5.24 AU RAD
PERIAPSIS- 1.0 AU RAD

PERSONNEL
PM - D. EATON ESA-ESTEC
PS - K.P. WENZEL ESA-ESTEC

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE FOR TWO SPACECRAFT TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE, WHEN THE SEPARATION OF THE ESA AND THE NASA SPACECRAFT IS APPROXIMATELY 0.01 AU, AND MEASUREMENTS OF THE JOVIAN MAGNETOSPHERE DURING THE JUPITER FLYBY PHASE. THE TWO SPACECRAFT FOR THIS MISSION (ISPM/NASA AND ISPR/ESA) TRAVEL TO JUPITER WITH A CLOSE ENCOUNTER IN MAY 1988, THEN ONE SPACECRAFT IS PLACED INTO A NORTH TRAJECTORY (RELATIVE TO THE SOLAR ECLIPTIC) AND THE OTHER INTO A SOUTH TRAJECTORY. THE JUPITER ENCOUNTER TAKES BOTH SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, BOTH SPACECRAFT TRAVEL IN HELIOCENTRIC OUT OF ECLIPTIC ORBITS WITH HIGH HELIOGRAPHIC INCLINATION AND PASS OVER THE ROTATIONAL POLES OF THE SUN. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSIONS INCLUDE THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B.

***** ISPR/ESA, BAME*****

INVESTIGATION NAME- PLASMA SPECTROMETER

NSSDC ID- ISPESA -05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - S.J. BAME LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE AND ESTABLISH BULK FLOW PARAMETER AND INTERNAL STATE VARIATIONS OF THE SOLAR WIND AS A FUNCTION OF SOLAR LATITUDE; (2) INVESTIGATE RADIAL VARIATIONS OF SOLAR WIND PROPERTIES BETWEEN EARTH AND JUPITER; AND (3) INVESTIGATE THE SOLAR WIND INTERACTION WITH THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF TWO SENSOR SYSTEMS, ASSOCIATED ELECTRONICS, AND INTERFACES WITH THE SPACECRAFT. ELECTRONS ARE MEASURED BY A 125-DEG SPHERICAL SECTION ELECTROSTATIC ANALYZER WITH 7 CHANNEL ELECTRON MULTIPLIERS (CEM'S) WHICH COVER A POLAR ANGLE RANGE OF 146 DEG. THE ANALYZER IS ENCLOSED IN A LIGHT-TIGHT PACKAGE WITH AN ENTRANCE APERTURE OF 1 CM WIDTH.

THE GAP WIDTH IS 0.30 CM AND THE AVERAGE RADIUS OF CURVATURE IS 0.5 CM. THE ANALYZER HAS A GEOMETRIC FACTOR (G) OF 4.7×10^{-3} CM-SR. THE SOLAR WIND ION ANALYZER MAKES THREE-DIMENSIONAL MEASUREMENTS OF SOLAR WIND IONS WITH ENERGIES IN THE RANGE BETWEEN 297 EV AND 30 KEV PER CHARGE. IT CONSISTS OF A 130-DEG SPHERICAL SECTION ELECTROSTATIC ANALYZER FITTED WITH 17 CEP SENSORS WHICH COVER A POLAR ANGLE RANGE OF 80 DEG. IT IS MOUNTED SO THAT ONE EDGE OF ITS POLAR ANGLE OF ACCEPTANCE IS PARALLEL TO THE SPIN AXIS. A STEPPING MOTOR IS USED TO ROTATE ANY ONE OF SEVEN APERTURES INTO PLACE. THE MASS OF THE ELECTRON INSTRUMENT IS 2.39 KG. IT USES 2 W MEAN AND 3 W PEAK, AND HAS A DATA RATE OF 20 BPS IN CRUISE MODE AND 40 BPS IN TRACKING MODE. THE MASS OF THE ION INSTRUMENT IS 4.62 KG. IT USES 4 W MEAN AND 10 W PEAK, AND HAS A DATA RATE OF 90 BPS IN CRUISE MODE AND 100 BPS IN TRACKING MODE.

----- ISPM/ESA, HEDGECOCK-----

----- ISPM/ESA, HEDGECOCK-----

INVESTIGATION NAME- MAGNETIC FIELD
 NSSDC ID- ISPESA -08 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS

PERSONNEL
 PI - P.C. HEDGECOCK IMPERIAL COLLEGE

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE THE STRENGTH AND GEOMETRY OF THE INTERPLANETARY MAGNETIC FIELD IN THE INNER HELIOSPHERE (PARTICULARLY AT HIGH SOLAR LATITUDES) AND TO INVESTIGATE THE HELIOGRAPHIC LATITUDE DEPENDENCE OF THE FIELD FLUCTUATION SPECTRA WITH SPECIAL EMPHASIS ON THE FREQUENCY RANGE BELOW 0.01 MZ. SECONDARY OBJECTIVES ARE TO STUDY THE INTERNAL DYNAMICS OF THE SOLAR WIND; THE ROLE OF DISCONTINUITIES AND WAVES IN THE INTERPLANETARY FIELD ON PROPAGATION AND ACCELERATION OF ENERGETIC PARTICLES; THE INTERPLANETARY PROPAGATION AND DEVELOPMENT OF DISCONTINUITIES AND WAVES; AND THE STRUCTURE AND DYNAMICS OF THE DUSK REGION OF THE JOVIAN MAGNETOSPHERE. THE INSTRUMENT CONSISTS OF A TRIAXIAL FLUXGATE MAGNETOMETER, A VECTOR HELIUM MAGNETOMETER, A BOOM, AND ASSOCIATED ELECTRONICS. THE INSTRUMENT HAS A MASS OF 4.58 KG EXCLUDING THE BOOM. IT HAS A DATA RATE OF 40 BPS IN THE CRUISE MODE AND 80 BPS IN THE TRACKING MODE. IT USES 3.22 W OF POWER.

----- ISPM/ESA, ESPOSITO-----

INVESTIGATION NAME- RADIO SCIENCE
 NSSDC ID- ISPESA -09 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS
 SOLAR PHYSICS

PERSONNEL
 PI - P.D. ESPOSITO NASA-JPL
 TM - H.E. VOLLAND U OF BONN
 TM - D. BERTOTTI U OF PAVIA
 TM - P.S. CALLAHAN NASA-JPL

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO UTILIZE THE ISPM/ESA SPACECRAFT AND THE NASA DEEP SPACE NETWORK FOR DIFFERENT STUDIES CONDUCTED BY INDIVIDUAL MEMBERS OF THE RADIO SCIENCE TEAM. STUDIES INCLUDE THE FOLLOWING: (1) DETERMINE THE CORONAL, INTEGRATED ELECTRON DENSITY AND THE GLOBAL CORONAL ELECTRON DENSITY AS A FUNCTION OF HELIOCENTRIC RADIAL DISTANCE AND LATITUDE; (2) INVESTIGATE THE MAGNITUDE AND LOCATION OF CHANGES IN THE ELECTRON DENSITY ALONG THE LINE OF SIGHT TO DETERMINE THE STRUCTURE AND TIME HISTORY OF DENSITY FLUCTUATIONS IN THE SOLAR WIND; AND (3) DETERMINE THE VELOCITY OF THE SOLAR WIND CLOSE TO THE SUN, AND DETERMINE THE STRUCTURE OF THE CORONAL ELECTRON DENSITY CLOSE TO THE SUN. IN ADDITION, THERE ARE SEVERAL OTHER INVESTIGATIONS WHICH ARE UNDER STUDY.

----- ISPM/ESA, MURLEY-----

INVESTIGATION NAME- SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST

NSSDC ID- ISPESA -01 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 GAMMA-RAY ASTRONOMY
 X-RAY ASTRONOMY

PERSONNEL
 PI - K.C. MURLEY CESR
 OI - M.K. SOMNER MPI-EXTRATERM PHYS

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ACCELERATION AND STORAGE OF ENERGETIC ELECTRONS ACCELERATED DURING SOLAR FLARES BY MEASURING SOLAR X-RADIATION; TO IDENTIFY GAMMA-RAY BURST SOURCES WITH KNOWN CELESTIAL OBJECTS OR PHENOMENA; AND TO STUDY PLASMA AND ENERGETIC CHARGED PARTICLE PROCESSES IN THE JOVIAN MAGNETOSPHERE. THIS INVESTIGATION IS SIMILAR TO THE NASA EXPERIMENT ISPM/NASA-02 (CLINE). THE INSTRUMENT CONSISTS OF TWO HEMISPHERICAL CESIUM IODIDE (IODIUM) CRYSTALS COUPLED TO TWO CURVED CATHODE PHOTOMULTIPLIERS; TWO SMALL SOLID-STATE DETECTORS CLOSE TO THE TWO CRYSTALS, WITH AN AMERICIUM 241 RADIOACTIVE SOURCE DEPOSITED ON THE SURFACES OF THE SOLID-STATE DETECTORS; ONE PROPORTIONAL COUNTER; AND A DIGITAL ELECTRONICS UNIT. THE SCINTILLATION COUNTERS MEASURE X RAYS IN THE ENERGY RANGE FROM 15 KEV TO 150 KEV, WHILE THE PROPORTIONAL COUNTER MEASURES X RAYS FROM 5 KEV TO 15 KEV. THE SOLID-STATE DETECTORS ARE USED TO CALIBRATE THE SCINTILLATORS. IN ADDITION THEY ACT AS BACKUP DETECTORS IN CASE OF A SCINTILLATION COUNTER FAILURE. THE INSTRUMENT HAS A MASS OF 11.17 KG, USES 11.2 W MEAN AND 11.7 W PEAK POWER, AND HAS A DATA RATE OF 80 BPS IN CRUISE MODE AND 160BPS IN TRACKING MODE.

----- ISPM/ESA, GLOECKLER-----

INVESTIGATION NAME- SOLAR-WIND COMPOSITION SPECTROMETER
 NSSDC ID- ISPESA -04 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS
 PARTICLES AND FIELDS

PERSONNEL
 PI - G. GLOECKLER U OF MARYLAND
 OI - J. GLISS U OF BERNE

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS INVESTIGATION IS TO STUDY THE ELEMENTAL AND IONIC-CHARGE COMPOSITION AND THE TEMPERATURES AND MEAN SPEEDS OF ALL MAJOR SOLAR WIND IONS FROM HIGH THROUGH FE. THE INSTRUMENT CONSISTS OF A DEFLECTION ASSEMBLY, HIGH VOLTAGE BUBBLE CONTAINING ANALOG ELECTRONICS, A POST-ACCELERATION 30 KV SUPPLY, A POINTING DEVICE, AND ELECTRONICS FOR DATA PROCESSING AND POWER CONVERSION. THE INSTRUMENT HAS A MASS OF 4.5 KG, USES 3.6 W MEAN AND 11.6 W PEAK POWER, AND HAS A DATA RATE OF 45 BPS IN CRUISE MODE AND 86 BPS IN TRACKING MODE.

----- ISPM/ESA, LANZEROTTI-----

INVESTIGATION NAME- HELIOSPHERE

NSSDC ID- ISPESA -03 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS

PERSONNEL
 PI - L.J. LANZEROTTI BELL TELEPHONE LAB

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE THE SOLAR FLARE PROCESS WITH MEASUREMENTS OF NON-RELATIVISTIC AND RELATIVISTIC ELECTRONS, AND NON-RELATIVISTIC IONS, AND THEIR DEPENDENCE ON HELIOLATITUDE; (2) INVESTIGATE SOLAR ELEMENTAL ABUNDANCES WITH MEASUREMENTS OF CHEMICAL AND ISOTOPIC COMPOSITION OF NUCLEI OF SOLAR ORIGIN AT ALL HELIOLATITUDES; (3) INVESTIGATE THE INTERPLANETARY PROPAGATION OF SOLAR ENERGETIC PARTICLES BY MEASUREMENT OF ANISOTROPY AND COMPOSITION PARAMETERS; (4) INVESTIGATE ACCELERATION PROCESSES; AND (5) INVESTIGATE TEMPORAL AND SPATIAL VARIATIONS OF PARTICLE INTENSITY IN AND NEAR THE JOVIAN MAGNETOSPHERE. THE INSTRUMENTATION CONSISTS OF THREE SENSORS. THE PRIMARY DETECTOR MEASURES PROTONS AND IONS AT LOW ENERGIES (.5 TO 20 KEV) WITH A GEOMETRY FACTOR (G) OF APPROXIMATELY 0.5×10^{-3} CM-SR. A RARE EARTH ALLOY MAGNET DEFLECTS ELECTRONS WITH ENERGIES .17, 400 KEV AWAY FROM THE PRIMARY DETECTOR TO SENSOR 2. THE OUTPUT IS FED INTO WINDOW-TYPE DISCRIMINATORS WHICH

----- ISPM/ESA, GRUN-----

INVESTIGATION NAME- COSMIC DUST
 NSSDC ID- ISPESA -07 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 DUST

PERSONNEL
 PI - E. GRUN MPI-NUCLEAR PHYS

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO INVESTIGATE PARTICULATE MATTER WITH MASSES BETWEEN 1×10^{-16} G AND 1×10^{-7} G IN THE HELIOSPHERE; DETERMINE ITS PHYSICAL AND DYNAMICAL PROPERTIES AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE; AND INVESTIGATE ITS INTERACTION WITH OTHER INTERPLANETARY/INTERSTELLAR PHENOMENA SUCH AS SOLAR RADIATION, SOLAR WIND, HELIOSPHERIC MAGNETIC FIELD, AND INTERSTELLAR NEUTRAL GAS. THIS INSTRUMENT COMPRISES A SENSOR WITH CHANNELTRON AND ASSOCIATED ELECTRONICS SUCH AS PREAMPLIFIERS, SIGNAL CONDITIONERS, AND SPACECRAFT INTERFACE UNITS. THE INSTRUMENT HAS A MASS OF 2.7 KG AND USES 1.5 W OF POWER. THE DATA RATE IS 3 BPS.

PROVIDE 7 PROTON-ION DIFFERENTIAL ENERGY CHANNELS IN THE RANGE FROM 0.02 MEV TO 5.0 MEV. THE OUTPUT IS ALSO PULSE HEIGHT ANALYZED IN SECTORS. SENSOR 2 PROVIDES UNIQUE IDENTIFICATION OF LOW ENERGY (.07, 15 KEV) ELECTRONS, WITH A G APPROXIMATELY EQUAL TO 0.05 SR CM-SS. FOUR DIFFERENTIAL ENERGY CHANNELS PROVIDE OUTPUTS OVER THE 16 KEV TO 200 KEV ENERGY RANGE. SENSOR 3 IS BEHIND A NICKEL-FOIL SHIELD, WITH A VIEW DIRECTION OPPOSITE TO SENSOR 2. THE FOIL STOPS PROTONS UP TO APPROXIMATELY 0.3 MEV, BUT ALLOWS PENETRATION OF LOW-ENERGY ELECTRONS. ELECTRONS ARE DETECTED FROM 30 KEV TO 400 KEV. PROTONS FROM 0.45 MEV TO 5.0 MEV. THE INSTRUMENT HAS A MASS OF 3.7 KG, A 4 W POWER USAGE, AND A DATA RATE OF 80 BPS IN CRUISE MODE AND 176 BPS IN TRACKING MODE.

----- ISPM/ESA, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY AND CHARGED PARTICLE

NSSDC ID- ISPEA-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - J.A. SIMPSON U OF CHICAGO

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO STUDY THE ENERGY, CHARGE, AND MASS SPECTRA OF ENERGETIC CHARGED PARTICLES IN INTERPLANETARY SPACE IN THE ENERGY RANGE FROM APPROXIMATELY 0.5 MEV/NUCLEON (FOR PROTONS) TO APPROXIMATELY 100 MEV/NUCLEON; AND TO STUDY SPATIAL GRADIENTS AND THE PROPAGATION OF CHARGED PARTICLES THROUGHOUT THE HELIOSPHERE BY MEASURING ABSOLUTE FLUX AND VECTOR ANISOTROPY. THE INSTRUMENT CONSISTS OF SIX CHARGED PARTICLE TELESCOPES (CPT) AND ASSOCIATED ELECTRONICS. THE HIGH ENERGY TELESCOPE PROVIDES MEASUREMENTS OF THE CHEMICAL AND ISOTOPIC COMPOSITION AND OF THE ENERGY SPECTRUM OF THE COSMIC RADIATION ABOVE APPROXIMATELY 10 MEV/NUCLEON. THE LOW ENERGY TELESCOPE (LET) EXTENDS CHEMICAL COMPOSITION AND SPECTRAL MEASUREMENTS DOWNWARDS TO .16, 1 MEV/NUCLEON. THE ANISOTROPY TELESCOPE, IN CONJUNCTION WITH THE LET, PROVIDE A MEANS OF DETERMINING THE DISTRIBUTION OF ARRIVAL DIRECTIONS IN THREE DIMENSIONS OF LOW ENERGY PROTONS AND HE NUCLEI. THE HIGH FLUX TELESCOPE PROVIDES MEASUREMENTS OF THE INTENSITY AND ARRIVAL DIRECTION OF PROTONS, HELIUM, CNO, AND FE GROUP NUCLEI IN HIGH FLUX ENVIRONMENTS, SUCH AS INTENSE SOLAR FLARES OR JUPITER'S MAGNETOSPHERE, WHERE THE OTHER SENSOR SYSTEMS MAY BECOME SATURATED. EACH CPT PROVIDES OUTPUT TO A DATA PROCESSING UNIT (DPU). THE ELECTRON TELESCOPE CONSISTS OF A ONE DOUBLE CERENKOV AND SEMICONDUCTOR DETECTOR TELESCOPE WHICH INTERFACE WITH THE DPU. THE INSTRUMENT HAS A MASS OF 11.17 KG AND USES 11.2 W MEAN AND 11.7 W PEAK POWER. THE DATA RATE IS 80 BPS IN CRUISE MODE AND 160 BPS IN TRACKING MODE.

----- ISPM/ESA, STONE-----

INVESTIGATION NAME- UNIFIED RADIO AND PLASMA WAVE

NSSDC ID- ISPEA-06 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) INVESTIGATE SOURCE POSITIONS OF TRAVELLING SOLAR RADIO BURSTS IN THE RANGE FROM DC TO 1 MHZ; (2) INVESTIGATE THE LARGE-SCALE MAGNETIC FIELD TOPOLOGY AND THE ELECTRON DENSITY ALONG THE EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE AT DISTANCES OF 0.1 AU TO APPROXIMATELY 5 AU; (3) INVESTIGATE JOVIAN RADIO SOURCE LOCATIONS IN THE RANGE FROM DC TO 1 MHZ; AND (4) INVESTIGATE WAVES IN THE PLASMA BETWEEN DC AND 30 KHZ, THEIR INSTABILITIES, THEIR ENERGY TRANSPORT MECHANISMS, AND THE THERMAL ELECTRON DENSITY. THIS INVESTIGATION OPERATES IN CONJUNCTION WITH THE SIMILAR INVESTIGATION ISPM/NASA-05 (STONE). THE INSTRUMENT COMPRISES THREE ANTENNA SYSTEMS (A 70-M TIP-TO-TIP DIPOLE IN THE EQUATORIAL PLANE, A MONOPOLE ALONG THE SPIN AXIS, AND A PAIR OF CROSSED-AXIS MAGNETIC SEARCH COILS LOCATED IN THE EQUATORIAL PLANE) AND FOUR RECEIVER SYSTEMS (AN RF RECEIVER FOR 5 KHZ TO 1 MHZ IN TWO INTERVALS FROM 5 TO 30 KHZ AND FROM 30 KHZ TO 1 MHZ; A PLASMA FREQUENCY RECEIVER COVERING FROM 0.8 KHZ TO 30 KHZ IN 32 CONTIGUOUS INTERVALS; A FAST ENVELOPE SAMPLER 0.2 KHZ TO 40 KHZ WITH FOUR COMMANDABLE DECADE RANGES TO CAPTURE TRANSIENT EVENTS; AND A WAVE FORM ANALYZER, DC TO 1 KHZ, THAT OPERATES IN TWO FREQUENCY BANDS, FROM DC TO 10 KHZ AND FROM 10 KHZ TO 1 KHZ). THE INSTRUMENT HAS A MASS OF 2.86 KG, EXCLUDING ANTENNAS AND BOOMS, AND HAS A DATA RATE OF 116 BPS. IT USES 0.22 W OF POWER.

***** ISPM/NASA*****

SPACECRAFT COMMON NAME- ISPM/NASA
ALTERNATE NAMES- ISPM-A, ISP
INT SOLAR POLAR, SOLAR POLAR

NSSDC ID- ISPNASA

LAUNCH DATE- 03/27/85 WEIGHT- 450. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSD

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC INCLINATION- 70. DEG
ORBIT PERIOD- 2020. DAYS APDAPSIS- 5.24 AU RAD
PERIAPSIS- 1.0 AU RAD

PERSONNEL
PI - R.G. McDONALD NASA HEADQUARTERS
PM - H.W. MORRIS NASA-JPL

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVES OF THE INTERNATIONAL SOLAR POLAR MISSION (ISPM) ARE FOR TWO SPACECRAFT TO INVESTIGATE, AS A FUNCTION OF SOLAR LATITUDE, THE PROPERTIES OF THE SOLAR CORONA, THE SOLAR WIND, THE STRUCTURE OF THE SUN-WIND INTERFACE, THE HELIOSPHERIC MAGNETIC FIELD, SOLAR AND NON-SOLAR COSMIC RAYS, SOLAR RADIO BURSTS AND PLASMA WAVES, AND THE INTERSTELLAR/INTERPLANETARY NEUTRAL GAS AND DUST. SECONDARY OBJECTIVES INCLUDE INTERPLANETARY PHYSICS INVESTIGATIONS DURING THE INITIAL EARTH-JUPITER PHASE, WHEN THE SEPARATION OF THE ESA AND THE NASA SPACECRAFT IS APPROXIMATELY 0.01 AU, AND MEASUREMENTS OF THE JOVIAN MAGNETOSPHERE DURING THE JUPITER FLYBY PHASE. THE TWO SPACECRAFT FOR THIS MISSION (ISPM/NASA AND ISPM/ESA) TRAVEL TO JUPITER WITH A CLOSE ENCOUNTER IN MAY 1984. THEN ONE SPACECRAFT IS PLACED INTO A NORTH TRAJECTORY (RELATIVE TO THE SOLAR ECLIPTIC) AND THE OTHER INTO A SOUTH TRAJECTORY. THE JUPITER ENCOUNTER TAKES BOTH SPACECRAFT JUST INSIDE IO'S ORBIT. AFTER JUPITER FLYBY, BOTH SPACECRAFT TRAVEL IN HELIOCENTRIC OUT OF ECLIPTIC ORBITS WITH HIGH HELIOGRAPHIC INCLINATION AND PASS OVER THE ROTATIONAL POLES OF THE SUN. SPACECRAFT DESIGN IS STILL UNDER STUDY. A JOINT NASA/ESA RADIO SCIENCE TEAM CONDUCTS INDIVIDUAL INVESTIGATIONS IN ADDITION TO THE SEPARATE EXPERIMENTS. THE MISSIONS INCLUDE THEORETICAL AND INTERDISCIPLINARY INVESTIGATIONS. THE SCIENTISTS FOR THESE INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- ISPM/NASA, ACUNA-----

INVESTIGATION NAME- MAGNETIC FIELD (MAG)

NSSDC ID- ISPNASA-05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - R.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION (MAG) IS TO MEASURE THE JOVIAN AND INTERPLANETARY VECTOR MAGNETIC FIELD TO INVESTIGATE THE LARGE-SCALE THREE-DIMENSIONAL STRUCTURE OF THE HELIOSPHERIC FIELD, ITS SOLAR ORIGIN, AND ITS SMALL-SCALE CHARACTERISTICS. THE MAG HAS A TIME RESOLUTION OF UP TO 20 VECTORS/S, A PRECISION OF 0.025 PERCENT, AN ACCURACY OF 0.12 NT, A SENSITIVITY OF 0.004 NT, AND A DYNAMIC RANGE OF PLUS OR MINUS 4,096 NT. MAG USES A TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED NEAR THE TIP OF A BOOM WITH AN INWARD SENSOR MOUNTED ABOUT HALFWAY TO TWO-THIRDS ALONG THE BOOM LENGTH. NORMAL DATA MODE IS 1 VECTOR/S WITH AN AUTOMATIC SWITCH TO 20 VECTORS/S BASED ON THE CHARACTERISTICS OF DATA OBSERVED IN THE PRECEDING PERIOD OF TIME. THE INSTRUMENT HAS A MASS OF 3.12 KG, USES 1.5 W OF POWER, AND HAS A BIT RATE OF 11 TO 220 BPS IN CRUISE MODE AND 26 TO 520 BPS IN TRACKING MODE. 20 VECTOR DATA ARE STORED FOR LATER (SLOWER) TRANSMISSION.

----- ISPM/NASA, CLINE-----

INVESTIGATION NAME- SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SXR)

NSSDC ID- ISPNASA-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
GAMMA-RAY ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL
PI - T.L. CLINE NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (IHR) ARE TO STUDY THE ACCELERATION, STORAGE AND ESCAPE PROCESSES OF ENERGETIC ELECTRONS IN SOLAR FLARES, TO IDENTIFY THE SOURCE OBJECTS OF COSMIC GAMMA-RAY BURST AND TO SEARCH FOR JOVIAN X-RAYS. THIS INVESTIGATION IS SIMILAR TO THE ESA EXPERIMENT ISPH/ESA-01 (MURLET). THE INVESTIGATION USES TWO HEMISPHERICAL SCINTILLATION SHELLS MOUNTED ON TWO PHOTOMULTIPLIER TUBES THAT PROVIDE INPUT TO A PROPORTIONAL COUNTER FOR LOWER ENERGY SENSITIVITY. THE GAIN, TRIGGER COMPARATOR, CALIBRATION TRIGGER, AND A FOUR-LEVEL SPECTRAL ANALYZER ARE COMMANDABLE. THE INSTRUMENT HAS A MASS OF 1.4 KG, USES 1.2 W OF POWER, AND HAS A DATA RATE OF 12 BPS.

----- ISPH/NASA, GIESE -----

INVESTIGATION NAME- ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE)

NSSDC ID- ISPNASA-06 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
ASTRONOMY
ZODIACAL LIGHT

PERSONNEL
PI - R.W. GIESE RUHR-U BOCHUM

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (ZLE) ARE TO STUDY THE MULTICOLOR (INCLUDING UV) BRIGHTNESS AND POLARIZATION OF REMOTE LIGHT SOURCES (INTEGRATED STARLIGHT, DIFFUSE GALACTIC LIGHT) AND OF THE LIGHT SCATTERED BY THE INTERPLANETARY DUST CLOUD AS A FUNCTION OF ECLIPTIC LATITUDE AND HELIOCENTRIC DISTANCE. THE ZLE USES A SENSOR WITH A STRAY LIGHT SHIELD AND ELECTRONICS. THE SENSOR CONSISTS OF OPTICS, A BEAMSPLITTER, AND 2 PHOTOMULTIPLIER TUBES AS DETECTORS. INTERFERENCE FILTERS IN EACH CHANNEL PROVIDE SPECTRAL INFORMATION IN UP TO 8 CHANNELS. THERE ARE POLARIZATION WHEELS IN EACH LIGHT PATH WITH FOUR SETTINGS. THE INSTRUMENT DIVIDES THE SKY INTO EITHER 32 OR 64 EQUAL SECTORS FOR MEASURING ANGULAR DISTRIBUTION. AND DATA ARE INTEGRATED OVER 25 TO 250 REVOLUTIONS. THE INSTRUMENT HAS A MASS OF 6.8 KG WITH A DATA RATE OF 36 TO 90 BPS IN CRUISE MODE.

----- ISPH/NASA, MACQUEEN -----

INVESTIGATION NAME- WHITE-LIGHT CORONAGRAPH/X-RAY HUV TELESCOPE (CXH)

NSSDC ID- ISPNASA-01 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.W. MACQUEEN HIGH ALTITUDE OBS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (CXH) ARE TO IMAGE THE SOLAR ATMOSPHERE FROM THE CHROMOSPHERE TO THE OUTER CORONA OVER A WIDE RANGE OF ALTITUDES AND SOLAR LATITUDES, OBTAIN THREE-DIMENSIONAL STRUCTURE OF THE SOLAR CORONA, INVESTIGATE THE CORONAL INFLUENCE ON THE SOLAR WIND, AND INVESTIGATE THE RELATION BETWEEN THE CORONA AND UNDERLYING PHENOMENA. THE CORONAGRAPH USES A FOUR-FILTER POSITION WHEEL WITH THREE POLARIZATION FILTERS AND ONE OPEN POSITION. THE INSTRUMENT HAS A 450 TO 650 NM SPECTRAL SENSITIVITY WITH A 10- TO 20-ARC-S RESOLUTION. THE FULL DUTY CYCLE IS FOUR PICTURES, EACH 800 BY 800 PIXELS. THE X-RAY HUV TELESCOPE IS A WOLTER TYPE 1 GRazing INCIDENCE SYSTEM WITH 17 FILTER POSITIONS. THE SPECTRAL SENSITIVITY IS FROM 0.3 TO 6 NP AND 17.1 TO 95 NM WITH 4 4-ARC-S RESOLUTION. EACH IMAGE IS 800 BY 800 PIXELS. THERE ARE NINE BANDPASS FILTERS. THE INSTRUMENT HAS A MASS OF 8.1 KG AND USES 4.0 W CONTINUOUS WITH 0.5 W AT PEAK. THE DATA RATE IS 1.6 BT BITS PER DAY NOMINAL TO 6.4 BT BITS PER DAY.

----- ISPH/NASA, ROSENBAUER -----

INVESTIGATION NAME- MASS SEPARATING SOLAR WIND (MSW)

NSSDC ID- ISPNASA-04 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - H.D. ROSENBAUER MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (MSW) IS TO STUDY SOLAR WIND PHENOMENOLOGY IN THREE DIMENSIONS BY MEASURING ION AND ELECTRON VELOCITY, ANGLES, AND MASS PER CHARGE. IT USES TWO SEPARABLE SENSOR SYSTEMS: AN ION MASS/CHARGE SPECTROMETER WITH A MECHANICAL STEPPING OF THE FOV, 11 DETECTORS, AND A RESOLUTION OF VELOCITY AND MASS/CHARGE OF ABOUT 20 PERCENT; AND AN ELECTROSTATIC ANALYZER WITH AN ENERGY THRESHOLD OF 0.5 EV, 7 DETECTORS, AND MEASUREMENTS IN 64 BANDS BETWEEN 6 EV AND 1600 EV. THE INSTRUMENT HAS A MASS OF 6.05 KG, USES 3.0 W OF POWER, AND HAS A PIT RATE OF 90 BPS DURING CRUISE MODE AND 500 TO 1000 BPS DURING TRACKING MODE.

----- ISPH/NASA, ROSENBAUER -----

INVESTIGATION NAME- DIRECT MEASUREMENT OF INTERSTELLAR GAS USING NE AS TRACER (DMG)

NSSDC ID- ISPNASA-07 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - H.R. ROSENBAUER MPI-AERONOMY

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (DMG) ARE TO STUDY THE TEMPERATURE, BULK VELOCITY, AND DENSITY OF INTERSTELLAR GAS IN THE VICINITY OF THE SOLAR SYSTEM. THE INVESTIGATION USES A CHANNEL ELECTRON MULTIPLIER CHANNELTUBION TO AMPLIFY AND COUNT SECONDARY ELECTRONS PRODUCED BY A LITHIUM FLUORIDE (LiF) PLANE SURFACE WHICH IS HEATED TO EVAPORATE AND PROVIDE FRESH LAYERS OF LiF AT INTERVALS. THIS SURFACE ALSO DETECTS HE ATOMS. A MECHANICAL COLLIMATOR SUPPRESSES CHARGED PARTICLES AND PHOTOELECTRONS. A STEPPING MOTOR PROVIDES AUTOMATIC SCANNING. THE INSTRUMENT USES 0.91 W STEADY AND 1.5 W PEAK POWER. THE BIT RATE IS 1 TO 2 BPS.

----- ISPH/NASA, STONE -----

INVESTIGATION NAME- COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA)

NSSDC ID- ISPNASA-03 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - E.C. STONE CALIF INST OF TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION (CPA) IS TO MEASURE ELEMENTAL COMPOSITION, ENERGY SPECTRA, AND ANGULAR DISTRIBUTIONS OF PARTICLES. THE PARTICLE ENERGY RANGE IS 40 KEV/NUCLEON THROUGH 400 MEV/NUCLEON. THE ISOTOPIC COMPOSITION IS MEASURED OVER THE ENERGY LEVELS 0.1 MEV/NUCLEON THROUGH 64 MEV/NUCLEON FOR H AND HE, 13 MEV/NUCLEON THROUGH 400 MEV/NUCLEON FOR FE, AND 30 KEV TO 120 MEV FOR ELECTRONS. OTHER OBJECTIVES ARE: (1) STUDY SPECTRAL DIFFERENCES AND STREAMING PATTERNS AT HIGH SOLAR LATITUDES; (2) INVESTIGATE THE ORIGIN OF THE LOW-ENERGY COSMIC RAY COMPONENT; (3) STUDY LATITUDE-DEPENDENT ACCELERATION MECHANISMS; (4) STUDY HELIOSPHERIC PROPAGATION OF JOVIAN ELECTRONS; AND (5) STUDY THE ORIGIN, ACCELERATION, AND BEHAVIOR OF ENERGETIC PARTICLES IN THE JOVIAN MAGNETOSPHERE. FIVE SENSOR SYSTEMS MOUNTED AS A SINGLE UNIT ARE USED. THEY ARE A MASS SPECTROMETER TELESCOPE, A PROTON-ELECTRON TELESCOPE, A LOW-ENERGY ION TELESCOPE, A SOLAR ELECTRON AND PROTON SYSTEM, AND A SUPRATHERMAL ENERGETIC PARTICLE SYSTEM. THE INSTRUMENT PACKAGE HAS A MASS OF 11.7 KG, USES 0.83 W POWER, AND HAS A BIT RATE OF 180 BPS IN CRUISE MODE AND 360 BPS IN TRACKING MODE.

----- ISPH/NASA, STONE -----

INVESTIGATION NAME- ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE)

NSSDC ID- ISPNASA-05 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL
PI - R.G. STONE NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION (RAE) ARE TO TRACK SOLAR RADIO BURSTS USING TRIANGULATION TO DETERMINE SOURCE LOCATION, MONITOR LARGE SCALE MAGNETIC FIELD TOPOLOGY AND ELECTRON DENSITY ALONG EXCITER TRAJECTORY AS A FUNCTION OF HELIOGRAPHIC LATITUDE AND LONGITUDE, AND TO DETERMINE JOVIAN RADIO SOURCE LOCATIONS. DATA ARE USED IN CONJUNCTION WITH ISPH/ESA-06 (ALSO STONE). THE INVESTIGATION USES A 100-M TIP-TO-TIP DIPOLE ANTENNA MOUNTED IN THE EQUATORIAL PLANE OF THE SPINNING SECTION AND ASSOCIATED ELECTRONICS. THE RF RECEIVER HAS A LOW PASS BAND OF 5 TO 30 MHz AND A HIGH PASS BAND OF 30MHz TO 1 MHz. IT SAMPLES IN 16 CHANNELS. THE MASS OF THE INSTRUMENT IS 1.68 KG (INCLUDING THE ANTENNA), POWER CONSUMPTION IS 1.06 W, AND THE DATA RATE IS 21.33 BPS.

***** LANDSAT *****

SPACECRAFT COMMON NAME- LANDSAT-D
ALTERNATE NAMES- LFO-A

NSSDC ID- LAND-D

LAUNCH DATE- 03/31/82 WEIGHT- 1407. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY NASA-OSTA
UNITED STATES

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.3 MIN INCLINATION- 98.2 DEG
PERIAPSIS- 705. KM ALT APOAPSIS- 705. KM ALT

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - J.R. MORRISON NASA HEADQUARTERS
PM - E.E. SPEAKER NASA-GSFC
PS - V.V. SALOMONSON NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT-D SYSTEM IS AN EXPERIMENTAL EARTH RESOURCES MONITORING SYSTEM WITH THE NEW POWERFUL REMOTE SENSING CAPABILITIES OF THE THEMATIC MAPPER (TM) AND PROVIDES A TRANSITION FOR BOTH FOREIGN AND DOMESTIC USERS FROM THE MULTISPECTRAL SCANNER (MSS) DATA (WHICH WILL ALSO BE PART OF THE INSTRUMENT PACKAGE) TO THE HIGHER RESOLUTION AND DATA RATE OF THE TM. IT HAS A COMPLETE END-TO-END HIGHLY AUTOMATED DATA SYSTEM, WHICH IS DESIGNED TO BE A NEW GENERATION SYSTEM, AND IS A MAJOR STEP FORWARD IN GLOBAL REMOTE-SENSING APPLICATIONS. THE LANDSAT-D MISSION CONSISTS OF AN ORBITING SATELLITE (SPACE SEGMENT) WITH THE NECESSARY WIDEBAND DATA LINKS AND SUPPORT SYSTEMS, AND A GROUND SEGMENT. THE LANDSAT-D SPACE SEGMENT CONSISTS OF TWO MAJOR SYSTEMS: (1) THE INSTRUMENT MODULE, CONTAINING THE INSTRUMENTS TOGETHER WITH THE MISSION UNIQUE SUBSYSTEMS, SUCH AS THE SOLAR ARRAY AND DRIVE, THE TDRS ANTENNA, THE WIDE-BAND MODULE (WBM), AND THE GLOBAL POSITIONING SYSTEM (GPS); AND (2) THE MULTIMISSION MODULAR SPACECRAFT (MMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER, PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-D SATELLITE IS LAUNCHED, IT IS DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 19-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185-KM TM AND MSS SENSORS SWATH WIDTH, PROVIDES AN OVERLAP OF 7.6 PERCENT. THE SPACE SEGMENT IS DESIGNED WITH 3 YEARS NOMINAL LIFE TIME IN ORBIT AND CAN BE EXTENDED THROUGH IN-ORBIT REPLACEMENT CAPABILITY WHEN THE SHUTTLE IS OPERATIONAL. THE SPACECRAFT AND ATTENDANT SENSORS WILL BE OPERATED THROUGH THE TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS).

----- LANDSAT-D, BANKS -----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)
NSSDC ID- LAND-D -02 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - G.F. BANKS NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT D MULTISPECTRAL SCANNER (MSS) PROVIDES REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION IS TO PROVIDE AN ALTERNATE DATA TO THE THEMATIC MAPPER (TM), IT PROVIDES DATA IN AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY. THE MSS SYSTEM IS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE, FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTS OF A DOUBLE REFLECTION-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATES IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETERS, BAND 2 - 0.6 TO 0.7 MICROMETERS, BAND 3 - 0.8 TO 0.9 MICROMETERS, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, PROVIDES NIGHTTIME SENSING CAPABILITIES. LANDSAT D MSS IS SIMILAR TO LANDSAT 3 MSS EXCEPT FOR CHANGES NECESSARY TO ACCOMMODATE THE LOWER ORBITAL ALTITUDE. THE SWATH WIDTH OF 195 KM WILL REMAIN THE SAME BY INCREASING THE FOV OF THE SENSORS FROM 11.56 TO 14.92 DEG. THE GROUND RESOLUTION WILL BE 82.6 M FOR BANDS 1 THROUGH 4 AND 248 M FOR BAND 5. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE IS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL IS ACCOMPLISHED. OPTICAL FILTERS PRODUCE SPECTRAL SEPARATION. SIX DETECTORS ARE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 3 USE PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USES SILICON PHOTOIODES, AND BAND 5 USES MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSES THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA ARE TIME-MULTIPLEXED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA ARE TRANSMITTED DIRECTLY TO AN ACQUISITION STATION VIA THE TDRSS. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND

ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT-D, FEINBERG -----

INVESTIGATION NAME- GLOBAL POSITIONING SYSTEM (GPS)
NSSDC ID- LAND-D -03 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - P.M. FEINBERG NASA-GSFC

BRIEF DESCRIPTION
THE GLOBAL POSITIONING SYSTEM (GPS) IS A DEPARTMENT OF DEFENSE (DOD) PROGRAM TO PROVIDE VERY PRECISE POSITION AND TIMING INFORMATION TO A VARIETY OF USERS. THE GPS ASSEMBLY ON LANDSAT-D OPERATES IN TWO PHASES. THE FIRST PHASE (APPROXIMATELY 90 DAYS) IS AN EXPERIMENTAL ONE TO VALIDATE AND CALIBRATE THE POSITION AND TIMING INFORMATION PROVIDED BY THE GPS ASSEMBLY. THE SECOND PHASE CALLS FOR OPERATIONAL USE OF THE GPS DATA BY LANDSAT-D.

----- LANDSAT-D, WEINSTEIN -----

INVESTIGATION NAME- THEMATIC MAPPER
NSSDC ID- LAND-D -01 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - O. WEINSTEIN NASA-GSFC

BRIEF DESCRIPTION
THE THEMATIC MAPPER (TM) IS A SEVEN-BAND, EARTH-LOOKING, SCANNING RADIOMETER WITH A 30-M GROUND ELEMENT RESOLUTION COVERING A 185-KM GROUND SWATH FROM A 705-KM ALTITUDE. THE INSTRUMENT CONSISTS OF PRIMARY IMAGING OPTICS, SCANNING MECHANISM, SPECTRAL BAND DISCRIMINATION OPTICS, DETECTOR ARRAYS, RADIATIVE COOLER, IN-FLIGHT CALIBRATOR, AND REQUIRED OPERATING AND PROCESSING ELECTRONICS. THE SCANNING MECHANISM PROVIDES THE CROSS-TRACK SCAN WHILE THE PROGRESS OF THE SPACECRAFT PROVIDES THE SCAN ALONG THE TRACK. THE OPTICAL SYSTEM IMAGES THE EARTH'S SURFACE ON A FIELD STOP OR A DETECTOR SIZED TO DEFINE AN AREA ON THE EARTH'S SURFACE 30 M SQ. SEVERAL LINES ARE SCANNED SIMULTANEOUSLY TO PERMIT SUITABLE DWELL TIME FOR EACH RESOLUTION ELEMENT. THE VARIATION IN RADIANT FLUX PASSING THROUGH THE FIELD STOP ONTO THE PHOTO AND THERMAL DETECTORS CREATES AN ELECTRICAL OUTPUT THAT REPRESENTS THE RADIANT HISTORY OF THE LINE. SEVEN SPECTRAL BANDS ARE USED TO PROVIDE THE SPECTRAL SIGNATURE CAPABILITY OF THE INSTRUMENT. THE INFORMATION OUTPUTS FROM THE DETECTOR CHANNELS ARE PROCESSED IN THE TM MULTIPLEXER FOR TRANSMISSION VIA THE TRACKING AND DATA RELAY SATELLITES (TDRS) AND/OR DIRECT READOUT TO LOCAL RECEIVING STATIONS.

***** LANDSAT-D1*****

SPACECRAFT COMMON NAME- LANDSAT-D1
ALTERNATE NAMES- LAND SATELLITE-E

NSSDC ID- LAND-E
LAUNCH DATE- 1983 WEIGHT- 1407. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY NASA-OSTA
UNITED STATES

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.3 MIN INCLINATION- 98.2 DEG
PERIAPSIS- 705.3 KM ALT APOAPSIS- 705.3 KM ALT

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - J.R. MORRISON NASA HEADQUARTERS
PM - E.E. SPEAKER NASA-GSFC
PS - V.V. SALOMONSON NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT-E SYSTEM IS AN EXPERIMENTAL EARTH RESOURCES MONITORING SYSTEM WITH THE NEW POWERFUL REMOTE SENSING CAPABILITIES OF THE THEMATIC MAPPER (TM) AND PROVIDES A TRANSITION FOR BOTH FOREIGN AND DOMESTIC USERS FROM THE MULTISPECTRAL SCANNER (MSS) DATA (WHICH WILL ALSO BE PART OF THE INSTRUMENT PACKAGE) TO THE HIGHER RESOLUTION AND DATA RATE OF THE TM. IT HAS A COMPLETE END-TO-END HIGHLY AUTOMATED DATA SYSTEM, WHICH IS DESIGNED TO BE A NEW GENERATION SYSTEM, AND IS A MAJOR STEP FORWARD IN GLOBAL REMOTE-SENSING APPLICATIONS. THE LANDSAT-E MISSION CONSISTS OF AN ORBITING SATELLITE (SPACE SEGMENT) WITH THE NECESSARY WIDEBAND DATA LINKS AND SUPPORT SYSTEMS, AND A GROUND SEGMENT. THE LANDSAT-E SPACE SEGMENT

CONSISTS OF TWO MAJOR SYSTEMS -- (1) THE INSTRUMENT MODULE, CONTAINING THE INSTRUMENTS TOGETHER WITH THE MISSION UNIQUE SUBSYSTEMS, SUCH AS THE SOLAR ARRAY AND DRIVE, THE TDRS ANTENNA, THE WIDE-BAND MODULE (WBM), AND THE GLOBAL POSITIONING SYSTEM (GPS), AND (2) THE MULTIMISSION MODULAR SPACECRAFT (MMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER, PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-E SATELLITE IS LAUNCHED, IT IS DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 19-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185 KM TM AND MSS SENSORS SWATH WIDTH, PROVIDES AN OVERLAP OF 7.6 PERCENT. THE SPACE SEGMENT IS DESIGNED WITH 3 YEARS NOMINAL LIFE-TIME IN ORBIT AND CAN BE EXTENDED THROUGH IN-ORBIT REPLACEMENT CAPABILITY WHEN THE SHUTTLE IS OPERATIONAL. THE SPACECRAFT AND ATTENDANT SENSORS WILL BE OPERATED THROUGH THE TRACKING AND DATA RELAY SATELLITE SYSTEM (TDRSS).

----- LANDSAT-D1, BANKS-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)
NSSDC ID- LAND-E -02 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - G.F. BANKS NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT E MULTISPECTRAL SCANNER (MSS) PROVIDES REPETITIVE DAY/NIGHT ACQUISITION OF HIGH-RESOLUTION MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS. WHILE ITS PRIMARY FUNCTION IS TO PROVIDE AN ALTERNATE DATA TO THE THEMATIC MAPPER (TM), IT PROVIDES DATA IN AREAS SUCH AS AGRICULTURE, FORESTRY, GEOLOGY, AND HYDROLOGY. THE MSS SYSTEM IS ALSO USED FOR OCEANOGRAPHIC AND METEOROLOGICAL PURPOSES, I.E., TO MAP SEA-ICE FIELDS, LOCATE AND TRACK MAJOR OCEAN CURRENTS, MONITOR BOTH AIR AND WATER POLLUTION, DETERMINE SNOW COVER, INVESTIGATE SEVERE STORM ENVIRONMENTS, ETC. THE MSS CONSISTS OF A DOUBLE REFLECTION-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATES IN THE FOLLOWING SPECTRAL INTERVALS -- BAND 1 - 0.5 TO 0.6 MICROMETERS, BAND 2 - 0.6 TO 0.7 MICROMETERS, BAND 3 - 0.7 TO 0.8 MICROMETERS, BAND 4 - 0.8 TO 1.1 MICROMETERS, AND BAND 5 - 10.4 TO 12.6 MICROMETERS. THIS LAST BAND, WHICH LIES IN THE THERMAL (EMISSIVE) PART OF THE SPECTRUM, PROVIDES NIGHTTIME SENSING CAPABILITIES. LANDSAT D MSS IS SIMILAR TO LANDSAT 3 MSS EXCEPT FOR CHANGES NECESSARY TO ACCOMMODATE THE LOWER ORBITAL ALTITUDE. THE SWATH WIDTH OF 185 KM WILL REMAIN THE SAME BY INCREASING THE FCV OF THE SENSORS FROM 11.56 TO 14.92 DEG. THE GROUND RESOLUTION WILL BE 83.6 M FOR BANDS 1 THROUGH 4 AND 248 M FOR BAND 5. THE PRIMARY IMAGE PRODUCED AT THE IMAGE PLANE IS RELAYED BY USE OF FIBER-OPTIC BUNDLES TO DETECTORS WHERE CONVERSION TO AN ELECTRONIC SIGNAL IS ACCOMPLISHED. OPTICAL FILTERS PRODUCE SPECTRAL SEPARATION. SIX DETECTORS ARE EMPLOYED IN EACH OF THE FIRST FOUR SPECTRAL BANDS AND TWO IN THE FIFTH BAND -- BANDS 1 THROUGH 3 USE PHOTOMULTIPLIER TUBES AS DETECTORS, BAND 4 USES SILICON PHOTODIODES, AND BAND 5 USES MERCURY-CADMIUM-TELLURIDE DETECTORS. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSES THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA ARE TIME-MULTIPLEXED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA ARE TRANSMITTED DIRECTLY TO AN ACQUISITION STATION VIA THE TDSS. DATA FROM THIS EXPERIMENT ARE HANDLED BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD, AND ARE AVAILABLE TO APPROVED INVESTIGATORS THROUGH ITS LANDSAT USERS SERVICES. ALL OTHER INTERESTED INDIVIDUALS ARE TO OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

----- LANDSAT-D1, FEINBERG-----

INVESTIGATION NAME- GLOBAL POSITIONING SYSTEM (GPS)
NSSDC ID- LAND-E -03 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - P.M. FEINBERG NASA-GSFC

BRIEF DESCRIPTION
THE GLOBAL POSITIONING SYSTEM (GPS) IS A DEPARTMENT OF DEFENSE (DOD) PROGRAM TO PROVIDE VERY PRECISE POSITION AND TIMING INFORMATION TO A VARIETY OF USERS. THE GPS ASSEMBLY ON LANDSAT-E OPERATES IN TWO PHASES. THE FIRST PHASE (APPROXIMATELY 90 DAYS) IS AN EXPERIMENTAL ONE TO VALIDATE AND CALIBRATE THE POSITION AND TIMING INFORMATION PROVIDED BY THE GPS ASSEMBLY. THE SECOND PHASE CALLS FOR OPERATIONAL USE OF THE GPS DATA BY LANDSAT-D.

----- LANDSAT-D1, WEINSTEIN-----

INVESTIGATION NAME- THEMATIC MAPPER
NSSDC ID- LAND-E -01 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
METEOROLOGY

PERSONNEL
PI - O. WEINSTEIN NASA-GSFC

BRIEF DESCRIPTION
THE THEMATIC MAPPER (TM) IS A SEVEN-BAND, EARTH-LOOKING, SCANNING RADIOMETER WITH A 30-M GROUND ELEMENT RESOLUTION COVERING A 185-KM GROUND SWATH FROM A 705-KM ALTITUDE. THE INSTRUMENT CONSISTS OF PRIMARY IMAGING OPTICS, SCANNING MECHANISM, SPECTRAL BAND DISCRIMINATION OPTICS, DETECTOR ARRAYS, RADIATIVE COOLER, IN-FLIGHT CALIBRATOR, AND REQUIRED OPERATING AND PROCESSING ELECTRONICS. THE SCANNING MECHANISM PROVIDES THE CROSS-TRACK SCAN WHILE THE PROGRESS OF THE SPACECRAFT PROVIDES THE SCAN ALONG THE TRACK. THE OPTICAL SYSTEM IMAGES THE EARTH'S SURFACE ON A FIELD STOP OR A DETECTOR SIZED TO DEFINE AN AREA ON THE EARTH'S SURFACE 30-M SQ. SEVERAL LINES ARE SCANNED SIMULTANEOUSLY TO PERMIT SUITABLE DWELL TIME FOR EACH RESOLUTION ELEMENT. THE VARIATION IN RADIANT FLUX PASSING THROUGH THE FIELD STOP ONTO THE PHOTO AND THERMAL DETECTORS CREATES AN ELECTRICAL OUTPUT THAT REPRESENTS THE RADIANT HISTORY OF THE LINE. SEVEN SPECTRAL BANDS ARE USED TO PROVIDE THE SPECTRAL SIGNATURE CAPABILITY OF THE INSTRUMENT. THE INFORMATION OUTPUTS FROM THE DETECTOR CHANNELS ARE PROCESSED IN THE TM MULTIPLEXER FOR TRANSMISSION VIA THE TRACKING AND DATA RELAY SATELLITES (TDRS) AND/OR DIRECT READOUT TO LOCAL RECEIVING STATIONS.

***** METEOSAT 2*****

SPACECRAFT COMMON NAME- METEOSAT 2
ALTERNATE NAMES- METEOROLOGICAL SAT-B, METEOSAT-B

NSSDC ID- METOS-B

LAUNCH DATE- 12/15/80 WEIGHT- 625.8 KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- ARIANE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 0. DEG
PERIAPSIS- 35600. KM ALT APOAPSIS- 35600. KM ALT

PERSONNEL
MG - H. DELAHAIS ESA-ESTEC
PM - D. LENNERTZ ESA-ESTEC

BRIEF DESCRIPTION
METEOSAT-B IS GEOSTATIONARY SPACECRAFT AND SERVES AS PART OF EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPS TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPERATION ARE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIES (1) A VISIBLE-IR RADIOMETER TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM TO DISSEMINATE IMAGE DATA TO USER STATIONS, TO COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND TO RELAY DATA FROM POLAR-ORBITING SATELLITES. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURES 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS ARE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE IS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY OUT FROM THE CENTRAL TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORM THE OUTER WALLS OF THE SPACECRAFT AND PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

----- METEOSAT 2, ESA STAFF-----

INVESTIGATION NAME- IMAGING RADIOMETER

ORIGINAL PAGE IS
OF POOR QUALITY

NSSDC ID- METOS-B-01

INVESTIGATIVE PROGRAM APPLICATIONS

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION THE VISIBLE-IR RADIOMETER FLOWN ON METEOSAT-B IS CAPABLE OF PROVIDING DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED SATELLITE FOR USE IN (1) OPERATIONAL WEATHER ANALYSIS AND FORECASTING AND, (2) FOR SUPPORT TO GARP. THE FIVE-CHANNEL INSTRUMENT IS ABLE TO TAKE FULL PICTURES OF THE EARTH'S DISK. THE THREE IR CHANNELS (TWO IN THE 10.5- TO 12.5-MICROMETER REGION AND ONE IN THE 5.7- TO 7.1-MICROMETER REGION), AND THE TWO VISIBLE CHANNELS (0.5- TO 0.9-MICROMETER) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY A SCAN MIRROR AND COLLECTED BY AN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE RADIOMETER OPTICAL AXIS, WHICH IS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDES A WEST-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN IS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR AT THE COMPLETION OF EACH SPIN. RESOLUTION AT THE SUB-SATELLITE POINT WAS 2.5 KM FOR THE VISIBLE, 5 KM FOR THE IR, AND WATER VAPOR CHANNELS.

----- METEOSAT 2, ESA STAFF-----

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- METOS-B-02 INVESTIGATIVE PROGRAM COMMUNICATIONS INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION THE DATA COLLECTION PLATFORM IS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR ORBITING SATELLITES. THIS EXPERIMENT IS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (WEFAX) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATES ON S-BAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

***** NOAA-C*****

SPACECRAFT COMMON NAME- NOAA-C ALTERNATE NAMES-

NSSDC ID- NOAA-C

LAUNCH DATE- 04/15/81 WEIGHT- 588.9 KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY UNITED STATES NOAA-NESS UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL MG - M.L. GARBACZ NASA HEADQUARTERS PM - G.A. BRANCHFLOWER NASA-GSFC PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION NOAA-C IS THE THIRD IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG

WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-C -01 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE NOAA-C ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WILL BE A FOUR CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WILL BE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER WILL OPERATE IN THE SCANNING MODE AND WILL MEASURE EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETERS. ALL FOUR CHANNELS WILL HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS WILL HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR WILL BE CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA WILL BE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD WILL BE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, WHICH WILL HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH WILL CONTAIN DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS WILL BE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-C -02 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE NOAA-C OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, WHICH HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9). WILL OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP SCAN TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-C -03 INVESTIGATIVE PROGRAM CODE EB/OPERATIONAL WEATHER OBS INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-C IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE

OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-C -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - M.H. SAUER NOAA-ERL
OI - C.C. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-D*****

SPACECRAFT COMMON NAME- NOAA-D
ALTERNATE NAMES-

NSSDC ID- NOAA-D

LAUNCH DATE- 04/15/82 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
NOAA-D IS THE FOURTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-D -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-D ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.85 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-D -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-D OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-D -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-D IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON

OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-D, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-D -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS	NOAA-ERL
O1 - N.H. SAUER	NOAA-ERL
O1 - C.J. BOSTROM	APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 1.50 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-E*****

SPACECRAFT COMMON NAME- NOAA-E
ALTERNATE NAMES-

NSSDC ID- NOAA-E

LAUNCH DATE- 04/15/83 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL

MG - W.L. GARBACZ	NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER	NASA-GSFC
PS - A. ARKING	NASA-GSFC

BRIEF DESCRIPTION

NOAA-E IS THE FIFTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-E -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS
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BRIEF DESCRIPTION

THE NOAA-E ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.95 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1-KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-E -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS
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BRIEF DESCRIPTION

THE NOAA-E OPERATIONAL VERTICAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS: CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-E -03 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS
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BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-E IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-E, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-E -04 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - H.M. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 MEV/M. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/M. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-F*****

SPACECRAFT COMMON NAME- NOAA-F
ALTERNATE NAMES-

NSSDC ID- NOAA-F

LAUNCH DATE- 04/15/84 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN
PERIAPSIS- 833. KM ALT

INCLINATION- 98.7 DEG
APOAPSIS- 833. KM ALT

PERSONNEL
MG - H.L. GARDALZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-F IS THE SIXTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS THE VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 50 SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

----- NOAA-F, BROOME-----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-F -05 INVESTIGATIVE PROGRAM
CODE EB/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - G.C. BROOME NASA-LARC
TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL

RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 90 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 66-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10 DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.22 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-F -01 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-F ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETERS, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETERS, AND CHANNEL 4 (IR WINDOW), 3.95 TO 3.93 MICROMETERS. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH CONTAINS DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-F -02 INVESTIGATIVE PROGRAM
CODE EB/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-F OPERATIONAL VERTICAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE

ORIGINAL PAGE IS
OF POOR QUALITY

18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO₂. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50- TO 60-GHZ OXYGEN BAND (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, NESS STAFF -----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-F -33 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-F IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-F, WILLIAMS -----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-F -04 INVESTIGATIVE PROGRAM
 CODE ED/OPER ENVIRON MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - M.H. SAUER NOAA-ERL
 OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE ITOS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/N AND 25 MEV/N. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-G *****

SPACECRAFT COMMON NAME- NOAA-G
 ALTERNATE NAMES-

NSSDC ID- NOAA-G

LAUNCH DATE- 04/15/85 WFIGHT- 588.9 KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
 UNITED STATES NOAA-NESS
 UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
 PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
 PG - P.L. GARBACZ NASA HEADQUARTERS
 PM - G.A. BRANCHFLOWER NASA-GSFC
 PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION

NOAA-G IS THE SEVENTH IN A SERIES OF THIRD-GENERATION, OPERATIONAL METEOROLOGICAL SATELLITES FOR USE IN THE NATIONAL OPERATIONAL ENVIRONMENTAL SATELLITE SUBSYSTEM (NOESS) TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP) DURING 1978-84. THE SATELLITE DESIGN PROVIDES AN ECONOMICAL AND STABLE SUN-SYNCHRONOUS PLATFORM FOR ADVANCED OPERATIONAL INSTRUMENTS TO MEASURE THE EARTH'S ATMOSPHERE, ITS SURFACE AND CLOUD COVER, AND THE NEAR-SPACE ENVIRONMENT. PRIMARY SENSORS INCLUDE AN ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) FOR OBSERVING DAYTIME AND NIGHTTIME GLOBAL CLOUD COVER AND AN OPERATIONAL VERTICAL SOUNDER FOR OBTAINING TEMPERATURE AND WATER VAPOR PROFILES THROUGH THE EARTH'S ATMOSPHERE. SECONDARY EXPERIMENTS CONSIST OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH MEASURES THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH PROCESSES AND RELAYS TO CENTRAL DATA ACQUISITION STATIONS, VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.025 DEG/SEC.

----- NOAA-G, BROOME -----

INVESTIGATION NAME- EARTH RADIATION BUDGET INSTRUMENT (ERBI)

NSSDC ID- NOAA-G -05 INVESTIGATIVE PROGRAM
 CODE ED/OPER ENVIRON MONITORING
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 TL - G.C. BROOME NASA-LARC
 TM - A.A. RUDMANN NASA-GSFC

BRIEF DESCRIPTION

THE EARTH RADIATION BUDGET SATELLITE SYSTEM (ERBSS) IS DESIGNED TO MEASURE THE ENERGY EXCHANGE BETWEEN THE EARTH-ATMOSPHERE SYSTEM AND SPACE. THESE MEASUREMENTS ARE IMPORTANT FOR CLIMATE PREDICTION AND IN DEVELOPING STATISTICAL RELATIONSHIPS BETWEEN REGIONAL WEATHER AND RADIATION BUDGET ANOMALIES. THE EARTH RADIATION BUDGET EXPERIMENTS WILL BE FLOWN ON BOTH NOAA AND ERBS SATELLITES TO MEASURE REGIONAL RADIATION BUDGETS AND EQUATOR-TO-POLE GRADIENTS OF NET RADIATION. THE EARTH RADIATION BUDGET INSTRUMENT (ERBI) CONSISTS OF EIGHT CHANNELS DISTRIBUTED WITHIN TWO INSTRUMENT PACKAGES: THE WIDE AND MEDIUM FIELD OF VIEW INSTRUMENT (W/MFOV) AND THE SCANNER INSTRUMENT. THE W/MFOV IS A FIVE CHANNEL RADIOMETER. FOUR CHANNELS ARE PRIMARILY EARTH-VIEWING, BUT UPON COMMAND CAN BE POINTED TOWARD THE SUN FOR PERIODIC CALIBRATION. THE FIFTH CHANNEL IS FIXED FOR CONTINUOUS OBSERVATION OF THE SUN FOR CALIBRATION. TWO OF THE FOUR GIMBALED SENSORS ARE WIDE-ANGLED AND VIEW THE ENTIRE EARTH FROM LIMB TO LIMB, APPROXIMATELY 177 DEG FOR TIROS-N AND 135 DEG FOR ERBS-A. THESE DETECTORS HAVE BROADBAND SPECTRAL RESPONSES VARYING FROM 0.2 MICROMETERS TO OVER 50 MICROMETERS. CHANNEL 1 MAKES TOTAL RADIATION MEASUREMENTS WHILE CHANNEL 2, WITH ITS FILTER ATTACHED, MAKES MEASUREMENTS OVER THE SHORTWAVE SPECTRAL BAND CHARACTERIZED BY THE SUPRASIL-W DOME FILTER WHICH CUTS OFF AT 5 MICROMETERS. THE REMAINING TWO GIMBALED SENSORS ARE MEDIUM FIELD OF VIEW CHANNELS WITH A 66-DEG FIELD OF VIEW FOR TIROS-N AND 88 DEG FOR ERBS-A, EQUIVALENT TO A TEXAS-SIZE FOOTPRINT. CHANNEL 3 MEASURES TOTAL RADIATION WHILE CHANNEL 4, PLACED UNDER A SUPRASIL-W DOME, MEASURES THE SHORTWAVE SPECTRAL BAND. THE EARTH-EMITTED LONGWAVE RADIATION COMPONENT IS DETERMINED BY SUBTRACTING THE SHORTWAVE CHANNEL FROM THE TOTAL CHANNEL. THE SOLAR CHANNEL (5) HAS A 10-DEG FIELD OF VIEW MEASURING THE TOTAL SOLAR SPECTRAL RANGE OF THE SUN. THE SCANNER INSTRUMENT IS A SMALL SPATIAL RESOLUTION (FOV EQUALS 3 DEG DIAMETER) SCANNING RADIOMETER CONTAINING THREE SEPARATE CHANNELS (6,7,8). CHANNEL 6 ISOLATES THE SHORTWAVE SPECTRAL INTERVAL (0.2 TO 5 MICROMETERS). CHANNEL 7 MEASURES THE LONGWAVE SPECTRAL REGION (5 TO 50 MICROMETERS), AND CHANNEL 8 (1.6 MICROMETERS) PROVIDES CLOUD IMAGERY TO AID IN ANALYZING CHANNEL 6 AND 7 DATA. ALL THREE SENSORS ARE LOCATED WITHIN A CONTINUOUSLY ROTATING SCAN DRUM WHICH SCANS THE FOV ACROSS TRACK SEQUENTIALLY FROM HORIZON TO HORIZON AND FROM A SPACE VIEW FOR CALIBRATION. ADDITIONAL INFORMATION CAN BE OBTAINED FROM 'SYSTEM CONSIDERATIONS FOR AN EARTH RADIATION BUDGET SCANNING RADIOMETER,' AND 'THE EARTH RADIATION BUDGET SATELLITE SYSTEM OF THE EARLY 1980'S.'

----- NOAA-G, NESS STAFF -----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-G -01 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-G ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) IS A FOUR-CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA ARE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER OPERATES IN THE SCANNING MODE AND MEASURES EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUTOFF AROUND 1.3 MICROMETER, CHANNEL 3 (IR WINDOW), 10.5 TO 11.5 MICROMETER, AND CHANNEL 4 (IR WINDOW), 3.55 TO 3.93 MICROMETER. ALL FOUR CHANNELS HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 DEG K AT 300 DEG K. THE AVHRR IS CAPABLE OF OPERATING IN BOTH REAL-TIME OR RECORDED MODES. REAL-TIME OR DIRECT READOUT DATA ARE TRANSMITTED TO GROUND STATIONS BOTH AT LOW (4 KM) RESOLUTION VIA AUTOMATIC PICTURE TRANSMISSION (APT) AND AT HIGH (1 KM) RESOLUTION VIA HIGH RESOLUTION PICTURE TRANSMISSION (HRPT). DATA RECORDED ON BOARD ARE AVAILABLE FOR CENTRAL PROCESSING. THEY INCLUDE GLOBAL AREA COVERAGE (GAC) DATA, HAVE A RESOLUTION OF 4 KM, AND LOCAL AREA COVERAGE (LAC) DATA, WHICH WILL CONTAIN DATA FROM SELECTED PORTIONS OF EACH ORBIT WITH A 1 KM RESOLUTION. IDENTICAL EXPERIMENTS ARE FLOWN ON THE OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF -----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER
NSSDC ID- NOAA-G -02 INVESTIGATIVE PROGRAM
CODE EO/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-G OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7 MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3 MICROMETER CARBON DIOXIDE BAND, CHANNEL 3 - THE 9.7 MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1 MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15 MICROMETER CARBON DIOXIDE BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18 TO 30 MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE-MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN BAND (50.3, 53.7, 55.8, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP SCAN TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, NESS STAFF -----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)
NSSDC ID- NOAA-G -03 INVESTIGATIVE PROGRAM
CODE EO/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-G IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW-DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 M/S. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-G, WILLIAMS -----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR
NSSDC ID- NOAA-G -04 INVESTIGATIVE PROGRAM
CODE EO/OPER ENVIRON MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - M.M. SAUER NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT IS AN EXTENSION OF THE SOLAR PROTON MONITORING EXPERIMENT FLOWN ON THE TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT. THE LOW-ENERGY PROTON ALPHA TELESCOPE (LEPAT) SEPARATELY MEASURES IN FIVE ENERGY RANGES BOTH PROTONS BETWEEN 150 KEV AND 40 MEV AND ALPHA PARTICLES BETWEEN 150 KEV/M AND 25 MEV/M. THERE ARE TWO LEPATS VIEWING IN THE ANTI-SUN AND ANTI-EARTH DIRECTIONS WITH 60-DEG VIEWING CONES. THE PROTON OMNIDIRECTIONAL DETECTOR (POD) MEASURES PROTONS ABOVE 10, 30, AND 60 MEV, ELECTRONS ABOVE 140 KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEWS IN THE ANTI-EARTH DIRECTION, AND MEASURES PROTONS ABOVE 400 KEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/M. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOSS *****

SPACECRAFT COMMON NAME- NOSS
ALTERNATE NAMES- NAT'L OCEANIC SATELLITE

NSSDC ID- NOSS

LAUNCH DATE- 00/00/86 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 98.7 MIN INCLINATION- 89. DEG
PERIAPSIS- 700. KM ALT APOAPSIS- 700. KM ALT

PERSONNEL
PM - G.A. BRANCHFLOWER NASA-GSFC

BRIEF DESCRIPTION
THE NATIONAL OCEANIC SATELLITE SYSTEM (NOSS) IS A JOINT ENDEAVOR, FUNDED BY NASA, NOAA, AND DOD. THE NOSS WILL BE A LIMITED, REAL-TIME, OPERATIONAL DEMONSTRATION FOR CONTINUOUS OBSERVATIONS OF THE OCEAN'S SURFACE WINDS, SEA-STATE, SURFACE WATER TEMPERATURE, WAVE HEIGHT, ICE, AND OTHER GEOPHYSICAL MEASUREMENTS UNDER ALL WEATHER CONDITIONS. THE BASIC INSTRUMENT COMPLIMENT FOR THE SATELLITE CONSISTS OF THREE PREVIOUSLY FLOWN INSTRUMENTS (AN IMPROVED VERSION OF THE NIMBUS-7 COASTAL ZONE COLOR SCANNER (CZCS/2), THE SEASAT-A RADAR ALTIMETER (ALT), AND AN IMPROVED VERSION OF THE SEASAT-A SCATTEROMETER (SCAT/2); AND ONE NOW IN DEVELOPMENT, THE LARGE ANTENNA MULTICHANNEL MICROWAVE RADIOMETER (LAMRR). THE NOSS SATELLITE WILL BE LAUNCHED BY THE SPACE SHUTTLE INTO A 300-KM INTERMEDIATE ORBIT. THE SPACECRAFT BUS PROVIDES THE PROPULSION CAPABILITY TO ATTAIN THE MISSION'S REQUIRED SUN-SYNCHRONOUS ORBITS OF 600 TO 900 KM, AND TO RETURN TO SHUTTLE ORBIT ALTITUDE ON COMMAND. THE DESIGN DURATION OF THE OPERATIONAL DEMONSTRATION IS 5 YEARS.

----- NOSS, BEBRIS -----

INVESTIGATION NAME- MICROWAVE WIND SCATTEROMETER (SCAT/2)
NSSDC ID- NOSS -02 INVESTIGATIVE PROGRAM
CODE EO/OPERATIONAL WEATHER OBS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
TL - J. BEBRIS NASA-GSFC

BRIEF DESCRIPTION
THE NOSS SCATTEROMETER (SCAT/2) IS AN ACTIVE MICROWAVE SENSOR EMPLOYED TO DETERMINE OCEAN SURFACE WINDFIELD VELOCITY AND DIRECTION IN BROAD SWATHS ON EITHER SIDE OF THE SATELLITE SUBTRACK. THE SCAT/2 DESIGN CONCEPTS AND PERFORMANCE PARAMETERS ARE BASED ON THOSE OF THE WIND SCATTEROMETER SUCCESSFULLY DEMONSTRATED ON SEASAT-A, AND DERIVED FROM EARLIER SATELLITE AND AIRCRAFT EXPERIMENTS. THE SCAT/2 IS A LONG PULSE, DOPPLER-SCANNED, NONSTATIC RADAR WHICH MAKES MEASUREMENTS OF THE OCEAN-SURFACE BACKSCATTER COEFFICIENT AT ANGLES RANGING FROM 0 TO 60 DEG ON BOTH SIDES OF THE SATELLITE SUBTRACK. THREE FAN BEAM ANTENNAS ON EACH SIDE OF THE SPACECRAFT ARE USED TO MAKE THREE INDEPENDENT AND TIME-SEPARATED MEASUREMENTS OF THE BACKSCATTER COEFFICIENT IN 10-KM RESOLUTION CELLS AT A 10-KM GRID SPACING THROUGHOUT THE

INSTRUMENT MEASUREMENTS SWATHS. INSTRUMENT BACKSCATTER DATA ARE USEFUL FOR WINDFIELD ESTIMATION PURPOSES IN MEASUREMENT SWATHS CORRESPONDING TO INCIDENCE ANGLES BETWEEN 15 AND 60 DEG. THUS THE SCAT/2 PROVIDES WIND VECTOR DATA IN COVERAGE SWATHS SOME 450 KM IN WIDTH OFFSET ON EITHER SIDE OF THE SATELLITE SUBTRACK. BACKSCATTER MEASUREMENTS AT INCIDENCE ANGLES LESS THAN 15 DEG ARE USEFUL FOR ESTIMATING WIND SPEED AND ALSO AID IN INSTRUMENT CALIBRATION AND SELF-DIAGNOSTICS. THE INSTRUMENT FIELD-OF-VIEW COVERAGE BELOW 15 DEG IS TERMED THE NEAR-NADIR SWATH AND EXTENDS SOME 100 KM ON EITHER SIDE OF THE SATELLITE SUBTRACK. THE MEASUREMENTS PRECISION AND WIND VECTOR CELL RESOLUTION CAPABILITY OF THE SCAT/2 SYSTEM ARE SIMILAR TO THOSE OF THE SEASAT SCATTEROMETER. HOWEVER, DUE TO THE USE OF TWO ADDITIONAL FAN BEAM ANTENNAS AND MORE SOPHISTICATED ON-BOARD ELECTRONICS FOR RECEIVED SIGNAL PROCESSING AND DETECTION, THE NOSS INSTRUMENT WILL PROVIDE A MUCH MORE EXTENSIVE WIND VECTOR DATA BASE IN DUAL MEASUREMENT SWATHS WITH A MUCH HIGHER PROBABILITY OF SUCCESSFUL WIND DIRECTION ALIAS REMOVAL IN DATA PROCESSING THAN WAS POSSIBLE WITH THE SEASAT INSTRUMENT CONFIGURATION.

----- NOSS, HEFFERNAN-----
 INVESTIGATION NAME- COMPRESSED PULSE RADAR ALTIMETER (PLT)

NOSSDC ID- NOSS -03 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 OCEANOGRAPHY

PERSONNEL
 TL - P.J. HEFFERNAN NASA-GSFC

BRIEF DESCRIPTION
 THE NOSS ALTIMETER (ALT) IS AN ACTIVE MICROWAVE SENSOR WHICH WILL BE USED TO DETERMINE OCEAN WAVE HEIGHT, SURFACE CURRENTS, WIND VELOCITY, SEA ICE BOUNDARIES, AND OTHER GEOPHYSICAL PARAMETERS IN A NARROW SWATH ALONG THE SATELLITE SUBTRACK. THE ALT IS A THIRD-GENERATION INSTRUMENT AND IS CLOSELY RELATED TO THE RADAR ALTIMETERS SUCCESSFULLY FLOWN ON THE GOES-C AND SEASAT-A MISSIONS. WHILE THE NOSS ALT HAS ESSENTIALLY THE SAME PERFORMANCE PARAMETERS AS THE UNIT FLOWN ON THE PROOF-OF-CONCEPT SEASAT MISSION, IT INCORPORATES A NUMBER OF MODIFICATIONS AND IMPROVEMENTS WHICH SIGNIFICANTLY ENHANCE MISSION OPERATIONS AND RELIABILITY ASPECTS FOR A 3-YEAR MINIMUM PRE-OPERATIONAL DEMONSTRATION. THESE ARE: REPROGRAMMABLE ON-BOARD MICROPROCESSORS; ADDITION OF RANGE-INCREASED INSTRUMENT DATA RATE TO PROVIDE ADDITIONAL WAVEFORM SAMPLES; AND IMPROVED INSTRUMENT SELF-CALIBRATION. EACH NOSS SPACECRAFT WILL CARRY TWO ALT INSTRUMENTS FOR RELIABILITY; THE INSTRUMENTS WILL BE OPERABLE SIMULTANEOUSLY FOR CROSS-CALIBRATION PURPOSES. THE ALT IS A FIXED-BEAM, NADIR-VIEWING MONOSTATIC CHIRP RADAR WHICH PROVIDES A RANGE MEASUREMENT PRECISION OF 10 CM OR BETTER WITH A SURFACE RESOLUTION OF LESS THAN 10 KM ALONG THE SATELLITE SUBTRACK. THE ALT OPERATES OUT 13.56 GHz, AND CONSISTS OF THE FOLLOWING MAJOR ELEMENTS: 1.0 M PARABOLIC REFLECTOR; MICROPROCESSOR-CONTROLLED ADAPTIVE TRACKER UNIT (ATU) AND SYNCHRONIZATION AND CONTROL UNIT (SACU); ANALOG AND DIGITAL SIGNAL PROCESSING SUBSYSTEMS; AND POWER AND SIGNAL CONDITIONING UNITS. THE ALT TRANSMITS EXTREMELY SHORT CHIRPED PULSES AT A POWER LEVEL OF 2 KW AND A REPETITION RATE OF 1020 PER SECOND. RETURN SIGNALS ARE PROCESSED AND ANALYZED AS TO TIME OF ARRIVAL AND DETAILS SIGNAL STRENGTH AND WAVEFORM SIGNATURE. SERIES OF SUCCESSIVE RETURNS ARE AVERAGED TO YIELD TWENTY-PER-SECOND SMOOTHED DATA ALONG THE SATELLITE SUBTRACK.

----- NOSS, MUNDY, JR.-----
 INVESTIGATION NAME- LARGE ANTENNA MULTICHANNEL MICROWAVE RADIOMETER (LAMMR)

NOSSDC ID- NOSS -04 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 OCEANOGRAPHY
 METEOROLOGY

PERSONNEL
 TL - E.C. MUNDY, JR. NASA-GSFC

BRIEF DESCRIPTION
 THE LARGE ANTENNA MULTICHANNEL MICROWAVE RADIOMETER (LAMMR) IS A LARGER VERSION OF THE NIMBUS 7 SMRR. THE LAMMR IS A 14-CHANNEL (SEVEN FREQUENCY, DUAL POLARIZED) SCANNING RADIOMETER MEASURING MICROWAVE EMISSIONS BETWEEN 4.3 AND 36.5 GHz. THE WIDE TRACK NECESSARY TO ACHIEVE GLOBAL COVERAGE IS ACCOMPLISHED WITH A CONICAL BEAM SCAN IN WHICH THE INCIDENT BEAM MAKES AN ANGLE OF 50 DEG TO THE LOCAL VERTICAL. GROUND RESOLUTION REQUIREMENTS DICTATE THAT THE EFFECTIVE ANTENNA APERTURE BE 3.6 TO 4 M. PRIMARY USAGE OF THE LAMMR IS MONITORING THE SEA SURFACE TEMPERATURE, WIND SPEED, AND SEA ICE, AND PROVIDING ATMOSPHERIC CORRECTIONS FOR THE ON-BOARD ALTIMETER (ALT) AND SCATTEROMETER (SCAT/2).

----- NOSS, PAROBY-----

INVESTIGATION NAME- COASTAL ZONE COLOR SCANNER/2 (CZCS/2)

NOSSDC ID- NOSS -01 INVESTIGATIVE PROGRAM
 CODE ED/OPERATIONAL WEATHER OBS
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY

PERSONNEL
 TL - W. PAROBY NASA-GSFC

BRIEF DESCRIPTION
 THE COASTAL ZONE COLOR SCANNER (CZCS/2) IS THE SAME AS ONE FLOWN ON NIMBUS-7 WITH THREE ADDITIONAL CHANNELS AND WILL MONITOR CHLOROPHYLL CONCENTRATION AND WATER TURBIDITY DISTRIBUTIONS. THE MULTI-SPECTRAL IMAGING COASTAL ZONE COLOR SCANNER IS AN EARTH-SCANNING NINE-CHANNEL RADIOMETER USING A CLASSICAL CASSEGRAINIAN TELESCOPE AND A WADSWORTH-TYPE GRATING SPECTROMETER. ALL NINE DETECTORS OBSERVE THE SAME AREA ON THE EARTH'S SURFACE AT THE SAME TIME AND DIFFER ONLY IN THE SPECTRAL RANGE THAT THEY DETECT. THE CZCS OPTICAL SYSTEM SEPARATES THE SCAN SCENES INTO TWO SPECTRAL RANGES, THE VISIBLE (INCLUDING SOLAR INFRARED) AND THE THERMAL INFRARED, BY A DICHOIC BEPP SPLITTER. THE VISIBLE LIGHT IS DEPOLARIZED AND THEN DISPERSED BY THE DIFFRACTION GRATING. EACH OF THE EIGHT WAVELENGTHS OR COLORS IS SENSED BY A SEPARATE SILICON PHOTODIODE DETECTOR. CO-REGISTRATION OF THE DETECTORS IS ASSURED BY THE USE OF A SINGLE, COMMON FIELD STOP PRIOR TO THE SPECTROMETER. THE INFRARED RADIANCE IS DIRECTED TO A PHOTOCONDUCTOR DETECTOR MOUNTED TO THE INNER STAGE OF A RADIATIVE COOLER. A CONTINUOUSLY ROTATING MIRROR SCANS A NOMINAL 1.12-MRAD (0.065 DEG) INSTANTANEOUS FIELD-OF-VIEW (IFOV) ACROSS THE EARTH'S SURFACE PERPENDICULAR TO THE ORBIT TRACT AT 0.82 REVOLUTIONS PER SECOND. THE SPACECRAFT'S ORBITAL VELOCITY PROVIDES THE OTHER DIRECTION. AT THE ORBITAL ALTITUDE OF 700 KM, THIS RESULTS IN AN INSTANTANEOUS VIEW OF THE EARTH'S SURFACE OF 0.794 SQ KM. AN UNOBSTRUCTED SCAN ANGLE OF 39.36 DEG ON EITHER SIDE OF NADIR PRODUCES A SCAN WIDTH ON THE GROUND OF 1148 KM. THE ROTATION OF THE EARTH UNDER THE SPACECRAFT ALLOWS FOR TOTAL SURFACE COVERAGE IN THE TEMPERATE AND POLAR ZONES AND APPROXIMATELY 80 PERCENT COVERAGE IN THE TROPICS EVERY DAY.

***** OSS-1*****

SPACECRAFT COMMON NAME- OSS-1
 ALTERNATE NAMES- SHUTTLE OBT-4

NOSSDC ID- SHOFT-4

LAUNCH DATE- 04/00/82 WEIGHT- 3730. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 90. MIN INCLINATION- 40.3 DEG
 PERIAPSIS- 300. KM ALT APOAPSIS- 300. KM ALT

PERSONNEL
 NM - K. KISSIN NASA-GSFC
 NS - W.M. NEUPERT NASA-GSFC

BRIEF DESCRIPTION
 THE EXPERIMENTS SELECTED TO BE PART OF THE OSS-1 PAYLOAD HAVE SEVERAL OBJECTIVES WHICH INCLUDE THE FOLLOWING: TO CONDUCT SUPPLEMENTARY OBSERVATIONS OF THE ORBITER'S ENVIRONMENT THAT HAVE SPECIFIC APPLICABILITY TO PLASMA PHYSICS AND ASTRONOMICAL PAYLOADS; TO CONDUCT SCIENTIFIC OBSERVATIONS THAT DEMONSTRATE THE SPACE SHUTTLE'S RESEARCH CAPABILITIES AND ARE APPROPRIATE FOR FLIGHT ON AN EARLY MISSION; AND TO EVALUATE TECHNOLOGY THAT MAY HAVE APPLICATION IN FUTURE EXPERIMENTS IN SPACE. SIX OF THE SEVEN EXPERIMENTS THAT MAKE UP THE OSS-1 PAYLOAD ON STS-5, OSS-1-01 TO OSS-1-06 ARE MOUNTED ON THE SPACELAB PALLET AND THE SEVENTH EXPERIMENT, OSS-1-07, IS MOUNTED IN THE MID DECK DIRECTLY BELOW THE ORBITER CABIN. THE SPACELAB PALLET IS TRANSPORTED TO AND FROM ORBIT IN THE CARGO BAY OF THE SPACE SHUTTLE ORBITER, AND REMAINS THERE THROUGHOUT THE 7-DAY FLIGHT. THE PARAMETERS MEASURED BY THE PAYLOAD INCLUDE: (1) PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT ATMOSPHERE, THAT RESULT FROM PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATIONS SYSTEMS; (2) POLARIZATION IN SOLAR X-RAY BURSTS; (3) SOLAR FLUX IN THE WAVELENGTH RANGE 120-400 NANOMETERS; (4) ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE; (5) THERMAL PROPERTIES OF THE CANNISTER EXPERIMENT; AND (6) OPTICAL PROPERTIES OF THE SHUTTLE-INDUCED ATMOSPHERES. IN ADDITION, THERE ARE MEASUREMENTS OF THE INFLUENCE OF WEIGHTLESSNESS ON THE LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS. AN INDUCED ENVIRONMENT CONTAMINATION MONITOR (IECM), DESIGNED AND PROVIDED BY THE MSFC, IS AN ENGINEERING PACKAGE FLOWN ON THE ORBITAL TEST FLIGHTS (OTFTS) TO PROVIDE VERIFICATION MEASUREMENTS OF PARTICLES AND GASES DURING GROUND OPERATIONS, ASCENT, ON-ORBIT DESCENT, AND POST LANDING. IT CONTAINS A HUMIDITY MONITOR, DEW POINT HYGROMETER, AIR SAMPLER, CASCADE IMPACTOR, PASSIVE SAMPLE ARRAY, OPTICAL EFFECTS MODULE, TEMPERATURE-CONTROLLED QUARTZ CRYSTAL MICROBALANCE, CRYOGENIC QUARTZ CRYSTAL MICROBALANCE,

CAMERA/PHOTOMETER, AND A MASS SPECTROMETER.

----- OSS-1, BANKS-----

INVESTIGATION NAME- VEHICLE CHARGING AND POTENTIAL EXPERIMENT

NSSDC ID- SHOFT-4-04 INVESTIGATIVE PROGRAM
CCDE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
PARTICLES AND FIELDS

PERSONNEL
PI - P.W. BANKS UYAH STATE U
OI - W.J. RAITT UYAH STATE U
OI - P.R. WILLIAMSON UYAH STATE U
OI - T. OYAYASHI U OF TOKYO

BRIEF DESCRIPTION
THE OBJECTIVES OF THE VEHICLE CHARGING AND POTENTIAL EXPERIMENT ARE TO: (1) DETERMINE ELECTRIC POTENTIAL CHANGES ASSOCIATED WITH ORBITER AND EXPERIMENT OPERATION, (2) DETERMINE THE ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE, (3) DETERMINE ELECTRIC POTENTIAL CHANGES ARISING FROM ACTIVE ELECTRON EMISSION, (4) DETERMINE ELECTRICAL PROCESSES ASSOCIATED WITH CHARGING AND DISCHARGING OF VEHICLE DIELECTRIC SURFACES, (5) ASSESS THE ELECTRICAL RESPONSE OF THE VEHICLE TO LOW LEVELS OF ELECTRON EMISSION, (6) DOCUMENT THE OPERATION OF A LOW POWER ELECTRON ACCELERATOR IN THE ORBITER ENVIRONMENT, AND (7) EVALUATE THE SUITABILITY OF THE ORBITER BAY FOR IN SITU PLASMA MEASUREMENTS. TO ACHIEVE THESE OBJECTIVES THE FOLLOWING INSTRUMENTS ARE FLOWN: (1) TWO CHARGE AND CURRENT PROBES (CCP) TO MEASURE VEHICLE RETURN CURRENTS AND DIELECTRIC CHARGES AT TWO LOCATIONS IN THE BAY, (2) SPHERICAL RETARDING POTENTIAL ANALYZER/LANGMUIR PROBE (SRPA/LP) TO MEASURE VEHICLE POTENTIAL RELATIVE TO THE PLASMA, ELECTRON DENSITY, AND PLASMA TEMPERATURE; AND (3) A FAST PULSE ELECTRON GUN (FPEG) TO PROVIDE ELECTRON EMISSION WITH SHORT (500 NA. SECONDS) PULSES AND CAPABLE OF DC OPERATION FOR EXTENDED PERIODS OF TIME. THE GUN OPERATES ON A CURRENT OF 0.1 AMP AND A VOLTAGE OF 1 KV.

----- OSS-1, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR

NSSDC ID- SHOFT-4-03 INVESTIGATIVE PROGRAM
CCDE ST
INVESTIGATION DISCIPLINE(S)
SCLAR PHYSICS

PERSONNEL
PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB
OI - D.K. PRINZ US NAVAL RESEARCH LAB
OI - M.E. VAN HOOSIER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THE 'SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR' EXPERIMENT ARE TO: (1) MEASURE THE INTENSITY OF THE SOLAR ULTRAVIOLET CONTINUUM AT 180 NANOMETERS RELATIVE TO ITS INTENSITY AT 211 NANOMETERS WITH AN ACCURACY OF PLUS OR MINUS 1 PERCENT, (2) MEASURE THE RELATIVE SPECTRAL DISTRIBUTION OF THE SOLAR RADIANCE THROUGHOUT THE SPECTRAL REGION FROM 120 TO 400 NANOMETERS WITH AN ACCURACY OF 1 TO 5 PERCENT (DEPENDENT ON WAVELENGTH) USING A SINGLE INSTRUMENT, (3) MEASURE THE ABSOLUTE INTENSITY OF THE SOLAR SPECTRUM BETWEEN 120 TO 400 NANOMETERS WITH AN ABSOLUTE ACCURACY OF 6 TO 10 PERCENT, DEPENDING ON WAVELENGTH, AND TIE INTO HIGH-ACCURACY GROUND BASED MEASUREMENTS ABOVE 300 NANOMETERS, AND (4) SEARCH FOR VARIABILITY OF THE SOLAR CONTINUUM AND EMISSION LINES ATTRIBUTABLE TO CHANGING LEVELS OF SOLAR ACTIVITY. THE INSTRUMENTATION CONSISTS OF TWO DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AN ULTRAVIOLET CALIBRATION SOURCE, AND A SOLAR POINTING ERROR SENSOR. THE SPECTROMETERS ARE SUN-POINTED AND HAVE A PLUS OR MINUS 0.5 DEG FIELD OF VIEW. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF EACH SOLAR-POINTED ORBIT TO MEASURE THE SHORT TIME VARIATIONS OF THE SOLAR ULTRAVIOLET FLUX. THE SECOND SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. SIMILARLY, TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS.

----- OSS-1, COMLES-----

INVESTIGATION NAME- INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS

NSSDC ID- SHOFT-4-07 INVESTIGATIVE PROGRAM
CCDE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - J.N. COMLES U OF HOUSTON
OI - M.V. SCHELD U OF HOUSTON

BRIEF DESCRIPTION

AN OBJECTIVE OF THE STUDY OF INFLUENCE OF WEIGHTLESSNESS ON LIGNIFICATION IN DEVELOPING PLANT SEEDLINGS EXPERIMENT IS TO USE THE FLIGHT DATA TO PROVIDE CONFIRMATION OR REJECTION OF THE HYPOTHESIS THAT GRAVITY EXERTS A POSITIVE CONTROL UPON THE PATHWAY OF LIGNIFICATION, AND THAT THERE IS A SYNERGISTIC INTERACTION WITH THE ATMOSPHERE. A SERIES OF COMPLEMENTARY EXPERIMENTS WITH PASSIVE EXPOSURE OF COMPACT PLANT SYSTEMS IN A SMALL GROWTH CHAMBER WILL BE FLOWN. MEASUREMENTS WILL BE MADE OF LIGNIFICATION AND ASSOCIATED ENZYMES, AND OF GASEOUS METABOLITES. THE EXPERIMENT PROVIDES EXPERIENCE WITH, AND DEVELOPMENT OF TECHNIQUES AND HARDWARE FOR, PLANT HANDLING IN SPACE.

----- OSS-1, NOVICK-----

INVESTIGATION NAME- SOLAR FLARE X-RAY POLARIMETER EXPERIMENT

NSSDC ID- SHOFT-4-02 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - R. NOVICK COLUMBIA U
OI - R.S. WOLFF COLUMBIA U

BRIEF DESCRIPTION

THE OBJECTIVES OF THE SOLAR FLARE X-RAY POLARIMETER EXPERIMENT ARE TO MEASURE THE: (1) DEGREE OF POLARIZATION IN SOLAR X-RAY BURSTS, (2) TEMPORAL DEPENDENCE OF THE X-RAY POLARIZATION, (3) ENERGY DEPENDENCE OF THE X-RAY POLARIZATION, (4) POLARIZATION ANGLE OF THE X-RAY EMISSION, AND (5) SOLAR X-RAY FLARE EMISSION BETWEEN 5 AND 30 KEV. IN ADDITION, THE CORRELATION OF THE X-RAY POLARIZATION WITH OTHER PHENOMENA ASSOCIATED WITH SOLAR FLARES IS STUDIED, AND THE SYSTEMATIC EFFECTS OF THE OPERATION OF THE INSTRUMENT IN A SATELLITE ENVIRONMENT IS EVALUATED. THE FLIGHT INSTRUMENT, A SCATTER BLOCK POLARIMETER, CONSISTS OF THREE DETECTORS MOUNTED IN AN EQUILATERAL CONFIGURATION. THERE ARE FOUR COUNTERS AND FOUR RECTANGULAR LITHIUM SCATTERING BLOCKS PER DETECTOR. THE POLARIMETER IS POINTED AT THE SUN DURING THE OCCURRENCE OF SOLAR FLARES AND WHEN SUN-POINTED IT HAS A THREE-DEG FIELD OF VIEW. THE INSTRUMENT USES THE ANGULAR DEPENDENCE OF THE INCOHERENT SCATTERING CROSS SECTION OF ELECTRONS TO DETECT THE DIRECTION OF THE INCIDENT PHOTON'S ELECTRIC VECTOR. THE DIFFERENCE IN COUNTING RATES IN DETECTORS AT DIFFERENT AZIMUTHS RELATIVE TO THE EARTH-SUN LINE IS THE SIGNATURE OF THE X-RAY POLARIZATION.

----- OSS-1, OLLENDORF-----

INVESTIGATION NAME- THERMAL CANISTER EXPERIMENT

NSSDC ID- SHOFT-4-05 INVESTIGATIVE PROGRAM
CODE RE
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - S. OLLENDORF NASA-65FC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE THERMAL CANISTER EXPERIMENT ARE TO: (1) DEMONSTRATE UNDER THE DIVERSE THERMAL ENVIRONMENTS OF THE SPACE SHUTTLE THE PERFORMANCE OF A THERMAL CANISTER UTILIZING FEEDBACK VARIABLE CONDUCTANCE HEATPIPES, AND (2) DEMONSTRATE THE ABILITY OF THE SYSTEM TO MAINTAIN TEMPERATURE CONTROL WITHIN NARROW LIMITS BY VARYING INTERNAL POWER DISSIPATION OVER A WIDE RANGE AND MONITORING THERMAL BEHAVIOR. TO ACHIEVE THESE OBJECTIVES A CANISTER 1 M X 1 M X 3 M AND WEIGHING 160 KG, FIXED CONDUCTANCE CANISTER HEAT PIPES, VARIABLE CONDUCTANCE HEAT PIPES, A RADIATOR AND RADIATOR HEAT PIPES, CONTROL ELECTRONICS AND DATA ACQUISITION AND COMMAND SYSTEM, AND SIMULATED INSTRUMENT HEAT LOADS (HEATERS) WITHIN THE CANISTER ARE FLOWN. THE THERMAL CANISTER IS BUILT IN AS CLOSE A CONFIGURATION AS POSSIBLE TO THE FLIGHT APPLICATION AND MOUNTED ON A STRUCTURE TOGETHER WITH SUPPORT ELECTRONICS. HEATERS WITHIN THE CANISTER SIMULATE INSTRUMENT POWER DISSIPATION. CANISTERS DEVELOPED FOR FLIGHT INSTRUMENTS ARE A STANDARD INVENTORY ITEM FOR FUTURE USE AS REQUIRED.

----- OSS-1, SHAMMAN-----

INVESTIGATION NAME- PLASMA DIAGNOSTIC PACKAGE

NSSDC ID- SHOFT-4-01 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
 PI - S.O. SHAMMAN U OF IOWA
 OI - L.A. FRANK U OF IOWA
 OI - D.A. SURNETT U OF IOWA
 OI - M. D'ANGELO U OF IOWA
 OI - H.C. BRINTON NASA-GSFC
 OI - D.L. REASONER NASA-MSFC
 OI - N. STONE NASA-MSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE PLASMA DIAGNOSTIC PACKAGE (PDP) EXPERIMENT ARE TO: (1) STUDY THE ORBITER-MAGNETOPLASMA INTERACTIONS, (2) MAP THE LOCALIZED SOURCES OF ELECTRIC AND MAGNETIC FIELDS, (3) DEMONSTRATE THE OPERATION OF THE PDP PRIOR TO ITS FLIGHT ON SPACELAB 2, AND (4) DETERMINE THE CHARACTERISTICS OF THE ELECTRON BEAM EMITTED FROM THE FAST-PULSE ELECTRON GUN (FPEG) OF EXPERIMENT SHOFT-4-04. SPECIFICALLY, THE PDP MEASURES THE PLASMA, WAVES, AND FIELDS THAT EXIST IN THE AMBIENT IONOSPHERE, THAT RESULT FROM THE PERTURBATIONS INDUCED BY THE MOTION OF THE ORBITER THROUGH THE MAGNETIZED PLASMA, AND THAT RESULT FROM 'INTERFERENCE' BECAUSE OF THE ORBITER/SPACELAB OPERATION SYSTEM. THE ELECTROMAGNETIC INTERFERENCE AND PLASMA CONTAMINATION WITHIN THE ORBITER BAY ARE MAPPED BY USING THE REMOTE MANIPULATOR ARM TO SCAN THE PDP OVER THE BAY AREA. THE FOLLOWING INSTRUMENTS MAKE UP THE PDP: A LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA) TO MEASURE NONTHERMAL ELECTRON AND ION ENERGY SPECTRA AND PITCH ANGLE DISTRIBUTIONS FOR PARTICLE ENERGIES BETWEEN 2 EV AND 50 KEV, AN AC MAGNETIC WAVE SEARCH COIL SENSOR TO MEASURE MAGNETIC FIELDS WITH A FREQUENCY RANGE OF 10 HZ TO 30 KHZ, AC ELECTRIC AND ELECTROSTATIC WAVE ANALYZERS TO MEASURE ELECTRIC FIELDS WITH A FREQUENCY RANGE OF 10 HZ TO 1 GHZ, A DC ELECTROSTATIC DOUBLE PROBE WITH SPHERICAL SENSORS TO MEASURE ELECTRIC FIELDS IN ONE AXIS FROM 2 MV/M TO 2 V/M, A DC TRIAXIAL FLUXGATE MAGNETOMETER TO MEASURE MAGNETIC FIELDS FROM 12 MILLIGAUSS TO 1.5 GAUSS, A LANGMUIR PROBE TO MEASURE THERMAL ELECTRON DENSITIES BETWEEN 10.E4 AND 10.E7 PER CUBIC CM AND DENSITY IRREGULARITIES WITH 10-M TO 10-KM SCALE SIZE, A RETARDING POTENTIAL ANALYZER/DIFFERENTIAL VELOCITY PROBE TO MEASURE ION NUMBER DENSITY FROM 10.E2 TO 10.E7 PER CUBIC CM, THE ENERGY DISTRIBUTION FUNCTION BELOW 16 EV, AND DIRECTED ION VELOCITIES UP TO 15 KM/SEC, AN ION MASS SPECTROMETER TO MEASURE ION DENSITIES FROM 20 TO 2.E7 IONS PER CUBIC CM IN THE MASS RANGE FROM 1 TO 60 AMU, AND A PRESSURE GAUGE TO MEASURE AMBIENT PRESSURE FROM 10.E-3 TO 10.E-7 TCRR.

----- OSS-1, WEINBERG -----

INVESTIGATION NAME- CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE

NSSDC ID- SHOFT-4-06 INVESTIGATIVE PROGRAM CODE 5T
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - J.L. WEINBERG SPACE ASTRONOMY LAB
 OI - D.W. SCHUBERT STATE U OF NEW YORK
 OI - F. GIOVANE STATE U OF NEW YORK

BRIEF DESCRIPTION

THE OBJECTIVES OF THE CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE EXPERIMENT ARE TO: (1) DETERMINE THE OPTICAL PROPERTIES OF THE SHUTTLE INDUCED ATMOSPHERES, (2) OBSERVE THE DIFFUSE ASTRONOMICAL BACKGROUND, AND (3) OBSERVE THE FARTH'S LIND IN THE STUDY OF ATMOSPHERIC AEROSOLS. THE EXISTING KYLAR PHOTOMETER/CAMERA SYSTEM ADAPTED TO BE PALLET MOUNTED IS USED. THE PHOTOELECTRIC POLARIMETER MEASURES INTENSITY AND POLARIZATION OF SKY BRIGHTNESS IN 10 COLORS BETWEEN 400 AND 820 NANOMETERS. IT HAS A SELF-CONTAINED POINTING SYSTEM, AND AUTOMATIC SHUTDOWN AND START-UP PROVISIONS TO ALLOW MAXIMUM VIEWING TIME. THE INSTRUMENT CAN BE PROGRAMMED TO DO SKY SURVEY IN SEVERAL MODES. THE EXPERIMENT CYCLE IS SELECTABLE THROUGH AN AUTOMATIC PROGRAMMER.

***** SAN MARCO-D/L *****

SPACECRAFT COMMON NAME- SAN MARCO-D/L
 ALTERNATE NAMES-

NSSDC ID- SM-DL

LAUNCH DATE- 11/00/81 WEIGHT- 200. KG
 LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
 LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
 ITALY CRA
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 100. MIN INCLINATION- 3. DEG
 PERIAPSEIS- 290. KM ALT APOAPSEIS- 1010. KM ALT

PERSONNEL
 PI - M.B. WEINBERG NASA HEADQUARTERS
 OI - E.R. SCHUBERT NASA HEADQUARTERS
 OI - R.S. TATUM NASA-GSFC
 OI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE RESEARCH SATELLITES SAN MARCO -D/L AND -D/M IS TO EXPLORE THE RELATIONSHIP BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA WITH EMPHASIS ON LOWER ATMOSPHERIC WINDS AND THERMOSPHERE-IONOSPHERE PHENOMENA FROM LOW (SAN MARCO -D/L) AND MULTISTATIONARY (SAN MARCO -D/M) ORBITS. TWO SCOUT LAUNCH VEHICLES WILL INJECT BOTH SPACECRAFT INTO MUTUALLY PREDETERMINED ORBITS. BOTH SPACECRAFT HAVE PLANNED MISSION LIFETIMES OF 1.5 YR. THE SCIENCE INVESTIGATIONS IN SM-DL WILL MAKE USE OF THE FOLLOWING FIVE FLIGHT SENSORS: A DRAG BALANCE FOR DETERMINING NEUTRAL DENSITY, A WIND AND TEMPERATURE SPECTROMETER, AN ION VELOCITY INSTRUMENT, AN AIRGLOW SOLAR SPECTROMETER, AND AN ELECTRIC FIELD METER. THE SM-DL SATELLITE IS A 96.5-CM-DIAMETER SPHERE WITH FOUR 48-CM CANTED MONOPOLE TELEMETRY ANTENNAS AND THREE ORTHOGONAL PAIRS OF ELECTRIC FIELD PROBE SENSORS (ONE PAIR ORIENTED ALONG THE SPACECRAFT SPIN AXIS). AN INTERNAL STRUCTURAL CYLINDER (26-CM DIAM) EXTENDS SLIGHTLY THROUGH THE SPHERE AND IS COINCIDENT WITH THE SATELLITE SPIN AXIS. THE POWER SUPPLY CONSISTS OF A SOLAR CELL ARRAY SPLIT INTO TWO SECTIONS, TWO RECHARGEABLE NICKEL-CADMIUM BATTERIES, AND ASSOCIATED CIRCUITRY. THE SATELLITE ATTITUDE DATA ARE PROVIDED BY A TRIAXIAL MAGNETOMETER, A HORIZON SENSOR, AND A DIGITAL SUN SENSOR. A MAGNETIC TORQUING SYSTEM IS USED TO CONTROL SPIN RATE AND SPACECRAFT ATTITUDE. A TAPE RECORDER WILL RECORD THE PCM TELEMETRY AT 6000 BPS FOR A MAXIMUM PERIOD OF 90 MIN. THE TRANSMISSION TO THE GROUND WILL BE EITHER IN REAL TIME AT 6000 BPS OR ON RECORDER PLAYBACK AT 72 KBS.

----- SAN MARCO-D/L, DRUGLIO -----

INVESTIGATION NAME- DRAG BALANCE AND AIR DENSITY
 NSSDC ID- SM-DL -01 INVESTIGATIVE PROGRAM CODE 5T/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - L. DRUGLIO NATL RES COUNC ITALY

BRIEF DESCRIPTION

THE DRAG BALANCE INSTRUMENT, WHICH IS AN INTEGRAL PART OF THE SATELLITE, CONSISTS OF AN INNER MASS, AN ELASTIC ELEMENT, AND AN OUTER SHELL. THE DRAG BALANCE IS THE CONNECTING ELASTIC ELEMENT BETWEEN THE OUTER LIGHT SHELL AND THE INNER HEAVY BODY. THE CENTER OF THE BALANCE IS LOCATED AT THE SATELLITE GEOMETRIC CENTER, OR THAT POINT WHICH IS THE GEOMETRIC CENTER BOTH OF THE INNER BODY AND THE SHELL. THIS INSTRUMENT MEASURES THE RELATIVE TRANSLATIONS BETWEEN THE SHELL AND THE INNER BODY BOTH IN VALUE AND DIRECTION, RESOLVING ANY RELATIVE TRANSLATION ALONG THREE MUTUALLY ORTHOGONAL AXES. THESE THREE AXES ARE FIXED TO THE BODY, ONE OF THEM BEING COINCIDENT WITH THE POLAR SYMMETRY AXIS OF THE SATELLITE, BEING FIXED TO THE SATELLITE, THE AXIS ROTATES WITH IT IN THE FREE-PRECESSION MOTION AROUND THE CENTER OF GRAVITY. THE BALANCE IS DESIGNED IN SUCH A WAY THAT THE MAXIMUM TRANSLATION BETWEEN THE SHELL AND THE DRUM IS GENERALLY OF THE ORDER OF 0.01 MM. IN MOST CASES THE DRAG FORCE AT THE ORBIT APOGEE IS NEGLIGIBLE. AS A CONSEQUENCE, THE APOGEE DATA ARE USED TO GET AN IN-FLIGHT CALIBRATION OF THE BALANCE. THUS, THE TRANSLATION OF THE ELASTIC SYSTEM IS CHANGED INTO VOLTAGES THAT ARE AMPLIFIED AND DEMODULATED TO OBTAIN DC SIGNALS.

----- SAN MARCO-D/L, HANSON -----

INVESTIGATION NAME- ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI
 NSSDC ID- SM-DL -03 INVESTIGATIVE PROGRAM CODE 5T/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES

PERSONNEL
 PI - W.B. HANSON U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THIS EXPERIMENT IS A PLANAR RETARDING POTENTIAL ANALYZER, DESIGNED TO OBTAIN MEASUREMENTS OF RELATIVE THERMAL-ION VELOCITY, PLASMA DENSITY, AND ION TEMPERATURE. THE ION ANGLE-OF-ARRIVAL CAN BE DETERMINED BY USE IN THE INSTRUMENT DESIGN OF A SQUARE APERTURE COLLIMATOR AND A SPLIT COLLECTOR. TOGETHER WITH KNOWLEDGE OF SPACECRAFT MOTION, THIS ALLOWS COMPUTATION OF THE THREE-DIMENSIONAL THERMAL-ION MOTION ALONG THE ORBITAL PATH. PLASMA DENSITY AND TEMPERATURE IS CALCULATED BY INTERPRETATION OF THE VOLTAGE-APPERAGE PROFILE PRODUCED BY THE INSTRUMENT FOR A GIVEN IMPRESSED VOLTAGE PATTERN ON THE GRIDS AND COLLECTOR. ION VELOCITY MEASUREMENT IS PLANNED ONCE EACH SPACECRAFT SPIN PERIOD (10 S).

----- SAN MARCO-D/L, WAYNARD-----

INVESTIGATION NAME- 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI)

NSDC ID- SM-DL -09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - W.C. WAYNARD
OI - J.P. NEPPNER

NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO OBSERVE THE THREE COMPONENTS OF AMBIENT ELECTRIC FIELD OVER THE SATELLITE TRAJECTORY. THREE PAIRS, A PAIR FOR EACH COMPONENT, OF CYLINDRICAL PROBES ARE USED. A BODY IN A PLASMA ESTABLISHES A POTENTIAL RELATIVE TO THE PLASMA THAT MAINTAINS A CURRENT BALANCE. IF NO CURRENT IS DRAWN FROM THE BODY, ITS POTENTIAL DEPENDS ON THE POTENTIAL DIFFERENCES WITHIN THE PLASMA. FOR EACH COMPONENT, THE FLOATING POTENTIAL (OF EACH OF THE TWO SYMMETRICALLY PLACED PROBES WITH RESPECT TO THE SPACECRAFT) IS MEASURED. FROM THESE OBSERVATIONS, THE ELECTRIC FIELD CAN BE CALCULATED FOR KNOWN CONDITIONS OF SATELLITE MOTION, PROBE GEOMETRY, AND MAGNETIC FIELD. TWO PAIRS OF PROBES EXTEND FROM THE SATELLITE EQUATOR, AND ONE PAIR IS ORIENTED ALONG THE SPIN AXIS.

----- SAN MARCO-D/L, SCHMIDTKE-----

INVESTIGATION NAME- AIRGLOW-SOLAR SPECTROMETER

NSDC ID- SM-DL -02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
AERONOMY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G. SCHMIDTKE
OI - F. FISCHER
OI - M. KNOTHE
OI - W. MASCHKE
OI - C. MUNTNER

INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM
INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION

THE SENSOR MEASURES THE EQUATORIAL DAY AND NIGHT AIR-GLOW, THE SOLAR RADIATION REFLECTED FROM THE SURFACE AND CLOUDS, THE SOLAR RADIATION OF INTERPLANETARY AND INTERGALACTIC ORIGIN REACHING THE SATELLITE IN THE SPECTRAL RANGE FROM 700 TO 20 NM WITH A SPECTRAL RESOLUTION OF 0.7 TO 4 NM. FOUR SPECTROMETERS, 4 GRATINGS, AND 17 MULTIPLIERS ARE USED. A TOROIDAL CONCAVE GRATINGS, OF RADIUS EQUAL TO 119.5 MM, WITH HOLOGRAPHICALLY FORMED CURVED LINES HAS BEEN CHOSEN TO ACHIEVE WAVELENGTH SCANNING BY ROTATING THE GRATINGS. THE SCANNING WILL BE PERFORMED BY STEPWISE NOTATION OF THE GRATINGS WITHIN PLUS OR MINUS 3 DEG, ONE STEP AT EACH REVOLUTION OF THE SATELLITE. EXIT SLITS ARE POSITIONED AT OPTIMUM DISTANCES NEAR THE ROWLAND CIRCLE. THE EXIT SLITS ARE FOLLOWED BY MULTIPLIERS. A FILTER WHEEL PROVIDES THREE FILTERS FOR EACH MULTIPLIER WORKING ABOVE 130 NM.

----- SAN MARCO-D/L, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE SPECTROMETER (WATS)

NSDC ID- SM-DL -04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER
OI - G.R. CARIGNAN

NASA-GSFC
U OF MICHIGAN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE IN SITU NEUTRAL WINDS, NEUTRAL PARTICLE TEMPERATURES, AND THE CONCENTRATION OF SELECTED GASES. THREE COMPONENTS OF THE WINDS; ONE NORMAL TO THE SATELLITE DIRECTION, ARE MEASURED. TWO SCANNING BAFFLES ARE USED, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR, AS WAS USED ON SATELLITE ATMOSPHERE EXPLORER-C (AE-C) NEUTRAL ATMOSPHERE TEMPERATURE EXPERIMENT (NATE), AND ONE MOVING HORIZONTALLY NEARLY IDENTICAL IN CONCEPT TO THE VERTICALLY SCANNING BAFFLE AND INCORPORATED ON THE NATE FOR AE-D AND -E. THE MAGNITUDES OF THE HORIZONTAL AND VERTICAL COMPONENTS OF THE WIND NORMAL TO THE SPACECRAFT VELOCITY VECTOR ARE COMPUTED FROM MEASUREMENTS OF THE ANGULAR RELATIONSHIP BETWEEN THE NEUTRAL PARTICLE STREAM AND THE SENSOR. THE COMPONENT OF THE TOTAL STREAM VELOCITY IN THE SATELLITE DIRECTION IS MEASURED DIRECTLY BY THE RETARDING POTENTIAL QUADRUPOLE (RQP) THROUGH DETERMINATION OF THE REQUIRED RETARDING POTENTIAL. FROM THESE QUANTITATIVE MEASUREMENTS THE WIND VECTOR IS COMPUTED. THE TEMPERATURE TECHNIQUE USED ON THE AE NATE PROVIDES THE BASIS FOR THE TEMPERATURE MEASUREMENTS FOR

THIS MISSION. IT SHOULD BE EMPHASIZED THAT THE WIND AND TEMPERATURE MEASUREMENTS CAN BE PERFORMED IN THE SAME OPERATING MODE. FOR COMPOSITION MEASUREMENTS, THE RQP MASS SPECTROMETER IS USED IN A SEPARATE OPERATING MODE DESIGNED FOR THIS PURPOSE.

----- SAN MARCO-D/M-----

SPACECRAFT COMMON NAME- SAN MARCO-D/M
ALTERNATE NAMES-

NSDC ID- SM-DM

LAUNCH DATE- 11/08/82 WEIGHT- 65. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY

UNITED STATES NASA-OSG
ITALY CRA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC INCLINATION- 2.9 DEG
ORBIT PERIOD- 480. MIN APOAPSIS- 27400. KM ALT
PERIAPSIS- 420. KM ALT

PERSONNEL

MG - W.D. WEINBERG
SC - E.H. SCHREINING
PM - R.S. TATUM
PS - N.W. SPENCER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE RESEARCH SATELLITES SAN MARCO -D/L AND -D/M IS TO EXPLORE THE RELATIONSHIP BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA WITH EMPHASIS ON LOWER ATMOSPHERIC WINDS AND THERMOSPHERE-IONOSPHERE PHENOMENA FROM LOW (SAN MARCO-D/L) AND MULTISTATIONARY (SAN MARCO-D/M) ORBITS. TWO SCOUT LAUNCH VEHICLES WILL INJECT BOTH SPACECRAFT INTO MUTUALLY PREDETERMINED ORBITS. BOTH SPACECRAFT HAVE PLANNED MISSION LIFETIMES OF 1.5 YEARS. SAN MARCO-D/M IS BUILT AROUND A SINGLE EXPERIMENT. THE PURPOSE OF THIS SPACECRAFT IS TO MONITOR CLOUD COVER AND OZONE CONTENT. WITH ONE-THIRD THE PERIOD OF AN EARTH-SYNCHRONOUS OR STATIONARY SATELLITE, OBSERVATIONS MAY BE REPEATED THREE TIMES PER DAY. THE GENERAL APPEARANCE OF SM-D/M IS THAT OF TWO CYLINDERS WITH A COMMON AXIS, ONE WITH DIAMETER OF 70 CM AND HEIGHT OF 40 CM, WITH THE SECOND CYLINDER EXTENDING FROM THE END OF THE FIRST FOR AN ADDITIONAL 42 CM AND WITH A DIAMETER OF ABOUT 32 CM. THE SURFACE OF THE LARGER CYLINDER IS COVERED WITH 1296 SOLAR CELLS THAT FEED 2 RECHARGEABLE BATTERY PACKS. THE SPACECRAFT IS SPIN STABILIZED ALONG THE AXIS OF ITS CYLINDRICAL STRUCTURE, AND SCANNING OPERATION FOR THE INSTRUMENT IS DEPENDENT UPON THE SATELLITE SPIN.

----- SAN MARCO-D/M, BROGLIO-----

INVESTIGATION NAME- IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT

NSDC ID- SP-DM -01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - L. BROGLIO

NATL RES COUNC ITALY

BRIEF DESCRIPTION

THIS RADIOMETER EXPERIMENT IS DESIGNED TO MONITOR CLOUD COVER AND OZONE CONTENT FROM A NEAR-EQUATORIAL ORBIT. A HIGH-RESOLUTION (25-KM INSTANTANEOUS FIELD OF VIEW-IFOV) AND LOW-RESOLUTION (200-KM IFOV) MODE ARE BOTH AVAILABLE. EITHER MODE IS OPERATED THROUGH A COMMON TELESCOPE, FILTER-WHEEL, AND SCAN-MIRROR SYSTEM. THERE ARE THREE HG, CR, TE (MERCURY, CADMIUM, TELLURIUM) DETECTORS. THE HIGH-RESOLUTION (HR) MAPPING OBSERVES IN A 10.5-12.5 MICROMETER BAND. THE LOW-RESOLUTION (LR) MULTISPECTRAL MAPPING OPERATES IN THE SAME BAND (CHANNEL 3) PLUS SIX OTHER BANDS BETWEEN 8.85 AND 15.81 MICROMETERS. BANDWIDTH FOR EACH OF THESE SIX BANDS IS LESS THAN .35 MICROMETERS, AND THE LOW EDGE OF THE BANDWIDTHS ARE AT 8.85, 9.59 (OZONE), 13.81, 14.14 (CO2), 14.59 (CO2) AND 14.90 (CO2) MICROMETERS. IN THE LR MODE, TWO CHANNELS ARE SELECTED FOR SIMULTANEOUS OBSERVING. SCANNING IS ACCOMPLISHED BY SPACECRAFT SPIN PLUS MIRROR STEPPING ONCE EACH REVOLUTION. ONE FRAME REQUIRES 6.5 (IMAGERY) TO 7.5 (SOUNDING) MIN AND CALIBRATION OCCURS ONCE EACH FRAME.

----- SRE-----

SPACECRAFT COMMON NAME- SRE
ALTERNATE NAMES- SOLAR MESOSPHERE ENPL

NSDC ID- SRE

LAUNCH DATE- 09/30/81 WEIGHT- 145. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-088

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.6 MIN
PERIAPSEID- 900. KM ALT

INCLINATION- 97.6 DEG
APOAPSEID- 900. KM ALT

PERSONNEL

MO - R.W. WEINRED
SC - G.G. TILFORD
PM - J.J. PAULSON
PB - C.A. BARTH

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
U OF COLORADO

BRIEF DESCRIPTION

THE SOLAR MESOSPHERE EXPLORER (SME) MISSION OBJECTIVE IS TO UNDERSTAND WHAT PHYSICAL PHENOMENA CAUSE CHANGES IN THE DENSITY AND DISTRIBUTION OF THE EARTH'S OZONE. THIS OBJECTIVE IS ACCOMPLISHED BY MEASURING OZONE PARAMETERS AND THE PROCESSES IN THE MESOSPHERE AND UPPER STRATOSPHERE THAT DETERMINE THEIR VALUES. SIMULTANEOUS MEASUREMENTS ARE MADE OF OZONE, THE SOLAR ULTRAVIOLET RADIATION THAT PRODUCES AND DESTROYS IT, AND THE AMOUNT OF WATER VAPOR AND NITROGEN DIOXIDE WHOSE PHOTODISSOCIATION PRODUCTS CAUSE CATALYTIC DESTRUCTION OF OZONE. TEMPERATURE AND PRESSURE ARE ALSO MEASURED. THE SATELLITE EXPERIMENT COMPLEMENT CONSISTS OF A SOLAR ULTRAVIOLET SPECTROMETER, AN OZONE UV SPECTROMETER, AN INFRARED RADIOMETER, AN INFRARED SPECTROMETER, AND A NITROGEN DIOXIDE SPECTROMETER. IN ADDITION, A SOLAR PROTON ALARM MECHANISM IS CARRIED TO MEASURE THE INTEGRATED SOLAR FLUX IN THE RANGE 30-500 REV. SPIN STABILIZED AT ABOUT 8 RPM, THE SATELLITE MOVES IN A 3 A.M. - 3 P.M. SUN-SYNCHRONOUS ORBIT. THE SPACECRAFT SHAPE IS THAT OF A RIGHT OCTAGONAL PRISM SLIGHTLY UNDER 1 M IN DIAMETER AND .75 M IN LENGTH. THE BASE MODULE HOUSES ALL SPACECRAFT SUBSYSTEMS EXCEPT THE SCIENTIFIC PAYLOAD AND DATA STORAGE. THE OBSERVATORY MODULE CONTAINING THE FIVE SCIENTIFIC INSTRUMENTS, ASSOCIATED ENGINEERING SENSORS, AND THE DATA STORAGE SYSTEM IS ATTACHED AS AN ASSEMBLY TO ONE OF THE OCTAGON FACED OF THE BASE MODULE. THE LAUNCH VEHICLE ADAPTOR IS MOUNTED TO THE OPPOSITE OCTAGONAL FACE. THE SPIN AXIS IS ORIENTED NORMAL TO THE ORBITAL PLANE IN THE DATA-TAKING MODE. A MAGNETIC CONTROL SYSTEM MAINTAINS THE ATTITUDE OF THE SPIN AXIS TO WITHIN PLUS OR MINUS 1 DEG PITCH AND PLUS OR MINUS 2 DEG YAW, AND IS NOT USED DURING DATA-TAKING PERIODS. THERE IS A SEPARATE SPIN RATE CONTROL. THE COMMAND SYSTEM IS CAPABLE OF EXECUTING EITHER DISCRETE OR MODAL COMMANDS IN REAL TIME OR FROM STORED PROGRAM CONTROL. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE TELEMETRY SYSTEM IS PCM AND CAN BE USED EITHER IN A REAL TIME OR IN A TAPE RECORDER MODE.

----- SME, BARTH-----

INVESTIGATION NAME- UV OZONE

NSSDC ID- SME -01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - A.J. STEWART
OI - C.W. HORD
OI - P.J. CRUTZEN
OI - R.E. DICKINSON
OI - P.L. BAILEY
OI - J.F. NOXON
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OI - J. LONDON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE ULTRAVIOLET OZONE EXPERIMENT IS TO MEASURE OZONE ABSORPTION OF RAYLEIGH-SCATTERED SUNLIGHT IN THE MIDDLE ULTRAVIOLET REGION. A DUAL CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2460-3100 A AND 2710-3350 A VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- SME -02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.J. STEWART

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OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE INFRARED RADIOMETER EXPERIMENT IS TO DETERMINE THE ALTITUDE-MIXING RATIO PROFILES FOR WATER AND OZONE FROM THERMAL EMISSIONS. PRESSURE AND TEMPERATURE ARE ALSO DETERMINED. A FOUR-CHANNEL RADIOMETER/TELESCOPE WITH TWO FILTER-DETECTOR COMBINATIONS OPERATING IN THE MICROMETER REGIONS 6.1-7.2, 8.6-10.6, 14.7-15.7, AND 13.2-17.2 VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- 1.27 MICROMETER AIRGLOW

NSSDC ID- SME -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.J. STEWART
OI - C.W. HORD
OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE 1.27-MICROMETER AIRGLOW EXPERIMENT IS TO OBTAIN LIMB-SCANNING MEASUREMENTS OF THE 1.27-MICROMETER AIRGLOW IN THE 50- TO 80-KM ALTITUDE RANGE, AND OF THE HYDROXYL EMISSION BETWEEN 0.8 AND 2.4 MICROMETERS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 0.7-1.4 AND 1.2-2.4 MICROMETERS VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- VISIBLE NITROGEN DIOXIDE

NSSDC ID- SME -04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.J. STEWART
OI - C.W. HORD
OI - G.E. THOMAS
OI - J. LONDON
OI - P.J. CRUTZEN
OI - R.E. DICKINSON

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BRIEF DESCRIPTION

THE OBJECTIVE OF THE VISIBLE NITROGEN DIOXIDE EXPERIMENT IS TO MEASURE THE DISTRIBUTION OF NITROGEN DIOXIDE IN THE 20- TO 40-KM ALTITUDE REGION. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN WAVELENGTH REGIONS OF 3250-4500 A AND 5200-7700 A VIEWS NORMAL TO THE SPIN AXIS. THE FIELD OF VIEW SWEEPS THROUGH THE LIMB SAMPLING A SUCCESSION OF 20 ELEMENTS OF THE ATMOSPHERE, EACH APPROXIMATELY 3.5 KM IN HEIGHT AT THE EARTH'S LIMB.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR UV MONITOR

NSSDC ID- SME -05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH
OI - G.J. ROTTMAN
OI - R.J. THOMAS
OI - J.C. GILLE
OI - P.L. BAILEY
OI - J.F. NOXON
OI - A.J. STEWART

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PERSONNEL
 PI - C.A. BARTH U OF COLORADO
 OI - G.J. ROTHMAN U OF COLORADO
 OI - R.J. THOMAS U OF COLORADO
 OI - J.C. GILLE NATL CTR FOR ATMOS RES
 OI - P.L. BAILEY NATL CTR FOR ATMOS RES
 OI - J.F. NOKON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. MORD U OF COLORADO
 OI - G.E. THOMAS U OF COLORADO
 OI - J. LONDON U OF COLORADO
 OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
 OI - R.E. DICKINSON NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
 THE OBJECTIVE OF THE SOLAR ULTRAVIOLET MONITOR EXPERIMENT IS TO MONITOR THE INCOMING SOLAR RADIATION TO DETERMINE THE EFFECT ON THE OZONE CONCENTRATIONS. A DUAL-CHANNEL EBERT-FASTIE SPECTROMETER OPERATING IN THE REGIONS 2200-3100 Å AND 1600-2500 Å HAS A LOOK DIRECTION 45 DEG TO THE SPACECRAFT AXIS OF ROTATION. IN A 3 A.M. - 3 P.M. ORBIT THE SOLAR MONITOR SCANS THROUGH THE SUN ONCE PER SPACECRAFT REVOLUTION. THE ACCEPTANCE ANGLE OF THE INSTRUMENT IS PLUS OR MINUS 10 DEG.

----- SRE, BARTH-----

INVESTIGATION NAME- SOLAR PROTON ALARM
 NSSDC ID- SRE -06 INVESTIGATIVE PROGRAM
 CODE 57
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - C.A. BARTH U OF COLORADO
 OI - G.J. ROTHMAN U OF COLORADO
 OI - R.J. THOMAS U OF COLORADO
 OI - J.C. GILLE NATL CTR FOR ATMOS RES
 OI - P.L. BAILEY NATL CTR FOR ATMOS RES
 OI - J.F. NOKON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. MORD U OF COLORADO
 OI - G.E. THOMAS U OF COLORADO
 OI - J. LONDON U OF COLORADO
 OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
 OI - R.E. DICKINSON NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
 THE SOLAR PROTON ALARM EXPERIMENT DETECTS PROTONS BETWEEN 30 AND 500 MEV. WHEN THE FLUX EXCEEDS A SELECTED VALUE THE INSTRUMENT SIGNALS AN OPPORTUNITY TO ALTER SCIENCE COMMANDS TO OBSERVE THE EFFECTS OF SOLAR PROTONS ON ATMOSPHERIC CONSTITUENTS.

***** SPACE SHUTTLE LDEF-A*****

SPACECRAFT COMMON NAME- SPACE SHUTTLE LDEF-A
 ALTERNATE NAMES- LONG DURATION EXPOS.FAC., LDEF

NSSDC ID- 55LDEF

LAUNCH DATE- 01/00/84 WEIGHT- 9200. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OAST

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 93.3 MIN INCLINATION- 28.5 DEG
 PERIAPSIS- 340. KM ALT APOAPSIS- 340. KM ALT

PERSONNEL
 MC - M.C. HILL NASA HEADQUARTERS
 PM - W.H. KINARD NASA-LARC

BRIEF DESCRIPTION
 THE LDEF IS BEING DEVELOPED BY THE NASA OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY AND THE NASA/LANGLEY RESEARCH CENTER TO ACCOMMODATE, USING SHUTTLE, A CLASS OF TECHNOLOGY, SCIENCE, AND APPLICATIONS EXPERIMENTS WHICH REQUIRE A FREE-FLYING EXPOSURE IN SPACE AND WHICH BENEFIT FROM POST-FLIGHT LABORATORY INVESTIGATIONS WITH THE RETRIEVED EXPERIMENT HARDWARE. IT IS PLANNED TO REGULARLY LAUNCH AND RECOVER LDEF AT APPROXIMATELY YEARLY INTERVALS. THE APPROVED EXPERIMENTS ARE NOW BEING DEVELOPED.

----- SPACE SHUTTLE LDEF-A, AMLCRN-----

INVESTIGATION NAME- ORBITAL LUBRICATION EXPERIMENT
 NSSDC ID- 55LDEF -25 INVESTIGATIVE PROGRAM
 CODE 85
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - G. AMLBORN BALL AEROSPACE SVS DIV
 OI - V. FRIEDEL BALL AEROSPACE SVS DIV

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO EVALUATE THE CUMULATIVE EFFECTS OF SPACE ON LUBRICANT OILS. SMALL CHANGES CAUSED BY SPACE EXPOSURE ARE IMPORTANT TO SUCH PHYSICAL BEHAVIOR AS FRICTION AND SURFACE WETTING. RADIATION EFFECTS ARE VIRTUALLY UNKNOWN. LUBRICANTS CONSIDERED FOR TESTING INCLUDE SATURATED HYDROCARBONS, DI-ESTERS, SILICONES, PENTAERYTHRITOL ESTERS, AND PERFLUOROPOLYETHERS.

----- SPACE SHUTTLE LDEF-A, BANKS-----

INVESTIGATION NAME- ION BEAM TEXTURED AND COATED SURFACES
 NSSDC ID- 55LDEF -01 INVESTIGATIVE PROGRAM
 CODE 85
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - D.A. BANKS NASA-LERC
 OI - M.J. MERTICH NASA-LERC
 OI - A.J. WEIGAND NASA-LERC

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURES THE EFFECT OF THE SPACE SHUTTLE LAUNCH AND NEAR-EARTH SPACE ENVIRONMENT EXPOSURE ON THE OPTICAL PROPERTIES OF ION BEAM TEXTURED HIGH-ABSORBANCE SOLAR THERMAL CONTROL SURFACES. VERIFICATION OF THE DURABILITY OF THESE SURFACES IS CONDUCTIVE TO THE ACCEPTANCE OF THIS TECHNOLOGY ON FUTURE SPACE SYSTEMS.

----- SPACE SHUTTLE LDEF-A, BLUE-----

INVESTIGATION NAME- EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS
 NSSDC ID- 55LDEF -26 INVESTIGATIVE PROGRAM
 CODE 85
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.D. BLUE GEORGIA INST OF TECH
 OI - J.J. GALLAGHER GEORGIA INST OF TECH
 OI - R.G. SHACKELFORD GEORGIA INST OF TECH

BRIEF DESCRIPTION
 THE EFFECTS OF SPACE EXPOSURE ON THE PERFORMANCE OF LASERS, RADIATION DETECTORS, AND OTHER OPTICAL COMPONENTS ARE MEASURED. FROM THE RESULTS OBTAINED, GUIDES FOR COMPONENT SELECTION ARE ESTABLISHED.

----- SPACE SHUTTLE LDEF-A, BOURNIEAU-----

INVESTIGATION NAME- OPTICAL FIBERS AND COMPONENTS
 NSSDC ID- 55LDEF -43 INVESTIGATIVE PROGRAM
 CODE 85
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J. BOURNIEAU CERT/ONERA

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE RADIATION EFFECTS ON FIBER OPTIC WAVEGUIDES WHICH ARE USED AS IMPORTANT COMPONENTS IN NEW COMMUNICATION SYSTEMS, OPTOELECTRONIC CIRCUITS AND DATA LINKS. COMPARISONS OF RADIATION-INDUCED DAMAGES IN FLIGHT AND DURING LABORATORY TESTS ARE TO DETERMINE THE VALIDITY OF IRRADIATION TESTS WITH RADIOACTIVE SOURCES.

----- SPACE SHUTTLE LDEF-A, BRANDHORST, JR.-----

INVESTIGATION NAME- ADVANCED PHOTOVOLTAIC EXPERIMENT
 NSSDC ID- 55LDEF -02 INVESTIGATIVE PROGRAM
 CODE 85
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - H.W. BRANDHORST, JR. NASA-LERC
 OI - A.P. FORESTIERI NASA-LERC

BRIEF DESCRIPTION
 THIS EXPERIMENT IS FLOWN TO INVESTIGATE THE EFFECT OF SPACE EXPOSURE ON NEW SOLAR CELL AND ARRAY MATERIALS, TO EVALUATE THEIR PERFORMANCE, AND TO MEASURE LONG-TIME VARIATIONS IN THE SPECTRAL CONTENT OF SUNLIGHT. SOLAR CELLS ARE CALIBRATED FOR SPACE USE.

ORIGINAL PAGE IS
 OF POOR QUALITY

----- SPACE SHUTTLE LDEF-A, BUCKER-----

INVESTIGATION NAME- FREE FLYER BIOSTACK

NSSDC ID- SSLDEF -50

INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. BUCKER

DFVLR

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO INVESTIGATE THE BIOLOGICAL EFFECT OF THE STRUCTURED COMPONENTS OF COSMIC RADIATION DURING SPACE FLIGHT, WITH EMPHASIS ON THE EFFECTS OF INDIVIDUAL VERY HEAVY IONS. QUANTITATIVE ASSESSMENT OF THE HAZARDS OF HEAVY ION PARTICLES TO MAN IN SPACE PERMITS THE ESTABLISHMENT OF SUITABLE PROTECTION GUIDELINES FOR MAN AND BIOLOGICAL EXPERIMENTS IN THE FUTURE SPACE FLIGHTS.

----- SPACE SHUTTLE LDEF-A, CALHOON-----

INVESTIGATION NAME- CASCADE VARIABLE CONDUCTANCE HEAT PIPE

NSSDC ID- SSLDEF -39

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - L.D. CALHOON

MCDONNELL-DOUGLAS CORP

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO VERIFY THE CAPABILITY OF A VARIABLE-CONDUCTANCE HEAT PIPE SYSTEM TO PROVIDE PRECISE TEMPERATURE CONTROL OF LONG-LIFE SPACECRAFT, WITHOUT NEED OF FEEDBACK HEATER OR OTHER POWER SOURCES FOR TEMPERATURE ADJUSTMENT, UNDER CONDITIONS OF WIDELY VARYING POWER INPUT AND THE SPACE ENVIRONMENT.

----- SPACE SHUTTLE LDEF-A, CALLEN-----

INVESTIGATION NAME- SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS

NSSDC ID- SSLDEF -08

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - W.R. CALLEN
OI - T.K. GAYLORD

GEORGIA INST OF TECH
GEORGIA INST OF TECH

BRIEF DESCRIPTION

THE EFFECT OF LONG SPACE EXPOSURE ON ELECTRO-OPTIC CRYSTALS FOR USE IN ULTRA-HIGH CAPACITY SPACE DATA STORAGE AND RETRIEVAL SYSTEMS IS TESTED. THE INFORMATION OBTAINED HELPS DEVELOP HIGH BIT CAPACITY RECORDER AND MEMORY SYSTEMS.

----- SPACE SHUTTLE LDEF-A, CRIFO-----

INVESTIGATION NAME- THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE

NSSDC ID- SSLDEF -40

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.F. CRIFO
OI - J.M. BERSET

CNRS-LPSP
CNRS-LPSP

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO TEST THE SPACE BEHAVIOR OF VACUUM UV OPTICAL COMPONENTS (EUV THIN FILMS, UV GAS FILTERS, PHOTOCATHODES AND UV CRYSTAL FILTERS) AND TO PROVIDE DATA FOR THE DEVELOPMENT AND QUALIFICATION OF NEW COMPONENTS.

----- SPACE SHUTTLE LDEF-A, DELASI-----

INVESTIGATION NAME- EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS

NSSDC ID- SSLDEF -20

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.J. DELASI
OI - F. KUEHNE
OI - M. ROSSI

GRUMMAN AEROSPACE CORP
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BRIEF DESCRIPTION

THIS EXPERIMENT TESTS THE PERFORMANCE IN THE SPACE ENVIRONMENT OF METALLIZED DIELECTRIC STRUCTURES WHICH ARE BEING CONSIDERED FOR DIPOLE ARRAY, TO OBTAIN QUANTITATIVE DATA ON THE DEGRADATION OF MECHANICAL, OPTICAL AND DIELECTRIC PROPERTIES, AND TO EVALUATE THE UTILITY OF COATINGS TO PREVENT OR RETARD DEGRADATION OF THESE STRUCTURES.

----- SPACE SHUTTLE LDEF-A, FELBECK-----

INVESTIGATION NAME- INFLUENCE OF SPACE EXPOSURE ON MECH PROPERTIES OF HI-TOUGHNESS GRAPHITE-EPOXY

NSSDC ID- SSLDEF -06

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - D.K. FELBECK

U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT IS FLOWN TO TEST THE EFFECT OF EXTENDED EXPOSURE TO A SPACE ENVIRONMENT ON THE MECHANICAL PROPERTIES OF A SPECIALLY TOUGHENED 5208/T300 GRAPHITE-EPOXY COMPOSITE MATERIAL. SPECIMENS MADE BY RECENTLY DEVELOPED TECHNIQUES OF INTERMITTENT INTERLAMINAR BONDING ARE EXPOSED AND AFTERWARD TESTED FOR (1) FRACTURE TOUGHNESS, (2) TENSILE STRENGTH, AND (3) ELASTIC MODULUS.

----- SPACE SHUTTLE LDEF-A, FILZ-----

INVESTIGATION NAME- PASSIVE COSMIC RADIATION DETECTOR

NSSDC ID- SSLDEF -14

INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - R.C. FILZ
OI - R. BEAUJEAN
OI - P.J. MCNULTY
OI - C.L. PEACOCK
OI - P.S. YOUNG

USAF GEOPHYS LAB
U OF KIEL
CLARKSON COLL OF TECH
NASA-MSFC
MISSISSIPPI STATE U

BRIEF DESCRIPTION

A PHOTOGRAFIC EMULSION PACKAGE IS EXPOSED TO OBTAIN INFORMATION ON THE FLUX AND ENERGY SPECTRUM OF TRAPPED RADIATION.

----- SPACE SHUTTLE LDEF-A, FLAMAND-----

INVESTIGATION NAME- RULED AND HOLOGRAPHIC GRATINGS

NSSDC ID- SSLDEF -42

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J. FLAMAND

INSTRUMENT SA/JOBIN-R

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE LONG-TERM STABILITY OF VARIOUS RULED AND HOLOGRAPHIC GRATINGS WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, GREGORY-----

INVESTIGATION NAME- THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE

NSSDC ID- SSLDEF -19

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - J.C. GREGORY
OI - P.M. PETERS

U OF ALABAMA
NASA-MSFC

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE WHAT EFFECTS FROM THE IMPINGEMENT OF HIGH FLUXES OF ATOMIC OXYGEN ON VARIOUS SOLID SURFACES ARE MEASURABLE AND TO INVESTIGATE THE MECHANISMS OF INTERACTION. THIS IS ACCOMPLISHED BY USING A WIDE VARIETY OF MATERIALS, SOME NOT CHEMICALLY AFFECTED BY OXYGEN, AND ALTERING THE EXPOSURE, ANGLE OF INCIDENCE, AND TEMPERATURE OF THE SUBSTRATES BY THEIR POSITION ON THE LDEF SPACECRAFT AND BY EXPERIMENT DESIGN.

----- SPACE SHUTTLE LDEF-A, GRUBER-----

INVESTIGATION NAME- SPACE POWER EXPERIMENT

NSSDC ID- SSLDEF -11 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.P. GRUBER NASA-LERC
OI - J.C. KOLECKI NASA-LERC

BRIEF DESCRIPTION
THIS EXPERIMENT DEMONSTRATES A LOW-COST APPROACH USING
COMMERCIALY AVAILABLE HARDWARE FOR SPACE POWER APPLICATIONS
LESS THAN 100 WATTS, AND OFFERS THE POTENTIAL FOR SIGNIFICANT
SAVINGS IN FUTURE POWER SYSTEMS.

----- SPACE SHUTTLE LDEF-A, HANKS-----

INVESTIGATION NAME- SHUTTLE BAY ENVIRONMENT MEASUREMENTS

NSSDC ID- SSLDEF -29 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.R. HANKS NASA-LARC
OI - J.P. YOUNG NASA-GSFC
OI - F.J. ON NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE THE ACOUSTIC, DYNAMIC,
PRESSURE AND THERMAL ENVIRONMENTS A LARGE HEAVY PAYLOAD WILL
EXPERIENCE IN THE SHUTTLE BAY DURING LAUNCH AND RE-ENTRY.

----- SPACE SHUTTLE LDEF-A, HICKEY-----

INVESTIGATION NAME- PASSIVE EXPOSURE OF EARTH RADIATION
BUDGET EXPERIMENT COMPONENTS

NSSDC ID- SSLDEF -27 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.R. HICKEY EPPLEY LAB, INC
OI - F.J. GRIFFIN EPPLEY LAB, INC

BRIEF DESCRIPTION
EARTH RADIATION BUDGET (ERB) EXPERIMENTS REQUIRE
ACCURACIES IN SOLAR AND EARTH FLUX RADIATION MEASUREMENTS IN
FRACTIONAL PERCENTAGES. THIS EXPERIMENT EXPOSES ERB CHANNEL
COMPONENTS, THEN RETRIEVES AND RESUBMITS THEM TO RADIOMETRIC
CALIBRATION. CORRECTIONS ARE APPLIED TO ERB RESULTS.
INFORMATION IS OBTAINED TO HELP SELECT COMPONENTS FOR FUTURE
SOLAR AND ERB EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, HORZ-----

INVESTIGATION NAME- CHEMISTRY OF MICROMETEOROIDS

NSSDC ID- SSLDEF -51 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - F. HORZ NASA-JSC
OI - D.S. MCKAY NASA-JSC
OI - D.A. MORRISON NASA-JSC
OI - D.E. BROWNLEE U OF WASHINGTON
OI - R.M. HOUSLEY ROCKWELL INTL CORP

BRIEF DESCRIPTION
THE OBJECTIVE OF THE EXPERIMENT IS TO OBTAIN CHEMICAL
ANALYSIS OF A STATISTICALLY SIGNIFICANT NUMBER OF
MICROMETEOROIDS. INFORMATION REGARDING THEIR DENSITY, SHAPE,
AND MASS FLUX IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, HUMES-----

INVESTIGATION NAME- SPACE DEBRIS IMPACT STUDY

NSSDC ID- SSLDEF -36 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D.H. HUMES NASA-LARC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO DETERMINE THE TYPE AND
DEGREE OF DAMAGE WHICH IS EXPECTED FROM METEOROID IMPACTS ON
EXPOSED TARGETS OF SEVERAL DIFFERENT CONFIGURATIONS. THESE
DATA SHOULD HELP IN THE DESIGN OF FUTURE SPACECRAFT WHICH
BECAUSE OF THEIR SIZES AND EXPECTED LIFETIMES, WOULD OTHERWISE
HAVE HIGH PROBABILITIES OF DAMAGE CAUSED BY METEOROID IMPACTS.

----- SPACE SHUTTLE LDEF-A, JOHNSTON-----

INVESTIGATION NAME- FIBER OPTICS EXPERIMENT

NSSDC ID- SSLDEF -03 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - A.R. JOHNSTON NASA-JPL

BRIEF DESCRIPTION
THIS EXPERIMENT DETERMINES LONG-TERM DEGRADATION OF FIBER
OPTIC DATA TRANSMISSION EQUIPMENT AND QUALIFIES DESIGNS FOR
MOUNTING TECHNIQUES, TERMINAL COUPLING, AND SHEATHS. FIBER
OPTIC TRANSMISSION LINES ARE REQUIRED FOR FUTURE SATELLITES
BECAUSE OF THEIR LARGE BANDWIDTHS, LACK OF ELECTROMAGNETIC
INTERFERENCE PROBLEMS, LOW WEIGHT AND COST, AND SAFETY.

----- SPACE SHUTTLE LDEF-A, LAVOI-----

INVESTIGATION NAME- LARGE SPACE STRUCTURE LIGHTING
EVALUATION

NSSDC ID- SSLDEF -47 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - P.A. LAVOI ILC TECHNOLOGY INC
OI - E.J. REINBOLT NASA-MSFC

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO OBTAIN DATA WHICH
PROVIDE A BASIS TO CONFIDENTLY SELECT LIGHTS FOR FUTURE
LONG-DURATION SPACE APPLICATIONS, SUCH AS LARGE SPACE
STRUCTURES. PRESENT STATE-OF-THE-ART LIGHTS ARE PLACED IN THE
SPACE ENVIRONMENT WITH APPROPRIATE INSTRUMENTATION. A BASIC
KNOWLEDGE OF THE OPERATION OF CONFINED PLASMA WITHOUT
MODIFICATION BY CONVECTION WILL LEAD TO SIGNIFICANTLY IMPROVED
LAMPS DESIGNED FOR TERRESTRIAL USE.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW
GRAVITY

NSSDC ID- SSLDEF -17 INVESTIGATIVE PROGRAM
CODE RS/CO-OP
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - M.D. LIND ROCKWELL INTER SCI CTR
OI - K.F. NIELSEN TECH U OF DENMARK

BRIEF DESCRIPTION
THIS EXPERIMENT DEVELOPS A NOVEL METHOD FOR GROWING
CRYSTALS FROM SOLUTIONS. THIS METHOD CONSISTS OF ALLOWING TWO
OR MORE REACTANT SOLUTIONS TO DIFFUSE SLOWLY TOWARDS EACH OTHER
IN A REGION OF PURE SOLVENT IN WHICH THEY REACT TO FORM SINGLE
CRYSTALS OF A DESIRED SUBSTANCE. SEVERAL CRYSTALS OF
IMPORTANCE IN RESEARCH AND TECHNOLOGY ARE OF INTEREST.

----- SPACE SHUTTLE LDEF-A, LIND-----

INVESTIGATION NAME- INTERSTELLAR GAS

NSSDC ID- SSLDEF -48 INVESTIGATIVE PROGRAM
CODE SC/CO-OP
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - D.L. LIND NASA-JSC
OI - J. GEISS U OF BERNE
OI - F. BUHLER U OF BERNE

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO ANALYZE THE
INTERSTELLAR NOBLE GAS ATOMS WHICH PENETRATE THE HELIOSPHERE TO
THE VICINITY OF THE EARTH. BY COLLECTING THESE PARTICLES AT
SEVERAL LOCATIONS IN THE EARTH'S ORBIT, IT IS POSSIBLE TO STUDY
THE DYNAMICS OF THE INTERSTELLAR WIND AS IT FLOWS THROUGH THE
HELIOSPHERE AND INTERACTS WITH THE SOLAR PHOTON FLUX AND SOLAR
WIND. THE EXPERIMENT ALSO INVESTIGATES CHARACTERISTICS OF THE
INTERSTELLAR MEDIUM OUTSIDE THE REGION OF THE SOLAR SYSTEM.

----- SPACE SHUTTLE LDEF-A, MALHERBE-----

INVESTIGATION NAME- VACUUM DEPOSITED OPTICAL COATINGS

NSSDC ID- SSLDEF -41

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A. MALHERBE NATRA/SFOM OPTICAL DIV

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO INVESTIGATE THE LONG-TERM STABILITY OF A WIDE RANGE OF VACUUM DEPOSITED OPTICAL COATINGS WHICH ARE USED IN SPACECRAFT OPTICAL AND ELECTRO-OPTICAL INSTRUMENTS.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- STUDY OF METEOROID IMPACT CRATERS ON VARIOUS MATERIAL

NSSDC ID- SSLDEF -32

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.C. MANDEVILLE CERT/ONERA

BRIEF DESCRIPTION

THE MAIN GOAL OF THIS EXPERIMENT IS TO STUDY IMPACT MICROCRATERS PRODUCED BY MICROMETEOR IMPACTS ON SELECTED MATERIALS (METALS, GLASSES, MINERALS) IN THE FORM OF THICK TARGETS. INTERPLANETARY DUST PARTICLES ARE EXPECTED TO FORM WELL-DEFINED CRATERS UPON IMPACTING THE EXPOSED MATERIALS AT VERY HIGH VELOCITY. THE STUDY OF CRATER FREQUENCY AND IMPACT FEATURES PRIMARILY GIVES DATA ON MASS-FLUX DISTRIBUTION OF MICROMETEORIDS, AND TO A LESSER EXTENT PROVIDES VELOCITY MAGNITUDE AND DIRECTION.

----- SPACE SHUTTLE LDEF-A, MANDEVILLE-----

INVESTIGATION NAME- DUST DEBRIS COLLECTION WITH STACKED DETECTORS

NSSDC ID- SSLDEF -33

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
DUST

PERSONNEL

PI - J.C. MANDEVILLE CERT/ONERA

BRIEF DESCRIPTION

THE AIM OF THIS EXPERIMENT IS TO INVESTIGATE, PRIMARILY, THE FEASIBILITY FOR FUTURE MISSIONS OF MULTILAYER THIN FILM DETECTORS ACTING AS ENERGY SORTERS IN ORDER TO COLLECT MICROMETEORIDS, IF NOT IN THEIR ORIGINAL SHAPE, AT LEAST AS FRAGMENTS SUITABLE FOR CHEMICAL ANALYSIS.

----- SPACE SHUTTLE LDEF-A, McDONNELL-----

INVESTIGATION NAME- MULTIPLE FOIL MICROABRASION PACKAGE

NSSDC ID- SSLDEF -31

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - J.A.M. McDONNELL U OF KENT
OI - D.G. ASHWORTH U OF KENT
OI - W.C. CAREY U OF KENT
OI - R.P. FLAVILL U OF KENT
OI - R.C. JENNISON U OF KENT

BRIEF DESCRIPTION

THIS EXPERIMENT EVALUATES THE NEAR-EARTH PICO-PARTICLE ENVIRONMENT BY PENETRATION OF MICROMETER THICKNESS MULTIPLE-FOIL ARRAYS. RELIABLE DEFINITION OF THE SIZE, VELOCITY AND DISTRIBUTION OF THE NEAR-EARTH SOLID PARTICLE ENVIRONMENT AND PARTICLE COMPOSITION ANALYSIS SUPERSEDES RESULTS OBTAINED FROM OTHER RELATED PASSIVE EXPERIMENTS.

----- SPACE SHUTTLE LDEF-A, MCINTOSH, JR.-----

INVESTIGATION NAME- LOW TEMPERATURE HEAT PIPE EXPERIMENT

NSSDC ID- SSLDEF -12

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R. MCINTOSH, JR. NASA-GSFC
OI - S. OLLENDORF NASA-GSFC
OI - C.R. MCCREIGHT NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT EVALUATES THE PERFORMANCE CHARACTERISTICS IN THE SPACE ENVIRONMENT OF A FIXED CONDUCTANCE TRANSPORTER HEAT PIPE, A THERMAL DIODE HEAT PIPE, AND A LOW-TEMPERATURE PHASE CHANGE MATERIAL.

----- SPACE SHUTTLE LDEF-A, MILLER-----

INVESTIGATION NAME- INDUCED ENVIRONMENT CONTAMINATION MONITOR

NSSDC ID- SSLDEF -30

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - E.H. MILLER NASA-MSFC
OI - J.A. FOUNTAIN NASA-MSFC
OI - R.C. LINTON NASA-MSFC

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES THE MOLECULAR AND PARTICULATE CONTAMINATION A MASSIVE PAYLOAD EXPERIENCES IN THE SHUTTLE BAY DURING THE ORBITAL PERIOD, AND POSSIBLE PLUME IMPINGEMENT DURING DEPLOYMENT OPERATIONS.

----- SPACE SHUTTLE LDEF-A, NICHOLS-----

INVESTIGATION NAME- EFFECTS OF SOLAR RADIATION ON GLASSES

NSSDC ID- SSLDEF -44

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - R.L. NICHOLS NASA-MSFC
OI - D.L. KINSEY VANDERBILT U

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE EFFECTS OF SOLAR RADIATION AND THE SPACE ENVIRONMENT ON THE OPTICAL, MECHANICAL, AND CHEMICAL PROPERTIES OF VARIOUS GLASSES.

----- SPACE SHUTTLE LDEF-A, O'SULLIVAN-----

INVESTIGATION NAME- HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS

NSSDC ID- SSLDEF -49

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - D. O'SULLIVAN DUBLIN INST ADV STUDY
OI - C.O. CEALLAIGH DUBLIN INST ADV STUDY
OI - A. THOMPSON DUBLIN INST ADV STUDY
OI - K.P. WENZEL ESA-ESTEC
OI - V. DOMINGO ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY CHARGE AND ENERGY SPECTRA OF COSMIC RAY NUCLEI, SUPER HEAVY NUCLEI, AND HEAVY ANTINUCLEI. THE INFORMATION PROVIDED ASSISTS IN UNDERSTANDING THE PHYSICAL PROCESSES OF COSMIC RAY NUCLEI PRODUCTION AND ACCELERATION AT THE SOURCE IN INTERSTELLAR SPACE. INFORMATION CONCERNING NUCLEOSYNTHESIS IS ALSO OBTAINED.

----- SPACE SHUTTLE LDEF-A, PAILLOUS-----

INVESTIGATION NAME- THERMAL COATINGS AND STRUCTURAL MATERIAL

NSSDC ID- SSLDEF -34

INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - A. PAILLOUS CERT/ONERA
OI - J.C. GUILLAUMON CNES/CST

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO EXAMINE THE VALIDITY OF GROUND SIMULATIONS OF THE SPACE ENVIRONMENT FOR STUDIES OF DEGRADATION OF THERMAL CONTROL COATINGS USED ON SATELLITES. COMPARISON IS MADE OF SAMPLE DEGRADATIONS FROM BOTH GROUND TESTS AND ACTUAL FLIGHT TESTS.

----- SPACE SHUTTLE LDEF-A, POWELL-----

INVESTIGATION NAME- GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE

NSSDC ID- SSLDEF -35 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - J.M. POWELL ROCKWELL INTL CORP
OI - D.W. VELCH ROCKWELL INTL CORP

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF GRAPHITE/POLYIMIDE TESTING IS TO ACCUMULATE ACTUAL OPERATIONAL DATA IN THE SPACE ENVIRONMENT OVER LONG PERIODS OF TIME. FROM THESE DATA, DESIGN CRITERIA ASSOCIATED WITH MECHANICAL PROPERTIES OF FUTURE LIGHTWEIGHT SPACE-ORIENTED STRUCTURAL COMPONENTS ARE ESTABLISHED. THE PRIMARY OBJECTIVE OF THE GRAPHITE/EPOXY SANDWICH TESTING IS TO ACCUMULATE ACTUAL OPERATIONAL DATA ASSOCIATED WITH LONG DURATION ORBITAL EXPOSURE AND TO VALIDATE MECHANICAL PROPERTIES KNOCK DOWN FACTORS AS APPLIED TO THE DESIGN/ANALYSIS OF THE EXISTING SPACE SHUTTLE GRAPHITE/EPOXY PAYLOAD BAY DOOR.

----- SPACE SHUTTLE LDEF-A, PREUSS-----

INVESTIGATION NAME- CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS

NSSDC ID- SSLDEF -46 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - L. PREUSS PBB SPACE DIV

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO INVESTIGATE THE COMBINED EFFECTS OF RADIATION AND CONTAMINATION ON DIFFERENT THERMAL COATINGS AND SOLAR CELLS WITH AND WITHOUT CONDUCTIVE LAYERS TO PROVIDE DESIGN CRITERIA, TECHNIQUES AND TEST METHODS TO ENSURE CONTROL OF COMBINED SPACE AND SPACECRAFT ENVIRONMENTAL EFFECTS. THIS EXPERIMENT ALSO PROVIDES QUALIFICATIONS FOR A NUMBER OF NEW COATINGS AND SOLAR CELLS.

----- SPACE SHUTTLE LDEF-A, RAND-----

INVESTIGATION NAME- BALLOON MATERIALS DEGRADATION

NSSDC ID- SSLDEF -38 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - J.L. RAND TEXAS A&M

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO ASSESS THE EFFECTS OF LONG-TERM EXPOSURE OF CANDIDATE BALLOON FILMS, TAPES, AND LINES TO THE SPACE ENVIRONMENT. DEGRADATION OF MECHANICAL AND RADIONETRIC PROPERTIES IS OBSERVED BY A SERIES OF TESTS ON THE EXPOSED MATERIALS.

----- SPACE SHUTTLE LDEF-A, ROBERTSON-----

INVESTIGATION NAME- EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS

NSSDC ID- SSLDEF -18 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - J.P. ROBERTSON NASA-LARC
OI - I.O. CLARK NASA-LARC
OI - R.K. CROUCH NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE EFFECT OF LONG DURATION SPACE EXPOSURE AND LAUNCH ENVIRONMENT ON THE PERFORMANCE OF PYROELECTRIC DETECTORS. PERFORMANCE PARAMETERS (RESPONSIVITY, DETECTIVITY, AND SPECTRAL RESPONSE) AND MATERIALS PROPERTIES (PYROELECTRIC COEFFICIENT AND DIELECTRIC LOSS TANGENT) ARE MEASURED BEFORE AND AFTER EXPOSURE.

----- SPACE SHUTTLE LDEF-A, ROBINSON, JR.-----

INVESTIGATION NAME- TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE

NSSDC ID- SSLDEF -37 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - G.A. ROBINSON, JR. NASA-MSFC
OI - F. EDELSTEIN GRUMMAN AEROSPACE CORP

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT IS TO DEMONSTRATE THE LONG-TERM OPERATION OF A HIGH-CAPACITY LIGHTWEIGHT HEAT PIPE IN A SUSTAINED ZERO-GRAVITY ENVIRONMENT. THE EXPERIMENT ALSO TESTS THE ABILITY OF THE HEAT PIPE TO REPRIME IN ZERO GRAVITY.

----- SPACE SHUTTLE LDEF-A, SCHALL-----

INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS

NSSDC ID- SSLDEF -15 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - P. SCHALL AEROSPACE CORP
OI - E.N. BORSON AEROSPACE CORP
OI - M.F. ANATEAU AEROSPACE CORP

BRIEF DESCRIPTION

MATERIALS SPECIMENS ARE ANALYZED TO UNDERSTAND CHANGES IN PROPERTIES AND STRUCTURE AFTER EXPOSURE TO SPACE ENVIRONMENT. THE EXPERIMENT WILL INCLUDE THE INVESTIGATION OF VARIOUS STRUCTURAL MATERIALS, SOLAR POWER COMPONENTS, THERMAL CONTROL MATERIALS, LASER COMMUNICATION COMPONENTS, LASER MIRROR COATINGS, LASER-HARDENED MATERIALS, ANTENNA MATERIALS, AND ADVANCED COMPOSITES.

----- SPACE SHUTTLE LDEF-A, SCOTT, JR.-----

INVESTIGATION NAME- ATOMIC OXYGEN STIMULATED OUTGASSING

NSSDC ID- SSLDEF -07 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - R.L. SCOTT, JR. SOUTHERN U
OI - R.C. LINTON NASA-MSFC

BRIEF DESCRIPTION

THE EFFECT OF OXYGEN IMPINGEMENT ON THERMAL CONTROL SURFACE IN NEAR-EARTH ORBIT IS INVESTIGATED WITH REGARD TO THE PRODUCTION OF OPTICALLY DAMAGING OUTGASSING PRODUCTS. THE BIDIRECTIONAL REFLECTANCE OF SELECTED COATINGS IS MEASURED BEFORE AND AFTER SPACE EXPOSURE. DATA HELP DETERMINE IF ATOMIC OXYGEN IMPINGEMENT WAS A MAJOR FACTOR IN UNEXPLAINED SKYLAB CONTAMINATION BY PROVIDING AN UNDERSTANDING OF THE EFFECT OF ATOMIC OXYGEN ON THERMAL CONTROL SURFACES.

----- SPACE SHUTTLE LDEF-A, SEELEY-----

INVESTIGATION NAME- HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS

NSSDC ID- SSLDEF -23 INVESTIGATIVE PROGRAM CODE RS

INVESTIGATION DISCIPLINE(S) TECHNOLOGY

PERSONNEL

PI - J.S. SEELEY READING U
OI - A. WHATLEY READING U
OI - R. HUNNEMAN READING U

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO EXPOSE TO THE SPACE ENVIRONMENT INFRARED MULTILAYER INTERFERENCE FILTERS OF NOVEL DESIGN, CONSTRUCTION, AND MANUFACTURE, WHICH ARE USEFUL IN SENSING ATMOSPHERIC TEMPERATURE AND COMPOSITION. OPTICAL BEHAVIOR OF THESE FILTERS UNDER RADIATION IS NOT KNOWN AND IS CRITICAL TO THEIR PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, SELLEN, JR.-----

INVESTIGATION NAME- SPACE PLASMA-HIGH VOLTAGE DRAINAGE

ORIGINAL PAGE IS
OF POOR QUALITY.

NSSDC ID- SSLDEF -09 INVESTIGATIVE PROGRAM
 CCDE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.M. SELLEN, JR. TRW SYSTEMS GROUP

BRIEF DESCRIPTION
 THIS EXPERIMENT IS FLOWN TO DETERMINE THE LONG-TERM CURRENT DRAINAGE PROPERTIES OF THIN DIELECTRIC FILMS SUBJECTED TO HIGH-LEVEL ELECTRIC STRESS IN THE PRESENCE OF THE AMBIENT PLASMA AND SOLAR RADIATION. OBSERVED BEHAVIOR OF THESE FILMS WILL ESTABLISH ALLOWABLE LONG-TERM ELECTRIC STRESS LEVELS FOR SUCH FILMS, AS APPLIED TO SOLAR ARRAY AND SPACECRAFT THERMAL CONTROL COATING MATERIALS.

----- SPACE SHUTTLE LDEF-A, SHAPIRO-----
 INVESTIGATION NAME- HEAVY IONS IN SPACE

NSSDC ID- SSLDEF -13 INVESTIGATIVE PROGRAM
 CCDE SC
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - M.M. SHAPIRO US NAVAL RESEARCH LAB
 OI - F.W. O'BELL US NAVAL RESEARCH LAB
 OI - R. SILBERBERG US NAVAL RESEARCH LAB
 OI - C.H. TSAO US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
 A STACK OF PASSIVE TRACK DETECTORS, INTERLEAVED WITH HEAVY METAL LAYERS, IS USED TO INVESTIGATE THE THREE COMPONENTS OF HEAVY NUCLEI IN SPACE (LOW-ENERGY NUCLEI N, O, NE, THE HEAVY NUCLEI OF THE VAN ALLEN BELTS, AND THE ULTRA-HEAVY NUCLEI, Z .GT. 30, OF THE GALACTIC COSMIC RADIATION).

----- SPACE SHUTTLE LDEF-A, SLEMP-----
 INVESTIGATION NAME- THERMAL CONTROL SURFACES(PASSIVE)

NSSDC ID- SSLDEF -05 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.S. SLEMP NASA-LARC
 OI - R.A. BABCOCK, 3RD NASA-LARC

BRIEF DESCRIPTION
 THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE TO NEW COATINGS BEING DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES OF PAINTS, OTHER COATINGS AND SECOND-SURFACE MIRRORS ARE EXPOSED, SOME TO ALL ENVIRONMENTS OF THE MISSION AND SOME TO ONLY SPECIFIC ENVIRONMENTS. SPECTRAL REFLECTANCE OF THE SAMPLES IS MEASURED BEFORE AND AFTER THE MISSION.

----- SPACE SHUTTLE LDEF-A, SLEMP-----
 INVESTIGATION NAME- SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT

NSSDC ID- SSLDEF -21 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.S. SLEMP NASA-LARC

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS EXPERIMENT IS TO EVALUATE THE EFFECTS OF THE NEAR-EARTH ORBITAL ENVIRONMENT ON THE PHYSICAL AND CHEMICAL PROPERTIES OF COMPOSITE MATERIALS.

----- SPACE SHUTTLE LDEF-A, TAYLOR-----
 INVESTIGATION NAME- SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS

NSSDC ID- SSLDEF -16 INVESTIGATIVE PROGRAM
 CCDE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - E.W. TAYLOR USAF WEAPONS LAB

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS INVESTIGATION IS TO QUALIFY FIBER OPTIC LINKS FOR FUTURE SPACE APPLICATIONS, AND TO DOCUMENT AND ANALYZE THE EFFECT OF THE NATURAL SPACE ENVIRONMENT ON LINK AND COMPONENT PERFORMANCE.

----- SPACE SHUTTLE LDEF-A, TENNYSON-----
 INVESTIGATION NAME- PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT

NSSDC ID- SSLDEF -24 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - R.C. TENNYSON U OF TORONTO
 OI - J.S. HANSEN U OF TORONTO

BRIEF DESCRIPTION
 BY VARYING THE TIMES OF EXPOSURE TO THE SPACE ENVIRONMENT, THE CHANGES IN THE MECHANICAL PROPERTIES OF SEVERAL LIGHTWEIGHT COMPOSITE MATERIALS, INCLUDING GRAPHITE, BORON, S-GLASS, AND PRD-49 ARE STUDIED. PROPERTY DEGRADATION CAUSED BY MATRIX BREAKDOWN, OUTGASSING, THERMAL STRESSES, AND INTERNAL VOID CRACKS MUST BE KNOWN ABOUT THESE MATERIALS. ACTUAL SPECIMEN TEST RESULTS FROM SPACE ARE CORRELATED WITH GROUND TEST DATA AT AMBIENT CONDITIONS AND IN A THERMAL-VACUUM CHAMBER.

----- SPACE SHUTTLE LDEF-A, VENABLES-----
 INVESTIGATION NAME- RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT

NSSDC ID- SSLDEF -22 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.D. VENABLES MARTIN-MARIETTA LABS
 OI - J.S. AHEARN MARTIN-MARIETTA LABS

BRIEF DESCRIPTION
 THIS EXPERIMENT OBTAINS INFORMATION ON PREDICTING AND IMPROVING THE RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS. THE EFFECTS OF EXPOSURE TO AN ORBITAL RADIATION ENVIRONMENT ARE COMPARED WITH RESULTS USING A TRANSMISSION ELECTRON MICROSCOPE. RADIATION-INDUCED FREQUENCY DRIFTS AND ACOUSTIC ABSORPTION IN THESE OSCILLATORS MUST BE MINIMIZED TO AVOID UNDESIRABLE VARIATIONS IN HIGH-PRECISION CLOCKS IN SATELLITES AND MISSILES. DATA OBTAINED FROM LDEF AND GROUND EXPERIMENTS PROVIDE GUIDES TO IMPROVE THE RADIATION HARDNESS OF THESE COMPONENTS.

----- SPACE SHUTTLE LDEF-A, WHITAKER-----
 INVESTIGATION NAME- SOLAR ARRAY MATERIALS (PASSIVE)

NSSDC ID- SSLDEF -45 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - A.F. WHITAKER NASA-MSFC
 OI - C.F. SMITH, JR. NASA-MSFC
 OI - L.E. YOUNG NASA-MSFC
 OI - H.W. BRANDHORST, JR. NASA-LERC
 OI - A.F. FORESTIERI NASA-LERC
 OI - E.W. COSTOGUE NASA-JPL
 OI - E.W. GADY NASA-GSFC
 OI - J.A. BASS NASA-GSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE ON MECHANICAL, ELECTRICAL, AND OPTICAL PROPERTIES OF CANDIDATE LIGHTWEIGHT SOLAR ARRAY MATERIALS SUCH AS THOSE NEEDED FOR A SPACE STATION, A SATELLITE POWER STATION, AND SOLAR ELECTRIC PROPULSION SOLAR ARRAYS. DATA OBTAINED ON THE COMBINED EFFECTS OF ULTRAVIOLET, PENETRATING RADIATION AND VACUUM ON THESE MATERIAL PROPERTIES ALLOW SPACECRAFT MANUFACTURERS TO DESIGN SOLAR ARRAYS WITH MORE PREDICTABLE LIFETIMES.

----- SPACE SHUTTLE LDEF-A, WILKES-----
 INVESTIGATION NAME- THERMAL CONTROL SURFACES

NSSDC ID- SSLDEF -04 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - D.R. WILKES NASA-MSFC
 OI - H.R. KING NASA-MSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT DETERMINES THE EFFECTS OF SPACE EXPOSURE ON NEW COATINGS DEVELOPED FOR SPACECRAFT THERMAL CONTROL. SAMPLES ARE MOUNTED ON AN INDEXING WHEEL WITH A REFLECTOMETER THAT PERIODICALLY RECORDS REFLECTANCE VALUES IN SPACE.

***** SPACELAB 1*****

SPACECRAFT COMMON NAME- SPACELAB 1
 ALTERNATE NAMES-

NSSDC ID- SPALAB1

LAUNCH DATE- 05/08/83 WEIGHT- 14500. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 INTERNATIONAL ESA
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 89.4 MIN INCLINATION- 57. DEG
 PERIAPSIS- 250. KM ALT APOAPSIS- 250. KM ALT

PERSONNEL
 NM - R.E. PACE NASA-MSFC
 NS - C.R. CHAPPELL NASA-MSFC
 NG - M.J. SMITH NASA HEADQUARTERS
 NC - M. WISKERCHEN NASA HEADQUARTERS
 PN - O.C. JEAN NASA-MSFC

BRIEF DESCRIPTION
 THE FIRST SPACELAB MISSION IS A JOINT NASA AND EUROPEAN SPACE AGENCY (ESA) MISSION. SPACELAB 1 CONSISTS OF A PRESSURIZED COMPARTMENT (MODULE) FOR HOUSING EQUIPMENT AND FLIGHT PERSONNEL AND A SPACE EXPOSED PLATFORM TO ACCOMMODATE INSTRUMENTS. THE COMPARTMENT AND PLATFORM ARE FLOWN INTO SPACE AND RETURNED INSIDE THE PAYLOAD COMPARTMENT OF THE SPACE SHUTTLE ORBITER. THE MISSION IS PLANNED TO LAST 7 DAYS, AND WHILE IN SPACE, THE ORBITER PAYLOAD COMPARTMENT DOORS ARE OPENED TO ALLOW VIEWING OF THE EARTH, SUN, AND DEEP SPACE. THE FOLLOWING INVESTIGATIONS ARE IN THE DEVELOPMENT PHASE: AN IMAGING SPECTROMETRIC OBSERVATORY, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT, HZE PARTICLE DOSIMETRY, NUTATION OF HELIANTHUS ANNUUS, VESTIBULAR EXPERIMENTS, INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS, VESTIBULO-SPINAL REFLEX MECHANISMS, EFFECTS ON PROLONGED WEIGHTLESSNESS, GEOPHYSICAL FLUID FLOW, WETTING-SPREADING AND OPERATING CHARACTERISTICS OF BEARING LUBRICANTS IN A ZERO GRAVITY ENVIRONMENT, TRIBOLOGICAL STUDIES OF FLUID-LUBRICATED JOURNAL BEARINGS, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR, GRILLE SPECTROMETER, WAVES IN THE OH EMISSIVE LAYER, TEMPERATURE-WIND IN MESOSPHERE-THERMOSPHERE, H AND D LYMAN ALPHA, SOLAR SPECTRUM FROM 1900 A TO 4 MICROMETERS, LOW-ENERGY ELECTRONS, MAGNETIC FIELD MEASUREMENT, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS, SOLAR CONSTANT, VERY WIDE FIELD CAMERA, X-RAY SPECTROSCOPY, HEAVY COSMIC RAY ISOTOPES, VESTIBULAR SLED, SLED EXPERIMENTS, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS, MASS DISCRIMINATION, MEASUREMENT OF INTRATHORACIC BLOOD PRESSURE, ADVANCED BIOSTACK, 3-DIMENSIONAL BALLISTOCARDIOGRAPHY, EFFECT OF RADIATION, ELECTROPHYSIOLOGICAL TAPE RECORDER, COLLECTION OF BLOOD SAMPLES, MATERIAL SCIENCE FACILITY, METRIC CAMERA, AND MICROWAVE SCATTEROMETER-RADIOMETER.

----- SPACELAB 1, ACKERMAN-----

INVESTIGATION NAME- GRILLE SPECTROMETER
 NSSDC ID- SPALAB1-18 INVESTIGATIVE PROGRAM CODE EB/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - M. ACKERMAN BIRA
 OI - D. FRIMONT BIRA
 OI - A. GIRARD ONERA

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVES ARE (1) TO DETERMINE THE VERTICAL DISTRIBUTION PROFILES OF TRACE CONSTITUENTS IN THE STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE IN ORDER TO STUDY THE CHEMICAL AND DYNAMICAL ATMOSPHERIC PROCESSES, AND (2) TO MONITOR, ON A LONG-TERM BASIS, MAN-MADE AND NATURAL ALTERATIONS OF THE NEAR-EARTH ENVIRONMENT. THE EQUIPMENT CONTAINS AN INFRARED SPECTROMETER WITH A TELESCOPE AND A COOLED INFRARED DETECTOR. THE SPECTROMETER WILL OPERATE IN THE WAVELENGTH RANGE FROM 2.5 TO 15 MICROMETERS.

----- SPACELAB 1, ANDRESEN-----

INVESTIGATION NAME- ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER

NSSDC ID- SPALAB1-28 INVESTIGATIVE PROGRAM CODE SC/CO-OP
 INVESTIGATION DISCIPLINE(S)
 X-RAY ASTRONOMY

PERSONNEL
 PI - R.D. ANDRESEN ESA-ESTEC
 OI - R.L.F. BOYD U COLLEGE LONDON
 OI - G. BROWLIE U COLLEGE LONDON
 OI - J.L. CULHANE U COLLEGE LONDON
 OI - J. IVES U COLLEGE LONDON
 OI - P.W. SANFORD U COLLEGE LONDON
 OI - A. PEACOCK ESA-ESTEC
 OI - B.G. TAYLOR ESA-ESTEC
 OI - G. BOELLA U OF MILAN
 OI - S. SALEMI U OF PALERMO
 OI - L. SCARSI U OF PALERMO
 OI - G. VILLA U OF MILAN

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVES ARE (1) TO USE A GAS SCINTILLATION PROPORTIONAL COUNTER (1.5-50 KEV, 5-DEG FIELD OF VIEW, LESS THAN 10 PERCENT RESOLUTION AT 6 KEV) TO MEASURE SPECTRAL FEATURES OF GALACTIC X-RAY SOURCES, THE DIFFUSE X-RAY BACKGROUND, CLUSTERS OF GALAXIES, AND THE X-RAY FLUORESCENCE FROM THE EARTH'S ATMOSPHERE, AND (2) TO TEST CAPABILITY TO REJECT CHARGED PARTICLE BACKGROUND RADIATION WHOSE ENERGY IS NEAR THAT OF WEAK X-RAY SOURCES. THE EQUIPMENT IS A GAS SCINTILLATION COUNTER HAVING A 25-100 MICROMETER BERYLLIUM WINDOW, XENON CHAMBER, PHOTOMULTIPLIER DETECTOR, AND A PULSE HEIGHT ANALYZER.

----- SPACELAB 1, BEAUJEAN-----

INVESTIGATION NAME- ISOTOPE STACK
 NSSDC ID- SPALAB1-29 INVESTIGATIVE PROGRAM CODE SC/CO-OP
 INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS

PERSONNEL
 PI - R. BEAUJEAN INST P+A NUCLEAR PHYS
 OI - W. ENGE INST P+A NUCLEAR PHYS
 OI - G. SIEGMON INST P+A NUCLEAR PHYS

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVE IS TO USE A STACK OF PLASTIC SHEETS TO MEASURE HEAVY COSMIC-RAY NUCLEI (CHARGE Z EQUAL TO OR GREATER THAN 3, 50 MEV PER NUCLEON TO 2 GEV PER NUCLEON), AND TO DETERMINE THE SOURCE, ACCELERATION, PROPAGATION, AND AGE OF COSMIC RAYS. THE EQUIPMENT CONSISTS OF A STACK OF LAYERS OF PLASTIC VISUAL TRACK DETECTORS HOUSED IN A SLEAVED ALUMINUM CONTAINER.

----- SPACELAB 1, BEGHIN-----

INVESTIGATION NAME- PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS
 NSSDC ID- SPALAB1-25 INVESTIGATIVE PROGRAM CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES

PERSONNEL
 PI - C. BEGHIN CNRS, CTR FOR SPECTRON
 OI - Y. ARNAL CNRS
 OI - M. HAMELIN CNRS
 OI - D. HENRY CNRS
 OI - M. PIRRE CNRS
 OI - J.J. BERTHELIER CNRS
 OI - J. LAURENAT CNRS
 OI - B.N. WAELHUM NDRE
 OI - J. TROIM NDRE
 OI - R. BOSWELL ESA-ESTEC
 OI - A. GONFALONE ESA-ESTEC
 OI - T.R. SANDERSON ESA-ESTEC

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVES ARE TO USE ELECTRON AND ION BEAM GUNS (UP TO 10 KEV), AN ASSOCIATED WAVE RECEIVER (UP TO 100 MHZ), ELECTRON TEMPERATURE PROBE, AND THREE PARTICLE DETECTORS TO: (1) STUDY IONOSPHERIC NEUTRALIZATION PROCESSES BY STUDYING THE STABILITY OF THE ELECTRONIC POTENTIAL OF THE GUN WITH RESPECT TO THE PLASMA, (2) STUDY PLASMA INSTABILITIES BY MEASURING ELECTRICAL (UP TO 100 MHZ) AND MAGNETIC (200 HZ UP TO 20 MHZ) WAVE COMPONENTS, (3) USE THE SHUTTLE MOTION TO PERFORM ION BOUNCE EXPERIMENTS, (4) STUDY THE B+ INTERACTION WITH THE NEUTRAL ATMOSPHERE, AND (5) MONITOR THE SECONDARY ELECTRON FLUX. THE EQUIPMENT CONSISTS OF AN ACTIVE PACKAGE CONTAINING AN ELECTRON GUN, AN ION GUN (DEUTERIUM AND XENON), A PARTICLE DETECTOR, AND A PASSIVE PACKAGE CONTAINING AN ELECTRIC ANTENNA, MAGNETIC ANTENNA, AND TWO PARTICLE DETECTORS.

----- SPACELAB 1, BENTON-----

INVESTIGATION NAME- HZE-PARTICLE DOSIMETRY

NSSDC ID- SPALAB1-11 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE BIOLOGY

PERSONNEL

PI - E.V. BENTON U OF CALIF, SAN FRANC.
OI - D.D. PETERSON U OF CALIF, SAN FRANC.
OI - R.M. CASSOU U OF CALIF, SAN FRANC.

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE TO PROVIDE BASELINE DATA FOR EVALUATION OF RADIATION RISK TO MAN FROM HIGH CHARGE AND ENERGY (HZE) PARTICLES ON THIS AND FUTURE SPACELAB MISSIONS, AND TO CONTINUE A PROGRAM OF DOCUMENTATION OF HZE PARTICLE RADIATION INSIDE MANNED SPACECRAFT WHICH HAS INCLUDED APOLLO, SKYLAB, AND ASTP MISSIONS. THE EQUIPMENT CONSISTS OF: (1) A PASSIVE DOSIMETER PACKET CONTAINING PLASTIC NUCLEAR TRACK DETECTORS, AN AGCL CRYSTAL DETECTOR, AND THERMOLUMINESCENT DETECTOR CHIPS, AND (2) A THICK PLASTIC STACK CONSISTING OF 200 LEXAN POLYCARBONATE PLASTIC FILMS.

----- SPACELAB 1, BERTAUX-----

INVESTIGATION NAME- INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA

NSSDC ID- SPALAB1-22 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.L. BERTAUX CNRS-SA
OI - G. KOCKARTS IASB

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE: TO USE A LYMAN-ALPHA PHOTOMETER EQUIPPED WITH H AND D ABSORPTION CELLS TO MEASURE DEUTERIUM EMISSION; TO OBSERVE PHOTON PRECIPITATION IN THE AUROREAL AND EQUATORIAL ZONES; TO USE A HYDROGEN ABSORPTION CELL AS A TECHNIQUE TO ELIMINATE THE INTERPLANETARY LYMAN-ALPHA BACKGROUND; TO OBSERVE THE SEPAC PROTON GUN INTERACTION WITH THE STS/SPACELAB ENVIRONMENT; AND TO ATTEMPT TO MEASURE ATMOSPHERIC HYDROGEN LYMAN-ALPHA EMISSIONS. THE EQUIPMENT CONSISTS OF A SPECTROPHOTOMETER WITH AN ATOMIC HYDROGEN ABSORPTION CELL AND AN ATOMIC DEUTERIUM ABSORPTION CELL, AND A SOLAR BLIND PHOTOMULTIPLIER FOR DETECTOR.

----- SPACELAB 1, BOWYER-----

INVESTIGATION NAME- FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT

NSSDC ID- SPALAB1-07 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - C.S. BOWYER U OF CALIF, BERKELEY
OI - G.C. COURTES CNRS-LAS
OI - J.M. DEMARVENG CNRS-LAS
OI - R. MALINA U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM UV (1100-3500 A) BROADBAND IMAGING AND LOW-RESOLUTION (20-200 A) SPECTROSCOPY OF GLOBULAR CLUSTERS, GALACTIC CLUSTERS, QUASI-STELLAR OBJECTS, NEARBY GALAXIES, UV STARS, EXTENDED SOURCES, GEORCORONA, AND SPACELAB 1 CONTAMINANTS. THE EQUIPMENT CONSISTS OF A FAR ULTRAVIOLET SPACE TELESCOPE (FAUST) AND AN ELECTRONIC INTERFACE MODULE. THE INSTRUMENT IS AN F/1.12 WYRNE CAMERA WITH AN EFFECTIVE COLLECTING AREA OF 150 SQ CM AND A FIELD-OF-VIEW OF 7.5 DEG. THE IMAGING CAPABILITY IS BETTER THAN 2 ARC MINUTES IN THE ENTIRE FIELD-OF-VIEW. THE DETECTOR SYSTEM USES A MICROCHANNEL PLATE IMAGE INTENSIFIER IN CONJUNCTION WITH A 60-EXPOSURE, 35 MILLIMETER FILM PACK OF KODAK 103A0.

----- SPACELAB 1, BROWN-----

INVESTIGATION NAME- NUTATION OF MELIANTHUS ANNUUS

NSSDC ID- SPALAB1-12 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A.H. BROWN U OF PENNSYLVANIA
OI - A.O. DAML U OF PENNSYLVANIA
OI - D.K. CHAPMAN U OF PENNSYLVANIA

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO: (1) DETERMINE QUANTITATIVELY WHETHER THE CONDITION OF SUSTAINED WEIGHTLESSNESS PRODUCES THE SAME DAMPING OR INHIBITING EFFECT ON PLANT NUTATION AS DOES ROTATION ON A HORIZONTAL CLINOSTAT ON EARTH, (2) MEASURE THE PERIOD AND AMPLITUDE OF ANY MUTATIONAL OSCILLATIONS BY THE SEEDLINGS WHICH MAY BE OBSERVED UNDER THE CONDITIONS OF SUSTAINED WEIGHTLESSNESS, AND (3) GAIN EXPERIENCE IN THE CONDUCT OF A PLANT PHYSIOLOGICAL EXPERIMENT IN A MULTIDISCIPLINARY SPACE LABORATORY IN WHICH DIVERSE FACILITIES ARE TO BE SHARED. THE EQUIPMENT CONSISTS OF -- DARK BOX, WITHIN WHICH FOUR TEST PLANTS ILLUMINATED BY INFRARED LIGHT ARE LOCATED IN THE FIELD OF VIEW OF A VIDEO CAMERA, ROTOR COMPARTMENTS, PLANT MODULES, BATTERY PACK, VIDEO TAPE DATA RECORDER, CONTROL ELECTRONICS, AND A CARRY-ON MODULE CONTAINER OF 28 PLANT MODULES.

----- SPACELAB 1, BUCKER-----

INVESTIGATION NAME- ADVANCED BIOSTACK EXPERIMENT

NSSDC ID- SPALAB1-32 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - N. BUCKER DFVLR

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO DETERMINE THE BIOLOGICAL IMPORTANCE OF NUCLEAR DISINTEGRATION STARS, TO ASSESS QUANTITATIVELY THE INTERFERENCE OF HZE PARTICLES WITH OTHER BIOLOGICAL STUDIES IN SPACE, TO DETERMINE THE DISTRIBUTION OF HZE PARTICLES AT DIFFERENT LOCATIONS IN THE MODULE AND ON THE PALLET, AND ESTABLISH RADIATION PROTECTION GUIDELINES FOR MAN AND BIOLOGICAL EXPERIMENTS IN FUTURE SPACE FLIGHTS. THE EQUIPMENT CONSISTS OF FOUR CYLINDERS WITH LAYERS OF DIFFERENT BIOLOGICAL OBJECTS BETWEEN DIFFERENT TRACK DETECTORS, INTEGRATING DOSIMETERS, AND SPECIALLY SELECTED TRACK DETECTORS.

----- SPACELAB 1, COGOLI-----

INVESTIGATION NAME- LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS

NSSDC ID- SPALAB1-36 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A. COGOLI U OF ZURICH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO GAIN FURTHER INFORMATION ON THE TRIGGERING OF THE IMMUNORESPONSE AND ON THE MECHANISM OF EUKARYOTIC CELL DIFFERENTIATION DURING LONG-DURATION SPACEFLIGHTS. THE EQUIPMENT CONSISTS OF AN INCUBATOR, FOUR FLASKS OF HUMAN BLOOD, AND A VESSEL FOR LIQUID AIR.

----- SPACELAB 1, COURTES-----

INVESTIGATION NAME- VERY WIDE FIELD GALACTIC CAMERA

NSSDC ID- SPALAB1-27 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
ZODIACAL LIGHT

PERSONNEL

PI - G.C. COURTES CNRS-LAS
OI - M. WITON CNRS-LAS
OI - J.P. SIVAN CNRS-LAS
OI - H.L. ATKINS NASA-MSC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ZODIACAL LIGHT AND GEGENSCHNEIN, EXTENDED GALACTIC OBJECTS, SKY BACKGROUND, CONTINUUM LIGHT AND EMISSION LINES IN HIS REGIONS, EXTENSION OF GALACTIC AND EXTRAGALACTIC MATERIAL, STARS AND STAR-LIKE OBJECTS, BRIGHT UV OBJECTS, DUST CONTAMINATION AROUND SPACELAB, AND EMISSION AND MORPHOLOGY STUDIES OF ATMOSPHERIC CONSTITUENTS, WITH WIDEFIELD (60 DEG) ULTRAVIOLET (130 TO 300 NM) AND SPECTROGRAPHIC PHOTOGRAPHY. THE EQUIPMENT IS A WIDE-FIELD CAMERA CONSISTING OF A HYPERBOLIC COLLECTOR, INTERCHANGEABLE SCHMIDT CHAMBERS (INCLUDING PRISM, FLAT MIRRORS AND FILTERS), AND REMOVABLE PROXIMITY-FOCUSED INTENSIFIER UTILIZING A CHANNEL ELECTRON MULTIPLIER ARRAY (CEMA) DETECTOR SYSTEM WITH A 100-FRAME FILM PACKAGE.

----- SPACELAB 1, CROMMELYNCK-----

INVESTIGATION NAME- ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT

NSSDC ID- SPALAB1-26 INVESTIGATIVE PROGRAM
CCBE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D. CROMMELYNCK ROY METEOROL INST BELG
OI - V. DOMINGO ESA-ESTEC
OI - A.C. DURNERY ESA-ESTEC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE (1) TO USE A SELF-CALIBRATING RADIOMETER TO MEASURE THE ABSOLUTE VALUE OF THE SOLAR CONSTANT AND TO MEASURE ANY LONG-TERM VARIATIONS IN THE SOLAR CONSTANT, AND (2) TO USE SURFACES OF FUSED SILICA AND METAL EXPOSED TO PALLET CONDITIONS TO DETERMINE THE AMOUNT OF DEGRADATION OF OPTICAL SURFACES DUE TO CONDITIONS ON THE SPACELAB PALLET. THE EQUIPMENT CONSISTS OF AN ABSOLUTE RADIOMETER WITH AN INBUILT STABILITY CHECK. THIS RADIOMETER HAS TWO CHANNELS WHICH ENABLE ANY DEGRADATION OF THE BLACK SURFACES TO BE DETECTED AND COMPENSATED. THE RADIATION MEASUREMENT WILL BE MADE BY USING A HEAT BALANCE SYSTEM DRIVEN AUTOMATICALLY BY A FEEDBACK SYSTEM.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- METRIC CAMERA FACILITY

NSSDC ID- SPALAB1-38 INVESTIGATIVE PROGRAM
CODE ER/CO-OP

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE METRIC CAMERA FACILITY HAS A ZEISS RMK A 30/23 AERIAL SURVEY CAMERA AND A SKYLAB OPTICAL WINDOW, WITH THE FOLLOWING MAIN CHARACTERISTICS -- F = 305 MM, F-STOPS AVAILABLE - F/5.6, F/8, F/11, SHUTTER SPEEDS - 1/100 AND 1/1000 S, NEGATIVE SIZE - 23 X 23 CM (LENGTH FOR 450 PHOTOS PER MAGAZINE), ANGLE OF FIELD IS 56 DEG, AND A RESOLVING POWER OF 40 PER MM. BLACK AND WHITE, COLOR, AND COLOR IR FILMS CAN BE USED. THE MAIN TOPICS FOR THE PROPOSED MEASUREMENTS ARE ANALYTICAL MEASUREMENTS FOR CONTROL EXTENSION, TOPOGRAPHIC MAPPING, ORTHOPHOTOMAPPING, RESOLUTION EXPERIMENT, AND THERMATIC MAPPING AND INTERPRETATION. TO GET 80 PERCENT LONGITUDINAL OVERLAP OF SUBSEQUENT PHOTOGRAPHS AT A SPACELAB VELOCITY OF 7.7 KM PER S THERE WILL BE A TIME INTERVAL OF ABOUT 5 SECONDS BETWEEN TWO SUCCESSIVE EXPOSURES. STRIPS 1800 TO 2300 KM CAN BE COVERED ON THE GROUND IN EACH SEQUENCE.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- MICROWAVE FACILITY

NSSDC ID- SPALAB1-39 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE MICROWAVE FACILITY ARE TO DEVELOP ALL-WEATHER REMOTE SENSING METHODS, STUDY SENSOR-OBJECT INTERACTION BY MEASUREMENT OF OCEAN SURFACE WAVE SPECTRA WITH A DUAL-FREQUENCY SCATTEROMETER, AND VERIFY SYNTHETIC APERTURE RADAR BEHAVIOR. THE MICROWAVE REMOTE SENSING EXPERIMENT (MRSE) INSTRUMENTATION IS THE RADAR FACILITY. IN THE ACTIVE MODES THE INSTRUMENT TRANSMITS MICROWAVE ENERGY IN X-BAND (9.65 GHZ) TO EARTH TARGETS. A SENSITIVE LOW NOISE RECEIVER DETECTS THE BACKSCATTERED RADAR SIGNALS. THE INSTRUMENT WILL OPERATE IN THREE MODES: (1) A MAIN MODE AS A TWO-FREQUENCY SCATTEROMETER (2 FS), (2) A HIGH-RESOLUTION MODE AS A SYNTHETIC APERTURE RADAR (SAR), AND (3) A PASSIVE MODE AS A PASSIVE MICROWAVE RADIOMETER. IN THE 2FS MODE, THE INSTRUMENT WILL MEASURE THE OCEAN SURFACE WAVE SPECTRA BY USING THE COMPLEX BACKSCATTERING OF THE OCEAN SURFACE AT TWO ADJACENT MICROWAVE FREQUENCIES. IN THE SAR MODE, AREAS OF THE EARTH'S SURFACE WILL BE IMAGED. THE BACKSCATTERED DATA WILL BE COHERENTLY RECORDED AND OFF-LINE PROCESSING WILL PROVIDE IMAGERY WITH A GROUND RESOLUTION OF 25 BY 25 M. THE RADIOMETER MODE MEASURES OCEAN SURFACE TEMPERATURES, AND WILL BE USED IN TIME MULTIPLEX WITH OTHER MODES.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE SLED FACILITY

NSSDC ID- SPALAB1-40 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE SPACE SLED FACILITY IS PROVIDED FOR VESTIBULAR RESEARCH ON HUMAN AND ANIMAL TEST SUBJECTS. THE SLED FACILITY CONSISTS OF A PLASTIC SEAT SHELL SUSPENDED ON A GIMBAL SYSTEM WHICH CAN BE ACCELERATED BY A MOTOR ALONG TWO GUIDING RAILS FROM ONE END OF SPACELAB TO THE OTHER. THE ACCELERATION PROFILES CAN BE PRESELECTED BETWEEN 0.001 AND 0.2 G. OSCILLATING ACCELERATION OF THE SLED WILL ALSO BE POSSIBLE (MOTION SICKNESS STUDIES). SINCE VISUAL PERCEPTION IS NOT POSSIBLE BECAUSE THE HEAD IS ENCLOSED, AND NOISE AND VIBRATION LEVELS ARE KEPT BELOW THE THRESHOLD PERCEPTION LEVEL, THE TEST SUBJECT MAY NOT BE ABLE TO DETECT ACCELERATION CHANGES OTHER THAN THOSE OF THE BALANCE ORGANS.

----- SPACELAB 1, ESA STAFF-----

INVESTIGATION NAME- SPACE PROCESSING LABORATORY

NSSDC ID- SPALAB1-42 INVESTIGATIVE PROGRAM
CODE EM/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE SPACE PROCESSING LABORATORY CONSISTS OF THREE CATEGORIES -- SYSTEM EQUIPMENT, MATERIAL SCIENCES INSTRUMENTATION, AND MATERIAL SCIENCES EXPERIMENTS. THE ISOTHERMAL HEATING FACILITY IS A MULTI-USER FACILITY FOR DIFFERENT TYPES OF EXPERIMENTS, INCLUDING SOLIDIFICATION STUDIES, DIFFUSION FUNDAMENTALS, CASTING OF METALS AND COMPOSITES, AND PREPARATION OF NEW AND/OR IMPROVED GLASSES AND CERAMICS. THE GRADIENT HEATING FACILITY FOR LOW TEMPERATURES IS DEFINED TO BE A MULTIPURPOSE FACILITY FOR DIFFERENT TYPES OF EXPERIMENTS SUCH AS CRYSTAL GROWTH AND UNIDIRECTIONAL SOLIDIFICATION OF EUTECTICS. VACUUM AND NOBLE GAS SUPPLY PROVISIONS ARE PART OF THE FACILITY. THE MIRROR HEATING FACILITY IS AN EXPERIMENTAL FACILITY WHICH IS PARTICULARLY SUITABLE FOR INVESTIGATING CRYSTAL GROWTH USING THE MELT ZONE OR TRAVELING SOLVENT METHODS. THE FLUID PHYSICS MODULE CONSISTS MAINLY OF A STRUCTURE FITTED WITH TWO DISCS WHICH CAN BE ROTATED SEPARATELY, AT THE SAME OR DIFFERENT SPEEDS, AND IN EITHER DIRECTION.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN

NSSDC ID- SPALAB1-1 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - R. KOCH U OF BERLIN
OI - F. ROCKER U OF BERLIN
OI - KIRSCH U OF BERLIN

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO PROCURE ABSOLUTE DATA, BY RECORDING CENTRAL VENOUS PRESSURE (MEASURED BY PUNCTURING AN ARM VEIN), THAT THE ADAPTION OF MINERAL AND WATER METABOLISM TO THE WEIGHTLESS CONDITION IS INITIATED BY THE ENGORGEMENT OF THE CEPHALAD CIRCULATION. THE EQUIPMENT CONTAINS 6 STRAIN GAGE MANOMETERS, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.M., ALDOSTERONE, AND OTHER HORMONES

NSSDC ID- SPALAB1-37 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - O.H. GAUER U OF BERLIN
OI - KIRSCH U OF BERLIN
OI - R. KOCH U OF BERLIN
OI - F. ROCKER U OF BERLIN
OI - H. STOBOY U OF BERLIN

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS THE CONFIRMATION AND COMPLETION OF SIMILAR WORK IN THE SKYLAB FLIGHTS, AND ATTEMPT TO FIND A CONNECTION WITH CIRCULATORY PARAMETERS. THE EQUIPMENT IS A CENTRIFUGE AND A STORAGE CONTAINER AT MINUS 20 DEG C.

----- SPACELAB 1, GAUSE-----

INVESTIGATION NAME- TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL

NSSDC ID- SPALAB1-10 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - W.L. GAUSE NASA-MSFC
OI - A.F. WHITAKER NASA-MSFC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO (1) DETERMINE THE EFFECT OF ZERO GRAVITY ON THE OPERATION OF FLUID-LUBRICATED JOURNAL BEARINGS, (2) OBSERVE FLUID FLOW-SURFACE WETTING AND HYDRODYNAMIC FLUID FORMATION IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, (3) OBSERVE AND MEASURE DYNAMIC INSTABILITIES IN HYDRODYNAMIC BEARINGS IN ZERO GRAVITY, (4) EVALUATE THE USE OF MAGNETIC FIELDS AND FERROLUBRICANTS FOR PREVENTING DYNAMIC INSTABILITY IN JOURNAL BEARINGS OPERATING IN ZERO GRAVITY, AND (5) EVALUATE THE USE OF MAGNETIC FIELDS FOR CONTROLLING FERROFLUIDS IN ZERO GRAVITY. EQUIPMENT CONSISTS OF TYPICAL JOURNAL BEARING AND LUBRICANT, FERROFLUID LUBRICATED MAGNETIC JOURNAL, TRANSPARENT BEARINGS TO FACILITATE PHOTOGRAPHY AND OBSERVATION, AND A CAMERA.

----- SPACELAB 1, GREEN-----

INVESTIGATION NAME- ELECTRO-PHYSIOLOGICAL TAPE RECORDER

NSSDC ID- SPALAB1-35 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - W.L. GREEN CLINICAL RES CENTER
OI - F.D. STOTT CLINICAL RES CENTER
OI - W.S. WOFF CLINICAL RES CENTER

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO STUDY ACCLIMATIZATION OF ASTRONAUTS TO ZERO GRAVITY BY MEANS OF AN ELECTROCARDIOGRAPH (ECG), ELECTROENCEPHALOGRAPH (EEG), AND ELECTRO-OCULOGRAPH (EOG) ON A CONTINUOUS BASIS BY A MINIATURE TAPE RECORDER ATTACHED TO THE CREW MEMBER. THE EQUIPMENT CONSISTS OF ECG, EEG, AND EOG ELECTRODES, PREAMPLIFIER, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, HART-----

INVESTIGATION NAME- GEOPHYSICAL FLUID FLOW

NSSDC ID- SPALAB1-08 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL
PI - J.E. HART U OF COLORADO
OI - J. TOOMRE U OF COLORADO
OI - P. GILMAN HIGH ALTITUDE OBS
OI - G. FICHTL NASA-MSFC

BRIEF DESCRIPTION
THERE ARE TWO EXPERIMENT OBJECTIVES. ONE OBJECTIVE OF THIS EXPERIMENT IS TO UNDERSTAND THE CONVECTION OF STARS AND THE SUN BY -- (1) STUDYING THE ONSET OF CONVECTION BETWEEN CONCENTRIC SPHERES AS A FUNCTION OF IMPOSED TEMPERATURE DIFFERENCES AND ROTATION, (2) STUDYING THE SHAPES OF THE CONVECTION CELLS AT THE ONSET OF CONVECTION AND ITS EVOLUTION, (3) STUDYING THE INTERACTIVE MOTIONS SUCH AS MEAN AZIMUTHAL FLOWS OBSERVED ON THE SOLAR EQUATORIAL REGION. THE OTHER OBJECTIVE IS TO ACT AS THE FORERUNNER OF A SERIES OF PROPOSED EXPERIMENTS TO STUDY THE BAROCLINIC PROPERTIES OF THE EARTH'S ATMOSPHERE AND THE GENERAL CIRCULATION OF THE EARTH'S OCEAN BASINS. THE EQUIPMENT CONSISTS OF AN ELECTROCONVECTION CELL, CONTROLLERS, AND A CAMERA.

----- SPACELAB 1, HERBE-----

INVESTIGATION NAME- WAVES IN THE OH EMISSIVE LAYER

NSSDC ID- SPALAB1-19 INVESTIGATIVE PROGRAM
CODE ED/CO-OP
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. HERBE CNRS-SA
OI - G. MOREELS CNRS-SA

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO STUDY THE LARGE-SCALE STRUCTURE OF THE ATMOSPHERIC OH EMISSION, AND TO INVESTIGATE POSSIBLE RELATIONS BETWEEN THE OH EMISSION STRUCTURE AND OROGRAPHY OR METEOROLOGICAL PHENOMENA. THE EQUIPMENT CONTAINS AN IMAGE INTENSIFIER WITH A CAMERA, FILTER, AND 16-MM MOVIE CAMERA WITH A 25-MM F/0.95 LENS. THE SPECTRAL PART OF THE AIRGLOW IS DELIMITED ON THE SHORT WAVELENGTH SIDE BY A WRAYTEN BBA FILTER (80 PERCENT CUTOFF AT 75 NANOMETERS) AND ON THE IR SIDE BY THE SENSITIVITY OF THE PHOTOCATHODE (50 PERCENT CUTOFF AT 830 NANOMETERS).

----- SPACELAB 1, HONECK-----

INVESTIGATION NAME- MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT

NSSDC ID- SPALAB1-34 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - S. HONECK U OF FRANKFURT
OI - C. THOMAS-GORFIAS U OF FRANKFURT
OI - G. REITZ U OF FRANKFURT

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO -- (1) MEASURE QUANTITATIVELY THE EFFECTS OF SPACE PARAMETERS (VACUUM, SOLAR UV-RADIATION) ON MICROBIAL BACTERIAL SPORES, BACTERIAL VEGETATIVE CELLS, BACTERIOPHAGES AND ENZYMES, AND TO UNDERSTAND THE EFFECTS ON THESE SAMPLES; (2) EVALUATE THE CONSEQUENCES OF GENETIC AND RESPONSE ALTERATIONS; AND (3) COMPARE THE RESULTS WITH SIMULATION EXPERIMENTS PERFORMED IN THE LABORATORY. THE EQUIPMENT IS A BOX ACCOMMODATING 100 TO 200 BIOLOGICAL SAMPLES.

----- SPACELAB 1, KIMZEY-----

INVESTIGATION NAME- INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN

NSSDC ID- SPALAB1-14 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - S.L. KIMZEY NASA-JSC
OI - W.H. CROSBY SCRIPPS C+R FOUNDATION
OI - M. TAVASSOLI SCRIPPS C+R FOUNDATION
OI - P.C. JOHNSON BAYLOR U
OI - J.P. CHEN U OF TENNESSEE
OI - C.D.R. DUNN U OF TENNESSEE
OI - R.D. LANGE U OF TENNESSEE
OI - E.C. LARKIN VETERANS ADMIN HOSP

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO OBTAIN NEW AND SPECIFIC INFORMATION PERTAINING TO THE MECHANISM AND SITE OF ACTION RELATIVE TO THE RED BLOOD CELL MASS AND PLASMA VOLUME CHANGES OBSERVED DURING SPACE FLIGHT. THE EQUIPMENT CONSISTS OF AN IN-FLIGHT BLOOD COLLECTION SYSTEM AND A REFRIGERATOR.

----- SPACELAB 1, MENDE-----

INVESTIGATION NAME- ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING

NSSDC ID- SPALAB1-05 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - S.B. MENDE LOCKNEED PALO ALTO
OI - R.H. EATHER BOSTON COLLEGE
OI - R.J. NAUMANN NASA-MSFC
OI - D.L. REASONER NASA-MSFC
OI - G.R. SWENSON NASA-MSFC
OI - B.J. DUNCAN NASA-MSFC
OI - K.S. CLIFTON NASA-MSFC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO (1) INVESTIGATE THE UPPER ATMOSPHERIC TRANSPORT PROCESSES THROUGH THE MEASUREMENT OF RESONANT SCATTERED EMISSIONS FROM POSITIVE Mg IONS, (2) MEASURE EXCITATION CROSS SECTIONS OF UPPER ATMOSPHERIC CONSTITUENTS USING INJECTED PARTICLE BEAMS AND DETECTION OF THE RESULTING EMISSIONS, (3) INVESTIGATE ATMOSPHERIC COMPOSITION AND ENERGY BUDGET THROUGH OBSERVATIONS OF NATURAL AURORA, (4)

OBSERVE LARGE- AND SMALL-SCALE AURORAL MORPHOLOGY AND COMPARE ULTRAVIOLET AND VISIBLE AURORA FEATURES, (5) SUPPORT THE ELECTRON ACCELERATOR IN CONDUCTING MEASUREMENTS OF MAGNETOSPHERIC ELECTRIC FIELDS, AND (6) MEASURE SMALL PARTICULATE CONTAMINATION AROUND THE SHUTTLE/ SPACELAB. THE EQUIPMENT CONSISTS OF -- (1) A DUAL-CHANNEL VIDEO SYSTEM WITH ASSOCIATED OPTICS AND DATA HANDLING ELECTRONICS MOUNTED ON A STABILIZED PLATFORM FOR POINTING AND CONTROL, (2) SEC VIDICON FOR HIGH-SENSITIVITY, HIGH-RESOLUTION OPERATION, (3) A LOW-RESOLUTION MICROCHANNEL PLATE ARRAY OPERATING IN A PHOTON COUNTING MODE, AND (4) COMS AND ONBOARD RECORDERS UTILIZED FOR DATA DISPLAY AND RECORDING. THE MAGNESIUM POSITIVE ION RESONANCE LINE WILL BE IMAGED AT 279.5 AND 280.2 NANOMETERS. FOR THE ATOMIC OXYGEN POSITIVE ION 2-P STATE STUDY, SIMULTANEOUS SENSING AT 731.9 AND 247.0 NANOMETERS WILL BE OBTAINED.

----- SPACELAB 1, OYASHI-----

INVESTIGATION NAME- SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)

NSSDC ID- SPALAB1-02 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. OYASHI U OF TOKYO
OI - J.W. SELLEN, JR. TRW SYSTEMS GROUP
OI - J.L. BURCH SOUTHWEST RES INST
OI - C.R. CHAPPELL NASA-MSFC
OI - W.T. ROBERTS NASA-MSFC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE AN ELECTRON BEAM ACCELERATOR AND A MAGNETO-PLASMA DYNAMIC (MPD) ARCJET TO STUDY: (1) AURORAL PRODUCTION IN THE UPPER ATMOSPHERE, (2) IONOSPHERE PARAMETERS SUCH AS ANOMALOUS RESISTIVITY, PLASMA COUPLING PROCESS, ELECTRIC AND MAGNETIC FIELD MORPHOLOGY, VEHICLE CHARGE NEUTRALIZATION, SHUTTLE/SPACELAB INDUCED ENVIRONMENTS, ELECTRON BEAM/ NEUTRAL PLUME INTERACTION, THE COUPLING BETWEEN THE EARTH'S ATMOSPHERE AND MAGNETOSPHERE, AND (3) THE EFFECTS OF PARTICLE INTERACTIONS ON ATMOSPHERIC DYNAMICS. THE EQUIPMENT CONSISTS OF AN ELECTRON BEAM ACCELERATOR, MAGNETO-PLASMA DYNAMIC ARCJET, BATTERY/CAPACITOR BANK TO PROVIDE HIGH DISCHARGE CURRENT, MONITOR AND DIAGNOSTIC DEVICES, AND CONTROL, DISPLAY, AND DATA MANAGEMENT SYSTEMS. THE ELECTRON BEAM ACCELERATOR, MPD ARCJET, AND NEUTRAL GAS EJECTOR ARE CONTAINED IN THE ACCELERATOR SUBSYSTEM. THE ELECTRON BEAM ACCELERATOR IS CAPABLE OF OPERATING AT VOLTAGES FROM 1 TO 7.5 KILOVOLTS AT A MAXIMUM OF 1.5 AMPS AND WITH A VARIABLE PULSE WIDTH OF FROM 10 MILLISECUNDS TO 1 SECOND. THE MPD ARCJET USES ARGON GAS AND HAS AN ENERGY INPUT OF 2 KILOJOULES PER PULSE. THE THIRD ACCELERATOR COMPONENT IS A NEUTRAL GAS PLUME GENERATOR WHICH USES NITROGEN AS THE GAS.

----- SPACELAB 1, PAN-----

INVESTIGATION NAME- BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G

NSSDC ID- SPALAB1-09 INVESTIGATIVE PROGRAM CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - C.H.T.PAN SHAKER RESEARCH CORP

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO -- (1) DETERMINE THE EXTENT TO WHICH SELECTED COMMERCIAL LUBRICANT WETTABILITY IS AFFECTED BY A ZERO-GRAVITY ENVIRONMENT, (2) DETERMINE HOW BEARING TORQUE, BEARING LUBRICANT FEEDING, AND BEARING OPERATING FILMS ARE ALTERED BY OPERATIONS IN ZERO GRAVITY, (3) COMPARE RESULTS WITH LABORATORY RESEARCH OF COMMERCIAL APPLICATIONS, AND (4) PROVIDE DATA FOR APPLICATIONS IN SPACE HARDWARE. THE EQUIPMENT CONSISTS OF PLATES FOR LUBRICANT WETTING AND SPREADING TESTS, HYDRODYNAMIC JOURNAL BEARING, AND AN AVAILABLE FLIGHT CAMERA. TWO TYPES OF EXPERIMENTS WILL BE CONDUCTED NAMELY, WETTING AND SPREADING ON STATIONARY SURFACES, AND TWO-PHASE BOUNDARY IN A JOURNAL BEARING CONFIGURATION. IN EACH CASE, THE FLUID-SURFACE COMBINATION WILL BE THE PRIMARY CONTROL PARAMETER.

----- SPACELAB 1, RESCHKE-----

INVESTIGATION NAME- VESTIBULO-SPINAL REFLEX MECHANISMS

NSSDC ID- SPALAB1-16 INVESTIGATIVE PROGRAM CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - W.F. RESCHKE NASA-JSC
OI - J.L. MORICK NASA-JSC
OI - D.J. ANDERSON U OF MICHIGAN

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE THE ESA SLED TO DETERMINE IF THE VESTIBULO-SPINAL REFLEX MEASUREMENT TECHNIQUE (H-REFLEX) IS SUITABLE AS AN EFFECTIVE PREDICTOR OF SUSCEPTIBILITY TO SPACE MOTION SICKNESS, AND TO STUDY THE RELATIONSHIP BETWEEN MOTION SICKNESS SENSITIVITY ON THE EARTH WITH CHANGES IN POSTURAL REFLEXES OBSERVED IN FLIGHT. THE EQUIPMENT CONSISTS OF A SLED FACILITY, POWER MODULE CONTAINING PULSE GENERATOR-OSCILLOSCOPE DIFFERENTIAL AMPLIFIER AND MICROPROCESSOR, PREAMPLIFIER, STIMULUS ISOLATION UNIT, AND ELECTRODE KIT.

----- SPACELAB 1, ROSS-----

INVESTIGATION NAME- MASS DISCRIMINATION DURING WEIGHTLESSNESS

NSSDC ID- SPALAB1-30 INVESTIGATIVE PROGRAM CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. ROSS U OF STIRLING

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO COMPARE MASS DISCRIMINATION WHEN BOTH THE OBSERVER AND THE TEST OBJECTS ARE WEIGHTLESS, WITH WEIGHT DISCRIMINATION UNDER NORMAL GRAVITY. THE EQUIPMENT IS A BOX CONTAINING WEIGHTED CONTAINERS, A BLINDFOLD, INSTRUCTIONS, AND RECORD CARDS.

----- SPACELAB 1, SCANO-----

INVESTIGATION NAME- BALLISTOCARDIOGRAPHIC RESEARCH IN WEIGHTLESSNESS

NSSDC ID- SPALAB1-33 INVESTIGATIVE PROGRAM CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - A. SCANO U OF ROME

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO RECORD A THREE-DIMENSIONAL BALLISTOCARDIOGRAM (BCG) IN RESTING WEIGHTLESS MAN AND COMPARE IT WITH SIMILAR TRACINGS RECORDED ON THE SAME SUBJECT IN GROUND CONDITIONS, POSSIBLY TO FIND BCG MODIFICATIONS IN RELATION TO CARDIOVASCULAR ADAPTATION TO WEIGHTLESSNESS, AND TO RECORD OTHER BODY ACCELERATIONS IN RELATION TO DIAPHRAGM DYNAMICS DURING SPONTANEOUS BREATHING, HYPERVENTILATION, AND COUGH. THE EQUIPMENT CONSISTS OF THREE SERVO-ACCELEROMETERS AND ONE ELECTROCARDIOGRAPH RECORDER WITH FOUR CHANNELS.

----- SPACELAB 1, SULZMAN-----

INVESTIGATION NAME- CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS

NSSDC ID- SPALAB1-15 INVESTIGATIVE PROGRAM CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - F.M. SULZMAN HARVARD U
OI - M.C. MOORE HARVARD U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO (1) TEST IF CIRCADIAN RHYTHMS PERSIST OUTSIDE THE EARTH'S ENVIRONMENT, AND TO DETERMINE IF THE CIRCADIAN TIMING SYSTEM IS EXOGENOUS OR ENDOGENOUS, AND (2) EXAMINE THE INFLUENCE OF THE SPACE ENVIRONMENT ON THE CIRCADIAN ORGANIZATION. THE EQUIPMENT CONSISTS OF A LIGHT-TIGHT BOX CONTAINING 24 GROWTH TUBES.

----- SPACELAB 1, THEILE-----

INVESTIGATION NAME- DC AND LOW FREQUENCY VECTOR MAGNETOMETER

NSSDC ID- SPALAB1-23 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B. THEILE BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE A THREE-AXIS FLUXGATE MAGNETOMETER TO STUDY: (1) MAGNETIC FIELDS OF THE IONOSPHERIC POLAR ELECTROJET AND ITS RETURN CURRENT, EQUATORIAL ELECTROJET, AND THE SOLAR QUIET CURRENT, (2) THE VECTOR MAGNETIC FIELD AS A PLASMA PARAPETER, AND (3) THE SPACELAB MAGNETIC FIELD BACKGROUND. THE EQUIPMENT CONSISTS OF TWO SEPARATE THREE-AXIS FLUXGATE SENSORS.

----- SPACELAB 1, THUILLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE

NSSDC ID- SPALAB1-20 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
OI - J.E. BLAMONT CNRS-SA
OI - M.L. DUBOIN CNET
OI - P. CONNES PARIS OBSERVATORY

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO USE A MICHELSON INTERFEROMETER TO (1) DETERMINE THE TEMPERATURE AND WIND PROFILES FROM THE TOP OF THE MESOSPHERE TO THE THERMOSPHERE BY ANALYSIS OF THE LINE WIDTHS AND DOPPLER SHIFTS OF NATURAL EMISSION OF DAYGLOW AND NIGHTGLOW CONSTITUENTS, AND (2) TO USE THIS EXPERIMENT AS A DEMONSTRATION FOR MORE SOPHISTICATED INSTRUMENTS TO BE FLOWN ON FUTURE MISSIONS. THE EQUIPMENT CONSISTS OF THREE FIELD-COMPENSATED MICHELSON INTERFEROMETERS, A HIGH-RESOLUTION INSTRUMENT, AND A CASSEGRAIN TELESCOPE. THE 630.0 AND 597.7 NANOMETER OI LINES AND THE 731.9 NANOMETER OII LINE OF THE AIRGLOW SPECTRUM WILL BE OBSERVED FOR THERMOSPHERIC MEASUREMENTS. FOR MESOSPHERIC MEASUREMENTS, THE 557.7 NANOMETER LINE AND THE 730.0 NANOMETER LINES IN THE (B-3) BAND OF THE OH POSITIVE ION RADICAL WILL BE UTILIZED.

----- SPACELAB 1, THUILLIER-----

INVESTIGATION NAME- MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS

NSSDC ID- SPALAB1-21 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
PI - P. SIMON IASB
OI - J.E. BLAMONT CNRS-SA
OI - R. PASTIELS IASB
OI - D. LABS LANDESSTERNHWARTE

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO MEASURE THE SOLAR SPECTRAL IRRADIANCE BETWEEN 170 AND 3200 NANOMETERS WITH AN ACCURACY OF 0.1 PERCENT IN ORDER TO DETERMINE SOLAR CONSTANT, VARIATIONS IN SOLAR CONSTANT WITH SOLAR CYCLE USING SPACELAB/STS FLIGHTS OVER A 10-YEAR PERIOD, AND VARIATIONS OF IRRADIANCE WITHIN EACH SPECTRAL REGION. THE EQUIPMENT CONSISTS OF THREE GRATING SPECTROMETERS COVERING UV - 170.0 TO 370.0 NM (1 NM BANDPASS), VISIBLE - 350.0 TO 900 NM (1 NM BANDPASS), AND IR - 800 TO 3200 NM (10 NM BANDPASS).

----- SPACELAB 1, TORR-----

INVESTIGATION NAME- AN IMAGING SPECTROMETRIC OBSERVATORY

NSSDC ID- SPALAB1-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.R. TORR U OF MICHIGAN
OI - A.L. BROADFOOT U OF SOUTHERN CALIF
OI - D.E. SHERANSKY U OF SOUTHERN CALIF
OI - D.R. SANDEL U OF SOUTHERN CALIF
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARIGNAN U OF MICHIGAN
OI - J.C.G. WALKER U OF MICHIGAN
OI - D.G. TORR U OF MICHIGAN
OI - T.H. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO: (1) OBTAIN THE FIRST DAYTIME MEASUREMENTS OF THE AIRGLOW SPECTRUM FROM THE EXTREME ULTRAVIOLET TO THE INFRARED (20 TO 1200 NM), (2) TO MONITOR THE SHUTTLE INDUCED CONTAMINATION, AND (3) TO SERVE AS A PRECURSOR FOR FUTURE SHUTTLE FLIGHTS. IT IS PLANNED TO MEASURE EMISSIONS FROM A LARGE RANGE OF MINOR CONSTITUENTS, METASTABLE AND EXCITED SPECIES OF BOTH ATOMIC AND MOLECULAR IONS, AND NEUTRALS IN THE ATMOSPHERE FROM THE STRATOSPHERE TO THE UPPER THERMOSPHERE. THE FLIGHT INSTRUMENT IS DESIGNED FOR HIGH SPEED OPERATION AS AN IMAGING DEVICE, AND IS COMPOSED OF FIVE IDENTICAL SPECTROMETERS, EACH OF WHICH IS RESTRICTED TO A GIVEN SPECTRAL RANGE WITHIN THE 20 TO 1200 NM REGION. EACH MODULE IS AN IMAGING SCANNING SPECTROMETER WITH COINCIDENT 0.5 X 0.007 DEG FIELDS OF VIEW. IMAGING CAPABILITY IS OBTAINED ALONG THE LENGTH OF THE OBSERVATIONAL FIELD BY USE OF AN AREA ARRAY DETECTOR COMPRISING 190 X 244 ELEMENTS. THUS, A SINGLE MEASUREMENT PRODUCES ADJACENT SPECTRA IN A GIVEN MODULE OBTAINED FROM ADJACENT OBSERVATIONAL FIELDS. WAVELENGTH RESOLUTION VARIES BETWEEN 0.2 AND 0.6 NM OVER THE SPECTRAL RANGE. A SCAN MIRROR IS USED, AND A SINGLE EXPOSURE AT ONE SCAN POSITION COVERS A 250 NM REGION. THE TELESCOPE WILL BE BAFFLED, AND WILL HAVE SEVERAL OPERATING MODES.

----- SPACELAB 1, VON BAUMGARTEN-----

INVESTIGATION NAME- HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS)

NSSDC ID- SPALAB1-41 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - R. VON BAUMGARTEN U OF MAINZ
OI - J. DICHGANS U OF FREIBURG
OI - T. BRANDT KRUPP KRANKEN-ANGSTALN
OI - W. SCHERER U OF MUNICH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO USE THE SLED TO STUDY THE VISUO-VESTIBULAR COORDINATION AND THE INTEGRATION OF MULTISENSORY STIMULI WITHIN THE ORIENTATION CENTERS OF THE BRAIN BY EXPOSING THE SUBJECT TO SHORT PERIODS OF LINEAR ACCELERATION IN CONJUNCTION WITH OPTOKINETIC STIMULATION AND CALORIC STIMULATION. IN ADDITION TO THE SPACE SLED, THE EQUIPMENT CONTAINS AN OPTOKINETIC STIMULATION DISPLAY, A CALORIC STIMULATION SYSTEM, AN OPTICAL TARGET SETTING SYSTEM, AN EYE MOVEMENT RECORDER, AN ELECTROMYOGRAPHIC RECORDING SYSTEM, AN ELECTRONYSTAGMOGRAPHIC RECORDING SYSTEM, ELECTROCARDIOGRAPHIC RECORDING SYSTEM, AND A MOTION PERCEPTION INDICATOR.

----- SPACELAB 1, VOSS, JR.-----

INVESTIGATION NAME- EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS

NSSDC ID- SPALAB1-17 INVESTIGATIVE PROGRAM
CODE SB/CO-UP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - E.W. VOSS, JR. U OF ILLINOIS

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE AN EVALUATION OF PROLONGED WEIGHTLESSNESS AS A STRESS FACTOR EFFECT ON THE HUMORAL IMMUNE RESPONSE OF HUMANS, AND TO ESTABLISH THE CAPABILITY OF HUMANS TO RESPOND IMMUNOLOGICALLY TO POTENTIAL FOREIGN PATHOGENS DURING FUTURE SUSTAINED SPACE FLIGHT. THE EQUIPMENT INCLUDES A CONTAINER FOR STORING BLOOD SAMPLES, STERILE SYRINGES, NEEDLES, AND TEST TUBES.

----- SPACELAB 1, WILHELM-----

INVESTIGATION NAME- STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION

NSSDC ID- SPALAB1-24 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. WILHELM MPI-AERONOMY
OI - W. STUBERMAN MPI-AERONOMY
OI - W. RIEDLER TECH U OF GRAZ

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO FLY A 2-FI FIELD OF VIEW ELECTROSTATIC ANALYZER TO MEASURE NATURAL ELECTRON FLUXES IN THE 0.1 TO 12.0-KEV RANGE TO STUDY PRECIPITATION PROCESS IN AURORAL EMISSION, EFFECTS OF THE ELECTRON ACCELERATOR (SEPAAC) OPERATIONS ON THE NATURAL ELECTRON FLUXES, THE INFLUENCE OF THE SHUTTLE/SPACELAB GENERATED ATMOSPHERE ON THE NATURAL ELECTRON FLUX, AND TO STUDY NATURAL ELECTRON FLUXES AS A SENSITIVE PROBE OF THE SURFACE CHARGE ON THE STS/SPACE LAB. THE EQUIPMENT CONSISTS OF AN ELECTROSTATIC DEFLECTION DEVICE WITH A

HEMISPHERIC FIELD OF VIEW AND WITH AZIMUTH AND PITCH-ANGLE RESOLUTION, AND EIGHT CONTINUOUS-CHANNEL ELECTRON MULTIPLIERS FOR DETECTORS.

----- SPACELAB 1, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR

NSDDC ID- SPALAB1-04 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS PARTICLES AND FIELDS

PERSONNEL

PI - R.C. WILLSON NASA-JPL
OI - R. BEER NASA-JPL
OI - M. ZIRIN CALIF INST OF TECH
OI - J. KENDALL, SR. CALIF INST OF TECH

BRIEF DESCRIPTION

THE OBJECTIVE OF THE ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR EXPERIMENT IS TO MEASURE THE TOTAL SOLAR IRRADIANCE WITH MAXIMUM ACCURACY AND PRECISION. THE SOLAR IRRADIANCE FROM FAR ULTRAVIOLET THROUGH FAR INFRARED WAVELENGTHS WILL BE MEASURED BY THREE TYPE IV ACTIVE CAVITY RADIOMETER DETECTORS. THESE DETECTORS ARE ELECTRICALLY SELF-CALIBRATED, CAVITY PYROMETERS EACH CAPABLE OF DEFINING THE ABSOLUTE RADIATION SCALE WITH AN UNCERTAINTY OF PLUS OR MINUS 0.1 PERCENT IN THE INTERNATIONAL SYSTEM OF UNITS (SI) AT THE SOLAR 'CONSTANT' LEVEL. THE THREE DETECTORS WILL BE INDEPENDENTLY SHUTTERED, AND THEIR CYCLES OF OPERATION WILL BE DIFFERENT. CHANNEL A WILL BE USED ROUTINELY TO MONITOR THE TOTAL SOLAR IRRADIANCE. THE TIME CONSTANT FOR A REFERENCE OR OBSERVATION PHASE STEP FUNCTION OF SOLAR 'CONSTANT' MAGNITUDE WILL BE LESS THAN 5. THE SECOND DETECTOR (CHANNEL B) WILL BE INTERMITTENTLY COMPARED WITH CHANNEL A TO ESTABLISH A'S LONG-TERM STABILITY OR TO CALIBRATE ANY APPARENT DEGRADATION. CHANNEL C, AFTER INITIAL COMPARISON WITH A AND B, WILL BE USED ONLY TO RESOLVE AMBIGUITIES ARISING FROM OPERATION OF THE FIRST TWO.

----- SPACELAB 1, YOUNG-----

INVESTIGATION NAME- VESTIBULAR STUDIES

NSDDC ID- SPALAB1-13 INVESTIGATIVE PROGRAM CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S) SPACE BIOLOGY

PERSONNEL

PI - L.S. YOUNG MASS INST OF TECH
OI - G.M. JONES MCILL U
OI - R.E. MALCOLM D+C INST OF ENVIRN MED
OI - K.E. MONEY D+C INST OF ENVIRN MED
OI - C.M. OHAN MASS INST OF TECH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO DETERMINE IF OTOLITH SENSITIVITY CHANGES ARE INVOLVED IN SPACE MOTION SICKNESS AND POSTFLIGHT POSTURAL DISTURBANCES. EQUIPMENT CONSISTS OF -- SLED FACILITY, MOTOR-DRIVEN ROTATING FIELD, 16-MM MOVIE CAMERA, CALIBRATION LIGHT ARRAY, STATION FOR HOPPING TEST, AND TAPE RECORDER.

***** SPACELAB 2*****

SPACECRAFT COMMON NAME- SPACELAB 2
ALTERNATE NAMES-

NSDDC ID- SPALAB2

LAUNCH DATE- 11/00/83 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSB

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.3 MIN INCLINATION- 50. DEG
PERIAPSIS- 400. KM ALT APOAPSIS- 400. KM ALT

PERSONNEL

MM - R.E. PACE NASA-MSFC
MS - F.W. URBAN NASA-MSFC
MG - W.R. WITT NASA HEADQUARTERS
MC - E. WELER NASA HEADQUARTERS
PM - D.C. JEAN NASA-MSFC

BRIEF DESCRIPTION

SPACELAB 2 CONSISTS OF THREE PALLETS AND A UNIQUE STRUCTURE (CALLED THE 1600) ON WHICH VARIOUS INSTRUMENTS ARE EXPOSED TO THE SPACE ENVIRONMENT. INCLUDED IN THE PAYLOAD IS THE INSTRUMENT POINTING SYSTEM BUILT BY THE EUROPEAN SPACE AGENCY (ESA) AND DESIGNED TO POINT THE INSTRUMENTS AT TARGETS OF OPPORTUNITY. THE FOLLOWING INVESTIGATIONS HAVE BEEN CHOSEN TO FLY ON THIS MISSION: VITAMIN D METABOLITES AND BONE DEMINERALIZATION, INTERACTION OF OXYGEN AND GRAVITY-INFLUENCED

LIGNIFICATION, EJECTABLE PLASMA DIAGNOSTICS PACKAGE, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDIES, SMALL HELIUM-COOLED INFRARED TELESCOPE, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI BETWEEN 80 GEV PER NUCLEON AND SEVERAL TEV PER NUCLEON, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM, CORONAL HELIUM ABUNDANCE SPACELAB EXPERIMENT, HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH, SOLAR UV SPECTRAL IRRADIANCE MONITOR, IN-ORBIT CALIBRATION OF MESA LOW-GRAVITY ACCELEROMETER, AND PROPERTIES OF SUPERFLUID HELIUM IN ZERO GRAVITY.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)

NSDDC ID- SPALAB2-10 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB
OI - O.K. ROE US NAVAL RESEARCH LAB
OI - K.R. NICOLAS US NAVAL RESEARCH LAB
OI - M.E. VAN HOOSIER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE: (1) THE STUDY OF THE ENERGY TRANSPORT AND MASS BALANCE OF THE TEMPERATURE MINIMUM, CHROMOSPHERE, TRANSITION ZONE AND CORONA IN THE QUIET SUN AS WELL AS IN PLACES, FLARES, AND SUNSPOTS; (2) THE EXAMINATION OF THE VELOCITY FIELD OF THE LOWER CORONA TO STUDY THE ORIGIN OF THE SOLAR WIND; (3) THE STUDY OF THE STRUCTURE AND DYNAMICS OF SPICULES AND SUPERSPICULES IN THE UV SPECTRUM; (4) THE STUDY OF STRUCTURE AND DYNAMICS OF PROMINENCES; AND (5) THE STUDY OF PRE-FLARE AND FLARE PHENOMENA. THESE OBJECTIVES ARE OBTAINED THROUGH INTENSITY MEASUREMENTS, DOPPLER MEASUREMENTS, AND LINE PROFILE ANALYSIS OF HIGH SPATIAL RESOLUTION (1 ARC-S) AND HIGH SPECTRAL RESOLUTION (5 PICOMETER) OF UV SPECTRA (WAVELENGTHS 117.6-170 NANOMETERS) COVERING A WIDE VARIETY OF CONTINUUM AND EMISSION LINES THAT ORIGINATE IN DIFFERENT TEMPERATURE REGIMES OF THE SOLAR ATMOSPHERE. THE INSTRUMENTATION CONSISTS OF A STIGMATIC SPECTROGRAPH WITH A SLIT THAT COVERS THE FULL SOLAR RADIUS SIMULTANEOUSLY WITH 1000 RESOLUTION ELEMENTS. THUS THE SLIT COVERS MANY DIFFERENT SOLAR FEATURES AT THE SAME TIME. ONE SPECTRUM CONTAINS ENOUGH INFORMATION FOR A STATISTICAL ANALYSIS. PHOTOGRAPHS OF A SERIES OF SPECTRA OVER A PERIOD OF AT LEAST 15 MIN ARE MADE IN ORDER TO FOLLOW THE CHANGES IN THE INTENSITY, DOPPLER VELOCITIES, AND LINE PROFILES AS THEY ARE CAUSED BY DISTURBANCES MOVING THROUGH THE SOLAR ATMOSPHERE. SPECTROHELIOGRAMS OF TWO DIMENSIONS AS A FUNCTION OF TIME ARE CONSTRUCTED IN ORDER TO INVESTIGATE THE 3-DIMENSIONAL STRUCTURE OF THE CHROMOSPHERE AND TRANSITION ZONE. A SYSTEMATIC MAPPING OF THE CORONAL VELOCITY FIELD OVER THE WHOLE SUN IS ALSO MADE ALONG WITH A SERIES OF LIND SPECTRA AT DIFFERENT ALTITUDES FOR STUDIES OF STRUCTURE AND DYNAMICS OF SPICULES. THE SLIT IS POINTED WITHIN A TOLERANCE OF HALF A SLIT WIDTH FOR A DURATION OF AT LEAST 15 MIN. THE SLIT OF THE HIGH RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) IS STEPPED IN RAPID SEQUENCE OVER A SMALL AREA OF THE SUN (PLUS OR MINUS 2 ARC-S), WHICH ALLOWS THE SPECTROHELIOGRAMS TO BE MADE. THE HRTS CONSISTS OF A 30-CM GREGORIAN TELESCOPE OF 90-CM FOCAL LENGTH, A UV SPECTROGRAPH, A 160 NANOMETER BROAD-BAND SPECTROHELIOGRAPH, AND AN ALPHA SPLIT DISPLAY SYSTEM HOUSED IN A THERMAL CONTROL CABINET MOUNTED ON THE INSTRUMENT POINTING SYSTEM (IPS). THE TELESCOPE HAS AN OCCULTING MIRROR AT THE PRIMARY FOCUS THAT REFLECTS AWAY ALL BUT A 5 X 15 ARC-MIN PORTION OF THE SOLAR IMAGE THAT THEN PASSES THROUGH AN APERTURE TO STRIKE A SECONDARY MIRROR THAT RE-IMAGES IT ONTO THE UV WADSWORTH SPECTROGRAPHIC SLIT PLATE. THE SECONDARY MIRROR RECEIVES LESS THAN ONE SOLAR CONSTANT OF ILLUMINATION. THE SPECTRAL RESOLUTION IS 50 MILLIANGSTROMS AND THE SPATIAL RESOLUTION IS 1 ARC-S. THE ROLL FILM CAMERA HOLDS 1000 EXPOSURES OF TYPE 101 FILM.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM)

NSDDC ID- SPALAB2-11 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB
OI - B.R. PRINZ US NAVAL RESEARCH LAB
OI - P.E. VAN HOOSIER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) IMPROVE THE ACCURACY OF KNOWLEDGE OF THE ABSOLUTE SOLAR FLUXES; (2) TO PROVIDE A HIGHLY ACCURATE TRACEABILITY OF SOLAR FLUXES TO A VARIETY OF UV RADIATION STANDARDS TO ESTABLISH LONG-TERM (SOLAR CYCLE) VARIATIONS; AND (3) TO MEASURE THE VARIABILITY OF SOLAR FLUXES IN THE WAVELENGTH RANGE OF 120-400 NANOMETERS DURING SEVERAL TIME PERIODS, RANGING FROM FLARE-PRODUCED CHANGES TO

ORIGINAL PAGE IS OF POOR QUALITY

THE VARIABILITY FROM SOLAR ROTATION. IT IS DESIRED TO (A) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR CONTINUUM IRRADIANCE MEASUREMENTS IN THIS WAVELENGTH RANGE WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT); (B) MEASURE WITH HIGH ACCURACY THE INTENSITIES OF THE CONTINUUM BELOW 200 NANOMETERS RELATIVE TO THE INTENSITIES OF THE CONTINUUM ABOVE 200 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 PERCENT; (C) PERFORM HIGH ACCURACY MEASUREMENTS OF THE INTENSITIES OF SOLAR EMISSION LINES RELATIVE TO THE STABLE SOLAR CONTINUUM ABOVE 200 NANOMETERS WITH A GOAL OF PLUS OR MINUS 1 TO 5 PERCENT (WAVELENGTH-DEPENDENT); AND (D) IMPROVE THE ABSOLUTE ACCURACY OF SOLAR EMISSION LINE IRRADIANCE MEASUREMENTS IN THE 120- TO 400-NANOMETER REGION WITH A GOAL OF PLUS OR MINUS 6 TO 10 PERCENT (WAVELENGTH-DEPENDENT). THE INSTRUMENTATION CONSISTS OF A SOLAR UV SPECTRAL IRRADIANCE MONITOR. THE MONITOR CONSISTS OF TWO IDENTICAL DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS (FIVE PHOTODIODES AND TWO PHOTON COUNTERS), AND A UV CALIBRATION LIGHT SOURCE. THEY ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON TO ELIMINATE THE EFFECTS OF CONTAMINATION FROM HIGH VACUUM OUTGASSING. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY DURING THE DAYLIGHT PORTION OF THE SOLAR-POINTED ORBIT FOR MEASURING SHORT-TIME VARIATIONS OF THE UV SOLAR FLUX (FLARE-RELATED AND SLOWLY-VARYING COMPONENT). THE OTHER SPECTROMETER IS USED ONLY ONCE A DAY TO TRACK ANY CHANGE IN SENSITIVITY OF THE FIRST SPECTROMETER. TWO OF THE FIVE PHOTODIODES ARE USED ONLY ONCE A DAY. A DEUTERIUM LAMP CALIBRATED IN SPECTRAL IRRADIANCE IS USED AS THE TRANSFER STANDARD SOURCE FOR DAILY IN-FLIGHT CALIBRATION AND STABILITY TRACKING OF BOTH SPECTROMETERS AND ALL SEVEN DETECTORS. THE TWO PHOTON COUNTERS OBTAIN A SPECTRAL RESOLUTION OF 0.1 NANOMETERS OVER THE WHOLE WAVELENGTH RANGE, WHILE 5-NANOMETER RESOLUTION IS OBTAINED WITH THE FIVE PHOTODIODES. A MICROPROCESSOR CONTROLS ALL INSTRUMENT FUNCTIONS BY PROGRAM INSTRUCTION. CHANNELS MONITOR THE 121.6-NANOMETER LINE (IN ALPHA) AND SEVEN SEGMENTS OF THE CONTINUUM FROM 140 TO 390 NANOMETERS. EIGHT NARROW-BAND CHANNELS (0.1-NANOMETER RESOLUTION) ARE MONITORED CONTINUOUSLY AND SCANNED IN FIVE 0.1-NANOMETER STEPS. IN THE SPECTRAL SCAN MODE (ONCE A DAY) THE SPECTRUM FROM 120 TO 400 NANOMETERS IS SCANNED AT 0.1-NANOMETER RESOLUTION. IN THE NARROW-BAND MODE THE SOLAR SPECTRUM AND THE DEUTERIUM LAMP ARE SCANNED WITH BOTH SPECTROMETERS; BOTH ARE MONITORED IN THE BROAD-BAND MODE.

----- SPACELAB 2, COWLES-----

INVESTIGATION NAME- INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION

NSBDC ID- SPALAB2-02 INVESTIGATIVE PROGRAM CODE 5D
 INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - J.D. COWLES U OF HOUSTON
 OI - M.W. SCHELD U OF HOUSTON

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO ESTABLISH THE EFFECT OF OXYGEN ON LIGNIN FORMATION IN PLANT TISSUE SUBJECTED TO A WEIGHTLESS ENVIRONMENT AND TO MEASURE THE RELATIVE AMOUNT OF AROMATIC BIOSYNTHESIS UNDER DIFFERENT OXYGEN ENVIRONMENTS. THE INVESTIGATION DISTINGUISHES BETWEEN TWO KNOWN FACTORS, OXYGEN AND GRAVITY, THAT INFLUENCE LIGNIFICATION IN PLANTS. SELECTED PREGERMINATED SEEDS ARE PLANTED IN METABOLIC CHAMBERS AND GERMINATED JUST PRIOR TO LAUNCH. CHAMBERS ARE CLOSED AND THE ATMOSPHERIC COMPOSITION IS ADJUSTED BY FLUSHING KNOWN GAS MIXTURES THROUGH RUBBER SEPTAS IN THE CHAMBER WALLS. THE O₂ CONCENTRATIONS ARE 21 PERCENT (FOR THE CONTROL), 10 PERCENT, AND 3 PERCENT. EACH OXYGEN CONCENTRATION IS DUPLICATED IN ANOTHER CHAMBER MODULE. MERCURY VAPOR LAMPS ARE USED TO SIMULATE SUNLIGHT DURING PROGRAMMED DAY/NIGHT CYCLES THROUGHOUT THE MISSION. THE INVESTIGATION IS ALSO DUPLICATED ON EARTH AT 1 GRAVITY AND ON A CLINOSTAT (GROUND CONTROLS).

----- SPACELAB 2, FAZIO-----

INVESTIGATION NAME- SMALL, HELIUM-COOLED INFRARED TELESCOPE

NSBDC ID- SPALAB2-05 INVESTIGATIVE PROGRAM CODE 5C
 INVESTIGATION DISCIPLINE(S)
 DUST
 ZODIACAL LIGHT
 ASTRONOMY

PERSONNEL
 PI - G.G. FAZIO SAO
 OI - W.F. HOFFMANN U OF ARIZONA
 OI - D.E. KLEINMANN SAO
 OI - F.J. LOW U OF ARIZONA
 OI - G.H. RIEKE U OF ARIZONA
 OI - M.A. TRAUD SAO
 OI - E.W. URDAN NASA-MSFC

BRIEF DESCRIPTION
 THIS MULTIDISCIPLINARY INVESTIGATION INVOLVES BOTH SCIENTIFIC AND TECHNICAL GOALS. THE SCIENTIFIC OBJECTIVES ARE THE: (1) MEASUREMENT AND MAPPING OF EXTENDED LOW-SURFACE BRIGHTNESS INFRARED EMISSION FROM THE GALAXY. THE EXPERIMENT IS 500 TIMES MORE SENSITIVE THAN CURRENT BALLOON EXPERIMENTS AT 500 MICROMETERS, THUS MAKING POSSIBLE EXTENSIVE MEASUREMENT OF QUANTITY, DISTRIBUTION AND TEMPERATURES OF GALACTIC DUST AND STRUCTURES; (2) MEASUREMENT OF DIFFUSE EMISSION FROM INTERGALACTIC MATERIAL AND/OR GALAXIES AND QUASARS; (3) MEASUREMENT OF THE ZODIACAL DUST EMISSION, ESPECIALLY IF THE H₂O COLUMN DENSITY CAN BE HELD TO LESS THAN 1.E-12 MOLECULES/CM²; AND (4) MEASUREMENT OF A LARGE NUMBER OF DISCRETE INFRARED SOURCES THAT OVERLAP WITH THE IRAS RESULTS. SPATIAL FILTERING PROVIDED MEASUREMENTS OF THE FLUX, SPECTRAL CHARACTERISTICS, POSITIONS, AND SIZES OF DISCRETE SOURCES WITH HIGH SENSITIVITY. TECHNICAL OBJECTIVES CONCERNED WITH THE MEASUREMENT OF THE NATURAL AND SPACECRAFT-INDUCED INFRARED BACKGROUND AND THE DETERMINATION OF SUITABLE TECHNIQUES FOR THE IN-SPACE USE OF SUPERFLUID HELIUM AND CRYOGENIC TELESCOPES ARE: (1) TO TAKE ENVIRONMENTAL MEASUREMENTS OF: H₂O, CO₂ (AND OTHER INFRARED-ACTIVE MOLECULES), DUST PARTICLES, THE EFFECTS OF MOLECULAR DEPOSITION AND COSMIC RAYS, AND THE EFFECTS FROM THE SHUTTLE ENVIRONMENT ON THE PERFORMANCE OF COOLED INFRARED TELESCOPES; (2) TO PROVE OUT THE DESIGN OF COOLED INFRARED TELESCOPES; AND (3) TO DEMONSTRATE THE PERFORMANCE OF A LARGE SUPERFLUID HELIUM DEWAR SYSTEM AND MEASURE CERTAIN PROPERTIES OF IT IN SPACE. THE INSTRUMENTATION CONSISTS OF A SMALL HERSCHELIAN TELESCOPE (15 CM IN DIAMETER WITH AN F/4 OFF AXIS) COOLED TO 3 DEG K. IT SCANS AT THE RATE OF 6 DEG/S AND COVERS A 90-DEG ARC ACROSS THE SKY. THE FOCAL PLANE CONTAINS 10 DETECTORS, 9 OF WHICH COVER THE REGION FROM 4 TO 120 MICROMETERS IN THREE NON-OVERLAPPING BROADBANDS (4 TO 9, 12 TO 24, AND 50 TO 120 MICROMETERS). ONE DETECTOR HAS A NARROW-BAND RESPONSE AT THE H₂O AND CO₂ BAND LOCATIONS (6 TO 7 AND 14 TO 16 MICROMETERS). THEY COVER A FULL 3 DEG PERPENDICULAR TO THE SCAN DIRECTION. THERE IS ALSO A MOVEABLE COLD SHUTTER TO PROVIDE AN ABSOLUTE ZERO FLUX REFERENCE FOR EACH BAND. THE STORED LIQUID HELIUM COOLING SYSTEM IS COMPOSED OF A LIQUID HELIUM DEWAR CONTAINING LIQUID HELIUM AT 1.5 K, A TRANSFER LINE ASSEMBLY, A VAPOR-COOLED TELESCOPE CRYOSTAT, AND A CRYOSTAT VACUUM COVER.

----- SPACELAB 2, GABRIEL-----

INVESTIGATION NAME- SOLAR CORONAL HELIUM ABUNDANCE

NSBDC ID- SPALAB2-09 INVESTIGATIVE PROGRAM CODE 57/CO-0P
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS

PERSONNEL
 PI - A.M. GABRIEL APPLETON LAB
 PI - J.L. CULMANN U COLLEGE LONDON
 OI - D.E. PATCHETT APPLETON LAB
 OI - K. STRONG U COLLEGE LONDON

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) DETERMINE THE RELATIVE ABUNDANCE OF HELIUM TO HYDROGEN IN THE SOLAR CORONA FROM THE MEASUREMENT OF THE PHOTOEXCITATION OF HYDROGEN LYMAN ALPHA 121.6 NANOMETERS AND HELIUM II AT 30.4 NANOMETERS; (2) DETERMINE THE FUNDAMENTAL PARAMETERS OF THE CORONAL PLASMA SUCH AS ELECTRON DENSITY, TEMPERATURE, AND IONIZATION BALANCE AS A FUNCTION OF RADIAL DISTANCE ABOVE THE LIND; (3) CONSTRUCT A CONTOUR MAP IN THE INTENSITY OF SELECTED EXTREME UV LINES AND IN PHYSICAL PARAMETERS (ELECTRON TEMPERATURE AND DENSITY) OF CORONAL FEATURES WITH 15 ARC-S RESOLUTION BOTH ON THE DISK AND ABOVE THE LIND OF THE SUN. THE INSTRUMENTATION IS COMPOSED OF A 1-M GRAZING-INCIDENCE SPECTROMETER USING A 1200-LINE/MP RULES GRATING. THE SUN'S IMAGE IS FOCUSED ONTO THE ENTRANCE SLIT PLANE BY MEANS OF A 20-CM FOCAL LENGTH GRAZING-INCIDENCE TELESCOPE OF WOLTER TYPE 1 SECTOR DESIGN. THE SLIT IS ORIENTED TANGENTIALLY TO THE SOLAR LIND AND CAN BE STEPPED RADially IN STEPS OF 1 ARC-MIN FROM A POSITION ON THE SOLAR DISK TO 8 ARC-MIN ABOVE THE LIND BY A SERVO-DRIVEN LINEAR TRAVERSE ON THE TELESCOPE MIRROR. TWELVE CHANNEL ELECTRON MULTIPLIERS ARE POSITIONED BEHIND DIFFERENT EXIT SLITS AT PRE-SELECTED SPECTRAL POSITIONS ON THE RING-LAND CIRCLE. TWO POSITIONS ARE AT 121.6 NANOMETERS AND 30.4 NANOMETERS (FOR H/HE ABUNDANCES). THE OTHER SLITS COVER ASSOCIATED PARAMETERS SUCH AS THE TEMPERATURE AND DENSITY OF THE SOLAR ATMOSPHERE. SOME SLITS HAVE ATTENUATING FILTERS FOR DYNAMIC RANGE OF THE RATIO OF THE DISK INTENSITY TO THAT OF THE CORONA AT 3.5.E5 KM. FILTERS ARE REMOVED FOR LIND MEASUREMENTS. A SMALL OSCILLATORY ROTATION OF THE GRATING ABOUT AN AXIS THROUGH THE ENTRANCE SLIT PERMITS A SMALL WAVELENGTH SCAN TO DISCRIMINATE AGAINST SCATTERED STRAY LIGHT. AN AUXILIARY INSTRUMENT MONITORS CHANGES IN HE II 30.4 NANOMETER INTENSITY CAUSED BY ATMOSPHERIC ABSORPTION EFFECTS RESULTING FROM SPACECRAFT HEIGHT OR CHANGES OF LINE-OF-SIGHT TO THE SUN. A ZERO-ORDER DETECTOR MONITORS THE SOLAR LIND CROSSINGS AND GIVES DATA ON SHORT-TERM INTENSITY VARIATIONS IN STARS FOR WAVELENGTHS SHORTER THAN 140 NANOMETERS. SIGNALS ARE COUNTED, MULTIPLIED, AND INTERFACED WITH THE SPACELAB TELEMETRY SYSTEM FOR TRANSMISSION TO THE GROUND. THE POINTING ACCURACY IS 15 ARC-S AND THE POINTING STABILITY IS 5 ARC-S.

----- SPACELAB 2, LANGE-----
 INVESTIGATION NAME- IN-ORBIT CALIBRATION OF LOW-G MINIATURE
 ELECTROSTATIC ACCELEROMETER

NSSDC ID- SPALAB2-12 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 TECHNOLOGY

PERSONNEL
 PI - M.G. LANGE BELL AEROSPACE CORP

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE THE: (1) EVALUATION OF THE SPACELAB 2 ORBITAL LOW-GRAVITY ACCELERATION ENVIRONMENT IN PLANNED MODES OF OPERATION, (2) EVALUATION OF THE SPACELAB 2 CAPABILITY AS A LOW-GRAVITY TEST FACILITY, AND (3) CALIBRATION AND EVALUATION OF THE IN-ORBIT PERFORMANCE OF THE MINIATURE ELECTROSTATIC ACCELEROMETER (MESA) AS MODIFIED FOR 3-AXIS ACCELERATION MEASUREMENT CAPABILITY. THE INSTRUMENTATION CONSISTS OF A 3-AXIS MINIATURE ELECTROSTATIC ACCELEROMETER MOUNTED ON A ROTATING TABLE THAT INTRODUCES A VARIABLE AND CONTROLLABLE CENTRIFUGAL ACCELERATION ALONG THE INPUT AXIS. THE TABLE ALSO PROVIDES MODULATION OF THE SENSED ACCELERATIONS, SHIFTING THE SIGNAL TO A LOW-NOISE REGION OF THE POWER DENSITY SPECTRUM. ONE OR MORE FIRED POSITIONS ARE USED TO MEASURE ALONG PREFERRED AXES. CALIBRATION REQUIRES THAT A KNOWN ACCELERATION BE INTRODUCED ALONG ITS INPUT AXIS. THIS CAN BE ACCOMPLISHED BY GRAVITY GRADIENT, MASS ATTRACTION, OR A SLOWLY ROTATING TABLE. THE LATTER IS USED BECAUSE IT HAS A LARGE NUMBER OF DIFFERENT ACCELERATION LEVELS THAT CAN BE PRODUCED BY VARYING THE ROTATION SPEED. VEHICLE ANGULAR RATES AND ORBITAL DRAG ARE FREQUENTLY MODULATED. A CALIBRATION, A TABLE-ROTATING, AND A TABLE-FIXED MODE ARE INCLUDED. THE MEASUREMENT PERIOD FOR ROTATION RATES USED VARIES FROM 10 S AT 1.E-4 GRAVITY TO 1000 S AT 1.E-8 GRAVITY.

----- SPACELAB 2, MASON-----
 INVESTIGATION NAME- DYNAMICS AND THERMAL PROPERTIES OF
 SUPERFLUID HELIUM IN ZERO-G

NSSDC ID- SPALAB2-13 INVESTIGATIVE PROGRAM
 CODE RS
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - P.V. MASON NASA-JPL
 OI - D.J. COLLINS NASA-JPL
 OI - D.D. ELLEMAN NASA-JPL
 OI - D. PETRAC NASA-JPL
 OI - W.M. SAFFREN NASA-JPL
 OI - T.G. WANG NASA-JPL

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO DETERMINE THE FLUID AND THERMAL PROPERTIES REQUIRED FOR THE DESIGN OF PLANNED SPACE EXPERIMENTS USING SUPERFLUID HELIUM (2.2 K) AS A CRYOGEN. TO ADVANCE SCIENTIFIC UNDERSTANDING OF THE INTERACTIONS BETWEEN SUPERFLUID AND NORMAL LIQUID HELIUM, AND TO DEMONSTRATE THE USE OF SUPERFLUID HELIUM AS A CRYOGEN IN ZERO GRAVITY. SPECIFICALLY, THE OBJECTIVES ARE TO: (1) TAKE DETAILED MEASUREMENTS OF LOW-FREQUENCY BLSM MODES OF SUPERFLUID HELIUM; (2) TAKE PRECISE MEASUREMENTS OF THE THERMAL FLUCTUATIONS AND DISTRIBUTIONS IN SUPERFLUID HELIUM IN ZERO GRAVITY. THE INVESTIGATION PERFORMS AT THE MICROKELVIN LEVEL OVER A FREQUENCY RANGE FROM 0-100 HZ; (3) DEVELOP AN APPARATUS TO MEASURE THE VELOCITIES AND ATTENUATION OF QUANTIZED SURFACE WAVES IN SUPERFLUID FILMS IN FREQUENCIES SO HIGH THAT SURFACE TENSION FORCES DOMINATE OVER GRAVITY FORCES AND ATTENUATION EFFECTS ON EARTH PRECLUDE THEIR MEASUREMENT; AND (4) OBTAIN SUPERFLUID HELIUM CRYOSTAT PERFORMANCE DATA FOR FUTURE SPACE APPLICATIONS. THE INSTRUMENTATION CONSISTS OF AN INSTRUMENTED CRYOSTAT (CONTAINING AN INVESTIGATION PACKAGE INSIDE) AND A SUPPORT ELECTRONICS PACKAGE. THE CAVITY IS SURROUNDED BY A 90-LITER SUPERFLUID HELIUM TOROID AND A MULTILAYER SUPER INSULATION SYSTEM SPACED BY HELIUM VAPOR-COOLED SHIELDS. THE DEWAR OPERATES IN BOTH UPRIGHT AND HORIZONTAL CONFIGURATIONS. THE CRYOSTAT IS INSTRUMENTED WITH GERMANIUM AND THERMOCOUPLE TEMPERATURE SENSORS TO MONITOR THE CHAMBER TEMPERATURES AND THE SUPERFLUID PLUG AND INSULATION PERFORMANCE. ACCELEROMETERS MONITOR VIBRATION EFFECTS IN ORDER TO CROSS-CORRELATE WITH THE BULK BEHAVIOR OBSERVATIONS.

----- SPACELAB 2, RENDILLO-----
 INVESTIGATION NAME- PLASMA DEPLETION EXPERIMENTS FOR
 IONOSPHERIC AND RADIO ASTRONOMICAL STUDY

NSSDC ID- SPALAB2-04 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - R. RENDILLO BOSTON U
 PI - A.V. DAROSA STANFORD U
 OI - M.D. PAPAIOANNIS BOSTON U
 OI - R.C. KELLEY CORNELL U
 OI - R.A. HELLINELL STANFORD U
 OI - P.A. BERNHARDT STANFORD U
 OI - M.D. PONGRATZ LOS ALAMOS SCI LAB
 OI - G.W. SMITH LOS ALAMOS SCI LAB
 OI - G.J. BAKER UTAH STATE U
 OI - R.D. HARRIS UTAH STATE U
 OI - D.T. FARLEY CORNELL U
 OI - D. ANDERSON NOAA-S&L

BRIEF DESCRIPTION
 THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) STUDY THE IONOSPHERIC (F-REGION) DEPLETION AND RELATED EFFECTS CAUSED BY SHUTTLE THROUSTER FIRINGS IN MID-LATITUDES, (2) DETERMINE THE NATURE OF THE PHYSICAL PROCESSES GOVERNING THE IONOSPHERIC STRUCTURE, INCLUDING DIFFUSION COEFFICIENTS, CHEMICAL REACTION RATES, NEUTRAL WIND VELOCITIES, ELECTRIC FIELDS, ELECTRON COOLING RATES, AND IONIZING FLUXES, (3) PRODUCE CONTROLLED PERTURBATIONS IN THE PLASMASPHERE TO EXAMINE THE FORMATION OF ARTIFICIAL VLF DUCTS AND THE EQUATORIAL SPREAD F-, AND (4) USE THE IONOSPHERIC DEPLETION REGION (IDR) TO CONDUCT GROUND-BASED HIGH-RESOLUTION RADIO ASTRONOMICAL STUDIES. DURING FLIGHT, THRUST FIRINGS FROM THE ORBITAL MANEUVERING SYSTEM RELEASE A MINIMUM OF 200 KG OF EXHAUST VAPORS OVER EACH OF THE RADIO ASTRONOMICAL SITES OF WESTFORD, NB; ARECIBO, PUERTO RICO; ROBERVAL, QUEBEC; JICAHARCA; PERU; AND HOBART, AUSTRALIA. AIRGLOW OBSERVATIONS ARE ATTEMPTED WITH A HIGH-RESOLUTION FADY-PEROT INTERFEROMETER AT 630 NANOMETERS CAPABLE OF DISCRIMINATING BETWEEN ATMOSPHERIC EMISSIONS AND SOLAR BACKGROUND RADIATION. RADAR AND OPTICAL MEANS ARE USED TO MEASURE TEMPERATURE FLUCTUATIONS AND ION DENSITY WHILE ELECTRON CONTENT MEASUREMENTS ARE MADE FROM SATELLITE SIGNALS PASSING THROUGH THE MODIFIED REGION. VLF PROPAGATION EFFECTS ARE EXAMINED BETWEEN ROBERVAL, QUEBEC AND SIPLE, ANTARCTICA TO MEASURE THE EFFECTS OF ARTIFICIALLY PRODUCED F-REGION GRADIENTS ON THE IONOSPHERIC PROPAGATION OF VLF SIGNALS. COLUMNAR ELECTRON CONTENT MEASUREMENTS ARE CONDUCTED USING POLARIMETERS IN CONJUNCTION WITH GEOSTATIONARY SATELLITE BEACONS. OPTICAL OBSERVATIONS PROVIDE INFORMATION ON LOW-LATITUDE NEUTRAL WIND VELOCITIES AND ELECTRIC FIELDS. LOW-FREQUENCY RADIO ASTRONOMY OBSERVATIONS MEASURE THE GALACTIC RADIO NOISE IN THE 1 TO 5 MHZ RANGE, WHERE THE PEAK OF GALACTIC EMISSION OCCURS, AND INTRIGUING RADIO SOURCES, E.G. VELA AND GUM NEBULAR.

----- SPACELAB 2, MEYER-----
 INVESTIGATION NAME- ELEMENTAL COMPOSITION AND ENERGY SPECTRA
 OF COSMIC RAY NUCLEI

NSSDC ID- SPALAB2-06 INVESTIGATIVE PROGRAM
 CODE SC
 INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS

PERSONNEL
 PI - P. MEYER U OF CHICAGO
 PI - D. MULLER U OF CHICAGO
 OI - J.E. LAMPORT U OF CHICAGO
 OI - J. L'HEUREUX U OF CHICAGO

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS INVESTIGATION IS TO MAKE A PRECISE DETERMINATION OF THE CHARGE COMPOSITION AND INDIVIDUAL ENERGY SPECTRA OF COSMIC RAY NUCLEI FROM LITHIUM TO IRON COVERING THE ENERGY RANGE FROM 50 TO 2000 GEV/NUCLEON. THE INVESTIGATION EXPOSES TO DEEP SPACE AN INSTRUMENT OF LARGE VOLUME AND CONSIDERABLE MASS FOR AN EXTENDED TIME PERIOD WITHOUT THE INFLUENCE OF AN OVERLYING ATMOSPHERE. THE INSTRUMENT FOR CHARGE COMPOSITION IS A TELESCOPE OF TWO PLASTIC SCINTILLATORS; FOR THE ENERGY MEASUREMENTS TWO GAS Cerenkov COUNTERS COVERING THE RANGE FROM 50 TO 150 GEV/NUCLEON AND A TRANSITION RADIATION DETECTOR SYSTEM FOR THE REGION FROM 400 TO 2000 GEV/NUCLEON ARE USED. THE DETECTOR ELEMENTS ARE CONTAINED IN A CYLINDRICAL PRESSURIZED SHELL WITH HEMISPHERICAL TOP AND BOTTOM COVERS (2.0 M IN DIAMETER WITH A MAXIMUM HEIGHT OF 3.7 M). ALL DETECTOR ELEMENTS OCCUPY AREAS 2 M X 2 M. THE TRANSITION RADIATION DETECTOR CONSISTS OF SIX RADIATORS (WITH A TOTAL OF 10,000 PLASTIC FOILS OF 5-MICROMETER THICKNESS) AND SIX BOMEN-FILLED MULTIPLE PROPORTIONAL CHAMBERS AND IS POSITIONED IN THE CENTER OF THE INSTRUMENT. TWO SCINTILLATORS ARE ADJACENT TO BOTH ENDS AND ARE HOUSED IN LIGHT INTEGRATION BODIES. THE TWO GAS Cerenkov COUNTERS FILL THE REMAINING SPACE BETWEEN THE SCINTILLATORS AND HEMISPHERICAL LIDS OF THE PRESSURIZED CONTAINER. THEY ARE FILLED WITH GASES AT ATMOSPHERIC PRESSURE AND THE INNER WALLS ARE COVERED WITH WHITE HIGHLY REFLECTIVE PAINT. THERE IS A GEOMETRIC FACTOR OF 5.50 M-SR FOR THE TRANSITION DETECTOR AND 1.50 M-SR FOR THE Cerenkov COUNTER TELESCOPE. TO DETECT THE LIGHT OF AN INCIDENT PARTICLE, 20 PHOTOMULTIPLIER TUBES WITH PHOTOCATHODES 12.7 CM (5 IN.) IN DIAMETER ARE USED. FAST 5.08-CM (2-IN.) PHOTOMULTIPLIERS ARE COUPLED DIRECTLY TO THE SCINTILLATORS, WHICH ARE USED FOR TIME DELAYS BETWEEN RESPONSES RECORDED BY EACH SCINTILLATOR; PARTICLES MUST PENETRATE BOTH. Cerenkov RADIATION IS DETECTED BY 50 TUBES WITH 12.7-CM (5-IN.) WINDOWS. AN ELECTRONICS PACKAGE COLLECTS THE INFORMATION FROM THE VARIOUS SENSORS AND FORMATS IT FOR GROUND TRANSMISSION.

----- SPACELAB 2, SCHNOES-----

INVESTIGATION NAME- VITAMIN D METABOLITES AND BONE
DERMINERALIZATION

NSSDC ID- SPALAB2-01 INVESTIGATIVE PROGRAM
CODE 5B

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - M.K. SCHNOES U OF WISCONSIN
OI - M.F. DE LUCA U OF WISCONSIN
OI - E. NOLTON NASA-ARC

BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE QUANTITATIVELY THE BLOOD LEVELS OF BIOLOGICALLY ACTIVE VITAMIN D METABOLITES OF THE FLIGHT CREW MEMBERS TO ESTABLISH WHETHER THESE DERANGEMENTS OF MINERAL (SPECIFICALLY CALCIUM) METABOLISM REFLECT THEMSELVES IN ANY WAY IN A MODULATION OF VITAMIN D METABOLISM TO ITS VARIOUS METABOLITES. THE EXPERIMENT IS COMPOSED OF A DEVELOPMENTAL PHASE AND A FINAL PHASE. AS PART OF THE DEVELOPMENTAL PHASE, EXISTING ANALYSIS METHODS FOR THE VITAMIN D METABOLITES WILL BE REFINED AND NEW METHODS DEVELOPED. THE FINAL PHASE WILL CONSIST OF THE QUANTITATIVE ANALYSIS OF THE VITAMIN D METABOLITES IN PLASMA SAMPLES OF THE SPACELAB 2 CREW COLLECTED PRIOR TO, DURING, AND POST FLIGHT. FLIGHT HARDWARE CONSISTS OF TWO BLOOD COLLECTION KITS, A CENTRIFUGE TO PREPARE THE PLASMA, AND A -20 DEG C FREEZER FOR SAMPLE STORAGE. ALL THE EQUIPMENT WILL BE LOCATED IN THE ORBITER MID-DECK.

----- SPACELAB 2, SHAWHAN-----

INVESTIGATION NAME- EJECTABLE PLASMA DIAGNOSTICS PACKAGE

NSSDC ID- SPALAB2-03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - S.D. SHAWHAN U OF IOWA
OI - L.A. FRANK U OF IOWA
OI - D.A. GURNETT U OF IOWA
OI - N. D'ANGELO U OF IOWA
OI - H.C. BRINTON NASA-GSFC

BRIEF DESCRIPTION
THE PLASMA DIAGNOSTIC PACKAGE (PDP) IS A FULLY INSTRUMENTED EJECTABLE SUBSATELLITE. DURING THE MISSION IT WILL OPERATE WITHIN THE PAYLOAD BAY, ON THE REMOTE MANIPULATOR SYSTEM (RMS), AND AS A FREE FLYER. THE OBJECTIVES INCLUDE: (1) TO STUDY ORBITER-MAGNETOPLASMA INTERACTIONS IN TERMS OF DENSITY WAVES, DC ELECTRIC FIELDS, ENERGIZED PLASMA, AND A VARIETY OF POSSIBLE WAVE-PARTICLE INSTABILITIES; (2) TO PROVIDE IN SITU MEASUREMENTS OF THE IONOSPHERIC PLASMA 'HOLES' INDUCED BY THE ORBITER ENGINE BURNS IN SUPPORT OF THE GROUND RADAR OBSERVATIONS OF SPACELAB 2 EXPERIMENT 4 (SPALAB2-04); (3) TO MEASURE FIELDS, WAVES, AND PLASMA MODIFICATIONS INDUCED BY THE ORBITER/SPACELAB OPERATING SYSTEMS IN THE SPACELAB BAY AND OUT TO DISTANCES OF 10 KM; AND (4) TO OBSERVE NATURAL WAVES, FIELDS, AND PLASMAS IN THE UNPERTURBED MAGNETOSPHERE. INSTRUMENTS TO BE FLOWN INCLUDE: (1) A QUADRISPHERICAL LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER-ELECTRON AND PROTON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV; (2) A PLASMA WAVE ANALYZER/ELECTRIC DIPOLE AND MAGNETIC SEARCH COIL SENSORS-COMPONENTS OF ELECTROSTATIC AND ELECTROMAGNETIC WAVES FROM 5 HZ TO 30 MHZ; (3) A DC ELECTRIC FIELD METER FOR SENSING COMPONENTS OF THE DC ELECTRIC FIELD OVER THE RANGE FROM 2 TO 2000 MV/M; (4) A TRIAXIAL FLUXGATE MAGNETOMETER TO MEASURE THE DC MAGNETIC FIELD DISTRIBUTION IN THE VICINITY OF THE ORBITER; (5) A LANGMUIR PROBE TO MEASURE ELECTRON DENSITY IN THE REGION 1.E4 TO 1.E7 PER CU CM AND ELECTRON TEMPERATURE FROM 500 TO 5000 DEG K; (6) A RETARDING POTENTIAL ANALYZER AND DIFFERENTIAL FLUX ANALYZER TO DETERMINE THE ENERGY DISTRIBUTION AND STREAMING VELOCITY DIRECTION FOR PLASMA IONS WITH ENERGIES .LT. 16 EV, NUMBER DENSITIES OF 1.E2 TO 1.E7 PER CU CM, TEMPERATURES FROM 500 TO 1.E6 DEG K, AND VELOCITIES UP TO 15 KM/S WITHIN PLUS OR MINUS 50 DEG OF THE INSTRUMENT PLANE; AND (7) AN ION MASS SPECTROMETER FOR MEASURING FROM 1 TO 64 AMU AND DENSITIES OF 20 TO 2.E6 PER CU CM. IN ADDITION TO THE PDP, THE EXPERIMENT CONSISTS OF A SPECIAL PURPOSE END EFFECTOR, A RELEASE MECHANISM, A RECEIVER AND DATA PROCESSING ASSEMBLY, AND AN R.F. ANTENNA ASSEMBLY.

----- SPACELAB 2, TITLE-----

INVESTIGATION NAME- SOLAR MAGNETIC AND VELOCITY FIELD
MEASUREMENT SYSTEM

NSSDC ID- SPALAB2-08 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - A.W. TITLE LOCKHEED PALO ALTO
OI - W.E. RAMSEY LOCKHEED PALO ALTO
OI - R.C. SMITHSON LOCKHEED PALO ALTO
OI - S.A. SCHOOLMAN LOCKHEED PALO ALTO
OI - T.D. YARBELL LOCKHEED PALO ALTO
OI - L.W. ACTON LOCKHEED PALO ALTO
OI - W.C. LIVINGSTON KITT PEAK NATL OBS
OI - J.W. HARVEY KITT PEAK NATL OBS
OI - R.W. MILKEY KITT PEAK NATL OBS
OI - G.W. SIMON SACRAMENTO PEAK OBS
OI - S.P. WARDEN SACRAMENTO PEAK OBS
OI - J.B. ZIRKER SACRAMENTO PEAK OBS

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) MEASURE MAGNETIC AND VELOCITY FIELDS IN THE SOLAR ATMOSPHERE WITH HIGH SPATIAL RESOLUTION AND DEDUCE THE SMALL-SCALE STRUCTURE AND EVOLUTION OF THESE FIELDS ON THE 10- TO 20-MIN TIME SCALE OF SOLAR GRANULATION; (2) FOLLOW THE EVOLUTION OF SOLAR MAGNETIC STRUCTURES OVER PERIODS OF 20 TO 40 H IN ORDER TO DETERMINE HOW THE MAGNETIC ELEMENTS COUPLE TO THE SUPERGRANULE VELOCITY PATTERNS AND BY WHAT MECHANISMS FIELD DIFFUSION AND DISAPPEARANCE OCCUR; (3) STUDY WITH HIGH TEMPORAL AND SPATIAL RESOLUTION THE MAGNETIC FIELD CHANGES ASSOCIATED WITH TRANSIENT EVENTS SUCH AS FLARES AND TO ISOLATE AND FOLLOW THE BIRTH OF SUNSPOTS, PCRES, AND EPHEMERAL REGIONS; (4) DEVELOP THE ELEMENTS OF AN H ALPHA MAGNETOGRAPH/TELESCOPE THAT CAN BE REFLOWN; AND (5) PROVIDE A TEST OF THE POINTING ACCURACY AND STABILITY OF THE INSTRUMENT POINTING SYSTEM (IPS) TO SUBARC-SECOND ACCURACY. THE INSTRUMENTATION CONSISTS OF A SOLAR OPTICAL UNIVERSAL POLARIMETER MOUNTED ON THE IPS. THE POLARIMETER IS COMPOSED OF A TUNABLE BIREFRINGENT FILTER WITH A BANDPASS OF 60 MILLIANGSTROMS USING ASSOCIATED BLOCKING FILTERS TO PERMIT THE FILTER TO OPERATE IN EIGHT SPECTRAL BANDS, EACH ABOUT 0.8 NANOMETER WIDE. A FILM CAMERA TAKES DIRECT FILTERGRAMS THROUGH THE TUNABLE FILTER. A CHARGE INJECTION DEVICE (CID)-ARRAY CAMERA TAKES PHOTOELECTRIC FILTERGRAMS WITH A HIGH SIGNAL-TO-NOISE RATIO THROUGH THE TUNABLE FILTERS. A VIDEO PROCESSOR STORES IMAGES IN DIGITAL MEMORY AND A HIGH RESOLUTION WHITE LIGHT SYSTEM WITH FILM CAMERA AND VIDEO DISPLAY IS USED FOR ACQUISITION OF ACCURATE POINTING DATA. THE FILTER SYSTEMS ARE INTERFACED TO A 30-CM CASSEGRAIN TELESCOPE WITH OFFSET POINTING CAPABILITY. ROTATABLE WEDGES ARE PLACED IN FRONT OF THE TELESCOPE TO ALLOW IT TO OBSERVE ANY DESIRED POINT ON THE SUN. A GUIDER ASSEMBLY COMPENSATES FOR HIGH SPEED IMAGE MOTION. TO RECORD A COMPLETE LINE PROFILE FILTERGRAMS ARE TAKEN IN ORTHOGONAL POLARIZATIONS AT 15 WAVELENGTHS SPACED 2 TO 3.5 PICROMETERS APART AND IN THE NEAR CONTINUUM. THEY ARE RECORDED ON 5015 FILM WITH A RESOLUTION ELEMENT OF 50 MICROMETERS PER SIDE.

----- SPACELAB 2, WILLMORE-----

INVESTIGATION NAME- HARD X-RAY IMAGING OF CLUSTERS OF
GALAXIES AND OTHER EXTENDED X-RAY SOURCES

NSSDC ID- SPALAB2-07 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
X-RAY ASTRONOMY

PERSONNEL
PI - A.P. WILLMORE U OF BIRMINGHAM
OI - D.K. BEDFORD U OF BIRMINGHAM
OI - G.F. CARPENTER U OF BIRMINGHAM
OI - C.J. EYLES U OF BIRMINGHAM
OI - J.R.W. HERRING U OF BIRMINGHAM
OI - G.M. SIMNETT U OF BIRMINGHAM
OI - G.K. SKINNER U OF BIRMINGHAM
OI - J.W.G. WILSON U OF BIRMINGHAM

BRIEF DESCRIPTION
THE PURPOSE OF THIS INVESTIGATION IS TO EXAMINE THE EMISSION FROM CLUSTERS OF GALAXIES IN ORDER TO STUDY THE MECHANISMS INVOLVED IN THEIR EMISSION AND THE POSSIBLE PRESENCE OF AN INTERGALACTIC GAS. THE SPATIAL AND SPECTRAL DISTRIBUTION OF X-RAY FLUX FROM THESE CLUSTERS IN THE ENERGY RANGE FROM 2 TO 20 KEV IS STUDIED. THE INVESTIGATION IS ALSO USED ON OTHER X-RAY SOURCES SUCH AS THOSE OCCURRING AT THE CENTER OF OUR GALAXY. THESE SOURCES ARE EXTREMELY WEAK AND REQUIRE A POINTING SYSTEM TO ACQUIRE SUFFICIENT OBSERVING TIME. THE INSTRUMENT IS A DOUBLE X-RAY TELESCOPE THAT USES A TECHNIQUE TO PRODUCE X-RAY IMAGES OF SMALL REGIONS OF THE SKY AT HIGHER X-RAY ENERGIES THAN IS POSSIBLE USING CONVENTIONAL METHODS. IT USES A CODED BINARY MASK AND A POSITION-SENSITIVE DETECTOR THAT PRODUCES AN X-RAY MAP OF THE SKY. THE MASK USES A SPECIAL CASE OF THE RANDOM PINHOLE MASK, WHICH PRODUCES AN IMAGE BY DECONVOLVING THE PATTERN OF THE MASK HOLES THAT PRODUCE A SHADOWGRAM ON THE POSITION-SENSITIVE DETECTOR WHEN ILLUMINATED BY DIFFERENT RESOLUTIONS. ONE HAS A COARSE RESOLUTION TO DETECT FAINT SOURCES AND AN EXTENDED REGION OF STRONGER SOURCES WHILE THE OTHER HAS A FINE RESOLUTION THAT RESOLVES FINE DETAILS IN MORE INTENSE REGIONS. THE VALUES ARE 12 X 12 ARC-MIN AND 3 X 3 ARC-MIN, RESPECTIVELY, AT FULL WIDTH HALF MAXIMUM OF THE RESPONSE AND DO NOT NECESSARILY IMPLY THE LIMITS TO THE FINENESS OF THE DETAIL THAT CAN BE DEDUCED. THE DETECTORS ARE COMPOSED OF MULTIWIRE POSITION-SENSITIVE PROPORTIONAL COUNTERS. ANTI-COINCIDENCE TECHNIQUES ARE USED TO REJECT COSMIC RAY EVENTS. A MOTORIZED GIMBAL SYSTEM IS USED TO POINT THE TELESCOPE TO WITHIN 0.5 DEG OF ANY ORIENTATION WITH RESPECT TO

THE SHUTTLE. A MICROPROCESSOR SYSTEM ACCEPTS THE NOMINAL VEHICLE ATTITUDE TO SELECT A PREPROGRAMMED LIST OF TARGETS AND TO DRIVE THE TELESCOPES. A GYRO PACKAGE FOR POINTING, STAR SENSORS FOR DETERMINATION OF ABSOLUTE DIRECTIONS TO WITHIN 1 ARC-MIN, AND STAR FIELD CAMERAS FOR LONG-TERM DRIFT MOTION ARE ALSO PART OF THE INSTRUMENTATION.

***** SPACELAB 3*****

SPACECRAFT COMMON NAME- SPACELAB 3
ALTERNATE NAMES-

NSSDC ID- SPALAB3

LAUNCH DATE- 04/18/84 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 92. MIN INCLINATION- 57. DEG
PERIAPSIS- 370. KM ALT APOAPSIS- 370. KM ALT

PERSONNEL
NM - S. REINARTZ NASA-MSFC
NS - G.W. FICHTL NASA-MSFC
NG - R.G. NOBLITT NASA HEADQUARTERS
SC - J.S. THEON NASA HEADQUARTERS
PM - D.C. JEAN NASA-MSFC

BRIEF DESCRIPTION
SPACELAB 3 CONSISTS OF A SPACELAB LONG MODULE AND A PALLET. THE FOLLOWING INVESTIGATIONS ARE PLANNED BUT NOT YET CONFIRMED FOR FLIGHT: FLUID EXPERIMENT SYSTEM, VAPOR CRYSTAL GROWTH SYSTEM, DROP DYNAMICS MODULE (DDM) EXPERIMENTS, GEOPHYSICAL FLUID FLOW CELL (GFFC), RESEARCH ANIMAL HOLDING FACILITY, LIFE SCIENCES MINILAB, HALOGEN OCCULTATION EXPERIMENT (HALOE), ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS), AND IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI.

----- SPACELAB 3, BISMAS-----

INVESTIGATION NAME- IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES

NSSDC ID- SPALAB3-15 INVESTIGATIVE PROGRAM
CCDE ST
INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL
PI - S. BISMAS TATA INST OF FUND RES
PI - D. LAL PHYSICAL RESEARCH LAB
OI - R. COWSIK TATA INST OF FUND RES
OI - N. DYRGAPRASAD TATA INST OF FUND RES
OI - V. VENKATAVARADAN TATA INST OF FUND RES
OI - S. SARKAR TATA INST OF FUND RES

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO MEASURE THE IONIZATION STATES OF HEAVY ELEMENTS (O TO FE) IN SOLAR COSMIC RAYS AND THE LOW-ENERGY GALACTIC COSMIC-RAY IONIZATION STATES. THE DETECTOR MODULE CONSISTS OF A THIN UPPER STACK OF KODAK CELLULOSE NITRATE (CN) PLASTIC SHEETS, A LOWER STACK OF KODAK CN WITH LEXAN POLYCARBONATE SHEETS AT THE BOTTOM, AND AN ELECTRONIC DRIVE SYSTEM.

----- SPACELAB 3, FARMER-----

INVESTIGATION NAME- ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS)

NSSDC ID- SPALAB3-14 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - C.B. FARMER NASA-JPL

BRIEF DESCRIPTION
THE PRIMARY PURPOSE OF THE ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS) SL 3 EXPERIMENT IS TO DEMONSTRATE THE CAPABILITY TO MONITOR ENVIRONMENTAL QUALITY BY SURVEYING THE ATMOSPHERE FOR TRACE CONSTITUENTS AND IDENTIFYING THEIR SOURCES, FLOW PATTERNS, AND DECAY MECHANISMS. IN ITS MOST GENERAL FORM, THE ATMOS EXPERIMENT OBJECTIVE IS TO DETERMINE CONCENTRATION PROFILES THROUGH STRATOSPHERIC ALTITUDES (20 TO 80 KM) AT A VERTICAL RESOLUTION OF 2 KM. THE ATMOS INSTRUMENT VIEWS THE SUN THROUGH THE STRATOSPHERE AND MEASURES THE SPECTRAL ABSORPTION OF SOLAR ENERGY. EACH DATA-TAKING RUN IS INITIATED PRIOR TO THE SUN EMERGING FROM OR DISAPPEARING BEHIND THE EARTH. DATA FROM THE INSTRUMENT FOR THESE SUNRISE AND SUNSET LIMB ENCOUNTERS ARE INTERFEROGRAMS THAT, WHEN PROCESSED ON THE GROUND, PROVIDE ABSORPTION SPECTRA.

THE INSTRUMENT CONSISTS OF THE OPTICAL SENSOR AND THE ELECTRONICS PACKAGE. THE SUN TRACKER AUTOMATICALLY LOCKS ONTO THE SUN AND CORRECTS FOR ANY ORIENTATION CHANGE WITHIN PREDETERMINED LIMITS. THE ENERGY FROM THE SUN TRACKER IS DIRECTED INTO THE OPTICAL SYSTEM AND IS COLLECTED BY AN INFRARED DETECTOR. THE DETECTOR SIGNAL IS AMPLIFIED AND SENT TO THE ELECTRONICS. THESE DATA IN CONJUNCTION WITH ENGINEERING AND HOUSEKEEPING DATA ARE CONVERTED INTO A SERIAL PCM BIT STREAM IN A FORMAT COMPATIBLE WITH THE SPACELAB HIGH-RATE MULTIPLEXER.

----- SPACELAB 3, HART-----

INVESTIGATION NAME- GEOPHYSICAL FLUID FLOW CELL (GFFC)

NSSDC ID- SPALAB3-10 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.E. HART U OF COLORADO

BRIEF DESCRIPTION
THE GOAL IS TO PERFORM BASIC EXPERIMENTS RELATIVE TO THE FLUID MECHANICS ASSOCIATED WITH SPHERICAL CONVECTION PROCESSES WITH A VIEW TOWARD CONFIRMING SPECIFIC THEORETICAL PREDICTIONS RELATED TO THE DYNAMICS OF THE SOLAR CONVECTIVE ZONE AND THE JOVIAN ATMOSPHERE. THE EXPERIMENTS ARE BASED ON FLUID DYNAMIC SCALING LAWS THAT PERMIT EXPERIMENTS RELEVANT TO GEOPHYSICAL AND ASTRONOMICAL FLUID DYNAMIC PROCESSES TO BE PERFORMED IN A LABORATORY ENVIRONMENT, SUCH AS THAT OF SPACELAB. THE INSTRUMENT CELL WITHIN WHICH THE FLUID EXPERIMENTS WILL BE PERFORMED CONSISTS OF A ROTATING SPHERICAL CAPACITOR APPROXIMATELY 6 CM IN DIAMETER WITH A 1 CM GAP. THE FLUID IS A DIELECTRIC SUBSTANCE SUCH THAT UPON APPLICATION OF VOLTAGE ACROSS THE GAP AND A RADIALLY DIRECTED TEMPERATURE GRADIENT, A RADIALLY DIRECTED ELECTRIC POLARIZATION FORCE OCCURS IN A MANNER ANALOGOUS TO RADIALLY DIRECTED BUOYANCY FORCES THAT EXIST IN A STAR, A PLANETARY ATMOSPHERE, OR AN OCEAN. IN ADDITION TO RADIAL BUOYANCY FORCES, THE THERMAL FORCING ASSOCIATED WITH POLE TO EQUATOR TEMPERATURE GRADIENTS IS ALSO INCLUDED. THUS, BY PROPER SELECTION OF ROTATION RATES OF THE CAPACITOR, IMPOSED TEMPERATURE GRADIENTS, AND APPLIED VOLTAGES, A ONE-TO-ONE SCALING CAN BE OBTAINED BETWEEN THE EXPERIMENT AND THE SOLAR AND JOVIAN CIRCULATIONS.

----- SPACELAB 3, LAL-----

INVESTIGATION NAME- FLUID EXPERIMENT SYSTEMS (FES)

NSSDC ID- SPALAB3-01 INVESTIGATIVE PROGRAM
CODE RS
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - R.B. LAL ALABAMA A*M U
PI - R.L. KROES NASA-MSFC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO ASSESS THE SCIENTIFIC UNCERTAINTIES REGARDING SOLUTION AND MELT CRYSTAL GROWTH IN A LOW-GRAVITY ENVIRONMENT, OBTAIN BASIC DATA ON CRYSTAL GROWING PROCESSES, AND PRODUCE IMPROVED CRYSTALS BY ELIMINATING CONVECTION TRANSIENTS. THIS EXPERIMENT WILL PRODUCE BASIC DATA ON THE PHYSICAL PROCESSES ASSOCIATED WITH SOLUTION GROWTH OF CRYSTALS. SPECIFIC OBJECTIVES OF THE EXPERIMENT ARE: (A) TO PRODUCE A STRUCTURALLY MORE HOMOGENEOUS CRYSTAL, FREE FROM INCLUSIONS OF SOLUTION, BY ELIMINATING CONVECTION TRANSIENTS, (B) TO OBTAIN DATA ON MASS AND HEAT TRANSPORT IN A LARGELY DIFFUSION-CONTROLLED GROWTH SYSTEM, AND (C) TO CONFIRM THE ADVANTAGES OF A LOW-GRAVITY ENVIRONMENT FOR SOLUTION CRYSTAL GROWTH. THE CRYSTAL GROWTH REGION IN THE FLUID EXPERIMENT SYSTEM IS A LIQUID-FILLED CUBIC VOLUME APPROXIMATELY 10 CM ON A SIDE. THIS VOLUME IS CONTROLLED THERMODYNAMICALLY AND IS OBSERVED VIA A HOLOGRAPHIC OPTICAL SYSTEM. THIS SYSTEM WILL BE USED TO MONITOR THE VARIATIONS IN THE LIQUID DENSITY SOLUTION CONCENTRATION AND TEMPERATURE AROUND GROWING CRYSTALS.

----- SPACELAB 3, NONE ASSIGNED-----

INVESTIGATION NAME- RESEARCH ANIMAL HOLDING FACILITY (RAHF)

NSSDC ID- SPALAB3-11 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
PLANETARY BIOLOGY

PERSONNEL
PI - NONE ASSIGNED

BRIEF DESCRIPTION
THE OBJECTIVES OF THE RESEARCH ANIMAL HOLDING FACILITY (RAHF) SL 3 VERIFICATION TEST ARE TO EVALUATE OPERATIONAL REQUIREMENTS AND PROCEDURES FOR THE PREFLIGHT PREPARATION, LAUNCH, IN ORBIT, DE-ORBIT, LANDING AND POSTFLIGHT HANDLING AND CARE OF SELECTED ANIMAL SPECIMENS (RAT, MOUSE); TO PROVIDE A FINAL BIOPARABILITY ASSESSMENT BETWEEN ANIMALS AND THE RAHF UNDER WEIGHTLESS CONDITIONS AND CLOSED LIFE SUPPORT SYSTEMS OF THE SPACE TRANSPORT SYSTEM (STS); TO OBTAIN OPERATIONAL

ORIGINAL PAGE IS
OF POOR QUALITY

EXPERIENCE AS A PRECURSOR FOR MORE COMPLEX DEDICATED MISSIONS; AND TO PERFORM A STUDY OF THE PHYSIOLOGICAL, BEHAVIORAL, AND MORPHOLOGICAL CHANGES THAT MAY OCCUR AS A CONSEQUENCE OF CONTAINMENT IN THE RAHF DURING SPACEFLIGHT. 20 RATS AND 24 MICE WILL BE FLOWN IN THE RAHF UNIT. OTHER THAN VISUAL AND PHOTOGRAPHIC OBSERVATION OF THE ANIMALS, NO INTERFACE WITH THE ANIMAL PAYLOAD WILL BE REQUIRED EXCEPT NORMAL HOUSEKEEPING OPERATIONS. RAHF OPERATION AND ANIMAL/RAHF INTERFACES ARE FULLY DOCUMENTED BY VISUAL MEANS, BY TAPED VERBAL COMMENTS, BY WRITTEN NOTES, AND PHOTOGRAPHICALLY USING 16 MM MOTION AND 35 MM STILL CAMERAS. AFTER RECOVERY OF ANIMALS, BEHAVIOR IS MONITORED, AND PHYSIOLOGICAL AND MORPHOLOGICAL DATA ARE OBTAINED TO COMPARE WITH INFLIGHT DATA AND GROUND CONTROLS.

----- SPACELAB 3, NONE ASSIGNED-----

INVESTIGATION NAME- LIFE SCIENCES MINILAB
 NSSDC ID- SPALAB3-12 INVESTIGATIVE PROGRAM
 CCDE 5B
 INVESTIGATION DISCIPLINE(S)
 PLANETARY BIOLOGY

PERSONNEL
 PI - NONE ASSIGNED

BRIEF DESCRIPTION
 THIS EXPERIMENT IS FLOWN TO EVALUATE THE PERFORMANCE OF HUMAN LIFE SCIENCES RESEARCH EQUIPMENT AND FACILITIES IN LOW-GRAVITY AND TO PROVIDE THE CAPABILITY FOR LIMITED HUMAN SCIENTIFIC INVESTIGATIONS WHICH MIGHT OPTIMIZE FUTURE LIFE SCIENCES RESEARCH IN SPACELAB MISSIONS. THE SL 3 JSC LIFE SCIENCES EXPERIMENT CONSISTS OF FOUR AREAS OF LIFE SCIENCES INVESTIGATIONS: FLUID SHIFT MEASUREMENT; URINE MONITORING; INFLIGHT BIOCHEMISTRY; AND PLANT GROWTH. THE HARDWARE ASSOCIATED WITH THESE INVESTIGATIONS HAS THREE MAJOR INTERFACE LOCATIONS THROUGHOUT THE VEHICLE: ORBITER MIDDECK, LIFE SCIENCES MINILAB AND NONMINILAB SPACELAB. THE ORBITER MIDDECK INTERFACES CONSIST OF STOWAGE OF SEVERAL HARDWARE ITEMS IN THE MIDDECK LOCKERS AND TEMPORARY MOUNTING OF EQUIPMENT DURING OPERATIONS. THE LIFE SCIENCES MINILAB IS A STANDARD FLIGHT SPACELAB DOUBLE RACK THAT WILL BE INTEGRATED AND CONTAINS RACK MOUNTED AND STOWED LIFE SCIENCES HARDWARE. THE SPACELAB NONMINILAB INTERFACES CONSIST OF MOUNTING TO THE SPACELAB DECK A LOWER BODY NEGATIVE PRESSURE DEVICE (LBWPD). THE LIFE SCIENCES INVESTIGATIONS ARE AS FOLLOWS: FLUID SHIFT MEASUREMENT EQUIPMENT (FSME) - THIS INVESTIGATION IS DESIGNED TO EVALUATE A VARIETY OF DEVICES AND TECHNIQUES FOR QUALITATIVELY AND QUANTITATIVELY ASSESSING SHIFTS IN BODY FLUIDS RESULTING FROM EXPOSURE TO THE LOW-GRAVITY ENVIRONMENT OF SPACE. THE DEVICES/TECHNIQUES EVALUATED ARE: CAPACITANCE, IMPEDANCE, AND ULTRASONIC PLETHYSMOGRAPHIC SYSTEMS AND TAPE MEASUREMENT SYSTEMS. PLANT GROWTH FACILITY (PGF) - THIS INVESTIGATION IS DESIGNED TO STUDY THE OPERATION OF GRAVITATIONAL FIELD SENSORS OF PLANTS AND RESPONSE MECHANISM IN A WEIGHTLESS ENVIRONMENT. THE THRESHOLD EXPOSURE TIME FOR A DETECTABLE GRAVITROPIC RESPONSE IS DETERMINED BY VARYING THE DURATION OF EXPOSURE TO SIMULATED GRAVITATIONAL FIELDS WITH THE PLANTS ORIENTED TRANSVERSE TO THE FIELD. DATA ARE ACQUIRED BY AN IN SENSITIVE VIDEO CAMERA OPERATING IN TIME LAPSE MODE AND CAPABLE OF IMAGE RECORDING IN A TIME INTERVAL SHORT ENOUGH TO FREEZE THE PLANT IMAGE AS IT IS ROTATING ON THE CENTRIFUGES. DATA ARE RECORDED ON VIDEO TAPE FOR PROCESSING POSTLANDING. URINE MONITORING SYSTEM (UMS) - THIS INVESTIGATION IS DESIGNED TO EVALUATE THE UMS AND ASSOCIATED HARDWARE TO VERIFY SYSTEM OPERATION IN THE COLLECTION, VOLUME DETERMINATION, AND SAMPLING OF INDIVIDUAL URINE VOIDS OF SPACEFLIGHT CREW MEMBERS. INFLIGHT BIOCHEMISTRY HARDWARE (IBH) - THIS INVESTIGATION IS DESIGNED TO VERIFY THE FLUID DYNAMICS AND BIOCHEMICAL ANALYTICAL CAPABILITY OF THE CENTRIFUGAL FAST ANALYZER (CFA) AND TO PERFORM ANALYSES OF A SELECTED NUMBER OF METABOLITES IN URINE, PLASMA, AND WHOLE BLOOD.

----- SPACELAB 3, RUSSELL, 3RD-----

INVESTIGATION NAME- HALOGEN OCCULTATION EXPERIMENT (HALOE)
 NSSDC ID- SPALAB3-13 INVESTIGATIVE PROGRAM
 CODE 5T
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - J.M. RUSSELL, 3RD NASA-LARC

BRIEF DESCRIPTION
 THE PRIMARY PURPOSE OF THE HALOE SL 3 EXPERIMENT IS TO VALIDATE THE INSTRUMENT DESIGN WITH ASSOCIATED CALIBRATION TECHNIQUES AND DATA REDUCTION SOFTWARE. A SECONDARY PURPOSE IS TO COLLECT A LIMITED QUANTITY OF MEASUREMENTS ON GAS CONCENTRATION VERSUS ALTITUDE FOR GAS SPECIES (HF, HCL, CO2, CH4, NO, H2O, AND O3) USING INFRARED REMOTE SENSING TECHNIQUES DURING SOLAR OCCULTATION EVENTS. THE HALOE INSTRUMENT IS AN INFRARED SENSOR THAT MEASURES TRACE GASES IN THE EARTH'S ATMOSPHERE TO ENHANCE OUR UNDERSTANDING OF CHEMICAL REACTION CHAINS AFFECTING THE OZONE LAYER. HF, HCL, NO, AND CH4 ARE MEASURED USING THE PRINCIPLE OF GAS CORRELATION SPECTROSCOPY. CO2, H2O, AND O3 ARE MEASURED BY BROADBAND RADIOMETRY TECHNIQUES. THE EIGHT SENSING CHANNELS ARE LOCATED IN SPECTRAL REGIONS BETWEEN 2 AND 11 MICROMETERS. THE INSTRUMENT IS DESIGNED TO OPERATE FROM AN ORBITING SPACECRAFT USING SOLAR

ENERGY PASSING THROUGH THE EARTH'S ATMOSPHERE AS THE RADIOMETRIC INPUT. MEASUREMENT OF THE VARIOUS GAS SPECIES IS BASED UPON DETECTION OF SPECTRAL ABSORPTION CHARACTERISTICS. THE INSTRUMENT CONSISTS OF AN OPTICS HEAD, SUPPORTED BY A TWO-AXIS AZIMUTH OVER ELEVATION GIMBAL, AND A SEPARATE ELECTRONICS PACKAGE. IT CONTAINS SENSORS AND CONTROLS TO ACQUIRE AND TRACK THE SUN AT TIMES OF MEASUREMENT. MEASUREMENTS ARE PERFORMED AT SUNRISE AND SUNSET EVENT TIMES, WHEN THE SOLAR LINE OF SIGHT PASSES THROUGH THE EARTH'S ATMOSPHERE. HALOE RECEIVES COMMANDS, SYNCHRONIZED PULSES, AND DC POWER FROM THE SPACECRAFT. OUTPUT DATA IN SERIAL DIGITAL FORM ARE PRESENTED TO THE SPACECRAFT FOR STORAGE AND TRANSMITTAL TO THE GROUND.

----- SPACELAB 3, SCHNEPPLE-----

INVESTIGATION NAME- VAPOR CRYSTAL GROWTH SYSTEM (VCGS)
 NSSDC ID- SPALAB3-02 INVESTIGATIVE PROGRAM
 CODE 5S
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - W.F. SCHNEPPLE EG+6 IXC

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVE IS TO GROW LARGE SINGLE CRYSTALS OF MERCURIC IODIDE (HG12) THAT ARE RELATIVELY FREE OF MASS LOAD STRAIN DEFECTS AND PHYSICAL PROPERTY INHOMOGENEITIES. THIS EXPERIMENT WILL PRODUCE A SINGLE CRYSTAL OF HG12 VIA THE SUBLIMATION CRYSTAL GROWTH PROCESS IN AN APPROXIMATELY 10 CM DIAMETER BY 15 CM HIGH EVACUATED AMPOULE. THE HG12 SOURCE MATERIAL ON THE WALLS OF THE AMPOULE IS HEATED SUCH THAT HG12 MOLECULES ARE EVAPORATED. A PLATE AT THE BOTTOM OF THE AMPOULE WITH A HG12 SEED CRYSTAL IS HELD AT A TEMPERATURE BELOW THE SOURCE MATERIAL TEMPERATURE. THE RESULTING TEMPERATURE GRADIENT BETWEEN THE AMPOULE WALLS AND THE SEED CRYSTAL WILL CAUSE HG12 MOLECULES TO BE TRANSPORTED TO THE SEED CRYSTAL, WHEREUPON THE MOLECULES WILL CONDENSE INTO THE SOLID PHASE. OBSERVATIONS OF THE CRYSTAL GROWING PROCESS WILL BE MADE VIA A MICROSCOPE. IF OUT-OF-CONTROL GROWTH CONDITIONS OCCUR, THE CRYSTAL TEMPERATURE WILL BE RAISED ABOVE THE SOURCE MATERIAL TEMPERATURE TO REMOVE THE ASSOCIATED UNWANTED CRYSTAL MASS, WITH SUBSEQUENT CRYSTAL COOL-DOWN TO CONTINUE THE GROWTH PROCESS.

----- SPACELAB 3, WANG-----

INVESTIGATION NAME- DROP DYNAMICS MODULE (DDM) EXPERIMENTS
 NSSDC ID- SPALAB3-09 INVESTIGATIVE PROGRAM
 CODE 5S
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - T.G. WANG NASA-JPL

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVE IS TO PERFORM BASIC EXPERIMENTS ON THE DYNAMICS OF ROTATING AND OSCILLATING DROPS, WITH A VIEW TOWARD CONFIRMING SPECIFIC THEORETICAL PREDICTIONS AND GAINING INSIGHT AND DIRECTION RELATIVE TO THOSE DYNAMICAL PROCESSES NOT CURRENTLY ACCESSIBLE BY THEORY. THE DROP DYNAMICS EXPERIMENTS WILL BE CONDUCTED IN AN ACOUSTICAL CHAMBER. THE LIQUID INJECTOR WILL INJECT A LIQUID BETWEEN TWO PROBES THAT WILL RETRACT WHEN A PREDETERMINED SIZE DROP IS FORMED, CAUSING THE DROP TO BE FREE FLOATING INSIDE THE ACOUSTIC CHAMBER. THREE ACOUSTIC SOURCES WILL GENERATE AN AUDIBLE TONE THAT IS VARIED IN FREQUENCY AND AMPLITUDE TO ROTATE AND OSCILLATE THE LIQUID DROP. A MOVIE CAMERA WILL BE USED WITH PRISMS AND MIRROR SURFACES TO RECORD THE MOVING DROPS FROM THREE DIFFERENT ANGLES. ALSO, THE VARIOUS PARAMETERS THAT WILL BE VARIED, SUCH AS THE FREQUENCY, AMPLITUDE, VOLTAGE, ETC., WILL BE RECORDED ON FILM. IN CONJUNCTION WITH THE CAMERA RECORDING, A REDUNDANT RECORDING WILL BE MADE ON A MAGNETIC CARTRIDGE IN THE EVENT THE CAMERA IS NOT WORKING OR RUNS OUT OF FILM. THE INSTRUMENT IS DESIGNED TO RUN BOTH AUTOMATICALLY BY PREPROGRAMMED MICROPROCESSORS THROUGH THE CONTROL PANEL AND MANUALLY BY CONTROLS ON THE CONTROL PANEL IF PARAMETERS DIFFERENT FROM THE ONES WHICH ARE IN THE SOFTWARE PROGRAM NEED TO BE INSERTED. THESE EXPERIMENTS ARE AIMED AT EXPERIMENTAL CONFIRMATION OF THEORETICAL PREDICTIONS OF FREE OSCILLATING AND ROTATING DROPS WITH DIAMETER OF ABOUT 1 CM.

***** ST*****

SPACECRAFT COMMON NAME- ST
 ALTERNATE NAMES- LARGE SPACE TELESCOPE, SPACE TELESCOPE
 NSSDC ID- LST
 LAUNCH DATE- 12/15/83 WEIGHT- 9100. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN
PERIAPSIS- 500. KM ALT

INCLINATION- 28.8 DEG
APOAPSIS- 500. KM ALT

PERSONNEL

MG - D.R. BURROWBRIDGE
SC - M.G. ROMAN
PM - W.C. KEATHLEY
PH - G.M. LEVIN
PS - C.R. O'BELL

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-MSFC
NASA-GSFC
NASA-MSFC

BRIEF DESCRIPTION

THE SPACE TELESCOPE (ST) IS A SPACEBORNE, DIFFRACTION-LIMITED RITCHEY-CHRETIEN TELESCOPE WITH THE FOLLOWING PARAMETERS: AN EFFECTIVE APERTURE OF 2.4 M, A SPATIAL RESOLUTION OF 0.1 ARC S, AND A WAVELENGTH COVERAGE FROM 0.1 TO 1000 MICROMETERS. THE EXPECTED LIMITING MAGNITUDE IS BETWEEN 27 AND 28. THIS IS 10 TIMES BETTER RESOLUTION AND GREATER WAVELENGTH COVERAGE THAN GROUND-BASED TELESCOPES, AND DETECTS OBJECTS THAT ARE 50 TIMES FAINTER. THE TELESCOPE IS CAPABLE OF ACCOMMODATING FIVE DIFFERENT INSTRUMENTS AT ITS FOCAL PLANE. THE SPACE SHUTTLE IS USED FOR INITIAL LAUNCH, IN-ORBIT SERVICING, AND FOR RETURN OF THE ST TO THE GROUND FOR MAINTENANCE. THE ANTICIPATED MINIMUM OPERATIONAL LIFETIME, EXCLUDING DOWNTIME FOR PERIODIC MAINTENANCE AND UPDATING, IS GREATER THAN 15 YR. THE ST SYSTEM SERVES AS A NATIONAL ASTRONOMICAL SPACE OBSERVATORY FACILITY. THE USE OF THE ONBOARD INSTRUMENTATION IS OPEN TO SCIENTISTS OF ALL COUNTRIES. ITS DESIGN IS FLEXIBLE TO ALLOW FOR THE REPLACEMENT OF SCIENTIFIC INSTRUMENTATION WHEN NECESSARY, TO INCORPORATE TECHNOLOGICAL ADVANCES, AND TO SATISFY CHANGES IN THE OBSERVATIONAL INTERESTS OF THE ASTRONOMICAL COMMUNITY. INSTRUMENTATION UPDATING, REPAIR, OR REPLACEMENT CAN BE ACCOMPLISHED EITHER BY RETURN OF THE ST TO THE GROUND, OR BY USING SUITED ASTRONAUTS FOR IN-ORBIT WORK.

ST, BLESS

INVESTIGATION NAME- HIGH-SPEED PHOTOMETER (HSP)

NSSDC ID- LST -06

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.C. BLESS
OI - G.W. VAN CITTERS
OI - E.L. ROBINSON
OI - J.L. ELLIOT
OI - A.D. CODE

U OF WISCONSIN
U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
CORNELL U
U OF WISCONSIN

BRIEF DESCRIPTION

THE HIGH-SPEED PHOTOMETER (HSP) INVESTIGATION MAKES FAST-TIME-RESOLUTION (1 MS AND SLOWER) PHOTOMETRIC OBSERVATIONS OF RAPIDLY VARYING OBJECTS IN THE SPECTRAL RANGE 115-850 NM AND LINEAR POLARIMETRIC OBSERVATIONS FROM 210 TO 700 NM OF A WIDE VARIETY OF OBJECTS. IT ESTABLISHES AN ACCURATE LINK BETWEEN OBSERVATIONS MADE ON EXISTING VISUAL AND UV PHOTOMETRIC SYSTEMS AND THE CORRESPONDING OBSERVATIONS OF THE FAINT OBJECTS OBSERVED BY THE SPACE TELESCOPE. THE INSTRUMENT CONSISTS OF TWO IMAGE DISSECTORS - ONE SENSITIVE IN THE UV AND SOLAR BLIND, THE OTHER SENSITIVE IN THE VISIBLE AND NEAR INFRARED. A WIDE VARIETY OF BANDPASSES IS FORMED BY BROADBAND AND INTERFERENCE FILTERS ARRANGED IN STRIPS ACROSS THE DISSECTOR TUBE'S PHOTOCATHODE. SOME OF THE FILTERS ARE COATED WITH A POLARIZING MATERIAL. DIAPHRAGMS PROVIDE A CHOICE OF THREE FIELDS OF VIEW: 0.7, 1.4, AND 2.8 ARC S. THE DISSECTORS CAN BE COMMANDED TO RECEIVE PHOTOELECTRONS FROM ANY OF THE APPROXIMATELY 100 FILTER-DIAPHRAGM-POLARIZER COMBINATIONS AVAILABLE. THE TWO DETECTORS CAN BE LOCATED INSIDE OR OUTSIDE OF AN AXIAL INSTRUMENT BAY, WITH NO ADDITIONAL OPTICS REQUIRED.

ST, BRANDT

INVESTIGATION NAME- HIGH-RESOLUTION SPECTROGRAPH (HRS)

NSSDC ID- LST -02

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - J.C. BRANDT
OI - A. ROGGESS, 3RD
OI - E.A. BEAVER
OI - S.R. HEAP
OI - J.R. HUTCHINGS
OI - M.A. JURA
OI - J.L. LINSKY
OI - S.P. HARAN
OI - B.D. SAVAGE
OI - A.M. SMITH
OI - L.M. TRAYTON
OI - R.J. WEYHANN

NASA-GSFC
NASA-GSFC
U OF CALIF, SAN DIEGO
NASA-GSFC
DOMINION ASTROPHYS OBS
U OF CALIF, LA
U OF COLORADO
NASA-GSFC
U OF WISCONSIN
NASA-GSFC
U OF TEXAS, AUSTIN
U OF ARIZONA

BRIEF DESCRIPTION

THIS INVESTIGATION USES AN ULTRAVIOLET SPECTROGRAPH CAPABLE OF OBTAINING HIGH-QUALITY SPECTRA AT TWO RESOLVING POWERS: 20,000 AND 120,000. THE LOWER DISPERSION IS ACHIEVED WITH FOUR GRATINGS THAT COVER THE SPECTRAL RANGE 110-320 NM SO THAT EACH GRATING IS USED ONLY NEAR ITS MAXIMUM BLAZE EFFICIENCY. THE HIGHER DISPERSION UTILIZES AN ECHELLE ARRANGEMENT. THE SENSOR IS A MULTI-CHANNEL PULSE-COUNTING DEVICE, THE DIGICON. THIS DETECTOR OPERATES FUNCTIONALLY LIKE AN IMAGE-DISSECTOR TUBE AND CAN BE USED AS AN IMAGE DISSECTOR TO PERFORM STAR CENTERING AND FIELD MAPPING OF THE ENTRANCE APERTURE, ELIMINATING THE NEED FOR A SEPARATE STAR TRACKER OR SLIT CAMERA. THERE ARE TWO DETECTORS, ONE WITH A CSTE PHOTOCATHODE AND ONE WITH CS1. THE TWO TARGET ENTRANCE APERTURES HAVE FIELDS OF VIEW OF 1.50 ARC S AND 0.350 ARC S, RESPECTIVELY. THERE ARE NO SIGNIFICANT TIME CONSTRAINTS. THE HIGH RESOLUTION SPECTROGRAPH (HRS) OPERATES IN SUNLIGHT SO THAT IT CAN BE UTILIZED AT ALL TIMES, EXCEPT WHEN THE SOURCE IS OCCULTED BY THE EARTH OR MOON. THE HIGH DYNAMIC RANGE AND CHOICE OF DISPERSIONS MAKE IT POSSIBLE TO OBSERVE A LARGE RANGE OF STELLAR MAGNITUDES, FROM VERY BRIGHT TO MODERATELY FAINT. THE HRS BRIDGES THE GAP BETWEEN OBJECTS OBSERVED BY ROCKET-BORNE SPECTROGRAPHS, COPERNICUS, IUE, AND THE FAINT-OBJECT SPECTROGRAPH (FOS).

ST, HARMS

INVESTIGATION NAME- FAINT-OBJECT SPECTROGRAPH (FOS)

NSSDC ID- LST -03

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.J. HARMS
OI - F. BARTKO, JR.
OI - F.A. BEAVER
OI - H.C. FORD
OI - B. MARGON
OI - A.F. DAVIDSEN
OI - E.M. BURBIDGE
OI - J.R. ANGEL

U OF CALIF, SAN DIEGO
MARTIN-MARIETTA AEROSP
U OF CALIF, SAN DIEGO
U OF CALIF, LA
U OF CALIF, LA
JOHNS HOPKINS U
U OF CALIF, SAN DIEGO
U OF ARIZONA

BRIEF DESCRIPTION

THE FAINT-OBJECT SPECTROGRAPH (FOS) INVESTIGATION OBTAINS SPECTRA OF ASTRONOMICAL OBJECTS AT THE FINEST POSSIBLE LIMITING MAGNITUDE IN ULTRAVIOLET AND VISIBLE WAVELENGTHS. THE SPECTROGRAPH COVERS A BROAD SPECTRAL RANGE AND IS INTENDED FOR SPECTROSCOPY PRIMARILY AT MODERATE SPECTRAL RESOLUTION. THE SPECTRAL PROFILES OF BROAD EMISSION AND ABSORPTION FEATURES AND CONTINUUM FLUX DISTRIBUTIONS ARE OBSERVED IN BOTH EXTENDED AND POINT SOURCES. THE FOS DESIGN IS BASED ON A FIXED-SLOT SPECTROGRAPH WITH THE CAPABILITY OF SELECTING EITHER OF TWO SPECTRAL RESOLVING POWERS (100 OR 1000) OVER THE WAVELENGTH RANGE 114-1000 NM. A NONDISPERSIVE MODE IS ALSO AVAILABLE, PROVIDING CAMERA IMAGES FOR SCIENTIFIC AND TARGET ACQUISITION PURPOSES. A POLARIZATION-ANALYZER CAPABILITY IS PROVIDED OVER THE WAVELENGTH RANGE 180-285 NM. THE FOS USES A 512-DIODE LINEAR ARRAY OF PHOTON-COUNTING DIGICONS AS DETECTORS. TO COVER THE FULL WAVELENGTH RANGE, TWO DETECTORS ARE USED. THE ULTRAVIOLET/VISIBLE SENSOR HAS A MAGNESIUM FLUORIDE FACEPLATE AND A BIALKALI PHOTOCATHODE. THE VISIBLE/NEAR-IR SENSOR HAS THE SAME WINDOW MATERIAL AND AN EXTENDED-RED TRIALKALI PHOTOCATHODE. FOR THE FINEST OBJECTS, INTEGRATION TIMES ARE LONG.

ST, JEFFERTS

INVESTIGATION NAME- ASTROMETRY SCIENCE

NSSDC ID- LST -09

INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - W.H. JEFFERTS
OI - G.F. BENEDICT
OI - P.D. HEMENWAY
OI - P.J. SHELUS
OI - R.L. DUNCOMBE
OI - W.F. VAN ALTENA
OI - O.G. FRANZ
OI - L.W. FREDERICK

U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
U OF TEXAS, AUSTIN
YALE U
LOWELL OBSERVATORY
U OF VIRGINIA

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE FACILITIES OF THE OPTICAL TELESCOPE ASSEMBLY, INSTEAD OF REQUIRING A SEPARATE INSTRUMENT. THE SPACE TELESCOPE (ST) FINE GUIDANCE SYSTEM (FGS) CONSISTS OF THREE IDENTICAL SENSORS DISTRIBUTED IN AN ANNULUS CENTERED ON THE OPTICAL AXIS OF THE ST. EACH SENSOR HAS ITS OWN FIELD OF VIEW (FOV). IN NORMAL OPERATIONS, TWO OF THE SENSORS ARE USED FOR FINE POINTING THE ST. THE SENSOR THAT IS NOT USED FOR TELESCOPE POINTING IS THE PRIMARY ASTROMETRIC INSTRUMENT AT THAT PARTICULAR TIME. AN FGS SENSOR CONSISTS OF A SET OF GIMBALED MIRRORS SUCH THAT ANY STAR WITHIN ITS FOV CAN BE PLACED ON AN IMAGE DISSECTOR/INTERFEROMETER COMBINATION. THE ENCODER READINGS OF THE GIMBALED MIRROR AXES SUPPLY THE OBJECT POSITION IN THE FOV; THE OUTPUT OF EACH OF THE PAIR OF INTERFEROMETERS SUPPLIES A FINE ERROR SIGNAL. EACH SENSOR CONTAINS A SET OF MOVABLE FILTERS; AND TEMPERATURE, VOLTAGE,

AND OTHER MONITORS. THE ASTROMETRY EXPERIMENTER OBSERVES STARS IN AN APPROXIMATE MAGNITUDE RANGE OF 3-20. THE EXPERIMENT HAS THE CAPABILITY OF OBSERVING 10 OBJECTS OF THE 17TH MAGNITUDE IN 10 MIN.

----- ST, VAN DE HULST-----

INVESTIGATION NAME- FAINT-OBJECT CAMERA (FOC)

NSSDC ID- LST -00 INVESTIGATIVE PROGRAM
 CODE SC/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - W.C. VAN DE HULST MUYGENS LAB
 OI - I.R. KING U OF CALIF, BERKELEY
 OI - P. CRANE EUROP SO OBS, SWIZR
 OI - R. ALBRECHT U OF VIENNA
 OI - C. BARBIERI U OF PADOVA
 OI - A. BOKSENBERG U COLLEGE LONDON
 OI - M.J. DISNEY U COLLEGE CARDIFF
 OI - T.M. KAMPERMAN ASTRONOMICAL INST
 OI - C.D. MACKAY U OF CAMBRIDGE
 OI - R.N. WILSON EUROP SO OBS, SWIZR
 OI - J.M. DEHARVENG CNRS-LAS

BRIEF DESCRIPTION
 THE FAINT-OBJECT CAMERA (FOC) INVESTIGATION USES AN IMAGING CAMERA WITH A TWO-DIMENSIONAL PHOTON-EVENT COUNTING DETECTOR, OPERATING AT A HIGH FOCAL RATIO, WHICH FULLY EXPLOITS THE SPATIAL RESOLVING POWER OF THE ST, AND IS ABLE TO DETECT OBJECTS THAT ARE 50 TIMES FAINTER THAN THOSE OBSERVABLE WITH THE MOST POWERFUL EARTHBOUND TELESCOPE. THE FOC HAS A MINIMUM FORMAT OF 200 X 200 PIXELS. BASED ON A PIXEL SIZE OF 25 X 25 MICROMETERS, A FOCAL RATIO OF APPROXIMATELY F/96 IS REQUIRED TO EXPLOIT THE SPATIAL RESOLVING POWER OF THE ST. AT THAT FOCAL RATIO, THE PIXEL SIZE IS 0.022 X 0.022 SQ ARC S AND THE FIELD OF VIEW OF A 200 X 200 PIXEL CAMERA IS 4.4 X 4.4 SQ ARC S. FOR IMAGERY AND PHOTOMETRY OF VERY FAINT STARS AND EXTENDED SOURCES, CUMULATIVE EXPOSURES ARE REQUIRED TO OBTAIN A USEFUL SIGNAL-TO-NOISE RATIO. THE WAVELENGTH RANGE IS 120 TO 800 NM AND THE DYNAMIC RANGE IS FROM 21ST TO 28TH VISUAL MAGNITUDE FOR POINT SOURCES, AND FROM 15TH TO 22ND VISUAL MAGNITUDE/SQ ARC S FOR EXTENDED SOURCES.

----- ST, WESTPHAL-----

INVESTIGATION NAME- WIDE-FIELD CAMERA (WFC)

NSSDC ID- LST -07 INVESTIGATIVE PROGRAM
 CODE SC/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - J.A. WESTPHAL CALIF INST OF TECH
 OI - W.A. BAUM LOWELL OBSERVATORY
 OI - D.G. CURRIE U OF MARYLAND
 OI - G.E. DANIELSON CALIF INST OF TECH
 OI - B.A. SMITH U OF ARIZONA
 OI - A.D. CODE U OF WISCONSIN
 OI - J.E. GUNN CALIF INST OF TECH
 OI - J. KRISTYAN CALIF INST OF TECH
 OI - C.R. LYNDS KITT PEAK NATL OBS
 OI - P.K. SEIDELMANN US NAVAL OBSERVATORY

BRIEF DESCRIPTION
 THE WIDE-FIELD CAMERA INVESTIGATION USES TWO CAMERAS OF DIFFERENT FOCAL LENGTHS HOUSED IN A SINGLE PLANETARY RADIAL RAY. ONE IS A WIDE-FIELD CAMERA AND THE OTHER IS A PLANETARY CAMERA. EACH CAMERA USES A SIMPLE OPTICAL MOSAIC TECHNIQUE IN CONJUNCTION WITH FOUR CHARGE-COUPLED DEVICES (CCD) AS DETECTORS, EACH HAVING 800 X 800 PICTURE ELEMENTS. EACH CCD IS THINNED FOR BACK-SIDE ILLUMINATION, AND THEIR SPECTRAL RESPONSES ARE EXTENDED SHORTWARD FROM THE VISIBLE TO THE VACUUM ULTRAVIOLET BY SPECIAL PROCESSING. THE OVERALL QUANTUM EFFICIENCY OF THE INSTRUMENT IS ABOUT 10 PERCENT FROM LYMAN ALPHA (121.6 NM) TO 350 M, RISING RAPIDLY TO ABOUT 50 PERCENT FROM 450 TO 800 NM, THEN GRADUALLY DECREASING INTO THE INFRARED. THE COMBINATION OF THE OPTICAL MOSAIC AND CCD DETECTORS PROVIDES A CONTIGUOUS FIELD WITH AN OVERALL SIZE OF 1600 X 1600 PIXELS. FOCAL RATIOS OF F/12.9 AND F/30 GIVE FIELD SIZES OF 2.67 SQ ARC MIN AT A RESOLUTION OF 0.1 ARC S PER PIXEL FOR THE WIDE-FIELD CAMERA AND 68.7 SQ ARC S AT 0.043 ARC S PER PIXEL FOR THE PLANETARY CAMERA. THE INSTRUMENT CONTAINS SPACE FOR 90 FILTERS, POLARIZERS/FILTERS, AND TRANSMISSION GRATINGS.

***** STP P80-1*****

SPACECRAFT COMMON NAME- STP P80-1
 ALTERNATE NAMES- SPACE TEST PROGRAM P80-1, P80-1

NSSDC ID- P80-1

LAUNCH DATE- 8 QTR 81 WEIGHT- KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC INCLINATION- 72.5 DEG
 ORBIT PERIOD- 99.6 MIN APOAPSIS- 740.P KM ALT
 PERIAPSIS- 740.8 KM ALT

PERSONNEL
 PM - J.N. JENSEN USAF SPACE DIVISION
 PS - J.R. STEVENS AFROSPACE CORP

BRIEF DESCRIPTION
 SPACE TEST PROGRAM P80-1 IS A DOD SATELLITE WHICH IS ESSENTIALLY A RECTANGULAR PARALLELEPIPED OF APPROXIMATE DIMENSIONS 2.4 X 2.4 X 0.7 METERS. IT HAS A CIRCULAR ORBIT AND IS THREE-AXIS STABILIZED TO MAINTAIN ONE 2.4 X 2.4 METER SURFACE VECTOR NADIR POINTING. THE SPACECRAFT SERVES AS A STABLE PLATFORM REFERENCE FOR THREE EXPERIMENT TELESCOPES. TELEMETRY CAPABILITY IS PCM AND USES ON-BOARD STORAGE TAPE RECORDERS WITH UP TO 6 HOURS STORAGE.

----- STP P80-1, BOWYER-----

INVESTIGATION NAME- EXTREME ULTRAVIOLET PHOTOMETER

NSSDC ID- P80-1 -03 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 EARTH RESOURCES SURVEY
 ASTRONOMY

PERSONNEL
 PI - C.S. BOWYER U OF CALIF, BERKELEY
 OI - D. FINLEY U OF CALIF, BERKELEY

BRIEF DESCRIPTION
 THE EXTREME-ULTRAVIOLET PHOTOMETER INVESTIGATION CONSISTS OF TWO IMAGING GRAZING-INCIDENCE TELESCOPES WITH SEVERAL BROADBAND FILTERS SENSITIVE TO EXTREME AND FAR ULTRAVIOLET RADIATION. ONE TELESCOPE IS NADIR-LOOKING AND THE OTHER IS ZENITH-LOOKING. THE ORBITAL MOTION OF THE SPACECRAFT PROVIDES A SCANNING FUNCTION, RESULTING IN A MAPPING OF EARTH AND SKY IN THE WAVELENGTH REGIONS OF INTEREST THROUGHOUT THE MISSION.

----- STP P80-1, LARSON-----

INVESTIGATION NAME- TEAL RUBY

NSSDC ID- P80-1 -01 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY

PERSONNEL
 PI - J.C. LARSON LOCKHEED PALO ALTO

BRIEF DESCRIPTION
 THIS INVESTIGATION USES AN INFRARED TELESCOPE AND DETECTION SYSTEM WHICH HAS A MULTISPECTRAL MOSAIC FOCAL PLANE TO MEASURE SIGNAL STRENGTH IN A VARIETY OF SPECTRAL BANDS IN THE INFRARED. IT GATHERS EARTH BACKGROUND DATA AND TESTS TECHNIQUES FOR IR DETECTION AND DATA REDUCTION.

----- STP P80-1, POWER-----

INVESTIGATION NAME- ION AUXILIARY PROPULSION SYSTEM

NSSDC ID- P80-1 -02 INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM
 INVESTIGATION DISCIPLINE(S)
 TECHNOLOGY

PERSONNEL
 PI - J.L. POWER NASA-LERC

BRIEF DESCRIPTION
 THE ION AUXILIARY PROPULSION SYSTEM WILL TEST TWO MERCURY ION THRUSTERS, EACH PRODUCING ONE MILLIPOUND OF THRUST. THESE ARE CONFIGURED ON THE SPACECRAFT TO BE REPRESENTATIVE OF THRUSTER'S USE FOR STATIONKEEPING AND MANEUVERING. INSTRUMENTATION PROVIDES THRUSTER PERFORMANCE AND MEASURES THE EFFECTS OF THE THRUSTERS ON OTHER SPACECRAFT COMPONENTS AND FUNCTIONS.

***** STP P80-2*****

SPACECRAFT COMMON NAME- STP P80-2
 ALTERNATE NAMES- SPACE TEST PROGRAM P80-2, P80-2
 SIRE

NSSDC ID- P80-2

LAUNCH DATE- 1 QTR 81
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

WEIGHT- 2430. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99. MIN
PERIAPSIS- 740. KM ALT

INCLINATION- 98.3 DEG
APOAPSIS- 740. KM ALT

PERSONNEL
PM - W.J. MIEMANN
PS - J.R. STEVENS

USAF SPACE DIVISION
AEROSPACE CORP

BRIEF DESCRIPTION

THE SPACE TEST PROGRAM P80-2 SPACECRAFT IS AN ASCENT AGENA (SIMILAR TO SEASAT) WHICH IS MODIFIED TO CARRY ORBITAL EXPERIMENTS ON THE FORWARD STRUCTURE. HIGH ELECTRIC POWER REQUIREMENTS ARE MET BY FLEXIBLE ROLL OUT SOLAR ARRAY PANELS WHICH EXTEND FROM THE AGENA. THE TWILIGHT SUN-SYNCHRONOUS ORBIT ALLOWS DEPLOYMENT OF THE ARRAY PERPENDICULAR TO THE INSOLATION VECTOR. EXPERIMENT DATA MAY BE READ OUT BY GROUND STATIONS OR MAY BE RECORDED FOR SUBSEQUENT TRANSMISSION TO THE GROUND STATIONS. THE INVESTIGATIONS WILL TEST A DEEP SPACE VIEWING INFRARED TELESCOPE WITH ACTIVE CRYOGENIC REFRIGERATION, AND MEASURE SOLAR FLARE ISOTOPIIC COMPOSITION.

----- STP P80-2, LYONS-----

INVESTIGATION NAME- SATELLITE INFRARED (SIRE)

NSSDC ID- P80-2 -01 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - J. LYONS

USAF SPACE DIVISION

BRIEF DESCRIPTION

THIS INVESTIGATION EMPLOYS AN ACTIVELY CRYO-COOLED TELESCOPE FOCAL PLANE WITH MULTIPLE FILTER BANDS FOR OBSERVATION OF STAR AND GALACTIC RADIANCE PROFILES AND AURORAS. THE TELESCOPE IS GIMBALED FOR 1-DEGREE OF FREEDOM SCANS, RELYING ON SPACECRAFT MANEUVERS AND OPTICAL FOV FOR ADDITIONAL OBSERVATIONAL SCOPE. THE REFRIGERATOR IS AN ELECTRICALLY POWERED WUILLUMIER CYCLE MACHINE OF THE TYPE FLOWN ON PREVIOUS STP FLIGHTS.

----- STP P80-2, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY ISOTOPE (CRIE)

NSSDC ID- P80-2 -02 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - J.A. SIMPSON
OI - M. GARCIA-MUNOZ
OI - J.P. WEFEL

U OF CHICAGO
U OF CHICAGO
U OF CHICAGO

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) STUDY SOLAR FLARE ENERGY CONVERSION AND SOLAR ACCELERATION MECHANISMS, AND (2) TO MONITOR SOLAR FLARE PARTICLE FLUXES. OBJECTIVE (1) IS DONE THROUGH THE IDENTIFICATION OF ISOTOPES WHOSE PRESENCE IS A MEASURE OF THE AMOUNT OF SOLAR MATTER TRAVERSED DURING ACCELERATION AND THE TIME SPENT WITHIN THE SOLAR CORONA. THE INSTRUMENT PACKAGE CONTAINS THREE MULTI-ELEMENT SOLID-STATE DETECTOR TELESCOPES. THE HIGH-ENERGY TELESCOPE IS USED TO RESOLVE ISOTOPES FROM HYDROGEN TO NICKEL IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON, AND ITS VIEW ANGLE IS 95 DEG (FULL CONE). THE LOW-ENERGY TELESCOPE IS USED TO RESOLVE ISOTOPES FROM HELIUM TO NICKEL IN THE RANGE 4 TO 230 MEV/NUCLEON, AND ITS VIEW ANGLE IS 80 DEG. THE MONITOR TELESCOPE DETECTS PROTONS FROM 0.5 TO 3.2 MEV AND HELIUM FROM 0.7 TO 2.5 MEV/NUCLEON. ITS VIEW ANGLE IS 75.4 DEG. DATA RATES ARE ONE 360-BIT WORD/S FOR THE HIGH-ENERGY TELESCOPE AND ONE 360-BIT WORD/S FOR THE LOW-ENERGY AND MONITOR TELESCOPES COMBINED.

***** UARS-1*****

SPACECRAFT COMMON NAME- UARS-1
ALTERNATE NAMES- UPPER ATMOSPHER. RESEAR. SAT

NSSDC ID- UARS-1

LAUNCH DATE- 10/00/86
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

WEIGHT- 3225. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

MASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 97. MIN
PERIAPSIS- 600. KM ALT

INCLINATION- 56. DEG
APOAPSIS- 600. KM ALT

PERSONNEL
MG - R.J. ARNOLD
SC - R.K. SEALS
PR - P.T. BURR
PS - C.A. REBER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

TWO UPPER ATMOSPHERE RESEARCH SATELLITES, UARS-1 AND UARS-2, ARE PART OF THE UPPER ATMOSPHERE RESEARCH PROGRAM. THE BASIC OBJECTIVES OF THE UARS-1 MISSION ARE TO CONDUCT RESEARCH IN THE ATMOSPHERE ABOVE THE TROPOPAUSE, AND TO MEASURE THE GLOBAL BUDGET OF CONSTITUENT TRACE GASES AND THEIR CHEMICAL, DYNAMICAL, AND RADIATIVE BEHAVIOR. SPECIFICALLY THE OBJECTIVES ARE: (1) TO STUDY ENERGY INPUT AND LOSS IN THE UPPER ATMOSPHERE; (2) TO STUDY GLOBAL ATMOSPHERIC PHOTOCHEMISTRY; (3) TO STUDY DYNAMICS OF THE UPPER ATMOSPHERE; AND (4) TO STUDY THE COUPLING AMONG PROCESSES AND BETWEEN ATMOSPHERIC REGIONS. THE SECOND SPACECRAFT, UARS-2, WITH SIMILAR OBJECTIVES WILL BE LAUNCHED 1 YEAR AFTER UARS-1 INTO A SIMILAR 600-KM CIRCULAR ORBIT, BUT WITH A HIGHER INCLINATION ANGLE. THE PLANNED LIFETIME FOR EACH SPACECRAFT IS 18 MONTHS, BUT THIS MAY BE EXTENDED BY RETRIEVAL OR IN-ORBIT REFURBISHMENT/RESUPPLY BY THE SHUTTLE. THE UARS HAS TWO MAJOR COMPONENTS. THE FIRST IS THE MULTIMISSIION MODULAR SPACECRAFT (MMS), DESIGNED AS A STANDARD BUS FOR NASA SPACECRAFT MISSIONS (E.G., SMM AND LANDSAT-D), AND CONSISTING OF FOUR BASIC MODULES: ATTITUDE CONTROL SUBSYSTEM; POWER SUBSYSTEM; COMMUNICATIONS AND DATA HANDLING SUBSYSTEM; AND THE PROPULSION MODULE. THE SECOND MAJOR COMPONENT IS AN INSTRUMENT ASSEMBLY (IA) WHICH IS COMPOSED OF: (1) THE FOUR MICROWAVE ANTENNAS AND THEIR MOMENTUM-COMPENSATING DEVICES; (2) A SOLAR-POINTED INSTRUMENT PLATFORM WITH SOLAR INSTRUMENTS; (3) THE CRYOGENIC LIMB INTERFEROMETER INSTRUMENT; (4) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO NOT REQUIRE CRYOGENIC COOLING; AND (5) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT CONTAIN CRYOGENS. THE MMS WILL MAINTAIN A PRECISE ORIENTATION TO THE LOCAL VERTICAL AND TO THE VELOCITY VECTOR. THERE ARE THREE ON-BOARD TAPE RECORDERS. THREE NASA STANDARD 50-AMP HOURS NICKEL-CADMIUM BATTERIES WILL FLY ALONG WITH THE SOLAR CELL ARRAY. THE DATA WILL BE RETURNED TO EARTH BY TDSS. A CENTRAL DATA PROCESSING FACILITY WITH REMOTE PROCESSING AND DISPLAY TERMINALS AT THE INVESTIGATOR'S INSTITUTION IS PLANNED.

----- UARS-1, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE
MONITOR 120-400 NM

NSSDC ID- UARS-1 -02 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - G.E. BRUECKNER
OI - M.E. VAN HOOSIER
OI - D.K. PRINZ
OI - J.D.F. BARTOE

US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB
US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THIS INVESTIGATION IS TO IMPROVE THE EXISTING ACCURACY OF SOLAR FLUX MEASUREMENTS IN THE 120- TO 400-NM REGION OF THE SPECTRUM AND TO ESTABLISH THE VARIATIONS OF THIS FLUX OVER A SOLAR CYCLE. THE FULL-SUN SPECTRAL IRRADIANCE IS MEASURED WITH TWO SPECTRAL RESOLUTIONS, 0.15 AND 5 NM, WITH AN ABSOLUTE ACCURACY OF PLUS OR MINUS 6-10 PERCENT (WAVELENGTH DEPENDENT). THE ACCURACY OF THE MEASUREMENTS BELOW 210 NM RELATIVE TO MEASUREMENTS OF THE MORE STABLE SOLAR CONTINUUM ABOVE 210 NM IS PLUS OR MINUS 1-5 PERCENT (WAVELENGTH DEPENDENT). THE SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SUSIM) CONSISTS OF TWO IDENTICAL DOUBLE DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND A DEUTERIUM CALIBRATION LAMP. THE SPECTROMETERS AND DETECTORS ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON GAS. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY; THE SECOND IS USED INFREQUENTLY TO TRACK THE STABILITY OF THE FIRST. THE DEUTERIUM LAMP SERVES AS A SECONDARY STANDARD FOR IN-FLIGHT CALIBRATION.

----- UARS-1, CARLSON-----

INVESTIGATION NAME- GLIMPSE: GLOBAL LIMB PHOTOMETRIC SCANNING
EXPERIMENT

NSSDC ID- UARS-1 -14 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
PI - R.W. CARLSON
OI - A.L. FRYAT
OI - E.R. REITER
OI - V.L. YUNG
OI - J.E. LOVILL

NASA-JPL
NASA-JPL
COLORADO STATE U
CALIF INST OF TECH
LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO PRODUCE DAILY GLOBAL MAPS OF VERTICAL OZONE PROFILES IN THE 18- TO 50-KM RANGE, AT 3-KM VERTICAL RESOLUTION AND 500 BY 500 KM HORIZONTAL RESOLUTION WITH 5 PERCENT PRECISION. THE PROFILES ARE OBTAINED BY LIND SCANS OF THE ATMOSPHERIC RADIANCE, UTILIZING ABSORPTION IN THE VISIBLE CHAPPAUS AND NEAR-UV HARTLEY BANDS TO DETERMINE OZONE ABUNDANCES. THE MEASUREMENTS ARE 'INVERTED' TO GIVE OZONE PROFILES IN THE NEAR-REAL TIME USING A HIGH-SPEED ARRAY PROCESSOR. THE INSTRUMENT CONSISTS OF AN EIGHT-CHANNEL LIND SCANNING PHOTOMETER TO PROVIDE LIND RADIANCE PROFILES AND A FOUR-CHANNEL DOWN-LOOKING GROUND/CLOUD ALBEDO SENSOR TO PROVIDE BOUNDARY CONDITIONS FOR THE DATA INVERSION. FOR THE LIND SCAN PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS): 3000, 3200, 3800, 5500, 6000, 6500, 7000, AND 8000; THE SPECTRAL BANDPASSES ARE 50-200 Å, DEPENDING ON CHANNEL; AND LIND SCAN TIME IS 2.0 S. THE PROJECTED FIELD OF VIEW IS 1 KM DIAMETER. FOR THE GROUND/CLOUD ALBEDO PHOTOMETER THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS) 3200, 5000, 6000, AND 7000. SPECTRAL BAND PASSES ARE 100 Å, AND THE SCAN TIME IS 12 S. THE PROJECTED FIELD OF VIEW IS 50-80 KM.

----- UARS-1, CHANG -----

INVESTIGATION NAME- THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE

NSSDC ID- UARS-1 -24 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J.S. CHANG LAWRENCE LIVERMORE LAB
PI - F.M. LUTHER LAWRENCE LIVERMORE LAB
OI - W.M. DUEHER LAWRENCE LIVERMORE LAB
OI - J.E. PENNER LAWRENCE LIVERMORE LAB
OI - D.J. WUEBBLES LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION

THIS INVESTIGATION STUDIES THE MECHANISMS THAT CONTROL UPPER ATMOSPHERE STRUCTURE VARIABILITY AND THE RESPONSE OF THE UPPER ATMOSPHERE TO NATURAL AND ANTHROPOGENIC PERTURBATIONS. THE FOCUS IS ON THE CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES IN THE MIDDLE ATMOSPHERE USING TIME-DEPENDENT TRANSPORT-KINETICS MODELS.

----- UARS-1, CUNNOLD -----

INVESTIGATION NAME- PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE

NSSDC ID- UARS-1 -18 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - D.M. CUNNOLD GEORGIA INST OF TECH
OI - F.W. ALVEA MASS INST OF TECH

BRIEF DESCRIPTION

THIS INVESTIGATION USES THE UARS DATA TO TEST AND UPDATE A THREE-DIMENSIONAL PHOTOCHEMICAL DYNAMICAL MODEL OF THE STRATOSPHERE. A 32-LEVEL MODEL EXTENDING FROM THE GROUND TO 87 KM AND CONTAINING A HORIZONTAL RESOLUTION APPROXIMATELY EQUIVALENT TO PLANETARY WAVE-NUMBER 18 IS USED IN THIS STUDY. IT CONTAINS THE PREDICTION OF BETWEEN THREE AND SIX LONG-LIVED CHEMICAL SPECIES. A PRINCIPAL GOAL OF THIS MODELING ACTIVITY IS TO ESTIMATE THE DYNAMICAL RESPONSE OF THE ATMOSPHERE TO CHEMICAL PERTURBATIONS, PARTICULARLY THE NATURE OF TRANSPORT IN THE STRATOSPHERE.

----- UARS-1, GELLER -----

INVESTIGATION NAME- OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS

NSSDC ID- UARS-1 -20 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - W.A. GELLER
OI - E.J. PITCHER
OI - J.E. GEISLER

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U OF MIAMI
U OF MIAMI

BRIEF DESCRIPTION

THE MAJOR GOALS OF THIS INVESTIGATION ARE: (1) TO CONSTRUCT A SIMULATION OF UPPER ATMOSPHERE FLOW REGIMES AND UTILIZE THE PROPOSED UARS OBSERVING PARAMETERS TO STUDY THE RESOLVABILITY OF UPPER ATMOSPHERE DYNAMICS BY THE UARS INSTRUMENTS AND SUBSEQUENT DATA ANALYSIS; (2) TO USE PRE-UARS LIND SCANNING DATA FOR THE STRATOSPHERE AND MESOSPHERE FOR GENERAL CIRCULATION STUDIES; (3) TO ASSESS THE EXTENT TO WHICH UPPER ATMOSPHERE DATA MUST BE INCLUDED IN STUDIES OF TROPOSPHERIC CLIMATE AND IN EXTENDED RANGE FORECASTING; AND (4) TO PURSUE A THEORETICAL MODELING EFFORT ON STRATOSPHERIC/MESOSPHERIC DYNAMICS AND ITS RELATION TO TROPOSPHERIC DYNAMICS.

----- UARS-1, GILLE -----

INVESTIGATION NAME- ADVANCED LIND SCANNER

NSSDC ID- UARS-1 -10 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.C. GILLE NATL CTR FOR ATMOS RES
PI - J.W. RUSSELL, 3RD NASA-LARC
OI - R.J. CICERONE U OF CALIF, SAN DIEGO
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - W.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE ADVANCED LIND SCANNER (ALS) EXPERIMENT HAS AS ITS OBJECTIVE MEASUREMENT OF THE VERTICAL AND HORIZONTAL DISTRIBUTIONS OF IMPORTANT TRACE GASES IN THE UPPER ATMOSPHERE, INCLUDING O₃, NO₂, HNO₃, N₂O, H₂O, AND CH₄; AND TEMPERATURE MEASUREMENT IN THE 8- TO 75-KM ALTITUDE RANGE WITH A 1 DEG K RMS ERROR FOR ALTITUDE LESS THAN 50 KM. A MULTISPECTRAL INTERFERENCE FILTER RADIOMETER WITH ELEVATION SCAN AND TWO-AZIMUTH POSITION CAPABILITY IS USED AND THE MEASUREMENT TECHNIQUE INVOLVES THE INVERSION OF THE MEASURED RADIANCE PROFILES. INSTANTANEOUS VERTICAL FIELDS OF VIEW (IFOV) ARE LESS THAN 2 KM IN ALL EXCEPT TWO CHANNELS WHICH ARE DESIGNED FOR LOW ALTITUDE SENSING. FOR THESE CHANNELS THE IFOV IS LESS THAN 1 KM. THE SPECTRAL RANGE OF APPROXIMATELY 6 TO 18 MICROMETERS IS COVERED WITH CHANNELS RANGING IN RESOLUTION FROM 80 TO 220 INVERSE CENTIMETERS. THE INSTRUMENT USES MERCURY-CADMIUM-TELLURIDE DETECTORS COOLED TO 80 DEG K.

----- UARS-1, GILLE -----

INVESTIGATION NAME- CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER

NSSDC ID- UARS-1 -12 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.C. GILLE NATL CTR FOR ATMOS RES
PI - W.G. MANKIN NATL CTR FOR ATMOS RES
PI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - W.T. COFFEY NATL CTR FOR ATMOS RES
OI - J.R. HOLTON U OF WASHINGTON
OI - V.G. KUNDE NASA-65FC
OI - D.G. MURCRAY U OF DENVER
OI - J.K. RUSSELL, 3RD NASA-LARC
OI - A.T. STAIR, JR. USAF GEOPHYS LAB
OI - W.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO OBTAIN MEASUREMENTS, THE INVERSION OF WHICH PROVIDES MORE DETAILED AND COMPREHENSIVE GLOBAL MAPS OF TEMPERATURE, TRACE SPECIES, AND EMISSION FEATURES OVER THE 10- TO 120-KM RANGE. THE CRYOGENIC UPPER ATMOSPHERE LIND EMISSION RADIOMETER (CULER) IS A CRYOGENICALLY COOLED TELESCOPE OF 15-CM APERTURE WITH A LIND SCANNING MIRROR FEEDING A 24-CHANNEL RADIOMETER AND A CIRCULAR VARIABLE FILTER (CVF) SPECTROMETER. THE FIXED RADIOMETRIC CHANNELS, SELECTED BY GRATING-FILTER COMBINATIONS BETWEEN 370-7000 INVERSE CENTIMETER (1.5 TO 27 MICROMETERS), ARE TAILORED FOR SPECIFIC MEASUREMENTS E.G., TEMPERATURE SOUNDING, CONCENTRATION OF PREDETERMINED CHEMICAL SPECIES, OR EMISSIONS FROM SPECIFIC EXCITATION MECHANISMS. THE SPECTRALLY SELECTIVE CVF HAS 1 PERCENT RESOLUTION BETWEEN 660-5000 INVERSE CENTIMETER.

----- UARS-1, GRAYSTONE-----

INVESTIGATION NAME- THEORETICAL INVESTIGATION PHYSICS,
CHEMISTRY, AND DYNAMICS-STRATOSPHERE

NSSDC ID- UARS-1 -25 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - P. GRAYSTONE METEOROLOGICAL OFFICE

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO FURTHER THE UNDERSTANDING OF THE STRATOSPHERE AND TO STUDY ITS INTERACTIONS WITH THE TROPOSPHERE. THESE OBJECTIVES ARE ACHIEVED THROUGH TWO PRIMARY ACTIVITIES, ANALYSIS AND DIAGNOSIS. A COMPREHENSIVE THREE DIMENSIONAL NUMERICAL MODEL OF THE TROPOSPHERE AND STRATOSPHERE IS USED.

----- UARS-1, GROSE-----

INVESTIGATION NAME- STRATOSPHERIC TRANSPORT PROCESSES, BUDGET
OF MINOR CONSTITUENTS, AND ENERGETICS

NSSDC ID- UARS-1 -22 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - J.L. GROSE NASA-LARC
OI - W.T. BLACKSHEAR NASA-LARC
OI - K.V. HAGGARD NASA-LARC
OI - E.E. RENSBERG NASA-LARC
OI - R.F. TURNER NASA-LARC
OI - R.J. KURZEJA GEORGE WASHINGTON U

BRIEF DESCRIPTION
THIS INVESTIGATION IS A COORDINATED PROGRAM OF THEORETICAL MODEL STUDIES AND DATA ANALYSIS, AND INTERPRETATION DESIGNED TO STUDY TRANSPORT PROCESSES, BUDGETS OF TRACE CHEMICALS, AND ENERGETICS OF THE STRATOSPHERE. THE FIRST PART OF THIS EFFORT IS DEVOTED TO THE STUDY OF THE TRANSPORT OF MINOR CONSTITUENTS, HEAT, MOMENTUM, AND POTENTIAL VORTICITY IN THE STRATOSPHERE. THE SECOND PART UTILIZES UARS DATA TO STUDY BUDGETS OF TRACE CHEMICALS BY DETERMINING BULK MASS TRANSFER RATES WITHIN THE STRATOSPHERE AND AMONG THE STRATOSPHERE, TROPOSPHERE, AND MESOSPHERE. THE LAST PART OF THIS EFFORT IS AN ANALYSIS OF THE STRATOSPHERE ENERGETICS.

----- UARS-1, HAYS-----

INVESTIGATION NAME- HIGH RESOLUTION DOPPLER IMAGER (HRDI)

NSSDC ID- UARS-1 -02 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - P.B. HAYS U OF MICHIGAN
OI - G. HERNANDEZ NOAA-ERL
OI - D. REES U COLLEGE LONDON
OI - R.G. ROBLE NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO USE A HIGH RESOLUTION DOPPLER IMAGING FABRY-PEROT INTERFEROMETER DETECTING SHARP FEATURES IN THE SPECTRUM OF LIGHT EMITTED OR SCATTERED FROM THE EARTH'S ATMOSPHERE TO OBTAIN THE TEMPERATURE AND VECTOR WIND FIELD DIRECTLY. THE INFORMATION OBTAINED WILL BE USED TO STUDY A SERIES OF PROBLEMS ASSOCIATED WITH THE DYNAMICS OF THE ATMOSPHERE AND THE TRANSPORT OF MINOR CONSTITUENTS WITHIN THE ATMOSPHERE. THERE IS A SINGLE SENSOR CONTAINING THE SPECTRAL FILTERS AND THE MAIN OBJECTIVE TELESCOPE WHICH CAN VIEW THE EARTH'S HORIZON THROUGH EITHER OF TWO ORTHOGONAL BAFFLE SYSTEMS. SWITCHING BETWEEN THESE BAFFLES IS ACCOMPLISHED BY ROTATING THE ZENITH SCAN MIRROR THROUGH 90 DEG. HORIZON SCANNING IS ACCOMPLISHED BY TILTING THIS MIRROR THROUGH 7.5 DEG IN THE ZENITH DIRECTION.

----- UARS-1, HEELIS-----

INVESTIGATION NAME- ION CONVECTION ELECTRODYNAMICS

NSSDC ID- UARS-1 -06 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. HEELIS U OF TEXAS, DALLAS
OI - W.B. HANSON U OF TEXAS, DALLAS
OI - J.W. HOFFMAN U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT U OF TEXAS, DALLAS
OI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - E.L. BREIG U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE: (1) TO MEASURE THE ION VELOCITY FIELD ALONG THE ORBIT TRACK, FROM WHICH THE CORRESPONDING IONOSPHERIC ELECTRIC FIELDS MAY BE DERIVED; (2) TO USE THE DERIVED ELECTRIC FIELDS, TOGETHER WITH WIND, PARTICLE FLUX, AND MAGNETIC FIELD DATA, TO CONSTRUCT MODELS OF THE HIGH LATITUDE POTENTIAL DISTRIBUTION AND HEAT INPUT FROM BOTH PARTICLE AND JOULE HEATING; (3) TO USE THE MODEL HEATING AND ION-NEUTRAL MOMENTUM TRANSFER AS INPUTS TO GLOBAL MODELS OF ATMOSPHERIC CHEMISTRY AND DYNAMICS; AND (4) TO USE THE DERIVED GLOBAL ELECTRIC FIELD DISTRIBUTIONS TO CONSTRUCT MODELS THAT WILL REVEAL THE INTERPLAY BETWEEN THE SOLAR WIND, THUNDERSTORM ACTIVITY, AND IONOSPHERIC ELECTRIC FIELDS. THE ION CONVECTION ELECTRODYNAMICS (ICE) INSTRUMENT MAKES THE FOLLOWING MEASUREMENTS: (1) BULK ION VELOCITY (ALL COMPONENTS ARE MEASURED TO 5 PERCENT. THE SENSITIVITY IS 10 M/SEC FOR THE RAM COMPONENT AND 2 M/S FOR THE HORIZONTAL AND VERTICAL COMPONENTS. THE SAMPLING DISTANCES FOR THE RAM, HORIZONTAL, AND VERTICAL COMPONENTS ARE LESS THAN 8 KM, APPROXIMATELY 250 M, AND 500 M, RESPECTIVELY); (2) THE ION TEMPERATURE (MEASURED IN THE RANGE 200 TO 20,000 DEG K WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AND AT A SAMPLING DISTANCE OF LESS THAN 8 KM); (3) ION CONCENTRATIONS (MEASURED OVER THE RANGE 10 TO 1.0E+6 PER CUBIC CM WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AT A SAMPLING DISTANCE OF ABOUT 500 M); (4) ELECTRON TEMPERATURE (MEASURED OVER THE RANGE FROM 300 TO 20,000 DEG K, WITH AN ACCURACY OF PLUS OR MINUS 10 PERCENT AND AT A SAMPLING DISTANCE OF LESS THAN 60 KM).

----- UARS-1, HOLTON-----

INVESTIGATION NAME- WAVE DYNAMICS AND TRANSPORT IN THE
MIDDLE ATMOSPHERE

NSSDC ID- UARS-1 -17 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.R. HOLTON U OF WASHINGTON
OI - J.M. WALLACE U OF WASHINGTON
OI - D.L. HARTMANN U OF WASHINGTON
OI - R.E. YOUNG NASA-ARC
OI - C.B. LEOVY U OF WASHINGTON

BRIEF DESCRIPTION

THIS INVESTIGATION USES A PROGRAM OF OBSERVATIONAL ANALYSIS AND NUMERICAL MODELING DESIGNED TO ELUCIDATE THE NATURE OF THE GENERAL CIRCULATION OF THE MIDDLE ATMOSPHERE, THE ROLE OF DYNAMICS IN CONTROLLING THE DISTRIBUTION AND VARIABILITY OF VARIOUS TRACE CONSTITUENTS, AND THE NATURE AND EXTENT OF DYNAMICAL INTERACTIONS BETWEEN THE LOWER AND MIDDLE ATMOSPHERES. EMPHASIS IS PLACED ON THE ROLES WHICH LARGE-SCALE WAVE MOTIONS PLAY IN MAINTAINING THE BUDGETS OF MOMENTUM, HEAT, AND TRACE CONSTITUENT CONCENTRATIONS ON A GLOBAL BASIS IN THE MIDDLE ATMOSPHERE.

----- UARS-1, HOUGHTON-----

INVESTIGATION NAME- AN IMPROVED STRATOSPHERIC AND
MESOSPHERIC SOUNDER (ISAMS)

NSSDC ID- UARS-1 -11 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.T. HOUGHTON OXFORD U
OI - R. HUNNEMAN READING U
OI - H. HADLEY RUTHERFORD HIGH EN LAB
OI - K.H. DAVIES RUTHERFORD HIGH EN LAB
OI - G.D. PESKETT OXFORD U
OI - C.D. RODGERS OXFORD U
OI - F.J. WILLIAMSON OXFORD U
OI - J.J. BARNETT OXFORD U
OI - J.G. WHITNEY OXFORD U
OI - C.A. BAILEY OXFORD U
OI - G.R. THORNTON OXFORD U
OI - J.S. SEELEY READING U

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO MAKE GLOBAL MEASUREMENTS OF RADIATION FROM CO₂, H₂O, CO, NO, N₂O, AND CH₄. THESE MEASUREMENTS YIELD: THE KINETIC TEMPERATURE, VIBRATIONAL TEMPERATURE, AND ALTITUDE DISTRIBUTION FOR CO₂; (2) THE H₂O CONCENTRATION FROM 15 TO 110 KM; (3) THE CO ALTITUDE DISTRIBUTION; (4) THE NO ALTITUDE DISTRIBUTION; (5) THE N₂O ALTITUDE DISTRIBUTION; AND (6) THE CH₄ ALTITUDE DISTRIBUTION. THESE PARAMETERS ARE OBTAINED AS A FUNCTION OF TIME AND LOCATION. THE IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER IS AN INFRARED RADIOMETER OBSERVING THERMAL EMISSION AND RESONANCE FLUORESCENCE OF SOLAR RADIATION FROM THE ATMOSPHERIC LIMB BY GAS CORRELATION SPECTROSCOPY. THE SPECTRAL RANGE COVERED IS 2.7 TO 100 MICROMETERS. THE ALTITUDE RANGE EXTENDS FROM 15 TO 140 KM, DEPENDING UPON THE PARTICULAR SPECIES MEASURED. FOR MOST CHANNELS, VERTICAL PROFILES OF TEMPERATURE (TO APPROXIMATELY 1 DEG K ACCURACY) AND COMPOSITION (TO APPROXIMATELY 10 PERCENT) CAN BE MADE WITH A VERTICAL RESOLUTION BETTER THAN 4 KM AND A HORIZONTAL RESOLUTION OF 400 KM (LIMITED BY GEOMETRY OF LIMB PATH).

----- UARS-1, LONDON -----

INVESTIGATION NAME- RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY

NSSDC ID- UARS-1 -19

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J. LONDON U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION DEALS WITH THE NATURAL VARIABILITY OF THE THERMAL STRUCTURE AND OZONE CONCENTRATION OF THE UPPER ATMOSPHERE WITH EMPHASIS ON THEIR RESPONSE TO SIGNIFICANT SOLAR VARIABILITY. IT PROVIDES DEFINITIVE TESTS FROM ANALYSIS OF RETRIEVED DATA OF SPECIFIED MECHANISMS BY WHICH OZONE VARIATIONS ARE IN RESPONSE TO VARIATIONS IN SOLAR ACTIVITY. A TWO-FOLD APPROACH IS USED: DATA ANALYSIS AND STATISTICAL EVALUATION OF THE PERTINENT UPPER ATMOSPHERE PARAMETERS AS THEY RELATE TO VARIOUS FORMS OF SOLAR ACTIVITY; AND THEORETICAL STUDY OF THE SENSITIVITY OF REALISTIC MODELS OF THE OZONE PHOTOCHEMICAL EQUILIBRIUM SYSTEM AS RELATED TO OBSERVED AND SUGGESTED SOLAR VARIABILITY.

----- UARS-1, MILLER -----

INVESTIGATION NAME- SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION

NSSDC ID- UARS-1 -16

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. MILLER NOAA-NMC
PI - R.S. QUIROZ NOAA-NMC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MERGE TEMPERATURE AND WIND MEASUREMENTS IN THE STRATOSPHERE AND MESOSPHERE WITH THE OPERATIONAL NATIONAL WEATHER SERVICE ANALYSES. ENERGY BUDGET TERMS ARE EVALUATED AND HEIGHT AND TEMPERATURE FIELDS (PLANETARY WAVES) ARE ANALYZED BY FOURIER ANALYSIS. THE INTERLAYER DYNAMIC COUPLING AMONG THE TROPOSPHERE, STRATOSPHERE, AND MESOSPHERE ALSO IS STUDIED.

----- UARS-1, MOUNT -----

INVESTIGATION NAME- ULTRAVIOLET OZONE SPECTROMETER

NSSDC ID- UARS-1 -03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G.H. MOUNT U OF COLORADO
OI - C.A. BARTH U OF COLORADO
OI - C.W. HORD U OF COLORADO
OI - D.W. RUSCH U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE OZONE DENSITY IN THE ALTITUDE RANGE FROM 40 TO 90 KM, BY OBSERVING THE ATTENUATION OF RAYLEIGH SCATTERED SUNLIGHT IN THE NEAR ULTRAVIOLET AT WAVELENGTHS FROM 2400 TO 3400 A; AND TO DETERMINE THE NITRIC OXIDE (NO) DENSITY IN THE ALTITUDE RANGE FROM 80 TO 250 KM BY OBSERVING THE SUNLIGHT FLUORESCENTLY SCATTERED IN THE NO GAMMA BANDS AT 2100 TO 2400 A. THE FLIGHT INSTRUMENT WILL BE A 250-MM FOCAL LENGTH, OFF-AXIS, PARABOLIC

TELESCOPE AND DUAL CHANNEL 1/8-M FBERT-FASTIE SPECTROGRAPH EMPLOYING TWO PHOTOMULTIPLIER TUBES OPERATING IN THE SPECTRAL RANGES 2100-3100 A AND 2400-3400 A AT 20-A RESOLUTION. THE INSTRUMENT IS MOUNTED ONTO A SCAN PLATFORM, ALLOWING SCANNING OF THE EARTH'S LIMB IN 3-KM HEIGHT INCREMENTS IN A TIME PERIOD OF 12 S. OPERATING MODES INCLUDE (1) SIMULTANEOUS INTENSITY MEASUREMENTS AT TWO WAVELENGTHS SEPARATED BY APPROXIMATELY 300 A, (ONE WHERE THE OZONE ABSORPTION IS STRONG AND ONE WHERE IT IS WEAK AS THE SCAN PLATFORM SCANS THE EARTH'S LIMB), AND (2) MEASUREMENT OF THE GAMMA BANDS IN THE RANGE 2150 TO 2450 A AS THE INSTRUMENT IS SCANNED THROUGH THE EARTH'S LIMB.

----- UARS-1, REBER -----

INVESTIGATION NAME- ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS

NSSDC ID- UARS-1 -21

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - C.A. REBER NASA-GSFC
OI - F.T. MUANG COMPUTER SCIENCES CORP
OI - A.E. HEDIN NASA-GSFC
OI - J.E. FREDERICK NASA-GSFC
OI - J. LONDON U OF COLORADO
OI - E. HILSENATH NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE THE ORGANIZATION, EMPIRICAL MODELING, AND GEOPHYSICAL INTERPRETATION OF THE VARIOUS DATA ACQUIRED FROM THE UARS. A SECONDARY OBJECTIVE IS THE ACQUISITION OF COMPLEMENTARY DATA FROM OTHER SOURCES (E.G., THE OPERATIONAL NOAA SATELLITES) FOR USE IN THIS ANALYSIS AND FOR USE BY THE UARS SCIENCE TEAM. A SUBSTANTIAL PART OF THE INVESTIGATION IS THE CALCULATION OF A TIME-DEPENDENT THREE-DIMENSIONAL ANALYTIC-EMPIRICAL MODEL USING DATA ON ATMOSPHERIC TEMPERATURE, MINOR SPECIES MIXING RATIOS, ETC. THE MODELING TECHNIQUE IS A DIRECT FOLLOW-UP TO THE 'GOCO MODEL' AND THE 'MASS SPECTROMETER-INCOHERENT SCATTER (MISIS) MODEL' WHICH HAVE PROVEN QUITE SUCCESSFUL FOR THERMOSPHERIC RESEARCH, AND TO THE CURRENT EMPIRICAL OZONE MODEL, ALL OF WHICH WERE DEVELOPED AND ARE AVAILABLE AT THE GODDARD SPACE FLIGHT CENTER, CODE 690, GREENBELT, MD 20771.

----- UARS-1, ROCHE -----

INVESTIGATION NAME- ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE

NSSDC ID- UARS-1 -05

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.E. ROCHE LOCKHEED PALO ALTO
OI - J.R. KUMER LOCKHEED PALO ALTO
OI - R.D. SEARS LOCKHEED PALO ALTO
OI - T.C. JAMES LOCKHEED PALO ALTO
OI - L.R. MEGILL UTAH STATE U
OI - K.D. BAKER UTAH STATE U
OI - D.G. MURCRAY U OF DENVER
OI - A. GOLDBAM U OF DENVER

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO REMOTELY MEASURE THE STRATOSPHERIC COMPOSITION (H₂O, N₂O, NO, HNO₃, Cl₂, ClO, HCl, O₃, CO₂, AND CH₄) AND TEMPERATURE IN THE 10- TO 60-KM ALTITUDE RANGE. THE COMPOSITION AND TEMPERATURE ARE DETERMINED FROM MEASUREMENTS OF LIMB EMISSION SPECTRA IN THE 2.5- TO 12-MICROMETER INFRARED WAVELENGTH RANGE. THE NECESSARY HIGH SENSITIVITY, BACKGROUND FLUX DISCRIMINATION, AND SPECTRAL RESOLUTION ARE PROVIDED BY A CRYOGENICALLY COOLED SOLID ETALON SPECTROMETER USING A LINEAR DETECTOR ARRAY TO SIMULTANEOUSLY COVER THE 10- TO 60-KM RANGE WITH 2-KM RESOLUTION. THE SPECTRAL RESOLUTION IS 0.25 INVERSE CENTIMETER. THREE FLYS ARE REQUIRED TO ACHIEVE GLOBAL COVERAGE WITHIN THE 75 DEG LATITUDE FOR THE 57 DEG ORBIT.

----- UARS-1, ROTTMAN -----

INVESTIGATION NAME- ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT

NSSDC ID- UARS-1 -04

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - G.J. ROTTMAN U OF COLORADO
OI - J. LONDON U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE SOLAR SPECTRUM AT WAVELENGTHS BETWEEN 120 AND 500 NM WITH AN ABSOLUTE ACCURACY BETTER THAN 10 PERCENT. TEMPORAL VARIATIONS OF THE SOLAR RADIATION ARE FOLLOWED TO WITHIN 1-2 PERCENT DURING THESE MISSIONS. THERE IS A 1/8 M EBERT-FASTIE SPECTROMETER WITH APPROXIMATELY 0.15-NM SPECTRAL RESOLUTION ON BOARD. IT HAS THREE SEPARATE DATA CHANNELS, EACH USING A PHOTOTUBE OPTIMIZED FOR DIFFERENT, BUT OVERLAPPING, PORTIONS OF THE INSTRUMENT SPECTRAL RANGE. SOLAR DATA ARE TAKEN ON A DAILY BASIS AND ANALYZED TO ESTABLISH CORRELATIONS OF THE SPECTRAL IRRADIANCE WITH SOLAR ROTATION AND WITH SOLAR ACTIVITY (10.7-CM FLUX LEVELS, SUNSPOT NUMBER, CALCIUM FLARE, SOLAR FLARES, ETC.). THE NORMAL MODE OF OPERATION INVOLVES A 4-H DUTY CYCLE PER DAY. OF THIS TOTAL TIME, 1 H IS SPENT OBSERVING THE SUN AND THE REMAINDER OF THE TIME IS SPENT IN CALIBRATION ACTIVITIES. TEN TO 15 STARS ARE CHOSEN FOR THE CALIBRATION PROGRAM.

----- UARS-1, TORR-----

INVESTIGATION NAME- ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER

NSSDC ID- UARS-1 -15 INVESTIGATIVE PROGRAM CODE EB
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - D.G. TORR U OF MICHIGAN
OI - M.R. TORR U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN
OI - A.F. NAGY U OF MICHIGAN
OI - E.R. YOUNG U OF MICHIGAN
OI - S.C. LIU NOAA
OI - R.J. CICERONE U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MAKE HIGH RESOLUTION STUDIES OF TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE. THE CONSTITUENTS ARE OBSERVED THROUGH ABSORPTION OF RAYLEIGH SCATTERED SUNLIGHT, RESONANCE FLUORESCENCE OF SUNLIGHT AT ULTRAVIOLET WAVELENGTHS, CHEMILUMINESCENCE, AND PARTICLE IMPACT EXCITATION. THE INVESTIGATION ALSO MONITORS PARTICLE PRECIPITATION FROM THE INCLUDED EMISSIONS AT 3914 AND 4278A. AN ECHELLE GRATING SPECTROGRAPH MEASURES THE CONCENTRATIONS OF THE TRACE CONSTITUENTS, O₃, OH, ClO, NO, AND NO₂ AT STRATOSPHERIC AND MESOSPHERIC ALTITUDES. A HIGH-RESOLUTION (0.04A) ATLAS WILL BE COMPILED IN BOTH ABSORPTION AND EMISSION. THE WAVE LENGTH RANGE IS 2000 TO 4000A. THE IMAGING CAPABILITY PERMITS A 50-KM ALTITUDE PROFILE (E.G., 20 TO 70 KM) TO BE OBSERVED SIMULTANEOUSLY AT 5-KM RESOLUTION.

----- UARS-1, RUSSELL, SRD-----
INVESTIGATION NAME- HALOGEN OCCULTATION EXPERIMENT (HALOE)

NSSDC ID- UARS-1 -09 INVESTIGATIVE PROGRAM CODE EB
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.M. RUSSELL, SRD NASA-LARC
OI - J. PARK COLL OF WILLIAM + MARY
OI - S.R. DRAYSON U OF MICHIGAN
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - R.J. CICERONE U OF CALIF, SAN DIEGO
OI - P.L. HANST ENVIRON PROTECT AGENCY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE, USING SOLAR OCCULTATION TECHNIQUES, THE UPPER ATMOSPHERIC VERTICAL CONCENTRATION PROFILES OF: H₂O, O₃, HCL, HF, NO, CH₄, HNO₃, AND CO₂. PRESSURE IN THE ALTITUDE RANGE FROM 10 TO 55 KM IS MEASURED. MEASUREMENTS ARE USED TO STUDY TRACE GAS SOURCES AND SINKS AND UPPER ATMOSPHERE TRANSPORT, AND TO VALIDATE PHOTOCHEMICAL AND ATMOSPHERIC DYNAMICS MODELS. A FOUR-CHANNEL GAS FILTER CORRELATION RADIOMETER AND A FIVE-CHANNEL FILTER RADIOMETER MOUNTED ON A COMMON CHASSIS WITH AZIMUTH AND ELEVATION CAPABILITY ARE USED. THE GAS FILTER CORRELATION RADIOMETRY IS USED TO MEASURE THE HCL, HF, CH₄, NO, AND CO₂, AND BROAD BAND FILTER SPECTROSCOPY IS USED TO MEASURE H₂O, O₃, HNO₃, AND CO₂. THE CO₂ DATA ARE USED TO OBTAIN THE ATMOSPHERIC PRESSURE PROFILE.

----- UARS-1, THULLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE

NSSDC ID- UARS-1 -01 INVESTIGATIVE PROGRAM CODE EB/CO-OP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL
PI - G. THULLIER CNRS-SA
OI - P. CONNES PARIS OBSERVATORY
OI - M. TEITELBAUM CNRS-SA
OI - M.L. DUBOIN CNET
OI - P. BLUM U OF BONN
OI - S.S. CHANDRA NASA-GSFC

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO MEASURE SIMULTANEOUSLY THE WIND AND TEMPERATURE IN THE HIGH MESOSPHERE AND LOW THERMOSPHERE, AND TO DERIVE THE EDDY DIFFUSION COEFFICIENT USING A REMOTE SENSING METHOD. ABSOLUTE LINE INTENSITIES ARE ALSO MEASURED. THE FLIGHT INSTRUMENT IS COMPOSED OF TWO MAIN UNITS. THE UPPER PART IS A CASSEGRAIN-TYPE TELESCOPE. THE LOWER PART CONSISTS OF A FIELD-COMPENSATED MICHELSON INTERFEROMETER AND ASSOCIATED OPTICS, DETECTORS, LASER UNIT, ELECTROMECHANISMS, AND ELECTRONICS. THE WAVELENGTHS MEASURED (IN ANGSTROMS) ARE: 5577, 6300, 7274, 7519, AND 7371. THE SPECTRAL SCANNING IS ACHIEVED BY A SMALL-ANGLE PRISM CHANGING THE OPTICAL PATH OF APPROXIMATELY 1 WAVELENGTH IN 16 STEPS. THE LMR IS SCANNED IN STEPS FROM 400 TO 70 KM. THE FIELD OF VIEW IS 2 DEG IN A HORIZONTAL PLANE AND THE VERTICAL FIELD OF VIEW VARIES FROM 16 ARC-MIN IN THE THERMOSPHERE, TO 4 ARC-MIN FOR MESOSPHERIC OBSERVATIONS. THE DURATION OF A COMPLETE SCAN FOR A GIVEN LINE IS 1.6 S.

----- UARS-1, WATERS-----

INVESTIGATION NAME- MICROWAVE LIMB SOUNDER (MLS)

NSSDC ID- UARS-1 -13 INVESTIGATIVE PROGRAM CODE EB
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.W. WATERS NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE WIND, O₃, ClO, H₂O₂, TEMPERATURE, O₂, CO, H₂O, MAGNETIC FIELD, AND PRESSURE IN THE UPPER ATMOSPHERE. THE SPECTRAL REGION COVERED IS FROM 63 TO 231 GHZ. THE SAMPLED ALTITUDE RANGE EXTENDS FROM 15 TO 110 KM. THE INSTRUMENT HAS 2-S INTEGRATION WITH LONGER INTEGRATIONS PERFORMED AS APPROPRIATE DURING DATA REDUCTION. ABSOLUTE ACCURACY OF THIS MICROWAVE LIMB SOUNDER (MLS) IS APPROXIMATELY 5 PERCENT FOR COMPOSITION, APPROXIMATELY 2 DEG K FOR TEMPERATURE, AND APPROXIMATELY 3 M/S FOR WINDS. VERTICAL RESOLUTION FOR PROFILE MEASUREMENTS IS 3-6 KM; HORIZONTAL RESOLUTION IS 30 KM ACROSS AND 300 KM ALONG THE OBSERVATION DIRECTION. COMPLETE PROFILES ARE OBTAINED IN LESS THAN 50 S.

----- UARS-1, WINNINGHAM-----

INVESTIGATION NAME- PARTICLE ENVIRONMENT MONITOR (PEM)

NSSDC ID- UARS-1 -07 INVESTIGATIVE PROGRAM CODE EB
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - J.D. WINNINGHAM U OF TEXAS, DALLAS
OI - P.M. BANKS UTAH STATE U
OI - J.L. BURCH SOUTHWEST RES INST
OI - R.G. GUNTON LOCKHEED PALO ALTO
OI - W.L. IMHOF LOCKHEED PALO ALTO
OI - J.B. REAGAN LOCKHEED PALO ALTO
OI - M.H. REES U OF ALASKA
OI - G.C. REID NOAA
OI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE GLOBAL INPUT OF CHARGED PARTICLE ENERGY INTO THE EARTH'S STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE AND THE PREDICTED ATMOSPHERIC PROCESSES. DIRECT IN SITU MEASUREMENTS OF PRECIPITATION ELECTRONS IN THE ENERGY RANGE FROM 100 EV TO 1 MEV AND OF PROTONS IN THE ENERGY RANGE FROM 0.5 TO 200 KEV (WITH OPTION OF EXTENDING PROTON MEASUREMENTS DOWN TO 100 KEV) ARE MADE WITH A MEDIUM ENERGY PARTICLE SPECTROMETER (MEPS) AND A HIGH ENERGY PARTICLE SPECTROMETER (HEPS). IN ADDITION, GLOBAL IMAGES AND ENERGY SPECTRA OF ATMOSPHERIC X RAYS PRODUCED BY ELECTRON PRECIPITATION ARE PERFORMED OVER THE ENERGY RANGE

FROM 6 TO 150 KEV WITH AN ATMOSPHERIC X RAY IMAGING SPECTROMETER. THE DATA FROM THESE INSTRUMENTS ARE USED AS INPUT TO COMPUTATIONAL MODELS.

----- UARS-1, ZUREK-----

INVESTIGATION NAME- RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE

NSSDC ID- UARS-1 -23 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - R.W. ZUREK NASA-JPL

BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS INVESTIGATION IS TO CONSTRUCT A COMPREHENSIVE AND CONSISTENT CLIMATOLOGY OF THE MESOSPHERE AS OBSERVED BY THE UARS SATELLITES. FROM THE MESOSPHERIC DATA, THIS ANALYSIS PRODUCES: (1) THE RADIATIVE BUDGET BASED ON O3 AND O2 ABSORPTION OF SOLAR RADIANCE AND CO2 EMISSION, INCLUDING THE EFFECTS ON THE LATTER OF NON-THERMODYNAMIC EQUILIBRIUM; AND (2) THE DYNAMICAL CLIMATOLOGY OF THE MESOSPHERE, SHOWING THE RELATIVE CONTRIBUTIONS TO THE HEAT AND MOMENTUM BUDGETS BY ADIABATIC HEATING, BY THE MEAN MERIDIONAL CIRCULATION, AND BY EDDIES (WAVES). THE EDDY CONTRIBUTION IS SEPARATED INTO STANDING AND TRANSIENT COMPONENTS WHICH INCLUDE DYNAMICAL FLUXES DUE TO ATMOSPHERIC TIDES.

***** UARS-2*****

SPACECRAFT COMMON NAME- UARS-2
ALTERNATE NAMES- UPPER ATMOSPHERIC RESEARCH SATELLITE

NSSDC ID- UARS-2

LAUNCH DATE- 10/08/87 WEIGHT- 3225. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 97. MIN INCLINATION- 70. DEG
PERIAPSIS- 600. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL

MG - R.J. ARNOLD NASA HEADQUARTERS
SC - R.W. SEALS NASA HEADQUARTERS
PM - P.T. BURR NASA-GSFC
PS - C.A. REBER NASA-GSFC

BRIEF DESCRIPTION

TWO UPPER ATMOSPHERE RESEARCH SATELLITES UARS-1 AND UARS-2 WILL BE LAUNCHED AS PART OF THE UPPER ATMOSPHERE RESEARCH PROGRAM. THE BASIC OBJECTIVES OF THE UARS-2 MISSION ARE TO CONDUCT RESEARCH IN THE ATMOSPHERE ABOVE THE TROPOPAUSE, AND TO MEASURE THE GLOBAL BUDGET OF CONSTITUENT TRACE GASES AND THEIR CHEMICAL, DYNAMICAL, AND RADIATIVE BEHAVIOR. SPECIFICALLY THE OBJECTIVES ARE TO: (1) STUDY ENERGY INPUT AND LOSS IN THE UPPER ATMOSPHERE; (2) STUDY GLOBAL ATMOSPHERIC PHOTOCHEMISTRY; (3) STUDY UPPER ATMOSPHERE DYNAMICS; AND (4) STUDY THE COUPLING AMONG PROCESSES AND BETWEEN ATMOSPHERIC REGIONS. UARS-2 WILL BE LAUNCHED 1 YEAR AFTER UARS-1 INTO A SIMILAR 600-KM CIRCULAR ORBIT BUT WITH A HIGHER INCLINATION ANGLE. THE PLANNED LIFETIME FOR EACH SPACECRAFT IS 18 MONTHS, BUT THIS MAY BE EXTENDED BY RETRIEVAL OR IN-ORBIT REFURBISHMENT/RESUPPLY BY THE SHUTTLE. THE UARS HAS TWO MAJOR COMPONENTS. THE FIRST IS THE MULTIMISSIION MODULAR SPACECRAFT (MMS), DESIGNED AS A STANDARD BUS FOR THE NASA SPACECRAFT MISSIONS (E.G., SMM AND LANDSAT-D), AND CONSISTING OF FOUR BASIC MODULES: ATTITUDE CONTROL SUBSYSTEM; POWER SUBSYSTEM; COMMUNICATIONS AND DATA HANDLING SUBSYSTEM; AND THE PROPULSION MODULE. THE SECOND MAJOR COMPONENT IS AN INSTRUMENT ASSEMBLY (IA) WHICH IS COMPOSED OF THE FOLLOWING INSTRUMENT MODULES: (1) THE FOUR MICROWAVE ANTENNAS AND THEIR MOMENTUM-COMPENSATING DEVICES; (2) A SOLAR-POINTED INSTRUMENT PLATFORM WITH SOLAR INSTRUMENTS; (3) THE CRYOGENIC LIMB INTERFEROMETER INSTRUMENT; (4) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO NOT REQUIRE CRYOGENIC COOLING; AND (5) A MODULE COMPRISED OF SMALLER INSTRUMENTS THAT DO CONTAIN CRYOGENS. THE MMS WILL MAINTAIN A PRECISE ORIENTATION TO THE LOCAL VERTICAL AND TO THE VELOCITY VECTOR. THERE ARE THREE ON-BOARD TAPE RECORDERS. THREE NASA STANDARD 50-AMP HOURS NICKEL-CADMIUM BATTERIES WILL FLY ALONG WITH THE SOLAR CELL ARRAY. THE DATA WILL BE RETURNED TO EARTH BY TORSS. A CENTRAL DATA PROCESSING FACILITY WITH REMOTE PROCESSING AND DISPLAY TERMINALS AT THE INVESTIGATORS' INSTITUTION IS PLANNED.

----- UARS-2, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM

NSSDC ID- UARS-2 -08 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL

PI - G.E. BRUECKNER US NAVAL RESEARCH LAB
OI - R.E. VAN MOOSIER US NAVAL RESEARCH LAB
OI - D.K. PRINZ US NAVAL RESEARCH LAB
OI - J.D.F. BARTOE US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THE MAIN OBJECTIVE OF THIS INVESTIGATION IS TO IMPROVE THE EXISTING ACCURACY OF SOLAR FLUX MEASUREMENTS IN THE 120- TO 400-NM REGION OF THE SPECTRUM AND TO ESTABLISH THE VARIATIONS OF THIS FLUX OVER A SOLAR CYCLE. THE FULL-SUN SPECTRAL IRRADIANCE IS MEASURED WITH TWO SPECTRAL RESOLUTIONS, 0.15 AND 5 NM, WITH AN ABSOLUTE ACCURACY OF PLUS OR MINUS 6-10 PERCENT (WAVELENGTH DEPENDENT). THE ACCURACY OF THE MEASUREMENTS BELOW 210 NM RELATIVE TO MEASUREMENTS OF THE MORE STABLE SOLAR CONTINUUM ABOVE 210 NM IS PLUS OR MINUS 1-5 PERCENT (WAVELENGTH DEPENDENT). THE SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SUSIM) CONSISTS OF TWO IDENTICAL DOUBLE DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND A DEUTERIUM CALIBRATION LAMP. THE SPECTROMETERS AND DETECTORS ARE SEALED IN A CANISTER FILLED WITH 1.1 ATM OF ARGON GAS. ONE SPECTROMETER IS USED ALMOST CONTINUOUSLY; THE SECOND IS USED INFREQUENTLY TO TRACK THE STABILITY OF THE FIRST. THE DEUTERIUM LAMP SERVES AS A SECONDARY STANDARD FOR IN-FLIGHT CALIBRATION.

----- UARS-2, CARLSON-----

INVESTIGATION NAME- GLIMPS: GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT

NSSDC ID- UARS-2 -14 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - R.W. CARLSON NASA-JPL
OI - A.L. FYMET NASA-JPL
OI - E.R. REITER COLORADO STATE U
OI - Y.L. YUNG CALIF INST OF TECH
OI - J.E. LOVILL LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO PRODUCE DAILY GLOBAL MAPS OF VERTICAL OZONE PROFILES IN THE 10- TO 50-KM RANGE, AT 5-KM VERTICAL RESOLUTION AND 500 BY 500 KM HORIZONTAL RESOLUTION WITH 5 PERCENT PRECISION. THE PROFILES ARE OBTAINED BY LIMB SCANS OF THE ATMOSPHERIC RADIANCE, UTILIZING ABSORPTION IN THE VISIBLE CHAPPUIS AND NEAR-UV HARTLEY BANDS TO DETERMINE OZONE ABUNDANCES. THE MEASUREMENTS ARE 'INVERTED' TO GIVE OZONE PROFILES IN THE NEAR-REAL TIME USING A HIGH-SPEED ARRAY PROCESSOR. THE INSTRUMENT CONSISTS OF AN EIGHT-CHANNEL LIMB SCANNING PHOTOMETER TO PROVIDE LIMB RADIANCE PROFILES AND A FOUR-CHANNEL DOWN-LOOKING GROUND/CLOUD ALBEDO SENSOR TO PROVIDE BOUNDARY CONDITIONS FOR THE DATA INVERSION. FOR THE LIMB SCAN PHOTOMETER, THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS): 3000, 3200, 5000, 5500, 6000, 6500, 7000, AND 8000; THE SPECTRAL BANDPASSES ARE 50-250 A, DEPENDING ON CHANNEL; AND LIMB SCAN TIME IS 2.0 S. THE PROJECTED FIELD OF VIEW IS 1 KM DIAMETER. FOR THE GROUND/CLOUD ALBEDO PHOTOMETER THE WAVELENGTH CHANNELS ARE (IN ANGSTROMS) 3200, 5000, 6000, AND 7000. SPECTRAL BAND PASSES ARE 100 A, AND THE SCAN TIME IS 12 S. THE PROJECTED FIELD OF VIEW IS 50-20 KM.

----- UARS-2, CHANG-----

INVESTIGATION NAME- THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE

NSSDC ID- UARS-2 -24 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J.S. CHANG LAWRENCE LIVERMORE LAB
PI - F.M. LUTHER LAWRENCE LIVERMORE LAB
OI - W.M. DUEMER LAWRENCE LIVERMORE LAB
OI - J.E. FENNER LAWRENCE LIVERMORE LAB
OI - D.J. WUEBBLES LAWRENCE LIVERMORE LAB

BRIEF DESCRIPTION:

THIS INVESTIGATION STUDIES THE MECHANISMS THAT CONTROL UPPER ATMOSPHERE STRUCTURE VARIABILITY AND THE RESPONSE OF THE UPPER ATMOSPHERE TO NATURAL AND ANTHROPOGENIC PERTURBATIONS. THE FOCUS IS ON THE CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES IN THE MIDDLE ATMOSPHERE USING TIME-DEPENDENT TRANSPORT-KINETICS MODELS.

----- UARS-2, GELLER-----

INVESTIGATION NAME- OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS

NSSDC ID- UARS-2 -20 INVESTIGATIVE PROGRAM CCDB ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - M.A. GELLER U OF MIAMI
OI - E.J. PITCHER U OF MIAMI
OI - J.E. GESSLER U OF MIAMI

BRIEF DESCRIPTION

THE MAJOR GOALS OF THIS INVESTIGATION ARE: (1) TO CONSTRUCT A SIMULATION OF UPPER ATMOSPHERE FLOW REGIMES AND UTILIZE THE PROPOSED UARS OBSERVING PARAMETERS TO STUDY THE RESOLVABILITY OF UPPER ATMOSPHERE DYNAMICS BY THE UARS INSTRUMENTS AND SUBSEQUENT DATA ANALYSIS; (2) TO USE PRE-UARS LIDAR SCANNING DATA FOR THE STRATOSPHERE AND MESOSPHERE FOR GENERAL CIRCULATION STUDIES; (3) TO ASSESS THE EXTENT TO WHICH UPPER ATMOSPHERE DATA MUST BE INCLUDED IN STUDIES OF TROPOSPHERIC CLIMATE AND IN EXTENDED RANGE FORECASTING; AND (4) TO PURSUE A THEORETICAL MODELING EFFORT ON STRATOSPHERIC/MESOSPHERIC DYNAMICS AND ITS RELATION TO TROPOSPHERIC DYNAMICS.

----- UARS-2, GILLE-----

INVESTIGATION NAME- ADVANCED LIDAR SCANNER

NSSDC ID- UARS-2 -10 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.C. GILLE NATL CTR FOR ATMOS RES
PJ - J.M. RUSSELL, SRD NASA-LARC
OI - R.J. CICERONE U OF CALIF, SAN DIEGO
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE ADVANCED LIDAR SCANNER (ALS) EXPERIMENT HAS AS ITS OBJECTIVE MEASUREMENT OF THE VERTICAL AND HORIZONTAL DISTRIBUTIONS OF IMPORTANT TRACE GASES IN THE UPPER ATMOSPHERE, INCLUDING O3, NO2, HNO3, N2O, H2O, AND CH4, AND TEMPERATURE MEASUREMENT IN THE 8- TO 75-KM ALTITUDE RANGE WITH A 1 DEG K RMS ERROR FOR ALTITUDE LESS THAN 50 KM. A MULTISPECTRAL INTERFERENCE FILTER RADIOMETER WITH ELEVATION SCAN AND TWO-AZIMUTH POSITION CAPABILITY IS USED AND THE MEASUREMENT TECHNIQUE INVOLVES THE INVERSION OF THE MEASURED RADIANCE PROFILES. INSTANTANEOUS VERTICAL FIELDS OF VIEW (IFOV) ARE LESS THAN 2 KM IN ALL EXCEPT TWO CHANNELS WHICH ARE DESIGNED FOR LOW ALTITUDE SENSING. FOR THESE CHANNELS THE IFOV IS LESS THAN 1 KM. THE SPECTRAL RANGE OF APPROXIMATELY 6 TO 18 MICROMETERS IS COVERED WITH CHANNELS RANGING IN RESOLUTION FROM 60 TO 220 INVERSE CENTIMETER. THE INSTRUMENT USES MERCURY-CADMIUM-TELLURIDE DETECTORS COOLED TO 80 DEG K.

----- UARS-2, GILLE-----

INVESTIGATION NAME- CRYOGENIC UPPER-ATMOSPHERE LIDAR EMISSION RADIOMETER

NSSDC ID- UARS-2 -12 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PJ - J.C. GILLE NATL CTR FOR ATMOS RES
PI - W.G. MANKIN NATL CTR FOR ATMOS RES
PI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
OI - M.V. COFFEY NATL CTR FOR ATMOS RES
OI - J.R. HOLTON U OF WASHINGTON
OI - V.G. KUNDE NASA-GSFC
OI - D.G. MURCHAY U OF DENVER
OI - J.M. RUSSELL, SRD NASA-LARC
OI - A.T. STAIR, JR. USAF GEOPHYS LAB
OI - M.A. GELLER U OF MIAMI

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO OBTAIN MEASUREMENTS, THE INVERSION OF WHICH PROVIDED MORE DETAILED AND COMPREHENSIVE GLOBAL MAPS OF TEMPERATURE, TRACE SPECIES, AND EMISSION FEATURES OVER THE 10- TO 120-KM RANGE. THE CRYOGENIC UPPER ATMOSPHERE LIDAR EMISSION RADIOMETER (CULER) IS A CRYOGENICALLY COOLED TELESCOPE OF 10-CM APERTURE WITH A LIDAR SCANNING MIRROR FEEDING A 24-CHANNEL RADIOMETER AND A CIRCULAR VARIABLE FILTER (CVF) SPECTROMETER. THE FINED RADIOMETRIC CHANNELS, SELECTED BY GRATING-FILTER COMBINATIONS BETWEEN 370-7000 INVERSE CENTIMETER (1.5 TO 27 MICROMETERS), ARE TAILORED FOR SPECIFIC MEASUREMENTS E.G., TEMPERATURE SOUNDING, CONCENTRATION OF PREDETERMINED CHEMICAL SPECIES, OR EMISSIONS FROM SPECIFIC EXCITATION MECHANISMS. THE SPECTRALLY SELECTIVE CVF HAS 1 PERCENT RESOLUTION BETWEEN 660-5000 INVERSE CENTIMETER.

----- UARS-2, GRAYSTONE-----

INVESTIGATION NAME- THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE

NSSDC ID- UARS-2 -25 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - P. GRAYSTONE METEOROLOGICAL OFFICE

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO FURTHER THE UNDERSTANDING OF THE STRATOSPHERE AND TO STUDY ITS INTERACTIONS WITH THE TROPOSPHERE. THESE OBJECTIVES ARE ACHIEVED THROUGH TWO PRIMARY ACTIVITIES, ANALYSIS AND DIAGNOSIS. A COMPREHENSIVE THREE DIMENSIONAL NUMERICAL MODEL OF THE TROPOSPHERE AND STRATOSPHERE IS USED.

----- UARS-2, GROSE-----

INVESTIGATION NAME- STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS

NSSDC ID- UARS-2 -22 INVESTIGATIVE PROGRAM CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - W.L. GROSE NASA-LARC
OI - M.T. BLACKSHEAR NASA-LARC
OI - K.V. HAGGARD NASA-LARC
OI - E.E. REMSBERG NASA-LARC
OI - R.E. TURNER NASA-LARC
OI - R.J. KURZAJA GEORGE WASHINGTON U

BRIEF DESCRIPTION

THIS INVESTIGATION IS A COORDINATED PROGRAM OF THEORETICAL MODEL STUDIES AND DATA ANALYSIS, AND INTERPRETATION DESIGNED TO STUDY TRANSPORT PROCESSES, BUDGETS OF TRACE CHEMICALS, AND ENERGETICS OF THE STRATOSPHERE. THE FIRST PART OF THIS EFFORT IS DEVOTED TO THE STUDY OF THE TRANSPORT OF MINOR CONSTITUENTS, HEAT, MOMENTUM, AND POTENTIAL VORTICITY IN THE STRATOSPHERE. THE SECOND PART UTILIZES UARS DATA TO STUDY BUDGETS OF TRACE CHEMICALS BY DETERMINING BULK MASS TRANSFER RATES WITHIN THE STRATOSPHERE AND AMONG THE STRATOSPHERE, TROPOSPHERE, AND MESOSPHERE. THE LAST PART OF THIS EFFORT IS AN ANALYSIS OF THE STRATOSPHERIC ENERGETICS.

----- UARS-2, HAYS-----

INVESTIGATION NAME- HIGH RESOLUTION DOPPLER IMAGER (HRDI)

NSSDC ID- UARS-2 -02 INVESTIGATIVE PROGRAM CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - P.D. HAYS U OF MICHIGAN
OI - G. MERMANDEZ NOAA-ERL
OI - B. REES U COLLEGE LONDON
OI - R.G. ROBLE NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO USE A HIGH RESOLUTION DOPPLER IMAGING FABRY-PEROT INTERFEROMETER DETECTING SHARP FEATURES IN THE SPECTRUM OF LIGHT EMITTED OR SCATTERED FROM THE EARTH'S ATMOSPHERE TO OBTAIN THE TEMPERATURE AND VECTOR WIND FIELD DIRECTLY. THE INFORMATION OBTAINED WILL BE USED TO STUDY A SERIES OF PROBLEMS ASSOCIATED WITH THE DYNAMICS OF THE ATMOSPHERE AND THE TRANSPORT OF MINOR CONSTITUENTS WITHIN THE TROPOSPHERE. THERE IS A SINGLE SENSOR CONTAINING THE SPECTRAL FILTERS AND THE MAIN OBJECTIVE TELESCOPE WHICH CAN VIEW THE EARTH'S HORIZON THROUGH EITHER OF TWO ORTHOGONAL BAFFLE SYSTEMS. SWITCHING BETWEEN THESE BAFFLES IS

ACCOMPLISHED BY ROTATING THE ZENITH SCAN MIRROR THROUGH 90 DEG. HORIZON SCANNING IS ACCOMPLISHED BY TILTING THIS MIRROR THROUGH 7.0 DEG IN THE ZENITH DIRECTION.

----- UARS-2, NEELIS-----

INVESTIGATION NAME- ION CONVECTION ELECTRODYNAMICS

NSSDC ID- UARS-2 -06 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - R.A. NEELIS U OF TEXAS, DALLAS
OI - W.D. HANSON U OF TEXAS, DALLAS
OI - J.M. HOFFMAN U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT U OF TEXAS, DALLAS
OI - R.G. BOBLE NATL CTR FOR ATMOS RES
OI - E.L. BRIS U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE: (1) TO MEASURE THE ION VELOCITY FIELD ALONG THE ORBIT TRACK, FROM WHICH THE CORRESPONDING IONOSPHERIC ELECTRIC FIELDS MAY BE DERIVED; (2) TO USE THE DERIVED ELECTRIC FIELDS, TOGETHER WITH WIND, PARTICLE FLUX, AND MAGNETIC FIELD DATA, TO CONSTRUCT MODELS OF THE HIGH LATITUDE POTENTIAL DISTRIBUTION AND HEAT INPUT FROM BOTH PARTICLE AND JOULE HEATING; (3) TO USE THE MODEL HEATING AND ION-NEUTRAL MOMENTUM TRANSFER AS INPUTS TO GLOBAL MODELS OF ATMOSPHERIC CHEMISTRY AND DYNAMICS; AND (4) TO USE THE DERIVED GLOBAL ELECTRIC FIELD DISTRIBUTIONS TO CONSTRUCT MODELS THAT WILL REVEAL THE INTERPLAY BETWEEN THE SOLAR WIND, THUNDERSTORM ACTIVITY, AND IONOSPHERIC ELECTRIC FIELDS. THE ION CONVECTION ELECTRODYNAMICS (ICE) INSTRUMENT MAKES THE FOLLOWING MEASUREMENTS: (1) BULK ION VELOCITY (ALL COMPONENTS ARE MEASURED TO 8 PERCENT). THE SENSITIVITY IS 10 M/SEC FOR THE RAM COMPONENT AND 2 M/S FOR THE HORIZONTAL AND VERTICAL COMPONENTS. THE SAMPLING DISTANCES FOR THE RAM, HORIZONTAL, AND VERTICAL COMPONENTS ARE LESS THAN 8 KM, APPROXIMATELY 250 M, AND 500 M, RESPECTIVELY; (2) THE ION TEMPERATURE (MEASURED IN THE RANGE 200 TO 20,000 DEG K WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AND AT A SAMPLING DISTANCE OF LESS THAN 8 KM); (3) ION CONCENTRATIONS (MEASURED OVER THE RANGE 10 TO 1.0E+6 PER CUBIC CM WITH AN ACCURACY OF PLUS OR MINUS 3 PERCENT, AT A SAMPLING DISTANCE OF ABOUT 500 M); (4) ELECTRON TEMPERATURE (MEASURED OVER THE RANGE FROM 300 TO 20,000 DEG K, WITH AN ACCURACY OF PLUS OR MINUS 10 PERCENT AND AT A SAMPLING DISTANCE OF LESS THAN 60 KM).

----- UARS-2, HOLTON-----

INVESTIGATION NAME- WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE

NSSDC ID- UARS-2 -17 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.R. HOLTON U OF WASHINGTON
OI - J.M. WALLACE U OF WASHINGTON
OI - D.L. WARTHANN U OF WASHINGTON
OI - R.E. YOUNG NASA-ARC
OI - C.W. LEVY U OF WASHINGTON

BRIEF DESCRIPTION

THIS INVESTIGATION USES A PROGRAM OF OBSERVATIONAL ANALYSIS AND NUMERICAL MODELING DESIGNED TO ELUCIDATE THE NATURE OF THE GENERAL CIRCULATION OF THE MIDDLE ATMOSPHERE, THE ROLE OF DYNAMICS IN CONTROLLING THE DISTRIBUTION AND VARIABILITY OF VARIOUS TRACE CONSTITUENTS, AND THE NATURE AND EXTENT OF DYNAMICAL INTERACTIONS BETWEEN THE LOWER AND MIDDLE ATMOSPHERES. EMPHASIS IS PLACED ON THE ROLES WHICH LARGE-SCALE WAVE MOTIONS PLAY IN MAINTAINING THE BUDGETS OF MOMENTUM, HEAT, AND TRACE CONSTITUENT CONCENTRATIONS ON A GLOBAL BASIS IN THE MIDDLE ATMOSPHERE.

----- UARS-2, HOUGHTON-----

INVESTIGATION NAME- AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)

NSSDC ID- UARS-2 -11 INVESTIGATIVE PROGRAM
CODE ED/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.T. HOUGHTON	OXFORD U
OI - R. MUNNEMAN	READING U
OI - H. MADLEY	RUTHERFORD HIGH LN LAB
OI - K.H. DAVIES	RUTHERFORD HIGH EN LAB
OI - G.D. PESKETT	OXFORD U
OI - C.D. RODGERS	OXFORD U
OI - E.J. WILLIAMSON	OXFORD U
OI - J.J. BARNETT	OXFORD U
OI - J.G. WHITNEY	OXFORD U
OI - C.A. BAILEY	OXFORD U
OI - G.R. THORNTON	OXFORD U
OI - J.S. SFELEY	READING U

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVE IS TO MAKE GLOBAL MEASUREMENTS OF RADIATION FROM CO₂, H₂O, CO, NO, N₂O, AND CH₄. THESE MEASUREMENTS YIELD: THE KINETIC TEMPERATURE, VIBRATIONAL TEMPERATURE, AND ALTITUDE DISTRIBUTION POP CO₂; (2) THE H₂O CONCENTRATION (FROM 15 TO 110 KM); (3) THE CO ALTITUDE DISTRIBUTION; (4) THE NO ALTITUDE DISTRIBUTION; (5) THE N₂O ALTITUDE DISTRIBUTION; AND (6) THE CH₄ ALTITUDE DISTRIBUTION. THESE PARAMETERS ARE OBTAINED AS A FUNCTION OF TIME AND LOCATION. THE IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER IS AN INFRARED RADIOMETER OBSERVING THERMAL EMISSION AND RESONANCE FLUORESCENCE OF SOLAR RADIATION FROM THE ATMOSPHERIC LHM BY GAS CORRELATION SPECTROSCOPY. THE SPECTRAL RANGE COVERED IS 2.7 TO 100 MICROMETERS. THE ALTITUDE RANGE EXTENDS FROM 15 TO 140 KM, DEPENDING UPON THE PARTICULAR SPECIES MEASURED. FOR MOST CHANNELS, VERTICAL PROFILES OF TEMPERATURE (TO APPROXIMATELY 1 DEG K ACCURACY) AND COMPOSITION (TO APPROXIMATELY 10 PERCENT) CAN BE MADE WITH A VERTICAL RESOLUTION BETTER THAN 4 KM AND A HORIZONTAL RESOLUTION OF 400 KM (LIMITED BY GEOMETRY OF LHM PATH).

----- UARS-2, LONDON-----

INVESTIGATION NAME- RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY

NSSDC ID- UARS-2 -19 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - J. LONDON U OF COLORADO

BRIEF DESCRIPTION

THIS INVESTIGATION DEALS WITH THE NATURAL VARIABILITY OF THE THERMAL STRUCTURE AND OZONE CONCENTRATION OF THE UPPER ATMOSPHERE WITH EMPHASIS ON THEIR RESPONSE TO SIGNIFICANT SOLAR VARIABILITY. IT PROVIDES DEFINITIVE TESTS FROM ANALYSIS OF RETRIEVED DATA OF SPECIFIED MECHANISMS BY WHICH OZONE VARIATIONS ARE IN RESPONSE TO VARIATIONS IN SOLAR ACTIVITY. A TWO-FOLD APPROACH IS USED: DATA ANALYSIS AND STATISTICAL EVALUATION OF THE PERTINENT UPPER ATMOSPHERE PARAMETERS AS THEY RELATE TO VARIOUS FORMS OF SOLAR ACTIVITY; AND THEORETICAL STUDY OF THE SENSITIVITY OF REALISTIC MODELS OF THE OZONE PHOTOCHEMICAL EQUILIBRIUM SYSTEM AS RELATED TO OBSERVED AND SUGGESTED SOLAR VARIABILITY.

----- UARS-2, MILLER-----

INVESTIGATION NAME- SYNOPTIC ANALYSIS/DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION

NSSDC ID- UARS-2 -16 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. MILLER NOAA-NMC
PI - R.S. QUIROZ NOAA-NMC

BRIEF DESCRIPTION:

THE OBJECTIVE OF THIS INVESTIGATION IS TO MERGE TEMPERATURE AND WIND MEASUREMENTS IN THE STRATOSPHERE AND MESOSPHERE WITH THE OPERATIONAL NATIONAL WEATHER SERVICE ANALYSES. ENERGY BUDGET TERMS ARE EVALUATED AND HEIGHT AND TEMPERATURE FIELDS (PLANETARY WAVES) ARE ANALYZED BY FOURIER ANALYSIS. THE INTERLAYER DYNAMIC COUPLING AMONG THE TROPOSPHERE, STRATOSPHERE, AND MESOSPHERE ALSO IS STUDIED.

----- UARS-2, MOUNT-----

INVESTIGATION NAME- ULTRAVIOLET OZONE SPECTROMETER

NSSDC ID- UARS-2 -03 INVESTIGATIVE PROGRAM
CODE ED

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G.W. MOUNT	U OF COLORADO
O1 - E.A. BARTH	U OF COLORADO
O1 - C.W. HORD	U OF COLORADO
O1 - D.W. RUSCH	U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE THE OZONE DENSITY IN THE ALTITUDE RANGE FROM 40 TO 90 KM, BY OBSERVING THE ATTENUATION OF RAYLEIGH SCATTERED SUNLIGHT IN THE NEAR ULTRAVIOLET AT WAVELENGTHS FROM 2400 TO 2480 Å AND TO DETERMINE THE NITRIC OXIDE (NO) DENSITY IN THE ALTITUDE RANGE FROM 80 TO 250 KM BY OBSERVING THE SUNLIGHT FLUORESCENTLY SCATTERED IN THE NO GAMMA BANDS AT 2100 TO 2400 Å. THE FLIGHT INSTRUMENT WILL BE A 200-MM FOCAL LENGTH, OFF-AXIS, PARABOLIC TELESCOPE AND DUAL CHANNEL 1/8-P EMERY-FASTIE SPECTROGRAPH EMPLOYING TWO PHOTOMULTIPLIER TUBES OPERATING IN THE SPECTRAL RANGES 2100-3100 Å AND 2400-3400 Å AT 20-Å RESOLUTION. THE INSTRUMENT IS MOUNTED ONTO A SCAN PLATFORM, ALLOWING SCANNING OF THE EARTH'S LIMB IN 3-KM HEIGHT INCREMENTS IN A TIME PERIOD OF 12 S. OPERATING MODES INCLUDE (1) SIMULTANEOUS INTENSITY MEASUREMENTS AT TWO WAVELENGTHS SEPARATED BY APPROXIMATELY 300 Å, (ONE WHERE THE OZONE ABSORPTION IS STRONG AND ONE WHERE IT IS WEAK AS THE SCAN PLATFORM SCANS THE EARTH'S LIMB), AND (2) MEASUREMENT OF THE GAMMA BANDS IN THE RANGE 2150 TO 2450 Å AS THE INSTRUMENT IS SCANNED THROUGH THE EARTH'S LIMB.

----- UARS-2, POTERRA-----

INVESTIGATION NAME- MAGNETOMETER EXPERIMENT

NSSDC ID- UARS-2 -26	INVESTIGATIVE PROGRAM CODE 1B
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INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - T.A. POTERRA	APPLIED PHYSICS LAB
O1 - M. SUGRUA	NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MONITOR AND INVESTIGATE LARGE-SCALE, FIELD-ALIGNED CURRENTS THAT ARE AN IMPORTANT ELEMENT IN THE COUPLING PROCESSES OF THE SOLAR WIND-MAGNETOSPHERE-IONOSPHERE-ATMOSPHERE SYSTEM. THE INSTRUMENT IS A TRIAXIAL FLURGATE MAGNETOMETER WITH A TOTAL RANGE OF PLUS OR MINUS 60,000 NT MEASURING THE VECTOR MAGNETIC FIELD AT THE RATE OF 16 TIMES PER S WITH A RESOLUTION OF 7.7 NT. THE INSTRUMENT IS BOOM MOUNTED.

----- UARS-2, REBER-----

INVESTIGATION NAME- ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS

NSSDC ID- UARS-2 -21	INVESTIGATIVE PROGRAM CODE 1B
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INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - C.A. REBER	NASA-GSFC
O1 - F.T. HUANG	COMPUTER SCIENCES CORP
O1 - A.E. MEDIN	NASA-GSFC
O1 - J.E. FREDERICK	NASA-GSFC
O1 - J. LONDON	U OF COLORADO
O1 - E. HILSENRAATH	NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THIS INVESTIGATION ARE THE ORGANIZATION, EMPIRICAL MODELING, AND GEOPHYSICAL INTERPRETATION OF THE VARIOUS DATA ACQUIRED FROM THE UARS. A SECONDARY OBJECTIVE IS THE ACQUISITION OF COMPLEMENTARY DATA FROM OTHER SOURCES (E.G., THE OPERATIONAL NOAA SATELLITES) FOR USE IN THIS ANALYSIS AND FOR USE BY THE UARS SCIENCE TEAM. A SUBSTANTIAL PART OF THE INVESTIGATION IS THE CALCULATION OF A TIME-DEPENDENT THREE-DIMENSIONAL ANALYTIC-EMPIRICAL MODEL USING DATA ON ATMOSPHERIC TEMPERATURE, MINOR SPECIES MIXING RATIOS, ETC. THE MODELING TECHNIQUE IS A DIRECT FOLLOW-UP TO THE 'OGO MODEL' AND THE 'MASS SPECTROPEX-INCORPORATED SCATTER (MSIS) MODEL' WHICH HAVE PROVEN QUITE SUCCESSFUL FOR ATMOSPHERIC RESEARCH, AND TO THE CURRENT EMPIRICAL OZONE MODEL, ALL OF WHICH WERE DEVELOPED AND ARE AVAILABLE AT THE GUDDARD SPACE FLIGHT CENTER, CODE 440, GREENBELT, MD 20771.

----- UARS-2, ROCHE-----

INVESTIGATION NAME- ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE

NSSDC ID- UARS-2 -04	INVESTIGATIVE PROGRAM CODE 1B
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INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL

PI - A.E. ROCHE	LOCKHEED PALO ALTO
O1 - J.B. KUMER	LOCKHEED PALO ALTO
O1 - R.D. BEARS	LOCKHEED PALO ALTO
O1 - T.C. JAMES	LOCKHEED PALO ALTO
O1 - L.A. REGILL	UTAH STATE U
O1 - K.D. BAKER	UTAH STATE U
O1 - D.G. MURRAY	U OF DENVER
O1 - A. GOLDBAN	U OF DENVER

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO REMOTELY MEASURE THE STRATOSPHERIC COMPOSITION (H₂O, N₂O, NO₂, HNO₃, Cl₂, ClO, HCl, O₃, CO₂, AND CH₄) AND TEMPERATURE IN THE 10- TO 60-KM ALTITUDE RANGE. THE COMPOSITION AND TEMPERATURE ARE DETERMINED FROM MEASUREMENTS OF LIRM EMISSION SPECTRA IN THE 3.5- TO 12-MICROMETER INFRARED WAVELENGTH RANGE. THE NECESSARY HIGH SENSITIVITY, BACKGROUND FLUX DISCRIMINATION, AND SPECTRAL RESOLUTION ARE PROVIDED BY A CRYOGENICALLY COOLED SOLID ETALON SPECTROMETER USING A LINEAR DETECTOR ARRAY TO SIMULTANEOUSLY COVER THE 10- TO 60-KM RANGE WITH 2-KM RESOLUTION. THE SPECTRAL RESOLUTION IS 0.25 INVERSE CENTIMETER. THREE DAYS ARE REQUIRED TO ACHIEVE GLOBAL COVERAGE WITHIN THE 75 DEG LATITUDE FOR THE 70 DEG ORBIT.

----- UARS-2, ROTTMAN-----

INVESTIGATION NAME- ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT

NSSDC ID- UARS-2 -04	INVESTIGATIVE PROGRAM CODE 1B
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INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL

PI - G.J. ROTTMAN	U OF COLORADO
O1 - J. LONDON	U OF COLORADO

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE SOLAR SPECTRUM AT WAVELENGTHS BETWEEN 120 AND 500 NM WITH AN ABSOLUTE ACCURACY BETTER THAN 10 PERCENT. TEMPORAL VARIATIONS OF THE SOLAR RADIATION ARE FOLLOWED TO WITHIN 1-2 PERCENT DURING THESE MISSIONS. THERE IS A 1/8 IN EBERT-FASTIE SPECTROMETER WITH APPROXIMATELY 0.15-NM SPECTRAL RESOLUTION ON BOARD. IT HAS THREE SEPARATE DATA CHANNELS, EACH USING A PHOTOTUBE OPTIMIZED FOR DIFFERENT, BUT OVERLAPPING, PORTIONS OF THE INSTRUMENT SPECTRAL RANGE. SOLAR DATA ARE TAKEN ON A DAILY BASIS AND ANALYZED TO ESTABLISH CORRELATIONS OF THE SPECTRAL IRRADIANCE WITH SOLAR ROTATION AND WITH SOLAR ACTIVITY (10.7-CM FLUX LEVELS, SUNSPOT NUMBER, CALCULATED SOLAR FLARES, ETC.). THE NORMAL MODE OF OPERATION INVOLVES A 4-H DUTY CYCLE PER DAY. OF THIS TOTAL TIME, 1 H IS SPENT OBSERVING THE SUN AND THE REMAINDER OF THE TIME IS SPENT IN CALIBRATION ACTIVITIES. TEN TO 15 STARS ARE CHOSEN FOR THE CALIBRATION PROGRAM.

----- UARS-2, RUSSELL, SBO-----

INVESTIGATION NAME- HALOGEN OCCULTATION EXPERIMENT (HALOE)

NSSDC ID- UARS-2 -09	INVESTIGATIVE PROGRAM CODE 1B
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INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.M. RUSSELL, SBO	NASA-LARC
O1 - J. PARK	COLL OF WILLIAM + MARY
O1 - S.R. DRAYSON	U OF MICHIGAN
O1 - P.J. CHUTZEN	NATL CTR FOR ATMOS OFS
O1 - R.J. CICCHONE	U OF CALIF, SAN DIEGO
O1 - P.L. HANST	ENVIRON PROTECT AGENCY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE, USING SOLAR OCCULTATION TECHNIQUES, THE PLANETARY ATMOSPHERIC VERTICAL CONCENTRATION PROFILES OF: H₂O, O₃, HCl, HF, NO, HNO₃, HNO₂, AND CO₂. PRESSURE IN THE ALTITUDE RANGE FROM 10 TO 40 KM IS MEASURED. MEASUREMENTS ARE USED TO STUDY TRACE GAS SOURCES AND SINKS AND UPPER ATMOSPHERE TRANSPORT, AND TO VALIDATE PHOTOCHEMICAL AND ATMOSPHERIC DYNAMICS MODELS. A FOUR-CHANNEL GAS FILTER CORRELATION RADIOMETER AND A FIVE-CHANNEL FILTER RADIOMETER MOUNTED ON A COMMON CHASSIS WITH AZIMUTH AND ELEVATION CAPABILITY ARE USED. THE GAS FILTER CORRELATION RADIOMETRY IS USED TO MEASURE THE HCl, HF, CH₄, NO, AND O₃, AND BROAD BAND FILTER SPECTROSCOPY IS USED TO MEASURE H₂O, O₃, HNO₂, AND CO₂. THE CO₂ DATA ARE USED TO OBTAIN THE ATMOSPHERIC PRESSURE PROFILE.

----- UARS-2, THUILLIER-----

INVESTIGATION NAME- TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE

NSSDC ID- UARS-2 -01 INVESTIGATIVE PROGRAM CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - G. THUILLIER	CHRS-SA
OI - P. CONNES	PARIS OBSERVATORY
OI - H. TEITELBAUM	CHRS-SA
OI - M.L. BUDOIN	CNET
OI - P. BLUM	U OF BONN
OI - S.S. CHANDRA	NASA-GSFC

BRIEF DESCRIPTION

THE INVESTIGATION OBJECTIVES ARE TO MEASURE SIMULTANEOUSLY THE WIND AND TEMPERATURE IN THE HIGH MESOSPHERE AND LOW THERMOSPHERE, AND TO DERIVE THE EDDY DIFFUSION COEFFICIENT USING A REMOTE SENSING METHOD. ABSOLUTE LINE INTENSITIES ARE ALSO MEASURED. THE FLIGHT INSTRUMENT IS COMPOSED OF TWO MAIN UNITS. THE UPPER PART IS A CASSEGRAIN-TYPE TELESCOPE. THE LOWER PART CONSISTS OF A FIELD-COMPENSATED NICHOLSON INTERFEROMETER AND ASSOCIATED OPTICS, DETECTORS, LASER UNIT, ELECTROMECHANISMS, AND ELECTRONICS. THE WAVELENGTHS MEASURED (IN ANGSTROMS) ARE: 5577, 6300, 7278, 7319, AND 7371. THE SPECTRAL SCANNING IS ACHIEVED BY A SMALL-ANGLE PRISM CHANGING THE OPTICAL PATH OF APPROXIMATELY 1 WAVELENGTH IN 16 STEPS. THE LIMB IS SCANNED IN STEPS FROM 400 TO 70 KM. THE FIELD OF VIEW IS 2 DEG IN A HORIZONTAL PLANE AND THE VERTICAL FIELD OF VIEW VARIES FROM 16 ARC-MIN IN THE THERMOSPHERE, TO 4 ARC-MIN FOR MESOSPHERIC OBSERVATIONS. THE DURATION OF A COMPLETE SCAN FOR A GIVEN LINE IS 1.6 S.

----- UARS-2, TORR-----

INVESTIGATION NAME- ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER

NSSDC ID- UARS-2 -15 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.G. TORR	U OF MICHIGAN
OI - M.R. TORR	U OF MICHIGAN
OI - T.M. DONAHUE	U OF MICHIGAN
OI - A.F. NAGY	U OF MICHIGAN
OI - E.R. YOUNG	U OF MICHIGAN
OI - S.C. LIU	NOAA
OI - R.J. CICERONE	U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS INVESTIGATION IS TO MAKE HIGH RESOLUTION STUDIES OF TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE. THE CONSTITUENTS ARE OBSERVED THROUGH ABSORPTION OF RAYLEIGH SCATTERED SUNLIGHT, RESONANCE FLUORESCENCE OF SUNLIGHT AT ULTRAVIOLET WAVELENGTHS, CHEMILUMINESCENCE, AND PARTICLE IMPACT EXCITATION. THE INVESTIGATION ALSO MONITORS PARTICLE PRECIPITATION FROM THE INCLUDED EMISSIONS AT 3914 AND 4278A. AN ECHELLE GRATING SPECTROGRAPH MEASURES THE CONCENTRATIONS OF THE TRACE CONSTITUENTS, O3, OH, CLO, NO, AND NO2 AT STRATOSPHERIC AND MESOSPHERIC ALTITUDES. A HIGH-RESOLUTION (0.04A) ATLAS WILL BE COMPILED IN BOTH ABSORPTION AND EMISSION. THE WAVE LENGTH RANGE IS 2000 TO 4600A. THE IMAGING CAPABILITY PERMITS A 50-KM ALTITUDE PROFILE (E.G., 20 TO 70 KM) TO BE OBSERVED SIMULTANEOUSLY AT 5-KM RESOLUTION.

----- UARS-2, WATERS-----

INVESTIGATION NAME- MICROWAVE LIMB SOUNDER (MLS)

NSSDC ID- UARS-2 -13 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.W. WATERS	NASA-JPL
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BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE WIND, O3, CLO, H2O2, TEMPERATURE, O2, CO, H2O, MAGNETIC FIELD, AND PRESSURE IN THE UPPER ATMOSPHERE. THE SPECTRAL REGION COVERED IS FROM 63 TO 231 GHZ. THE SAMPLED ALTITUDE RANGE EXTENDS FROM 15 TO 110 KM. THE INSTRUMENT HAS 2-S INTEGRATION, WITH LONGER INTEGRATIONS PERFORMED AS APPROPRIATE DURING DATA REDUCTION. ABSOLUTE ACCURACY OF THIS MICROWAVE LIMB SOUNDER (MLS) IS APPROXIMATELY 5 PERCENT FOR COMPOSITION, APPROXIMATELY 2 DEG K

FOR TEMPERATURE, AND APPROXIMATELY 3 M/S FOR WINDS. VERTICAL RESOLUTION FOR PROFILE MEASUREMENTS IS 3-6 KM; HORIZONTAL RESOLUTION IS 30 KM ACROSS AND 300 KM ALONG THE OBSERVATION DIRECTION. COMPLETE PROFILES ARE OBTAINED IN LESS THAN 50 S.

----- UARS-2, WINNINGHAM-----

INVESTIGATION NAME- PARTICLE ENVIRONMENT MONITOR (PEM)

NSSDC ID- UARS-2 -07 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - J.D. WINNINGHAM	U OF TEXAS, DALLAS
OI - P.M. BANKS	UTAH STATE U
OI - J.L. BURCH	SOUTHWEST RES INST
OI - R.G. GUNTON	LOCKHEED PALO ALTO
OI - W.L. IMHOF	LOCKHEED PALO ALTO
OI - J.B. REAGAN	LOCKHEED PALO ALTO
OI - M.H. REES	U OF ALASKA
OI - G.C. REID	NOAA
OI - R.G. ROBLE	NATL CTR FOR ATMOS RES
OI - P.J. CRUTZEN	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE GLOBAL INPUT OF CHARGED PARTICLE ENERGY INTO THE EARTH'S STRATOSPHERE, MESOSPHERE, AND THERMOSPHERE AND THE PREDICTED ATMOSPHERIC PROCESSES. DIRECT IN SITU MEASUREMENTS OF PRECIPITATION ELECTRONS IN THE ENERGY RANGE FROM 100 EV TO 5 MEV AND OF PROTONS IN THE ENERGY RANGE FROM 0.5 TO 200 MEV (WITH OPTION OF EXTENDING PROTON MEASUREMENTS DOWN TO 100 EV) ARE MADE WITH A MEDIUM ENERGY PARTICLE SPECTROMETER (MEPS) AND A HIGH ENERGY PARTICLE SPECTROMETER (HEPS). IN ADDITION, GLOBAL IMAGES AND ENERGY SPECTRA OF ATMOSPHERIC X RAYS PRODUCED BY ELECTRON PRECIPITATION ARE PERFORMED OVER THE ENERGY RANGE FROM 6 TO 150 KEV WITH AN ATMOSPHERIC X RAY IMAGING SPECTROMETER. THE DATA FROM THESE INSTRUMENTS ARE USED AS INPUT TO COMPUTATIONAL MODELS.

----- UARS-2, ZUREK-----

INVESTIGATION NAME- RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE

NSSDC ID- UARS-2 -23 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

PI - R.W. ZUREK	NASA-JPL
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BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS INVESTIGATION IS TO CONSTRUCT A COMPREHENSIVE AND CONSISTENT CLIMATOLOGY OF THE MESOSPHERE AS OBSERVED BY THE UARS SATELLITES. FROM THE MESOSPHERIC DATA, THIS ANALYSIS PRODUCES: (1) THE RADIATIVE BUDGET BASED ON O3 AND O2 ABSORPTION OF SOLAR RADIANCE AND CO2 EMISSION, INCLUDING THE EFFECTS ON THE LATTER OF NON-THERMODYNAMIC EQUILIBRIUM; AND (2) THE DYNAMICAL CLIMATOLOGY OF THE MESOSPHERE, SHOWING THE RELATIVE CONTRIBUTIONS TO THE HEAT AND MOMENTUM BUDGETS BY ADIABATIC HEATING, BY THE MEAN MERIDIONAL CIRCULATION, AND BY EDDIES (WAVES). THE EDDY CONTRIBUTION IS SEPARATED INTO STANDING AND TRANSIENT COMPONENTS WHICH INCLUDE DYNAMICAL FLUXES DUE TO ATMOSPHERIC TIDES.

4

INDEX OF ACTIVE AND PLANNED SPACECRAFT
AND EXPERIMENTS

4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

This index contains the names of all spacecraft and experiments that were either active sometime between June 1, 1979, and May 31, 1980, or planned as of May 31, 1980. The spacecraft are listed alphabetically by both common name and alternate names. The alternate names are printed with a reference to the NSSDC spacecraft common name. Next to the NSSDC spacecraft common name are the sponsoring country and agency, launch date, orbit type, NSSDC ID code, and the current status. The current state includes the epoch date, status, and data rate of all launched spacecraft and experiments. For prelaunch spacecraft, only the status is shown; there is no information shown for prelaunch spacecraft experiments. The status and data rate, for the most part, reflect the state as of May 31, 1980, that became effective on the listed epoch date. However, a few changes subsequent to this date may appear. An explanation of the terms used in these columns may be found in Appendix C. The experiments are listed following the associated spacecraft common name and are ordered alphabetically by the principal investigator's or team leader's last name. The experiment name, NSSDC ID code, and current state are also given for each experiment. Finally, each name is followed by a page number referencing the description of the spacecraft or experiment found in this report.

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INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS----- EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.	
1976-059A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	06/26/76	GEOCENTRIC	76-059A 76-059A-01	06/27/76 06/27/76	NORMAL NORMAL	STND STND	11 11	
1977-007A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	02/06/77	GEOCENTRIC	77-007A 77-007A-01	02/07/77 02/07/77	NORMAL NORMAL	STND STND	11 11	
1979-053A HIGBIE	UNITED STATES ENERGETIC PARTICLE DETECTOR	06/10/79	GEOCENTRIC	79-053A 79-053A-01	06/11/79 06/11/79	NORMAL NORMAL	STND STND	11 11	
AE 5	SEE AE-E								
AE-E	UNITED STATES	NASA-OSS	11/20/75	GEOCENTRIC	75-107A	11/20/75	NORMAL	STND	12
BRACE	CYLINDRICAL ELECTROSTATIC PROBE (CEP)				75-107A-01	12/00/75	NORMAL	STND	12
BRINTON	BENNETT ION-MASS SPECTROMETER (BIMS)				75-107A-10	12/11/75	NORMAL	STND	12
CHAMPION	ATMOSPHERIC DENSITY ACCELEROMETER (PESA)				75-107A-02	12/04/75	NORMAL	STND	12
DOERING	PHOTOELECTRON SPECTROMETER (PES)				75-107A-03	12/00/75	NORMAL	STND	12
HANSON	RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)				75-107A-04	12/00/75	NORMAL	STND	13
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)				75-107A-11	12/11/75	NORMAL	STND	13
HEATH	BACKSCATTER UV SPECTROMETER (BUV)				75-107A-16	12/18/78	NORMAL	STND	13
HEDIN	NEUTRAL ATMOSPHERE COMPOSITION (NACE)				75-107A-08	12/11/75	NORMAL	STND	13
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)				75-107A-06	12/00/75	NORMAL	STND	14
NIER	OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)				75-107A-07	12/11/75	NORMAL	STND	14
RICE	CAPACITANCE MANOMETER				75-107A-12	12/04/75	NORMAL	STND	14
RICE	COLD CATHODE ION GAUGE				75-107A-13	12/04/75	NORMAL	STND	14
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)				75-107A-09	12/11/75	NORMAL	STND	14
AEM-A	SEE HCMM								
AEM-B	SEE SAGE								
AEM-C	SEE MAGSAT								
AEM-D	SEE ERBS-A								
AEROS	SEE SMS 1								
AMPE/CHARGE COMP EXPL	SEE CCE								
AMPE/ION RELEASE MODULE	SEE IRM								
APPL EXPL MISSION A	SEE HCMM								
APPL EXPL MISSION B	SEE SAGE								
ARIEL 5	SEE UK 5								
ARIEL 6	SEE UK 6								
ASTRO-A	JAPAN	ISAS	02/00/81	GEOCENTRIC	ASTRO-A	APPROVED MISSION		107	
HIRAO	ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES				ASTRO-A-06			107	
KONDO	SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE				ASTRO-A-04			107	
MATSUOKA	TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE				ASTRO-A-03			107	
NISHI	SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE				ASTRO-A-02			107	
TAKAKURA	SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING				ASTRO-A-01			107	
TAKEUCHI	ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR				ASTRO-A-05			107	
ASTRONOMICAL SATELLITE-A	SEE ASTRO-A								
ATMOSPHERE EXPLORER-E	SEE AE-E								
BERKSAT	SEE EUVE								
BHASKARA	INDIA U.S.S.R.	ISRO UNKNOWN	06/07/79	GEOCENTRIC	79-051A	06/07/79	NORMAL	STND	15
CALLA	SATELLITE MICROWAVE RADIOMETER (SAMIR)				79-051A-01	06/12/79	NORMAL	STND	15
JOSEPH	TV CAMERA				79-051A-02	05/16/80	NORMAL	STND	15
KAMAT	DATA COLLECTION PLATFORM				79-051A-07	06/25/79	NORMAL	SUBS	15
KASTURIRANGAN	PINKHOLE X-RAY SKY SURVEY				79-051A-03	06/30/79	PARTIAL	ZERO	15
CCE	UNITED STATES	NASA-OSS	09/13/83	GEOCENTRIC	CCE	PROPOSED MISSION		107	
GLOECKLER	CHARGE-ENERGY-MASS SPECTROMETER (CHEM)				CCE -03			108	
MCENTIRE	MEDILP ENERGY PARTICLE ANALYZER (MEPA)				CCE -02			108	
SHELLEY	PLASMA COMPOSITION				CCE -01			108	
CHARGE COMPOSITION EXPL	SEE CCE								
COBE	UNITED STATES	NASA-OSS	10/01/85	GEOCENTRIC	COBE	PROPOSED MISSION		108	

ORIGINAL PAGE IS
OF POOR QUALITY

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	-----CURRENT STATUS-----				PAGE NO.
PRINC. INVEST. NAME	EXPERIMENT NAME			NSSDC ID	EPDCH MDDYY	STATUS	DATA RATE	
HAUSER	DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)			COBE -02				108
HATHER	FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)			COBE -01				109
SROOT	DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)			COBE -03				109
COPERNICUS	SEE OAO 3							
CORSA-B	SEE MAKUCHO							
COS-B	INTERNATIONAL ESA	08/09/75	GEOCENTRIC	75-072A	08/09/75	NORMAL	STND	15
CARAVANE COLLABOR.	GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV)			75-072A-01	08/09/75	NORMAL	STND	15
COSMIC BACKGROUND EXPL	SEE COBE							
COSMIC RADIATION SAT B	SEE MAKUCHO							
COSMIC RAY SATELLITE-B	SEE COS-B							
COSMOS 900	U.S.S.R. SAS	03/30/77	GEOCENTRIC	77-023A	10/11/79	INOPERABLE	ZERO	16
AFONIN	FLAT RETARDING POTENTIAL ANALYZER			77-023A-01	10/11/79	INOPERABLE	ZERO	16
AFONIN	HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE			77-023A-02	10/11/79	INOPERABLE	ZERO	16
GDALIEVICH	SPHERICAL ION TRAP WITH FLOATING POTENTIAL			77-023A-03	10/11/79	INOPERABLE	ZERO	16
GDALIEVICH	CYLINDRICAL ELECTROSTATIC PROBE			77-023A-04	10/11/79	INOPERABLE	ZERO	16
GORTCHAKOV	RELATIVISTIC PROTON AND ELECTRON COUNTER			77-023A-08	10/11/79	INOPERABLE	ZERO	16
SCHUTTE	PANORAMIC ELECTROSTATIC SPECTROMETER			77-023A-07	10/11/79	INOPERABLE	ZERO	16
SOSNOVETS	DIFFERENTIAL ENERGY SPECTROMETER			77-023A-05	10/11/79	INOPERABLE	ZERO	17
TELTSOV	DIFFERENTIAL LOW ENERGY SPECTROMETER			77-023A-06	10/11/79	INOPERABLE	ZERO	17
TULUPOV	AURORAL PHOTOMETER			77-023A-09	10/11/79	INOPERABLE	ZERO	17
DAUGHTER	SEE ISEE 2							
DE-A	SEE DYNAMICS EXPLORER-A							
DE-B	SEE DYNAMICS EXPLORER-B							
DMSP 12535	SEE DMSP 5D-1/F1							
DMSP 13536	SEE DMSP 5D-1/F2							
DMSP 14537	SEE DMSP 5D-1/F3							
DMSP 15539	SEE DMSP 5D-1/F4							
DMSP 5D-1/F1	UNITED STATES DOD-USAF	09/11/76	GEOCENTRIC	76-091A	09/16/79	INOPERABLE	ZERO	17
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			76-091A-01	09/16/79	INOPERABLE	ZERO	17
BLAKE	RADIATION DOSIMETER			76-091A-03	09/16/79	INOPERABLE	ZERO	17
SHRUM	GAMMA RAY DETECTOR			76-091A-04	09/16/79	INOPERABLE	ZERO	18
DMSP 5D-1/F2	UNITED STATES DOD-USAF	06/05/77	GEOCENTRIC	77-044A	02/17/80	INOPERABLE	ZERO	18
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			77-044A-01	02/17/80	INOPERABLE	ZERO	18
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			77-044A-02	02/17/80	INOPERABLE	ZERO	18
	SPECIAL SENSOR H (SSH)							
WIZERA	REPOTE X-RAY SENSOR - PRECIPITATING ELECTRONS			77-044A-06	02/17/80	INOPERABLE	ZERO	19
ROTHWELL	PRECIPITATING ELECTRON SPECTROMETER			77-044A-03	02/17/80	INOPERABLE	ZERO	19
SAGALYN	IONOSPHERIC PLASMA MONITOR			77-044A-05	02/17/80	INOPERABLE	ZERO	19
SNYDER	PASSIVE IONOSPHERIC MONITOR			77-044A-04	02/17/80	INOPERABLE	ZERO	19
DMSP 5D-1/F3	UNITED STATES DOD-USAF	05/01/78	GEOCENTRIC	78-042A	12/02/79	PARTIAL	SUBS	19
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			78-042A-01	03/12/80	PARTIAL	SUBS	19
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			78-042A-02	01/03/80	INOPERABLE	ZERO	20
	SPECIAL SENSOR H (SSH)							
SHRUM	GAMMA-RAY DETECTOR			78-042A-04	05/01/78	NORMAL	STND	20
DMSP 5D-1/F4	UNITED STATES DOD-USAF	06/06/79	GEOCENTRIC	79-050A	12/31/79	PARTIAL	STND	20
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			79-050A-01	12/31/79	PARTIAL	STND	20
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			79-050A-02	12/29/79	NORMAL	ZERO	21
	SPECIAL SENSOR H (SSH)							
AFGWC STAFF	SSP/T-MICROWAVE TEMPERATURE SOUNDER			79-050A-06	01/28/80	PARTIAL	STND	21
AFGWC STAFF	SNOW/CLOUD DISCRIMINATOR SPECIAL SENSOR C (SSC)			79-050A-08	12/29/79	NORMAL	ZERO	21
MORSE	SSD - ATMOSPHERIC DENSITY SENSOR			79-050A-07	12/29/79	INOPERABLE	ZERO	21
ROTHWELL	PRECIPITATING ELECTRON SPECTROMETER			79-050A-03	01/28/80	PARTIAL	STND	21
SAGALYN	IONOSPHERIC PLASMA MONITOR			79-050A-05	01/28/80	PARTIAL	STND	21
SNYDER	PASSIVE IONOSPHERIC MONITOR			79-050A-04	01/28/80	PARTIAL	STND	21
DMSP 5D-1/F5	UNITED STATES DOD-USAF		GEOCENTRIC	DMSP-F5		APPROVED MISSION		109
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			DMSP-F5-01				109
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			DMSP-F5-02				110
	SPECIAL SENSOR H (SSH)							
ROTHWELL	PRECIPITATING ELECTRON SPECTROMETER			DMSP-F5-03				110
SAGALYN	IONOSPHERIC PLASMA MONITOR			DMSP-F5-05				110

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
SNYDER	PASSIVE IONOSPHERIC MONITOR			DMSP-F5-04				110
DMSP BLOCK 5D-1	SEE DMSP 5D-1/F1							
DMSP BLOCK 5D-1	SEE DMSP 5D-1/F2							
DMSP BLOCK 5D-1	SEE DMSP 5D-1/F3							
DMSP BLOCK 5D-1	SEE DMSP 5D-1/F4							
DMSP BLOCK 5D-1	SEE DMSP 5D-1/F5							
DMSP-F1	SEE DMSP 5D-1/F1							
DMSP-F2	SEE DMSP 5D-1/F2							
DMSP-F3	SEE DMSP 5D-1/F3							
DMSP-F4	SEE DMSP 5D-1/F4							
DMSP-F5	SEE DMSP 5D-1/F5							
DMSP5D1	SEE DMSP 5D-1/F1							
DMSP5D1	SEE DMSP 5D-1/F2							
DMSP5D1	SEE DMSP 5D-1/F3							
DMSP5D1	SEE DMSP 5D-1/F4							
DMSP5D1	SEE DMSP 5D-1/F5							
DYNAMICS EXPLORER-A	UNITED STATES NASA-OSS 07/31/81 GEOCENTRIC			DE-A		APPROVED MISSION		110
BURCH	HIGH ALTITUDE PLASMA INSTRUMENT			DE-A	-05			110
CHAPPELL	RETARDING ION MASS SPECTROMETER			DE-A	-04			111
CORONITI	AURORAL PHYSICS			DE-A	-07			111
FRANK	GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS			DE-A	-03			111
HELLIWELL	CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS			DE-A	-08			111
SHAWHAN	PLASMA WAVES			DE-A	-02			112
SHELLEY	HOT PLASMA COMPOSITION			DE-A	-06			112
SUGIURA	MAGNETIC FIELD OBSERVATIONS			DE-A	-01			112
DYNAMICS EXPLORER-B	UNITED STATES NASA-OSS 07/31/81 GEOCENTRIC			DE-B		APPROVED MISSION		112
BRACE	LANGMUIR PROBE			DE-B	-09			113
CARIGNAN	NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER			DE-B	-03			113
HANSON	RETARDING POTENTIAL ANALYZER			DE-B	-07			113
HAYS	FABRY-PEROT INTERFEROMETER			DE-B	-05			113
HEELIS	ION DRIFT METER			DE-B	-06			114
HOFFMAN	LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION			DE-B	-13			114
MAYNARD	ELECTRIC FIELD INVESTIGATIONS			DE-B	-02			114
MAYR	ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION			DE-B	-12			114
NAGY	MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION			DE-B	-10			114
ROBLE	NEUTRAL-PLASMA INTERACTIONS INVESTIGATION			DE-B	-11			115
SPENCER	WIND AND TEMPERATURE SPECTROMETER			DE-B	-04			115
SUGIURA	MAGNETIC FIELD OBSERVATIONS			DE-B	-01			115
WINNINGHAM	LOW ALTITUDE PLASMA INSTRUMENT			DE-B	-08			115
EARTH RAD BUDGET SAT	SEE ERBS-A							
EARTH RES TECH SAT.-B	SEE LANDSAT 2							
EARTH RES TECH SAT.-C	SEE LANDSAT 3							
EINSTEIN	SEE HEAD 2							
ERBS-A	UNITED STATES NASA-OA 11/00/83 GEOCENTRIC			ERBS-A		APPROVED MISSION		115
BROOME	EARTH RADIATION BUDGET INSTRUMENT (ERBI)			ERBS-A	-01			116
MCCORRICK	STRATOSPHERIC AEROSOL AND GAS (SAGE)			ERBS-A	-02			116
RUSSELL, 3RD	HALOGEN OCCULTATION (HALOE)			ERBS-A	-03			116
ERTS-B	SEE LANDSAT 2							
ERTS-C	SEE LANDSAT 3							
ESA-GEOS 2	INTERNATIONAL ESA 07/14/78 GEOCENTRIC			78-071A		08/01/78 NORMAL	STND	22
BEGHIN	WAVE FIELD IMPEDANCE			78-071A-11		08/01/78 NORMAL	STND	22
GEISS	LOW-ENERGY ION COMPOSITION			78-071A-03		08/01/78 NORMAL	STND	22
GENDRIN	MAGNETIC WAVE FIELDS			78-071A-06		08/01/78 NORMAL	STND	22
MULTYQVIST	LOW-ENERGY ELECTRON AND PROTON PITCH			78-071A-04		08/01/78 NORMAL	STND	23

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS----- EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
MARIANI WELZNER	ANGLE DISTRIBUTION TRIAxIAL FLUXGATE MAGNETOMETER DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION			78-071A-09 78-071A-08	08/01/78 08/01/78	NORMAL NORMAL	STND STND	23 23
PEDERSEN PETIT UNGSTRUP WILKEN	DC FIELDS BY DOUBLE PROBE VLF PLASMA RESONANCES ELECTRIC WAVE FIELDS ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION			78-071A-07 78-071A-05 78-071A-10 78-071A-01	08/01/78 08/01/78 08/01/78 08/01/78	NORMAL NORMAL NORMAL NORMAL	STND STND STND STND	23 23 24 24
WRENN	THERMAL PLASMA FLOW			78-071A-02	08/01/78	NORMAL	STND	24
EUROPEAN X-RAY OBS SAT.		SEE EXOSAT						
EUVÉ BOWYER	UNITED STATES EXTREME ULTRAVIOLET FULL SKY SURVEY	NASA-OSS	10/00/85	GEOCENTRIC	EUVÉ EUVÉ -01	PROPOSED MISSION		116 117
EXOS 1	SEE KYOKKO							
EXOS A	SEE KYOKKO							
EXOS-B	SEE JIKIKEN							
EXOS-C UNKNOWN UNKNOWN UNKNOWN	JAPAN X-RAY AND GAMMA-RAY ASTRONOMICAL TELESCOPES ULTRAVIOLET TELESCOPE INFRARED TELESCOPE ENERGETIC PARTICLES	ISAS	1982	GEOCENTRIC	EXOS-C EXOS-C -01 EXOS-C -02 EXOS-C -03 EXOS-C -04	APPROVED MISSION		117 117 117 117 117
EXOSAT BOYD TAYLOR TRUMPER	INTERNATIONAL LOW-ENERGY X-RAY IMAGING TELESCOPES GAS SCINTILLATION X-RAY SPECTROMETER MEDIUM-ENERGY COSMIC X-RAY PACKAGE	ESA	11/00/81	GEOCENTRIC	EXOSAT EXOSAT -02 EXOSAT -03 EXOSAT -01	APPROVED MISSION		117 118 118 118
EXOSPHERIC SAT. A	SEE KYOKKO							
EXOSPHERIC SAT. B	SEE JIKIKEN							
EXOSPHERIC SAT. C	SEE EXOS-C							
EXPLORER 50	SEE IMP-J							
EXPLORER 55	SEE AE-E							
EXTREME UV EXPLORER	SEE EUVÉ							
FEUERNAD	SEE FIREWHEEL							
FIREWHEEL ACUNA FOPPL HAUSLER MCENTIRE	INTERNATIONAL DC MAGNETOMETER ION RELEASE AC MAGNETOMETER ION COMPOSITION TELESCOPE	ESA	05/23/80	GEOCENTRIC	FIRE-A FIRE-A -02 FIRE-A -01 FIRE-A -04 FIRE-A -03	FAILED MISSION		118 118 118 119 119
FIREWHEEL SUB-SAT 1 ACUNA GURNETT PASCHMANN SPENNER	INTERNATIONAL DC MAGNETOMETER PLASMA WAVE LOW-ENERGY ELECTRON AND ION DETECTOR RETARDING POTENTIAL ANALYZER	ESA	05/23/80	GEOCENTRIC	FIRE-E FIRE-E -01 FIRE-E -04 FIRE-E -02 FIRE-E -03	FAILED MISSION		119 119 119 119 119
FIREWHEEL SUB-SAT 2 ACUNA BRYANT JOHNSTONE WRENN	INTERNATIONAL DC MAGNETOMETER ENERGETIC PARTICLE SUPRATHERMAL ELECTRONS LANGMUIR PROBE	ESA	05/23/80	GEOCENTRIC	FIRE-B FIRE-B -01 FIRE-B -02 FIRE-B -03 FIRE-B -04	FAILED MISSION		119 119 120 120 120
FIREWHEEL SUB-SAT 3 ACUNA BUSH CARLSON CARLSON MALLINCKRODT MOZER	INTERNATIONAL DC/A MAGNETOMETER ENERGETIC ION MASS SPECTROMETER LOW-ENERGY ELECTRON DETECTOR ELECTRON DENSITY MEASUREMENT PROTON/ELECTRON ELECTROSTATIC ANALYZER DC/AC ELECTRIC FIELD	ESA	05/23/80	GEOCENTRIC	FIRE-C FIRE-C -01 FIRE-C -03 FIRE-C -05 FIRE-C -06 FIRE-C -04 FIRE-C -02	FAILED MISSION		120 120 120 120 120 120 121
FIREWHEEL SUB-SAT 4 ACUNA MCNAMARA WHALEN	INTERNATIONAL DC MAGNETOMETER LANGMUIR PROBE ENERGETIC CHARGED PARTICLE DETECTORS	ESA	05/23/80	GEOCENTRIC	FIRE-D FIRE-D -01 FIRE-D -02 FIRE-D -03	FAILED MISSION		121 121 121 121
GALILEO	SEE GALILEO PROBE							
GALILEO	SEE GALILEO ORBITER							
GALILEO ORBITER ANDERSON BELTON	UNITED STATES RADIO SCIENCE ORBITER IMAGING	NASA-OSS	02/20/84	JUPITER ORBITER	JOPO JOPO -11 JOPO -10	APPROVED MISSION		121 122 122

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

ORIGINAL PAGE IS
OF POOR QUALITY

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
CARLSON	NEAR INFRARED MAPPING SPECTROMETER (AIMS) INVESTIGATION AND MAPPER			JOPO -01				122
FANALE	FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES			JOPO -12				122
FRANK	PLASMA			JOPO -04				122
GIERASCH	JOVIAN ATMOSPHERIC DYNAMICS			JOPO -13				123
GRAND	ELECTRON EMITTER			JOPO -05				123
GRUN	DUST			JOPO -09				123
GURNEY	PLASMA WAVE SPECTROMETER			JOPO -07				123
HORD	ULTRAVIOLET SPECTROMETER (UVS)			JOPO -02				123
HUNTEN	STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES			JOPO -14				123
KIVELSON	MAGNETOMETER			JOPO -03				124
LACIS	PHOTOPOLARIMETER RADIOMETER			JOPO -08				124
MASURSKY	GEOLOGY OF THE GALILEAN SATELLITES			JOPO -15				124
MCLEROY	INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES			JOPO -16				124
ORTON	GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER			JOPO -17				124
OWEN	COMPOSITION OF THE JOVIAN ATMOSPHERE			JOPO -18				124
POLLACK	THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE			JOPO -19				124
RUSSELL	JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS			JOPO -20				124
SAGAN	ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE			JOPO -21				125
SCARF	WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER			JOPO -22				125
SCHUBERT	JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION			JOPO -23				125
SONETT	INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES JOVIAN MAGNETOSPHERE			JOPO -24				125
WILLIAMS	ENERGETIC PARTICLES			JOPO -06				125
GALILEO PROBE	UNITED STATES NASA-OSS 03/22/84 JUPITER PROBE			JOP		APPROVED MISSION		125
BOESE	NET FLUX RADIOMETER			JOP -04				126
LANZEROTTI	LIGHTNING			JOP -06				126
NIEMANN	MASS SPECTROMETER			JOP -03				126
RAGENT	NEPHELOMETER			JOP -05				126
SIEFF	ATMOSPHERIC STRUCTURE			JOP -02				126
VON ZAHN	HELIUM ABUNDANCE INTERFEROMETER			JOP -01				126
GAMMA-RAY OBSERVATORY	UNITED STATES NASA-OSS 08/01/85 GEOCENTRIC			GRO		PROPOSED MISSION		127
FICHEL	HIGH-ENERGY GAMMA-RAY TELESCOPE			GRO -04				127
FISHMAN	TRANSIENT-EVENT MONITOR			GRO -05				127
KURFESS	SCINTILLATION SPECTROMETER			GRO -02				127
PETERSON	GAMMA-RAY SPECTROSCOPY			GRO -01				127
SCHONFELDER	IMAGING COMPTON TELESCOPE			GRO -03				127
GEODETIC SATELLITE-C	SEE GEOS 3							
GEOS 3	UNITED STATES NASA-OSTA 04/09/75 GEOCENTRIC			75-027A	04/09/75	NORMAL	STND	24
ANDERLE	US NAVY DOPPLER SYSTEM			75-027A-05	04/09/75	NORMAL	STND	24
GALICINAO	SATELLITE-TO-SATELLITE TRACKING			75-027A-06	01/01/79	NORMAL	STND	25
JACKSON	C-BAND SYSTEM			75-027A-03	04/09/75	NORMAL	STND	25
PURDY	RADAR ALTIMETER SYSTEM			75-027A-01	12/01/78	PARTIAL	STND	25
SALZBERG	S-BAND TRACKING SYSTEM			75-027A-02	05/30/78	NORMAL	SUBS	25
STEPHANIDES	LASER TRACKING REFLECTOR			75-027A-04	04/09/75	NORMAL	STND	25
GEOS-C	SEE GEOS 3							
GEOSTATION.METEORO.SAT.2	SEE GMS-2							
GEOSTATION.METEOROL.SAT.	SEE GMS							
GLOBAL MAGNETIC SURV MSN	SEE MAGSAT							
GMS	JAPAN NASDA 07/14/77 GEOCENTRIC			77-065A	08/15/77	NORMAL	STND	26
JMA STAFF	UNITED STATES NASA-OSTA							
	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			77-065A-01	08/15/77	NORMAL	STND	26
JMA STAFF	WEATHER COMMUNICATIONS FACILITY			77-065A-03	08/15/77	NORMAL	STND	26
KOHNO	SPACE ENVIRONMENT MONITOR (SEM)			77-065A-02	08/15/77	NORMAL	STND	26
GMS-2	JAPAN NASDA 08/00/81 GEOCENTRIC			GMS-2		APPROVED MISSION		128
JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			GMS-2 -01				128
JMA STAFF	WEATHER COMMUNICATIONS FACILITY			GMS-2 -03				128
KOHNO	SPACE ENVIRONMENT MONITOR (SEM)			GMS-2 -02				128
GOES 1	UNITED STATES NOAA-NES 10/16/75 GEOCENTRIC			75-100A	06/18/80	NORMAL	ZERO	26
NESS STAFF	UNITED STATES NASA-OSTA							
	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-100A-01	06/18/80	PARTIAL	ZERO	26
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-100A-05	11/30/79	NORMAL	ZERO	27

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPCH HRDDY	STATUS	DATA RATE	PAGE NO.
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-100A-02	06/01/78	PARTIAL	ZERO	27
WILLIAMS	SOLAR X-RAY MONITOR			75-100A-03	06/01/78	NORMAL	ZERO	27
WILLIAMS	MAGNETIC FIELD MONITOR			75-100A-04	06/18/80	NORMAL	ZERO	27
GOES 2	UNITED STATES NOAA-NESS 06/16/77 GEOCENTRIC			77-048A	06/16/77	NORMAL	STND	27
NESS STAFF	UNITED STATES NASA-OSTA METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			77-048A-05	10/04/79	NORMAL	STND	28
WILLIAMS	ENERGETIC PARTICLE MONITOR			77-048A-02	07/20/77	NORMAL	STND	28
WILLIAMS	SOLAR X-RAY MONITOR			77-048A-03	07/20/77	NORMAL	STND	28
WILLIAMS	MAGNETIC FIELD MONITOR			77-048A-04	08/17/77	NORMAL	STND	28
GOES 3	UNITED STATES NOAA-NESS 06/16/78 GEOCENTRIC			78-062A	08/14/79	NORMAL	STND	28
NESS STAFF	UNITED STATES NASA-OSTA VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			78-062A-01	07/13/78	NORMAL	STND	28
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			78-062A-05	07/13/78	NORMAL	STND	29
WILLIAMS	ENERGETIC PARTICLE MONITOR			78-062A-02	07/13/78	NORMAL	STND	29
WILLIAMS	SOLAR X-RAY MONITOR			78-062A-03	07/13/78	NORMAL	STND	29
WILLIAMS	MAGNETIC FIELD MONITOR			78-062A-04	07/13/78	NORMAL	STND	29
GOES-A	SEE GOES 1							
GOES-B	SEE GOES 2							
GOES-C	SEE GOES 3							
GOES-D	UNITED STATES NOAA-NESS 09/09/80 GEOCENTRIC			GOES-D		APPROVED MISSION		128
NESS STAFF	UNITED STATES NASA-OSTA VISIBLE-INFRARED SPIN SCAN RADIOMETER			GOES-D -01				129
NESS STAFF	ATMOSPHERIC SOUNDER (VAS)			GOES-D -05				129
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			GOES-D -02				129
WILLIAMS	ENERGETIC PARTICLE MONITOR			GOES-D -03				129
WILLIAMS	SOLAR X-RAY MONITOR			GOES-D -04				129
WILLIAMS	MAGNETIC FIELD MONITOR							
GOES-E	UNITED STATES NOAA-NESS 03/12/81 GEOCENTRIC			GOES-E		APPROVED MISSION		129
NESS STAFF	UNITED STATES NASA-OSTA VISIBLE-INFRARED SPIN SCAN RADIOMETER			GOES-E -01				130
NESS STAFF	ATMOSPHERIC SOUNDER (VAS)			GOES-E -05				130
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			GOES-E -02				130
WILLIAMS	ENERGETIC PARTICLE MONITOR			GOES-E -03				130
WILLIAMS	SOLAR X-RAY MONITOR			GOES-E -04				130
WILLIAMS	MAGNETIC FIELD MONITOR							
GOES-F	UNITED STATES NOAA-NESS 09/16/82 GEOCENTRIC			GOES-F		APPROVED MISSION		131
NESS STAFF	UNITED STATES NASA-OSTA VISIBLE-INFRARED SPIN SCAN RADIOMETER			GOES-F -01				131
NESS STAFF	ATMOSPHERIC SOUNDER (VAS)			GOES-F -05				131
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM			GOES-F -02				131
WILLIAMS	ENERGETIC PARTICLE MONITOR			GOES-F -03				131
WILLIAMS	SOLAR X-RAY MONITOR			GOES-F -04				132
WILLIAMS	MAGNETIC FIELD MONITOR							
GOES-I	SEE GOES 1							
HAKUCHO	JAPAN ISAS 02/21/79 GEOCENTRIC			79-014A	02/21/79	NORMAL	STND	29
HAKINO	DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES			79-014A-02	03/00/79	NORMAL	STND	29
MIYAMOTO	MONITOR OF X-RAY SOURCES			79-014A-01	03/00/79	NORMAL	STND	29
HCMM	UNITED STATES NASA-OSTA 04/26/78 GEOCENTRIC			78-041A	04/26/78	NORMAL	STND	30
BARNES	HEAT CAPACITY MAPPING RADIOMETER			78-041A-01	03/01/79	PARTIAL	SUBS	30
HEAD 2	UNITED STATES NASA-OSS 11/13/78 GEOCENTRIC			78-103A	11/13/78	NORMAL	STND	30
GIACCONI	MONITOR PROPORTIONAL COUNTER			78-103A-01	11/15/78	NORMAL	STND	30
GIACCONI	HIGH-RESOLUTION IMAGER			78-103A-02	11/16/78	NORMAL	STND	30
GIACCONI	CURVED-CRYSTAL BRAGG X-RAY			78-103A-03	11/16/78	NORMAL	STND	31
GIACCONI	IMAGING PROPORTIONAL COUNTER			78-103A-04	11/16/78	NORMAL	STND	31
GIACCONI	SOLID-STATE X-RAY DETECTOR			78-103A-05	10/20/79	INOPERABLE	ZERO	31
HEAD 3	UNITED STATES NASA-OSS 09/20/79 GEOCENTRIC			79-082A	09/20/79	NORMAL	STND	31
ISRAEL	HEAVY NUCLEI			79-082A-03	09/24/79	NORMAL	STND	31
JACOBSON	GAMMA-RAY LINE SPECTROMETER			79-082A-01	06/03/80	PARTIAL	STND	31
KOCH	ISOTOPIC COMPOSITION OF COSMIC RAYS			79-082A-04	09/24/79	NORMAL	STND	32
HEAD-B	SEE HEAD 2							
HEAT CAPACITY MAP MSN	SEE HCMM							
HELIOCENTRIC	SEE ISEE 3							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

1973 IS
OF POOR QUALITY

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH HHDDYY	STATUS	DATA RATE	PAGE NO.
HELIOS 1	SEE HELIOS-A							
HELIOS 2	SEE HELIOS-B							
HELIOS-A	FED REP OF GERMANY UNITED STATES	DFWF NASA-OSS	12/10/74 HELIOCENTRIC	74-097A	12/10/74	NORMAL	STND	32
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER			74-097A-12	12/10/74	NORMAL	STND	32
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			74-097A-04	03/10/75	PARTIAL	STND	32
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			74-097A-05	03/10/75	PARTIAL	STND	32
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			74-097A-06	03/10/75	PARTIAL	STND	33
KEPLER	ENERGETIC ELECTRON DETECTOR			74-097A-10	12/10/74	NORMAL	STND	33
KUNDT	CELESTIAL MECHANICS			74-097A-14	12/10/74	NORMAL	STND	33
KUNOW	COSMIC-RAY PARTICLES			74-097A-07	12/10/74	NORMAL	STND	33
LEINERT	ZODIACAL LIGHT PHOTOMETER			74-097A-11	12/10/74	NORMAL	STND	33
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS			74-097A-02	12/10/74	NORMAL	STND	34
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			74-097A-01	12/10/74	NORMAL	STND	34
NEUBAUER	SEARCH COIL MAGNETOMETER			74-097A-03	12/10/74	NORMAL	STND	34
ROSENBAUER	PLASMA DETECTORS			74-097A-09	12/10/74	NORMAL	STND	34
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			74-097A-08	12/10/74	NORMAL	STND	34
HELIOS-B	FED REP OF GERMANY UNITED STATES	DFWF NASA-OSS	01/19/76 HELIOCENTRIC	76-003A	05/15/80	INOPERABLE	ZERO	34
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER			76-003A-12	05/15/80	INOPERABLE	ZERO	35
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			76-003A-04	05/15/80	INOPERABLE	ZERO	35
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			76-003A-05	05/15/80	INOPERABLE	ZERO	35
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			76-003A-06	05/15/80	INOPERABLE	ZERO	35
KEPLER	ENERGETIC ELECTRON DETECTOR			76-003A-10	05/15/80	INOPERABLE	ZERO	36
KUNDT	CELESTIAL MECHANICS			76-003A-14	05/15/80	INOPERABLE	ZERO	36
KUNOW	COSMIC-RAY PARTICLES			76-003A-07	05/15/80	INOPERABLE	ZERO	36
LEINERT	ZODIACAL LIGHT PHOTOMETER			76-003A-11	05/15/80	INOPERABLE	ZERO	36
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS			76-003A-02	05/15/80	INOPERABLE	ZERO	36
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			76-003A-01	05/15/80	INOPERABLE	ZERO	36
NEUBAUER	SEARCH COIL MAGNETOMETER			76-003A-03	05/15/80	INOPERABLE	ZERO	36
ROSENBAUER	PLASMA DETECTORS			76-003A-09	05/15/80	INOPERABLE	ZERO	37
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			76-003A-08	05/15/80	INOPERABLE	ZERO	37
HELOS	SEE EXOSAT							
HI.ECCEN LUN OCCULT.SAT.	SEE EXOSAT							
HIGH ENERGY ASTRON OBS-B	SEE HEAD 2							
HIGH ENERGY ASTRON OBS3	SEE HEAD 3							
ICE + CLIMATE EXPERIMENT	SEE ICEx							
ICEx	UNITED STATES	NASA-OA	10/09/89 GEOCENTRIC	ICEx-A		PROPOSED MISSION		132
BARATH	WIDE SWATH IMAGING RADIOMETER (WSIR)			ICEx-A -02				132
BARNES	POLAR ICE MAPPING RADIOMETER (PIMR)			ICEx-A -05				132
FITZMAURICE	ICE ELEVATION ALTIMETER SYSTEM (IEAS)			ICEx-A -04				132
JONES, JR.	SCATTEROMETER (SCAT)			ICEx-A -03				133
KING	LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMMR)			ICEx-A -01				133
KING	DATA COLLECTION AND LOCATION SYSTEM (DCLS)			ICEx-A -06				133
IME-D	SEE ISEE 2							
IME-H	SEE ISEE 3							
IMP B	SEE IMP-J							
IMP-J	UNITED STATES	NASA-OSS	10/26/73 GEOCENTRIC	73-078A	10/26/73	NORMAL	STND	37
AGGSON	ELECTROSTATIC FIELDS			73-078A-11	10/26/73	NORMAL	STND	37
BAME	SOLAR PLASMA ELECTROSTATIC ANALYZER			73-078A-10	10/26/73	NORMAL	STND	37
BRIDGE	SOLAR PLASMA FARADAY CUP			73-078A-02	10/26/73	NORMAL	STND	38
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			73-078A-04	10/26/73	NORMAL	STND	38
GLOECKLER	SOLID-STATE DETECTORS			73-078A-03	12/10/78	PARTIAL	STND	38
GURNETT	ELECTROSTATIC WAVES AND RADIO NOISE			73-078A-12	10/26/73	NORMAL	STND	38
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			73-078A-08	11/05/73	NORMAL	STND	38
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			73-078A-09	10/26/73	NORMAL	STND	38
NESS	MAGNETIC FIELD EXPERIMENT			73-078A-01	10/26/73	NORMAL	STND	39
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE			73-078A-07	10/26/73	NORMAL	STND	39
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPE			73-078A-06	10/26/73	NORMAL	STND	39
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			73-078A-05	10/26/73	NORMAL	STND	39

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSDC ID	EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
IMP-K	SEE ISEE 1							
IMP-K PRIME	SEE ISEE 2							
INDIAN NATIONAL SAT.	SEE INSAT-1A							
INDIAN NATIONAL SAT.	SEE INSAT-1B							
INFRA-RED ASTRONOM SAT	SEE IR ASTRON. SAT.							
INSAT-1A	INDIA ISRO	12/21/82	GEOCENTRIC	INSAT-1		APPROVED MISSION		133
INSAT-1B	INDIA ISRO	1983	GEOCENTRIC	INSAT1B		APPROVED MISSION		133
INT SOLAR POLAR	SEE ISPM/ESA							
INT SOLAR POLAR	SEE ISPM/NASA							
INT ULTRAVIOLET EXPL	SEE IUE							
INTERCOSMOS 18	U.S.S.R. IZMIRAN	10/24/78	GEOCENTRIC	79-099A	10/24/78	NORMAL	STND	39
INTERCOSMOS 19	U.S.S.R. INTENCOS	02/27/79	GEOCENTRIC	79-026A	02/27/79	NORMAL	STND	39
INTNL SUN EARTH EXPL-A	SEE ISEE 1							
INTNL SUN EARTH EXPL-C	SEE ISEE 3							
ION RELEASE MODULE	SEE IRM							
IONO-IK	SEE INTERCOSMOS 19							
IONOSONDE-IK	SEE INTERCOSMOS 19							
IONOSP SOUNDING SAT 2	SEE ISS-B							
IR ASTRON. SAT.	THE NETHERLANDS UNITED STATES UNITED KINGDOM	NIVR NASA-OSS SRC	02/18/82	GEOCENTRIC	IRAS		APPROVED MISSION	134
IRAS	SEE IR ASTRON. SAT.							
IRM	UNITED STATES FED REP OF GERMANY LI AND BA RELEASE MODULE	NASA-OSS MPI	09/12/83	GEOCENTRIC	IRM IRM -01		PROPOSED MISSION	134 134
ISEE 1	UNITED STATES	NASA-OSS	10/22/77	GEOCENTRIC	77-102A	10/22/77	NORMAL	STND
ANDERSON	ELECTRONS AND PROTONS				77-102A-10	10/22/77	NORMAL	STND
BAME	FAST PLASMA AND SOLAR WIND IONS				77-102A-01	01/00/79	PARTIAL	STND
CLINE	GAMMA-RAY BURSTS				77-102A-14	10/22/77	NORMAL	STND
FRANK	HOT PLASMA				77-102A-03	10/22/77	NORMAL	STND
GURNETT	PLASMA WAVES				77-102A-07	10/22/77	NORMAL	STND
HARVEY	PLASMA DENSITY				77-102A-08	10/22/77	NORMAL	STND
HELLIWELL	ULF WAVE PROPAGATION				77-102A-15	10/22/77	NORMAL	STND
HEPPNER	DC ELECTRIC FIELD				77-102A-11	10/22/77	NORMAL	STND
HOVESTADT	LOW-ENERGY COSMIC RAYS				77-102A-05	08/07/78	PARTIAL	STND
HOZER	QUASI-STATIC ELECTRIC FIELDS				77-102A-06	10/22/77	NORMAL	STND
OGILVIE	FAST ELECTRONS				77-102A-02	10/22/77	NORMAL	STND
RUSSELL	FLUXGATE MAGNETOMETER				77-102A-04	10/22/77	NORMAL	STND
SHARP	ION COMPOSITION				77-102A-12	04/13/78	PARTIAL	STND
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS				77-102A-09	10/02/79	INOPERABLE	ZERO
ISEE 2	INTERNATIONAL UNITED STATES	ESA NASA-OSS	10/22/77	GEOCENTRIC	77-102B	10/22/77	NORMAL	STND
ANDERSON	ELECTRONS AND PROTONS				77-102B-08	05/01/79	PARTIAL	STND
EGIDI	SOLAR WIND IONS				77-102B-02	10/22/77	NORMAL	STND
FRANK	HOT PLASMA				77-102B-03	01/10/78	PARTIAL	STND
GURNETT	PLASMA WAVES				77-102B-05	10/22/77	NORMAL	STND
HARVEY	RADIO PROPAGATION				77-102B-06	10/22/77	NORMAL	STND
PASCHMANN	FAST PLASMA				77-102B-01	04/08/80	INOPERABLE	ZERO
RUSSELL	FLUXGATE MAGNETOMETER				77-102B-04	10/22/77	NORMAL	STND
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS				77-102B-07	10/22/77	NORMAL	STND
ISEE 3	UNITED STATES	NASA-OSS	08/12/78	HELIOCENTRIC	78-079A	08/12/78	NORMAL	STND
ANDERSON	INTERPLANETARY AND SOLAR ELECTRONS				78-079A-09	11/22/79	INOPERABLE	ZERO
ANDERSON	X- AND GAMMA-RAY BURSTS				78-079A-14	08/15/78	NORMAL	STND
BAME	SOLAR WIND PLASMA				78-079A-01	03/19/80	PARTIAL	STND
HECKMAN	HIGH-ENERGY COSMIC RAY				78-079A-05	08/15/78	NORMAL	STND
HOVESTADT	LOW-ENERGY COSMIC RAYS				78-079A-03	08/15/78	NORMAL	STND
HYNDS	ENERGETIC PROTONS				78-079A-0P	08/15/78	NORMAL	STND
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI				78-079A-06	08/15/78	NORMAL	STND
OGILVIE	SOLAR WIND ION COMPOSITION				78-079A-11	08/18/78	NORMAL	STND
SCARF	PLASMA WAVES				78-079A-07	08/12/78	NORMAL	STND
SMITH	MAGNETIC FIELDS				78-079A-02	08/12/78	NORMAL	STND
STEINBERG	RADIO MAPPING				78-079A-10	08/13/78	NORMAL	STND
STONE	HIGH-ENERGY COSMIC RAYS				78-079A-12	01/15/79	PARTIAL	STND

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS-----			PAGE NO.					
					EPOCH MDDYY	STATUS	DATA RATE						
TEEGARDEN VON ROSENINGE WILCOX	GAMMA-RAY BURSTS MEDIUM ENERGY COSMIC RAY GROUND BASED SOLAR STUDIES			78-079A-10	01/15/79	PARTIAL	STND	46					
				78-079A-04	08/15/78	NORMAL	STND	46					
				78-079A-12		NA	NA	47					
1SEE-A	SEE 1SEE 1												
1SEE-B	SEE 1SEE 2												
1SEE-C	SEE 1SEE 3												
1S18 1	CANADA UNITED STATES	CRC NASA-OSS	01/30/69	GEOCENTRIC	69-009A	01/30/70	PARTIAL	SUBS	47				
BARRINGTON BRACE CALVERT HARTZ MCBIARMID SAGALYN WHITTEKER	VLF RECEIVER CYLINDRICAL ELECTROSTATIC PROBE FIXED-FREQUENCY SOUNDER COSMIC RADIO NOISE ENERGETIC PARTICLE DETECTORS SPHERICAL ELECTROSTATIC ANALYZER SWEEP-FREQUENCY SOUNDER				69-009A-03	01/30/70	NORMAL	SUBS	47				
					69-009A-07	01/30/70	NORMAL	SUBS	47				
					69-009A-02	01/30/70	NORMAL	SUBS	47				
					69-009A-10	01/30/70	NORMAL	SUBS	48				
					69-009A-04	01/30/70	NORMAL	SUBS	48				
					69-009A-08	01/30/70	NORMAL	SUBS	48				
					69-009A-01	01/30/70	NORMAL	SUBS	48				
1S18 2	CANADA UNITED STATES	CRC NASA-OSS	04/01/71	GEOCENTRIC	71-024A	02/04/73	PARTIAL	SUBS	48				
ANGER BARRINGTON CALVERT HARTZ HOFFMAN MAIER MCBIARMID SHEPHERD WHITTEKER	3914- AND 3577-A PHOTOMETER VLF RECEIVER FIXED-FREQUENCY SOUNDER COSMIC RADIO NOISE ION-PASS SPECTROMETER RETARDING POTENTIAL ANALYZER ENERGETIC PARTICLE DETECTORS 6300-A PHOTOMETER SWEEP-FREQUENCY SOUNDER				71-024A-11	02/04/73	NORMAL	SUBS	49				
					71-024A-03	02/04/73	NORMAL	SUBS	49				
					71-024A-02	02/04/73	NORMAL	SUBS	49				
					71-024A-10	02/04/73	NORMAL	SUBS	49				
					71-024A-06	07/00/79	INOPERABLE	ZERO	49				
					71-024A-08	02/04/73	NORMAL	SUBS	50				
					71-024A-04	02/04/73	PARTIAL	SUBS	50				
					71-024A-12	02/04/73	NORMAL	SUBS	50				
					71-024A-01	02/04/73	NORMAL	SUBS	50				
					1S18-A	SEE 1S18 1							
1S18-B	SEE 1S18 2												
ISP	SEE ISPM/ESA												
ISP	SEE ISPM/NASA												
ISPM-A	SEE ISPM/NASA												
ISPM-B	SEE ISPM/ESA												
ISPM/ESA	INTERNATIONAL	ESA	04/16/85	HELIOCENTRIC	ISPESA		APPROVED MISSION		134				
BAME ESPUSITO GLECKLER GRUN HEDGECOCK MURLEY LANZEROTTI SIMPSON STONE	PLASMA SPECTROMETER RADIO SCIENCE SOLAR-WIND COMPOSITION SPECTROMETER COSMIC DUST MAGNETIC FIELD SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST HELIOSPHERE COSMIC RAY AND CHARGED PARTICLE UNIFIED RADIO AND PLASMA WAVE				ISPESA -09				134				
					ISPESA -09				135				
					ISPESA -04				135				
					ISPESA -07				135				
					ISPESA -08				135				
					ISPESA -01				135				
					ISPESA -03				135				
					ISPESA -02				136				
					ISPESA -06				136				
					ISPM/NASA	UNITED STATES	NASA-OSS	03/27/85	HELIOCENTRIC	ISPNASA		APPROVED MISSION	
ALUNA CLINE GIESE MACQUEEN ROSENBAUER ROSENBAUER STONE STONE	MAGNETIC FIELD (MAG) SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SXR) ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE) WHITE-LIGHT CORONAGRAPH/X-RAY XUV TELESCOPE (CXU) MASS SEPARATING SOLAR WIND (SWE) DIRECT MEASUREMENT OF INTERSTELLAR GAS TRACING HE AS TRACER (NGM) COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA) ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (EAS)				ISPNASA-06				136				
					ISPNASA-02				136				
					ISPNASA-08				137				
					ISPNASA-01				137				
					ISPNASA-04				137				
					ISPNASA-07				137				
					ISPNASA-03				137				
					ISPNASA-05				137				
					1SS-2	SEE 1SS-B							
					1SS-B	JAPAN	RRL	02/16/78	GEOCENTRIC	78-018A	02/16/78	NORMAL	STND
AIKYO IWAMOTO KOTAKI OGAWA	SWEEP-FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP) ION MASS SPECTROMETER RADIO NOISE MEASUREMENTS AT 0.5, 5, 10, AND 25 MHz RETARDING POTENTIAL TRAP				78-018A-01	02/27/78	NORMAL	STND	51				
					78-018A-04	02/27/78	NORMAL	STND	51				
					78-018A-02	02/27/78	NORMAL	STND	51				
					78-018A-03	02/27/78	NORMAL	STND	51				
IUE	UNITED STATES INTERNATIONAL UNITED KINGDOM	NASA-OSS ESA SRC	01/26/78	GEOCENTRIC	78-012A	01/26/78	NORMAL	STND	51				
GUEST INVESTIGATORS	LOW-HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE				78-012A-01	01/26/78	NORMAL	STND	52				

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME OPRINC.INVEST.NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSBDC ID	EP0CH MMDDYY	STATUS	DATA RATE	PAGE NO.
NONE ASSIGNED	PARTICLE FLUX MONITOR (SPACECRAFT)			78-012A-02	01/26/78	NORMAL	STND	52
JIKIKEN	JAPAN ISAS	09/16/78	GEOCENTRIC	78-087A	09/16/78	NORMAL	STND	52
EJIKI	IMPEDANCE AND ELECTRIC FIELD (IEF)			78-087A-04	09/25/78	NORMAL	STND	52
KAMASHIMA	CONTROLLED ELECTRON BEAM EMISSIONS (CBE)			78-087A-07	09/23/78	NORMAL	STND	52
KIMURA	VLF DOPPLER PROPAGATION (DPL)			78-087A-03	09/23/78	NORMAL	STND	53
KUDO	ENERGY SPECTRUM OF PARTICLES (ESP)			78-087A-06	09/23/78	NORMAL	STND	53
OYA	STIMULATED PLASMA WAVE (SPW)			78-087A-01	09/25/78	NORMAL	STND	53
OYA	NATURAL PLASMA WAVES (NPW)			78-087A-02	09/25/78	NORMAL	STND	53
JOP	SEE GALILEO PROBE							
JOP	SEE GALILEO ORBITER							
JUPITER ORBITER PROBE	SEE GALILEO PROBE							
JUPITER ORBITER PROBE	SEE GALILEO ORBITER							
NYORIO	JAPAN ISAS	02/04/78	GEOCENTRIC	78-014A	11/09/79	INOPERABLE	ZERO	53
IWANOYO	ION MASS SPECTROMETER			78-014A-06	11/09/79	INOPERABLE	ZERO	53
KANEDA	UV AURORAL TV IMAGING			78-014A-03	11/09/79	INOPERABLE	ZERO	53
MUKAI	ELECTRON ENERGY ANALYZER			78-014A-02	11/09/79	INOPERABLE	ZERO	54
NAKAMURA	UV SLOW SPECTROPHOTOMETER			78-014A-05	11/09/79	INOPERABLE	ZERO	54
YAMA	ELECTRON PROBES			78-014A-01	11/09/79	INOPERABLE	ZERO	54
YOSHINO	ELECTROSTATIC PLASMA WAVE MEASUREMENT			78-014A-04	11/09/79	INOPERABLE	ZERO	54
LAND SATELLITE-E	SEE LANDSAT-01							
LANDSAT 2	UNITED STATES NASA-OSTA	01/22/75	GEOCENTRIC	78-004A	05/06/80	NORMAL	SUPS	54
BALLA	MULTISPECTRAL SCANNER (MSS)			78-004A-02	05/06/80	NORMAL	SUPS	54
LANDSAT 3	UNITED STATES NASA-OSTA	03/07/78	GEOCENTRIC	78-026A	03/05/78	NORMAL	STND	55
BALLA	MULTISPECTRAL SCANNER (MSS)			78-026A-02	07/11/78	PARTIAL	STND	55
GILBERT	DATA COLLECTION SYSTEM (DCS)			78-026A-03	03/05/78	NORMAL	STND	55
WILSON	RETURN BEAM VIDICON CAMERA (RBV)			78-026A-01	03/05/78	NORMAL	STND	55
LANDSAT-C	SEE LANDSAT 3							
LANDSAT-D	UNITED STATES NASA-OSTA	03/31/82	GEOCENTRIC	LAND-D		APPROVED MISSION		138
BANKS	MULTISPECTRAL SCANNER (MSS)			LAND-D -02				138
FEINBERG	GLOBAL POSITIONING SYSTEM (GPS)			LAND-D -03				138
WEINSTEIN	THEMATIC MAPPER			LAND-D -01				138
LANDSAT-D1	UNITED STATES NASA-OSTA	1983	GEOCENTRIC	LAND-E		APPROVED MISSION		138
BANKS	MULTISPECTRAL SCANNER (MSS)			LAND-E -02				138
FEINBERG	GLOBAL POSITIONING SYSTEM (GPS)			LAND-E -03				138
WEINSTEIN	THEMATIC MAPPER			LAND-E -01				138
LARGE SPACE TELESCOPE	SEE ST							
LDEF	SEE SPACE SHUTTLE LDEF-A							
LFO-A	SEE LANDSAT-D							
LONG DURATION EXPOS.FAC.	SEE SPACE SHUTTLE LDEF-A							
MAG-1K	SEE INTERCOSMOS 18							
MAGIC	SEE INTERCOSMOS 18							
MAGION	U.S.S.R. INTERCOS CAS	10/24/78	GEOCENTRIC	78-099C	11/14/78	NORMAL	STND	56
CZECHOSLOVAKIA								
MAGSAT	UNITED STATES NASA-OSTA	10/30/79	GEOCENTRIC	79-094A	06/11/80	INOPERABLE	ZERO	56
LANGEI	SCALAR MAGNETOMETER			79-094A-01	06/11/80	INOPERABLE	ZERO	56
LANGEI	VECTOR MAGNETOMETER			79-094A-02	06/11/80	INOPERABLE	ZERO	56
MAGSAT-A	SEE MAGSAT							
MARINER 77A	SEE VOYAGER 1							
MARINER 77B	SEE VOYAGER 2							
MARINER JUPITER/SATURN A	SEE VOYAGER 1							
MARINER JUP. TER/SATURN B	SEE VOYAGER 2							
ME01	SEE SMS 1							
ME02	SEE SMS 2							
METEOROLOGICAL SAT-A	SEE METEOSAT 1							
METEOROLOGICAL SAT-B	SEE METEOSAT 2							
METEOSAT 1	INTERNATIONAL ESA	11/25/77	GEOCENTRIC	77-108A	11/24/79	PARTIAL	STND	56

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MDDYY	CURRENT STATUS STATUS	DATA RATE	PAGE NO.
ESA STAFF	UNITED STATES NASA-OSTA			77-108A-01	11/24/79	INOPERABLE	ZERO	97
ESA STAFF	IMAGING RADIOMETER			77-108A-02	11/23/77	NORMAL	STND	97
METEOSAT 2	INTERNATIONAL ESA	12/15/80	GEOCENTRIC	METEOS-0		APPROVED MISSION		130
ESA STAFF	IMAGING RADIOMETER			METEOS-B-01				140
ESA STAFF	DATA COLLECTION PLATFORM (DCP)			METEOS-B-02				140
METEOSAT-B	SEE METEOSAT 2							
RJS 77A	SEE VOYAGER 1							
RJS 77B	SEE VOYAGER 2							
MOTHER	SEE ISEE 1							
RPE SUB-PAYLOAD	SEE FIREWHEEL SUB-SAT 1							
NAT'L OCEANIC SATELLITE	SEE NOSS							
NIMBUS 4	UNITED STATES NASA-OSTA	04/08/70	GEOCENTRIC	70-029A	01/09/70	PARTIAL	STND	97
MEATH	BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER			70-029A-09	01/09/70	PARTIAL	SUBS	97
NIMBUS 5	UNITED STATES NASA-OSTA	12/11/72	GEOCENTRIC	72-097A	01/04/73	PARTIAL	STND	58
HOUGHTON	SELECTIVE CHOPPER RADIOMETER (SCR)			72-097A-02	07/19/75	NORMAL	SUBS	58
WILHELM, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)			72-097A-04	08/19/77	PARTIAL	SUBS	58
NIMBUS 6	UNITED STATES NASA-OSTA	06/12/75	GEOCENTRIC	75-052A	01/00/76	PARTIAL	STND	59
HOUGHTON	PRESSURE-MODULATED RADIOMETER (PMR)			75-052A-09	08/04/76	NORMAL	SUBS	59
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			75-052A-09	06/06/79	PARTIAL	SUBS	59
JULIAN	TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE)			75-052A-01	06/19/75	NORMAL	STND	59
NIMBUS 7	UNITED STATES NASA-OSTA	10/24/78	GEOCENTRIC	78-098A	10/24/78	NORMAL	STND	60
ALLISON	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			78-098A-10	10/24/78	NORMAL	STND	60
GLOERSEN	SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR)			78-098A-08	10/24/78	NORMAL	STND	60
MEATH	SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOPS)			78-098A-09	10/24/78	NORMAL	STND	60
HOUGHTON	STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)			78-098A-02	11/15/78	NORMAL	STND	60
NOVIS	COASTAL ZONE COLOR SCANNER (CZCS)			78-098A-03	10/29/78	NORMAL	STND	61
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			78-098A-07	11/15/78	NORMAL	STND	61
MCCORMICK	STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11)			78-098A-06	10/24/78	NORMAL	STND	61
NIMBUS-B	SEE NIMBUS 4							
NIMBUS-E	SEE NIMBUS 5							
NIMBUS-F	SEE NIMBUS 6							
NIMBUS-G	SEE NIMBUS 7							
NOAA 6	UNITED STATES NOAA-NES	06/27/79	GEOCENTRIC	79-057A	06/27/79	NORMAL	STND	62
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			79-057A-01	06/27/79	NORMAL	STND	62
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			79-057A-02	06/27/79	NORMAL	STND	62
NESS STAFF	DATA COLLECTION SYSTEM			79-057A-03	06/27/79	NORMAL	STND	62
WILLIAMS	SPACE ENVIRONMENT MONITOR			79-057A-04	06/27/79	NORMAL	STND	62
NOAA-A	SEE NOAA 6							
NOAA-B	UNITED STATES NOAA-NES	05/29/80	GEOCENTRIC	80-043A		FAILED MISSION		63
NESS STAFF	UNITED STATES NASA-OSTA			80-043A-01				63
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			80-043A-02				63
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			80-043A-03				63
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			80-043A-04				63
WILLIAMS	SPACE ENVIRONMENT MONITOR							
NOAA-C	UNITED STATES NOAA-NES	04/15/81	GEOCENTRIC	NOAA-C		APPROVED MISSION		140
NESS STAFF	UNITED STATES NASA-OSTA			NOAA-C-01				140
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-C-02				140
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-C-03				140
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-C-04				141
WILLIAMS	SPACE ENVIRONMENT MONITOR							
NOAA-D	UNITED STATES NOAA-NES	04/15/82	GEOCENTRIC	NOAA-D		APPROVED MISSION		141
NESS STAFF	UNITED STATES NASA-OSTA			NOAA-D-01				141
	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)							

ORIGINAL PAGE IS
OF POOR QUALITY

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
NFSS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-B -02				141
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-B -03				141
WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-B -04				142
NOAA-E	UNITED STATES	NOAA-NESS	04/15/83 GEOCENTRIC	NOAA-E		APPROVED MISSION		142
NESS STAFF	UNITED STATES	NASA-OSTA		NOAA-E -01				142
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOPETER (AVHRR)			NOAA-E -02				142
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-E -03				142
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-E -04				143
WILLIAMS	SPACE ENVIRONMENT MONITOR							143
NOAA-F	UNITED STATES	NOAA-NESS	04/15/84 GEOCENTRIC	NOAA-F		APPROVED MISSION		143
BROOME	UNITED STATES	NASA-OSTA		NOAA-F -05				143
NESS STAFF	EARTH RADIATION BUDGET INSTRUMENT (ERB1)			NOAA-F -01				143
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOPETER (AVHRR)			NOAA-F -02				143
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-F -03				144
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-F -04				144
WILLIAMS	SPACE ENVIRONMENT MONITOR							144
NOAA-G	UNITED STATES	NOAA-NESS	04/15/85 GEOCENTRIC	NOAA-G		APPROVED MISSION		144
BROOME	UNITED STATES	NASA-OSTA		NOAA-G -05				144
NESS STAFF	EARTH RADIATION BUDGET INSTRUMENT (ERB1)			NOAA-G -01				144
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-G -02				145
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-G -03				145
WILLIAMS	DATA COLLECTION SYSTEM (DCS)			NOAA-G -04				145
NOSS	UNITED STATES	NASA-OA	00/00/86 GEOCENTRIC	NOSS		APPROVED MISSION		145
DEBRIS	MICROWAVE WIND SCATTEROMETER (SCAT/2)			NOSS -02				145
HEFFERNAN	COMPRESSED PULSE RADAR ALTIMETER (ALT)			NOSS -03				146
MUNDY, JR.	LARGE ANTENNA MULTICHANNEL MICROWAVE RADIOMETER (LAMRR)			NOSS -04				146
PAROBY	COASTAL ZONE COLOR SCANNER/2 (CZCS/2)			NOSS -01				146
NRC SUB-PAYLOAD	SEE FIREWHEEL SUB-SAT 4							
0A0 3	UNITED STATES	NASA-OSS	08/21/72 GEOCENTRIC	72-055A	08/21/72	NORMAL	STND	63
BOYD	STELLAR X-RAYS			72-065A-02	06/00/73	PARTIAL	STND	64
SPITZER	HIGH-RESOLUTION TELESCOPES			72-065A-01	08/21/72	NORMAL	STND	64
0A0-C	SEE 0A0 3							
OSS-1	UNITED STATES	NASA-OSS	04/00/82 GEOCENTRIC	SHOFT-4		APPROVED MISSION		146
BANKS	VEHICLE CHARGING AND POTENTIAL EXPERIMENT			SHOFT-4-04				147
BRUECKNER	SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR			SHOFT-4-03				147
COWLES	INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS			SHOFT-4-07				147
NOVICK	SOLAR FLARE X-RAY POLARIMETER EXPERIMENT			SHOFT-4-02				147
OLLENDORF	THERMAL CANISTER EXPERIMENT			SHOFT-4-05				147
SHANNAN	PLASMA DIAGNOSTIC PACKAGE			SHOFT-4-01				147
WEINBERG	CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE			SHOFT-4-06				148
OUTER PLANETS A	SEE VOYAGER 1							
OUTER PLANETS B	SEE VOYAGER 2							
OVAL	SEE COSMOS 900							
P78-1	SEE STP P78-1							
P78-2	SEE STP P78-2							
P80-1	SEE STP P80-1							
P80-2	SEE STP P80-2							
PIONEER 6	UNITED STATES	NASA-OSS	12/16/65 HELIOCENTRIC	65-105A	02/07/71	NORMAL	SUBS	64
ANDERSON	CELESTIAL MECHANICS			65-105A-07	12/16/65	NORMAL	STND	64
ANDERSON	RELATIVITY INVESTIGATION			65-105A-10	12/16/65	NORMAL	STND	64
BRIDGE	SOLAR WIND PLASMA FARADAY CUP			65-105A-02	12/03/74	PARTIAL	SUBS	64
FAN	COSMIC-RAY TELESCOPE			65-105A-03	12/03/74	NORMAL	SUBS	65
GOLDSTEIN	SPECTRAL BROADENING			65-105A-09	12/16/65	NORMAL	STND	65
MCCRACKEN	COSMIC-RAY ANISOTROPY			65-105A-05	12/03/74	PARTIAL	SUBS	65
WOLFE	ELECTROSTATIC ANALYZER			65-105A-06	12/03/74	NORMAL	SUBS	65
PIONEER 9	UNITED STATES	NASA-OSS	11/02/68 HELIOCENTRIC	68-100A	05/19/69	NORMAL	SUBS	65
ANDERSON	CELESTIAL MECHANICS			68-100A-04	11/02/68	NORMAL	STND	66
BERG	COSMIC DUST DETECTOR			68-100A-08	05/19/69	NORMAL	SUBS	66
ESHLEMAN	TWO-FREQUENCY BEACON RECEIVER			68-100A-03	12/03/74	NORMAL	SUBS	66
MCCRACKEN	COSMIC-RAY ANISOTROPY			68-100A-05	05/19/69	NORMAL	SUBS	66

ORIGINAL PAGE IS
OF POOR QUALITY

3

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
SCARF	PLASMA WAVE DETECTOR			68-100A-07	05/19/69	NORMAL	SUBS	67
SONETT	TRIAIAL MAGNETOMETER			68-100A-01	05/19/69	NORMAL	SUBS	67
WEBER	COSMIC-RAY TELESCOPE			68-100A-06	05/19/69	NORMAL	SUBS	67
WOLFE	ELECTROSTATIC ANALYZER			68-100A-02	12/03/74	NORMAL	SUBS	67
PIONEER 10	UNITED STATES	NASA-OSS	03/03/72 JUPITER FLYBY	72-012A	03/03/72	NORMAL	STND	67
ANDERSON	CELESTIAL MECHANICS			72-012A-09	03/03/72	NORMAL	STND	68
FILLIUS	JOVIAN TRAPPED RADIATION			72-012A-05	12/19/73	NORMAL	STND	68
GENRELS	IMAGING PHOTOPOLARIMETER (IPP)			72-012A-07	03/03/72	NORMAL	STND	68
JUDGE	ULTRAVIOLET PHOTOMETRY			72-012A-06	03/03/72	NORMAL	STND	68
KINARD	METEOROID DETECTORS			72-012A-04	03/03/72	NORMAL	STND	68
KLIJORE	S-BAND OCCULTATION			72-012A-10	12/05/73	NORMAL	ZERO	69
MCDONALD	COSMIC-RAY SPECTRA			72-012A-12	03/03/72	NORMAL	STND	69
SIMPSON	CHARGED PARTICLE COMPOSITION			72-012A-02	03/03/72	NORMAL	STND	69
VAN ALLEN	JOVIAN CHARGED PARTICLES			72-012A-11	03/03/72	NORMAL	STND	69
WOLFE	PLASMA			72-012A-15	03/03/72	NORMAL	STND	69
PIONEER 11	UNITED STATES	NASA-OSS	04/06/73 SATURN FLYBY	73-019A	04/06/73	NORMAL	STND	70
ACUNA	JOVIAN MAGNETIC FIELD			73-019A-14	09/07/79	INOPERABLE	ZERO	70
ANDERSON	CELESTIAL MECHANICS			73-019A-09	04/06/73	NORMAL	STND	70
FILLIUS	JOVIAN TRAPPED RADIATION			73-019A-05	04/06/73	NORMAL	STND	70
GENRELS	IMAGING PHOTOPOLARIMETER (IPP)			73-019A-07	04/06/73	NORMAL	STND	71
INGERSOLL	INFRARED RADIOMETER			73-019A-08	10/03/79	NORMAL	ZERO	71
JUDGE	ULTRAVIOLET PHOTOMETRY			73-019A-06	04/06/73	NORMAL	STND	71
KINARD	METEOROID DETECTORS			73-019A-04	04/06/73	NORMAL	STND	71
KLIJORE	S-BAND OCCULTATION			73-019A-10	09/02/79	NORMAL	ZERO	71
MCDONALD	COSMIC-RAY SPECTRA			73-019A-12	04/06/73	NORMAL	STND	71
SIMPSON	CHARGED PARTICLE COMPOSITION			73-019A-02	04/06/73	NORMAL	STND	72
SMITH	MAGNETIC FIELDS			73-019A-01	04/06/73	NORMAL	STND	72
VAN ALLEN	JOVIAN CHARGED PARTICLES			73-019A-11	04/06/73	NORMAL	STND	72
WOLFE	PLASMA			73-019A-13	12/04/77	NORMAL	STND	72
PIONEER VENUS 1	UNITED STATES	NASA-OSS	05/20/78 VENUS ORBITER	78-051A	05/20/78	NORMAL	STND	72
BRACE	LANGMUIR PROBE			78-051A-01	12/05/78	NORMAL	STND	73
CROFT	RADIO SCIENCE TEAM			78-051A-03	05/20/78	NORMAL	STND	73
DONAHUE	PARTICIPATING THEORIST DONAHUE			78-051A-04	NA	NA	NA	73
EVANS	TRANSIENT GAMMA-RAY SOURCES			78-051A-05	05/20/78	NORMAL	STND	73
HANSEN	CLOUD PHOTOPOLARIMETER			78-051A-06	05/20/78	NORMAL	STND	73
KNUDSEN	RETARDING POTENTIAL ANALYZER			78-051A-07	05/20/78	NORMAL	STND	73
MASURSKY	PARTICIPATING THEORIST MASURSKY			78-051A-08	NA	NA	NA	74
MC GILL	PARTICIPATING THEORIST MC GILL			78-051A-09	NA	NA	NA	74
NAGY	PARTICIPATING THEORIST NAGY			78-051A-10	NA	NA	NA	74
NIMMANN	NEUTRAL PARTICLE MASS SPECTROMETER			78-051A-11	12/05/78	NORMAL	STND	74
PETTENGILL	RADAR ALTIMETER			78-051A-02	02/12/79	NORMAL	STND	74
RUSSELL	TRIAIAL FLUXGATE MAGNETOMETER			78-051A-12	05/20/78	NORMAL	STND	74
SCARF	ELECTRIC FIELD DETECTOR			78-051A-13	05/20/78	NORMAL	STND	74
SCHUBERT	PARTICIPATING THEORIST SCHUBERT			78-051A-14	NA	NA	NA	75
STEWART	PROGRAMMABLE ULTRAVIOLET SPECTROMETER			78-051A-15	12/05/78	NORMAL	STND	75
TAYLOR, JR.	ION MASS SPECTROMETER			78-051A-17	12/05/78	NORMAL	STND	75
WOLFE	SOLAR WIND PLASMA DETECTOR			78-051A-18	05/20/78	NORMAL	STND	75
PIONEER VENUS 1978 ORBIT	SEE PIONEER VENUS 1							
PIONEER VENUS ORBITER	SEE PIONEER VENUS 1							
PIONEER-A	SEE PIONEER 6							
PIONEER-D	SEE PIONEER 9							
PIONEER-F	SEE PIONEER 10							
PIONEER-G	SEE PIONEER 11							
PROGNOZ 7	U.S.S.R.	SAS	10/30/78 GEOCENTRIC	78-101A	06/00/79	NORMAL	ZERO	75
DOLGINOV	THREE-AXIS FLUXGATE MAGNETOMETERS			78-101A-04	06/00/79	NORMAL	ZERO	75
ESTULIN	GAMMA-RAY SPECTROMETER			78-101A-03	06/00/79	NORMAL	ZERO	75
GRINGAUZ	ELECTRIC SCANNING PLASMA DETECTOR			78-101A-05	06/00/79	INOPERABLE	ZERO	76
MULTQVIST	MAGNETOSPHERIC ION COMPOSITION SPECTROMETER			78-101A-02	06/00/79	NORMAL	ZERO	76
KACHAROV	X-RAY SPECTROMETER			78-101A-06	06/00/79	NORMAL	ZERO	76
KOVALEV	PROTON SPECTROMETER			78-101A-14	06/00/79	NORMAL	ZERO	76
KOVALEV	STANDARD DOSIMETER			78-101A-15	06/00/79	NORMAL	ZERO	76
KULAGIN	UV DETECTOR			78-101A-08	06/00/79	NORMAL	ZERO	76
LICKIN	SOLAR X-RAY SPECTROMETER			78-101A-07	06/00/79	NORMAL	ZERO	76
LOGACHEV	ELECTRON AND PROTON SPECTROMETER			78-101A-11	06/00/79	NORMAL	ZERO	76
LOGACHEV	ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION			78-101A-12	06/00/79	NORMAL	ZERO	76
LOGACHEV	GAS DISCHARGE COUNTER			78-101A-13	06/00/79	NORMAL	ZERO	77
PISARENKO	ENERGETIC ELECTRON SPECTROMETER			78-101A-09	06/00/79	NORMAL	ZERO	77
SEVERNY	UV EMISSION SPECTROMETER			78-101A-10	06/00/79	NORMAL	ZERO	77
VAISBERG	SELECTIVE COMBINED PLASMA SPECTROMETER (SCS)			78-101A-01	06/00/79	NORMAL	ZERO	77
S 6E	SEE AE-E							
SAGE	UNITED STATES	NASA-OSTA	02/18/79 GEOCENTRIC	79-013A	12/11/79	NORMAL	SUBS	77

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	-----CURRENT STATUS-----			PAGE NO.
					EPOCH RHHBYV	STATUS	DATA RATE	
MCCORMICK	STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)			79-013A-01	06/12/79	PARTIAL	SUBS	77
SAN MARCO-B/L	ITALY CRA UNITED STATES NASA-OSS	11/06/81	GEOCENTRIC	SM-DL		APPROVED MISSION		148
BROGLIO	DRAG BALANCE AND AIR DENSITY			SM-DL -01				148
HANSON	ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI			SM-DL -03				148
RAYNARD	3-AXIS ELECTRIC FIELD INSTRUMENT (EFI)			SM-DL -05				149
SCHMIDTKE	AIRGLOW-SOLAR SPECTROMETER			SM-DL -02				149
SPENCER	WIND AND TEMPERATURE SPECTROMETER (WATS)			SM-DL -04				149
SAN MARCO-B/M	UNITED STATES NASA-OSS ITALY CRA	11/06/82	GEOCENTRIC	SM-DM		APPROVED MISSION		149
BROGLIO	IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT			SM-DM -01				149
SAS-D	SEE IUE							
SATS	SEE HCMM							
SCATHA	SEE STP P78-2							
SEO	SEE BHASKARA							
SESP NO. NRL-111-0264	SEE SOLRAD 118							
SESP P74-1D	SEE SOLRAD 118							
SESP P78-2A	SEE STP P78-2							
SHUTTLE OFV-4	SEE OSS-1							
SIRE	SEE STP P80-2							
SME	UNITED STATES NASA-OSS	09/30/81	GEOCENTRIC	SME		APPROVED MISSION		149
BARTH	UV OZONE			SME -01				150
BARTH	INFRARED RADIOMETER			SME -02				150
BARTH	1.27 MICROMETER AIRGLOW			SME -03				150
BARTH	VISIBLE NITROGEN DIOXIDE			SME -04				150
BARTH	SOLAR UV MONITOR			SME -05				150
BARTH	SOLAR PROTON ALARM			SME -06				151
SMM	UNITED STATES NASA-OSS	02/14/80	GEOCENTRIC	80-014A	02/14/80	NORMAL	STND	77
ACTON	SOFT X-RAY POLYCHROMATOR (XRP)			80-014A-04	02/22/80	NORMAL	STND	78
CHUPP	GAMMA RAY SPECTROMETER (GRE)			80-014A-07	02/17/80	NORMAL	STND	78
DE JAGER	HARD X-RAY IMAGING SPECTROMETER (HXIS)			80-014A-05	02/21/80	NORMAL	STND	78
FROST	HARD X-RAY BURST SPECTROMETER (HARBS)			80-014A-06	02/19/80	NORMAL	STND	78
HOUSE	CORONAGRAPH/POLARIMETER			80-014A-01	02/20/80	NORMAL	STND	78
TANDBERG-NANSEN	ULTRAVIOLET SPECTROMETER AND POLARIMETER			80-014A-02	02/21/80	NORMAL	STND	79
WILLSON	ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR			80-014A-08	02/16/80	NORMAL	STND	79
SMS 1	UNITED STATES NOAA-NESS	05/17/74	GEOCENTRIC	74-033A	01/00/80	NORMAL	STND	79
NESS STAFF	UNITED STATES NASA-OSTA			74-033A-01	04/19/79	PARTIAL	ZERO	79
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			74-033A-05	04/19/79	PARTIAL	ZERO	79
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			74-033A-02	01/00/80	NORMAL	STND	80
WILLIAMS	ENERGETIC PARTICLE MONITOR			74-033A-03	01/00/80	NORMAL	STND	80
WILLIAMS	SOLAR X-RAY MONITOR			74-033A-04	06/18/80	PARTIAL	STND	80
WILLIAMS	MAGNETIC FIELD MONITOR							
SMS 2	UNITED STATES NOAA-NESS	02/06/75	GEOCENTRIC	75-011A	04/19/79	NORMAL	STND	80
NESS STAFF	UNITED STATES NASA-OSTA			75-011A-04	04/19/79	NORMAL	STND	80
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-011A-05	04/19/79	PARTIAL	SUBS	81
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-011A-01	07/03/78	NORMAL	ZERO	81
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-011A-02	07/03/78	NORMAL	ZERO	81
WILLIAMS	SOLAR X-RAY MONITOR			75-011A-03	07/03/78	PARTIAL	ZERO	81
WILLIAMS	MAGNETIC FIELD MONITOR							
SMS-A	SEE SMS 1							
SMS-B	SEE SMS 2							
SMS-C	SEE GOES 1							
SOLAR MAXIMUM MISSION	SEE SMM							
SOLAR MESOSPHERE EXPL	SEE SME							
SOLAR POLAR	SEE ISPM/ESA							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.	
-----CURRENT STATUS-----									
SOLAR POLAR	SEE ISPR/NASA								
SOLRAD 11B	UNITED STATES	DOD-NAVY	03/15/76	GEOCENTRIC	76-0230	10/31/79	INOPERABLE	ZERO	01
KREPLIN	1- TO 8-A SOLAR X-RAY MONITOR				76-0230-04	10/31/79	INOPERABLE	ZERO	01
KREPLIN	8- TO 16-A SOLAR X-RAY MONITOR				76-0230-05	10/31/79	INOPERABLE	ZERO	01
KREPLIN	44- TO 60-A SOLAR X-RAY MONITOR				76-0230-06	10/31/79	INOPERABLE	ZERO	02
KREPLIN	170- TO 1050-A SOLAR EUV MONITOR				76-0230-07	10/31/79	INOPERABLE	ZERO	02
KREPLIN	0.5- TO 3-A SOLAR X-RAY MONITOR				76-0230-12	10/31/79	INOPERABLE	ZERO	02
KREPLIN	2- TO 10-A SOLAR X-RAY MONITOR				76-0230-13	10/31/79	INOPERABLE	ZERO	02
NEEKINS	CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR				76-0230-03	07/00/79	INOPERABLE	ZERO	02
SOLRAD HI-TRIP	SEE SOLRAD 11B								
SOLWIND	SEE STP P78-1								
SOLWIND	SEE STP P78-1								
SP74-10	SEE SOLRAD 11B								
SPACE SHUTTLE LDEF-A	UNITED STATES	NASA-OAST	01/00/84	GEOCENTRIC	SSLDEF		APPROVED MISSION	151	
AHLBORN	ORBITAL LUBRICATION EXPERIMENT				SSLDEF -25			151	
BANKS	ION BEAM TEXTURED AND COATED SURFACES				SSLDEF -01			151	
SLUE	EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS				SSLDEF -26			151	
DOURRIEU	OPTICAL FIBERS AND COMPONENTS				SSLDEF -43			151	
BRANDHORST, JR.	ADVANCED PHOTOVOLTAIC EXPERIMENT				SSLDEF -02			151	
BUCKER	FREE FLYER BIOSTACK				SSLDEF -50			152	
CALHOUN	CASCADE VARIABLE CONDUCTANCE HEAT PIPE				SSLDEF -39			152	
CALLEN	SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS				SSLDEF -08			152	
CRIFO	THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE				SSLDEF -40			152	
DELASI	EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS				SSLDEF -20			152	
FELBECK	INFLUENCE OF SPACE EXPOSURE ON MECH PROPERTIES OF HI-TOUGHNESS GRAPHITE-EPOXY				SSLDEF -06			152	
FILZ	PASSIVE COSMIC RADIATION DETECTOR				SSLDEF -14			152	
FLAMAND	RULED AND HOLOGRAPHIC GRATINGS				SSLDEF -42			152	
GREGORY	THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE				SSLDEF -19			152	
GRUBER	SPACE POWER EXPERIMENT				SSLDEF -11			153	
HANKS	SHUTTLE BAY ENVIRONMENT MEASUREMENTS				SSLDEF -29			153	
HICKEY	PASSIVE EXPOSURE OF EARTH RADIATION BLDG1 EXPERIMENT COMPONENTS				SSLDEF -27			153	
HORZ	CHEMISTRY OF MICROMETEORIODS				SSLDEF -51			153	
HUMES	SPACE DEBRIS IMPACT STUDY				SSLDEF -36			153	
JOHNSTON	FIBER OPTICS EXPERIMENT				SSLDEF -03			153	
LAVOI	LARGE SPACE STRUCTURE LIGHTING EVALUATION				SSLDEF -47			153	
LIND	GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY				SSLDEF -17			153	
LIND	INTERSTELLAR GAS				SSLDEF -48			153	
MALHERBE	VACUUM DEPOSITED OPTICAL COATINGS				SSLDEF -41			154	
MANDEVILLE	STUDY OF METEORIODS IMPACT CRATERS ON VARIOUS MATERIAL				SSLDEF -32			154	
MANDEVILLE	DUST DEBRIS COLLECTION WITH STACKED DETECTORS				SSLDEF -33			154	
MCDONNELL	MULTIPLE FOIL MICROABRASION PACKAGE				SSLDEF -31			154	
MCINTOSH, JR.	LOW TEMPERATURE HEAT PIPE EXPERIMENT				SSLDEF -12			154	
MILLER	INDUCED ENVIRONMENT CONTAMINATION MONITOR				SSLDEF -30			154	
NICHOLS	EFFECTS OF SOLAR RADIATION ON GLASSES				SSLDEF -44			154	
O'SULLIVAN	HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS				SSLDEF -49			154	
PAILLOUS	THERMAL COATINGS AND STRUCTURAL MATERIAL				SSLDEF -34			154	
POWELL	GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE				SSLDEF -35			155	
PREUSS	CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS				SSLDEF -46			155	
RAND	BALLOON MATERIALS DEGRADATION				SSLDEF -38			155	
ROBERTSON	EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS				SSLDEF -18			155	
ROBINSON, JR.	TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE				SSLDEF -37			155	
SCHALL	SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS				SSLDEF -15			155	
SCOTT, JR.	ATOMIC OXYGEN STIMULATED OUTGASSING				SSLDEF -07			155	
SEELEY	HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS				SSLDEF -23			155	
SELLEN, JR.	SPACE PLASMA-HIGH VOLTAGE DRAINAGE				SSLDEF -09			156	
SHAPIRO	HEAVY IONS IN SPACE				SSLDEF -13			156	
SLEMP	THERMAL CONTROL SURFACES (PASSIVE)				SSLDEF -05			156	
SLEMP	SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT				SSLDEF -21			156	

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME * PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSDC ID	-----CURRENT STATUS----- EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
TAYLOR	SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS			SSLDEF -16				156
TENNYSON	PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT			SSLDEF -24				156
VENABLES	RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT			SSLDEF -22				156
WHITAKER WILKES	SOLAR ARRAY MATERIALS (PASSIVE) THERMAL CONTROL SURFACES			SSLDEF -45 SSLDEF -04				156 156
SPACE TELESCOPE	SEE ST							
SPACE TEST PROGRAM P78-1	SEE STP P78-1							
SPACE TEST PROGRAM P80-1	SEE STP P80-1							
SPACE TEST PROGRAM P80-2	SEE STP P80-2							
SPACELAB 1	INTERNATIONAL UNITED STATES	ESA NASA-OSS	05/00/83 GEOCENTRIC	SPALAB1		APPROVED MISSION		157
ACKERMAN	GRILLE SPECTROMETER			SPALAB1-18				157
ANDRESEN	ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER			SPALAB1-28				157
BEAUJEAN	ISOTOPE STACK			SPALAB1-29				157
BEGHIN	PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS			SPALAB1-25				157
BENTON	MZE-PARTICLE DOSIMETRY			SPALAB1-11				158
BERTAUX	INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA			SPALAB1-22				158
BOWYER	FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT			SPALAB1-07				158
BROWN	MUTATION OF HELIANTHUS ANNUUS			SPALAB1-12				158
BUCKER	ADVANCED BIOSTACK EXPERIMENT			SPALAB1-32				158
COGOLI	LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS			SPALAB1-36				158
COURTES	VERY WIDE FIELD GALACTIC CAMERA			SPALAB1-27				158
CROMBIE	ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT			SPALAB1-26				159
ESA STAFF	METRIC CAMERA FACILITY			SPALAB1-38				159
ESA STAFF	MICROWAVE FACILITY			SPALAB1-39				159
ESA STAFF	SPACE SLED FACILITY			SPALAB1-40				159
ESA STAFF	SPACE PROCESSING LABORATORY			SPALAB1-42				159
GAUER	MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN			SPALAB1-31				159
GAUER	COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES			SPALAB1-37				159
GAUSE	TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL			SPALAB1-10				160
GREEN	ELECTRO-PHYSIOLOGICAL TAPE RECORDER			SPALAB1-35				160
MART	GEOPHYSICAL FLUID FLOW			SPALAB1-08				160
HERSE	WAVES IN THE OH EMISSION LAYER			SPALAB1-19				160
HONECK	MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT			SPALAB1-34				160
KIRZEY	INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN			SPALAB1-14				160
MEHDE	ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING			SPALAB1-03				160
OBAYASHI	SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)			SPALAB1-02				161
PAN	BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G			SPALAB1-09				161
RESCHKE	VESTIBULO-SPINAL REFLEX MECHANISMS			SPALAB1-16				161
ROSS	MASS DISCRIMINATION DURING WEIGHTLESSNESS			SPALAB1-30				161
SCANO	BALISTOCARDIOGRAPHIC RESEARCH IN WEIGHTLESSNESS			SPALAB1-33				161
SULZMAN	CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS			SPALAB1-15				161
THEILE	DC AND LOW FREQUENCY VECTOR MAGNETOMETER			SPALAB1-23				161
THUILLIER	TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE			SPALAB1-20				162
THUILLIER	MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS			SPALAB1-21				162
TORR	AN IMAGING SPECTROMETRIC OBSERVATORY			SPALAB1-01				162
VON BAUMGARTEN	HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS)			SPALAB1-41				162
VOSS, JR.	EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS			SPALAB1-17				162
WILHELM	STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION			SPALAB1-24				162
WILLSON	ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR			SPALAB1-04				163
YOUNG	VESTIBULAR STUDIES			SPALAB1-13				163
SPACELAB 2	UNITED STATES	NASA-OSS	11/00/83 GEOCENTRIC	SPALAB2		APPROVED MISSION		163
BRUECKNER	SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS)			SPALAB2-10				163
BRUECKNER	SOLAR UV SPECTRAL IRRADIANCE MONITOR			SPALAB2-11				163

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NS3DC ID	EPOCH R0DDYV	STATUS	DATA RATE	PAGE NO.
	(SUSIM)							
COWLES	INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION			SPALAB2-02				164
FAJIO	SMALL, HELIUM-COOLED INFRARED TELESCOPE			SPALAB2-05				164
GABRIEL	SOLAR CORONAL HELIUM ABUNDANCE			SPALAB2-09				164
LANGE	IN-ORBIT CALIBRATION OF LOW-G MINIATURE ELECTROSTATIC ACCELEROMETER			SPALAB2-12				165
MASON	DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G			SPALAB2-13				165
MENDILLO	PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY			SPALAB2-04				165
MEYER	ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI			SPALAB2-06				165
SCHNOES	VITAMIN D METABOLITES AND BONE DEMINERALIZATION			SPALAB2-01				166
SHAWHAN	EJECTABLE PLASMA DIAGNOSTICS PACKAGE			SPALAB2-03				166
TITL	SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM			SPALAB2-08				166
WILLMORE	HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES			SPALAB2-07				166
SPACELAB 3	UNITED STATES NASA-OSS 04/18/84 GEOCENTRIC			SPALAB3				167
BISWAS	IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES			SPALAB3-15				167
FARMER	ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMOS)			SPALAB3-14				167
HART	GEOPHYSICAL FLUID FLOW CELL (GFFC)			SPALAB3-10				167
LAL	FLUID EXPERIMENT SYSTEMS (FES)			SPALAB3-01				167
NONE ASSIGNED	RESEARCH ANIMAL HOLDING FACILITY (RAHF)			SPALAB3-11				167
NONE ASSIGNED	LIFE SCIENCES MINILAB			SPALAB3-12				168
RUSSELL, SRD	HALOGEN OCCULTATION EXPERIMENT (HALOE)			SPALAB3-13				168
SCHNEPPLE	VAPOR CRYSTAL GROWTH SYSTEM (VCGS)			SPALAB3-02				168
WANG	DRCP DYNAMICS MODULE (DDM) EXPERIMENTS			SPALAB3-09				168
SRC SUB-PAYLOAD	SEE FIREWHEEL SUB-SAT 2							
ST	UNITED STATES NASA-OSS 12/15/83 GEOCENTRIC			LST		APPROVED MISSION		168
PLESS	HIGH-SPEED PHOTOMETER (HSP)			LST -06				169
BRANDT	HIGH-RESOLUTION SPECTROGRAPH (HRS)			LST -02				169
HARMS	FAINT-OBJECT SPECTROGRAPH (FOS)			LST -03				169
JEFFERYS	ASTROMETRY SCIENCE			LST -09				169
VAN DE HULST	FAINT-OBJECT CAMERA (FOC)			LST -08				170
WESTPHAL	WIDE-FIELD CAMERA (WFC)			LST -07				170
STP P78-1	UNITED STATES DOD-USAF 02/24/79 GEOCENTRIC			79-017A	02/24/79	NORMAL	STND	82
BOWYER	EXTREME ULTRAVIOLET SPECTROMETER			79-017A-04	03/13/80	NORMAL	ZERO	82
IMHOF	GAMMA RAY SPECTROMETER			79-017A-01	02/24/79	NORMAL	STND	83
LANDECKER	SOLAR X-RAY SPECTROMETER			79-017A-03	02/24/79	NORMAL	STND	83
MICHELIS	SOLAR WIND P NITOR			79-017A-02	02/24/79	PARTIAL	STND	83
PEPIN	PRELIMINARY AEROSOL MONITOR			79-017A-07	02/24/79	NORMAL	STND	83
SHULMAN	X-RAY MONITOR			79-017A-06	02/24/79	NORMAL	STND	83
VANCOUR	HIGH LATITUDE PARTICLE SPECTROMETER			79-017A-05	02/24/79	NORMAL	STND	83
STP P78-2	UNITED STATES DOD-USAF 01/30/79 GEOCENTRIC			79-007A	01/30/79	NORMAL	STND	83
AGGOSON	ELECTRIC FIELD DETECTOR			79-007A-05	02/25/79	NORMAL	STND	84
BLAKE	ENERGETIC PROTON DETECTOR			79-007A-14	01/31/79	NORMAL	STND	84
COHEN	ELECTRON GUN-ION GUN			79-007A-07	10/25/79	PARTIAL	STND	84
DEFORREST	UCSD CHARGED PARTICLE DETECTOR			79-007A-11	01/31/79	NORMAL	STND	84
FENNELL	SPACECRAFT SHEATH FIELDS DETECTOR			79-007A-06	03/30/79	PARTIAL	SUBS	84
HALL	QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS			79-007A-03	01/30/79	NORMAL	STND	84
HALL	THERMAL CONTROL SAMPLE MONITOR			79-007A-04	01/30/79	NORMAL	STND	84
HARDY	RAPID SCAN PARTICLE DETECTOR			79-007A-12	02/09/79	NORMAL	STND	85
JOHNSON	ENERGETIC ION SPECTROMETER			79-007A-13	02/08/79	NORMAL	STND	85
KOONS	CHARGING ELECTRICAL EFFECTS ANALYZER			79-007A-02	02/05/79	NORMAL	STND	85
LEDLEY	MAGNETIC FIELD MONITOR			79-007A-08	02/22/79	NORMAL	STND	85
MIZERA	SPACECRAFT SURFACE POTENTIAL MONITOR			79-007A-01	02/05/79	NORMAL	STND	85
REAGAN	HIGH-ENERGY PARTICLE DETECTOR			79-007A-15	01/31/79	NORMAL	STND	85
STP P80-1	UNITED STATES DOD-USAF 2 QTR 81 GEOCENTRIC			P80-1		APPROVED MISSION		170
BOWYER	EXTREME ULTRAVIOLET PHOTOMETER			P80-1 -03				170
LARSON	TEAL RUBY			P80-1 -01				170
POWER	ION AUXILIARY PROPULSION SYSTEM			P80-1 -02				170
STP P80-2	UNITED STATES DOD-USAF 1 QTR 81 GEOCENTRIC			P80-2		APPROVED MISSION		171
LYONS	SATELLITE INFRARED (SIRE)			P80-2 -01				171
SIMPSON	COSMIC RAY ISOTOPE (CRIE)			P80-2 -02				171
STP PROPE	SEE ISEE 1							
STRAT AERO AND GAS EXP	SEE SAGE							
SYNCH METEOROL SATELL A	SEE SMS 1							
SYNCH METEOROL SATELL B	SEE SMS 2							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

* SPACECRAFT NAME		COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
*PRINC. INVEST. NAME		EXPERIMENT NAME							
TIP 1	POTENRA	UNITED STATES	DOD-NAVY 09/02/72	GEOCENTRIC	72-069A	12/00/74	NORMAL	STND	85
					72-069A-01	09/02/72	NORMAL	STND	86
TIROS-N		UNITED STATES	NOAA-NESS 10/13/78	GEOCENTRIC	78-096A	10/13/78	NORMAL	STND	86
	NESS STAFF	UNITED STATES	NASA-OSTA		78-096A-01	10/13/78	NORMAL	STND	86
	NESS STAFF		ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)		78-096A-02	10/13/78	NORMAL	STND	86
	NESS STAFF		OPERATIONAL VERTICAL SOUNDER		78-096A-03	10/13/78	NORMAL	STND	86
	WILLIAMS		DATA COLLECTION SYSTEM (DCS)		78-096A-04	10/13/78	NORMAL	STND	86
			SPACE ENVIRONMENT MONITOR						
TRIAD			SEE TIP 1						
TRIAD 1			SEE TIP 1						
TRIAD A			SEE TIP 1						
TRIAD OI 1X			SEE TIP 1						
UARS-1	BRUECKNER	UNITED STATES	NASA-DA 10/00/86	GEOCENTRIC	UARS-1		APPROVED MISSION		171
	CARLSON		SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM		UARS-1 -08				171
	CHANG		GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT		UARS-1 -14				171
	CUNNOLD		THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE		UARS-1 -24				172
	GELLER		PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE		UARS-1 -18				172
	GILLE		OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS		UARS-1 -20				172
	GILLE		ADVANCED LIMB SCANNER		UARS-1 -10				172
	GRAYSTONE		CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER		UARS-1 -12				172
	GROSE		THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE		UARS-1 -25				173
	HAYS		STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS		UARS-1 -22				173
	HEELIS		HIGH RESOLUTION DOPPLER IMAGER (HRDI)		UARS-1 -02				173
	HOLTON		ION CONVECTION ELECTRODYNAMICS		UARS-1 -06				173
	HOUGHTON		WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE		UARS-1 -17				173
	LONDON		AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)		UARS-1 -11				173
	MILLER		RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY		UARS-1 -19				174
	MOUNT		SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION		UARS-1 -16				174
	REBER		ULTRAVIOLET OZONE SPECTROMETER		UARS-1 -03				174
	ROCHE		ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS		UARS-1 -21				174
	ROTHMAN		ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE		UARS-1 -05				174
	RUSSELL, SRD		ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT		UARS-1 -04				174
	THUILLIER		HALOGEN OCCULTATION EXPERIMENT (HALOE) TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE		UARS-1 -09				175
	TORR		ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER		UARS-1 -01				175
	WATERS		MICROWAVE LIMB SOUNDER (MLS)		UARS-1 -15				175
	WINNINGHAM		PARTICLE ENVIRONMENT MONITOR (PEM)		UARS-1 -07				175
	ZUREK		RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE		UARS-1 -25				176
UARS-2	BRUECKNER	UNITED STATES	NASA-OA 10/00/87	GEOCENTRIC	UARS-2		APPROVED MISSION		176
	CARLSON		SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM		UARS-2 -08				176
	CHANG		GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT		UARS-2 -14				176
	GELLER		THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE		UARS-2 -24				176
	GILLE		OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS		UARS-2 -20				177
	GILLE		ADVANCED LIMB SCANNER		UARS-2 -10				177
	GRAYSTONE		CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER		UARS-2 -12				177
	GROSE		THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE		UARS-2 -25				177
	HAYS		STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS		UARS-2 -22				177
	HEELIS		HIGH RESOLUTION DOPPLER IMAGER (HRDI)		UARS-2 -02				177
	HOLTON		ION CONVECTION ELECTRODYNAMICS		UARS-2 -06				178
	HOUGHTON		WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE		UARS-2 -17				178
			AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS)		UARS-2 -11				178

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
LONDON	RESPONSE OF UPPER ATMOSPHERE PARAMETERS 1C VARIATIONS OF SOLAR ACTIVITY			UARS-2 -19				178
MILLER	SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION			UARS-2 -16				178
MOUNT POTEMPA	ULTRAVIOLET OZONE SPECTROMETER			UARS-2 -03				178
REBER	MAGNETOMETER EXPERIMENT			UARS-2 -26				179
	ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS			UARS-2 -21				179
ROCHE	ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE			UARS-2 -08				179
ROTTMAN	ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT			UARS-2 -04				179
RUSSELL, JR	HALOGEN OCCULTATION EXPERIMENT (HALOE)			UARS-2 -09				179
THUILLIER	TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE			UARS-2 -01				180
TORR	ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER			UARS-2 -15				180
WATERS	MICROWAVE LIND SOUNDER (MLS)			UARS-2 -13				180
WINNINGHAM	PARTICLE ENVIRONMENT MONITOR (PEM)			UARS-2 -07				180
ZUREK	RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE			UARS-2 -23				180
UCB SUB-PAYLOAD		SEE FIREWHEEL SUB-SAT 3						
UK 5	UNITED KINGDOM SRC UNITED STATES NASA-OSS	10/19/74	GEOCENTRIC	74-077A	03/14/80	INOPERABLE	ZERO	87
BOYD	0.3- TO 30-KEV COSMIC X RAY WITH A RECTANGULAR COLLIMATOR			74-077A-01	03/14/80	INOPERABLE	ZERO	87
BOYD	HIGH-RESOLUTION SOURCE SPECTRA			74-077A-03	03/14/80	INOPERABLE	ZERO	87
ELLIOT	HIGH-ENERGY COSMIC X-RAY SPECTRA			74-077A-05	03/14/80	INOPERABLE	ZERO	87
NOLT	ALL-SKY MONITOR			74-077A-06	03/14/80	INOPERABLE	ZERO	87
POUNDS	2- TO 10-KEV SKY SURVEY			74-077A-02	03/14/80	INOPERABLE	ZERO	87
POUNDS	POLARIMETER/SPECTROMETER			74-077A-04	03/14/80	INOPERABLE	ZERO	88
UK 6	UNITED KINGDOM SRC UNITED STATES NASA-OSS	06/02/79	GEOCENTRIC	79-047A	06/02/79	PARTIAL	STND	88
BOYD	X-RAY GRAZING INCIDENCE SYSTEM			79-047A-03	06/02/79	PARTIAL	SUBS	88
FOULER	COSMIC RAY			79-047A-01	06/02/79	PARTIAL	SUBS	88
POUNDS	X-RAY PROPORTIONAL COUNTERS			79-047A-02	06/02/79	PARTIAL	SUBS	88
UME 2	SEE ISS-0							
UNITED KINGDOM-5	SEE UK 5							
UNITED KINGDOM-6	SEE UK 6							
UPPER ATMOSP. RESEAR. SAT	SEE UARS-1							
UPPER ATMOSP. RESEAR. SAT	SEE UARS-2							
USAF OPERATIONAL SAT-76	SEE 1976-059A							
USAF OPERATIONAL SAT-77	SEE 1977-007A							
USAF OPERATIONAL SAT-79	SEE 1979-053A							
VELA 5A	UNITED STATES DOD-USAF	05/23/69	GEOCENTRIC	69-046D	03/00/80	NORMAL	ZERO	88
BAME	SOLAR WIND			69-046D-05	03/00/80	PARTIAL	ZERO	88
BAME	NEUTRON DETECTOR			69-046D-07	03/00/80	NORMAL	ZERO	89
CHAMBERS	SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A			69-046D-02	03/00/80	PARTIAL	ZERO	89
KLEBSADEL	GAMMA-RAY ASTRONOMY			69-046D-08	03/00/80	NORMAL	ZERO	89
VELA 5B	UNITED STATES DOD-USAF	05/23/69	GEOCENTRIC	69-046E	03/00/80	PARTIAL	ZERO	89
BAME	SOLAR WIND			69-046E-05	03/00/80	PARTIAL	ZERO	89
BAME	NEUTRON DETECTOR			69-046E-07	03/00/80	NORMAL	ZERO	90
BELIAN	COSMIC X RAYS			69-046E-06	06/15/79	INOPERABLE	ZERO	90
HIGBIE	SOLAR PARTICLE TELESCOPES			69-046E-03	03/00/80	NORMAL	ZERO	90
HIGBIE	ELECTRON DETECTORS			69-046E-04	03/00/80	NORMAL	ZERO	90
KLEBSADEL	GAMMA RAY ASTRONOMY			69-046E-08	03/00/80	NORMAL	ZERO	90
VELA 5B (USAF)	SEE VELA 5B							
VELA 6A	UNITED STATES DOD-USAF	04/08/70	GEOCENTRIC	70-027A	03/00/80	NORMAL	ZERO	90
BAME	SOLAR WIND EXPERIMENT			70-027A-05	03/00/80	PARTIAL	ZERO	91
BAME	NEUTRON DETECTOR			70-027A-07	03/00/80	NORMAL	ZERO	91
CHAMBERS	SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A			70-027A-02	03/00/80	PARTIAL	ZERO	91
HIGBIE	SOLAR PARTICLE TELESCOPES			70-027A-03	03/00/80	NORMAL	ZERO	91
HIGBIE	ELECTRON DETECTORS			70-027A-04	03/00/80	NORMAL	ZERO	91
KLEBSADEL	GAMMA-RAY ASTRONOMY			70-027A-08	03/00/80	NORMAL	ZERO	91
VELA 6B	UNITED STATES DOD-USAF	04/08/70	GEOCENTRIC	70-027B	03/00/80	PARTIAL	ZERO	92
BAME	NEUTRON DETECTOR			70-027B-07	03/00/80	NORMAL	ZERO	92
HIGBIE	SOLAR PARTICLE TELESCOPES			70-027B-03	03/00/80	NORMAL	ZERO	92
HIGBIE	ELECTRON DETECTORS			70-027B-04	03/00/80	NORMAL	ZERO	92

ORIGINAL PAGE IS
OF POOR QUALITY

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME *PRINC. INVEST. NAME	COUNTRY AND AGENCY EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	EPOCH MMDDYY	CURRENT STATUS	DATA RATE	PAGE NO.
KLEBERSADEL	GAMMA-RAY ASTRONOMY			70-0270-08	03/00/80	PARTIAL	ZERO	92
VELA 6B (USAF)	SEE VELA 6B							
VELA 9 (TRW)	SEE VELA 9A							
VELA 10 (TRW)	SEE VELA 9B							
VELA 11 (TRW)	SEE VELA 6A							
VELA 12 (TRW)	SEE VELA 6B							
VENERA 11	U.S.S.R. SAS	09/09/78	HELIOCENTRIC	78-084A	09/09/78	NORMAL	STND	92
ESTULIN	GAMMA-RAY SPECTROMETER			78-084A-01	09/00/78	NORMAL	STND	93
GRINGAUZ	RETARDING POTENTIAL TRAPS			78-084A-02	09/00/78	NORMAL	STND	93
KURT	UV GRATING MONOCHROMATOR			78-084A-03	09/00/78	NORMAL	STND	93
LOGACHEV	ELECTRON AND PROTON SPECTROMETER			78-084A-04	09/00/78	NORMAL	STND	93
MAZETS	GAMMA-RAY BURST DETECTORS			78-084A-05	09/00/78	NORMAL	STND	93
PISARENKO	PROTON SPECTROMETER			78-084A-06	09/00/78	NORMAL	STND	93
SAVICH	TMC-FREQUENCY TRANSMITTERS			78-084A-07	09/00/78	NORMAL	STND	93
VAISBERG	SOLAR WIND PLASMA DETECTORS			78-084A-08	09/00/78	NORMAL	STND	93
VENERA 12	U.S.S.R. SAS	09/14/78	HELIOCENTRIC	78-086A	09/14/78	NORMAL	STND	94
ESTULIN	GAMMA-RAY SPECTROMETER			78-086A-01	09/00/78	NORMAL	STND	94
GRINGAUZ	RETARDING POTENTIAL TRAPS			78-086A-02	09/00/78	NORMAL	STND	94
KURT	UV GRATING MONOCHROMATOR			78-086A-03	09/00/78	NORMAL	STND	94
LOGACHEV	ELECTRON AND PROTON SPECTROMETER			78-086A-04	09/00/78	NORMAL	STND	94
MAZETS	GAMMA-RAY BURST DETECTORS			78-086A-05	09/00/78	NORMAL	STND	94
PISARENKO	PROTON SPECTROMETER			78-086A-06	09/00/78	NORMAL	STND	94
SAVICH	PROTON SPECTROMETER			78-086A-07	09/00/78	NORMAL	STND	94
VAISBERG	SOLAR WIND PLASMA DETECTORS			78-086A-08	09/00/78	NORMAL	STND	94
VIKING 1 LANDER	UNITED STATES NASA-OSS	08/20/75	MARS LANDER	75-075C	07/20/76	NORMAL	STND	95
MESS	METEOROLOGY			75-075C-07	09/00/78	PARTIAL	SUBS	95
MICHAEL, JR.	LANDER RADIO SCIENCE			75-075C-11	02/26/79	NORMAL	SUBS	95
MUTCH	LANDER IMAGING			75-075C-06	02/26/79	NORMAL	SUBS	95
VIKING 1 ORBITER	UNITED STATES NASA-OSS	08/20/75	AREOCENTRIC	75-075A	08/21/75	NORMAL	STND	95
CARR	ORBITER IMAGING			75-075A-01	07/19/79	NORMAL	STND	96
FARMER	MARS ATMOSPHERIC WATER DETECTION (MAWD)			75-075A-03	07/19/79	NORMAL	SUBS	96
KIEFFER	INFRARED THERMAL MAPPING (ITRM)			75-075A-02	07/19/79	NORMAL	SUBS	96
MICHAEL, JR.	ORBITER RADIO SCIENCE			75-075A-04	07/19/79	NORMAL	STND	96
VIKING 2 LANDER	UNITED STATES NASA-OSS	09/09/75	MARS LANDER	75-083C	04/11/80	PARTIAL	ZERO	96
MESS	METEOROLOGY			75-083C-07	02/01/80	INOPERABLE	ZERO	97
MUTCH	LANDER IMAGING			75-083C-06	02/01/80	INOPERABLE	ZERO	97
VIKING-A LANDER	SEE VIKING 2 LANDER							
VIKING-B LANDER	SEE VIKING 1 LANDER							
VIKING-B ORBITER	SEE VIKING 1 ORBITER							
VIKING-D	SEE VIKING 1 ORBITER							
VOYAGER 1	UNITED STATES NASA-OSS	09/05/77	SATURN FLYBY	77-084A	09/06/77	NORMAL	STND	97
BRIDGE	PLASMA SPECTROMETERS			77-084A-06	09/06/77	NORMAL	STND	97
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-084A-04	09/06/77	NORMAL	STND	97
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-084A-03	09/06/77	NORMAL	STND	98
KRIMIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-084A-07	09/06/77	NORMAL	STND	98
LANE	MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A			77-084A-11	12/15/79	INOPERABLE	ZERO	98
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-084A-05	09/06/77	NORMAL	STND	98
SCARF	PLASMA WAVE (.01-56 KHZ)			77-084A-13	09/06/77	NORMAL	STND	98
SMITH	IMAGING			77-084A-01	09/06/77	NORMAL	STND	99
TYLER	RADIO SCIENCE TEAM			77-084A-02	09/06/77	NORMAL	STND	99
VOGT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-084A-08	09/06/77	NORMAL	STND	99
WARWICK	PLANETARY RADIO ASTRONOMY			77-084A-10	09/06/77	NORMAL	STND	99
VOYAGER 2	UNITED STATES NASA-OSS	08/20/77	SATURN FLYBY	77-076A	09/06/77	NORMAL	STND	100
BRIDGE	PLASMA SPECTROMETERS			77-076A-06	09/06/77	NORMAL	STND	100
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-076A-04	09/06/77	NORMAL	STND	100
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-076A-03	09/06/77	NORMAL	STND	100
KRIMIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-076A-07	09/06/77	NORMAL	STND	100
LANE	MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A			77-076A-11	07/09/79	PARTIAL	SUBS	101
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-076A-05	09/06/77	NORMAL	STND	101
SCARF	PLASMA WAVE (.01-56 KHZ)			77-076A-13	09/06/77	NORMAL	STND	101
SMITH	IMAGING			77-076A-01	09/06/77	NORMAL	STND	101
TYLER	RADIO SCIENCE TEAM			77-076A-02	09/06/77	NORMAL	STND	101
VOGT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-076A-08	09/06/77	NORMAL	STND	102
WARWICK	PLANETARY RADIO ASTRONOMY			77-076A-10	09/06/77	NORMAL	STND	102

5

INVESTIGATOR NAME INDEX

5. INVESTIGATOR NAME INDEX

This index contains an alphabetical listing of the names of the investigators or team members associated with each experiment described in Sections 2 and 3. The current organizational affiliation of the person is also shown. Listed under each person's name are the associated experiments. Each experiment contains the spacecraft and experiment name, NSSDC ID code, and the page number referencing the description of the experiment. An asterisk preceding an experiment name identifies the person as the principal investigator or team leader for that experiment.

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ORIGINAL PAGE IS
OF POOR QUALITY

ACKERMAN, M. - BIRA, BRUSSELS, BELGIUM *SPACELAB 1, GRILLE SPECTROMETER (SPALAB1-10).....	157
ANDERSON, R.L. - U OF IOWA, IOWA CITY, IA DYNAMICS EXPLORER-A, GLOBAL ALTRONAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (DE-A -03).....	111
ACTON, L.W. - LOCKHEED PALO ALTO, PALO ALTO, CA *SMN, SOFT X-RAY POLYCHROMATOR (RXP) (78-019A-04).....	78
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	100
ACUNA, M.H. - NASA-GSFC, GREENBELT, MD *FIREWHEEL DC MAGNETOMETER (FIRE-A -02).....	118
*FIREWHEEL SUB-SAT 1, DC MAGNETOMETER (FIRE-E -01).....	119
*FIREWHEEL SUB-SAT 2, DC MAGNETOMETER (FIRE-A -01).....	119
*FIREWHEEL SUB-SAT 3, DC/AC MAGNETOMETER (FIRE-C -01).....	120
*FIREWHEEL SUB-SAT 4, DC MAGNETOMETER (FIRE-D -01).....	121
ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	46
*ISPM/NASA, MAGNETIC FIELD (MAG) (ISPNASA-06).....	136
*RAGSAT, VECTOR MAGNETOMETER (79-094A-02).....	94
*PIONEER 11, JOVIAN MAGNETIC FIELD (73-019A-13).....	70
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	98
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-09).....	101
ADAMS, B.J. - U OF LEICESTER, LEICESTER, ENGLAND UK 5, 2- TO 10-KEV SKY SURVEY (74-077A-02).....	87
UK 5, POLARIMETER/SPECTROMETER (74-077A-04).....	88
AFGWC STAFF, GLOBAL WEATHER CTR, OFFUTT AFB, NE *DMSP 5D-1/F1, OPERATIONAL LINESCAN SYSTEM (OLS) (76-091A-01).....	17
*DMSP 5D-1/F2, OPERATIONAL LINESCAN SYSTEM (OLS) (77-044A-01).....	18
*DMSP 5D-1/F2, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH) (77-044A-02).....	18
*DMSP 5D-1/F3, OPERATIONAL LINESCAN SYSTEM (OLS) (78-042A-01).....	19
*DMSP 5D-1/F3, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH) (78-042A-02).....	20
*DMSP 5D-1/F4, OPERATIONAL LINESCAN SYSTEM (OLS) (79-050A-01).....	20
*DMSP 5D-1/F4, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH) (79-050A-02).....	21
*DMSP 5D-1/F4, SSW/T-MICROWAVE TEMPERATURE SOUNDER (79-050A-04).....	21
*DMSP 5D-1/F4, SNOW/CLOUD DISCRIPINATOR SPECIAL SENSOR C (SSC) (79-050A-08).....	21
*DMSP 5D-1/F5, OPERATIONAL LINESCAN SYSTEM (OLS) (DMSP-15-01).....	109
*DMSP 5D-1/F5, VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH) (DMSP-15-02).....	110
AFONIN, V.V. - IKI, MOSCOW, USSR *COSMOS 900, FLAT RETARDING POTENTIAL ANALYZER (77-023A-01).....	16
*COSMOS 900, HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE (77-023A-02).....	16
AGARWAL, P.C. - TATA INST OF FUND RES, BOMBAY, INDIA BHASKARA, PINHOLE X-RAY SKY SLAVEY (78-051A-03).....	19
ALGSON, Y.L. - NASA-GSFC, GREENBELT, MD *IMP-J, ELECTROSTATIC FIELDS (73-078A-11).....	37
*IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-078A-12).....	38
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	41
*STP P7B-2, ELECTRIC FIELD DETECTOR (79-007A-05).....	84
AHEARN, J.S. - MARTIN-MARIETTA LABS, BALTIMORE, MD SPACE SHUTTLE LDEF-A, RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT (SSLDEF -22).....	156
AHLBORN, G. - BALL AEROSPACE SYS DIV, BOULDER, CO SPACE SHUTTLE LDEF-A, ORBITAL LUBRICATION EXPERIMENT (SSLDEF -25).....	161
AIKYO, K. - RADIO RESEARCH LAB, ICKYO, JAPAN *ISS-B, SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP) (78-018A-01).....	91
ALBRECHT, R. - U OF VIENNA, VIENNA, AUSTRIA ST, FAINT-OBJECT CAMERA (FOC) (LST -02).....	178
ALEXANDER, JR., J.K. - NASA-GSFC, GREENBELT, MD VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
ALLISON, L.J. - NASA-GSFC, GREENBELT, MD *NIMBUS 7, TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR) (78-098A-10).....	60
ALVAREZ, J.W. - NASA-LARC, HAMPTON, VA PIONEER 10, METEOROID DETECTORS (72-012A-04).....	68
PIONEER 11, METEOROID DETECTORS (73-019A-04).....	71
ALYEA, F.N. - MASS INST OF TECH, CAMBRIDGE, MA UARS-1, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-1 -10).....	172
AMATEAU, M.F. - AEROSPACE CORP, EL SEGUNDO, CA SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -18).....	159
ANDERLE, R.J. - USN SURFACE WEAPNS CTR, DAHLGREN, VA *GEGS 4, US NAVY DOPPLER SYSTEM (75-027A-05).....	24
ANDERSON, D. - NOAA-BEL, BOULDER, CO PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-021A-15).....	75
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
ANDERSON, D.J. - U OF MICHIGAN, ANN ARBOR, MI SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	161
ANDERSON, F.P. - NATL RES INST OCEANOL, STELLENBOSCH, REP OF SOUTH AFRICA NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-05).....	61
ANDERSON, J.D. - NASA-JPL, PASADENA, CA *GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122

INVESTIGATORS AND EXPERIMENTS

PAGE

*PIIONEER 6, CELESTIAL MECHANICS (69-100A-07).....	64
*PIIONEER 6, RELATIVITY INVESTIGATION (69-100A-10).....	64
*PIIONEER 9, CELESTIAL MECHANICS (69-100A-06).....	64
*PIIONEER 10, CELESTIAL MECHANICS (72-012A-09).....	60
*PIIONEER 11, CELESTIAL MECHANICS (73-019A-09).....	70
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
ANDERSON, K.H. - U OF CALIF, BERKELEY, BERKELEY, CA	
*ISSE 1, ELECTRONS AND PHOTONS (77-102A-10).....	40
*ISSE 2, ELECTRONS AND PHOTONS (77-102B-08).....	43
*ISSE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	44
*ISSE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	45
ANDERSON, R.D. - U OF IOWA, IOWA CITY, IA	
FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E -R4).....	119
ANDRESEN, R.D. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
EROSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EROSAT -03).....	118
*SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-2B).....	157
ANGEL, J.R. - U OF ARIZONA, TUCSON, AZ	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
ANGER, C.D. - U OF CALGARY, CALGARY, ALBERTA, CANADA	
GALILEO ORBITER, ORBITER IMAGING (JOPD -10).....	182
*ISSE 2, 3914- AND 397-A PHOTOMETER (71-024A-11).....	49
APEL, J.R. - NOAA-PREL, SEATTLE, WA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-099A-03).....	61
ARAKAWA, T. - U OF TOKYO, TOKYO, JAPAN	
JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-027A-06).....	53
ARMSTRONG, T.P. - U OF KANSAS, LAWRENCE, KS	
GALILEO ORBITER, ENERGETIC PARTICLES (JOPD -06).....	125
IMP-J, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-08).....	38
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	98
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
ARNAL, Y. - CNRS, ORLEANS, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-2S).....	157
ARNOLD, J.R. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
HEAD 3, GAMMA-RAY LINE SPECTROMETER (79-082A-01).....	31
ARVIDSON, R.E. - WASHINGTON U, SAINT LOUIS, MO	
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
ASBRIDGE, J.R. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
IMP-J, SOLAR PLASMA ELECTROSTATIC ANALYZER (75-078A-10).....	37
ISSE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISSE 2, FAST PLASMA (77-102B-01).....	44
ISSE 3, SOLAR WIND PLASMA (78-079A-01).....	45
VELA 5A, SOLAR WIND (69-046B-05).....	88
VELA 5A, NEUTRON DETECTOR (69-046B-07).....	89
VELA 5B, SOLAR WIND (69-046E-05).....	89
VELA 5B, NEUTRON DETECTOR (69-046E-07).....	90
VELA 6A, SOLAR WIND EXPERIMENT (78-027A-05).....	91
VELA 6A, NEUTRON DETECTOR (78-027A-07).....	91
VELA 6B, NEUTRON DETECTOR (78-027B-07).....	92
ASHWORTH, D.G. - U OF KENT, CANTERBURY, KENT, ENGLAND	
SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLEDEF -31).....	154
ATWAY, H.G. - HIGH ALTITUDE OBS, BOULDER, CO	
SMN, ULTRAVIOLET SPECTROMETER AND POLARIMETER (88-010A-02).....	70
ATKINS, M.L. - NASA-MSFC, HUNTSVILLE, AL	
SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	158
ATREYA, S.K. - U OF MICHIGAN, ANN ARBOR, MI	
GALILEO PROBE, MASS SPECTROMETER (JOPD -03).....	124
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
AUSTIN, R. - SCRIPPS INST OCEANOGR, LA JOLLA, CA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-048A-03).....	61
AXFORD, W.I. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
CCC, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCC -03).....	108
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	98
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
BARCOCK, SRD, R.A. - NASA-LARC, HAMPTON, VA	
SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (PASSIVE) (SSLEDEF -05).....	156
BAILEY, C.A. - OXFORD U, OXFORD, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-2 -11).....	178
BAILEY, P.L. - NATL CTR FOR ATMOS RES, BOULDER, CO	
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SMF -04).....	150

INVESTIGATORS AND EXPERIMENTS

PAGE

SME, SOLAR UV MONITOR (SME -05)	150
SME, SOLAR PROTON ALARM (SME -06)	151
BAKER, D.J. - UTAH STATE U, LOGAN, UT SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04)	165
BAKER, D.N. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01)	11
1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01)	11
1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01)	11
VELA 5B, SOLAR PARTICLE TELESCOPES (69-046E-03)	90
VELA 5P, ELECTRON DETECTORS (69-046E-04)	90
VELA 6A, SOLAR PARTICLE TELESCOPES (78-027A-03)	91
VELA 6A, ELECTRON DETECTORS (78-027A-04)	91
VELA 6B, SOLAR PARTICLE TELESCOPES (78-027B-03)	92
VELA 6B, ELECTRON DETECTORS (78-027B-04)	92
BAKER, K.D. - UTAH STATE U, LOGAN, UT	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05)	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05)	179
BALLA, J.A. - NASA-GSFC, GREENBELT, MD	
*LANDSAT 2, MULTISPECTRAL SCANNER (MSS) (75-004A-02)	54
*LANDSAT 3, MULTISPECTRAL SCANNER (MSS) (78-026A-02)	55
BALOGH, A. - IMPERIAL COLLEGE, LONDON, ENGLAND	
ISEE 3, ENERGETIC PROTONS (78-079A-08)	45
BALSIGER, H. - U OF BERNE, BERNE, SWITZERLAND	
CCE, PLASMA COMPOSITION (CCE -01)	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06)	112
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03)	22
ISEE 1, ION COMPOSITION (77-102A-12)	42
BARE, S.J. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
FIREWHEEL SUB-SAT 1, LOW-ENERGY ELECTRON AND ION DETECTOR (FIRE-E -02)	119
*IMP-J, SOLAR PLASMA ELECTROSTATIC ANALYZER (73-078A-10)	37
*ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01)	40
ISEE 2, FAST PLASMA (77-102B-01)	44
ISEE 2, SOLAR WIND IONS (77-102B-02)	43
*ISEE 3, SOLAR WIND PLASMA (78-079A-01)	45
*ISPM/ESA, PLASMA SPECTROMETER (ISPESA -05)	134
*VELA 5A, SOLAR WIND (69-046D-05)	88
*VELA 5A, NEUTRON DETECTOR (69-046D-07)	89
*VELA 5B, SOLAR WIND (69-046E-05)	89
*VELA 5B, NEUTRON DETECTOR (69-046E-07)	90
*VELA 6A, SOLAR WIND EXPERIMENT (70-027A-05)	91
*VELA 6A, NEUTRON DETECTOR (70-027A-07)	91
*VELA 6B, NEUTRON DETECTOR (70-027B-07)	92
GANDEEN, W.R. - NASA-GSFC, GREENBELT, MD	
NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01)	59
BANKS, B.A. - NASA-LERC, CLEVELAND, OH	
*SPACE SHUTTLE LDEF-A, ION BEAM TEXTURED AND COATED SURFACES (SSLDEF -01)	151
BANKS, G.F. - NASA-GSFC, GREENBELT, MD	
*LANDSAT-D, MULTISPECTRAL SCANNER (MSS) (LAND-D -02)	138
*LANDSAT-D1, MULTISPECTRAL SCANNER (MSS) (LAND-E -02)	139
BANKS, P.H. - UTAH STATE U, LOGAN, UT	
DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A -04)	111
*OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-A-04)	107
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07)	175
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07)	180
BARATH, F.T. - NASA-JPL, PASADENA, CA	
*ICEX, WIDE SWATH IMAGING RADIOMETER (WSIR) (IFEX-A -02)	132
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR) (78-098A-08)	60
BARBIERI, C. - U OF PADOVA, PADOVA, ITALY	
ST, FAINT-OBJECT CAMERA (FOC) (LST -08)	170
BARFIELD, J.N. - SOUTHWEST RES INST, SAN ANTONIO, TX	
GOES-D, MAGNETIC FIELD MONITOR (GOES-D -04)	129
GOES-E, MAGNETIC FIELD MONITOR (GOES-E -04)	130
GOES-F, MAGNETIC FIELD MONITOR (GOES-F -04)	132
BARNES, A. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18)	75
BARNES, W.L. - NASA-GSFC, GREENBELT, MD	
*HCM, HEAT CAPACITY MAPPING RADIOMETER (78-041A-01)	30
*ICEX, POLAR ICE MAPPING RADIOMETER (PIMR) (ICEX-A -05)	132
BARNETT, J.J. - OXFORD U, OXFORD, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11)	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11)	178
BARRINGTON, R.E. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
*ISIS 1, VLF RECEIVER (69-009A-03)	47
*ISIS 2, VLF RECEIVER (71-024A-03)	49
BARTH, C.A. - U OF COLORADO, BOULDER, CO	
GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02)	123
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15)	75
*SME, UV OZONE (SME -01)	150
*SME, INFRARED RADIOMETER (SME -02)	150

INVESTIGATORS AND EXPERIMENTS

PAGE

*SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
*SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
*SME, SOLAR UV MONITOR (SME -05).....	150
*SME, SOLAR PROTON ALARM (SME -06).....	151
UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	174
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	178
BARTKO, JR., F. - MARTIN-MARIETTA AEROSP, DENVER, CO	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
BARTLEY, W.C. - NATL ACADEMY OF SCI, WASHINGTON, DC	
PIONEER 8, COSMIC-RAY ANISOTROPY (65-105A-05).....	65
PIONEER 9, COSMIC-RAY ANISOTROPY (68-100A-05).....	66
BARTOE, J.D.F. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
OSB-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SMOFT-4-03).....	147
SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	163
SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	163
UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	171
UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	176
BASS, J.A. - NASA-GSFC, GREENBELT, MD	
SPACE SHUTTLE LOEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -05).....	156
BAUER, S.J. - NASA-GSFC, GREENBELT, MD	
HELIOS-A, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-04).....	32
HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	32
HELIOS-B, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-04).....	35
HELIOS-B, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-05).....	35
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
BAUM, W.A. - LOWELL OBSERVATORY, FLAGSTAFF, AZ	
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
BEAUJEAN, R. - INST P-A NUCLEAR PHYS, KIEL, FED REP OF GERMANY	
*SPACELAB 1, ISOTOPE STACK (SPALAB1-29).....	157
BEAUJEAN, R. - U OF KIEL, KIEL, FED REP OF GERMANY	
SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	152
BEAVER, E.A. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
BEDRIS, J. - NASA-GSFC, GREENBELT, MD	
*NOSS, MICROWAVE WIND SCATTEROMETER (SCAT/2) (NOSS -02).....	145
BECKERS, J.M. - SACRAMENTO PEAK OBS, SUNSPOT, NM	
SMR, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	79
BEDFORD, D.K. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
BEDO, D.E. - USAF GEOPHYS LAB, BEDFORD, MA	
AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
BEER, R. - NASA-JPL, PASADENA, CA	
SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	163
BEGHIN, C. - CNRS, CTR FOR SPECTRON, ORLEANS, FRANCE	
*ESA-GEOS 2, WAVE FIELD IMPEDANCE (78-071A-11).....	22
*SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
BEHAMMON, K.W. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	98
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	101
BELCHER, J.W. - MASS INST OF TECH, CAMBRIDGE, MA	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
BELIAN, R.D. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01).....	11
1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01).....	11
1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01).....	11
VELA 5B, SOLAR PARTICLE TELESCOPES (69-046E-03).....	90
VELA 5B, ELECTRON DETECTORS (69-046E-04).....	90
*VELA 5B, COSMIC X RAYS (69-046E-06).....	90
VELA 6A, SOLAR PARTICLE TELESCOPES (70-027A-03).....	91
VELA 6A, ELECTRON DETECTORS (70-027A-04).....	91
VELA 6B, SOLAR PARTICLE TELESCOPES (70-027B-03).....	92
VELA 6B, ELECTRON DETECTORS (70-027B-04).....	92
BELL, T.F. - STANFORD U, PALO ALTO, CA	
DYNAMICS EXPLORER-A, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (DE-A -08).....	111
ISEE 1, VLF WAVE PROPAGATION (77-102A-13).....	41
BELMONT, A.D. - CONTROL DATA CORP, MINNEAPOLIS, MN	
NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-092A-09).....	60
BELTON, M.J.S. - KITT PEAK NATL OBS, TUCSON, AZ	
*GALILEO ORBITER, ORBITER IMAGING (JOPD -10).....	122
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
BENEDICT, G.F. - U OF TEXAS, AUSTIN, AUSTIN, TX	
ST, ASTROMETRY SCIENCE (LST -09).....	169

INVESTIGATORS AND EXPERIMENTS

PAGE

BENNETT, K. - ESA-ESTEC, NOORDWIJK, NETHERLANDS GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
BENTON, E.V. - U OF CALIF, SAN FRANC., SAN FRANCISCO, CA *SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	158
BEGG, G.E. (RETIRED)- NASA-GSFC, GREENBELT, MD *PIONEER 9, COSMIC DUST DETECTOR (68-100A-04).....	66
BERNHARDT, P.A. - STANFORD U, PALO ALTO, CA SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
BERTSET, J.M. - CNRS-LMSP, VERRIERES LE BUISSON, FRANCE SPACE SHUTTLE LDEF-A, THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE (SSLDEF -40).....	152
BERTAUX, J.L. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE *SPACELAB 1, INVESTIGATION ON ATMOSPHERIC M AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA (SPALAB1-22).....	158
*VENERA 11, UV GRATING MONOCHROMATOR (78-084A-03).....	93
*VENERA 12, UV GRATING MONOCHROMATOR (78-086A-03).....	94
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
BERTHELIER, J.J. - CNRS, SAINT-MAUR DES FOSSES, FRANCE SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
BERTOTTI, B. - U OF PAVIA, PAVIA, ITALY ISP/ESA, RADIO SCIENCE (ISPESA -09).....	135
BERTSCH, D.L. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
BEZRUKH, V.V. - IKI, MOSCOW, USSR COSMOS 900, FLAT RETARDING POTENTIAL ANALYZER (77-023A-01).....	16
BINDER, A.B. - U OF KIEL, KIEL, FED REP OF GERMANY VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
BINNS, W.R. - MCDONNELL-DOUGLAS CORP, HUNTINGTON BEACH, CA HEAD 3, HEAVY NUCLEI (79-082A-03).....	31
BINSACK, J.H. - MASS INST OF TECH, CAMBRIDGE, MA 17F-J, SOLAR PLASMA FARADAY CLP (73-078A-02).....	38
BISWAS, S. - TATA INST OF FUND RES, BOMBAY, INDIA *SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
BLACKSHEAR, W.T. - NASA-LARC, HAMPTON, VA UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-1 -22).....	173
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-2 -22).....	177
BLAKE, J.B. - AEROSPACE CORP, EL SEGUNDO, CA *DMSP 5D-1/F1, RADIATION DOSIMETER (76-091A-03).....	17
*STP P78-2, ENERGETIC PROTON DETECTOR (79-007A-14).....	84
BLAMONT, J.E. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE GALILEO PROBE, NEPHELOMETER (JOP -05).....	126
SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	162
SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	162
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
BLANCHARD, R.C. - NASA-LARC, HAMPTON, VA GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
BLASIUS, K.R. - SCIENCE APPL, INC, PASADENA, CA VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
BLEEKER, J.A.M. - U OF LEIDEN, LEIDEN, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	118
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
BLESS, R.C. - U OF WISCONSIN, MADISON, WI *ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	169
BLUE, M.D. - GEORGIA INST OF TECH, ATLANTA, GA *SPACE SHUTTLE LDEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLDEF -26).....	151
BLUM, P. - U OF BONN, BONN, FED REP OF GERMANY UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	175
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	180
BOELLA, G. - U OF MILAN, MILAN, ITALY EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
BOESE, R.W. - NASA-ARC, MOFFETT FIELD, CA *GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	126
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	71
BOGGESS, 3RD, A. - NASA-GSFC, GREENBELT, MD *ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
BOISCHOT, A. - PARIS OBSERVATORY, MEUDON, FRANCE VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102

INVESTIGATORS AND EXPERIMENTS

PAGE

BOKSENBURG, A. - U COLLEGE LONDON, LONDON, ENGLAND ST. FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
BOLDT, E.A. - NASA-GSFC, GREENBELT, MD UK 5, ALL-SKY MONITOR (74-077A-06).....	87
BORG, N. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	23
BORN, G. - NASA-JPL, PASADENA, CA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
BORSON, E.M. - AEROSPACE CORP, EL SEGUNDO, CA SPACE SHUTTLE LOEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -15).....	155
BOSQUED, J.M. - CESR, TOULOUSE, FRANCE ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
BOSTROM, C.O. - APPLIED PHYSICS LAB, LAUREL, MD AE-E, PHOTOELECTRON SPECTROMETER (VES) (75-107A-03).....	12
IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-078A-05).....	39
ISEE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-09).....	42
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	44
NOAA-B, SPACE ENVIRONMENT MONITOR (80-043A-04).....	63
NOAA-C, SPACE ENVIRONMENT MONITOR (NOAA-C -04).....	141
NOAA-D, SPACE ENVIRONMENT MONITOR (NOAA-D -04).....	142
NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	143
NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	144
NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	145
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	98
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
BOSWELL, R. - ESA-ESTEC, NOORDWIJK, NETHERLANDS FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E -04).....	119
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
BOURRIEAU, J. - CERT/ONERA, TOULOUSE CEDEX, FRANCE *SPACE SHUTTLE LOEF-A, OPTICAL FIBERS AND COMPONENTS (SSLDEF -43).....	151
BOWYER, C.S. - U OF CALIF, BERKELEY, BERKELEY, CA *EUVE, EXTREME ULTRAVIOLET FULL SKY SURVEY (EUVE -01).....	117
*SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	158
*STP P78-1, EXTREME ULTRAVIOLET SPECTROMETER (79-017A-04).....	82
*STP P80-1, EXTREME ULTRAVIOLET PHOTOMETER (P80-1 -03).....	170
BOYD, R.L.F. - U COLLEGE LONDON, LONDON, ENGLAND ESA-GEOS 2, THERMAL PLASMA FLOW (78-071A-02).....	24
*EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	118
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
*OAO 3, STELLAR X-RAYS (72-065A-02).....	64
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
*UK 5, 0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR (74-077A-01).....	87
*UK 5, HIGH-RESOLUTION SOURCE SPECTRA (74-077A-03).....	87
*UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	88
BRACE, L.M. - NASA-GSFC, GREENBELT, MD *AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
*DYNAMICS EXPLORER-B, LANGMUIR PROBE (DE-B -09).....	113
*ISIS 1, CYLINDRICAL ELECTROSTATIC PROBE (69-009A-07).....	47
*PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	73
BRANDHORST, JR., H.W. - NASA-LERC, CLEVELAND, OH *SPACE SHUTTLE LOEF-A, ADVANCED PHOTOVOLTAIC EXPERIMENT (SSLDEF -02).....	151
SPACE SHUTTLE LOEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
BRANDT, J.C. - NASA-GSFC, GREENBELT, MD *SM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	79
*ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
BRANDT, T. - KRUPP KRANKEN-ANGSTALN, ESSEN, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-41).....	162
BREIG, E.L. - U OF TEXAS, DALLAS, RICHARDSON, TX UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	178
BRENKLE, J.P. - NASA-JPL, PASADENA, CA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
BRIDGE, H.S. - MASS INST OF TECH, CAMBRIDGE, MA *IMP-J, SOLAR PLASMA FARADAY CUP (73-078A-02).....	38
*PIONEER 6, SOLAR WIND PLASMA FARADAY CUP (65-105A-02).....	64
*VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
*VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
BRIGGS, G.A. - NASA HEADQUARTERS, WASHINGTON, DC VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
BRINKMAN, A.C. - U OF UTRECHT, UTRECHT, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	118
BRINTON, H.C. - NASA-GSFC, GREENBELT, MD *AE-E, BENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-10).....	12

INVESTIGATORS AND EXPERIMENTS

PAGE

OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	147
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	166
BROADFOOT, A.L. - U OF SOUTHERN CALIF, TUCSON, AZ	
*SPACELAB 1, AN IMAGING SPECTROSCOPIC OBSERVATORY (SPALAB1-01).....	162
*VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
*VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
BROGLIO, L. - NATL RES COUNC ITALY, ROME, ITALY	
*SAN MARCO-D/L, DRAG BALANCE AND AIR DENSITY (SM-DL -01).....	148
*SAN MARCO-B/R, IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT (SM-BM -01).....	149
BROOME, G.C. - NASA-LARC, HAMPTON, VA	
*ERBS-A, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (ERBS-A -01).....	116
*NOAA-F, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-F -05).....	143
*NOAA-G, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-G -05).....	144
BROWLIE, G. - U COLLEGE LONDON, LONDON, ENGLAND	
*SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
BROWN, A.W. - U OF PENNSYLVANIA, PHILADELPHIA, PA	
*SPACELAB 1, NUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	158
BROWN, JR., W.E. - NASA-JPL, PASADENA, CA	
PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	74
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
BROWNLEE, D.E. - U OF WASHINGTON, SEATTLE, WA	
SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIODS (SSLDEF -51).....	153
BRUECKNER, G.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
*OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SHOFT-4-03).....	147
*SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	163
*SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11).....	163
*UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	171
*UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	176
BRUNER, JR., E.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
SM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	79
BRYANT, D.A. - APPLETON LAB, SLOUGH, ENGLAND	
*FIREWHEEL SUB-SAT 2, ENERGETIC PARTICLE (FIRE-B -02).....	120
BUCKER, H. - DFVLR, FRANKFURT, FED REP OF GERMANY	
*SPACE SHUTTLE LDEF-A, FREE FLYER BIOSTACK (SSLDEF -50).....	152
*SPACELAB 1, ADVANCED BIOSTACK EXPERIMENT (SPALAB1-32).....	158
BUHLER, F. - U OF BERNE, BERNE, SWITZERLAND	
SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -48).....	153
BURBIDGE, E.M. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	
ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
BURCH, J.L. - SOUTHWEST RES INST, SAN ANTONIO, TX	
*DYNAMICS EXPLORER-A, HIGH ALTITUDE PLASMA INSTRUMENT (DE-A -05).....	110
*DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INSTRUMENT (DE-B -08).....	115
*DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (DE-B -15).....	114
*SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAK) (SPALAB1-02).....	161
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	175
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	180
BURLAGA, L.F. - NASA-GSFC, GREENBELT, MD	
HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	34
HELIOS-B, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (76-003A-02).....	36
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	98
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	101
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
BURROWS, J.R. - NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA	
ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	48
ISIS 2, ENERGETIC PARTICLE DETECTORS (71-024A-04).....	50
BUSH, R. - U OF CALIF, BERKELEY, BERKELEY, CA	
*FIREWHEEL SUB-SAT 3, ENERGETIC ION MASS SPECTROMETER (FIRE-C -03).....	120
FIREWHEEL SUB-SAT 3, PROTON/ELECTRON ELECTROSTATIC ANALYZER (FIRE-C -04).....	120
BYRNAK, B. - DANISH SPACE RES INST, LYNGBY, DENMARK	
HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
CAMILL, JR., L.J. - U OF MINNESOTA, MINNEAPOLIS, MN	
DYNAMICS EXPLORER-A, MAGNETIC FIELD OBSERVATIONS (DE-A -01).....	112
DYNAMICS EXPLORER-B, MAGNETIC FIELD OBSERVATIONS (DE-B -01).....	115
CAIN, D.L. - NASA-JPL, PASADENA, CA	
PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	69
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	71
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
CALMOUN, L.D. - MCDONNELL-DOUGLAS CORP, ST. LOUIS, MO	
*SPACE SHUTTLE LDEF-A, CASCADE VARIABLE CONDUCTANCE HEAT PIPE (SSLDEF -39).....	132
CALLA, O.P.N. - SPACE APPLICATIONS CTR, AHMEDABAD, INDIA	
*BMASKARA, SATELLITE MICROWAVE RADIOMETER (SAMIR) (79-051A-01).....	15

ORIGINAL PAGE IS
OF POOR QUALITY

INVESTIGATORS AND EXPERIMENTS

PAGE

CALLAHAN, P.S. - NASA-JPL, PASADENA, CA ISPR/ESA, RADIO SCIENCE (ISPESA -09).....	135
CALLER, W.R. - GEORGIA INST OF TECH, ATLANTA, GA SPACE SHUTTLE LDEF-A, SPACE TESTING OF HOLOGRAPHIC DATA STORAGE CRYSTALS (SSLDEF -08).....	152
CALVEY, W. - LOCKHEED PALO ALTO, PALO ALTO, CA ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02)..... ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	47 49
CAMPBELL, W.J. - US GEOLOGICAL SURVEY, TACOMA, WA NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMWR) (78-098A-08).....	60
CANDIDI, M. - CNR, SPACE PLASMA LAB, ROME, ITALY ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	23
CANTARANO, S.C. - CNR, SPACE PLASMA LAB, ROME, ITALY MELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02)..... MELIOS-B, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (76-003A-02)..... ISEE 2, SOLAR WIND IONS (77-102B-02).....	34 36 43
CANTIN, M. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
CARAVANE COLLABOR. SEE APPENDIX B2 COS-B, GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV) (75-072A-01).....	15
CAREY, W.C. - U OF KENT, CANTERBURY, KENT, ENGLAND SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	154
CARIGNAN, G.R. - U OF MICHIGAN, ANN ARBOR, MI AE-E, NEUTRAL ATMOSPHERE COMPOSITION (NAEC) (75-107A-08)..... AE-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09)..... AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11)..... DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A -04)..... DYNAMICS EXPLORER-B, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (DE-B -03)..... DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04)..... DYNAMICS EXPLORER-B, FABRY-PEROT INTERFEROMETER (DE-B -05)..... DYNAMICS EXPLORER-B, LANGMUIR PROBE (DE-B -09)..... GALILEO PROBE, MASS SPECTROMETER (JOP -03)..... PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11)..... SAN MARCO-D/L, WIND AND TEMPERATURE SPECTROMETER (WATS) (SM-0L -04)..... SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	13 14 15 111 113 115 113 113 113 126 74 149 162
CARLSON, C.W. - U OF CALIF, BERKELEY, BERKELEY, CA FIREWHEEL SUB-SAT 3, EMERGETIC ION MASS SPECTROMETER (FIRE-C -03)..... FIREWHEEL SUB-SAT 3, LOW-ENERGY ELECTRON DETECTOR (FIRE-C -05)..... FIREWHEEL SUB-SAT 3, ELECTRON DENSITY MEASUREMENT (FIRE-C -06).....	120 120 120
CARLSON, R.W. - NASA-JPL, PASADENA, CA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01)..... PIONEER 10, ULTRAVIOLET PHOTOMETRY (72-012A-06)..... PIONEER 11, ULTRAVIOLET PHOTOMETRY (73-019A-06)..... UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14)..... UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	122 68 71 171 176
CAROVILLANO, R.L. - BOSTON COLLEGE, CHESTNUT HILL, MA DYNAMICS EXPLORER-A, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (DE-A -03).....	111
CARPENTER, D.L. - STANFORD U, PALO ALTO, CA DYNAMICS EXPLORER-A, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (DE-A -08).....	111
CARPENTER, G.F. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
CARR, M.H. - US GEOLOGICAL SURVEY, MENLO PARK, CA GALILEO ORBITER, ORBITER IMAGING (JOPO -10)..... VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	122 96
CARR, T.D. - U OF FLORIDA, GAINESVILLE, FL VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10)..... VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	99 102
CASH, JR., W. - U OF CALIF, BERKELEY, BERKELEY, CA EUVE, EXTREME ULTRAVIOLET FULL SKY SURVEY (EUVE -01).....	117
CASSOU, R.M. - U OF CALIF, SAN FRANC., SAN FRANCISCO, CA SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	158
CAYTEL, C. - U OF CALIF, BERKELEY, BERKELEY, CA FIREWHEEL SUB-SAT 3, DC/AC ELECTRIC FIELD (FIRE-C -02)..... FIREWHEEL SUB-SAT 3, ELECTRON DENSITY MEASUREMENT (FIRE-C -06).....	121 120
CATURA, R.C. - LOCKHEED PALO ALTO, PALO ALTO, CA SMR, SOFT X-RAY POLYCHROMATOR (XRP) (70-014A-04).....	78
CAUFFMAN, D.P. - LOCKHEED PALO ALTO, PALO ALTO, CA ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	41
CEALLAIGH, C.O. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	154
CERULLI, P. - CNR, SPACE PLASMA LAB, ROME, ITALY ISEE 2, SOLAR WIND IONS (77-102B-02).....	43
CHAGNON, C.W. - USAF GEOPHYS LAB, BEDFORD, MA AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14

INVESTIGATORS AND EXPERIMENTS

PAGE

CHAMBERS, W.H. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	89
*VELA 9A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (69-046B-02).....	91
*VELA 6A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (70-027A-02).....	
CHAMPION, K.S.W. - USAF GEOPHYS LAB, BEDFORD, MA	12
*AE-E, ATMOSPHERIC DENSITY ACCELEROMETER (MESA) (75-107A-02).....	
CHAN, K.L. - NASA-ARC, HOFFETT FIELD, CA	48
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	50
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-029A-01).....	
CHANDRA, S.S. - NASA-GSFC, GREENBELT, MD	175
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	180
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	
CHANG, J.S. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA	172
*UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	176
*UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	
CHAPMAN, C.R. - PLANETARY SCIENCE INST, TUCSON, AZ	122
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	
CHAPMAN, B.K. - U OF PENNSYLVANIA, PHILADELPHIA, PA	158
SPACELAB 1, NUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	
CHAPMAN, R.D. - NASA-GSFC, GREENBELT, MD	79
SMH, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	
CHAPPELL, C.R. - NASA-MSFC, HUNTSVILLE, AL	111
*DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A -04).....	42
ISEE 1, ION COMPOSITION (77-102A-12).....	161
SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	
CHASE, JR., S.C. - SANTA BARBARA RES CTR, GOLETA, CA	71
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	96
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTH) (75-075A-02).....	
CHEN, J.P. - U OF TENNESSEE, KNOXVILLE, TN	160
SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	
CHRISTENSEN, A.B. - AEROSPACE CORP, EL SEGUNDO, CA	21
DMSP 5D-1/F4, SSD - ATMOSPHERIC DENSITY SENSOR (79-050A-07).....	
CHUPP, E.L. - U OF NEW HAMPSHIRE, DURHAM, NH	78
*SMH, GAMMA RAY SPECTROMETER (GRS) (80-014A-07).....	
CICERONE, R.J. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	175
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	172
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	175
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	179
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	177
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	180
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	
CLARK, D. - NOAA-NESS, SUITLAND, MD	61
WIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	
CLARK, G.W. - MASS INST OF TECH, CAMBRIDGE, MA	30
HEAO 2, MONITOR PROPORTIONAL COUNTER (78-103A-01).....	30
HEAO 2, HIGH-RESOLUTION IMAGER (78-103A-02).....	31
HEAO 2, CURVED-CRYSTAL BRAGG X-RAY (78-103A-03).....	31
HEAO 2, IMAGING PROPORTIONAL COUNTER (78-103A-04).....	31
HEAO 2, SOLID-STATE X-RAY DETECTOR (78-103A-05).....	
CLARK, I.O. - NASA-LARC, HAMPTON, VA	155
SPACE SHUTTLE LDEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -1P).....	
CLAYTON, D.D. - RICE U, HOUSTON, TX	127
GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	
CLIFTON, K.S. - NASA-MSFC, HUNTSVILLE, AL	160
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	
CLINE, T.L. - NASA-GSFC, GREENBELT, MD	127
GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	40
*ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	46
ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	136
*ISPM/NASA, SOLAR X-RAY FLARE AND COSMIC-RAY BURST (SXR) (ISPNASA-02).....	78
SMH, HARD X-RAY BURST SPECTROMETER (HXRBS) (80-014A-06).....	
CLOUTIER, P.A. - RICE U, HOUSTON, TX	75
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	
CODE, A.D. - U OF WISCONSIN, MADISON, WI	169
ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	170
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	
COFFEE, JR., C.W. - NASA-LARC, HAMPTON, VA	116
ERBS-A, HALOGEN OCCULTATION (HALOE) (ERBS-A -03).....	
COFFEE, D.L. - NASA-GISS, NEW YORK, NY	124
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	68
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	73
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	98
VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-084A-11).....	101
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	

INVESTIGATORS AND EXPERIMENTS

PAGE

COFFEY, M.T. - NATL CTR FOR ATMOS RES, BOULDER, CO UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
COBOLI, A. - U OF ZURICH, ZURICH, SWITZERLAND *SPACELAB 1, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS (SPALAB1-36).....	148
COHEN, H.A. - USAF GEOPHYS LAB, BEDFORD, MA *STP P78-2, ELECTRON GUN-ION GUN (79-007A-07).....	24
COLBURN, D.S. - NASA-ARC, MOFFETT FIELD, CA PIONEER 9, TRIAXIAL MAGNETOMETER (68-100A-01).....	67
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	72
COLE, K.D. - LA TROBE U, BUNDOORA, AUSTRALIA DYNAMICS EXPLORER-B, LANGUIR PROBE (DE-B -09).....	113
COLEMAN, JR., P.J. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	124
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	72
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	74
COLLARD, H.R. - NASA-ARC, MOFFETT FIELD, CA PIONEER 10, PLASMA (72-012A-13).....	64
PIONEER 11, PLASMA (73-019A-13).....	72
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	75
COLLINS, D.J. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165
CONNER, J.P. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
VELA 5B, COSMIC X RAYS (69-046E-06).....	90
CONNES, P. - PARIS OBSERVATORY, MEUDON, FRANCE SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	162
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	175
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	180
CONRATH, B.J. - NASA-GSFC, GREENBELT, MD VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
COOK, A.F. - SAO, CAMBRIDGE, MA VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
COOKE, B.A. - U OF LEICESTER, LEICESTER, ENGLAND UK 5, 2- TO 10-KEV SKY SURVEY (74-077A-02).....	67
UK 5, POLARIMETER/SPECTROMETER (74-077A-04).....	86
COPLAN, H.A. - U OF MARYLAND, COLLEGE PARK, MD ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	46
CORONITI, F.V. - U OF CALIF, LA, LOS ANGELES, CA *DYNAMICS EXPLORER-A, AURORAL PHYSICS (DE-A -07).....	111
GALILEO ORBITER, PLASMA (JOFC -04).....	122
ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	74
COSTOGUE, E.N. - NASA-JPL, PASADENA, CA SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
COTE, C.E. - NASA-GSFC, GREENBELT, MD NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	49
COULSON, K.L. - U OF CALIF, DAVIS, DAVIS, CA NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
COURTES, G.C. - CNRS-LAS, MARSEILLE, FRANCE *PROGNOZ 7, UV EMISSION SPECTROMETER (78-101A-10).....	77
SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	148
*SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	158
COUTURIER, P. - PARIS OBSERVATORY, MEUDON, FRANCE ISEE 3, RADIO MAPPING (78-079A-10).....	46
COWLES, J.R. - U OF HOUSTON, HOUSTON, TX *OSS-1, INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS (SHOFT-4-07).....	147
*SPACELAB 2, INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION (SPALAB2-02).....	164
COVSIK, R. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
CRANE, P. - EUROP SO OBS, SWIZR, GENEVA, SWITZERLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
CRIFO, J.F. - CNRS-LPSP, VERRIERES LE BUISSON, FRANCE *SPACE SHUTTLE LDEF-A, THIN METAL FILM AND EVAPORATED CATHODES PERFORMANCE IN SPACE (SSLDEF -40).....	152
CROFT, T.A. - SRI INTERNATIONAL, MENLO PARK, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	66
*PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
CROMMELYNCK, D. - ROY METEOROL INST BELG, BRUSSELS, BELGIUM *SPACELAB 1, ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT (SPALAB1-26).....	159

INVESTIGATORS AND EXPERIMENTS

PAGE

CROOK, G.H. - GAINES M. CROOK ASSOC, CANOGA PARK, CA PIONEER V, PLASMA WAVE DETECTOR (68-100A-07).....	67
CROSBY, W.M. - SCRIPPS C&R FOUNDATION, LA JOLLA, CA SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
CROUCH, R.K. - NASA-LARC, HAMPTON, VA SPACE SHUTTLE LDEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -1E).....	153
CRUIKSHANK, D.P. - U OF HAWAII, HONOLULU, HI VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
CRUISE, A.M. - U COLLEGE LONDON, LONDON, ENGLAND UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	88
CRUTZEN, P.J. - NATL CTR FOR ATMOS RES, BOULDER, CO SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	175
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	175
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	172
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	180
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	179
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	177
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
CULHANE, J.L. - U COLLEGE LONDON, LONDON, ENGLAND *SM, SOFT X-RAY POLYCHROMATOR (SRP) (80-019A-04).....	78
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-20).....	157
*SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	164
CUNNOLD, D.M. - GEORGIA INST OF TECH, ATLANTA, GA NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOPS) (78-098A-09).....	60
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
*UARS-1, PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERIC OZONE (UARS-1 -18).....	172
CURKIE, D.G. - U OF MARYLAND, COLLEGE PARK, MD ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
CURTIS, P. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE-MODULATED RADIOMETER (PMR) (75-052A-09).....	59
CUTTS, J.A. - SCIENCE APPL, INC, PASADENA, CA VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
D'ANGELO, N. - U OF IOWA, IOWA CITY, IA OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	147
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	146
DAHL, A.O. - U OF PENNSYLVANIA, PHILADELPHIA, PA SPACELAB 1, NUTATION OF HELIANTHUS ANNUUS (SPALAB1-12).....	158
DALGARNO, A. - SAO, CAMBRIDGE, MA AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
DANIELSON, G.E. - CALIF INST OF TECH, PASADENA, CA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPD -01).....	122
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
DARSA, A.V. - STANFORD U, PALO ALTO, CA *SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
DAVE, J.V. - IHM CORPORATION, PALO ALTO, CA NIMBUS 6, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (70-025A-05).....	57
DAVIDSEN, A.F. - JOHNS HOPKINS U, BALTIMORE, MD ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
DAVIES, D.W. - NASA-JPL, PASADENA, CA VIKING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAWD) (77-076A-03).....	96
DAVIES, J.G. - U OF MANCHESTER, MANCHESTER, ENGLAND VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
DAVIES, K.W. - RUTHERFORD HIGH EN LAB, CHILTON, ENGLAND UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
DAVIES, P.E. - RAND CORP, SANTA MONICA, CA GALILEO ORBITER, ORBITER IMAGING (JOPD -10).....	122
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
DAVIS, JR., L. - CALIF INST OF TECH, PASADENA, CA ISEE 3, MAGNETIC FIELDS (78-079A-02).....	46
PIONEER 11, MAGNETIC FIELDS (75-019A-01).....	72

ORIGINAL PAGE IS
OF POOR QUALITY

INVESTIGATORS AND EXPERIMENTS	PAGE
DE JAGER, C. - U OF UTRECHT, UTRECHT, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	114
ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
*SMM, HARD X-RAY IMAGING SPECTROMETER (HXIS) (80-014A-05).....	78
DE LUCA, M.F. - U OF WISCONSIN, MADISON, WI SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	166
DEERENBERG, A.J.M. - U OF LEIDEN, LEIDEN, NETHERLANDS GAMMA-RAY OBSERVATORY, IMAGING COPPTON TELESCOPE (GRO -02).....	127
DEFOREST, S.E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
*STP P78-2, UCSD CHARGED PARTICLE DETECTOR (79-007A-11).....	84
DEHARVENG, J.M. - CNRS-LAS, MARSEILLE, FRANCE SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	157
ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
DEMEL, G. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY GALILEO PROBE, LIGHTNING (JCP -06).....	126
HELIOS-A, SEARCH COIL MAGNETOMETER (74-097A-03).....	34
HELIOS-B, SEARCH COIL MAGNETOPFTER (76-003A-03).....	36
DELASI, R.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LDEF-A, EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLDEF -20).....	192
DENNIS, R.R. - NASA-GSFC, GREENBELT, MD SMM, HARD X-RAY BURST SPECTROMETER (HXRBS) (80-014A-06).....	75
DESAI, U.D. - NASA-GSFC, GREENBELT, MD SMM, HARD X-RAY BURST SPECTROMETER (HXRBS) (80-014A-06).....	7E
DICHGANS, J. - U OF FREIBURG, FREIBURG, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-41).....	167
DICKINSON, R.E. - NATL CTR FOR ATMOS RES, BOULDER, CO SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
DISNEY, M.J. - U COLLEGE CARDIFF, CARDIFF, WALES ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
DOERING, J.P. - JOHNS HOPKINS U, BALTIMORE, MD *AE-E, PHOTOELECTRON SPECTROMETER (PES) (75-107A-03).....	12
DOLGINOV, SH.SH. - IZHIRAN, MOSCOW, USSR *PROGNOZ 7, THREE-AXIS FLUXGATE MAGNETOMETERS (78-101A-04).....	75
DOMINGO, V. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	154
SPACELAB 1, ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT (SPALAB1-26).....	159
DONAHUE, T.M. - U OF MICHIGAN, ANN ARBOR, MI GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	126
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	73
*PIONEER VENUS 1, PARTICIPATING THEORIST DONAHUE (78-051A-04).....	73
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	175
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	180
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-0M4A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
DONLEY, J.L. - NASA-GSFC, GREENBELT, MD ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-08).....	50
DONNELLY, R.F. - NOAA-ERL, BOULDER, CO GOES-D, SOLAR X-RAY MONITOR (GOES-D -03).....	129
GOES-E, SOLAR X-RAY MONITOR (GOES-E -03).....	130
GOES-F, SOLAR X-RAY MONITOR (GOES-F -03).....	131
DOSCHKE, G.A. - US NAVAL RESEARCH LAB, WASHINGTON, DC STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
DRAYSON, S.R. - U OF MICHIGAN, ANN ARBOR, MI UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	175
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	179
DRUMMOND, A.J. - EPPLBY LAB, INC, NEWPORT, RI NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
DUBOIN, M.L. - CNET, ISSY LES MOULINEAUX, FRANCE SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	162
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	175
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	180
DUEMER, W.M. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	172
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	176
DULK, G.A. - U OF COLORADO, BOULDER, CO	

INVESTIGATORS AND EXPERIMENTS

PAGE

SMH, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
DUNCAN, B.J. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	160
DUNCOMBE, N.L. - U OF TEXAS, AUSTIN, AUSTIN, TX ST, ASTROMETRY SCIENCE (LST -09).....	169
DUNN, C.D.R. - U OF TENNESSEE, KNOXVILLE, TN SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
DURNEY, A.C. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
SPACELAB 1, ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT (SPALAB1-26).....	189
DUROUCHOUX, P. - CENS, SACLAY, FRANCE GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
DUXBURY, T.C. - NASA-JPL, PASADENA, CA VIKING 1 ORBITER, ORBITER IMAGING (75-079A-01).....	96
DYAL, P. - NASA-ARC, MOFFETT FIELD, CA PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	72
DYER, C. - ROYAL NAVAL COLLEGE, LONDON, ENGLAND GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	127
DYRGAPRASAD, N. - TATA INST OF FUND RES, BOMBAY, INDIA SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
EATHER, R.M. - BOSTON COLLEGE, CHESTNUT HILL, MA DYNAMICS EXPLORER-A, GLOBAL ALORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (DE-A -03).....	111
SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	160
ERENHARDT, P.R. - U OF BERNE, BERNE, SWITZERLAND CEE, PLASMA COMPOSITION (CEE -01).....	100
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (76-071A-03).....	22
ISEE 1, ION COMPOSITION (77-102A-12).....	42
EDELSTEIN, F. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LDEF-A, TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE (SSLDEF -37).....	155
EGIDI, A. - CNR, SPACE PLASMA LAB, ROME, ITALY *ISEE 2, SOLAR WIND IONS (77-102B-02).....	43
EJIRI, M. - U OF TOKYO, TOKYO, JAPAN *JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	52
EL-SAYED, S.I. - TEXAS A&M, COLLEGE STATION, TX NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-089A-03).....	61
ELLEMAN, D.D. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165
ELLIOT, H. - IMPERIAL COLLEGE, LONDON, ENGLAND *ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
*UK 5, HIGH-ENERGY COSMIC X-RAY SPECTRA (74-077A-05).....	87
ELLIOT, J.L. - CORNELL U, ITHACA, NY ST, HIGH-SPEED PHOTOMETER (HSF) (LST -06).....	169
ENGE, W. - INST P+A NUCLEAR PHYS, KIEL, FED REP OF GERMANY SPACELAB 1, ISOTOPE STACK (SPALAB1-29).....	157
ENGEL, A.R. - IMPERIAL COLLEGE, LONDON, ENGLAND UK 5, HIGH-ENERGY COSMIC X-RAY SPECTRA (74-077A-05).....	87
ENGLMAN, J.J. - CENS, SACLAY, FRANCE MEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	22
ESA STAFF ESA, TOULOUSE, FRANCE *METEOSAT 1, IMAGING RADIOMETER (77-108A-01).....	57
*METEOSAT 1, DATA COLLECTION PLATFORM (DCP) (77-108A-02).....	57
ESA STAFF ESA-ESTEC, NOORDWIJK, NETHERLANDS *METEOSAT 2, IMAGING RADIOMETER (METOS-B-01).....	140
*METEOSAT 2, DATA COLLECTION PLATFORM (DCP) (METOS-B-02).....	140
*SPACELAB 1, METRIC CAMERA FACILITY (SPALAB1-38).....	159
*SPACELAB 1, MICROWAVE FACILITY (SPALAB1-39).....	159
*SPACELAB 1, SPACE SLED FACILITY (SPALAB1-40).....	159
*SPACELAB 1, SPACE PROCESSING LABORATORY (SPALAB1-42).....	159
ESHLEMAN, V.R. - STANFORD U, PALO ALTO, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122
*PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	66
VYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
VYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
FPOSITO, L. - U OF COLORADO, BOULDER, CO VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7500 A (77-084A-11).....	98
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7500 A (77-076A-11).....	101
ESPOSITO, P.H. - NASA-JPL, PASADENA, CA *ISPM/ESA, RADIO SCIENCE (ISPESA -09).....	135
ESTBROOK, F.B. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122

INVESTIGATORS AND EXPERIMENTS

PAGE

ESTULIN, I.V. - IKI, MOSCOW, USSR	
*PROGNOZ 7, GAMMA-RAY SPECTROMETER (77-101A-03).....	75
*VENERA 11, GAMMA-RAY SPECTROMETER (78-084A-01).....	93
*VENERA 12, GAMMA-RAY SPECTROMETER (78-086A-01).....	94
STCHETO, J.M. - CNET, ISSY-LES-MOULINEAUX, FRANCE	
ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06).....	22
ISEE 1, PLASMA DENSITY (77-102A-08).....	41
ISEE 2, RADIO PROPAGATION (77-102B-06).....	43
EVANS, W.D. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
ISEE 3, X- AND GAMMA-RAY BURSTS (76-079A-14).....	45
*PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	75
VELA 9B, COSMIC X RAYS (69-046E-06).....	90
EVENSON, P. - U OF CHICAGO, CHICAGO, IL	
ISEE 3, COSMIC-RAY ELECTRONS AND NUCLEI (78-079A-06).....	45
EYLES, C.J. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
FAINBERG, J. - NASA-GSFC, GREENBELT, MD	
ISEE 3, RADIO MAPPING (78-079A-10).....	46
FAIRFIELD, D.M. - NASA-GSFC, GREENBELT, MD	
ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	23
FAN, C.Y. - U OF ARIZONA, TUCSON, AZ	
IMP-J, SOLID-STATE DETECTORS (73-079A-03).....	38
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISEE 3, LOW-ENERGY COSMIC RAYS (76-071A-03).....	45
*PIONEER 6, COSMIC-RAY TELESCOPE (69-08A-03).....	64
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	97
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
FANALE, F.P. - NASA-JPL, PASADENA, CA	
*GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	127
*GALILEO ORBITER, FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES (JOPO -12).....	122
FARLEY, D.T. - CORNELL U, ITHACA, NY	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	164
FARMER, C.B. - NASA-JPL, PASADENA, CA	
*SPACELAB 3, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY (ATMCS) (SPALAB3-14).....	167
*VIKING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAWD) (78-079A-03).....	94
FARHING, W.M. - NASA-GSFC, GREENBELT, MD	
DYNAMICS EXPLORER-A, MAGNETIC FIELD OBSERVATIONS (DF-A -01).....	112
DYNAMICS EXPLORER-B, MAGNETIC FIELD OBSERVATIONS (DF-B -01).....	115
MAGSAT, SCALAR MAGNETOMETER (79-094A-01).....	54
FAVALE, A.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
FACCHETT, B.C. - APPLETON LAB, SLOUGH, ENGLAND	
SM, SOFT X-RAY POLYCHROMATOR (SRP) (88-014A-04).....	70
FAZIO, G.G. - SAO, CAMBRIDGE, MA	
*SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
FECHTIG, H. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	
*GALILEO ORBITER, DUST (JOPO -09).....	123
*HELIOS-A, MICROMETEOROID DETECTOR AND ANALYZER (76-097A-12).....	32
*HELIOS-B, MICROMETEOROID DETECTOR AND ANALYZER (76-003A-12).....	35
FEHLAU, P.E. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
VELA 9A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (69-046D-02).....	84
VELA 9A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (70-027A-02).....	91
FEINBERG, P.M. - NASA-GSFC, GREENBELT, MD	
*LANDSAT-B, GLOBAL POSITIONING SYSTEM (GPS) (LAND-B -03).....	139
*LANDSAT-D1, GLOBAL POSITIONING SYSTEM (GPS) (LAND-D -03).....	134
FELBECK, D.K. - U OF MICHIGAN, ANN ARBOR, MI	
*SPACE SHUTTLE LDEF-A, INFLUENCE OF SPACE EXPOSURE ON MECH PROPERTIES OF HI-TOUGHNESS GRAPHITE-EPOXY (SSLEEF -06).....	152
FELDMAN, W.C. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISEE 2, FAST PLASMA (77-102B-01).....	44
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	45
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
FELTHAUSER, H.E. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
VELA 9A, SOLAR WIND (69-046D-05).....	88
VELA 9B, SOLAR WIND (69-046E-05).....	89
VELA 9A, SOLAR WIND EXPERIMENT (70-027A-05).....	91
FENNELL, J.F. - AEROSPACE CORP, EL SEGUNDO, CA	
*STP P78-2, SPACECRAFT SHEATH FIELDS DETECTOR (79-007A-06).....	84
FICHTEL, C.E. - NASA-GSFC, GREENBELT, MD	
*GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
FICHTL, G. - NASA-MSC, HUNTSVILLE, AL	
SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-08).....	140

INVESTIGATORS AND EXPERIMENTS

PAGE

FILLIUS, R.W. - U OF CALIF, SAN DIEGO, LA JOLLA, CA *PIONEER 10, JOVIAN TRAPPED RADIATION (72-012A-08).....	68
*PIONEER 11, JOVIAN TRAPPED RADIATION (73-019A-08).....	70
FILZ, H.C. - USAF GEOPHYS LAB, BEDFORD, MA *SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	152
FINDLAY, J.A. - NASA-GSFC, GREENBELT, MD ISIS 1, CYLINDRICAL ELECTROSTATIC PROBE (69-009A-07).....	47
FINLEY, D. - U OF CALIF, BERKELEY, BERKELEY, CA STP P80-1, EXTREME ULTRAVIOLET PHOTOMETER (P80-1 -03).....	170
FISCHER, F. - INST FUR PHYS WELTHAUM, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	149
FISHMAN, G.J. - NASA-MSFC, HUNTSVILLE, AL *GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (680 -05).....	127
FISK, L.A. - U OF NEW HAMPSHIRE, DURHAM, NH ISSE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISSE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	45
ISSE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	46
FITZMAURICE, P.W. - NASA-GSFC, GREENBELT, MD *ICEN, ICE ELEVATION ALTIMETER SYSTEM (ICEN-A -04).....	132
FJELDBO, G. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOP0 -11).....	122
PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	69
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	71
FLAMAND, J. - INSTRUMENT SA/JOBIN-R, LONGJUMEAU, FRANCE *SPACE SHUTTLE LDEF-A, RULED AND HOLOGRAPHIC GRATINGS (SSLDEF -42).....	152
FLASAR, F.M. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
FLAVILL, R.P. - U OF KENT, CANTERBURY, KENT, ENGLAND SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	154
FOPPL, H. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY *FIREWHEEL, ION RELEASE (FIRE-A -01).....	112
IRM, LI AND BA RELEASE MODULE (IRM -01).....	134
FORD, H.C. - U OF CALIF, LA, LOS ANGELES, CA ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	169
FORESTIERI, A.F. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, PYANEC PHOTOVOLTAIC EXPERIMENT (SSLDEF -02).....	151
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
FORMISANO, V. - CNR, SPACE PLASMA LAB, ROME, ITALY ISSE 2, SOLAR WIND IONS (77-102B-02).....	43
FORREST, D.J. - U OF NEW HAMPSHIRE, DURHAM, NH SMW, GAMMA RAY SPECTROMETER (GR) (80-010A-07).....	78
FOUNTAIN, J.A. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, INDUCED ENVIRONMENT CONTAMINATION MONITOR (SSLDEF -30).....	154
FOWLER, P.M. - U OF BRISTOL, BRISTOL, ENGLAND *UK 6, COSMIC RAY (79-047A-01).....	88
FRANK, L.A. - U OF IOWA, IOWA CITY, IA *DYNAMICS EXPLORER-A, GLOBAL AURORAL IMAGING AT VISIBLE AND ULTRAVIOLET WAVELENGTHS (DE-A -03).....	111
*GALILEO ORBITER, PLASMA (JOPC -04).....	122
*IMP-J, MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS (73-078A-04).....	38
ISSE 1, HOT PLASMA (77-102A-03).....	40
ISSE 2, HOT PLASMA (77-102B-03).....	43
OS5-1, PLASMA DIAGNOSTIC PACKAGE (SHOPT-4-01).....	147
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
SPACELAP 2, EJECTABLE PLASMA DIAGNOSTIC PACKAGE (SPALAP2-03).....	166
FRANZ, O.G. - LOWELL OBSERVATORY, FLAGSTAFF, AZ ST, ASTROMETRY SCIENCE (LST -09).....	169
FREDERICK, J.E. - NASA-GSFC, GREENBELT, MD UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	174
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	179
FREDERICK, L.W. - U OF VIRGINIA, CHARLOTTESVILLE, VA ST, ASTROMETRY SCIENCE (LST -09).....	169
FREDERICKS, R.W. - TRW SYSTEMS GROUP, REDONDO BEACH, CA ISSE 1, PLASMA WAVES (77-102A-07).....	41
ISSE 2, PLASMA WAVES (77-102B-05).....	43
ISSE 3, PLASMA WAVES (78-079A-07).....	46
PIONEER 9, PLASMA WAVE DETECTOR (69-100A-07).....	67
FRIEDEL, V. - BALL AEROSPACE SYS DIV, BOULDER, CO SPACE SHUTTLE LDEF-A, ORBITAL LUBRICATION EXPERIMENT (SSLDEF -25).....	161
FRIMONT, D. - BIRA, BRUSSELS, BELGIUM SPACELAB 1, WILLE SPECTROMETER (SPALAB1-18).....	157

INVESTIGATORS AND EXPERIMENTS

PAGE

FRISZ, T.A. - NOAA-ERL, BOULDER, CO	
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -86).....	125
ISSE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-07).....	97
ISSE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	98
FROST, R.J. - NASA-GSFC, GREENBELT, MD	
SBMM, HARD X-RAY BURST SPECTROMETER (MHRBS) (88-010A-06).....	78
FULLER, J.C. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
VELA 3A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (69-046D-02).....	89
VELA 3B, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (70-027A-02).....	91
FYNDL, A.L. - NASA-JPL, PASADENA, CA	
UARS-1, GLIMPSE/GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	176
UARS-2, GLIMPSE/GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	176
GABRIEL, A.H. - APPLETON LAB, SLOUGH, ENGLAND	
SBMM, SOFT X-RAY POLYCHROMATOR (SRP) (88-010A-04).....	78
SPACELAB 2, SOLAR CORONAL HELIOP ABUNDANCE (SPALAB2-09).....	164
GADBY, E.M. - NASA-GSFC, GREENBELT, MD	
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
GALICINAO, I.V. - NASA-GSFC, GREENBELT, MD	
GEOS 3, SATELLITE-TO-SATELLITE TRACKING (79-027A-06).....	25
GALLAGHER, J.J. - GEORGIA INST OF TECH, ATLANTA, GA	
SPACE SHUTTLE LDEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLDEF -26).....	161
GARCIA-MUNOZ, M. - U OF CHICAGO, CHICAGO, IL	
IMP-J, SOLAR FLARE HIGH-Z/LOW-Z AND LOW-Z ISOTOPE (73-012A-07).....	39
STP P88-2, COSMIC RAY ISOTOPE (CRIE) (P88-2 -02).....	171
GAUER, D.H. - U OF BERLIN, BERLIN, FED REP OF GERMANY	
SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1 -1).....	159
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALBOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	159
GAUDE, R.L. - NASA-RSFC, HUNTSVILLE, AL	
SPACELAB 1, TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL (SPALAB1-10).....	160
GAUTIER, D. - PARIS OBSERVATORY, MEUDON, FRANCE	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
GAYLORD, T.K. - GEORGIA INST OF TECH, ATLANTA, GA	
SPACE SHUTTLE LDEF-A, SPACE TESTING OF HOLOGRAPHIC DATA STORAGE (CRYSTALS) (SSLDEF -08).....	152
GOALEVICH, G.L. - IKI, MOSCOW, USSR	
COSMOS 900, SPHERICAL ION TRAP WITH FLOATING POTENTIAL (77-022A-03).....	14
COSMOS 900, CYLINDRICAL ELECTROSTATIC PROBE (77-022A-04).....	14
GENRELS, T. - U OF ARIZONA, TUCSON, AZ	
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (73-012A-07).....	68
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-012A-07).....	71
GEISLER, J.E. - U OF MIAMI, MIAMI, FL	
UARS-1, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	172
UARS-2, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	177
GEISS, J. - U OF BERNE, BERNE, SWITZERLAND	
CEE, PLASMA COMPOSITION (CEE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	22
ISSE 1, ION COMPOSITION (77-102A-12).....	42
ISSE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	46
ISPM/ESA, SOLAR WIND COMPOSITION SPECTROMETER (ISPEXA -04).....	135
SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -08).....	153
GELLER, M.A. - U OF MIAMI, MIAMI, FL	
UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	172
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
UARS-1, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	172
UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	177
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
UARS-2, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	177
GENDRIN, R.E. - CNRS, 185V-LES-MOULINEAUX, FRANCE	
ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06).....	22
GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -87).....	125
ISSE 1, PLASMA DENSITY (77-102A-08).....	41
ISSE 2, RADIO PROPAGATION (77-102B-06).....	43
GERARD, E. - PARIS OBSERVATORY, MEUDON, FRANCE	
GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122
GHISETTI, A. - U OF BERNE, BERNE, SWITZERLAND	
CEE, PLASMA COMPOSITION (CEE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	22
ISSE 1, ION COMPOSITION (77-102A-12).....	42
G. (CONI), D. - SAO, CAMBRIDGE, MA	
HEAD 2, MONITOR PROPORTIONAL COUNTER (78-103A-01).....	30
HEAD 2, HIGH-RESOLUTION IMAGER (78-103A-02).....	30
HEAD 2, CURVED-CRYSTAL BRAGG X-RAY (78-103A-03).....	31
HEAD 2, IMAGING PROPORTIONAL COUNTER (78-103A-04).....	31
HEAD 2, SOLID-STATE X-RAY DETECTOR (78-103A-05).....	31

INVESTIGATORS AND EXPERIMENTS

PAGE

GIERASCH, P.J. - CORNELL U, ITHACA, NY	
*GALILEO ORBITER, JOVIAN ATMOSPHERIC DYNAMICS (JOPQ -13).....	123
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
GIESE, R.H. - RUHR-U BOCHUM, BOCHUM, FED REP OF GERMANY	
*ISPM/NASA, ZODIACAL LIGHT/BACKGROUND STARLIGHT (ZLE) (ISPNASA-08).....	137
GILBERT, E.L. - NASA-GSFC, GREENBELT, MD	
*LANDSAT 3, DATA COLLECTION SYSTEM (DCS) (78-026A-03).....	55
GILLE, J.C. - NATL CTR FOR ATMOS RES, BOULDER, CO	
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
*UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	172
*UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
*UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	177
*UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
GILMAN, P. - HIGH ALTITUDE OBS, BOULDER, CO	
SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-06).....	160
GIOVANE, F. - STATE U OF NEW YORK, ALBANY, NY	
OSS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SHOFT-A-06).....	148
GIRARD, A. - ONERA, CHATILLON, FRANCE	
SPACELAB 1, GRILLE SPECTROMETER (SPALAB1-18).....	157
GLEIM, F.O. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY	
GALILEO PROBE, LIGHTNING (JOP -06).....	126
GLOECKLER, G. - U OF MARYLAND, COLLEGE PARK, MD	
*CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	104
*IMP-J, SOLID-STATE DETECTORS (73-078A-03).....	38
ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	40
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	45
ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	46
*ISPM/ESA, SOLAR-WIND COMPOSITION SPECTROMETER (ISPEA-04).....	135
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	98
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-074-07).....	100
GLOERSEN, P. - NASA-GSFC, GREENBELT, MD	
NIMBUS 5, ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) (72-097A-04).....	58
*NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR) (78-096A-08).....	60
GOERTZ, C.K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
VOYAGER 1, PLASMA SPECTROMETERS (77-064A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
GOLDMAN, A. - U OF DENVER, DENVER, CO	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
GOLDSTEIN, R.H. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
*PIONEER 6, SPECTRAL BROADENING (65-105A-09).....	65
GOMBOSI, T.I. - HUNGARIAN ACAD OF SCI, BUDAPEST, HUNGARY	
PROGNOZ 7, ELECTRIC SCANNING PLASMA DETECTOR (78-101A-05).....	76
GONFALONE, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
GOODALL, C.V. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	88
GOODY, R.M. - HARVARD U, CAMBRIDGE, MA	
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
GORDON, H.R. - NOAA-PHEL, SEATTLE, WA	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (ZCS) (78-098A-03).....	61
GORE, P. - CENS, SACLAY, FRANCE	
MEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
GORTCHAKOV, YE. V. - INST NUCLEAR PHYSICS, MOSC, USSR	
*COSMOS 900, RELATIVISTIC PROTON AND ELECTRON COUNTER (77-023A-08).....	16
GRAMS, G.W. - GEORGIA INST OF TECH, ATLANTA, GA	
GALILEO PROBE, NEPHELOMETER (JOP -05).....	126
NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II) (78-098A-06).....	61
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
GRANTHAM, W.L. - NASA-LARC, HAMPTON, VA	
*ICEX, SCATTEROMETER (SCAT) (ICEX-A -03).....	133
GRAND, R.J.L. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	23
*GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
ISEE 1, PLASMA DENSITY (77-102A-08).....	41
ISEE 2, RADIO PROPAGATION (77-102B-06).....	43

INVESTIGATORS AND EXPERIMENTS

PAGE

GRAYSTONE, P. - METEOROLOGICAL OFFICE, LONDON, ENGLAND	173
*UARS-1, THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE (UARS-1 -25)	177
*UARS-2, THEORETICAL INVESTIGATION PHYSICS, CHEMISTRY, AND DYNAMICS-STRATOSPHERE (UARS-2 -25)	
GREELEY, R. - ARIZONA STATE U, TUCSON, AZ	122
GALILEO ORBITER, ORBITER IMAGING (JOPO -10)	96
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01)	
GREEN, A.E.S. - U OF FLORIDA, GAINESVILLE, FL	60
NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TCPS) (78-098A-09)	
GREEN, G. - U OF KIEL, KIEL, FED REP OF GERMANY	33
HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07)	36
HELIOS-B, COSMIC-RAY PARTICLES (76-003A-07)	
GREEN, M.L. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND	160
*SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-35)	
GREEN, I.M. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	67
PIONEER 9, PLASMA WAVE DETECTOR (68-100A-07)	74
PIONEER VENUS 1, ELECTRIC FIELD DETECTOR (78-051A-13)	
GREENBERG, R. - PLANETARY SCIENCE INST, TUCSON, AZ	122
GALILEO ORBITER, ORBITER IMAGING (JOPO -10)	
GREENSTADT, E.W. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	42
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04)	44
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04)	
GREGORY, J.C. - U OF ALABAMA, HUNTSVILLE, AL	152
*SPACE SHUTTLE LDEF-A, THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE (SSLDEF -19)	
GREINER, D.E. - U OF CALIF, BERKELEY, BERKELEY, CA	45
ISEE 3, HIGH-ENERGY COSMIC RAY (78-079A-05)	
GRIFFIN, F.J. - EPPLEY LAB, INC, NEWPORT, RI	153
SPACE SHUTTLE LDEF-A, PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS (SSLDEF -27)	
GRIFFITHS, R.E. - U OF LEICESTER, LEICESTER, ENGLAND	87
UK 5, 2- TO 10-KEV SKY SURVEY (74-077A-02)	88
UK 5, POLARIMETER/SPECTROMETER (74-077A-04)	
GRINGAUZ, K.I. - IKI, MOSCOW, USSR	76
*PROGNOZ 7, ELECTRIC SCANNING PLASMA DETECTOR (78-101A-05)	93
*VENERA 11, RETARDING POTENTIAL TRAPS (78-084A-02)	94
*VENERA 12, RETARDING POTENTIAL TRAPS (78-086A-02)	
GROSE, W.L. - NASA-LARC, HAMPTON, VA	173
*UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-1 -22)	177
*UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS, AND ENERGETICS (UARS-2 -22)	
GROSSI, M.D. - RAYTHEON CORP, SUDBURY, MA	95
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11)	96
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04)	
GRUBER, R.P. - NASA-LERC, CLEVELAND, OH	153
*SPACE SHUTTLE LDEF-A, SPACE POWER EXPERIMENT (SSLDEF -11)	
GRUN, E. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY	123
*GALILEO ORBITER, DUST (JOPO -09)	135
*ISPM/ESA, COSMIC DUST (ISPESA -07)	
GUBSKY, V.F. - IKI, MOSCOW, USSR	16
COSMOS 900, CYLINDRICAL ELECTROSTATIC PROBE (77-023A-04)	
GUDMANSSEN, P. - TECH U OF DENMARK, LYNGBY, DENMARK	60
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR) (78-098A-08)	
GUEST, J.E. - U OF LONDON, LONDON, ENGLAND	96
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01)	
GUEST INVESTIGATORS SEE EXPER. DESCRIPT.	52
*IUE, LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE (78-012A-01)	
GUILLAUMON, J.C. - CNES/CSY, TOULOUSE CEDEX, FRANCE	154
SPACE SHUTTLE LDEF-A, THERMAL COATINGS AND STRUCTURAL MATERIAL (SSLDEF -34)	
GULKIS, S. - NASA-JPL, PASADENA, CA	109
COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01)	108
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02)	109
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03)	122
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -11)	99
GALILEO ORBITER, RADIO SCIENCE (JOPO -11)	102
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10)	
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10)	
GUNN, J.E. - CALIF INST OF TECH, PASADENA, CA	170
ST, WIDE-FIELD CAMERA (WFC) (LST -07)	
GUNTON, R.G. - LOCKHEED PALO ALTO, PALO ALTO, CA	175
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07)	180
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07)	
GURNETT, D.A. - U OF IOWA, IOWA CITY, IA	117
DYNAMICS EXPLORER-A, PLASMA WAVES (DE-A -02)	119
*FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E -04)	123
*GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07)	
*HELIOS-A, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-04)	52

INVESTIGATORS AND EXPERIMENTS

PAGE

*HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	32
*HELIOS-A, 50-KHZ TO 2-MHZ RADIO WAVE (74-097A-06).....	33
*HELIOS-B, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-04).....	35
*HELIOS-B, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-05).....	35
*HELIOS-B, 50-KHZ TO 2-MHZ RADIO WAVE (76-003A-06).....	38
*IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-078A-12).....	41
*ISEE 1, PLASMA WAVES (77-102A-07).....	41
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	43
*ISEE 2, PLASMA WAVES (77-102B-05).....	46
ISEE 3, PLASMA WAVES (78-079A-07).....	147
OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	166
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-03).....	98
VOYAGER 1, PLASMA WAVE (.01-56 KHZ) (77-084A-13).....	101
VOYAGER 2, PLASMA WAVE (.01-56 KHZ) (77-076A-13).....	
HADDOCK, F.T. - U OF MICHIGAN, ANN ARBOR, MI	99
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	102
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	
HADLEY, M. - RUTHERFORD HIGH EN LAB, CHILTON, ENGLAND	173
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	178
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	
HAERENDEL, G. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY	108
CCE, PLASMA COMPOSITION (CCE -01).....	118
FIREWHEEL, ION RELEASE (FIRE-A -01).....	134
*IRM, LI AND BA RELEASE MODULE (IRM -01).....	42
ISEE 1, ION COMPOSITION (77-102A-12).....	
HAGGARD, K.V. - NASA-LARC, HAMPTON, VA	173
UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-1 -22).....	177
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-2 -22).....	
HAGGE, D.E. - UNKNOWN	38
IMP-J, SOLAR AND COSMIC-RAY PARTICLES (73-078A-09).....	
HALL, D.F. - AEROSPACE CORP, EL SEGUNDO, CA	84
*STP P78-2, QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS (79-007A-03).....	84
*STP P78-2, THERMAL CONTROL SAMPLE MONITOR (79-007A-04).....	
HALL, D.S. - APPLETON LAB, SLOUGH, ENGLAND	120
FIREWHEEL SUB-SAT 2, ENERGETIC PARTICLE (FIRE-B -02).....	
HALL, L.A. - USAF GEOPHYS LAB, BEDFORD, MA	14
AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	
HAMEEN-ANTTILA, J. - U OF ARIZONA, TUCSON, AZ	68
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	71
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	
HAMELIN, M. - CNRS, ORLEANS, FRANCE	157
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	
HANEL, R.A. - NASA-GSFC, GREENBELT, MD	98
*VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	100
*VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	
HANKS, B.R. - NASA-LARC, HAMPTON, VA	153
*SPACE SHUTTLE LDEF-A, SHUTTLE BAY ENVIRONMENT MEASUREMENTS (SSLDEF -29).....	
HANSEN, J.E. - NASA-GISS, NEW YORK, NY	124
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	73
*PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	98
VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-084A-11).....	101
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	
HANSEN, J.S. - U OF TORONTO, DOWNSVIEW, ONTARIO, CANADA	156
SPACE SHUTTLE LDEF-A, PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT (SSLDEF -24).....	
HANSON, W.B. - U OF TEXAS, DALLAS, RICHARDSON, TX	13
*AE-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	111
DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A -04).....	114
DYNAMICS EXPLORER-B, ION DRIFT METER (DE-B -06).....	113
*DYNAMICS EXPLORER-B, RETARDING POTENTIAL ANALYZER (DE-B -07).....	148
*SAN MARCO-D/L, ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER) IVI (SM-DL -03).....	173
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	178
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	
HANST, P.L. - ENVIRON PROTECT AGENCY, RESEARCH TRIANGLE PARK, NC	175
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	179
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	
HARDY, D.A. - USAF GEOPHYS LAB, BEDFORD, MA	85
*STP P78-2, RAPID SCAN PARTICLE DETECTOR (79-007A-12).....	
HARMS, R.J. - U OF CALIF, SAN DIEGO, LA JOLLA, CA	169
*ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	
HARRIS, R.D. - UTAH STATE U, LOGAN, UT	165
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	
HART, J.E. - U OF COLORADO, BOULDER, CO	160
*SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-0R).....	167
*SPACELAB 3, GEOPHYSICAL FLUID FLOW CELL (GFFC) (SPALAB3-10).....	
HARTLE, R.E. - NASA-GSFC, GREENBELT, MD	126
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	74
PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	

INVESTIGATORS AND EXPERIMENTS

PAGE

PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
HARTMAN, R.C. - NASA-GSFC, GREENBELT, MD	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
HARTMANN, D.L. - U OF WASHINGTON, SEATTLE, WA	
UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	173
UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	178
HARTZ, T.R. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
*ISIS 1, COSMIC RADIO NOISE (69-089A-10).....	48
*ISIS 2, COSMIC RADIO NOISE (71-024A-10).....	49
HARVEY, C.C. - PARIS OBSERVATORY, MEUDON, FRANCE	
*ISEE 1, PLASMA DENSITY (77-102A-08).....	41
*ISEE 2, RADIO PROPAGATION (77-102B-06).....	43
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
HARVEY, J.W. - KITT PEAK NATL OBS, TUCSON, AZ	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
HASHIMOTO, K. - KYOTO U, KYOTO, JAPAN	
JIKIKEN, VLF DOPPLER PROPAGATION (DPL) (78-087A-03).....	53
HAUSER, M.G. - NASA-GSFC, GREENBELT, MD	
COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	109
*COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	108
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	109
HAUSLER, B. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
*FIREWHEEL, AC MAGNETOMETER (FIRE-A -04).....	119
FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E -04).....	119
IRM, LI AND BA RELEASE MODULE (IRM -01).....	134
HAYS, P.B. - U OF MICHIGAN, ANN ARBOR, MI	
*AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	13
*DYNAMICS EXPLORER-B, FABRY-PEROT INTERFEROMETER (DE-B -05).....	113
*UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	173
*UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	177
HEAD, SRD, J.W. - BROWN U, PROVIDENCE, RI	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	122
HEAP, S.R. - NASA-GSFC, GREENBELT, MD	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
HEATH, D.F. - NASA-GSFC, GREENBELT, MD	
*AE-E, BACKSCATTER UV SPECTROMETER (BUV) (75-107A-16).....	13
*AMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (70-025A-05).....	57
*AMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	60
HECKMAN, H.M. - LAWRENCE BERKELEY LAB, BERKELEY, CA	
*ISEE 3, HIGH-ENERGY COSMIC RAY (78-079A-05).....	45
HEDGECOCK, P.C. - IMPERIAL COLLEGE, LONDON, ENGLAND	
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	42
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	44
*ISPM/ESA, MAGNETIC FIELD (ISPESA -08).....	135
HEDIN, A.E. - NASA-GSFC, GREENBELT, MD	
*AE-E, NEUTRAL ATMOSPHERE COMPOSITION (NACE) (75-107A-08).....	13
DYNAMICS EXPLORER-B, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (DE-B -03).....	113
DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04).....	115
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	174
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	179
HEELIS, R.A. - U OF TEXAS, DALLAS, RICHARDSON, TX	
*DYNAMICS EXPLORER-B, ION DRIFT METER (DE-B -06).....	114
DYNAMICS EXPLORER-B, RETARDING POTENTIAL ANALYZER (DE-B -07).....	113
*UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
*UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	178
HEFFERNAN, P.J. - NASA-GSFC, GREENBELT, MD	
*NOSS, COMPRESSED PULSE RADAR ALTIMETER (ALT) (NOSS -03).....	146
HELLIWELL, R.A. - STANFORD U, PALO ALTO, CA	
*DYNAMICS EXPLORER-A, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (DE-A -08).....	111
*ISEE 1, VLF WAVE PROPAGATION (77-102A-13).....	41
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
HEMENWAY, P.D. - U OF TEXAS, AUSTIN, AUSTIN, TX	
ST, ASTROMETRY SCIENCE (LST -09).....	169
HEMPE, H. - U OF KIEL, KIEL, FED REP OF GERMANY	
HELIOS-A, COSMIC-RAY PARTICLES (74-057A-07).....	33
HELIOS-B, COSMIC-RAY PARTICLES (76-003A-07).....	36
HENRY, D. - CNRS, ORLEANS, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
HENRY, R.M. - U OF WASHINGTON, SEATTLE, WA	
VIKING 1 LANDER, METEOROLOGY (75-073C-07).....	95
VIKING 2 LANDER, METEOROLOGY (75-083C-07).....	97
HEPPNER, J.P. - NASA-GSFC, GREENBELT, MD	

INVESTIGATORS AND EXPERIMENTS

PAGE

DYNAMICS EXPLORER-B, ELECTRIC FIELD INVESTIGATIONS (DE-B -02).....	114
IMP-J, ELECTROSTATIC FIELDS (73-078A-11).....	37
*ISSE 1, DC ELECTRIC FIELD (77-102A-11).....	41
SAN MARCO-0/L, 3-AXIS ELECTRIC FIELD INSTRUMENT (EFI) (SM-DL -05).....	149
HERMAN, B.M. - U OF ARIZONA, TUCSON, AZ	
NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II) (78-098A-06).....	61
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
HERMAN, J.R. - NASA-GSFC, GREENBELT, MD	
PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
HERMSEN, W. - U OF LEIDEN, LEIDEN, NETHERLANDS	
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
HERNANDEZ, E. - NOAA-ERL, BOULDER, CO	
UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	173
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	177
HERRING, J.R.H. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
HERSE, M. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE	
*SPACELAB 1, WAVES IN THE OH EMISSIVE LAYER (SPALAB1-19).....	160
HESS, S.L. - FLORIDA STATE U, TALLAHASSEE, FL	
*VIKING 1 LANDER, METEOROLOGY (75-075C-07).....	95
*VIKING 2 LANDER, METEOROLOGY (75-083C-07).....	97
HICKEY, J.R. - EPPLEY LAB, INC, NEWPORT, RI	
NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
*SPACE SHUTTLE LDEF-A, PASSIVE EXPOSURE OF EARTH RADIATION BUDGET EXPERIMENT COMPONENTS (SSLDEF -27).....	153
HICKMAN, D. - AEROSPACE CORP, EL SEGUNDO, CA	
OMSP 50-1/F4, SSD - ATMOSPHERIC DENSITY SENSOR (79-050A-07).....	21
HIGBIE, P.R. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
*1976-059A, ENERGETIC PARTICLE DETECTOR (76-059A-01).....	11
*1977-007A, ENERGETIC PARTICLE DETECTOR (77-007A-01).....	11
*1979-053A, ENERGETIC PARTICLE DETECTOR (79-053A-01).....	11
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
*VELA 5B, SOLAR PARTICLE TELESCOPES (69-046E-03).....	90
*VELA 5B, ELECTRON DETECTORS (69-046E-04).....	90
*VELA 6A, SOLAR PARTICLE TELESCOPES (70-027A-03).....	91
*VELA 6A, ELECTRON DETECTORS (70-027A-04).....	91
*VELA 6B, SOLAR PARTICLE TELESCOPES (70-027B-03).....	92
*VELA 6B, ELECTRON DETECTORS (70-027B-04).....	92
HILDNER, E.G. - HIGH ALTITUDE OBS, BOULDER, CO	
SMN, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
HILSENRATH, E. - NASA-GSFC, GREENBELT, MD	
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	174
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	179
HINTEREGGER, H.E. - USAF GEOPHYS LAB, BEDFORD, MA	
*AE-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
HIRAO, K. - U OF TOKYO, TOKYO, JAPAN	
*ASTRO-A, ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES (ASTRO-A-06).....	107
KYOKKO, ELECTRON PROBES (78-014A-01).....	54
HIRASHIMA, Y. - RIKKYO U, TOKYO, JAPAN	
ASTRO-A, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE (ASTRO-A-04).....	107
HOEGY, W.R. - NASA-GSFC, GREENBELT, MD	
DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04).....	115
DYNAMICS EXPLORER-B, LANGMUIR PROBE (DE-B -09).....	113
HOFFMAN, H.-J. - U OF BONN, BONN, FED REP OF GERMANY	
GALILEO PROBE, HELIUM ABUNDANCE INTERFEROMETER (JOP -01).....	126
HOFFMAN, J.H. - U OF TEXAS, DALLAS, RICHARDSON, TX	
DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A -04).....	111
*ISIS 2, ION-MASS SPECTROMETER (71-024A-06).....	49
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	178
HOFFMAN, R.A. - NASA-GSFC, GREENBELT, MD	
DYNAMICS EXPLORER-A, HIGH ALTITUDE PLASMA INSTRUMENT (DE-A -05).....	110
DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INSTRUMENT (DE-B -08).....	115
*DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (DE-B -13).....	114
HOFFMANN, W.F. - U OF ARIZONA, TUCSON, AZ	
SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
HOFSTADTER, R. - STANFORD U, PALO ALTO, CA	
*GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
HOLMGREN, L.A. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN	
ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	23
HOLT, O. - AURORAL OBS, TROMSO, NORWAY	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
HOLT, S.S. - NASA-GSFC, GREENBELT, MD	

INVESTIGATORS AND EXPERIMENTS

PAGE

HEAD 2, MONITOR PROPORTIONAL COUNTER (78-103A-01).....	30
HEAD 2, HIGH-RESOLUTION IMAGER (78-103A-02).....	30
HEAD 2, CURVED-CRYSTAL DRAGG X-RAY (78-103A-03).....	31
HEAD 2, IMAGING PROPORTIONAL COUNTER (78-103A-04).....	31
HEAD 2, SOLID-STATE X-RAY DETECTOR (78-103A-05).....	31
*UK 5, ALL-SKY MONITOR (74-077A-06).....	87
HOLTON, E. - NASA-ARC, MOFFETT FIELD, CA	
*SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	166
HOLTON, J.R. - U OF WASHINGTON, SEATTLE, WA	
*UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-1 -12).....	172
*UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	173
*UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-2 -12).....	177
*UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	178
HOMICK, J.L. - NASA-JSC, HOUSTON, TX	
*SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	161
HONECK, S. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY	
*SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-34).....	160
HONES, JR., E.M. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISEE 2, FAST PLASMA (77-102B-01).....	44
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	45
HORAN, D.M. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SOLRAD 11B, 1- TO 8-A SOLAR X-RAY MONITOR (76-023D-04).....	81
SOLRAD 11B, 8- TO 16-A SOLAR X-RAY MONITOR (76-023D-05).....	81
SOLRAD 11B, 44- TO 60-A SOLAR X-RAY MONITOR (76-023D-06).....	82
SOLRAD 11B, 170- TO 1055-A SOLAR EUV MONITOR (76-023D-07).....	82
SOLRAD 11B, 0.5- TO 3-A SOLAR X-RAY MONITOR (76-023D-12).....	82
SOLRAD 11B, 2- TO 10-A SOLAR X-RAY MONITOR (76-023D-13).....	82
HORD, C.W. - U OF COLORADO, BOULDER, CO	
*GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	123
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	75
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	174
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	178
HORZ, F. - NASA-JSC, HOUSTON, TX	
*SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIDS (SSLDEF -51).....	153
HOUGHTON, J.T. - OXFORD U, OXFORD, ENGLAND	
*NIMBUS 5, SELECTIVE CHOPPER RADIOMETER (SCR) (72-097A-02).....	58
*NIMBUS 6, PRESSURE-MODULATED RADIOMETER (PMR) (75-092A-09).....	59
*NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	60
*UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-1 -11).....	173
*UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
HOUSE, F.B. - DREXEL INST OF TECH, PHILADELPHIA, PA	
*NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
HOUSE, L.L. - HIGH ALTITUDE OBS, BOULDER, CO	
*SMH, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
HOUSLEY, R.H. - ROCKWELL INTL CORP, THOUSAND OAKS, CA	
*SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIDS (SSLDEF -51).....	153
HOVESTADT, D.K. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
CCE, CHARGE-ENERGY-MASS SPECTROMETER (CHEM) (CCE -03).....	108
IMP-J, SOLID-STATE DETECTORS (73-078A-03).....	38
*ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	40
*ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	45
ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	46
HOVIS, W.A. - NOAA-NESS, SUITLAND, MD	
*NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	61
HOWARD, H.T. - STANFORD U, PALO ALTO, CA	
*PIONEER 9, TWO-FREQUENCY DEACON RECEIVER (68-100A-03).....	66
HOWARD, K.A. - US GEOLOGICAL SURVEY, MENLO PARK, CA	
*VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
HUANG, F.T. - COMPUTER SCIENCES CORP, SILVER SPRING, MD	
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	174
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	179
HUCK, F.O. - NASA-LARC, HAMPTON, VA	
*VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
*VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
HUGHES, E.B. - STANFORD U, PALO ALTO, CA	
*GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
HULTQVIST, B.K.G. - KIRUNA GEOPHYS INST, KIRUNA, SWEDEN	
*ESA-GEOS 2, LOW-ENERGY ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-04).....	23
*PROGNOZ 7, MAGNETOSPHERIC ION COMPOSITION SPECTROMETER (78-101A-02).....	76

INVESTIGATORS AND EXPERIMENTS

PAGE

HURES, D.H. - NASA-LARC, HAMPTON, VA	
PIIONEER 10, METEOROID DETECTORS (72-012A-04).....	68
PIIONEER 11, METEOROID DETECTORS (73-019A-04).....	71
*SPACE SHUTTLE LDEF-A, SPACE DEBRIS IMPACT STUDY (SSLDEF -36).....	153
HUMMER, R.F. - SANTA BARBARA RES CTR, GOLETA, CA	
PIIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	68
PIIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	71
HUNDHAUSEN, A.J. - NATL CTR FOR ATMOS RES, BOULDER, CO	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
HUNNEMAN, R. - READING U, READING, ENGLAND	
SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	155
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-2 -11).....	178
HUNT, G.E. - U COLLEGE LONDON, LONDON, ENGLAND	
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
HUNTEN, D.H. - U OF ARIZONA, TUCSON, AZ	
*GALILEO ORBITER, STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES (JOPO -14).....	123
GALILEO PROBE, MASS SPECTROMETER (JCP -03).....	126
HURLEY, K.C. - CESR, TOULOUSE, FRANCE	
GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
*ISPM/ESA, SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST (ISPESA -01).....	135
HUTCHINGS, J.B. - DOMINION ASTROPHYS OBS, VICTORIA, CANADA	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
HYNDS, R.J. - IMPERIAL COLLEGE, LONDON, ENGLAND	
*ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
IMAI, T. - INST PHYS + CHEM RES, TOKYO, JAPAN	
ASTRO-A, ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR (ASTRO-A-05).....	107
IMAMOTO, S.J. - AEROSPACE CORP, EL SEGUNDO, CA	
DMSP 5D-1/F1, RADIATION DOSIMETER (76-091A-03).....	17
IMHOFF, W.L. - LOCKHEED PALO ALTO, PALO ALTO, CA	
NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	60
*STP P78-1, GAMMA RAY SPECTROMETER (79-017A-01).....	83
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	175
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	180
INGERSOLL, A.P. - CALIF INST OF TECH, PASADENA, CA	
NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
*PIIONEER 11, INFRARED RADIOMETER (73-019A-08).....	71
INOUE, H. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-A, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE (ASTRO-A-03).....	107
INTRILIGATOR, D.S. - U OF SOUTHERN CALIF, LOS ANGELES, CA	
PIIONEER 10, PLASMA (72-012A-13).....	69
PIIONEER 11, PLASMA (73-019A-13).....	72
PIIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	75
ISRAEL, M.H. - WASHINGTON U, SAINT LOUIS, MO	
*HEAD 3, HEAVY NUCLEI (79-082A-03).....	31
ITOH, T. - U OF TOKYO, TOKYO, JAPAN	
KYOKKO, ELECTROSTATIC PLASMA WAVE MEASUREMENT (78-014A-04).....	54
IVES, J. - U COLLEGE LONDON, LONDON, ENGLAND	
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
IWAMOTO, I. - RADIO RESEARCH LAB, TOKYO, JAPAN	
*ISS-B, ION MASS SPECTROMETER (78-018A-04).....	51
*KYOKKO, ION MASS SPECTROMETER (78-014A-06).....	53
JACKSON, E.B. - NASA-WFC, WOLLOPS ISLAND, VA	
*GEOS 3, C-BAND SYSTEM (75-027A-03).....	25
JACKSON, J.E. - NASA-GSFC, GREENBELT, MD	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
JACOBOWITZ, H. - NOAA-NESS, SUITLAND, MD	
*NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
*NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
JACOBSON, A.S. - NASA-JPL, PASADENA, CA	
GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
*HEAD 3, GAMMA-RAY LINE SPECTROMETER (79-082A-01).....	31
SM, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
JAMES, T.C. - LOCKHEED PALO ALTO, PALO ALTO, CA	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
JEFFERYS, W.H. - U OF TEXAS, AUSTIN, AUSTIN, TX	
*ST, ASTROMETRY SCIENCE (LST -09).....	169
JENNISON, R.C. - U OF KENT, CANTERBURY, KENT, ENGLAND	
SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	154

INVESTIGATORS AND EXPERIMENTS

PAGE

JMA STAFF JAPANESE METEOROL AGCV, TOKYO, JAPAN	
*GRS, VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISRR) (77-065A-01).....	26
*GRS, WEATHER COMMUNICATIONS FACILITY (77-065A-03).....	26
*GRS-2, VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISRR) (GRS-2 -01).....	120
*GRS-2, WEATHER COMMUNICATIONS FACILITY (GRS-2 -03).....	120
JOHNSON, P.C. - BAYLOR U, WACO, TX	
*SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
JOHNSON, R.G. - LOCKHEED PALO ALTO, PALO ALTO, CA	
CCE, PLASMA COMPOSITION (CCE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ISEE 1, ION COMPOSITION (77-102A-12).....	42
*STP P78-2, ENERGETIC ION SPECTROMETER (79-007A-13).....	85
JOHNSON, T.V. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
JOHNSON, W.N. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	127
SMR, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
JOHNSTON, A.R. - NASA-JPL, PASADENA, CA	
*SPACE SHUTTLE LOEF-A, FIBER OPTICS EXPERIMENT (SSLDEF -03).....	153
JOHNSTONE, A.D. - MULLARD SPACE SCI LAB, LONDON, ENGLAND	
*FIREWHEEL SUB-SAT 2, SUPRATHERMAL ELECTRONS (FIRE-B -03).....	120
JOKIPII, J.R. - U OF ARIZONA, TUCSON, AZ	
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
JONES, B.B. - APPLETON LAB, SLOUGH, ENGLAND	
SMR, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	78
JONES, D. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	23
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
ISEE 1, PLASMA DENSITY (77-102A-08).....	41
ISEE 2, RADIO PROPAGATION (77-102B-06).....	43
JONES, D.E. - BRIGHAM YOUNG U, PROVO, UT	
ISEE 3, MAGNETIC FIELDS (78-079A-02).....	46
PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	72
JONES, G.W. - MCGILL U, MONTREAL, QUEBEC, CANADA	
*SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	163
JONES, JR., W.L. - NASA-LARC, HAMPTON, VA	
*ICEX, SCATTEROMETER (SCAT) (ICEX-A -03).....	133
JORDAN, C. - OXFORD U, OXFORD, ENGLAND	
SMR, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	78
JOSEPH, G. - SPACE APPLICATIONS CTR, AHMEDABAD, INDIA	
*BHASKARA, TV CAMERA (79-051A-02).....	15
JUDGE, D.L. - U OF SOUTHERN CALIF, LOS ANGELES, CA	
*PIONEER 10, ULTRAVIOLET PHOTOMETRY (72-012A-06).....	68
*PIONEER 11, ULTRAVIOLET PHOTOMETRY (73-019A-06).....	71
JULIAN, P. - NATL CTR FOR ATMOS RES, BOULDER, CO	
*NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	59
JURA, M.A. - U OF CALIF, LA, LOS ANGELES, CA	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
KACHAROV, G.YE. - LENGRAD INST PHYS TECH, LENINGRAD, USSR	
*PROGNOZ 7, X-RAY SPECTROMETER (78-101A-06).....	76
KAISER, M.L. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
KALYANARAMAN, S. - ISRO SATELLITE CENTER, BANGALORE, INDIA	
*BHASKARA, DATA COLLECTION PLATFORM (79-051A-07).....	15
KANADA, T. - NAGOYA U, NAGOYA, JAPAN	
JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	53
KAMAT, D.S. - SPACE APPLICATIONS CTR, AHMEDABAD, INDIA	
*BHASKARA, DATA COLLECTION PLATFORM (79-051A-07).....	15
KAMPERMAN, T.M. - ASTRONOMICAL INST, UTRECHT, NETHERLANDS	
ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
KANBACH, G. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
KANE, S.R. - U OF CALIF, BERKELEY, BERKELEY, CA	
ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	44
ISEE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	45
KANEBA, E. - U OF TOKYO, TOKYO, JAPAN	
*KYOKKO, UV AURORAL TV IMAGING (78-014A-03).....	57

INVESTIGATORS AND EXPERIMENTS

PAGE

KASTURIRANGAN, K. - ISRO SATELLITE CENTER, BANGALORE, INDIA *BHASKARA, PINHOLE X-RAY SKY SURVEY (79-051A-03).....	19
KATZ, N. - AEROSPACE CORP, EL SEGUNDO, CA *MSP 50-1/P1, RADIATION DOSEMETER (76-091A-03).....	17
KAULA, W.M. - U OF CALIF, LA, LOS ANGELES, CA *PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	74
KAWASHIMA, N. - U OF TOKYO, TOKYO, JAPAN *JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-087A-06)..... *JIKIKEN, CONTROLLED ELECTRON BEAM EMISSIONS (CBE) (78-087A-07).....	83 82
KEATH, E.P. - APPLIED PHYSICS LAB, LAUREL, MD *VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-089A-07)..... *VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	98 100
KEATING, G.M. - NASA-LARC, HAMPTON, VA *PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
KELLEY, M.C. - CORNELL U, ITHACA, NY *FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E-04)..... *ISEE 1, QUASI-STATIC ELECTRIC FIELDS (77-102A-06)..... *SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	119 42 168
KELLOGG, P.J. - U OF MINNESOTA, MINNEAPOLIS, MN *HELIOS-A, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-04)..... *HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05)..... *HELIOS-A, 50-KHZ TO 2-MHZ RADIO WAVE (74-097A-06)..... *HELIOS-B, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-04)..... *HELIOS-B, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-05)..... *HELIOS-B, 50-KHZ TO 2-MHZ RADIO WAVE (76-003A-06).....	32 32 33 35 35 35
KELLOGG, W.W. - NATL CTR FOR ATMOS RES, BOULDER, CO *NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	59
KELLY, K.K. - U OF COLORADO, BOULDER, CO *GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	123
KENDALL, SR., J. - CALIF INST OF TECH, PASADENA, CA *SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	163
KENKNIGHT, C.E. - U OF ARIZONA, TUCSON, AZ *PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07)..... *PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	68 71
KENNEL, C.F. - U OF CALIF, LA, LOS ANGELES, CA *DYNAMICS EXPLORER-A, AURORAL PHYSICS (DE-A -07)..... *GALILEO ORBITER, MAGNETOMETER (JOPO -03)..... *GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07)..... *ISEE 1, HOT PLASMA (77-102A-03)..... *ISEE 2, HOT PLASMA (77-102B-03)..... *PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	111 124 123 40 43 74
KEPPLER, E. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01)..... *HELIOS-A, ENERGETIC ELECTRON DETECTOR (74-097A-10)..... *HELIOS-B, ENERGETIC ELECTRON DETECTOR (76-003A-10)..... *ISEE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-09)..... *ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	24 33 36 42 44
KIEFFER, H.H. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ *GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01)..... *VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	122 96
KIMURA, I. - KYOTO U, KYOTO, JAPAN *JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02)..... *JIKIKEN, VLF DOPPLER PROPAGATION (DPL) (78-087A-03).....	53 53
KIMZEY, S.L. - NASA-JSC, HOUSTON, TX *SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
KINARD, W.H. - NASA-LARC, HAMPTON, VA *PIONEER 10, METEOROID DETECTORS (72-012A-04)..... *PIONEER 11, METEOROID DETECTORS (73-019A-04).....	68 71
KING, H.M. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (SSLDEF -04).....	196
KING, I.R. - U OF CALIF, BERKELEY, BERKELEY, CA *ST, FAINT-OBJECT CAMERA (FOC) (LST -06).....	170
KING, J.L. - NASA-GSFC, GREENBELT, MD *ICEX, LARGE ANTENNA MULTIFREQUENCY MICROWAVE RADIOMETER (LAMMR) (ICEX-A -01).....	133
KING, R.A. - NASA-GSFC, GREENBELT, MD *ICEX, DATA COLLECTION AND LOCATION SYSTEM (DCLS) (ICEX-A -06).....	133
KINSER, D.L. - VANDERBILT U, NASHVILLE, TN *SPACE SHUTTLE LDEF-A, EFFECTS OF SOLAR RADIATION ON GLASSES (SSLDEF -04).....	154
KINTNER, P.M. - CORNELL U, ITHACA, NY *FIREWHEEL SUB-SAT 1, PLASMA WAVE (FIRE-E-04).....	119
KINZER, R.L. - US NAVAL RESEARCH LAB, WASHINGTON, DC *GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02)..... *SMM, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	127 78

INVESTIGATORS AND EXPERIMENTS

PAGE

KIRK, D.B. - NASA-ARC, MOFFETT FIELD, CA GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
KIRSCH U OF BERLIN, BERLIN, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	159
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	159
KISSÉL, J. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY GALILEO ORBITER, DUST (JOPO -09).....	123
KIVELSON, M.G. - U OF CALIF, LA, LOS ANGELES, CA *GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	124
ISEE 1, FLURGATE MAGNETOMETER (77-102A-04).....	42
ISEE 2, FLURGATE MAGNETOMETER (77-102B-04).....	44
KLARMANN, J. - WASHINGTON U, SAINT LOUIS, MO HEAD 3, HEAVY NUCLEI (79-082A-03).....	31
KLEESADEL, R.W. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM ISEE 3, X- AND GAMMA-RAY BURSTS (78-079A-14).....	45
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
*VELA 5A, GAMMA-RAY ASTRONOMY (69-046D-08).....	89
*VELA 5B, GAMMA-RAY ASTRONOMY (69-046E-08).....	98
*VELA 6A, GAMMA-RAY ASTRONOMY (70-027A-08).....	91
*VELA 6B, GAMMA-RAY ASTRONOMY (70-027B-08).....	92
KLEINMANN, D.E. - SAO, CAMBRIDGE, MA SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
KLIORE, A.J. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122
*PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	69
*PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	71
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
KLUMPAR, D.M. - U OF TEXAS, DALLAS, RICHARDSON, TX DYNAMICS EXPLORER-A, HIGH ALTITUDE PLASMA INSTRUMENT (DE-A -05).....	110
DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INSTRUMENT (DE-B -08).....	115
DYNAMICS EXPLORER-C, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGULAR RESOLUTION (DE-C -13).....	114
KNIFFEN, D.A. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
KNOLL, R. - PARIS OBSERVATORY, MEUDON, FRANCE ISEE 3, RADIO MAPPING (78-079A-10).....	46
KNOTHE, W. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-0L -02).....	140
KNOTT, K. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	23
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	123
KNUDSEN, W.C. - LOCKHEED PALO ALTO, PALO ALTO, CA *PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	73
KOCH, L. - CENS, SACLAY, FRANCE GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
*HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
KOCH, R. - U OF BERLIN, BERLIN, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	159
SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	159
KOCKARTS, G. - JASO, BRUSSELS, BELGIUM SPACELAB 1, INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA (SPALAB1-22).....	158
KOHNO, Y. - METEOROL RES INST, TOKYO, JAPAN *GMS, SPACE ENVIRONMENT MONITOR (SEM) (77-065A-02).....	26
*GMS-2, SPACE ENVIRONMENT MONITOR (SEM) (GMS-2 -02).....	128
KOLASINSKI, W.A. - AEROSPACE CORP, EL SEGUNDO, CA DNBP 50-1/F1, RADIATION DOSIMETER (76-001A-03).....	17
KOLECKI, J.C. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, SPACE POWER EXPERIMENT (S6LDEF -11).....	153
KONDO, I. - U OF TOKYO, TOKYO, JAPAN *ASTRO-A, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE (ASTRO-A-04).....	107
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-016A-01).....	29
KOONS, M.C. - AEROSPACE CORP, EL SEGUNDO, CA *STP P78-2, CHARGING ELECTRICAL EFFECTS ANALYZER (79-007A-02).....	85
KOPP, R. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM SMN, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
KORTH, A. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	24
KOTAKI, M. - RADIO RESEARCH LAB, TOKYO, JAPAN *ISB-0, RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ (78-018A-02).....	51
KOVALEV, E.E. - INST MED BIOLOG PROB, MOSCOW, USSR *PROGNOZ 7, PROTON SPECTROMETER (78-101A-14).....	76
*PROGNOZ 7, STANDARD DOSIMETER (78-101A-15).....	76

INVESTIGATORS AND EXPERIMENTS

PAGE

KOYAMA, K. - U OF TOKYO, TOKYO, JAPAN ASTRO-A, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE (ASTRO-A-03).....	107
KREPLIN, R.W. - US NAVAL RESEARCH LAB, WASHINGTON, DC *SOLRAD 11B, 1- TO 8-A SOLAR X-RAY MONITOR (76-0230-04).....	01
*SOLRAD 11B, 8- TO 16-A SOLAR X-RAY MONITOR (76-0230-05).....	01
*SOLRAD 11B, 44- TO 60-A SOLAR X-RAY MONITOR (76-0230-06).....	02
*SOLRAD 11B, 170- TO 1000-A SOLAR EUV MONITOR (76-0230-07).....	02
*SOLRAD 11B, 0.5- TO 3-A SOLAR X-RAY MONITOR (76-0230-12).....	02
*SOLRAD 11B, 2- TO 10-A SOLAR X-RAY MONITOR (76-0230-13).....	02
*STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	03
KRIDER, E.P. - U OF ARIZONA, TUCSON, AZ GALILEO PROBE, LIGHTNING (JCP -06).....	106
KRIMIGIS, S.M. - APPLIED PHYSICS LAB, LAUREL, MD CCE, MEDIUM ENERGY PARTICLE ANALYZER (MEPA) (CCE -02).....	100
FIREWHEEL, ION COMPOSITION TELESCOPE (FIRE-A -03).....	110
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
*IMP-3, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-08).....	38
*VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-084A-07).....	98
*VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
KRISTIAN, J. - CALIF INST OF TECH, PASADENA, CA ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
KROES, R.L. - NASA-MSFC, HUNTSVILLE, AL *SPACELAB 3, FLUID EXPERIMENT SYSTEMS (FES) (SPALAB3-01).....	167
KRUEGER, A.J. - NASA-GSFC, GREENBELT, MD NIMBUS 9, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (70-029A-05).....	57
NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-099A-00).....	60
KUBO, H. - U OF TOKYO, TOKYO, JAPAN *JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-007A-06).....	53
KUEHNE, F. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LDEF-A, EFFECT OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLDEF -20).....	102
KULAGIN, YU.M. - INST APPLIED GEOPHYS, MOSCOW, USSR *PROGNOZ 7, UV DETECTOR (78-101A-08).....	76
KUMAR, S. - U OF SOUTHERN CALIF, LOS ANGELES, CA VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
KUMER, J.B. - LOCKHEED PALO ALTO, PALO ALTO, CA UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
KUNDE, V.G. - NASA-GSFC, GREENBELT, MD UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
KUNDT, W. - U OF HAMBURG, HAMBURG, FED REP OF GERMANY *HELIOS-A, CELESTIAL MECHANICS (74-097A-14).....	33
*HELIOS-B, CELESTIAL MECHANICS (76-003A-14).....	36
KUNOW, H. - U OF KIEL, KIEL, FED REP OF GERMANY *HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	33
*HELIOS-B, COSMIC-RAY PARTICLES (76-003A-07).....	36
KUNZ, W.E. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM VELA 5A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (69-046B-02).....	89
VELA 6A, SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A (70-027A-02).....	91
KUPFESS, J.D. - US NAVAL RESEARCH LAB, WASHINGTON, DC *GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	127
SMN, GAMMA RAY SPECTROMETER (GRE) (60-014A-07).....	78
KURT, V.G. - IKI, MOSCOW, USSR *VENERA 11, UV GRATING MONOCHROMATOR (78-084A-03).....	93
*VENERA 12, UV GRATING MONOCHROMATOR (78-086A-03).....	94
KUZAJA, R.J. - GEORGE WASHINGTON U, WASHINGTON, DC UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-1 -22).....	173
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-2 -22).....	177
L'HEUREUX, J. - U OF CHICAGO, CHICAGO, IL SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	165
LABS, D. - LANDESSSTERNWART, HEIDELBERG, FED REP OF GERMANY SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 170 TO 4000 NANOMETERS (SPALAB1-21).....	162
LACIS, A.A. - NASA-GISS, NEW YORK, NY *GALILEO ORBITER, PHOTOPOLARIMETER (JOPO -0F).....	124
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	73
LAL, D. - PHYSICAL RESEARCH LAB, AHMEDABAD, INDIA *SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
LAL, R.H. - ALABAMA A&M U, NORMAL, AL *SPACELAB 3, FLUID EXPERIMENT SYSTEMS (FES) (SPALAB3-01).....	167
LAMPORT, J.F. - U OF CHICAGO, CHICAGO, IL PIONEER 6, COSMIC-RAY TELESCOPE (65-105A-03).....	65

INVESTIGATORS AND EXPERIMENTS

PAGE

SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	165
LANDECKER, P.S. - AEROSPACE CORP, EL SEGUNDO, CA *STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
LANE, A.L. - NASA-JPL, PASADENA, CA GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	123
*VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-080A-11).....	90
*VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	101
LANGE, R.D. - U OF TENNESSEE, KNOXVILLE, TN SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
LANGE, M.S. - BELL AEROSPACE CORP, BUFFALO, NY *SPACELAB 2, IN-ORBIT CALIBRATION OF LOW-G MINIATURE ELECTROSTATIC ACCELEROMETER (SPALAB2-12).....	165
LANDEL, R.A. - NASA-OSFC, GREENBELT, MD *MAGSAT, SCALAR MAGNETOMETER (79-094A-01).....	96
*MAGSAT, VECTOR MAGNETOMETER (79-094A-02).....	96
LANZEROTTI, L.J. - BELL TELEPHONE LAB, MURRAY HILL, NJ GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
*GALILEO PROBE, LIGHTNING (JOP -06).....	126
*ISPM/ESA, HELIOSPHERE (ISPEGA -03).....	130
VOYAGER 1, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-080A-07).....	90
VOYAGER 2, LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE (77-076A-07).....	100
LAPORTE, D.D. - SANTA BARBARA RES CTR, SOLETA, CA VIKING 1 ORBITER, MARS ATMOSPHERIC WATER DETECTION (MAMD) (75-078A-03).....	96
LARKIN, E.C. - VETERANS ADMIN HOSP, MARTINEZ, CA SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
LARSON, J.C. - LOCKHEED PALO ALTO, PALO ALTO, CA *STP P80-1, TEAL RUBY (P80-1 -01).....	170
LAURENAT, J. - CNRS, SAINT-MAUR DES FOSSES, FRANCE SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-29).....	157
LAUGHLIN, C.R. - NASA-OSFC, GREENBELT, MD *HIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	59
LAVOI, P.A. - ILC TECHNOLOGY INC, SUNNYVALE, CA *SPACE SHUTTLE LOEF-A, LARGE SPACE STRUCTURE LIGHTING EVALUATION (SSLDEF -07).....	153
LAZARUS, A.J. - MASS INST OF TECH, CAMBRIDGE, MA *IMP-J, SOLAR PLASMA FARADAY CUP (73-078A-02).....	38
*PIONEER 6, SOLAR WIND PLASMA FARADAY CUP (65-105A-02).....	64
VOYAGER 1, PLASMA SPECTROMETERS (77-080A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
LEADABRAND, R.L. - SRI INTERNATIONAL, MENLO PARK, CA *PIONEER 9, TWO-FREQUENCY SEARCH RECEIVER (68-100A-03).....	66
LEBLANC, Y. - PARIS OBSERVATORY, MEUDON, FRANCE VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-080A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
LEDLEY, D.G. - NASA-OSFC, GREENBELT, MD DYNAMICS EXPLORER-A, MAGNETIC FIELD OBSERVATIONS (DE-A -01).....	112
DYNAMICS EXPLORER-B, MAGNETIC FIELD OBSERVATIONS (DE-B -01).....	115
*STP P78-2, MAGNETIC FIELD MONITOR (79-007A-08).....	85
LEINERT, C. - MPI-ASTRONOMIE, HEIDELBERG, FED REP OF GERMANY *HELIOS-A, ZODIACAL LIGHT PHOTOMETER (74-097A-11).....	33
*HELIOS-B, ZODIACAL LIGHT PHOTOMETER (74-093A-11).....	36
LEOVY, C.B. - U OF WASHINGTON, SEATTLE, WA *UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	173
*UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	178
VIKING 1 LANDER, METEOROLOGY (75-075C-07).....	95
VIKING 2 LANDER, METEOROLOGY (75-083C-07).....	97
LEPPING, R.P. - NASA-OSFC, GREENBELT, MD VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-080A-05).....	98
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	101
LEVINTHAL, M. - BELL TELEPHONE LAB, MURRAY HILL, NJ *GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
LEVINTHAL, E.C. - STANFORD U, PALO ALTO, CA VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
LEVY, G.S. - NASA-JPL, PASADENA, CA VOYAGER 1, RADIO SCIENCE TEAM (77-080A-02).....	99
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
LEWIS, J.S. - MASS INST OF TECH, CAMBRIDGE, MA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
LICKIN, O.B. - IKI, MOSCOW, USSR *PROGNOZ 7, SOLAR X-RAY SPECTROMETER (78-103A-07).....	76
LIEBES, J.H., S. - STANFORD U, PALO ALTO, CA VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	94
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97

INVESTIGATORS AND EXPERIMENTS

PAGE

LIN, R.P. - U OF CALIF, BERKELEY, BERKELEY, CA	
ISSC 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISSC 2, ELECTRONS AND PROTONS (77-102B-02).....	43
ISSC 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	44
LIND, D.L. - NASA-JSC, HOUSTON, TX	
ISSC 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	46
SPACE SHUTTLE LDEF-A, INTERSTELLAR GAS (SSLDEF -48).....	103
LIND, W.D. - ROCKWELL INTER SCI CTR, THOUSAND OAKS, CA	
SPACE SHUTTLE LDEF-A, GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY (SSLDEF -17).....	103
LINDAL, G.F. - NASA-JPL, PASADENA, CA	
GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122
VIKING 1 LANDER, LANDER RADIO SCIENCE (78-079C-11).....	98
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-079A-04).....	94
VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
LINDHOLM, B.F. - LUND OBS, LUND, SWEDEN	
GALILEO ORBITER, DUST (JOPO -09).....	123
LINSKY, J.L. - U OF COLORADO, BOULDER, CO	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
LINTON, R.C. - NASA-MSFC, HUNTSVILLE, AL	
SPACE SHUTTLE LDEF-A, ATOMIC OXYGEN STIMULATED OUTGASSING (SSLDEF -07).....	105
SPACE SHUTTLE LDEF-A, INDUCED ENVIRONMENT CONTAMINATION MONITOR (SSLDEF -30).....	104
LIPPENCOTT, C.R. - U OF TEXAS, DALLAS, RICHARDSON, TX	
AE-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	113
DYNAMICS EXPLORER-0, ION DRIFT METER (DE-D -06).....	114
DYNAMICS EXPLORER-0, RETARDING POTENTIAL ANALYZER (DE-D -01).....	113
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	170
LIU, S.C. - NOAA, BOULDER, CO	
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -10).....	175
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -10).....	180
LIVINGSTON, W.C. - KIT, PEAR HAYL OBS, TUCSON, AZ	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
LOCKWOOD, J.A. - U OF NEW HAMPSHIRE, DURHAM, NH	
SARMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -02).....	127
LOGACHEV, VU.I. - INST NUCLEAR PHYSICS, MOSCOW, USSR	
PROBNDI 7, ELECTRON AND PROTON SPECTROMETER (78-101A-11).....	76
PROBNDI 7, ENERGETIC PARTICLES CHANGE AND MASS COMPOSITION (78-101A-12).....	76
PROBNDI 7, GAS DISCHARGE COUNTER (78-101A-13).....	77
VENERA 11, ELECTRON AND PROTON SPECTROMETER (78-084A-04).....	93
VENERA 12, ELECTRON AND PROTON SPECTROMETER (78-086A-04).....	94
LOIDL, M. - MPI-EXTRATERM PHYS, GARCHING, FED REP OF GERMANY	
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-05).....	22
LONDON, J. - U OF COLORADO, BOULDER, CO	
SME, UV BIZONE (SME -01).....	100
SME, INFRARED RADIOMETER (SME -02).....	100
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	100
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	100
SME, SOLAR UV MONITOR (SME -05).....	100
SME, SOLAR PROTON ALARM (SME -06).....	101
UARS-1, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-1 -04).....	174
UARS-1, RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY (UARS-1 -10).....	174
UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21).....	174
UARS-2, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-2 -04).....	170
UARS-2, RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATIONS OF SOLAR ACTIVITY (UARS-2 -10).....	170
UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	170
LONG, R.A. - SRI INTERNATIONAL, MENLO PARK, CA	
PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	66
LOVILL, J.E. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA	
UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	171
UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	176
LOW, F.J. - U OF ARIZONA, TUCSON, AZ	
SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
LUND, N. - DANISH SPACE RES INST, LYNGBY, DENMARK	
HEAD 3, ISOTOPIE COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
LUST, R. - MPI-HEADQUARTERS, MUNICH, FED REP OF GERMANY	
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
LUTHER, F.M. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA	
UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	172
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	176
LYNDS, C.R. - KIT, PEAR HAYL OBS, TUCSON, AZ	
ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
LYON, F.P. - MASS INST OF TECH, CAMBRIDGE, MA	
IMP-J, SOLAR PLASMA FARADAY CUP (73-078A-02).....	30
LYONS, J. - USAF SPACE DIVISION, LOS ANGELES, CA	

INVESTIGATORS AND EXPERIMENTS

PAGE

*ST-7B0-2, SATELLITE INFRARED (SIRE) (P80-2 -01).....	171
MACCALLUM, C.J. - SANDIA LABORATORIES, ALBUQUERQUE, NM GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
MACKAY, C.D. - U OF CAMBRIDGE, CAMBRIDGE, ENGLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
MAGUIRE, R.H. - HIGH ALTITUDE OBS, BOULDER, CO *ISPM/NASA, WHITE-LIGHT CORONAGRAPH/X-RAY TV TELESCOPE (CRR) (ISPMASA-01).....	137
MAEDA, R. - RADIO RESEARCH LAB, TOKYO, JAPAN *ISS-0, SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP) (78-018A-01).....	91
MAELUM, B.N. - NORS, KJELLER, NORWAY SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
MAGEE, J.E. - U OF CALIF, LA, LOS ANGELES, CA DYNAMICS EXPLORER-A, AURORAL PHYSICS (DE-A -07).....	111
MAGUIRE, M.C. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
MAHONEY, M.A. - NASA-JPL, PASADENA, CA GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
MAIER, A. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY HELIOS-A, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (74-097A-01).....	34
HELIOS-B, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (76-003A-01).....	36
MAIER, E.J. - NASA-GSFC, GREENBELT, MD *ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-08).....	94
MAKINO, F. - NAGOYA U, NAGOYA, JAPAN *MAMUCHO, DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES (79-014A-02).....	79
MALCOLM, R.E. - D-C INST OF ENVIRON MED, DOWNSVIEW, ONTARIO, CANADA SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	163
MALHERBE, A. - MATRA/SFOM OPTICAL DIV, RUEIL CEDER, FRANCE *SPACE SHUTTLE LDEF-A, VACUUM DEPOSITED OPTICAL COATINGS (SSLDDEF -01).....	154
MALINA, R. - U OF CALIF, BERKELEY, BERKELEY, CA SPACELAB 1, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT (SPALAB1-07).....	158
MALLINCKRODT, J. - U OF CALIF, BERKELEY, BERKELEY, CA *FIREWHEEL SUB-RAY 3, PROTON/ELECTRON ELECTROSTATIC ANALYZER (FIRE-C -04).....	120
MANDEVILLE, J.C. - CERN/ONERA, TOULOUSE CEDER, FRANCE *SPACE SHUTTLE LDEF-A, STUDY OF METEOROID IMPACT CRATERS ON VARIOUS MATERIAL (SSLDDEF -32).....	10
*SPACE SHUTTLE LDEF-A, DUST DEBRIS COLLECTION WITH STACKED DETECTORS (SSLDDEF -22).....	154
MANHEIM, M.G. - NATL CTR FOR ATMOS RES, BOULDER, CO *UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMS EMISSION RADIOMETER (UARS-1 -12).....	172
*UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMS EMISSION RADIOMETER (UARS-2 -12).....	177
MANSON, J.E. - USAF GEOPHYS LAB, BEDFORD, MA AK-E, SOLAR EUV SPECTROPHOTOMETER (EUVS) (75-107A-06).....	14
MARAN, S.P. - NASA-GSFC, GREENBELT, MD ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	149
MARCOS, F.A. - USAF GEOPHYS LAB, BEDFORD, MA AK-E, ATMOSPHERIC DENSITY ACCELEROMETER (MESA) (75-107A-02).....	12
MARGON, B. - U OF CALIF, LA, LOS ANGELES, CA ST, FAINT-OBJECT SPECTROGRAPH (FOS) (LST -03).....	149
MARIANI, F. - U OF ROME, ROME, ITALY *ESA-GEOS 2, TRIAXIAL FLUXGATE MAGNETOMETER (78-071A-09).....	27
HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	36
HELIOS-B, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (76-003A-02).....	36
MASCHKE, R. - INST FUR PHYS WELTRAUP, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-9L -02).....	149
MASON, P.V. - NASA-JPL, PASADENA, CA *SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165
MASSÉ, P. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-0F2A-04).....	32
MASURSKY, M. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
*GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -15).....	124
*GALILEO ORBITER, GEOLOGY OF THE GALILEAN SATELLITES (JOPO -01).....	74
*PIONEER VENUS 1, PARTICIPATING THEORIST MASURSKY (78-051A-09).....	96
VIKING 1 ORBITER, ORBITER IMAGING (75-076A-01).....	99
VOYAGER 1, IMAGING (77-084A-01).....	101
VOYAGER 2, IMAGING (77-076A-01).....	101
MATHEW, E.L. - ENVIRONMENT CANADA, DOWNSVIEW, ONTARIO, CANADA NIMBUS 4, BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER (78-025A-05).....	57
NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS) (78-098A-09).....	60
MATHER, J.C. - NASA-GSFC, GREENBELT, MD *CODE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (CODE -01).....	109
*CODE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (CODE -02).....	108

INVESTIGATORS AND EXPERIMENTS

PAGE

COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	109
WATSON, D.L. - NASA-JPL, PASADENA, CA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
MATSUMOTO, M. - KYOTO U, KYOTO, JAPAN JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-067A-02).....	53
MATSUOKA, M. - U OF TOKYO, TOKYO, JAPAN ASTRO-A, TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE (ASTRO-A-03).....	107
PATTESON, J.L. - U OF CALIF, SAN DIEGO, LA JOLLA, CA GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
MAUERSBERGER, K. - U OF MINNESOTA, MINNEAPOLIS, MN AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
MAYER-HASSELWANDER, H.A. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
RAYNARD, M.C. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER-B, ELECTRIC FIELD INVESTIGATIONS (DE-B -02).....	114
ISEE 1, DC ELECTRIC FIELD (77-102A-11).....	41
SAN MARCO-D/L, Z-AXIS ELECTRIC FIELD INSTRUMENT (EFI) (SM-DL -05).....	149
MAYR, H.G. - NASA-GSFC, GREENBELT, MD DYNAMICS EXPLORER-H, ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION (DE-H -12).....	114
MAZETS, E.P. - LENGRAD INST PHYS TECH, LENINGRAD, USSR VENERA 11, GAMMA-RAY BURST DETECTORS (78-084A-05).....	93
VENERA 12, GAMMA-RAY BURST DETECTORS (78-086A-05).....	94
MCAFEE, J.R. - NOAA-ERL, BOULDER, CO ISEE 1, PLASMA DENSITY (77-102A-08).....	41
ISEE 2, RADIO PROPAGATION (77-102B-06).....	43
MCCONNELL, J.C. - YORK U, DOWNSVIEW, ONTARIO, CANADA VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
MCCORD, T.R. - U OF HAWAII, HONOLULU, HI GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
MCCORMICK, P.P. - NASA-LARC, HAMPTON, VA ERRS-A, STRATOSPHERIC AEROSOL AND GAS (SAGE) (ERRS-A -02).....	116
NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II) (78-098A-06).....	61
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
MCCRACKEN, K.G. - CSIRO, M RYDE, NSW, AUSTRALIA HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	34
HELIOS-B, GALACTIC AND SOLAR COSMIC RAYS (76-003A-08).....	37
PIONEER 6, COSMIC-RAY ANISOTROPY (65-105A-05).....	65
PIONEER 9, COSMIC-RAY ANISOTROPY (68-100A-05).....	66
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
MCCREIGHT, C.R. - NASA-ARC, MOFFETT FIELD, CA SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF -12).....	154
MCDIARMID, I.B. - NATL RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	48
ISIS 2, ENERGETIC PARTICLE DETECTORS (71-024A-04).....	50
MCDONALD, F.B. - NASA-GSFC, GREENBELT, MD HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	34
HELIOS-B, GALACTIC AND SOLAR COSMIC RAYS (76-003A-08).....	37
IMP-J, SOLAR AND COSMIC-RAY PARTICLES (73-076A-09).....	38
ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	46
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
MCDONNELL, J.A.M. - U OF KENT, CANTERBURY, KENT, ENGLAND SPACE SHUTTLE LDEF-A, MULTIPLE FOIL MICROABRASION PACKAGE (SSLDEF -31).....	154
MCELROY, M.B. - HARVARD U, CAMBRIDGE, MA GALILEO ORBITER, INVESTIGATION OF THE JOVIAN UPPER ATMOSPHERE AND OF SATELLITE ATMOSPHERES (JOPO -16).....	124
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	73
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
MCENTIRE, R.W. - APPLIED PHYSICS LAB, LAUREL, MD MCE, MEDIUM ENERGY PARTICLE ANALYZER (MEPA) (MCE -02).....	108
FIREWHEEL, ION COMPOSITION TELESCOPE (FIRE-A -03).....	119
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
MCGILL, G.E. - U OF MASSACHUSETTS, AMHERST, MA PIONEER VENUS 1, PARTICIPATING THEORIST MCGILL (78-051A-09).....	74
MCGOOGAN, J.T. - NASA-WFC, WOLLOPS ISLAND, VA ICEX, ICE ELEVATION ALTIMETER SYSTEM (IEAS) (ICEX-A -04).....	132
MCILWAIN, C.E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA PIONEER 10, JOVIAN TRAPPED RADIATION (72-012A-05).....	68
PIONEER 11, JOVIAN TRAPPED RADIATION (73-019A-05).....	70
MCMINTOSH, JR., R. - NASA-GSFC, GREENBELT, MD	

INVESTIGATORS AND EXPERIMENTS

PAGE

*SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF -12).....	154
MCKAY, D.S. - NASA-JSC, HOUSTON, TX SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIODS (SSLDEF -51).....	153
MCKENZIE, D.L. - AEROSPACE CORP, EL SEGUNDO, CA STP P78-1, SOLAR X-RAY SPECTROMETER (79-017A-03).....	83
MCKIBBIN, D.D. - NASA-ARC, MOFFETT FIELD, CA PIONEER 9, ELECTROSTATIC ANALYZER (68-100A-02).....	67
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-1P).....	75
MCMANARA, A.G. - NATI RES COUNC OF CAN, OTTAWA, ONTARIO, CANADA *FIREWHEEL SUB-SAT 4, LANGMUIR PROBE (FIRE-D -02).....	121
MCMULTY, P.J. - CLARKSON COL. OF TECH, POTSDAM, NY SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	152
MCPHERRON, R.L. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, MAGNETOMETER (JOPD -03).....	124
ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	42
ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	44
PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	74
MEEGAN, C.A. - NASA-MSFC, HUNTSVILLE, AL GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (GRO -05).....	127
MEEKINS, J.F. - US NAVAL RESEARCH LAB, WASHINGTON, DC *SOLRAD 11B, CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR (76-023D-03).....	82
MEGILL, L.R. - UTAH STATE U, LOGAN, UT UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
MELBOURNE, W.G. - NASA-JPL, PASADENA, CA HELIOS-A, CELESTIAL MECHANICS (74-097A-14).....	33
HELIOS-B, CELESTIAL MECHANICS (76-003A-14).....	36
MELZNER, F. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY *ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	23
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
MENDE, S.B. - LOCKHEED PALO ALTO, PALO ALTO, CA *SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	140
MENDILLO, M. - BOSTON U, BOSTON, MA *SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
MENG, C.I. - APPLIED PHYSICS LAB, LAUREL, MD ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
MESTREAU, P. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-062A-04).....	32
METZGER, A.E. - NASA-JPL, PASADENA, CA HEAD 3, GAMMA-RAY LINE SPECTROMETER (79-082A-01).....	31
METZNER, G. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	23
MEYER, P. - U OF CHICAGO, CHICAGO, IL *ISEE 3, COSMIC-RAY ELECTRONS AND NUCLEI (78-079A-06).....	45
*SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	165
MICHAEL, JR., W.H. - NASA-LARC, HAMPTON, VA *VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
*VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
MICHEL, F.C. - RICE U, HOUSTON, TX PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
MICHEL, D.J. - US NAVAL RESEARCH LAB, WASHINGTON, DC *STP P78-1, SOLAR WIND MONITOR (79-017A-02).....	83
MIGGENRIEDER, H. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISEE 2, FAST PLASMA (77-102B-01).....	44
MIMALOV, J.D. - NASA-ARC, MOFFETT FIELD, CA PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	75
MILKEY, R.W. - KITT PEAK NATL OBS, TUCSON, AZ SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-0R).....	166
MILLER, A.J. - NOAA-NMC, WASHINGTON, DC NIMBUS 7, SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TCPS) (78-098A-09).....	60
*UARS-1, SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-1 -16).....	174
*UARS-2, SYNOPTIC ANALYSIS-DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-2 -16).....	178
MILLER, D.E. - METEOROLOGICAL OFFICE, BERKSHIRE, ENGLAND SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
MILLER, E.R. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, INDUCED ENVIRONMENT CONTAMINATION MONITOR (SSLDEF -30).....	154

INVESTIGATORS AND EXPERIMENTS

PAGE

MINER, E.D. - NASA-JPL, PASADENA, CA VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	96
MIRTICH, M.J. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, ION BEAP TEXTURED AND COATED SURFACES (SSLDEF -01).....	151
MIYAMOTO, S. - OSAKA CITY U, OSAKA, JAPAN ASTRO-A, SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING (ASTRO-A-01).....	107
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	29
MIYAOKA, M. - U OF TOHOKU, SENDAI, JAPAN JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	53
MIYATAKE, Y. - U OF ELECTRO-COMMUN, TOKYO, JAPAN JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	53
MIZERA, P.F. - AEROSPACE CORP, EL SEGUNDO, CA *DMSP 5D-1/F2, REMOTE X-RAY SENSOR - PRECIPITATING ELECTRONS (77-044A-06).....	19
*STP P78-2, SPACECRAFT SURFACE POTENTIAL MONITOR (79-007A-01).....	85
MOE, O.K. - US NAVAL RESEARCH LAB, WASHINGTON, DC SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	163
MONEY, K.E. - D+C INST OF ENVIRN MED, DOWNSVIEW, ONTARIO, CANADA SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	163
MONTGOMERY, M.D. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISEE 2, FAST PLASMA (77-102B-01).....	44
ISEE 3, SOLAR WIND PLASMA (78-079A-01).....	45
MOORE, M.C. - HARVARD U, CAMBRIDGE, MA SPACELAB 1, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS (SPALAB1-15).....	161
MOOS, H.W. - JOHNS HOPKINS U, BALTIMORE, MD VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
MONEELS, G. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE SPACELAB 1, WAVES IN THE OH EMISSIVE LAYER (SPALAB1-19).....	160
MORENO, G. - CNR, SPACE PLASMA LAB, ROME, ITALY ISEE 2, SOLAR WIND IONS (77-102B-02).....	43
MORFILL, G. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY GALILEO ORBITER, DUST (JOPO -09).....	123
MORIOKA, A. - U OF TOHOKU, SENDAI, JAPAN JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	53
MORIYAMA, F. - U OF TOKYO, TOKYO, JAPAN ASTRO-A, SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE (ASTRO-A-02).....	107
MORRIS, E.C. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
MORRISON, D.A. - NASA-JSC, HOUSTON, TX SPACE SHUTTLE LDEF-A, CHEMISTRY OF MICROMETEORIDS (SSLDEF -51).....	153
MORSE, F.A. - AEROSPACE CORP, EL SEGUNDO, CA *DMSP 5D-1/F4, SSD - ATMOSPHERIC DENSITY SENSOR (79-050A-07).....	21
MOSIER, S.R. - NATL SCIENCE FOUND, WASHINGTON, DC ISEE 3, RADIO MAPPING (78-079A-10).....	46
MOUNT, G.H. - U OF COLORADO, BOULDER, CO *UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	174
*UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	178
MOZER, F.S. - U OF CALIF, BERKELEY, BERKELEY, CA *FIREWHEEL SUB-SAT 3, DC/AC ELECTRIC FIELD (FIRE-C -02).....	121
*ISEE 1, QUASI-STATIC ELECTRIC FIELDS (77-102A-06).....	42
MUELLER-MELLIN, M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	33
HELIOS-P, COSMIC-RAY PARTICLES (76-003A-07).....	36
MUENCH, J. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	24
MUKAI, T. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, ENERGY SPECTRUM OF PARTICLES (ESP) (78-087A-06).....	53
*KYOKKO, ELECTRON ENERGY ANALYZER (78-014A-02).....	54
MULLER, D. - U OF CHICAGO, CHICAGO, IL *SPACELAB 2, ELEMENTAL COMPOSITION AND ENERGY SPECTRA OF COSMIC RAY NUCLEI (SPALAB2-06).....	165
MUNCH, G. - CALIF INST OF TECH, PASADENA, CA VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	96
MUNDY, JR., E.C. - NASA-GSFC, GREENBELT, MD *NOSS, LARGE ANTENNA MULTICHANNEL MICROWAVE RADIOMETER (LAMMR) (NOSS -04).....	146
MUNTHNER, C. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY SAN MARCO-D/1, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	149
MURAKAMI, T. - U OF TOKYO, TOKYO, JAPAN	

INVESTIGATORS AND EXPERIMENTS

PAGE

ASTRO-A, SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING (ASTRO-A-01).....	107
MURASATO, S. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, CONTROLLED ELECTRON BEAM EMISSIONS (CBE) (78-087A-07).....	52
MURCRAY, D.G. - U OF DENVER, DENVER, CO SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1-05).....	174
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-1-12).....	172
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2-05).....	179
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIND EMISSION RADIOMETER (UARS-2-12).....	177
MUTCH, T.A. - NASA HEADQUARTERS, WASHINGTON, DC *VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
*VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
NAGY, A.F. - U OF MICHIGAN, ANN ARBOR, MI DYNAMICS EXPLORER-A, RETARDING ION MASS SPECTROMETER (DE-A-04).....	111
DYNAMICS EXPLORER-B, FABRY-PEROT INTERFEROMETER (DE-B-05).....	113
*DYNAMICS EXPLORER-B, MAGNETOSPHERIC ENERGY COUPLING TO THE ATMOSPHERE INVESTIGATION (DE-B-10).....	114
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	73
*PIONEER VENUS 1, PARTICIPATING THEORIST NAGY (78-051A-10).....	74
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1-15).....	175
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2-15).....	180
NAKAMURA, M. - TSUKUBA U, TOKYO, JAPAN *KYOKKO, UV GLOW SPECTROPHOTOMETER (78-014A-05).....	54
NAKAMURA, R. - U OF TOKYO, TOKYO, JAPAN KYOKKO, ELECTROSTATIC PLASMA WAVE MEASUREMENT (78-014A-04).....	54
NAUMANN, R.J. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	160
NESS, M.F. - NASA-GSFC, GREENBELT, MD *HELIOS-A, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (74-097A-02).....	34
*HELIOS-B, FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS (76-003A-02).....	36
*IMP-3, MAGNETIC FIELD EXPERIMENT (75-078A-01).....	39
PIONEER 11, JOVIAN MAGNETIC FIELD (73-019A-14).....	70
*VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	98
*VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	101
NESS STAFF NOAA-NESS, SUITLAND, MD *GOES 1, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-100A-01).....	26
*GOES 1, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (75-100A-05).....	27
*GOES 2, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (77-048A-05).....	28
*GOES 3, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (78-062A-01).....	28
*GOES 3, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (78-062A-05).....	29
*GOES-D, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-D-01).....	129
*GOES-D, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (GOES-D-05).....	129
*GOES-E, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-E-01).....	130
*GOES-E, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (GOES-E-05).....	130
*GOES-F, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-F-01).....	131
*GOES-F, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (GOES-F-05).....	131
*NOAA 6, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (79-057A-01).....	62
*NOAA 6, OPERATIONAL VERTICAL SOUNDER (79-057A-02).....	62
*NOAA 6, DATA COLLECTION SYSTEM (79-057A-03).....	62
*NOAA-B, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (80-043A-01).....	62
*NOAA-B, OPERATIONAL VERTICAL SOUNDER (80-043A-02).....	63
*NOAA-B, DATA COLLECTION SYSTEM (DCS) (80-043A-03).....	63
*NOAA-C, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-C-01).....	140
*NOAA-C, OPERATIONAL VERTICAL SOUNDER (NOAA-C-02).....	140
*NOAA-C, DATA COLLECTION SYSTEM (DCS) (NOAA-C-03).....	140
*NOAA-D, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-D-01).....	141
*NOAA-D, OPERATIONAL VERTICAL SOUNDER (NOAA-D-02).....	141
*NOAA-D, DATA COLLECTION SYSTEM (DCS) (NOAA-D-03).....	141
*NOAA-E, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-E-01).....	142
*NOAA-E, OPERATIONAL VERTICAL SOUNDER (NOAA-E-02).....	142
*NOAA-E, DATA COLLECTION SYSTEM (DCS) (NOAA-E-03).....	142
*NOAA-F, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-F-01).....	143
*NOAA-F, OPERATIONAL VERTICAL SOUNDER (NOAA-F-02).....	143
*NOAA-F, DATA COLLECTION SYSTEM (DCS) (NOAA-F-03).....	144
*NOAA-G, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (NOAA-G-01).....	144
*NOAA-G, OPERATIONAL VERTICAL SOUNDER (NOAA-G-02).....	145
*NOAA-G, DATA COLLECTION SYSTEM (DCS) (NOAA-G-03).....	145
*SMS 1, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (74-033A-01).....	79
*SMS 1, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (74-033A-05).....	79
*SMS 2, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-011A-04).....	60
*SMS 2, METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (75-011A-05).....	61
*TIROS-N, ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) (78-096A-01).....	86
*TIROS-N, OPERATIONAL VERTICAL SOUNDER (78-096A-02).....	86
*TIROS-N, DATA COLLECTION SYSTEM (DCS) (78-096A-03).....	86
NEUBAUER, F.M. - BRAUNSCHWEIG TECH U, BRAUNSCHWEIG, FED REP OF GERMANY *HELIOS-A, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (74-097A-01).....	34
*HELIOS-A, SEARCH COIL MAGNETOMETER (74-097A-03).....	34
*HELIOS-B, FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS (76-003A-01).....	36
*HELIOS-B, SEARCH COIL MAGNETOMETER (76-003A-03).....	36
VOYAGER 1, TRIAXIAL FLUXGATE MAGNETOMETERS (77-084A-05).....	98
VOYAGER 2, TRIAXIAL FLUXGATE MAGNETOMETERS (77-076A-05).....	101
NEUGEBAUER, G. - CALIF INST OF TECH, PASADENA, CA PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	71
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	96
NEUM, G. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY GALILEO ORBITER, ORBITER IMAGING (JOPO-10).....	122

INVESTIGATORS AND EXPERIMENTS

PAGE

NEWTON, G.P. - NASA HEADQUARTERS, WASHINGTON, DC DYNAMICS EXPLORER-B, ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION (DE-B -12).....	114
NICHOLS, R.L. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, EFFECTS OF SOLAR RADIATION ON GLASSES (SSLDEF -44).....	154
NICOLAS, K.R. - US NAVAL RESEARCH LAB, WASHINGTON, DC SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	163
NIEL, M. - CFSR, TOULOUSE, FRANCE GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
NIELSEN, K.F. - TECH U OF DENMARK, LYNGBY, DENMARK SPACE SHUTTLE LDEF-A, GROWTH OF CRYSTALS FROM SOLUTIONS IN LOW GRAVITY (SSLDEF -17).....	153
NIEMANN, H.W. - NASA-GSFC, GREENBELT, MD AE-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09).....	14
DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04).....	115
*GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	126
*PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11).....	74
NIER, A.O.C. - U OF MINNESOTA, MINNEAPOLIS, MN *AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
NISHI, K. - U OF TOKYO, TOKYO, JAPAN *ASTRO-A, SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE (ASTRO-A-02).....	107
NISHIDA, A. - U OF TOKYO, TOKYO, JAPAN JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	52
NIWA, N. - U OF TOKYO, TOKYO, JAPAN KYOKKO, UV AURORAL TV IMAGING (78-014A-03).....	53
NONE ASSIGNED	
*IUE, PARTICLE FLUX MONITOR (SPACECRAFT) (78-012A-02).....	52
*SPACELAB 3, RESEARCH ANIMAL HOLDING FACILITY (RAHF) (SPALAB3-11).....	167
*SPACELAB 3, LIFE SCIENCES MINILAB (SPALAB3-12).....	168
NORMAN, K. - U COLLEGE LONDON, LONDON, ENGLAND ESA-GEOS 2, THERMAL PLASMA FLUX (78-071A-02).....	24
NORTON, R.B. - NOAA-ERL, BOULDER, CO ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	47
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	49
NOVICK, R. - COLUMBIA U, NEW YORK, NY HEAD 2, MONITOR PROPORTIONAL COUNTER (78-103A-01).....	30
HEAD 2, HIGH-RESOLUTION IMAGER (78-103A-02).....	30
HEAD 2, CURVED-CRYSTAL BRAGG X-RAY (78-103A-03).....	31
HEAD 2, IMAGING PROPORTIONAL COUNTER (78-103A-04).....	31
HEAD 2, SOLID-STATE X-RAY DETECTOR (78-103A-05).....	31
*OSS-1, SOLAR FLARE X-RAY POLARIMETER EXPERIMENT (SHOFT-4-02).....	147
NORON, J.F. - NOAA, BOULDER, CO SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
NULL, G.W. - NASA-JPL, PASADENA, CA PIONEER 10, CELESTIAL MECHANICS (72-012A-09).....	68
PIONEER 11, CELESTIAL MECHANICS (73-019A-09).....	70
O'DELL, F.W. - US NAVAL RESEARCH LAB, WASHINGTON, DC SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF -13).....	156
O'GALLAGHER, J.J. - U OF MARYLAND, COLLEGE PARK, MD ISEE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISEE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	45
PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	69
PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	72
O'NEAL, R.L. - NASA-LARC, HAMPTON, VA PIONEER 10, METEOROID DETECTORS (72-012A-04).....	68
O'SULLIVAN, D. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND *SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	154
OBAYASHI, Y. - U OF TOKYO, TOKYO, JAPAN OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	147
*SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	161
OGATA, Y. - RADIO RESEARCH LAB, TOKYO, JAPAN ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
OGAWA, T. - KYOTO U, KYOTO, JAPAN *ISS-B, RETARDING POTENTIAL TRAP (78-018A-03).....	51
JIKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	52
OGAWARA, Y. - U OF TOKYO, TOKYO, JAPAN ASTRO-A, SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING (ASTRO-A-01).....	107
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	29

INVESTIGATORS AND EXPERIMENTS

PAGE

INVESTIGATORS AND EXPERIMENTS	PAGE
OGILVIE, K.W. - NASA-GSFC, GREENBELT, MD	
+ISEE 1, FAST ELECTRONS (77-102A-02).....	42
+ISEE 3, SOLAR WIND ION COMPOSITION (78-079A-11).....	46
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
ONTSU, J. - NAGOYA U, NAGOYA, JAPAN	
JIKIKEN, NATURAL PLASMA WAVES (NPN) (78-087A-02).....	53
OKI, K. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-A, SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING (ASTRO-A-01).....	107
OKUBAIRA, K. - RIKIKYO U, TOKYO, JAPAN	
ASTRO-A, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE (ASTRO-A-04).....	107
OLBERT, S. - MASS INST OF TECH, CAMBRIDGE, MA	
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
OLLENDORF, S. - NASA-GSFC, GREENBELT, MD	
+OSS-1, THERMAL CANISTER EXPERIMENT (SMOFT-4-05).....	147
SPACE SHUTTLE LDEF-A, LOW TEMPERATURE HEAT PIPE EXPERIMENT (SSLDEF-12).....	154
OLSON, R.A. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
VELA 6B, GAMMA-RAY ASTRONOMY (70-027B-08).....	92
ORAN, C.M. - MASS INST OF TECH, CAMBRIDGE, MA	
SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	163
ON, F.J. - NASA-GSFC, GREENBELT, MD	
SPACE SHUTTLE LDEF-A, SHUTTLE BAY ENVIRONMENT MEASUREMENTS (SSLDEF-29).....	153
ONO, T. - U OF TOHOKU, SENDAI, JAPAN	
JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	53
ORTON, G.S. - NASA-JPL, PASADENA, CA	
+GALILEO ORBITER, GROUND-TRUTH ANALYSIS OF RADIATIVE TRANSFER IN THE ATMOSPHERE OF JUPITER (JOPO -17).....	124
ORWIG, L.E. - NASA-GSFC, GREENBELT, MD	
SMM, HARD X-RAY BURST SPECTROMETER (HXRB5) (80-014A-06).....	78
OTT, W. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY	
FIREWHEEL SUB-SAT 1, RETARDING POTENTIAL ANALYZER (FIRE-E-03).....	119
OWEN, T. - STATE U OF NEW YORK, BUFFALO, NY	
+GALILEO ORBITER, COMPOSITION OF THE JOVIAN ATMOSPHERE (JOFO -18).....	124
GALILEO PROBE, MASS SPECTROMETER (JOP -03).....	126
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
OYA, H. - U OF TOHOKU, AOBAYAMA, JAPAN	
ASTRO-A, ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES (ASTRO-A-06).....	107
+JIKIKEN, STIMULATED PLASMA WAVE (SPW) (78-087A-01).....	53
+JIKIKEN, NATURAL PLASMA WAVES (NPW) (78-087A-02).....	53
OYAMA, K. - U OF TOKYO, TOKYO, JAPAN	
ASTRO-A, ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES (ASTRO-A-06).....	107
+KYOKKO, ELECTRON PROBES (78-014A-01).....	54
OZEROV, V.D. - IKI, MOSCOW, USSR	
COSMOS 900, SPHERICAL ION TRAP WITH FLOATING POTENTIAL (77-023A-03).....	16
PAGE, D.E. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
PAILLOUS, A. - CERT/ONERA, TOULOUSE CEDEX, FRANCE	
SPACE SHUTTLE LDEF-A, THERMAL COATINGS AND STRUCTURAL MATERIAL (SSLDEF-34).....	154
PALLUCONI, F.D. - NASA-JPL, PASADENA, CA	
VIKING 1 ORBITER, INFRARED THERMAL MAPPING (IRTM) (75-075A-02).....	96
PALMER, F.H. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
ISIS 1, VLF RECEIVER (69-009A-03).....	47
ISIS 2, VLF RECEIVER (71-024A-03).....	49
PAN, C.H.T. - SHAKER RESEARCH CORP, BALLSTON LAKE, NY	
SPACE SHUTTLE LDEF-A, BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN ZERO-G (SPALAB1-09).....	161
PANASYUK, M.I. - INST NUCLEAR PHYSICS, MOSCOW, USSR	
COSMOS 900, DIFFERENTIAL ENERGY SPECTROMETER (77-023A-05).....	17
PANG, K. - SCIENCE APPL, INC, PASADENA, CA	
VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-084A-11).....	98
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	101
PAPAGIANNIS, M.D. - BOSTON U, BOSTON, MA	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
PARESCHE, F. - U OF CALIF, BERKELEY, BERKELEY, CA	
EUVE, EXTREME ULTRAVIOLET FULL SKY SURVEY (EUVE -01).....	117
PARK, C.G. - STANFORD U, PALO ALTO, CA	
DYNAMICS EXPLORER-A, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (DE-A -08).....	111
PARK, J. - COLL OF WILLIAM + MARY, WILLIAMSBURG, VA	
UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1-09).....	175
UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2-09).....	179

INVESTIGATORS AND EXPERIMENTS

PAGE

INVESTIGATORS AND EXPERIMENTS	PAGE
PARKINSON, J.M. - U COLLEGE LONDON, LONDON, ENGLAND SMM, SOFT X-RAY POLYCHROMATOR (HRP) (80-014A-04).....	78
PARKS, G.K. - U OF WASHINGTON, SEATTLE, WA ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
PARNELL, T.A. - NASA-MSFC, HUNTSVILLE, AL GAMMA-RAY OBSERVATORY, TRANSIENT-EVENT MONITOR (GRO -05).....	127
PAROBY, W. - NASA-GSFC, GREENBELT, MD *NOSS, COASTAL ZONE COLOR SCANNER/2 (CZCS/2) (NOSS -01).....	146
PASCHMANN, G. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY CCE, CHARGE-ENERGY-MASS SPECTROMETER(CHEM) (CCE -03).....	108
*FIREWHEEL SUB-SAT 1, LOW-ENERGY ELECTRON AND ION DETECTOR (FIRE-E -02).....	119
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
*ISEE 2, FAST PLASMA (77-102B-01).....	44
ISEE 2, SOLAR WIND IONS (77-102B-02).....	43
PASTIELS, R. - IASB, BRUSSELS, BELGIUM SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 NANOMETERS (SPALAB1-21).....	162
PATCHETT, B.E. - APPLETON LAB, SLOUGH, ENGLAND SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	164
PEACOCK, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
PEACOCK, C.L. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	192
PEARCE, J.B. - RADIOPHYSICS, INC, BOULDER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
PEARL, J.C. - NASA-GSFC, GREENBELT, MD VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
PEDERSEN, A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS *ESA-GEOS 2, DC FIELDS BY DOUBLE PROBE (78-071A-07).....	23
GALILEO ORBITER, ELECTRON EMITTER (JOPO -05).....	125
PIONEER VENUS 1, LANGMUIR PROBE (78-051A-01).....	75
PELLAT, R. - CTR FOR THEORETIC PHYS, PARIS, FRANCE ISEE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISEE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
PELLKOFER, H. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY HELIOS-A, PLASMA DETECTORS (74-097A-09).....	34
HELIOS-B, PLASMA DETECTORS (76-003A-09).....	37
PELTZER, R.G. - MARTIN-MARIETTA AEROSP, DENVER, CO VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
PENNER, J.E. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	172
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	176
PEPIN, T.J. - U OF WYOMING, LARAMIE, WY NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11) (78-098A-06).....	61
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
*STP P78-1, PRELIMINARY AEROSOL MONITOR (79-017A-07).....	83
PESKETT, G.D. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE-MODULATED RADIOMETER (PMR) (75-052A-09).....	59
NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	60
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-1 -11).....	175
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
PETERS, B. - DANISH SPACE RES INST, LYNGBY, DENMARK *HEAO 3, ISOTOPIIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
PETERS, P.N. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, THE INTERACTION OF ATOMIC OXYGEN WITH SOLID SURFACES AT ORBITAL ALTITUDE (SSLDEF -19).....	152
PETERSON, A.M. - STANFORD U, PALO ALTO, CA PIONEER 9, TWO-FREQUENCY BEACON RECEIVER (68-100A-03).....	66
PETERSON, D.D. - U OF CALIF, SAN FRANC, SAN FRANCISCO, CA SPACELAB 1, HZE-PARTICLE DOSIMETRY (SPALAB1-11).....	158
PETERSON, L.E. - U OF CALIF, SAN DIEGO, LA JOLLA, CA *GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
HEAO 3, GAMMA-RAY LINE SPECTROMETER (79-082A-01).....	31
PETIT, M. - CNET, ISSY-LES-MOULINEAUX, FRANCE *ESA-GEOS 2, VLF PLASMA RESONANCES (78-071A-05).....	23
ISEE 1, PLASMA DENSITY (77-102A-08).....	41
ISEE 2, RADIO PROPAGATION (77-102B-06).....	43
PETRAC, D. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165

INVESTIGATORS AND EXPERIMENTS

PAGE

PETRIE, C.E. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA	
ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	47
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	58
ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	49
PETROU, N. - CENS, SACLAY, FRANCE	
HEAD 3, ISOTOPIIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
PETTENBILL, G. - MASS INST OF TECH, CAMBRIDGE, MA	
*PIONEER VENUS 1, RADAR ALTIMETER (78-091A-02).....	74
PFEIFFER, G.W. - U OF IOWA, IOWA CITY, IA	
IMP-J, ELECTROSTATIC WAVES AND RADIO NOISE (73-078A-12).....	38
PFOETZER, G. (RETIRED)- MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (72-071A-01).....	24
PHARO, III, M.W. - NASA-GSFC, GREENBELT, MD	
AE-E, BENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-10).....	12
PHILLIPS, R. - NASA-JPL, PASADENA, CA	
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
PILCHER, C.B. - U OF HAWAII, HONOLULU, HI	
GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	122
PINKAU, K. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
*GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
SMH, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
PIRRAGLIA, J.A. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-024A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
PIRRE, M. - CNRS, ORLEANS, FRANCE	
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
PISARENKO, M.F. - IKI, MOSCOW, USSR	
*PROBNOZ 7, MAGNETOSPHERIC ION COMPOSITION SPECTROMETER (78-101A-02).....	76
*PROBNOZ 7, ENERGETIC ELECTRON SPECTROMETER (78-101A-09).....	77
*VENERA 11, PROTON SPECTROMETER (78-084A-06).....	93
*VENERA 12, PROTON SPECTROMETER (78-086A-06).....	94
PITCHER, E.J. - U OF MIAMI, MIAMI, FL	
UARS-1, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-1 -20).....	172
UARS-2, OBSERV. ANALYSIS-THEORETICAL MODELLING INVESTIGATIONS OF DYNAMICS FOR UARS (UARS-2 -20).....	177
PITZ, E. - MPI-ASTRONOMIE, HEIDELBERG, FED REP OF GERMANY	
HELIOS-A, ZODIACAL LIGHT PHOTOMETER (74-097A-11).....	33
HELIOS-B, ZODIACAL LIGHT PHOTOMETER (76-003A-11).....	36
PLANET, W.G. - NOAA-NESS, SUITLAND, MD	
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
PLEASANTS, J.E. - NASA-LARC, HAMPTON, VA	
ERBS-A, STRATOSPHERIC AEROSOL AND GAS (SAGE) (ERBS-A -02).....	116
PNEUMAN, G.W. - HIGH ALTITUDE OBS, BOULDER, CO	
SMH, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
POLLACK, J.B. - NASA-ARC, MOFFETT FIELD, CA	
*GALILEO ORBITER, THERMAL AND DYNAMICAL PROPERTIES OF THE JOVIAN ATMOSPHERE (JOPD -19).....	124
GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	126
GALILEO PROBE, NEPHELOMETER (JOP -05).....	126
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
PONGRATZ, M.B. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM	
SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
PONNAMPERUMA, C.A. - U OF MARYLAND, COLLEGE PARK, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
POTEMPA, T.A. - APPLIED PHYSICS LAB, LAUREL, MD	
*TIP 1, TRIAXIAL FLUXGATE MAGNETOMETER (72-069A-01).....	86
*UARS-2, MAGNETOMETER EXPERIMENT (UARS-2 -26).....	179
POTTER, W.E. - U OF MINNESOTA, MINNEAPOLIS, MN	
AE-E, OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS) (75-107A-07).....	14
POUNDS, K.A. - U OF LEICESTER, LEICESTER, ENGLAND	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	118
*UK 9, 2- TO 10-KEV SKY SURVEY (74-077A-02).....	87
*UK 9, POLARIMETER/SPECTROMETER (74-077A-04).....	88
*UK 6, X-RAY PROPORTIONAL COUNTERS (79-047A-02).....	88
POWELL, J.H. - ROCKWELL INTL CORP, TULSA, OK	
*SPACE SHUTTLE LDEF-A, GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE (SSLDEF -35).....	155
POWER, J.L. - NASA-LERC, CLEVELAND, OH	
*STP P80-1, ION AUXILIARY PROPELLSION SYSTEM (P80-1 -02).....	170
PRANKE, J.B. - AEROSPACE CORP, EL SEGUNDO, CA	
DMSP 5D-1/F4, SSD - ATMOSPHERIC DENSITY SENSOR (79-050A-07).....	21

INVESTIGATORS AND EXPERIMENTS

PAGE

PREUSS, L. - MBB SPACE DIV, MUNICH, FED REP OF GERMANY *SPACE SHUTTLE LDEF-A, CRITICAL SURFACE DEGRADATION EFFECTS ON COATINGS AND SOLAR CELLS (SSLDEF -06).....	155
PRINCE, D.E. - USAF MATERIALS LAB, WRIGHT PATTERSON AFB, OH STP P78-2, QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS (79-007A-03)..... STP P78-2, THERMAL CONTROL SAMPLE MONITOR (79-007A-04).....	84 84
PRINZ, D.K. - US NAVAL RESEARCH LAB, WASHINGTON, DC OSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SHOFT-4-03)..... SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM) (SPALAB2-11)..... UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08)..... UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NP (UARS-2 -08).....	147 163 171 176
PURDY, C.L. - NASA-MFC, Wallops Island, VA *GEOS 3, RADAR ALTIMETER SYSTEM (75-027A-01).....	25
QUENRY, J.J. - IMPERIAL COLLEGE, LONDON, ENGLAND UK 5, HIGH-ENERGY COSMIC X-RAY SPECTRA (74-077A-05).....	87
QUERFELD, C.W. - HIGH ALTITUDE OBS, BOULDER, CO SHM, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
QUIROS, R.S. - NOAA-NMC, WASHINGTON, DC *UARS-1, SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-1 -16)..... *UARS-2, SYNOPTIC ANALYSIS+DYNAMICAL INTERPRETA. OF UARS METEOROLOGICAL INFORMATION (UARS-2 -16).....	174 178
RAGENT, G. - NASA-ARC, HOFFETT FIELD, CA *GALILEO PROBE, NEPHELOMETER (JOP -05).....	126
RAGHAVARAO, R. - PHYSICAL RESEARCH LAB, AHMEDABAD, INDIA ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01)..... ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	48 58
RAITT, W.J. - UTAH STATE U, LOGAN, UT ESA-GEOS 2, THERMAL PLASMA FLW (78-071A-02)..... OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	24 147
RAMATY, R. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
RAMSEIR, R.O. - ENVIRONMENT CANADA, DOWNSVIEW, ONTARIO, CANADA NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMRM) (78-098A-08).....	60
RAMSEY, M.E. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
RAND, J.L. - TEXAS A+M, COLLEGE STATION, TX *SPACE SHUTTLE LDEF-A, BALLOON MATERIALS DEGRADATION (SSLDEF -30).....	155
RAO, U.R. - ISRO SATELLITE CENTER, BANGALORE, INDIA PIONEER 6, COSMIC-RAY ANISOTROPY (65-105A-05)..... PIONEER 9, COSMIC-RAY ANISOTROPY (68-100A-05).....	65 66
RAPLEY, C.G. - U COLLEGE LONDON, LONDON, ENGLAND SHM, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	78
RASMUSSEN, I. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAD 7, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
RASOOL, S.I. - NASA HEADQUARTERS, WASHINGTON, DC PIONEER 10, S-BAND OCCULTATION (72-012A-10)..... PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	69 71
REAGAN, J.B. - LOCKHEED PALO ALTO, PALO ALTO, CA DYNAMICS EXPLORER-A, CONTROLLED AND NATURALLY-OCCURRING WAVE PARTICLE INTERACTIONS (DE-A -08)..... *STP P78-2, HIGH-ENERGY PARTICLE DETECTOR (79-007A-15)..... UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07)..... UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	111 85 175 180
REASBERG, R. - MASS INST OF TECH, CAMBRIDGE, MA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11)..... VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	95 96
REASONER, D.L. - NASA-MBFC, HUNTSVILLE, AL OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01)..... SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	147 160
REBER, C.A. - NASA-GSFC, GREENBELT, MD AE-E, NEUTRAL ATMOSPHERE COMPOSITION (NACE) (75-107A-08)..... DYNAMICS EXPLORER-3, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (DE-B -03)..... *UARS-1, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-1 -21)..... *UARS-2, ANALYTIC-EMPIRICAL MODELING OF UPPER ATMOSPHERE PARAMETERS (UARS-2 -21).....	13 113 174 179
REES, D. - U COLLEGE LONDON, LONDON, ENGLAND DYNAMICS EXPLORER-B, FABRY-PEROT INTERFEROMETER (DE-B -05)..... UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02)..... UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	113 173 177
REES, M.H. - U OF ALASKA, FAIRBANKS, ALASKA UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07)..... UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	175 180
REID, G.C. - NOAA, BOULDER, CO UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07)..... UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	175 180
REINBOLT, E.J. - NASA-MBFC, HUNTSVILLE, AL	

INVESTIGATORS AND EXPERIMENTS

PAGE

SPACE SHUTTLE LOEF-A, LARGE SPACE STRUCTURE LIGHTING EVALUATION (SSLDEF -47).....	153
REITER, E.A. - COLORADO STATE U, FORT COLLINS, CO	
UARS-1, GLIMPSE/GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	171
UARS-2, GLIMPSE/GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	176
REITZ, S. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY	
SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-24).....	160
REMS, M. - CERN, TOULOUSE, FRANCE	
ISBE 1, ELECTRONS AND PROTONS (77-102A-10).....	40
ISBE 2, ELECTRONS AND PROTONS (77-102B-08).....	43
REMSBERG, E.E. - NASA-LARC, HAMPTON, VA	
UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-1 -22).....	173
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-2 -22).....	177
REPPIN, C. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
SMN, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
RESCHKE, M.F. - NASA-JSC, HOUSTON, TX	
SPACELAB 1, VESTIBULO-SPINAL REFLEX MECHANISMS (SPALAB1-16).....	161
RICE, C.J. - AEROSPACE CORP, EL SEGUNDO, CA	
RAE-E, CAPACITANCE MANOMETER (75-107A-12).....	14
RAE-E, COLD CATHODE ION GAUGE (75-107A-13).....	14
RICHARD, M.L. - NASA-GEFC, GREENBELT, MD	
NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	61
RIDDLE, A.C. - U OF COLORADO, BOULDER, CO	
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
RIEDLER, W. - TECH U OF GRAZ, GRAZ, AUSTRIA	
SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	162
RIEGER, E. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY	
FIREWHEEL, ION RELEASE (FIRE-A -01).....	118
SMN, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
RIEGLER, G.R. - NASA-JPL, PASADENA, CA	
GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
RIEKE, G.M. - U OF ARIZONA, TUCSON, AZ	
SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
RINNERT, K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY	
GALILEO PROBE, LIGHTNING (JOP -06).....	126
RIO, Y. - CENS, SACLAY, FRANCE	
HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
ROBERTS, W.T. - NASA-MSFC, HUNTSVILLE, AL	
SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC) (SPALAB1-02).....	161
ROBERTSON, J.B. - NASA-LARC, HAMPTON, VA	
SPACE SHUTTLE LOEF-A, EFFECT OF SPACE EXPOSURE ON PYROELECTRIC INFRARED DETECTORS (SSLDEF -18).....	155
ROBINSON, E.L. - U OF TEXAS, AUSTIN, AUSTIN, TX	
ST, HIGH-SPEED PHOTOMETER (HSP) (LST -06).....	169
ROBINSON, JR., S.A. - NASA-MSFC, HUNTSVILLE, AL	
SPACE SHUTTLE LOEF-A, TRANSVERSE FLAT PLATE HEAT PIPE PERFORMANCE (SSLDEF -37).....	155
ROBLE, R.G. - NATL CTR FOR ATMOS RES, BOULDER, CO	
DYNAMICS EXPLORER-B, FABRY-PEROT INTERFEROMETER (DE-B -05).....	113
DYNAMICS EXPLORER-B, NEUTRAL-PLASMA INTERACTIONS INVESTIGATION (DE-B -11).....	115
UARS-1, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-1 -02).....	173
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	175
UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (LARS-1 -12).....	172
UARS-2, HIGH RESOLUTION DOPPLER IMAGER (HRDI) (UARS-2 -02).....	177
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	178
UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	180
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
ROCCIA, R. - CENS, SACLAY, FRANCE	
GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
ROCHE, A.E. - LOCKHEED PALO ALTO, PALO ALTO, CA	
UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
ROCKER, F. - U OF BERLIN, BERLIN, FED REP OF GERMANY	
SPACELAB 1, MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN (SPALAB1-31).....	159
SPACELAB 1, COLLECTION OF BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	159
RODGERS, C.D. - OXFORD U, OXFORD, ENGLAND	
NIMBUS 6, PRESSURE-MODULATED RADIOMETER (PMR) (75-052A-09).....	60
NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	60
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
ROEDERER, J.G. - U OF ALASKA, COLLEGE, ALASKA	
GALILEO ORBITER, ENERGETIC PARTICLES (JOP) -06).....	125
ROELOF, E.C. - APPLIED PHYSICS LAB, LAUREL, MD	

INVESTIGATORS AND EXPERIMENTS

PAGE

GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	123
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	34
HELIOS-B, GALACTIC AND SOLAR COSMIC RAYS (76-003A-08).....	37
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
ROGERSON, JR., J. - PRINCETON U, PRINCETON, NJ DAO 3, HIGH-RESOLUTION TELESCOPES (72-045A-01).....	64
ROSE, R.C. (RETIRED)- NATL RES CONC OF CAN, OTTAWA, ONTARIO, CANADA ISIS 1, ENERGETIC PARTICLE DETECTORS (69-009A-04).....	48
ROSENBAUER, M.R. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY CCF, PLASMA COMPOSITION (CCF -01).....	100
*ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	22
*HELIOS-A, PLASMA DETECTORS (74-097A-09).....	34
*HELIOS-B, PLASMA DETECTORS (76-003A-09).....	37
ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISEE 1, ION COMPOSITION (77-102A-12).....	42
ISEE 2, FAST PLASMA (77-102B-01).....	44
*ISPHYNASA, MASS SEPARATING SOLAR WIND (SWE) (ISPHNASA-04).....	137
*ISPHYNASA, DIRECT MEASUREMENT OF INTERSTELLAR GAS USING HE AS TRACER (INGM) (ISPHNASA-07).....	137
ROSS, D.B. - NOAA-ERL, BOULDER, CO NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMWR) (78-098A-08).....	60
ROSS, M. - U OF STIRLING, STIRLING, SCOTLAND *SPACELAB 1, MASS DISCRIMINATION DURING WEIGHTLESSNESS (SPALAB1-30).....	161
ROSSI, M. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY SPACE SHUTTLE LDEF-A, EFFECTS OF THE SPACE ENVIRONMENT ON THE PROPERTIES OF METALLIZED DIELECTRICS (SSLOEF -20).....	152
ROYENBERG, M. - DANISH SPACE RES INST, LYNGBY, DENMARK NEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
ROTHERMEL, M. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
ROTHWELL, P.L. - USAF GEOPHYS LAB, BEDFORD, MA *DMSP 5D-1/F2, PRECIPITATING ELECTRON SPECTROMETER (77-044A-03).....	19
*DMSP 5D-1/F4, PRECIPITATING ELECTRON SPECTROMETER (79-050A-03).....	21
*DMSP 5D-1/F5, PRECIPITATING ELECTRON SPECTROMETER (DMSP-F5-03).....	110
ROTHMAN, G.J. - U OF COLORADO, BOULDER, CO SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
*UARS-1, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-1 -04).....	174
*UARS-2, ULTRAVIOLET SOLAR SPECTRAL IRRADIANCE EXPERIMENT (UARS-2 -04).....	179
RUDHANN, A.A. - NASA-GSFC, GREENBELT, MD ERBS-A, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (ERBS-A -01).....	116
NOAA-F, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-F -05).....	143
NOAA-G, EARTH RADIATION BUDGET INSTRUMENT (ERBI) (NOAA-G -05).....	144
RUFF, I. - NOAA-NESS, SUITLAND, MD NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
RUSCH, D.W. - U OF COLORADO, BOULDER, CO UARS-1, ULTRAVIOLET OZONE SPECTROMETER (UARS-1 -03).....	174
UARS-2, ULTRAVIOLET OZONE SPECTROMETER (UARS-2 -03).....	178
RUSSELL, C.T. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, MAGNETOMETER (JOPO -03).....	124
*GALILEO ORBITER, JUPITER MAGNETOSPHERE AND SATELLITE MAGNETOSPHERE INTERACTIONS (JOPO -20).....	124
*ISEE 1, FLUXGATE MAGNETOMETER (77-102A-04).....	42
*ISEE 2, FLUXGATE MAGNETOMETER (77-102B-04).....	44
*PIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-091A-12).....	74
RUSSELL, P.B. - SRI INTERNATIONAL, MENLO PARK, CA NIMBUS 7, STRATOSPHERIC AEROSOL MEASUREMENT-11 (SAM-11) (78-098A-06).....	61
SAGE, STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) (79-013A-01).....	77
RUSSELL, 3RD, J.M. - NASA-LARC, HAMPYTON, VA *ERBS-A, HALOGEN OCCULTATION (HALOE) (ERBS-A -03).....	116
*SPACELAB 3, HALOGEN OCCULTATION EXPERIMENT (HALOE) (SPALAB3-12).....	160
*UARS-1, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-1 -09).....	175
*UARS-1, ADVANCED LIMB SCANNER (UARS-1 -10).....	172
*UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1 -12).....	172
*UARS-2, HALOGEN OCCULTATION EXPERIMENT (HALOE) (UARS-2 -09).....	179
*UARS-2, ADVANCED LIMB SCANNER (UARS-2 -10).....	177
*UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2 -12).....	177
RYAN, J.A. - CALIF ST U, FULLERTON, FULLERTON, CA VIKING 1 LANDER, METEOROLOGY (75-075C-07).....	95
VIKING 2 LANDER, METEOROLOGY (75-083C-07).....	97
SAFFREN, M.M. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165
SAGALYN, R.C. - USAF GEOPHYS LAB, BEDFORD, MA *DMSP 5D-1/F2, IONOSPHERIC PLASMA MONITOR (77-044A-05).....	19
*DMSP 5D-1/F4, IONOSPHERIC PLASMA MONITOR (79-050A-05).....	21
*DMSP 5D-1/F5, IONOSPHERIC PLASMA MONITOR (DMSP-F5-05).....	110
*ISIS 1, SPHERICAL ELECTROSTATIC ANALYZER (69-009A-08).....	48

INVESTIGATORS AND EXPERIMENTS

PAGE

BAGAN, C. - CORNELL U, ITHACA, NY	
•GALILEO ORBITER, ORGANIC CHEMISTRY OF THE JOVIAN ATMOSPHERE (JOPO -21).....	125
VIKING 1 LANDER, LANDER IMAGING (75-075C-06).....	95
VIKING 2 LANDER, LANDER IMAGING (75-083C-06).....	97
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
BAGANA, E. - RADIO RESEARCH LAB, TOKYO, JAPAN	
RYOKO, 10W MASS SPECTROMETER (78-014A-06).....	53
BALONI, S. - U OF PALERMO, PALERMO, ITALY	
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
BALZERS, J.H. - NASA-GSFC, GREENBELT, MD	
•GOES 3, S-BAND TRACKING SYSTEM (75-027A-02).....	25
BANUELSON, R.E. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, INFRARED SPECTROSCOPY AND RADIOMETRY (77-084A-03).....	98
VOYAGER 2, INFRARED SPECTROSCOPY AND RADIOMETRY (77-076A-03).....	100
BANATANI, S. - U OF TEXAS, DALLAS, RICHARDSON, TX	
AE-8, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
BANDEL, D.R. - U OF SOUTHERN CALIF, TUCSON, AZ	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-05).....	162
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
BANDERSON, T.A. - ESA-ESTEC, NOORDWIJK, NETHERLANDS	
ISSE 3, ENERGETIC PROTONS (78-079A-08).....	45
SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
BANFORD, P.W. - U COLLEGE LONDON, LONDON, ENGLAND	
EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	118
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
OD 3, STELLAR X-RAYS (72-065A-02).....	64
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
UK 9, 0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR (74-077A-01).....	87
UK 9, HIGH-RESOLUTION SOURCE SPECTRA (74-077A-03).....	87
BARKAR, S. - TATA INST OF FUND RES, BOMBAY, INDIA	
SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
BATO, M. - NASA-GISS, NEW YORK, NY	
VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-084A-11).....	98
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	101
BAUER, H.H. - NOAA-ERL, BOULDER, CO	
GOES-D, ENERGETIC PARTICLE MONITOR (GOES-D -02).....	129
GOES-E, ENERGETIC PARTICLE MONITOR (GOES-E -02).....	130
GOES-F, ENERGETIC PARTICLE MONITOR (GOES-F -02).....	131
NOAA-0, SPACE ENVIRONMENT MONITOR (80-043A-04).....	63
NOAA-C, SPACE ENVIRONMENT MONITOR (NOAA-C -04).....	101
NOAA-D, SPACE ENVIRONMENT MONITOR (NOAA-D -04).....	102
NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	103
NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	104
NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	105
SAVAGE, D.D. - U OF WISCONSIN, MADISON, WI	
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
SAVICH, M.A. - IRE, MOSCOW, USSR	
•VENERA 11, TWO-FREQUENCY TRANSMITTERS (78-084A-07).....	93
•VENERA 12, PROTON SPECTROMETER (78-086A-07).....	94
SAWYER, C.D. - HIGH ALTITUDE OBS, BOULDER, CO	
SMN, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
SCANO, A. - U OF ROME, ROME, ITALY	
•SPACELAB 1, DALLISTOCARIOGRAPHIC RESEARCH IN WEIGHTLESSNESS (SPALAB1-33).....	161
SCARF, F.L. - TRW SYSTEMS GROUP, REDONDO BEACH, CA	
•GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPO -07).....	123
•GALILEO ORBITER, WAVE-PARTICLE INTERACTION PHENOMENA AT JUPITER (JOPO -22).....	125
ISSE 1, PLASMA WAVES (77-102A-07).....	41
ISSE 2, PLASMA WAVES (77-102B-05).....	43
•ISSE 3, PLASMA WAVES (78-079A-07).....	46
•PIONEER 9, PLASMA WAVE DETECTOR (68-100A-07).....	67
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
•PIONEER VENUS 1, ELECTRIC FIELD DETECTOR (78-051A-13).....	74
•VOYAGER 1, PLASMA WAVE (.01-96 KHZ) (77-084A-13).....	98
•VOYAGER 2, PLASMA WAVE (.01-96 KHZ) (77-076A-13).....	101
SCARSI, L. - U OF PALERMO, PALERMO, ITALY	
EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
SCARCE, C.S. - NASA-GSFC, GREENBELT, MD	
IMP-J, MAGNETIC FIELD EXPERIMENT (75-076A-01).....	39
SCHALL, P. - AEROSPACE CORP, EL SEGUNDO, CA	
•SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON SPACECRAFT MATERIALS (SSLDEF -15).....	155
SCHARDT, A.W. - NASA-GSFC, GREENBELT, MD	
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99

INVESTIGATORS AND EXPERIMENTS

PAGE

VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	182
SCHELD, H.W. - U OF HOUSTON, HOUSTON, TX OBS-1, INFLUENCE OF WEIGHTLESSNESS IN LIGNIFICATION OF PLANT SEEDLINGS (SMOFT-4-07).....	147
SPACELAB 2, INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION (SPALAB2-02).....	164
SCHERB, F. - U OF WISCONSIN, MADISON, WI PIONEER 6, SOLAR WIND PLASMA FARADAY CUP (65-105A-02).....	64
SCHERER, M. - U OF MUNICH, MUNICH, FED REP OF GERMANY SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-41).....	162
SCHINDLER, K. - RUHR-U BOCHUM, BOCHUM, FED REP OF GERMANY ISSE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
ISSE 2, FAST PLASMA (77-102B-01).....	40
SCHMIDT, H.U. - MPI-PHYS ASTROPHYS, GARCHING, FED REP OF GERMANY SMM, CORONAGRAPH/POLARIMETER (68-014A-01).....	78
SCHMIDTKE, G. - INST FUR PHYS WELTRAUP, FREIBURG, FED REP OF GERMANY SAN MARCO-D/L, AIRGLOW-SOLAR SPECTROMETER (SM-DL -02).....	149
SCHNEID, E.J. - GRUMMAN AEROSPACE CORP, BETHPAGE, NY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04).....	127
SCHNEPPEL, W.F. - EG&G INC, GOLETA, CA SPACELAB 3, VAPOR CRYSTAL GROWTH SYSTEM (VCGS) (SPALAB3-02).....	168
SCHNOES, H.K. - U OF WISCONSIN, MADISON, WI SPACELAB 2, VITAMIN D METABOLITES AND BONE DEMINERALIZATION (SPALAB2-01).....	166
SCHOLER, M. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY ISSE 1, LOW-ENERGY COSMIC RAYS (77-102A-05).....	41
ISSE 3, LOW-ENERGY COSMIC RAYS (78-079A-03).....	48
SCHOLES, W.J. - EPPLEY LAB, INC, NEWPORT, RI NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
SCHONFELDER, V. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, IMAGING COPPTON TELESCOPE (GRO -02).....	127
SCHOOLMAN, S.A. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
SCHUBERT, G. - U OF CALIF, LA, LOS ANGELES, CA GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	122
GALILEO ORBITER, JOVIAN ATMOSPHERIC STRUCTURE AND CIRCULATION (JOPO -23).....	125
GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
PIONEER VENUS 1, PARTICIPATING THEORIST SCHUBERT (78-051A-14).....	78
SCHUERMAN, D.W. - STATE U OF NEW YORK, ALBANY, NY OBS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SMOFT-4-06).....	148
SCHUTTE, N.M. - IKI, MOSCOW, USSR COSMOS 900, PANORAMIC ELECTROSTATIC SPECTROMETER (77-023A-07).....	16
SCOTT, JR., R.L. - SOUTHERN U, BATON ROUGE, LA SPACE SHUTTLE LDEF-A, ATOMIC CRYGEN STIMULATED OUTGASSING (SSLDEF -07).....	188
SCUDDER, J.D. - NASA-GSFC, GREENBELT, MD ISSE 1, FAST ELECTRONS (77-102A-02).....	42
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
SEALE, R. - NOAA-ERL, BOULDER, CO NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	62
TIROS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	86
SEARS, R.D. - LOCKHEED PALO ALTO, PALO ALTO, CA UARS-1, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-1 -05).....	174
UARS-2, ALTITUDE DISTRIBUTION OF ATMOSPHERIC MINOR SPECIES AND TEMP. IN 10-60KM RANGE (UARS-2 -05).....	179
SEEK, J.B. - NASA-GSFC, GREENBELT, MD IMP-J, MAGNETIC FIELD EXPERIMENT (73-078A-01).....	39
SEELEY, J.S. - READING U, READING, ENGLAND SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	155
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
SFIDEL, B.L. - NASA-JPL, PASADENA, CA PIONEER 10, S-BAND OCCULTATION (72-012A-10).....	69
PIONEER 11, S-BAND OCCULTATION (73-019A-10).....	71
SEIDELMANN, P.K. - US NAVAL OBSERVATORY, WASHINGTON, DC ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
SILLEN, JR., J.M. - TRW SYSTEMS GROUP, REDONDO BEACH, CA SPACE SHUTTLE LDEF-A, SPACE PLASMA-HIGH VOLTAGE DRAINAGE (SSLDEF -09).....	154
SPACELAB 1, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPPAC) (SPALAB1-02).....	161
SERLEMITSOS, P.J. - NASA-GSFC, GREENBELT, MD UK 5, ALL-SKY MONITOR (74-077A-C6).....	87
SEVERNY, A.B. - CRIMEAN ASTROPHYS OBS, CRIMEA, USSR PROGNOZ 7, UV EMISSION SPECTROMETER (78-101A-10).....	77
SHACKELFORD, R.G. - GEORGIA INST OF TECH, ATLANTA, GA	

INVESTIGATORS AND EXPERIMENTS

PAGE

SPACE SHUTTLE LOEF-A, EFFECTS OF LONG-DURATION EXPOSURE ON ACTIVE OPTICAL SYSTEMS COMPONENTS (SSLOEF -26).....	151
SHAPIRO, I.I. - MASS INST OF TECH, CAMBRIDGE, MA	
PIIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-078C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-078A-04).....	94
SHAPIRO, M.M. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACE SHUTTLE LOEF-A, HEAVY IONS IN SPACE (SSLOEF -13).....	156
SHARE, G.H. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	127
GMM, GAMMA RAY SPECTROMETER (GRE) (80-014A-07).....	78
SHARP, R.D. - LOCKHEED PALO ALTO, PALO ALTO, CA	
CEE, PLASMA COMPOSITION (CEE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ISSE 1, ION COMPOSITION (77-102A-12).....	42
SHAWHAN, S.D. - U OF IOWA, IOWA CITY, IA	
DYNAMICS EXPLORER-A, PLASMA WAVES (DE-A -02).....	112
GALILEO ORBITER, PLASMA WAVE SPECTROMETER (JOPD -07).....	123
OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-A-01).....	107
SPACELAB 2, EJECTABLE PLASMA DIAGNOSTICS PACKAGE (SPALAB2-02).....	166
SHELLEY, E.O. - LOCKHEED PALO ALTO, PALO ALTO, CA	
CEE, PLASMA COMPOSITION (CEE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ISSE 1, ION COMPOSITION (77-102A-12).....	42
SHELUS, P.J. - U OF TEXAS, AUSTIN, AUSTIN, TX	
ST, ASTROMETRY SCIENCE (LST -09).....	169
SHENANSKY, D.E. - U OF SOUTHERN CALIF, TUCSON, AZ	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	97
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
SHENK, W.E. - NASA-GFPC, GREENBELT, MD	
GOES 1, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-100A-01).....	26
GOES 2, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-062A-01).....	28
GOES-D, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-D -01).....	179
GOES-E, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-E -01).....	130
GOES-F, VISIBLE-INFRARED SPIN SCAN RADIOMETER ATMOSPHERIC SOUNDER (VAS) (GOES-F -01).....	131
SMS 1, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (74-033P-03).....	79
SMS 2, VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) (75-011A-04).....	80
SHEPHERD, G.G. - YORK U, DOWNSVIEW, ONTARIO, CANADA	
AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	13
ISIS 2, 6300-A PHOTOMETER (71-024A-12).....	50
SHERIDAN, K.V. - CSIRO, DIV OF RADIOPHYS, EPPING, AUSTRALIA	
SMM, CORONAGRAPH/POLARIMETER (80-014A-01).....	70
SHRUM, J. - USAF TECH APPL CTR, ALEXANDRIA, VA	
OMSP 50-1/71, GAMMA RAY DETECTOR (76-091A-04).....	18
OMSP 50-1/73, GAMMA-RAY DETECTOR (76-042A-04).....	20
SHULMAN, S.D. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
STP P7B-1, X-RAY MONITOR (79-017A-06).....	83
SIEFF, A. - NASA-ARC, MOFFETT FIELD, CA	
GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
SIEGMAN, G. - INST P+A NUCLEAR PHYS, KIEL, FED REP OF GERMANY	
SPACELAB 1, ISOTOPE STACK (SPALAB1-29).....	157
SILBERBERG, R. - US NAVAL RESEARCH LAB, WASHINGTON, DC	
SPACE SHUTTLE LOEF-A, HEAVY IONS IN SPACE (SSLOEF -13).....	156
SILVAGGIO, P.M. - NASA-ARC, MOFFETT FIELD, CA	
GALILEO PROBE, NET FLUX RADIOMETER (JOP -04).....	126
SIMNETT, G.M. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND	
SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
SIMON, G.W. - SACRAMENTO PEAK OBS, SUNSPOT, NH	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
SIMON, P. - IASB, BRUSSELS, BELGIUM	
SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 100 TO 6000 NANOMETERS (SPALAB1-21).....	162
SIMPSON, J.A. - U OF CHICAGO, CHICAGO, IL	
IMP-J, SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE (75-078A-07).....	39
ISPR/ESA, COSMIC RAY AND CHARGED PARTICLE (ISPR/ESA -02).....	136
PIONEER 6, COSMIC RAY TELESCOPE (65-105A-03).....	65
PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	69
PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	75
STP P8B-2, COSMIC RAY ISOTOPE (CRIE) (P8B-2 -02).....	171
BISCOE, G.L. - U OF CALIF, LA, LOS ANGELES, CA	
ISSE 3, MAGNETIC FIELDS (78-079A-02).....	96
PIIONEER VENUS 1, TRIAXIAL FLUXGATE MAGNETOMETER (78-051A-12).....	74
VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
SIVAN, J.P. - CNRS-LAS, MARSEILLE, FRANCE	
SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	158

INVESTIGATORS AND EXPERIMENTS

PAGE

SKINNER, G.K. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
SLEMP, W.S. - NASA-LARC, HAMPTON, VA *SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (PASSIVE) (SSLDEF -05)..... *SPACE SHUTTLE LDEF-A, SPACE EXPOSURE OF MATERIALS FOR ADVANCED SPACECRAFT (SSLDEF -21).....	156 156
SMIDDY, M. - USAF GEOPHYS LAB, BEDFORD, MA ISIS 1, SPHERICAL ELECTROSTATIC ANALYZER (69-009A-06).....	48
SMILAUER, J.I. - GEOPHYS INST CAS, PRAGUE, CZECHOSLOVAKIA COSMOS 906, HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE (77-023A-02)..... PROGNOZ 7, ELECTRIC SCANNING PLASMA DETECTOR (78-101A-05).....	16 76
SMITH, A.M. - NASA-GSFC, GREENBELT, MD ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
SMITH, B.A. - U OF ARIZONA, TUCSON, AZ ST, WIDE-FIELD CAMERA (WFC) (LST -07)..... VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01)..... *VOYAGER 1, IMAGING (77-084A-01)..... *VOYAGER 2, IMAGING (77-076A-01).....	170 96 99 101
SMITH, D.F. - HIGH ALTITUDE OBS, BOULDER, CO ISEE 3, INTERPLANETARY AND SOLAR ELECTRONS (78-079A-09).....	44
SMITH, E.J. - NASA-JPL, PASADENA, CA ISEE 1, PLASMA WAVES (77-102A-07)..... ISEE 2, PLASMA WAVES (77-102B-05)..... *ISEE 3, MAGNETIC FIELDS (78-079A-02)..... ISEE 3, PLASMA WAVES (78-079A-07)..... *PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	41 43 46 46 72
SMITH, G.L. - NASA-LARC, HAMPTON, VA NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
SMITH, G.W. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM SPACELAB 2, PLASMA DEPLETION EXPERIMENTS FOR IONOSPHERIC AND RADIO ASTRONOMICAL STUDY (SPALAB2-04).....	165
SMITH, S.D. - READING U, READING, ENGLAND NIMBUS 5, SELECTIVE CHOPPER RADIOMETER (SCR) (72-097A-02).....	52
SMITH, Z.A. - NOAA-SEL, BOULDER, CO PIONEER 10, PLASMA (72-012A-13)..... PIONEER 11, PLASMA (73-019A-13).....	69 72
SMITH, JR., C.F. - NASA-MSFC, HUNTSVILLE, AL SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
SMITHSON, R.C. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
SMOOT, G.F. - LAWRENCE BERKELEY LAB, BERKELEY, CA COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01)..... COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02)..... *COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	109 108 109
SNYDER, A.L. - USAF GEOPHYS LAB, BEDFORD, MA *DMSP 5D-1/F2, PASSIVE IONOSPHERIC MONITOR (77-044A-04)..... *DMSP 5D-1/F4, PASSIVE IONOSPHERIC MONITOR (79-050A-04)..... *DMSP 5D-1/F5, PASSIVE IONOSPHERIC MONITOR (DMSP-F5-04).....	19 21 110
SODERBLOM, L.A. - US GEOLOGICAL SURVEY, FLAGSTAFF, AZ GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOP0 -01)..... VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01)..... VOYAGER 1, IMAGING (77-084A-01)..... VOYAGER 2, IMAGING (77-076A-01).....	122 96 99 101
SOMMER, H.K. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRO -04)..... ISPR/ESA, SOLAR-FLARE X-RAYS AND COSMIC GAMMA RAY BURST (ISPESA -01).....	127 135
SOMMER, S.C. - NASA-ARC, MOFFETT FIELD, CA GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
SONETT, C.P. - U OF ARIZONA, TUCSON, AZ *GALILEO ORBITER, INTERACTION OF GALILEAN SATELLITE MAGNETIC PROPERTIES+JOVIAN MAGNETOSPHERE (JOP0 -24)..... *PIONEER 9, TRIAXIAL MAGNETOMETER (68-100A-01)..... PIONEER 11, MAGNETIC FIELDS (73-019A-01).....	125 67 72
SOSNOVETS, E.N. - INST NUCLEAR PHYSICS, MOSCOW, USSR *COSMOS 900, DIFFERENTIAL ENERGY SPECTROMETER (77-023A-05).....	17
SOUTOUL, A. - CENS, SACLAY, FRANCE HEAD 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
SPALDING, R.E. - SANDIA LABORATORIES, ALBUQUERQUE, NM PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
SPENCER, N.W. - NASA-GSFC, GREENBELT, MD *AE-E, NEUTRAL ATMOSPHERE TEMPERATURE (NATE) (75-107A-09)..... DYNAMICS EXPLORER-B, NEUTRAL ATMOSPHERE COMPOSITION SPECTROMETER (DE-B -02)..... *DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04)..... GALILEO PROBE, MASS SPECTROMETER (JOP -03)..... PIONEER VENUS 1, NEUTRAL PARTICLE MASS SPECTROMETER (78-051A-11)..... *SAM MARCO-0/L, WIND AND TEMPERATURE SPECTROMETER (WATS) (SM-CL -04).....	14 113 115 126 74 149

INVESTIGATORS AND EXPERIMENTS

PAGE

SPENNER, K. - INST FUR PHYS WELTRAUM, FREIBURG, FED REP OF GERMANY *FIREHEEL SUB-SAT 1, RETARDING POTENTIAL ANALYZER (FIRE-E-03).....	119
PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	73
SPITZER, L. - PRINCETON U, PRINCETON, NJ *ROAD 3, HIGH-RESOLUTION TELESCOPES (72-065A-01).....	64
STABLIN, D.H. - MASS INST OF TECH, CAMBRIDGE, MA *NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMWR) (78-098A-08).....	60
PIONEER VENUS 1, RADAR ALTIMETER (78-051A-02).....	74
VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
STAIR, JR., A.T. - USAF GEOPHYS LAB, BEDFORD, MA *UARS-1, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-1-12).....	172
UARS-2, CRYOGENIC UPPER-ATMOSPHERE LIMB EMISSION RADIOMETER (UARS-2-12).....	177
STAUBERT, R. - U OF TUBINGEN, TUBINGEN, FED REP OF GERMANY *EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT-01).....	118
STEINBERG, J.L. - PARIS OBSERVATORY, MEUDON, FRANCE *ISEE 3, RADIO MAPPING (78-079A-10).....	46
STELZRIED, C.T. - NASA-JPL, PASADENA, CA *VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
STEPHANIDES, C.C. - NASA-GSFC, GREENBELT, MD *GEOS 3, LASER TRACKING REFLECTOR (75-027A-04).....	25
STEWART, A.I. - U OF COLORADO, BOULDER, CO *GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	123
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	75
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SRE -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
STOBOY, H. - U OF BERLIN, BERLIN, FED REP OF GERMANY *SPACELAB 1, COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES (SPALAB1-37).....	159
STONE, E.C. - CALIF INST OF TECH, PASADENA, CA *HEAD 3, HEAVY NUCLEI (79-082A-03).....	31
*IMP-J, ELECTRONS AND HYDROGEN AND HELIUM ISOTOPIES (73-078A-06).....	39
*ISEE 3, HIGH-ENERGY COSMIC RAYS (78-079A-12).....	46
*ISPM/NASA, COMPREHENSIVE PARTICLE ANALYSIS SYSTEM (CPA) (ISPMASA-03).....	137
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	98
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
STONE, N. - NASA-MSFC, HUNTSVILLE, AL *OSS-1, PLASMA DIAGNOSTIC PACKAGE (SHOFT-4-01).....	147
STONE, P.H. - MASS INST OF TECH, CAMBRIDGE, MA *GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	124
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	73
STONE, R.G. - NASA-GSFC, GREENBELT, MD *HELIOS-A, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-04).....	32
HELIOS-A, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (74-097A-05).....	32
HELIOS-A, 50-KHZ TO 2-MHZ RADIO WAVE (74-097A-06).....	33
HELIOS-B, COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-04).....	35
HELIOS-B, FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS (76-003A-05).....	35
HELIOS-B, 50-KHZ TO 2-MHZ RADIO WAVE (76-003A-06).....	35
ISEE 3, RADIO MAPPING (78-079A-10).....	46
*ISP/ESA, UNIFIED RADIO AND PLASMA WAVE (ISPESA-06).....	136
*ISPM/NASA, ELECTROMAGNETIC SURVEY AND UNIFIED RADIO AND PLASMA WAVE (RAE) (ISPMASA-05).....	137
STOTT, F.D. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND *SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-35).....	160
STONE, L.L. - NOAA-NESS, SUITLAND, MD *NIMBUS 6, EARTH RADIATION BUDGET (ERB) (75-052A-05).....	59
NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
STROBEL, D.F. - US NAVAL RESEARCH LAB, WASHINGTON, DC *VOYAGER 1, ULTRAVIOLET SPECTROSCOPY (77-084A-04).....	57
VOYAGER 2, ULTRAVIOLET SPECTROSCOPY (77-076A-04).....	100
STRONG, I.B. - LOS ALAMOS SCI LAB, LOS ALAMOS, NM *PIONEER VENUS 1, TRANSIENT GAMMA-RAY SOURCES (78-051A-05).....	73
VELA 5A, GAMMA-RAY ASTRONOMY (69-046B-08).....	89
VELA 5B, GAMMA RAY ASTRONOMY (69-046E-08).....	90
VELA 6A, GAMMA-RAY ASTRONOMY (70-027A-08).....	91
VELA 6B, GAMMA-RAY ASTRONOMY (70-027B-08).....	92
STRONG, K. - U COLLEGE LONDON, LONDON, ENGLAND *SPACELAB 2, SOLAR CORONAL HELIUM ABUNDANCE (SPALAB2-09).....	164
STUEDEMANN, W. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	162
SUGIURA, M. - NASA-GSFC, GREENBELT, MD *DYNAMICS EXPLORER-A, MAGNETIC FIELD OBSERVATIONS (DE-A -01).....	112
*DYNAMICS EXPLORER-B, MAGNETIC FIELD OBSERVATIONS (DE-B -01).....	115
UARS-2, MAGNETOMETER EXPERIMENT (UARS-2-26).....	179

INVESTIGATORS AND EXPERIMENTS

PAGE

SULLIVAN, J.D. - MASS INST OF TECH, CAMBRIDGE, MA VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
SULZMAN, F.M. - HARVARD U, CAMBRIDGE, MA *SPACELAB 1, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS (SPALAB1-15).....	161
SUOMI, V.E. - U OF WISCONSIN, MADISON, WI NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	59
VOYAGER 1, IMAGING (77-084A-01).....	99
VOYAGER 2, IMAGING (77-076A-01).....	101
SWANENBURG, B.N. - U OF LEIDEN, LEIDEN, NETHERLANDS EXOSAT, LOW-ENERGY X-RAY IMAGING TELESCOPES (EXOSAT -02).....	118
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
SWENSON, G.R. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 1, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING (SPALAB1-03).....	160
SWINDELL, W. - U OF ARIZONA, TUCSON, AZ PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	68
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	71
SYLVAIN, M. - LGE, SAINT-MAUR-DES-FOSSES, FRANCE ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
TAKAGI, M. - U OF TOKYO, TOKYO, JAPAN KYOKKO, UV AURORAL TV IMAGING (78-014A-03).....	53
TAKAHASHI, T. - U OF TOKYO, SENDAI, JAPAN ASTRO-A, ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES (ASTRO-A-06).....	107
TAKAKURA, T. - U OF TOKYO, TOKYO, JAPAN *ASTRO-A, SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING (ASTRO-A-01).....	107
TAKENOSHITA, Y. - RADIO RESEARCH LAB, TOKYO, JAPAN ISS-B, SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP) (78-018A-01).....	51
TAKEUCHI, H. - INST PHYS + CHEM RES, TOKYO, JAPAN *ASTRO-A, ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR (ASTRO-A-05).....	107
TALLEY, R.L. - SIGMA DATA SERV CORP, SILVER SPRING, MD NIMBUS 6, TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL (TWERLE) (75-052A-01).....	59
TANAKA, K. - U OF TOKYO, TOKYO, JAPAN ASTRO-A, SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE (ASTRO-A-02).....	107
TANAKA, Y. - U OF TOKYO, TOKYO, JAPAN *HAKUCHO, DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES (79-014A-02).....	29
TANENBAUM, H.D. - SAO, CAMBRIDGE, MA HEAD 2, MONITOR PROPORTIONAL COUNTER (78-103A-01).....	30
HEAD 2, HIGH-RESOLUTION IMAGER (78-103A-02).....	30
HEAD 2, CURVED-CRYSTAL BRAGG X-RAY (78-103A-03).....	31
HEAD 2, IMAGING PROPORTIONAL COUNTER (78-103A-04).....	31
HEAD 2, SOLID-STATE X-RAY DETECTOR (78-103A-05).....	31
TANDBERG-HANSSSEN, E. - NASA-MSFC, HUNTSVILLE, AL *SMH, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	79
TARBELL, T.D. - LOCKHEED PALO ALTO, PALO ALTO, CA SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
TAVASSOLI, M. - SCRIPPS C+R FOUNDATION, LA JOLLA, CA SPACELAB 1, INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN (SPALAB1-14).....	160
TAYLOR, B.G. - ESA-ESTEC, NOORDWIJK, NETHERLANDS *EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-28).....	157
TAYLOR, E.W. - USAF WEAPONS LAB, KIRTLAND AFB, NM *SPACE SHUTTLE LDEF-A, SPACE ENVIRONMENT EFFECTS ON FIBER OPTIC SYSTEMS (SSLDEF -16).....	156
TAYLOR, F. - NASA-JPL, PASADENA, CA GALILEO ORBITER, NEAR INFRARED MAPPING SPECTROMETER (NIMS) INVESTIGATION AND MAPPER (JOPO -01).....	122
TAYLOR, R.G. - US NAVAL RESEARCH LAB, WASHINGTON, DC SOLRAD 11B, 1- TO 8-A SOLAR X-RAY MONITOR (76-023D-04).....	81
SOLRAD 11B, 8- TO 16-A SOLAR X-RAY MONITOR (76-023D-05).....	81
SOLRAD 11B, 44- TO 60-A SOLAR X-RAY MONITOR (76-023D-06).....	82
SOLRAD 11B, 170- TO 1050-A SOLAR EUV MONITOR (76-023D-07).....	82
SOLRAD 11B, 0.5- TO 3-A SOLAR X-RAY MONITOR (76-023D-12).....	82
SOLRAD 11B, 2- TO 10-A SOLAR X-RAY MONITOR (76-023D-13).....	82
TAYLOR, JR., H.A. - NASA-GSFC, GREENBELT, MD AE-E, BENNETT ION-MASS SPECTROMETER (BIMS) (75-107A-10).....	12
*PIONEER VENUS 1, ION MASS SPECTROMETER (78-051A-17).....	75
TEEGARDEN, B.J. - NASA-GSFC, GREENBELT, MD GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	34
HELIOS-B, GALACTIC AND SOLAR COSMIC RAYS (76-003A-08).....	37
IMP-J, SOLAR AND COSMIC-RAY PARTICLES (75-078A-09).....	38
ISEE 1, GAMMA-RAY BURSTS (77-102A-14).....	40
*ISEE 3, GAMMA-RAY BURSTS (78-079A-15).....	46

INVESTIGATORS AND EXPERIMENTS

PAGE

PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
TEITELBAUM, M. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE	
UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	175
UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	180
VELTISOV, M.V. - INST NUCLEAR PHYSICS, MOSCOW, USSR	
*COSMOS 900, DIFFERENTIAL LOW ENERGY SPECTROMETER (77-023A-06).....	17
YENNYSON, R.C. - U OF TORONTO, DUNHURST, ONTARIO, CANADA	
*SPACE SHUTTLE LDEF-A, PROPERTIES OF POLYMER MATRIX COMPOSITE MATERIALS, EFFECT OF SPACE ENVIRONMENT (SSLDEF -24).....	156
THEILE, B. - BRAUNSCHEWIG TECH U, BRAUNSCHEWIG, FED REP OF GERMANY	
*SPACELAB 1, DC AND LOW FREQUENCY VECTOR MAGNETOMETER (SPALAB1-23).....	161
THEIS, R.F. - NASA-GSFC, GREENBELT, MD	
AE-E, CYLINDRICAL ELECTROSTATIC PROBE (CEP) (75-107A-01).....	12
DYNAMICS EXPLORER-B, WIND AND TEMPERATURE SPECTROMETER (DE-B -04).....	115
DYNAMICS EXPLORER-B, LANGMUIR PROBE (DE-B -09).....	113
THOMAS, G.E. - U OF COLORADO, BOULDER, CO	
GALILEO ORBITER, ULTRAVIOLET SPECTROMETER (UVS) (JOPO -02).....	123
PIONEER VENUS 1, PROGRAMMABLE ULTRAVIOLET SPECTROMETER (78-051A-15).....	75
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
THOMAS, R.J. - U OF COLORADO, BOULDER, CO	
SME, UV OZONE (SME -01).....	150
SME, INFRARED RADIOMETER (SME -02).....	150
SME, 1.27 MICROMETER AIRGLOW (SME -03).....	150
SME, VISIBLE NITROGEN DIOXIDE (SME -04).....	150
SME, SOLAR UV MONITOR (SME -05).....	150
SME, SOLAR PROTON ALARM (SME -06).....	151
THOMAS-GORFIAS, C. - U OF FRANKFURT, FRANKFURT, FED REP OF GERMANY	
SPACELAB 1, MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT (SPALAB1-34).....	160
THOMPSON, A. - DUBLIN INST ADV STUDY, DUBLIN, IRELAND	
SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -49).....	154
THOMPSON, D.B. - NASA-GSFC, GREENBELT, MD	
GAMMA-RAY OBSERVATORY, HIGH-ENERGY GAMMA-RAY TELESCOPE (GRU -04).....	127
THORNTON, G.R. - OXFORD U, OXFORD, ENGLAND	
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAMS) (UARS-2 -11).....	178
THUILLIER, G. - CNRS-SA, VERRIERES-LE-BUISSON, FRANCE	
*SPACELAB 1, TEMPERATURE AND WIND MEASUREMENTS IN THE MESOSPHERE AND THERMOSPHERE (SPALAB1-20).....	162
*SPACELAB 1, MEASUREMENT OF THE SOLAR SPECTRUM FROM 190 TO 4000 ANGOSTROMS (SPALAB1-21).....	162
*UARS-1, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-1 -01).....	175
*UARS-2, TEMPERATURE AND WIND MEASUREMENT IN THE MESOSPHERE AND LOWER THERMOSPHERE (UARS-2 -01).....	180
TILLMAN, J.E. - U OF WASHINGTON, SEATTLE, WA	
VIKING 1 LANDER, METEOROLOGY (75-075C-07).....	95
VIKING 2 LANDER, METEOROLOGY (75-083C-07).....	97
TITLE, A.M. - LOCKHEED PALO ALTO, PALO ALTO, CA	
*SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
TOLSON, R.H. - NASA-LARC, HAMPTON, VA	
VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
TOMASKO, M.G. - U OF ARIZONA, TUCSON, AZ	
PIONEER 10, IMAGING PHOTOPOLARIMETER (IPP) (72-012A-07).....	68
PIONEER 11, IMAGING PHOTOPOLARIMETER (IPP) (73-019A-07).....	71
TOOMRE, J. - U OF COLORADO, BOULDER, CO	
SPACELAB 1, GEOPHYSICAL FLUID FLOW (SPALAB1-08).....	160
TORBERT, R.B. - U OF CALIF, BERKELEY, BERKELEY, CA	
FIREWHEEL SUB-SAT 3, DC/AC MAGNETOMETER (FIRE-C -01).....	120
FIREWHEEL SUB-SAT 3, DC/AC ELECTRIC FIELD (FIRE-C -02).....	121
TORR, D.G. - U OF MICHIGAN, ANN ARBOR, MI	
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
*UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	175
*UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	180
TORR, M.R. - U OF MICHIGAN, ANN ARBOR, MI	
*SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	175
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	180
TOWNSEND, W.F. - NASA-WFO, WALLOPS ISLAND, VA	
*ICEX, ICE ELEVATION ALTIMETER SYSTEM (ICEX-A -04).....	132
TRAFTON, L.M. - U OF TEXAS, AUSTIN, AUSTIN, TX	
PIONEER 11, INFRARED RADIOMETER (73-019A-08).....	71
ST, HIGH-RESOLUTION SPECTROGRAPH (HRS) (LST -02).....	169
TRAINOR, J.H. - NASA-GSFC, GREENBELT, MD	

INVESTIGATORS AND EXPERIMENTS

PAGE

*HELIOS-A, GALACTIC AND SOLAR COSMIC RAYS (74-097A-08).....	34
*HELIOS-B, GALACTIC AND SOLAR COSMIC RAYS (76-003A-08).....	37
IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-076A-05).....	39
ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	46
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
TRAUB, W.A. - SAO, CAMBRIDGE, MA SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
TRAVIS, L. - NASA-GISS, NEW YORK, NY GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPD -08).....	124
PIONEER VENUS 1, CLOUD PHOTOPOLARIMETER (78-051A-06).....	73
TREGER, L. - CENS, GIF-SUR-YVETTE, FRANCE *PROGNOZ 7, ENERGETIC ELECTRON SPECTROMETER (78-101A-09).....	77
TROIM, J. - NDRE, KJELLER, NORWAY SPACELAB 1, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS (SPALAB1-25).....	157
TROY, JR., D.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC ISIS 2, RETARDING POTENTIAL ANALYZER (71-024A-08).....	50
TRUMPER, J. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY *EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	118
TSAO, C.H. - US NAVAL RESEARCH LAB, WASHINGTON, DC SPACE SHUTTLE LDEF-A, HEAVY IONS IN SPACE (SSLDEF -13).....	156
TSURUTANI, B.T. - NASA-JPL, PASADENA, CA ISEE 3, MAGNETIC FIELDS (78-079A-02).....	46
TULUPOV, V.I. - INST NUCLEAR PHYSICS, MOSCOW, USSR *COSMOS 900, AURORAL PHOTOMETER (77-023A-09).....	17
TURNER, J. - IONOSPHERIC PRED SERV, SYDNEY, AUSTRALIA ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
TURNER, M. - U OF LEICESTER, LEICESTER, ENGLAND EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	118
TURNER, R.E. - NASA-LARC, HAMPTON, VA UARS-1, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-1 -22).....	173
UARS-2, STRATOSPHERIC TRANSPORT PROCESSES, BUDGET OF MINOR CONSTITUENTS AND ENERGETICS (UARS-2 -22).....	177
TURNER, R.E. - NASA-MSFC, HUNTSVILLE, AL PIONEER 10, METEOROID DETECTORS (72-012A-04).....	68
TUZZOLINO, A. - U OF CHICAGO, CHICAGO, IL PIONEER 10, CHARGED PARTICLE COMPOSITION (72-012A-02).....	69
PIONEER 11, CHARGED PARTICLE COMPOSITION (73-019A-02).....	72
TYLER, G.L. - STANFORD U, PALO ALTO, CA VIKING 1 LANDER, LANDER RADIO SCIENCE (75-075C-11).....	95
VIKING 1 ORBITER, ORBITER RADIO SCIENCE (75-075A-04).....	96
*VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
*VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
ULMER, M. - NORTHWESTERN U, EVANSTON, IL GAMMA-RAY OBSERVATORY, SCINTILLATION SPECTROMETER (GRO -02).....	127
UMAN, M. - U OF FLORIDA, GAINESVILLE, FL GALILEO PROBE, LIGHTNING (JCF -36).....	126
UNGSTRUP, E. - DANISH SPACE RES INST, LYNGBY, DENMARK ESA-GEOS 2, MAGNETIC WAVE FIELDS (78-071A-06).....	22
*ESA-GEOS 2, ELECTRIC WAVE FIELDS (78-071A-10).....	24
UNKNOWN *EXOS-C, X-RAY AND GAMMA-RAY ASTRONOMICAL TELESCOPES (EXOS-C -01).....	117
*EXOS-C, ULTRAVIOLET TELESCOPE (EXOS-C -02).....	117
*EXOS-C, INFRARED TELESCOPE (EXOS-C -03).....	117
*EXOS-C, ENERGETIC PARTICLES (EXOS-C -04).....	117
UNWIN, R.S. - DEPT OF SCI+INDUST RES, CHRISTCHURCH, NEW ZEALAND ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
URBAN, F.W. - NASA-MSFC, HUNTSVILLE, AL SPACELAB 2, SMALL, HELIUM-COOLED INFRARED TELESCOPE (SPALAB2-05).....	164
VAISBERG, O.L. - IKI, MOSCOW, USSR *PROGNOZ 7, SELECTIVE COMBINED PLASMA SPECTROMETER (SCS) (78-101A-01).....	77
*VENERA 11, SOLAR WIND PLASMA DETECTORS (78-084A-08).....	93
*VENERA 12, SOLAR WIND PLASMA DETECTORS (78-086A-08).....	94
VALENZUELA, A. - MPI-EXTRATERR PHYS, GARCHING, FED REP OF GERMANY FIREWHEEL, ION RELEASE (FIRE-A -01).....	118
IRM, LI AND BA RELEASE MODULE (IRM -01).....	134
VALNICEK, B. - ASTRONOMICAL INST, ONDREJOV, CZECHOSLOVAKIA *PROGNOZ 7, SOLAR X-RAY SPECTROMETER (78-101A-07).....	76
VAN ALLEN, J.A. - U OF IOWA, IOWA CITY, IA IMP-J, CHARGED PARTICLE MEASUREMENTS EXPERIMENT (73-078A-08).....	58

INVESTIGATORS AND EXPERIMENTS	PAGE
*PIONEER 10, JOVIAN CHARGED PARTICLES (72-012A-11).....	69
*PIONEER 11, JOVIAN CHARGED PARTICLES (73-019A-11).....	72
VAN ALSTEN, M.F. - YALE U, NEW HAVEN, CT *ST, ASTROMETRY SCIENCE (LST -89).....	169
VAN DEEK, M.F. - SPACE RESEARCH LAB, UTRECHT, NETHERLANDS *SNR, HARD X-RAY IMAGING SPECTROMETER (NRIS) (80-014A-05).....	78
VAN CITTERS, G.V. - U OF TEXAS, AUSTIN, AUSTIN, TX *ST, HIGH-SPEED PHOTOMETER (HSP) (LST -86).....	169
VAN DE MULST, M.C. - HUYGENS LAB, LEIDEN, NETHERLANDS *ST, FAINT-OBJECT CAMERA (FOC) (LST -88).....	170
VAN DEN NIEUWENHOF, R.M. - U OF UTRECHT, UTRECHT, NETHERLANDS *ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
VAN GILS, J.M. - U OF UTRECHT, UTRECHT, NETHERLANDS *ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
VAN HOLLEBEKE, M.A. - U OF MARYLAND, COLLEGE PARK, MD *ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	46
VAN HOOSIER, R.E. - US NAVAL RESEARCH LAB, WASHINGTON, DC *SSS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR (SMOFT-4-03).....	147
*SPACELAB 2, SOLAR UV HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS) (SPALAB2-10).....	163
*SPACELAB 2, SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIN) (SPALAB2-11).....	163
*UARS-1, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-1 -08).....	171
*UARS-2, SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR 120-400 NM (UARS-2 -08).....	176
VAN ROOIJEN, J.J. - U OF UTRECHT, UTRECHT, NETHERLANDS *ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
VANCOUR, R.P. - USAF GEOPHYS LAB, BEDFORD, MA *STP P78-1, HIGH LATITUDE PARTICLE SPECTROMETER (79-017A-05).....	83
VASYLIUNAS, V.M. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *GALILEO ORBITER, PLASMA (JOPD -84).....	122
*ISEE 1, HOT PLASMA (77-102A-03).....	40
*ISEE 2, HOT PLASMA (77-102B-03).....	43
*VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
*VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
VEDRENNE, G. - CESR, TOULOUSE, FRANCE *GAMMA-RAY OBSERVATORY, GAMMA-RAY SPECTROSCOPY (GRO -01).....	127
*PROGNOZ 7, GAMMA-RAY SPECTROMETER (78-101A-03).....	75
*VENERA 11, GAMMA-RAY SPECTROMETER (78-084A-01).....	93
*VENERA 12, GAMMA-RAY SPECTROMETER (78-086A-01).....	94
VENABLES, J.D. - MARTIN-MARIETTA LABS, BALTIMORE, MD *SPACE SHUTTLE LOEF-A, RADIATION SENSITIVITY OF QUARTZ CRYSTAL OSCILLATORS EXPERIMENT (SSLDEF -22).....	156
VENKATAVARADAN, V. - TATA INST OF FUND RES, BOMBAY, INDIA *SPACELAB 3, IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES (SPALAB3-15).....	167
VEVERKA, J. - CORNELL U, ITHACA, NY *GALILEO ORBITER, ORBITER IMAGING (JOPD -10).....	122
*VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
VILLA, G. - U OF MILAN, MILAN, ITALY *EXOSAT, GAS SCINTILLATION X-RAY SPECTROMETER (EXOSAT -03).....	118
*SPACELAB 1, ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER (SPALAB1-26).....	157
VITON, M. - CNRS-LAS, MARSEILLE, FRANCE *SPACELAB 1, VERY WIDE FIELD GALACTIC CAMERA (SPALAB1-27).....	158
VOGT, R.E. - CALIF INST OF TECH, PASADENA, CA *HEAD 3, HEAVY NUCLEI (79-082A-03).....	31
*IMP-J, ELECTRONS AND HYDROGEN AND HELIUM ISOTOPIES (73-078A-06).....	39
*ISEE 3, HIGH-ENERGY COSMIC RAYS (78-079A-12).....	46
*VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99
*VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
VOLK, H. - MPI-NUCLEAR PHYS, HEIDELBERG, FED REP OF GERMANY *ESA-GEOS 2, DC ELECTRIC FIELD AND GRADIENT B ELECTRON BEAM DEFLECTION (78-071A-08).....	23
*ISEE 1, FAST PLASMA AND SOLAR WIND IONS (77-102A-01).....	40
*ISEE 2, FAST PLASMA (77-102B-01).....	44
VOLLAND, M.E. - U OF BONN, BONN, FED REP OF GERMANY *ISPM/ESA, RADIO SCIENCE (ISPESA -09).....	135
VON BAURGARTEN, R. - U OF MAINZ, MAINZ, FED REP OF GERMANY *SPACELAB 1, HUMAN VESTIBULAR REACTIONS AND SENSATION IN SPACE (SLED EXPERIMENTS) (SPALAB1-41).....	162
VON ROSENVIINGE, T.T. - NASA-GSFC, GREENBELT, MD *ISEE 3, MEDIUM ENERGY COSMIC RAY (78-079A-04).....	46
VON ZAHN, U. - U OF BONN, BONN, FED REP OF GERMANY *GALILEO PROBE, HELIUM ABUNDANCE INTERFEROMETER (JOP -01).....	176
VONDERHAAR, T.M. - COLORADO STATE U, FORT COLLINS, CO *NIMBUS 7, EARTH RADIATION BUDGET (ERB) (78-098A-07).....	61
VOSS, JR., E.W. - U OF ILLINOIS, URBANA, IL *SPACELAB 1, EFFECTS OF PROLONGED WEIGHTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS (SPALAB1-17).....	162
WADDINGTON, C.J. - U OF MINNESOTA, MINNEAPOLIS, MN	

INVESTIGATORS AND EXPERIMENTS

PAGE

*HEAO 3, HEAVY NUCLEI (79-082A-03).....	31
WAGNER, W.J. - HIGH ALTITUDE OBS, BOULDER, CO SMR, CORONAGRAPH/POLARIMETER (80-014A-01).....	78
WALKER, J.C.G. - U OF MICHIGAN, ANN ARBOR, MI AE-E, VISIBLE AIRGLOW PHOTOMETER (VAE) (75-107A-11).....	13
SPACELAB 1, AN IMAGING SPECTROMETRIC OBSERVATORY (SPALAB1-01).....	162
MALLACE, J.M. - U OF WASHINGTON, SEATTLE, WA UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	173
UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	178
WANG, T.G. - NASA-JPL, PASADENA, CA SPACELAB 2, DYNAMICS AND THERMAL PROPERTIES OF SUPERFLUID HELIUM IN ZERO-G (SPALAB2-13).....	165
*SPACELAB 3, DROP DYNAMICS MODULE (DDM) EXPERIMENTS (SPALAB3-09).....	168
WANG, W.-C. - NASA-GISS, NEW YORK, NY GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	124
WARNOCK, J.M. - NOAA, BOULDER, CO ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	47
ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	49
WARWICK, J.W. - RADIOPHYSICS, INC, BOULDER, CO *VOYAGER 1, PLANETARY RADIO ASTRONOMY (77-084A-10).....	99
*VOYAGER 2, PLANETARY RADIO ASTRONOMY (77-076A-10).....	102
WATANABE, T. - TSUKUBA U, TOKYO, JAPAN KYOKKO, UV GLOW SPECTROPHOTOMETER (7E-014A-05).....	54
WATANABE, Y. - U OF TOKYO, TOKYO, JAPAN JKIKEN, IMPEDANCE AND ELECTRIC FIELD (IEF) (78-087A-04).....	52
WATERS, J.W. - NASA-JPL, PASADENA, CA *UARS-1, MICROWAVE LIMB SOUNDER (MLS) (UARS-1 -13).....	175
*UARS-2, MICROWAVE LIMB SOUNDER (MLS) (UARS-2 -13).....	180
WEBBER, W.R. - U OF NEW HAMPSHIRE, DURHAM, NH GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
*PIONEER 9, COSMIC-RAY TELESCOPE (68-100A-06).....	67
PIONEER 10, COSMIC-RAY SPECTRA (72-012A-12).....	69
PIONEER 11, COSMIC-RAY SPECTRA (73-019A-12).....	71
VOYAGER 1, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-084A-08).....	99
VOYAGER 2, HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE (77-076A-08).....	102
WEBER, R.R. - NASA-GSFC, GREENBELT, MD HELIOS-A, 50-KHZ TO 2-MHZ RADIO WAVE (74-097A-06).....	33
HELIOS-B, 50-KHZ TO 2-MHZ RADIO WAVE (76-003A-06).....	35
WEFEL, J.P. - U OF CHICAGO, CHICAGO, IL STP P80-2, COSMIC RAY ISOTOPE (CRIE) (P80-2 -02).....	171
WEIGAND, A.J. - NASA-LERC, CLEVELAND, OH SPACE SHUTTLE LDEF-A, ION BEAP TEXTURED AND COATED SURFACES (SSLDEF -01).....	151
WEIHRAUCH, J. - MPI-PHYS ASTROPHYS, GARCHING, FED REP OF GERMANY HELIOS-A, MICROMETEOROID DETECTOR AND ANALYZER (74-097A-12).....	32
HELIOS-B, MICROMETEOROID DETECTOR AND ANALYZER (76-003A-12).....	35
WEINBERG, J.L. - SPACE ASTRONOMY LAB, ALBANY, NY *OSS-1, CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE (SHOFT-4-06).....	148
WEINSTEIN, O. - NASA-GSFC, GREENBELT, MD *LANDSAT-D, THEMATIC MAPPER (LAND-D -01).....	138
*LANDSAT-D1, THEMATIC MAPPER (LAND-E -01).....	139
WEISS, R. - MASS INST OF TECH, CAMBRIDGE, MA COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	109
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	108
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	109
MELCH, D.W. - ROCKWELL INTL CORP, TULSA, OK SPACE SHUTTLE LDEF-A, GRAPHITE/POLYIMIDE AND GRAPHITE/EPOXY MECHANICAL PROPERTIES IN SPACE (SSLDEF -35).....	155
WELLMAN, J.B. - NASA-JPL, PASADENA, CA GALILEO ORBITER, ORBITER IMAGING (JOPO -10).....	122
VIKING 1 ORBITER, ORBITER IMAGING (75-075A-01).....	96
WENZEL, K.P. - ESA-ESTEC, NOORDWIJK, NETHERLANDS ISEE 3, ENERGETIC PROTONS (78-079A-08).....	45
SPACE SHUTTLE LDEF-A, HIGH RESOLUTION STUDY OF ULTRA HEAVY COSMIC RAYS (SSLDEF -40).....	154
WEST, R. - U OF COLORADO, BOULDER, CO VOYAGER 1, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-084A-11).....	98
VOYAGER 2, MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A (77-076A-11).....	101
WESTERGARD, N.J. - DANISH SPACE RES INST, LYNGBY, DENMARK HEAO 3, ISOTOPIC COMPOSITION OF COSMIC RAYS (79-082A-04).....	32
WESTPHAL, J.A. - CALIF INST OF TECH, PASADENA, CA *ST, WIDE-FIELD CAMERA (WFC) (LST -07).....	170
WEYMANN, R.J. - U OF ARIZONA, TUCSON, AZ ST, HIGH-RESOLUTION SPECTROGRAPH (MRS) (LST -02).....	169
WHALEN, B.A. - NATL RES COUNG OF CAN, OTTAWA, ONTARIO, CANADA DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112

ORIGINAL PAGE IS
OF POOR QUALITY

INVESTIGATORS AND EXPERIMENTS

PAGE

*FIREWHEEL SUB-SAT 4, ENERGETIC CHARGED PARTICLE DETECTORS (FIRE-D -03).....	121
WHATLEY, A. - READING U, READING, ENGLAND SPACE SHUTTLE LDEF-A, HIGH-PERFORMANCE INFRARED MULTILAYER FILTERS-RADIATION EFFECTS (SSLDEF -23).....	155
WHITAKER, A.F. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
*SPACELAB 1, TRIBOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL (SPALAB1-10).....	160
WHITNEY, J.G. - OXFORD U, OXFORD, ENGLAND UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISARS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISARS) (UARS-2 -11).....	178
WHITTEKER, J.H. - COMMUN RESEARCH CENTRE, OTTAWA, ONTARIO, CANADA *ISIS 1, SWEEP-FREQUENCY SOUNDER (69-009A-01).....	48
ISIS 1, FIXED-FREQUENCY SOUNDER (69-009A-02).....	47
*ISIS 2, SWEEP-FREQUENCY SOUNDER (71-024A-01).....	50
ISIS 2, FIXED-FREQUENCY SOUNDER (71-024A-02).....	49
WHITTEN, R.C. - NASA-ARC, MOFFETT FIELD, CA PIONEER VENUS 1, RETARDING POTENTIAL ANALYZER (78-051A-07).....	73
PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-18).....	75
WIBBERENZ, G.M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	33
HELIOS-B, COSMIC-RAY PARTICLES (76-003A-07).....	36
ISEE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-09).....	42
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	44
WILCOX, J.M. - STANFORD U, PALO ALTO, CA *ISEE 3, GROUND BASED SOLAR STUDIES (78-079A-13).....	47
WILHEIT, JR., T.T. - NASA-GSFC, GREENBELT, MD *NIMBUS 5, ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) (72-097A-04).....	58
NIMBUS 7, SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMR) (78-098A-08).....	60
WILHELM, K. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY *SPACELAB 1, STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION (SPALAB1-24).....	167
WILKEN, B. - MPI-AERONOMY, LINDAU, FED REP OF GERMANY CCE, CHANGE-ENERGY-MASS SPECTROMETER(CHEM) (CCE -03).....	106
*ESA-GEOS 2, ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION (78-071A-01).....	24
GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
HELIOS-A, ENERGETIC ELECTRON DETECTOR (74-097A-10).....	33
HELIOS-B, ENERGETIC ELECTRON DETECTOR (76-003A-10).....	36
ISEE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-09).....	42
ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	44
WILKES, D.R. - NASA-MSFC, HUNTSVILLE, AL *SPACE SHUTTLE LDEF-A, THERMAL CONTROL SURFACES (SSLDEF -04).....	156
WILKINSON, D.T. - PRINCETON U, PRINCETON, NJ COBE, FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS) (COBE -01).....	109
COBE, DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE) (COBE -02).....	109
COBE, DIFFERENTIAL MICROWAVE RADIOMETERS (DMR) (COBE -03).....	109
WILLIAMS, D.J. - NOAA-ERL, BOULDER, CO *GALILEO ORBITER, ENERGETIC PARTICLES (JOPO -06).....	125
*GOES 1, ENERGETIC PARTICLE MONITOR (75-100A-02).....	27
*GOES 1, SOLAR X-RAY MONITOR (75-100A-03).....	27
*GOES 1, MAGNETIC FIELD MONITOR (75-100A-04).....	27
*GOES 2, ENERGETIC PARTICLE MONITOR (77-048A-02).....	28
*GOES 2, SOLAR X-RAY MONITOR (77-048A-03).....	28
*GOES 2, MAGNETIC FIELD MONITOR (77-048A-04).....	28
*GOES 3, ENERGETIC PARTICLE MONITOR (78-062A-02).....	29
*GOES 3, SOLAR X-RAY MONITOR (78-062A-03).....	29
*GOES 3, MAGNETIC FIELD MONITOR (78-062A-04).....	29
*GOES-D, ENERGETIC PARTICLE MONITOR (GOES-D -02).....	129
*GOES-D, SOLAR X-RAY MONITOR (GOES-D -03).....	129
*GOES-D, MAGNETIC FIELD MONITOR (GOES-D -04).....	129
*GOES-E, ENERGETIC PARTICLE MONITOR (GOES-E -02).....	130
*GOES-E, SOLAR X-RAY MONITOR (GOES-E -03).....	130
*GOES-E, MAGNETIC FIELD MONITOR (GOES-E -04).....	130
*GOES-F, ENERGETIC PARTICLE MONITOR (GOES-F -02).....	131
*GOES-F, SOLAR X-RAY MONITOR (GOES-F -03).....	131
*GOES-F, MAGNETIC FIELD MONITOR (GOES-F -04).....	131
HELIOS-A, ENERGETIC ELECTRON DETECTOR (74-097A-10).....	33
HELIOS-B, ENERGETIC ELECTRON DETECTOR (76-003A-10).....	36
*IMP-J, ENERGETIC ELECTRONS AND PROTONS (73-078A-05).....	39
*ISEE 1, ENERGETIC ELECTRONS AND PROTONS (77-102A-09).....	42
*ISEE 2, ENERGETIC ELECTRONS AND PROTONS (77-102B-07).....	44
*NOAA 6, SPACE ENVIRONMENT MONITOR (79-057A-04).....	62
*NOAA-B, SPACE ENVIRONMENT MONITOR (80-043A-04).....	63
*NOAA-C, SPACE ENVIRONMENT MONITOR (NOAA-C -04).....	141
*NOAA-D, SPACE ENVIRONMENT MONITOR (NOAA-D -04).....	142
*NOAA-E, SPACE ENVIRONMENT MONITOR (NOAA-E -04).....	143
*NOAA-F, SPACE ENVIRONMENT MONITOR (NOAA-F -04).....	144
*NOAA-G, SPACE ENVIRONMENT MONITOR (NOAA-G -04).....	145
*SMS 1, ENERGETIC PARTICLE MONITOR (74-033A-02).....	80
*SMS 1, SOLAR X-RAY MONITOR (74-033A-03).....	80
*SMS 1, MAGNETIC FIELD MONITOR (74-033A-04).....	80
*SMS 2, ENERGETIC PARTICLE MONITOR (75-011A-01).....	81
*SMS 2, SOLAR X-RAY MONITOR (75-011A-02).....	81
*SMS 2, MAGNETIC FIELD MONITOR (75-011A-03).....	81
*TIROS-N, SPACE ENVIRONMENT MONITOR (78-096A-04).....	86
WILLIAMSON, E.J. - OXFORD U, OXFORD, ENGLAND NIMBUS 6, PRESSURE-MODULATED RADIOMETER (PMR) (75-052A-04).....	59

INVESTIGATORS AND EXPERIMENTS

PAGE

NIMBUS 7, STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) (78-098A-02).....	60
UARS-1, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-1 -11).....	173
UARS-2, AN IMPROVED STRATOSPHERIC AND MESOSPHERIC SOUNDER (ISAPS) (UARS-2 -11).....	178
WILLIAMSON, P.R. - UTAH STATE U, LOGAN, UT OSS-1, VEHICLE CHARGING AND POTENTIAL EXPERIMENT (SHOFT-4-04).....	147
WILLMORE, A.P. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SMM, HARD X-RAY IMAGING SPECTROMETER (HXIS) (80-014A-05).....	78
*SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
UK 5, 0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR (74-077A-01).....	87
UK 5, HIGH-RESOLUTION SOURCE SPECTRA (74-077A-03).....	88
UK 6, X-RAY GRAZING INCIDENCE SYSTEM (79-047A-03).....	
WILLS, R.D. - ESA-ESTEC, NOORDWIJK, NETHERLANDS GAMMA-RAY OBSERVATORY, IMAGING COMPTON TELESCOPE (GRO -03).....	127
WILLSON, R.C. - NASA-JPL, PASADENA, CA SMM, ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR (80-014A-08).....	79
*SPACELAB 1, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR (SPALAB1-0A).....	163
WILSON, J.V.G. - U OF BIRMINGHAM, BIRMINGHAM, ENGLAND SPACELAB 2, HARD X-RAY IMAGING OF CLUSTERS OF GALAXIES AND OTHER EXTENDED X-RAY SOURCES (SPALAB2-07).....	166
WILSON, L. - NASA-GSFC, GREENBELT, MD LANDSAT 3, RETURN BEAM VIDICON CAMERA (RBV) (78-026A-01).....	55
WILSON, R.M. - EUROP SO OBS, SWIZR, GENEVA, SWITZERLAND ST, FAINT-OBJECT CAMERA (FOC) (LST -08).....	170
WINNINGHAM, J.D. - U OF TEXAS, DALLAS, RICHARDSON, TX DYNAMICS EXPLORER-A, HIGH ALTITUDE PLASMA INSTRUMENT (DE-A -05).....	110
*DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INSTRUMENT (DE-B -02).....	115
*DYNAMICS EXPLORER-B, LOW ALTITUDE PLASMA INVESTIGATION HIGH ANGLE RESOLUTION (DE-E -13).....	114
*UARS-1, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-1 -07).....	175
*UARS-2, PARTICLE ENVIRONMENT MONITOR (PEM) (UARS-2 -07).....	180
WITTE, M. - U OF KIEL, KIEL, FED REP OF GERMANY HELIOS-A, COSMIC-RAY PARTICLES (74-097A-07).....	33
HELIOS-B, COSMIC-RAY PARTICLES (76-003A-07).....	36
WOIFF, M.S. - CLINICAL RES CENTER, HARROW, MIDDLESEX, ENGLAND SPACELAB 1, ELECTRO-PHYSIOLOGICAL TAPE RECORDER (SPALAB1-15).....	160
WOLFE, J.M. - NASA-ARC, MOFFETT FIELD, CA HELIOS-A, PLASMA DETECTORS (74-097A-09).....	34
HELIOS-B, PLASMA DETECTORS (76-003A-09).....	37
*PIONEER 6, ELECTROSTATIC ANALYZER (65-105A-06).....	65
*PIONEER 9, ELECTROSTATIC ANALYZER (68-100A-02).....	67
*PIONEER 10, PLASMA (72-012A-13).....	69
*PIONEER 11, PLASMA (73-019A-13).....	72
*PIONEER VENUS 1, SOLAR WIND PLASMA DETECTOR (78-051A-1B).....	75
WOLFF, R.S. - COLUMBIA U, NEW YORK, NY OSS-1, SOLAR FLARE X-RAY POLARIMETER EXPERIMENT (SHOFT-4-02).....	147
WOLFSON, C.J. - LOCKHEED PALO ALTO, PALO ALTO, CA SMM, SOFT X-RAY POLYCHROMATOR (XRP) (80-014A-04).....	78
WOOD, R. - NASA-JPL, PASADENA, CA GALILEO ORBITER, RADIO SCIENCE (JOPO -11).....	122
PIONEER VENUS 1, RADIO SCIENCE TEAM (78-051A-03).....	73
WOOD, G.E. - NASA-JPL, PASADENA, CA VOYAGER 1, RADIO SCIENCE TEAM (77-084A-02).....	99
VOYAGER 2, RADIO SCIENCE TEAM (77-076A-02).....	101
WOODGATE, F.E. - NASA-GSFC, GREENBELT, MD SMM, ULTRAVIOLET SPECTROMETER AND POLARIMETER (80-014A-02).....	79
WORDEN, S.P. - SACRAMENTO PEAK OBS, SUNSPOT, NM SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
WRENN, G.L. - U COLLEGE LONDON, LONDON, ENGLAND ESA-GEOS 2, THERMAL PLASMA FLC (78-071A-02).....	24
*FIREWHEEL SUB-SAT 2, LANGMUIR PROBE (FIRE-B -04).....	120
WRIGLEY, R.C. - NASA-ARC, MOFFETT FIELD, CA NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	61
WUEBBLES, D.J. - LAWRENCE LIVERMORE LAB, LIVERMORE, CA UARS-1, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-1 -24).....	172
UARS-2, THEORETICAL ANALYSIS-CHEMICAL, RADIATIVE, AND DYNAMICAL PROCESSES-MIDDLE ATMOSPHERE (UARS-2 -24).....	176
YEATES, C.M. - NASA-JPL, PASADENA, CA VOYAGER 1, PLASMA SPECTROMETERS (77-084A-06).....	97
VOYAGER 2, PLASMA SPECTROMETERS (77-076A-06).....	100
VENTSCH, C.S. - BIGELOW LAB OCEAN SCI, WEST BOOTHBAY HARBOR, ME NIMBUS 7, COASTAL ZONE COLOR SCANNER (CZCS) (78-098A-03).....	61
YOSHIMORI, M. - RIKIKYO U, TOKYO, JAPAN ASTRO-A, SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7.0 MEV RANGE (ASTRO-A-04).....	107
*HAKUCHO, MONITOR OF X-RAY SOURCES (79-014A-01).....	29
YOSHINO, T. - U OF ELECTRO-COMMUN, TOKYO, JAPAN *KYOKKO, ELECTROSTATIC PLASMA WAVE MEASUREMENT (78-014A-04).....	54

INVESTIGATORS AND EXPERIMENTS

PAGE

YOUNG, D.T. - U OF BERNE, BERNE, SWITZERLAND	
CCE, PLASMA COMPOSITION (CCE -01).....	108
DYNAMICS EXPLORER-A, HOT PLASMA COMPOSITION (DE-A -06).....	112
ESA-GEOS 2, LOW-ENERGY ION COMPOSITION (78-071A-03).....	22
ISSE 1, ION COMPOSITION (77-102A-12).....	42
YOUNG, E.R. - U OF MICHIGAN, ANN ARBOR, MI	
UARS-1, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-1 -15).....	175
UARS-2, ULTRAVIOLET STRATOSPHERIC IMAGING SPECTROMETER (UARS-2 -15).....	180
YOUNG, J.P. - NASA-GSFC, GREENBELT, MD	
SPACE SHUTTLE LDEF-A, SHUTTLE BAY ENVIRONMENT MEASUREMENTS (SSLDEF -29).....	193
YOUNG, L.E. - NASA-MSFC, HUNTSVILLE, AL	
SPACE SHUTTLE LDEF-A, SOLAR ARRAY MATERIALS (PASSIVE) (SSLDEF -45).....	156
YOUNG, L.R. - MASS INST OF TECH, CAMBRIDGE, MA	
SPACELAB 1, VESTIBULAR STUDIES (SPALAB1-13).....	163
YOUNG, P.B. - MISSISSIPPI STATE U, STATE COLLEGE, MS	
SPACE SHUTTLE LDEF-A, PASSIVE COSMIC RADIATION DETECTOR (SSLDEF -14).....	152
YOUNG, R.E. - NASA-ARC, MOFFETT FIELD, CA	
GALILEO PROBE, ATMOSPHERIC STRUCTURE (JOP -02).....	126
UARS-1, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-1 -17).....	173
UARS-2, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE (UARS-2 -17).....	178
YUNG, Y.L. - CALIF INST OF TECH, PASADENA, CA	
GALILEO ORBITER, PHOTOPOLARIMETER RADIOMETER (JOPO -08).....	124
UARS-1, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-1 -14).....	171
UARS-2, GLIMPSE:GLOBAL LIMB PHOTOMETRIC SCANNING EXPERIMENT (UARS-2 -14).....	176
ZAVIENTSEFF, V.T. - NASA-ARC, MOFFETT FIELD, CA	
PIONEER 10, PLASMA (72-012A-13).....	69
PIONEER 11, PLASMA (73-019A-13).....	72
ZIMMERMAN, H. - MPI-EXTRATERA PHYS, GARCHING, FED REP OF GERMANY	
EXOSAT, MEDIUM-ENERGY COSMIC X-RAY PACKAGE (EXOSAT -01).....	118
ZIRIN, H. - CALIF INST OF TECH, PASADENA, CA	
SPACELAB 1, ACTIVE CAVITY RADIOPETER SOLAR IRRADIANCE MONITOR (SPALAB1-04).....	163
ZIRKER, J.B. - SACRAMENTO PEAK OBS, SUNSPOT, NM	
SPACELAB 2, SOLAR MAGNETIC AND VELOCITY FIELD MEASUREMENT SYSTEM (SPALAB2-08).....	166
ZOOK, H.A. - NASA-JSC, HOUSTON, TX	
GALILEO ORBITER, DUST (JOPO -09).....	123
ZUCCARO, D.R. - U OF TEXAS, DALLAS, RICHARDSON, TX	
AE-E, RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA) (75-107A-04).....	13
DYNAMICS EXPLORER-B, ION DRIFT METER (DE-B -06).....	114
DYNAMICS EXPLORER-B, RETARDING POTENTIAL ANALYZER (DE-B -07).....	113
UARS-1, ION CONVECTION ELECTRODYNAMICS (UARS-1 -06).....	173
UARS-2, ION CONVECTION ELECTRODYNAMICS (UARS-2 -06).....	178
ZUREK, R.W. - NASA-JPL, PASADENA, CA	
UARS-1, RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE (UARS-1 -23).....	176
UARS-2, RADIATIVE-DYNAMIC BALANCES IN THE MESOSPHERE (UARS-2 -23).....	180

APPENDIXES

APPENDIX A - OTHER RELEVANT SPACECRAFT

Spacecraft relevant to the purpose of this report and not included elsewhere are listed in this appendix. Also listed here are missions which were planned to be launched during the reporting period but failed at launch. The spacecraft include those that have been published in earlier reports of this series and now have a status of canceled, failed at launch, or mission being rescoped. Included are essentially dormant spacecraft which are used to provide new science and technology information incorporating ground-based facilities and techniques. In this latter group are the air density studies using air drag effects and ground-based photography, radio beacon receptions, celestial mechanics studies using spacecraft motions and radio transmissions, and laser retroreflector studies. In addition, some spacecraft that were turned off but were still operable in the last report and dropped from this one are listed; it is extremely unlikely these will ever be re-activated. The spacecraft are listed alphabetically by the NSSDC spacecraft common name. Listed with each spacecraft are the sponsoring country and agency, the actual launch date, the NSSDC ID code, and the status. A definition of the terms used in the current status column can be found in Appendix C.

<u>Spacecraft Name</u>	<u>Sponsoring Country and Agency</u>	<u>Launch Date</u>	<u>NSSDC ID</u>	<u>Current Status</u>
AD-A	United States NASA-OSS	12/19/63	63-053A	Air Density Studies
AD-C	United States NASA-OSS	08/08/68	68-066A	Air Density Studies
Apollo 11	United States NASA-OMSF	07/16/69	69-059C	Laser Retroreflector
Apollo 14	United States NASA-OMSF United States NASA-OSS	01/31/71	71-008C	Laser Retroreflector
Apollo 15	United States NASA-OMSF United States NASA-OSS	07/26/71	71-063C	Laser Retroreflector
ATS 5	United States NASA-OSTA	08/12/69	69-069A	Radio Beacon
ATS 6	United States NASA-OSTA	05/30/74	74-039A	*Abandoned 06/30/79
BE-C	United States NASA-OSS	04/29/65	65-032A	Laser Retroreflector
ESA-GEOS 1	International ESA	04/20/77	77-029A	Operational Off 05/29/79
Firewheel	International ESA	05/23/80		†Failed at launch
Firewheel Sub-payload 1	" "	"		"
Firewheel Sub-payload 2	" "	"		"
Firewheel Sub-payload 3	" "	"		"
Firewheel Sub-payload 4	" "	"		"
GEOS 1	United States NASA-OSS	11/06/65	65-089A	Laser Retroreflector
GEOS 2	United States NASA-OSS	01/11/68	68-002A	Laser Retroreflector
IMP-H	United States NASA-OSS	09/23/72	72-073A	*Abandoned 10/31/78
LAGEOS	United States NASA-OSTA	05/04/76	76-039A	Laser Retroreflector
NOAA-B	United States NOAA-NESS United States NASA-OSTA	05/30/80	80-043A	†Failed at launch
NOAA 5	United States NOAA-NESS United States NASA-OSTA	07/29/79	76-077A	*Abandoned 03/01/79
Pioneer 7	United States NASA-OSS	08/17/66	66-075A	Celestial Mechanics
Pioneer 8	United States NASA-OSS	12/13/67	67-123A	Celestial Mechanics
S3-3	United States DOD-USAF	07/08/76	76-065B	*Abandoned 05/15/79

*The spacecraft is unlikely to be re-activated or is now inoperable.

†Used for engineering and test purposes.

‡The spacecraft and experiment descriptions are included in the 'Active' (NOAA-B) and 'Planned' (Firewheel and subpayloads) sections of this report for reference.

APPENDIX B - SPECIAL INVESTIGATORS

B1. Joint IRAS Science Working Group

The Infrared Astronomy Satellite (IRAS), like IUE, does not have individual principal investigators or team leaders associated with each experiment. Operation of the spacecraft is by the Joint IRAS Science Working Group. Members of this Working Group and their affiliation are listed.

B2. The Caravane Collaboration (COS-B)

The gamma-ray astronomy experiment for COS-B was built, operated, and the data analyzed by a collaboration of six European research groups. Group members that have played a significant role in the implementation of the program are listed with their affiliation.

B3. Individual Galileo Investigations

The Orbiter Imaging and Radio Science investigations include individual studies. The individual investigation name, the objectives, and the investigator and his affiliation are listed.

B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release Module (IRM) Scientific Team

The AMPTE/Charge Composition Explorer/Ion Release Module investigations are conducted by an international scientific team. The members of this scientific team and their affiliation are listed. The Co-Principal Investigators are indicated by an asterisk. This team has rights to the data from each investigation on the two missions while the experiment personnel listed in Section 3.3 have rights only to data from their experiment.

B5. Copernicus Guest Investigators and Investigations

Copernicus (OAO 3) was used by a number of special investigators. The investigation name, the guest investigators, and their affiliation are listed in Appendix B5.

B6. International Solar Polar Mission (ISPM) Theoretical and Interdisciplinary Scientists

The names and affiliation of ISPM theoretical and interdisciplinary scientists are listed.

B7. List of NASA-Selected Magsat Investigators

Investigators who use one or both of the magnetometers on Magsat are listed with their investigations.

B1. Joint Infrared Astronomy Satellite (IRAS) Science Working Group

<u>Member</u>	<u>Affiliation</u>
Aumann, H. H.	NASA-Jet Propulsion Laboratory
Beintema, D.	University of Groningen, The Netherlands
Borgman, J.	University of Groningen, The Netherlands
Clegg, P.	Queen Mary College, London University, UK
Dejong, T.	University of Leiden, The Netherlands
Gillette, F.	Kitt Peak National Observatory
Habing, A.	University of Leiden, The Netherlands
Hauser, M.	NASA-Goddard Space Flight Center
Houck, J.	Cornell University
Jennings, R.	University College, London University, UK
Low, F.	University of Arizona
Marsden, P.	University of Leeds, UK
Neugebauer, G.	California Institute of Technology (U.S. Principal Scientist, Co-Chairman)
Pottasch, S.	University of Groningen, The Netherlands
Soifer, T.	California Institute of Technology
Van Duinen, R.	University of Groningen, The Netherlands (European Principal Scientist, Co-Chairman)
Walker, R.	NASA-Ames Research Center

B2. The Caravane Collaboration (COS-B)

<u>Member</u>	<u>Affiliation</u>
Bennett, K.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Bignami, G. F.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Boella, G.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Buccheri, R.	Università di Palermo, Italy
Burger, J. J.	Scientific Projects Department, ESA-ESTEC Noordwijk, The Netherlands
D'Amico, N.	Università di Palermo, Italy
Hermsen, W.	Huygens Laboratorium Leiden, The Netherlands
Kanbach, G.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Koch, L.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Labeyrie, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Lichti, G. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Lust, R.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Masnou, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Mayer-Hasselwander, H. A.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany

B2 concluded

<u>Member</u>	<u>Affiliation</u>
Occhialini, G. P.	Istituto di Scienze Fisiche dell'Università di Milano, Italy
Paul, J. A.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Pinkau, K.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Sacco, B.	Università di Palermo, Italy
Scarsi, L.	Università di Palermo, Italy
Swanenburg, B. N.	Huygens Laboratorium Leiden, The Netherlands
Taylor, B. G.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands
Trendelenburg, E. A.	ESA Headquarters, Paris, France
van de Hulst, H. C.	Huygens Laboratorium Leiden, The Netherlands
Wills, R. D.	Space Science Department, ESA-ESTEC Noordwijk, The Netherlands

B3. INDIVIDUAL GALILEO INVESTIGATIONS

IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Auroral Studies	To search for and investigate Jupiter's auroras; to use auroral imaging to obtain information on the configuration and dynamics of the Jovian magnetosphere; to search for luminous phenomena on the dark sides of the Galilean satellites	Clifford D. Anger University of Calgary/ Canada
Structure and Dynamics of the Jovian Atmosphere	To investigate the physical structure and dynamical regimes of the Jovian atmosphere, including cloud motion, heat transfer, cloud composition and scattering properties, and atmosphere wave motions	Michael J. S. Belton Kitt Peak National Observatory
Geological Histories of the Galilean Satellites	To investigate the geologic histories of the Galilean satellites by photogeologic techniques to determine surface morphology and measure local elevations and height contours, and by the preparation of contour maps and geological maps	Michael H. Carr U.S. Geological Survey

B3 continued

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Dynamics and Satellite Histories	To study dynamics of the upper atmosphere of Jupiter by determining cloud motions and evolution; to synthesize Galileo imagery with previous imagery, including ground-based patrol photography; to study surface histories of the Galilean satellites, particularly by crater density and morphology; and to investigate possibilities to make imaging studies of smaller Jovian satellites and of asteroid targets of opportunity	Clark R. Chapman Planetary Science Institute
Geodetics of the Galilean Satellites	To establish a geodetic net on the Galilean satellites and determine their radii, shapes, and rotational poles; to provide satellite control nets for precision cartography	Merton E. Davies Rand Corporation
Geological Exploration of the Galilean Satellites	To investigate the geology of the Galilean satellites using photogeological techniques, with emphasis on cratering, tectonic processes, and the discovery of new geological processes associated with the presence of icy crusts on the satellites	Ronald Greeley Arizona State University

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Dynamical Properties of the Galilean Satellites	To study the internal structure and past history of the Galilean satellites from dynamical studies of shape and rotation; to investigate impact cratering and chronology; to search for previously undiscovered satellites in the Jovian system	Richard Greenberg Planetary Science Institute
Geology of the Galilean Satellites	To investigate surface morphology and infer geologic histories of the Galilean satellites, with emphasis on impact cratering processes and comparative studies with the terrestrial planets	James W. Head, III Brown University
Photogeology of the Galilean Satellites	To investigate the geology of the Galilean satellites with emphasis on impact cratering processes; to develop a multispectral image processing capability and imaging data library in Europe	Gerhard Neukum Munich University, Federal Republic of Germany
Photometry and Imaging of Jupiter and the Galilean Satellites	To investigate the Jovian atmosphere and cloud properties by multispectral photometry and polarimetry; to study surface composition of the Galilean satellites with emphasis on the role of volatiles; to search for auroral emissions from the interaction of satellite atmospheres with the Jovian magnetosphere	Carl B. Pilcher University of Hawaii

B3 continued

GALILEO IMAGING INVESTIGATIONS

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Jovian Atmospheric Circulation	To investigate the nature of the thermal and dynamical processes responsible for the atmospheric circulation of Jupiter and the ways that these processes are influenced by the structure of the cloud layers	Gerald Schubert University of California, Los Angeles
Imaging, Spectrophotometry, and Polarimetry of the Galilean Satellites and Jupiter	To investigate the surface morphology and spectrophotometric properties of the Galilean satellites; to identify compositional units of the satellites; to obtain photometry of Jovian belts and zones to investigate cloud properties and energy balance; to investigate possibilities for making photo-polarimetric observations of the smaller Jovian satellites	Joseph Veverka Cornell University
Multispectral Radiometric Imaging of Jupiter and the Galilean Satellites	To participate closely in the development of a multispectral radiometric imaging capability for Galileo, including design of the camera system, its calibration, and development of image processing software; to use these multispectral images to study compositional differences on the surfaces of the Galilean satellites and in the atmosphere of Jupiter	John B. Wellman Jet Propulsion Laboratory

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Celestial Mechanics Measurements of Jupiter and Its Satellites	To use closed-loop radiometric data from the Galileo orbiter to: (1) determine the structure of the gravitational fields of Jupiter and the Galilean satellites; (2) determine the relativistic time delay during the solar conjunction of Jupiter; and (3) improve the determination of the orbits of Jupiter and its satellites. Also, to measure the general relativistic redshift in the gravitational field of Jupiter (by using one-way Doppler data)	John D. Anderson Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to measure the vertical pressure and temperature profiles and atmospheric absorptivity on Jupiter, the Jovian ionospheric structure and dynamics, and the plasma environment of the Galilean satellites; to use phase and intensity scintillation data to study atmospheric turbulence and convection on Jupiter; and to investigate the use of bistatic radar techniques to study the surfaces of the Galilean satellites	Von R. Eshleman Stanford University

B3 continued

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Search for Gravitational Radiation	To use high-precision Doppler monitoring during cruise to conduct a systematic search for very low frequency gravitational waves incident on the solar system, to a level of strain amplitude of about $1.E-15$	Frank B. Estabrook Jet Propulsion Laboratory
Jupiter Radio Astronomy	To study relativistic electrons in the Jovian magnetosphere by measuring the integrated radio flux near 400 MHz (using the Probe relay antenna) over a large range in time and geometry	Eric Gerard Meudon Observatory
Microwave Investigation of Jupiter	To use the Probe relay antenna to study the trapped radiation belts of Jupiter and to measure the thermal microwave radiation from the planet with high spatial resolution. Also, to measure the thermal microwave brightness of the Galilean satellites in order to study their surface properties	Samuel Gulkis Jet Propulsion Laboratory

GALILEO RADIO SCIENCE

<u>Investigation Name</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on the neutral atmospheres. For Jupiter, the occultation data determine temperature, pressure, and density profiles down to the 100 mb pressure level. In addition, deviations of the local vertical direction from the predicted value will be determined and used to study zonal wind velocities in the Jovian atmosphere	Arvydas J. Kliore Jet Propulsion Laboratory
Atmospheres and Ionospheres of Jupiter and Its Satellites	To use S-X band occultation techniques to study the atmospheres and ionospheres of Jupiter and the Galilean satellites, with emphasis on ionospheric measurements. In the ionosphere, the occultation data yield electron number density and plasma scale height profiles	Gunnar Lindal Jet Propulsion Laboratory
Radio Scintillation in the Jovian Atmosphere	To use spacecraft radio scintillations to measure and study turbulence in the Jovian atmosphere, and electron density irregularities, magnetic field direction, and winds in the Jovian ionosphere. Also, where possible, to take similar measurements of the Galilean satellites	Richard Woo Jet Propulsion Laboratory

B4. AMPTE/Charge Composition Explorer (CCE)/Ion Release
Module (IRM) Scientific Team

<u>Member</u>	<u>Affiliation</u>
Bostrom, C. O. Foppl, H.	Applied Physics Laboratory Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Gloeckler, G. *Haerendel, G.	University of Maryland Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Hausler, B.	Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
*Krimigis, S. M. McEntire, R. W. Paschmann, G.	Applied Physics Laboratory Applied Physics Laboratory Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany
Shelley, E. G. Valenzuela, A.	Lockheed Palo Alto Research Laboratory Max-Planck-Institut für Extraterrestrische Physik, Garching bei München Federal Republic of Germany

B5. Copernicus Guest Investigators and Investigations

Study of the Nature of Shells in Be Stars

G. J. Peters, University of Southern California

Study of Circumstellar Shells and Stellar Wind Variability in Be Stars and OB Supergiants

T. P. Snow, University of Colorado

Search for Coronal Features or Circumstellar Cloud Around Sirius B

M. P. Savedoff, University of Rochester

Oscillator Strengths for NI and OI

D. C. Morton, Anglo-Australian Observatory

Ultraviolet and Visible-Wavelength Observations of Spectral Variations in the Mass-Losing Be Star 59 Cygni

T. P. Snow, University of Colorado, et al

A Survey of Interstellar Magnesium in the Directions of A and B Stars Within 100 Parsecs

R. E. Stencel, Y. Kondo, and E. J. Weiler, GSFC and NASA Headquarters

Search for Variability in the X-Ray Emission of the BL LAC Object PKS 0548-322

C. S. Bowyer and K. O. Mason, University of California, Berkeley

Spectral Variability of Accreting Degenerate Dwarfs

C. S. Bowyer, K. O. Mason, D. Lamb, and G. Brandvardi, University of California, Berkeley

Search for Interstellar Boron

Meneguzzi, Centre d'Etudes Nucléaires de Saclay, France

Observation of Hot Companions of Mira Variables

H. M. Johnson, Lockheed Missiles and Space Co.

A Search for Interstellar SiO in Diffuse Clouds

T. P. Snow, University of Colorado

Interstellar Observations of OB Associations with the Copernicus Satellite

J. M. Shull, University of Colorado

Velocity Structure in H₂ Lines Toward Pi Aquari

T. P. Snow, University of Colorado

Simultaneous In-Eclipse UV Observations of Early-Type Eclipsing Binary Stars

D. D. Meisal and C. Mees, State University of Arts and Science,
Genee , New York

B5 continued

Doppler Line Profile Measurement of the Jovian Lyman Alpha Emission
S. K. Atreva et al, University of Michigan

Search for Weak Interstellar Lines (O IV, NV, BIII)
D. C. Morton, Anglo-Australian Observatory, Australia

Extension of the D/H Study Toward Hot Stars
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche
Scientifique, France

High Velocity Stellar Winds in HI
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche
Scientifique, France

High Velocity Gas in the Vicinity of Iota Orionis
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche
Scientifique, France

Study of Argon in High Velocity Gas
C. Laurent and A. Vidal-Madjar, Centre National de la Recherche
Scientifique, France

Observations of Rotationally Excited HD and Search for Interstellar HCl toward
Zeta Ophiuchi
M. Jura, University of California, Los Angeles

Observations of Interstellar C₂
B. Lutz, Lowell Observatory, W. H. Smith, Washington University,
and T. P. Snow, University of Colorado

Atmospheric Density Measurements
R. L. White, The Charles Stark Draper Lab., Inc.

Search for OVI in 29 CMs and Study of Far UV, Red-Shifted Lines in Three Stars
D. C. Morton, Anglo-Australian Observatory, Australia

Survey of Interstellar CI and CO
M. A. Jura, University of California, Los Angeles

UV Observations of an Interstellar Cloud with Anomalous Depletions
P. C. Frisch, University of Chicago

Abundance Patterns in HII Regions
J. Silk, University of California, Berkeley, and D. York, Princeton
University

Depletion of Fluorine in Interstellar Gas
D. York, Princeton University, and T. P. Snow, University of Colorado

Observation of Lyman Alpha from the Algol Binary System

F. B. Wood and K.-Y. Chen, University of Florida, Gainesville

A Search for Fe III Shell Lines in the Spectra of the Pole-On Be Stars 31

Peg and Omega CMa

G. J. Peters, University of Southern California

Observations of Selected Emission Lines in Beta Lyrae at Various Phases of Its 12.9-Day Period

M. Plavec, University of California, Los Angeles

Scanning of Selected Shell Absorption Lines in Phi Persei at Various Phases of Its 126.0-Day Period

M. Plavec, University of California, Los Angeles

Search for Interstellar H₂O

T. P. Snow, University of Colorado, and W. H. Smith, Washington University

An UV Survey of Be Stars (with Ground-Based Observations)

J. M. Marlborough, University of Western Ontario; A. Slettebak, Ohio Wesleyan University; G. Spear, California State College, Sonoma; G. Peters, University of Southern California; and T. P. Snow, University of Colorado

An Attempt to Detect Forbidden Lines of CIII from Interstellar Gas

L. M. Hobbs, University of Chicago and D. York, Princeton University

Study of Refractory Element Abundances in High Velocity Interstellar Gas

L. M. Hobbs, University of Chicago and D. York, Princeton University

A Search for Variability in the UV Spectrum of Pi Aquari

G. J. Peters, University of Southern California

The Profile and Period of the 4.8-Hour X-Ray Modulation of Cyg. X-3

C. S. Bowyer and K. O. Mason, University of California, Berkeley

Long-Term X-Ray Observations of Systems with Unusual Opacities

C. S. Bowyer and P. A. Charles, University of California, Berkeley

**B6. International Solar Polar Mission (ISPM)
Theoretical and Interdisciplinary Scientists**

<u>Member</u>	<u>Affiliation</u>
A. Barnes	NASA/Ames Research Center
J. C. Brandt	NASA/Goddard Space Flight Center
L. A. Fisk	University of New Hampshire
J. R. Jokipii	University of Arizona
J. Lemaire	Institute d'Aeronomie Spatiale de Belgique, Belgium
G. Noci	Arcetri Observatory, Italy
C. P. Sonett	University of Arizona

B7. LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Spherical Harmonic Representation of the Main Geomagnetic Field for World Charting and Investigation of Some Fundamental Problems of Physics and Geophysics	Produce an accurate model of the main geomagnetic field, together with reliable estimates of the accuracy of coefficients	David R. Barraclough Institute of Geological Sciences/United Kingdom
Investigation of Antarctic Crust and Upper Mantle Using Magsat and Other Geophysical Data	Using Magsat data, devise a general framework for the structure of Antarctica into which more specific and local measurements can be integrated	Charles R. Bentley University of Wisconsin
Geomagnetic Field Forecasting and Fluid Dynamics of the Core	To adjust the Gauss coefficients of the Magsat main field model to satisfy dynamic constraints; to use Magsat data to test the ability to forecast the structure of the internal geomagnetic field	Edward R. Benton University of Colorado
Magsat for Geomagnetic Studies in the Indian Region	Prepare a regional geomagnetic reference field and magnetic anomaly maps over the Indian and neighboring regions; to gain a clearer understanding of secondary effect features and the variability of the dawn/dusk field; to study in detail the equatorial electrojet and transie variations	B. N. Bhargava Indian Institute for Geomagnetism/India
Satellite Magnetic and Gravity Investigation of the Eastern Indian Ocean	Produce magnetic anomaly maps of the Indian Ocean; quantify the comparison between Magsat data and GEOS 3 gravity data; interpret the magnetic data using ancillary data	Robert F. Brammer The Analytic Sciences Corporation

B7 continued

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Studies of High Latitude Current Systems Using Magsat Vector Data	Understand the physical processes which control high latitude current systems; improve the confidence level in studies of internal field sources	J. Ronald Burrows National Research Council of Canada/ Canada
Use of Magsat Anomaly Data for Crustal Structure and Mineral Resources in the U.S. Midcontinent	To analyze Magsat anomaly data to synthesize a total geologic model and interpret crustal geology in the midcontinent region; to contribute to the interpretation and calculation of the depth of the Curie Isotherm	Robert S. Carmichael University of Iowa
The Reduction, Verification and Interpretation of Magsat Magnetic Data Over Canada	Select quiet-time data; correct Magsat data for disturbance fields and apply the routines; compare Magsat and vector airborne data; combine magnetic anomaly data from Magsat and aircraft; produce regional interpretations relating to Earth structure	Richard L. Coles Energy, Mines and Resources Canada/Canada
Magsat Data, the Regional Magnetic Field, and the Crustal Structure of Australia and Antarctica	Incorporate Magsat data into regional magnetic field charts to improve their accuracy; determine if differences exist in temperature-depth curves for different tectonic areas; study the boundaries between major tectonic blocks, and between continental and oceanic crust; determine Curie point depth and crustal magnetization for Antarctica	James C. Cooley Bureau of Mineral Resources/Australia

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Proposal from Japanese National Team for Magsat Project	Analysis of the regional geomagnetic field around Japan and Japanese Antarctica; study the contributions to magnetic variations by electric currents and hydromagnetic waves in and above the ionosphere	Naoshi Fukushima Geophysics Research Laboratory/Japan
Crustal Structures Under the Active Volcanic Areas of Central and Eastern Mediterranean	Calculate the depth of the Curie temperature for the Mediterranean area, and relate to areas of volcanic activity; investigate the Italian and Tyrrhenian anomaly	Paolo Gasparini Osservatorio Vesuviano/ Italy
Geomagnetic Field Modeling by Optimal Recursive Filtering	To produce a state vector to predict field values for several years beyond the Magsat model; to obtain optimal estimates of field values throughout the 1900-1980 period	Bruce P. Gibbs Business and Technological Systems, Incorporated
Magnetic Anomaly of Bangui	Improve the explanation of the cause of the Bangui anomaly, using Magsat data, other magnetic data, gravity, seismic, and heat flow data	M. R. Godivier Office de la Recherche Scientifique et Technique Outre-Mer/ France
The Mineralogy of Global Magnetic Anomalies	To interpret Magsat data to locate mafic and ultramafic source rocks and lineament expressions of anomalies that can be correlated with crustal or upper mantle depths; to determine mineral stabilities pertinent to magnetic anomalies to determine the magnetic properties of metamorphic rocks	Stephen E. Haggerty University of Massachusetts

B7 continued

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Identification of the Magnetic Signatures of Lithostratigraphic and Structural Elements in the Canadian Shield Using Magnetic Anomalies and Data from Individual Tracks from Magsat	Confirm and extend the model for the crust/mantle magnetization	D. H. Hall University of Manitoba/ Canada
Investigations of Medium Wavelength Magnetic Anomalies in the Eastern Pacific Using Magsat Data	To determine the relationship of magnetic anomalies with surface geological features	Christopher G.A. Harrison University of Miami
An Investigation of Magsat and Complementary Data Emphasizing Precambrian Shields and Adjacent Areas of West Africa and South America	To determine the Magsat magnetic signatures of various tectonic provinces; to determine the geological associations of these signatures; to synthesize Magsat and other data with mineral resources data globally	David A. Hastings Technicolor Graphic Services, Incorporated
Electromagnetic Deep-Probing (100-1000 km) of the Earth's Interior from Artificial Satellites: Constraints on the Regional Emplacement of Crustal Resources	To evaluate the applicability of electromagnetic deep-sounding experiments using natural sources in the magnetosphere	John F. Hermance Brown University

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Application of Magsat to Lithospheric Modeling in South America: Part I-- Processing and Interpretation of Magnetic and Gravity Anomaly Data	Magnetic anomalies will be used to develop lithospheric models to determine the properties of principal tectonic features; magnetic anomalies of South America will be correlated with those of adjacent continental areas to attempt to reconstruct Gondwanaland (see Keller, p. B-22)	William J. Hinze Purdue University
An Investigation of the Crustal Properties of Australia and Surrounding Regions Derived from Interpretation of Magsat Anomaly Field Data	Produce a map of surface magnetization to understand the evolution of the crust and to aid in mineral exploration	B. David Johnson Macquarie University/ Australia
Comparison of Storm-time Changes of Geomagnetic Field at Ground and at Magsat Altitudes	To differentiate between ionospheric and magnetospheric origin for fluctuations in individual storms	R. P. Kane Instituto de Pesquisas Espaciais/Brazil
Analysis of Magsat and Surface Data of the Indian Region	To develop a field model through numerical integration and the non-linear least squares technique; to study geomagnetic anomaly data in conjunction with allied geophysical data for assessment of natural resource and tectonic features	K. L. Khosla Surveyor General/India

B7 continued

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Application of Magsat to Lithospheric Modeling in South America Part II-- Synthesis of Geologic and Seismic Data for Development of Integrated Crustal Models	To provide models of the seismic velocity structure of the lithosphere (see Hinze, p. B-21)	G. R. Keller University of Texas at El Paso
Investigation of the Effects of External Current Systems on the Magsat Data Utilizing Grid Cell Modeling Techniques	Apply a modeling procedure to the vector Magsat data in order to separate the terrestrial component from that due to extraterrestrial sources	David M. Klumpar University of Texas at Dallas
Analysis of Intermediate-Wavelength Magnetic Anomalies Over the Oceans in Magsat and Sea Surface Data	To determine the distribution of intermediate wavelength magnetic anomalies of lithospheric origin in the oceans; the extent to which Magsat describes the distribution, and to determine the cause of these anomalies	John L. LaBrecque Lamont-Doherty Geological Observatory
Magsat Investigations Consortium	Reduce Magsat vector data for a global analytic field model and constant altitude field maps; compare Magsat data to regional studies; study features of the core field; correlate globally and regionally Magsat and gravimetric data	Jean-Louis le Mouel Institut de Physique du Globe de Paris/France

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Magsat Anomaly Field Inversion and Interpretation for the U.S.	To construct a regional crustal temperature/heat flow model based on a developed magnetization model, heat flow/production data, and spectral estimates of the Curie depth	Michael A. Mayhew Business and Technological Systems, Incorporated
Equivalent Source Modeling of the Main Field Using Magsat Data	To model the core field; compute equivalent spherical harmonic coefficients for comparison with other field models; to examine the spectral content of the core field	Michael A. Mayhew Business and Technological Systems, Incorporated
Structure, Composition, and Thermal State of the Crust in Brazil	Construct preliminary crustal models in the Brazilian territory; point out possible variations in crustal structure among different geological provinces	Igor I. Gil Pacca Universidade de Sao Paulo/Brazil
A Proposal for the Investigation of Magsat and Triad Magnetometer Data to Provide Corrective Information on High-Latitude External Fields	Identify and evaluate high-latitude external fields from the comparison of data acquired by the Magsat and Triad spacecraft which can be used to improve geomagnetic field models	Thomas A. Potemra Johns Hopkins University
Improved Definition of Crustal Magnetic Anomalies in Magsat Data	Develop an improved method for the identification of magnetic anomalies of crustal origin in satellite data by better defining and removing the most persistent external field effects	Robert D. Regan Phoenix Corporation

B7 concluded

LIST OF NASA-SELECTED MAGSAT INVESTIGATORS

<u>Investigation Title</u>	<u>Objectives</u>	<u>Investigator and Affiliation</u>
Study of Enhanced Errors and of the Secular Magnetic Variation Using Magsat Models and Those Derived in POGO Surveys	To estimate the secular variation over the period 1965-80 by removing mathematical instability based upon scalar field intensity alone	David P. Stern NASA/Goddard Space Flight Center
Proposal to Analyze the Magnetic Anomaly Maps from Magsat Over Portions of the Canadian and Other Shields	Examination of the expected difference between the Grenville and Superior provinces	David W. Strangway University of Toronto/ Canada
Compatibility Study of the Magsat Data and Aeromagnetic Data in the Eastern Piedmont of the U.S.	Evaluate the compatibility between the Magsat and aeromagnetic data in the Eastern North Carolina Piedmont	Ihn Jae Won North Carolina State University

APPENDIX C - DEFINITIONS

Certain words and phrases are used in this report in a precise and specific sense. These terms are defined here to clarify the intended meaning.

- Active -** A spacecraft/experiment pertinent to this report that has been launched and was reported to NSSDC to have either a "normal" or "partial" status.
- Apoapsis -** The distance from the center or the altitude from the surface of the reference body to the furthest orbit point. Distance is used in astronomical units (AU) for heliocentric orbits and altitude is used in kilometers (km) for all other orbits.
- Approved Mission -** A spacecraft mission has been approved and funding is or will be available for it.
- Brief Description -** A concise summary of the spacecraft mission, specifically outlining overall mission objectives and the scientific studies being performed. Also, a concise summary of experiment purposes and instrument characteristics, emphasizing those relevant to scientific use of the resulting data.
- Canceled Mission -** A mission was canceled and no funds are expected to become available to carry it out.
- Failed Mission -** A spacecraft failed to achieve a suitable orbit, or the experiments failed to function after achieving orbit.
- Inclination -** The angle (in degrees) between the satellite orbital plane and the equatorial plane of the primary gravitational body. For satellites with heliocentric orbits, the ecliptic plane is used in lieu of the equatorial plane.
- Inoperable -** A spacecraft/experiment can no longer produce useful scientific data due to: malfunction or failure of the spacecraft/experiment systems or critical parts thereof; completion of the spacecraft trajectory in which useful measurements could be taken; or discontinuation of network support (tracking, command, and telemetry).
- Normal -** Spacecraft/experiment systems are capable of working so that the data would be suitable for all planned scientific studies for the spacecraft/experiments when they are turned on and the data are recorded.

- NSSDC ID Code -** An identification code used in the NSSDC information system. In this system, each successfully launched spacecraft/experiment is assigned a code based on the launch sequence of the spacecraft. Subsequent to 1962, this code (e.g., 72-012A for the spacecraft Pioneer 10) corresponds to the COSPAR international designation. The experiment codes are based on the spacecraft code. For example, the experiments carried aboard the spacecraft 73-019A (Pioneer 11) are numbered 73-019A-01, 73-019A-02, etc. Each prelaunch spacecraft and experiment is also assigned an NSSDC ID code based on the name of the spacecraft. For example, the approved NASA launch, Solar Mesosphere Explorer, would be coded SME. The experiments to be carried aboard this spacecraft would be coded SME -01, SME -02, etc. Once a spacecraft is launched, its prelaunch designation is changed to a postlaunch one; e.g., Pioneer-G, which was launched April 6, 1973, was given the NSSDC ID code of 73-019A, corresponding to the launch spacecraft common name, Pioneer 11.
- Orbit Type -** A word or phrase indicating the most important phase of the trajectory of a given spacecraft mission. The orbit type may be geocentric, geocentric commensurate, selenocentric, heliocentric, Hermocentric (Mercury), Cythereanocentric (Venus), Aerocentric (Mars), Zenocentric (Jupiter), Chronocentric (Saturn), lunar lander, Venus lander, Mars lander, Jupiter lander, lunar flyby, Venus flyby, Mars flyby, Mercury flyby, Jupiter flyby, Venus probe, or Jupiter probe.
- Partial -** Spacecraft/experiment systems are working, but not all are working as well as the design required. If the spacecraft/experiments were turned on and the data recorded, the data would be suitable for only a portion of the planned scientific studies.
- Periapsis -** The distance from the center or the altitude from the surface of the reference body to the nearest orbit point. Distance is used in astronomical units (AU) for heliocentric orbits and altitude is used in kilometers (km) for all other orbits.
- Planned-** A spacecraft mission was last reported to NSSDC as either "approved" or "proposed." Also indicates an experiment is expected to fly on a planned spacecraft mission.
- Proposed Mission -** Spacecraft design and experiments have been selected but funding has not been approved.
- Standard -** Data that can be processed and made available to the experimenters are being acquired at the rate or percentage of coverage required to accomplish the planned studies.

- Substandard -** Data that can be processed and made available to the experimenters are not being acquired at the rate or percentage of coverage required to continue all planned studies.
- Unknown -** Information is either unknown or unavailable at NSSDC.
- Zero -** Applied to data acquisition rates, indicates a spacecraft/experiment has been turned off except for state of health measurements and is in a standby condition, capable of being returned to its previous status; or, a spacecraft/experiment has failed and is incapable of returning additional data.

APPENDIX D - ABBREVIATIONS AND ACRONYMS

A	angstrom
ABMA	Army Ballistic Missile Agency
AC	alternating current
ACAD	academy
ACIC	Aeronautical Chart and Information Center (now Defense Mapping Agency Aerospace Center)
ACS	attitude control system
AD	Dual Air Density Explorer (satellite, NASA)
A/D	analog to digital
AE	Atmosphere Explorer (satellite, NASA)
AEC	Atomic Energy Commission
AEM	Atmospheric Explorer Mission
AEROPROPUL	aeropropulsion
AEROSAT	Aeronautical Satellite (NASA-ESA)
AEROSP	aerospace
AFB	Air Force Base
AFCLR	Air Force Cambridge Research Laboratories (now US Air Force Geophysics Laboratory)
AFGL	Air Force Geophysics Laboratory
AFO	Announcements of Flight Opportunities
AFSC	Air Force Systems Command
AGC	automatic gain control
AGCY	agency
AH	amp hours
AIMP	Anchored Interplanetary Monitoring Platform (satellite, NASA)
AK	Alaska
AL	Alabama
ALOSYN	Alouette topside sounder synoptic (data)
ALPO	Apollo Lunar Polar Orbiter (satellite, NASA); Association of Lunar and Planetary Observers
ALS	advanced limb scanner
ALSEP	Apollo Lunar Surface Experiments Package (NASA)
ALT	altitude
AM	amplitude modulation
A.M.	ante meridiem
AMP	ampere
AMPS	Atmosphere, Magnetosphere, and Plasmas in Space (satellite, NASA)
AMS	Army Map Service (now Defense Mapping Agency Topographic Center)
AMSAT	Radio Amateur Satellite Corporation
AMU	atomic mass unit; astronaut maneuvering unit
ANIK	Canadian Telecommunications Satellite; also referred to as TELESAT
ANNA	Army, Navy, NASA, Air Force (geodetic satellite)
ANS	Astronomical Netherlands Satellite (The Netherlands-NASA)
AOSO	Advanced Orbiting Solar Observatory
AP	magnetic activity index Ap
APL	Applied Physics Laboratory of Johns Hopkins University
APPL	application
APT	automatic picture transmission
A/R	acquisition/reference

AR	Arkansas
ARC	Ames Research Center (NASA)
ARC-MIN	arc-minute
ARC-S	arc-second
ARDC	Air Research and Development Command (now AFSC)
ARPA	Advanced Research Projects Agency
ARSP	Aerospace Research Support Program (USAF)
AS+E	American Science & Engineering, Inc.
ASOS	antimony-sulfide oxy-sulfide
ASTP	Apollo-Soyuz Test Project (USSR-NASA)
ASTROPHYS	astrophysics
AT	atomic
ATCOS	Atmospheric Composition Satellite (NASA)
ATDA	Alternate Target Docking Adapter
ATFE	advanced thermal control flight experiment
ATM	Apollo Telescope Mount; atmosphere
ATMOS	Atmospheric Trace Molecules Observed by Spectroscopy
ATS	Applications Technology Satellite (NASA)
AT+T	American Telephone & Telegraph Corp.
ATU	Adaptive Tracker Unit
AU	astronomical unit
AUST	Australia
AVCS	advanced vidicon camera system
AVG	average
AVHRR	advanced very high resolution radiometer
AWRE	Atomic Weapons Research Establishment (Australia)
AXIS	atmospheric X-ray imaging spectrometer
AZ	Arizona
BAF	barium fluoride
BCD	binary coded decimal
BCG	ballistocardiogram
BE	Beacon Explorer (satellite, NASA); beryllium
BEV	billion electron volts
BIC	barium iodide cloud
BIMS	Bennett ion mass spectrometer
BIOS	Biological Satellite (NASA)
BPI	bits per inch
BPS	bits per second
BSU	basic sounding unit
BTL	Bell Telephone Laboratories
BUV	backscatter ultraviolet
BV	billion volts
B/W	black and white
BWF	Bundesminister fur Wissenschaftliche Forschung (Fed Rep of Germany)
CA	California
CAF	calcium fluoride
CAL	calorie

CAL TECH	California Institute of Technology
CALSPHERE	calibration sphere
CAMEO	Chemically Active Materials Ejected In Orbit (satellite, NASA)
CAN	Canada
CAS	Cooperative Applications Satellite (France-NASA)
CAV	composite analog video
CBE	controlled beam emissions
CCD	charged-coupled device
CCE	Charge Composition Explorer (satellite, NASA)
CCP	charged and current probes
CD	cadmium; crystal detector
CDA	command and data acquisition (station)
CDC	Control Data Corporation
C+DH	control and data handling
CDHP	Command and Data Handling Package
CDS	cadmium sulfide
CEM	channel electron multipliers
CENS	Centre d'Etudes Nucleaires de Saclay (France)
CEP	Cylindrical Electrostatic Probe
CFA	crossed electric and magnetic field analyzer
CHASE	coronal helium abundance Spacelab experiment
CHEM	charge and energy mass spectrometer; chemical
CI	co-investigator
CID	cathode imaging detector
CM	command module; centimeter
CMD	command
CMS	composition measurement system
CN	cellulose nitrate
CNES	Centre National d'Etudes Spatiales (France)
CNET	Centre National d'Etudes des Telecommunications (France)
CNRS	Centre National de la Recherche Scientifique (France)
CO	Colorado
COBE	Cosmic Background Explorer (satellite, NASA)
COMM	commission
COMSAT	Communications Satellite Corporation
CONIE	Comision Nacional de Investigacion del Espacio (Spain)
CORSA	Cosmic-Ray Satellite (Japan)
COS	Cosmic-Ray Satellite (ESA); cosmic
COSPAR	Committee on Space Research
COUNC	council
CO2	carbon dioxide
CPA	comprehensive particle analysis
CPS	cycles per second
CPT	charged-particle telescope
CPU	central processing unit
CRC	Communications Research Centre (Canada)
CRIE	cosmic-ray isotope experiment
CRPL	Central Radio Propagation Laboratories (later ITSA; formerly part of ESSA; now NOAA/ERL)
CRREL	Cold Region Research & Engineering Laboratories
CRS	Commission for Space Research (Italy)
CRT	cathode ray tube

C-4

CSI	cesium iodide
CSM	command service module
CSTE	cesium telluride
CT	Connecticut
CTR	center
CTS	Canadian Telecommunications Satellite
CULER	cryogenic upper-atmosphere limb emission radiometer
CVF	circular variable filter
CXX	white light coronagraph/X-ray XUV telescope
CZCS	coastal zone ocean color scanner
D	day
DAC	data acquisition camera
DADE	Dual Air Density Explorer (satellite, NASA)
DAN	Danish
DAPP	Defense Acquisition and Processing Program (DOD)
DASA	Defense Atomic Support Agency
DATS	Despun Antenna Test Satellite (DOD)
DB	decibel
DC	direct current; District of Columbia
DCLS	data collection and location system
DCP	data collection platform
DCS	direct couple system; data collection system
DDM	drop dynamics module
DE	Dynamics Explorer (satellite, NASA); Delaware
DEF	defense
DEG	degree
DENPA	Density Phenomena (satellite, Japan)
DEV	development
DFI	development flight instrumentation
DFVLR	Deutsche Forschungs-und Versuchanstalt fur Luft-und Raumfahrt; (Research Laboratory for Aeronautics and Astronautics, Fed Rep of Germany)
DIAL/MIKA	Diament Allemande/Mini Kapsel (satellite, Fed Rep of Germany-France)
DIAL/WIKA	Diament Allemande/Wissenschaftliche Kapsel (satellite, Fed Rep of Germany)
DIAM	diameter
DIAPO	Diapason (satellite, France)
DIRBE	diffuse infrared background experiment
DIT	Drexel Institute of Technology (now Drexel University)
DMA	Defense Mapping Agency
DMAAC	Defense Mapping Agency Aerospace Center
DMATC	Defense Mapping Agency Topographic Center
DME	Direct Measurements Explorer (satellite, NASA)
DMR	differential microwave radiometer
DMSP	Defense Military Satellite Program (DOD)
DMU	IUE data multiplex unit
DOD	Department of Defense
DODGE	Department of Defense Gravity Experiment (satellite, DOD)

DPL VLF Doppler Propagation
 DPU data processing unit
 DRID direct readout image dissector (camera system)
 DRIR direct readout infrared radiometer
 DRTE Defense Research Telecommunications Establishment (now CRC)
 DSAP Defense System Applications Program (DOD)
 DSCS Defense Satellite Communications System (DOD)
 DSIR Department of Science and Industrial Research (England)
 DSN Deep Space Network
 DUS data utilization stations
 DV digital video
 DYN dynamic

E energy; east
 EASEP Early Apollo Scientific Experiment Package
 EBS electron beam system
 ECG electrocardiograph
 ECS Experimental Communications Satellite (NASA)
 EDS Environmental Data Service (NOAA)
 EEG electroencephalogram
 EFI electric field instrument
 EGO Eccentric (Orbiting) Geophysical Observatory (satellite, NASA)
 EGRS Engineers Satellite (DOD)
 EICS energetic ion composition spectrometer
 EIRP effective isotropic radiative power
 EL electric (data camera carried on Apollo)
 ELDO European Launch Development Organization (ESA)
 ELEC electric
 ELECTR electronics
 ELF extremely low frequency
 ELMS Earth Limb Measurement Satellite (NASA-USAF)
 EME environmental measurement experiment
 EMG electromyogram
 EMR Electromechanical Research (Company, England)
 ENVIRON environment; environmental
 EOF end of file
 EOG electro-oculogram
 EOGO Eccentric Orbiting Geophysical Observatory (satellite, NASA)
 EOS Earth Observation Satellite (NASA)
 EPE Energetic Particle Explorer (satellite, NASA)
 E/Q energy per unit charge
 ERB Earth radiation budget (experiment)
 ERBI Earth radiation budget instrument
 ERBS Earth Radiation Budget Satellite (NASA)
 ERBSS Earth Radiation Budget Satellite system
 ERDC Earth Resources Data Center
 ERGS Earth Geodetic Satellite (USAF)
 ERL Environmental Research Laboratory (NOAA)
 EROS Earth Resources Observation Service
 ERS Environmental Research Satellite (USAF)

ERT	extended range telescope
ERTS	Earth Resources Technology Satellite (NASA)
ESA	European Space Agency; electrostatic analyzer
ESA-GEOS	Geostationary Earth-Orbiting Satellite (ESA)
ESM	equipment support module
ESMR	electrically scanning microwave radiometer
ESOC	European Space Operations Centre (ESA)
ESP	energy spectrum of particles
ESRO	European Space Research Organization (now ESA)
ESSA	Environmental Science Services Administration (now NOAA)
ESTABL	establishment
ESTEC	European Space Technology Center (ESA)
ETR	Eastern Test Range (also referred to as Cape Canaveral)
ETS	Engineering Test Satellite
EU	europium
EUV	extreme ultraviolet
EUVE	Extreme Ultraviolet Explorer (satellite, NASA)
EUVS	extreme ultraviolet spectrophotometer
EV	electron volt
EVA	extravehicular activity
EVM	Earth-viewing (equipment) module
EXOS	Exospheric Satellite (Japan)
EXOSAT	European X-ray Observation Satellite (ESA)
EXTRATERR	extraterrestrial
FARO	Flare-Activated Radiobiological Observatory (satellite, DOD)
FAUST	far ultraviolet space telescope
FE	iron
FES	fluid experiment systems
FGS	fine guide system
FIRAS	far infrared absolute spectrophotometer
FL	Florida
FLT-SAT	Fleet Satellite (USN)
FM	frequency modulation
FMDM	flex multiplexer/demultiplexer
FMRT	final meteorological radiation tape
FOC	faint object camera
FOF2	frequency of F2
FOS	faint object spectrograph
FOUND	foundation
FOV	field of view
FPEG	fast pulse electron gun
FPI	Fabry-Perot interferometer
FPR	flat plate radiometer
FR	French Research (satellite, France)
FRC	Flight Research Center (NASA)
FRG	Federal Republic of Germany
FS	frequency scatterometer
FSC	FLTSATCOM (satellite, USN-USAF)
FSK	frequency shift key
FWHM	full width at half maximum
FWS	filter wedge spectrometer

G	Earth gravity; geometry factor; gram
GA	Georgia
GAC	global area coverage
GARP	Global Atmospheric Research Program
GCA	Geophysics Corporation of America
GE	General Electric (Company)
.GE.	greater than or equal to
GEMS	Geostationary European Meteorological Satellite (ESA)
GEOPHYS	geophysical
GEOS	Geodetic Earth-Orbiting Satellite (NASA); Geostationary Earth-Orbiting Satellite (ESA)
GES FUR WELTRAUM- FORSCH	Gesellschaft fur Weltraumforschung (Center for Space Research, Fed Rep of Germany)
G.E.T.	ground elapsed time
GEV	giga electron volts (10^9 ev)
GEX	gas exchange
GGSE	gravity gradient stabilization experiment
GHZ	gigahertz
GISS	Goddard Institute for Space Studies (NASA)
GLIMPSE	global limb photometric scanning experiment
GM	Geiger-Mueller
GMS	Geostationary Meteorological Satellite (Japan)
GMT	Greenwich mean time
GOES	Geosynchronous Operational Environmental Satellite (NASA-NOAA; also called SMS)
GP	Gravitational Redshift Space Probe (NASA)
GPS	global positioning system
GRARR	Goddard Range and Range Rate
GRAVR	Gravitational Redshift Space Probe (NASA)
GRE	ground reconstruction equipment; ground reconstruction electronics
GREB	Galactic Radiation Experiment Background (satellite, USN)
GRI	Groupe de Recherche Ionospherique (France)
GROC	Netherlands Committee for Geophysics and Space Research
GRS	German Research Satellite (NASA-Fed Rep of Germany)
GSD	Grid Sphere Drag (satellite, DOD)
GSE	geocentric solar ecliptic (coordinate system); ground support equipment
GSFC	Goddard Space Flight Center (NASA)
GSM	geocentric solar magnetospheric (coordinate system)
.GT.	greater than
GUGMS	Glavnoye Upravleniye Gidrometeorologicheskoi Sluzhby (Main Administration of the Hydrometeorological Service, USSR)
GV	gigavolt
GVHRR	geosynchronous very high resolution radiometer
H	hour; hydrogen
HAC	half-angle colimator
HALOE	halogen occultation experiment
HAO	High Altitude Observatory

HAPI	high-altitude plasma instrument
HCMM	Heat Capacity Map Mission (satellite, NASA)
HCMR	heat capacity mapping radiometer
HCO	Harvard College Observatory
HDRSS	high data rate storage system
HE	helium
HEAO	High-Energy Astrophysical Observatory (satellite, NASA)
HEOS	High-Eccentricity Earth-Orbiting Satellite (ESA)
HEP	high-energy protons
HEPS	high-energy particle spectrometer
HEPAT	high-energy proton alpha telescope
HET	health, education, telecommunications; high-energy telescope
HETS	high-energy telescope system
HEW	US Dept. of Health, Education and Welfare (now US Dept. of Education)
HF	high frequency
HFE	heat-flow experiment; heat-flow electronics
HG	mercury
HGI2	mercuric iodide
HI	Hawaii
HRDI	high-resolution Doppler imager
H2O	water
HOLE	high ionospheric depletion region
HR	high resolution
HRDI	high-resolution Doppler image
HRIR	high-resolution infrared radiometer
HRIRS	high-resolution infrared radiometer sounder
HRPT	high-resolution picture transmission
HRS	high-resolution spectrograph
HRTS	high-resolution telescope and spectrograph
H.S.	high school
HSP	high-speed photometer
HYDROMET	hydrometeorological
HZ	hertz (cycles per second)
HZE	high-energy particle
IA	instrument assembly; Iowa
IAP	Institute of Atmospheric Physics (USSR)
IBM	International Business Machines (Corporation)
ICBM	intercontinental ballistic missile
ICE	ion convection electrodynamics
ICEX	ice and climate experiment
ICSU	International Council of Scientific Unions
ID	identification; Idaho
IDC	image dissector camera
IDCS	image dissector camera system
IDCSP	Initial (or Interim) Defense Communication Satellite Program (or Project) (DOD)
IDM	ion drift meter
IDSCS	Initial Defense Satellite Communication system (DOD)
IDT	instrument definition team

IE	Ionospheric Explorer (satellite, NASA-NBS)
IEAS	ice evaluation altimeter system
IECM	induced environment contamination monitor
IEF	impedance & electric field
IFOV	instrument field of view
IGRF	International Geomagnetic Reference Field
IGY	International Geophysical Year
IKI	Institute for Space Research (USSR)
IL	Illinois
IME	International Magnetospheric Explorer (satellite, NASA-ESA)
IMP	Interplanetary Monitoring Platform (satellite, NASA)
IMS	International Magnetospheric Study
IN	Indiana
IN.	inch
INDASAT	Indian Scientific Satellite (ISRO-USSR)
INOP	inoperable
INSAT	Indian National Satellite (ISRO-USSR)
INSB	indium/antimony
INST	institute
INTA	Instituto Nacional de Tecnica Aeroespacial (Spain); the National Institute of Aerospace Science
INTASAT	satellite (INTA, Spain)
INTELSAT	International Telecommunications Satellite (NASA-COMSAT)
ION COMP	ionospheric composition
IPA	Institute for Physics of the Atmosphere (SAS)
IPP	imaging photopolarimeter
IPS	instrument pointing system
IQSY	International Quiet Sun Year
IR	infrared
IRAS	Infrared Astronomy Satellite (The Netherlands-NASA-UK)
IRBM	intermediate range ballistic missile
IRIG	Inter-Range Instrumentation Group
IRIS	infrared-interferometer spectrometer; International Investigation Radiation Satellite (NASA-ESA)
IRLS	interrogation, recording, and location system
IRM	Ion Release Module (satellite, NASA)
IRR	infrared radiometry
IRTM	infrared thermal mapping
IRTRN	infrared transmission
ISAMS	improved stratospheric & mesospheric sounder
ISAS	Institute of Space & Aeronautical Science (Japan)
ISEE	International Sun-Earth Explorer (satellite, NASA-ESA)
ISIS	International Satellite for Ionospheric Studies (NASA-Canada)
ISPM	International Solar Polar Mission (ESA)
ISRO	Indian Space Research Organization
ISS	Ionospheric Sounding Satellite (Japan)
ITCZ	intertropical convergence zone
ITE	intersite transportation equipment
ITOS	Improved TIROS Operational Satellite (NOAA)
ITPR	infrared temperature profile radiometer
ITR	incremental tape recorder

ITSA	Institute for Telecommunication of Sciences and Aeronomy (formerly a subdivision of ESSA; now NOAA-ERL)
IU	instrument unit
IUE	International Ultraviolet Explorer (satellite, NASA-UK-ESA)
IUS	intermediate upper stage
IUWDS	International URSIGRAM and World Days Service
IVI	ion velocity instrument
IZMIRAN	Institute of Terrestrial Magnetism and Aeronomy of the Academy of Sciences (USSR)
JHU	Johns Hopkins University
JPL	Jet Propulsion Laboratory (NASA)
JSC	Johnson Space Center (NASA)
KBS	kilobits per second
KEV	kiloelectron volt
KG	kilogram
KHZ	kilohertz
KM	kilometer
KP	magnetic activity index Kp
KPNO	Kitt Peak National Observatory
KS	Kansas
KSC	Kennedy Space Center (NASA)
KY	Kentucky
LA	Los Angeles; Louisiana
LAB	laboratory
LAC	local area coverage
LACATE	lower atmosphere composition and temperature
LAGEOS	Laser Geodetic Earth-Orbiting Satellite (NASA)
LAMMR	large antenna multifrequency microwave radiometer
LANG	Langmuir probe instrument
LAPI	low-altitude plasma instrument
LARC	Langley Research Center (NASA)
LAS	Large Astronomical Satellite (ESA)
LASL	Los Alamos Scientific Laboratory
LCS	Lincoln Calibration Sphere
LDEF	long-duration exposure facility
.LE.	less than or equal to
LED	light-emitting diode
LEE	low-energy electron
LEM	lunar excursion module
LEMMS	low-energy magnetospheric measurement system
LEPAT	low-energy proton alpha telescope
LEPEDEA	low-energy proton and electron differential energy analyzer
LERC	Lewis Research Center (NASA)
LES	Lincoln Experimental Satellite (DOD)
LET	low-energy telescope

LETS	low-energy telescope system
LF	light fine; low frequency
LI	lithium
LIF	lithium fluoride
LL	Lincoln Laboratory (MIT)
LM	lunar module
LMD	Laboratory of Meteorological Dynamics
LOFTI	Low-Frequency Trans-Ionospheric (satellite, USN-SRL)
LOGACS	Low-G Accelerometer Calibration System (USAF)
LP	Langmuir probe
LPSP	Laboratoire de Physique Stellaire et Planetaire (CNRS)
LR	labeled release; low resolution
LRIR	limb radiance inversion radiometer; low-resolution infrared radiometer
LRL	Lunar Receiving Laboratory (JSC)
LRV	lunar roving vehicle
LS	light smoothed
LST	Large Space Telescope (satellite, NASA; now called Space Telescope)
.LT.	less than
LTV	Ling-Temco-Vought (Company)
M	meter; milli- (prefix)
MA	Mercury Atlas; Massachusetts
MAG	magnetic field
MAG-A	magnetometer A
MAG-B	magnetometer B
MAPS	measurement of air pollution from satellite
MARENTS	Modified Advanced Research Environmental Test Satellite (USAF)
MAS	Ministry of Aviation Supply (UK)
MASC	magnetic attitude spin coil
MATER	material
MAWD	Mars atmosphere water detection
MB	millibar
MC	megacycle
MCC	Mission Control Center
MD	Maryland
ME	Maine
M/E	mass to charge ratio
MED	medicine; medical
MEPA	medium-energy particle analyzer
MEPS	medium-energy particle spectrometer
MESA	miniature electrostatic accelerometer
METEC	Meteoroid Technology (satellite, NASA)
METEOSAT	Meteorological Satellite (ESA)
MEV	million electron volts
MG	magnesium; milligram
MGF	fluxgate magnetometer
MHZ	megahertz
MI	Michigan
MIDAS	Missile Defense Alarm System (USAF)

MIN	minute
MIT	Massachusetts Institute of Technology
MJS	Mariner Jupiter/Saturn (spacecraft, NASA)
MLS	microwave limb sounder
MM	millimeter
MMS	multimission modular spacecraft
MMW	millimeter wave
MN	Minnesota
MO	month; Missouri
MOL	Manned Orbiting Laboratory (satellite, DOD)
M-P	minus-plus
MPD	magneto-plasma dynamic
MPI	Max-Planck-Institute (Fed Rep of Germany)
MR	medium resolution
MRIR	medium-resolution infrared radiometer
MRSE	microwave remote sensing experiment
MS	microsecond; millisecond; Mississippi
MSC	Manned Spacecraft Center (now Johnson Space Center)
MSFC	Marshall Space Flight Center (NASA)
MSIS	mass spectrometer - incoherent scatter (model)
MSN	mission
MSS	Magnetic Storm Satellite (NASA-AFCRL); multispectral scanner
MSSCC	multicolor spin-scan cloudcover camera
MT	Montana
MTS	Meteoroid Technology Satellite (NASA)
MUSE	monitor of ultraviolet solar energy
MV	millivolts (10^{-3} volts)
MW	milliwatt
N	nucleon; north
NA	not applicable; Nora Alice (satellite, DOD)
NACE	neutral atmosphere composition experiment
NACS	neutral atmosphere composition spectrometer
NADUC	Nimbus/ATS Data Utilization Center
NASA	National Aeronautics and Space Administration (Washington, DC, Headquarters)
NASC	National Aeronautics and Space Council
NASDA	National Space Development Agency (Japan)
NATE	neutral atmosphere temperature experiment
NATL	national
NATO	North Atlantic Treaty Organization
NBS	National Bureau of Standards
NC	North Carolina
NCAR	National Center for Atmospheric Research
NCC	National Climatic Center (NOAA)
ND	North Dakota
NDRE	Norwegian Defense Research Establishment
NE	electron density (concentration); Nebraska
NEMS	Nimbus-E microwave spectrometer; Near-Earth Magnetospheric Satellite (ESA)
NESC	National Environmental Satellite Center (now NESS)

NESS National Environmental Satellite Service (NOAA)
 NGM direct measurement of interstellar gas using HE as tracer
 NGSP National Geodetic Satellite Program
 NH New Hampshire
 NHC National Hurricane Center
 NI ion density (concentration)
 NIH National Institutes of Health
 NIMS near infrared mapping spectrometer
 NJ New Jersey
 NM nanometer; New Mexico
 NMC National Meteorological Center
 NMRT Nimbus meteorological radiation tape
 NNN no national name
 NNSS Navy Navigational Satellite System
 NO. number
 NOAA National Oceanic and Atmospheric Administration (formerly ESSA)
 NOESS National Operational Environmental Satellite Subsystem
 NOMSS National Operational Meteorological Satellite System
 NORAD North American Air Defense Command
 NORW Norwegian
 NOS National Ocean Survey (NOAA)
 NOSS National Oceanic Satellite System
 NOTS Naval Ordnance Test Station
 NFW neutral plasma wave
 NRC National Research Council
 NRL Naval Research Laboratory
 NSA National Security Agency
 NSF National Science Foundation
 NSSDC National Space Science Data Center
 NT nanotesla
 NUCL nuclear
 NWL Naval Weapons Laboratory
 NWP natural plasma waves
 NWRC National Weather Records Center (presently NCC)
 NV Nevada
 NY New York

OA Office of Applications (NASA)
 OAO Orbiting Astronomical Observatory (satellite, NASA)
 OAPS orbit adjust propulsion system
 OAR Office of Aerospace Research (USAF-AFSC)
 OART Office of Advanced Research and Technology (NASA)
 OAST Office of Aeronautics and Space Technology (NASA)
 OBS observatory
 O+C operations and checkout
 OCC OPLE Command Center
 OFO Orbiting Frog Otolith (NASA experimental spacecraft)
 OFT orbital flight test
 OGO Orbiting Geophysical Observatory (satellite, NASA)
 OGPC orbiter general purpose computer
 OH Ohio

OI	other investigator
OIB	orbiter interface box
OK	Oklahoma
OLS	operational linescan system
OMNI	low-resolution omnidirectional radiometer (on Explorer 7)
OMSF	Office of Manned Space Flight (NASA)
ONERA	Office National d'Etudes et de Recherches Aeronautiques
ONR	Office of Naval Research
OOI	orbiter operational instrumentation
OPEP	orbital-plane experiment package
OPF	Orbiter Processing Facility
OPLE	Omega position and location experiment
OP OFF	operational off
OR	Oregon
ORBIS	Orbiting Radio Beacon Ionospheric Satellite (NASA)
ORS	Octahedral Research Satellite (NASA); Orbiting Research Satellite (DOD)
OSCAR	Orbiting Satellite Carrying Amateur Radio
OSO	Orbiting Solar Observatory (satellite, NASA)
OSS	Office of Space Science (NASA); open source spectrometer
OSSA	Office of Space Science and Applications (NASA; now two separate offices)
OSTA	Office of Space and Terrestrial Applications
OT	Operational TIROS (satellite, NASA)
OTDA	Office of Tracking and Data Acquisition (NASA)
OV	Orbiting Vehicle (satellite, USAF)
OVT	organic vapor trap
PA	Pennsylvania
PAC	Packaged Attitude Control (satellite, NASA)
PAET	Planetary Atmosphere Experiment Test
PAGEOS	Passive Geodetic Earth-Orbiting Satellite (NASA)
PAM	pulse amplitude modulation
PC	proportional counter
PCB	power control box
PCM	pulse coded modulation
PD	project director
PDP	plasma diagnostic package; passive dosimeter packet
PE	Planetary Explorer
PEA	planar electrostatic analyzer
PEM	particle environment monitor
PEP	platform electronic package
PES	photoelectron spectrometer
PFM	pulse frequency modulation
PHA	pulse height analyzer
PHASR	Personnel Hazards Associated with Space Radiation (satellite, USAF)
PHYS	physics
PI	principal investigator
PIBS	positive ion beam system
PICNO	picture number

PIMR	polar ice mapping radiometer
PIP	Payload Integration Plan
PIXEL	picture element
PL	prelaunch
PLACE	position location and aircraft communication experiment
PM	pulse modulation; photomultiplier
P.M.	post meridian
PMEL	Pacific Marine Environmental Laboratory (NOAA)
PMP	precision mounting platform
PMR	pressure modulation radiometer; Pacific Missile Range
PMT	photomultiplier tube
P-N	positive-negative (junction)
POCC	OFT Payloads Operations Control Center
POD	proton omnidirectional detector
POGO	Polar Orbiting Geophysical Observatory (satellite, NASA)
PPR	photopolarimeter radiometer
PPS	pulses per second
PR	pyrolytic release
PROT	protection
PS	picoseconds; pressure sensor
PSA	pressure sensor A
PSB	pressure sensor B
PSE	passive seismic experiment
PTL	Photographic Technology Laboratory (JSC)
PWI	plasma wave instrument
Q	charge
QOMAC	quarter-orbit magnetic attitude control (system)
RA	Ranger (spacecraft, NASA)
RAD	radium; radiation
RADCAT	Radar Calibration Target (satellite, ARPA)
RADOSE	Radiation Dosimeter (satellite, DOD)
RAE	Radio Astronomy Explorer (satellite, NASA); electromagnetic survey & unified radio and plasma wave
RAHF	Research Animal Holding Facility
RAM	random access memory (system)
RANICON	resistor anode image convertor
RBV	return beam vidicon (camera)
RC	resistance capacitor
RCA	Radio Corporation of America
RCE	reaction control equipment
R+D	research and development
REP	republic
RES	research
REXS	Radio Exploration Satellite (Japan)
RF	radio frequency
RFI	radio frequency interference
RHU	radioscope heater units
RI	Rhode Island

RIMS retarding ion mass spectrometer
RM Radiation Meteoroid (satellite, NASA); Radiometric Measurement
 (satellite, DOD)
RMS root mean square; Radiation Meteoroid Satellite (NASA); Radio-
 metric Measurement Satellite (DOD); remote manipulator system
RPA retarding potential analyzer
RPM revolutions per minute
RPQ retarding potential quadrupole
RPS revolutions per second
RRL Radio Research Laboratories (Japan)
RSRS Radio and Space Research Station (England)
RTD Research Technology Division (USAF)
RTG radioisotope thermoelectric generator
RTTS real-time transmission system

S second; south
SAA South Atlantic Anomaly
SACU synchronization and control unit
SAGE stratospheric aerosol and gas experiment
SAI spin-scan auroral imager
SAM stratospheric aerosol measurement
SAMOS Satellite Mission Observation (satellite, USAF)
SAMS stratospheric and mesospheric sounder
SAMSO Space and Missile Systems Organization (USAF)
SAO Smithsonian Astrophysical Observatory
SAPPSAC spacecraft attitude precision pointing and slewing adaptive
 control
SAR synthetic aperture radar
SAS Small Astronomy Satellite (NASA); Soviet Academy of Sciences
SATAR Satellite for Aerospace Research (NASA)
SATELL satellite
SATS Satellite Antenna Test System (NASA)
SBRC Santa Barbara Research Center
SC project scientist; spark chamber; South Carolina
S/C spacecraft
SCAMS scanning microwave spectrometer
SCAT scattometer
SCATHA spacecraft charging at high altitudes
SCEL Signal Corps Engineering Laboratories
SCH school
SCI science
SCMR surface composition mapping radiometer
SCORE Signal Communication by Orbiting Relay Equipment (satellite, DOD)
SCR selective chopper radiometer
SCS selective combined plasma spectrometer
SD San Diego; South Dakota
SDPF Sensor Data Processing Facility
SE Solar Explorer (satellite, NASA)
SEA spherical electrostatic analyzer
SEASAT Ocean Dynamic Satellite (NASA)
SEC secondary electron conduction (vidicon tube)

SECOR	Sequential Collation of Range (satellite, USAF)
SEM	space environment monitor
SEO	Satellite for Earth Observations (Program, India)
SEPAC	space experiments with particle accelerators
SERT	Spinning Satellite for Electric Rocket Test (NASA)
SESP	Space Experiment Support Program
SESPO	Space Environmental Support Project Office
SFA	sweep frequency analyzer
SHS	Soviet Hydrometeorological Service
SIBS	Salk Institute for Biological Studies
SIDS	Space Investigations Documentation System (NASA)
SIG	selenide isotope generator
SIM	scientific instrument module
SIRE	satellite infrared experiment
SIRS	satellite infrared spectrometer; System for Information Retrieval and Storage (NSSDC)
SM	San Marco (satellite, NASA-Italy)
SMC	scanning modulation collimator
SME	Solar Mesosphere Explorer (satellite, NASA)
SMM	Solar Maximum Mission (satellite, NASA)
SMMR	scanning multispectral microwave radiometer
SMS	Synchronous Meteorological Satellite (NASA)
S/N	signal to noise
SNAP	systems for nuclear auxiliary power
SOEP	solar-oriented experiment package
SOLRAD	Solar Radiation (satellite, NASA-DOD)
SPADES	Solar Perturbation and Atmospheric Density Measurement Satellite (DOD)
SPHINX	Space Plasma High Voltage Interactive Experiment (satellite, NASA)
SPIDPO	Shuttle Payload Integration and Development Program Office
SFM	solar proton monitor
SPW	stimulated plasma waves
SQ	square
SR	Solar Radiation (satellite, NASA); scanning radiometer; sounding rocket; steradian
SRATS	Solar Radiation and Thermospheric Structure (satellite, Japan)
SRC	Space Research Council; Science Research Council
SRI	Stanford Research Institute
SRPA	spherical retarding potential analyzer
SRT	supporting research and technology
SSC	Satellite Situation Center
SSCC	spin-scan cloudcover camera
SSD	Space Science Division (JPL)
SSH	spherical sensor H
SSM/T	special sensor microwave/temperature sounder
SSPP	Shuttle Spacelab Payloads Project
SSS	Small Scientific Satellite (NASA)
SST	satellite-to-satellite tracking
SSUS	solid spinning upper stage
ST	Space Telescope (satellite, NASA)
STADAN	Spacecraft Tracking and Data Acquisition Network (now STDN)

STARAD	Starfish Radiation (satellite, NASA)
STD	standard
STDN	Spaceflight Tracking and Data Network (NASA)
STL	Space Technology Laboratories (now TRW Systems Group)
STN	station
STP	Solar Terrestrial Probe (satellite, NASA); Solar Terrestrial Physics; Space Test Program
STRATOS	stratosphere
STS	Space Transportation Systems
STUD	studies
SUI	State University of Iowa (now University of Iowa)
SURCAL	Surveillance Calibration (satellite, DOD)
SUSIM	solar ultraviolet spectral irradiance monitor
SVC	service
SW	southwest
SWE	mass separating solar wind; solar wind experiment
SWRF	Sine Wave Response Filter (program)
SKR	solar X-ray flare and cosmic-ray burst investigation
SYNCOM	Synchronous Communication (satellite, NASA)
SYST	system
TAC	Technology Application Center
TACOMSAT	Tactical Communications Satellite (DOD)
TATS	Test and Training Satellite (NASA)
TATSACOM	Tactical Satellite Communications (program, DOD)
TBD	to be determined
TD	technical director; Thor-Delta (satellite, ESA); launch vehicle (NASA-USAF)
TDP	Tracking Data Processor (program)
T+DR	tracking and data relay
TDRSS	tracking and data relay satellite system
TE	electron temperature; tellurium
TEC	telemetry and command; transearth coast
TECH	technical; technology
TED	total energy detector
TEI	transearth injection
TELE ^{can}	satellite, Canada (also referred to as ANIK)
TEMP	temporal; temperature
TET	telescope and electron telescope
TETR	Test and Training (satellite, NASA)
TEV	tetra electron volts
THIR	temperature/humidity infrared radiometer
THORAD-AGE	Thor Augmented Delta Agena (launch vehicle)
TIMATION	Time Location System (USN)
TIP	Tracking Impact Prediction (satellite, DOD)
TIROS	Television and Infrared Observations Satellite (NASA)
TL	team leader
TLD	thermoluminescence detector
TLI	translunar injection
TM	team member; thematic mapper
TN	Tennessee

TOMS total ozone mapping system
 TOPO topographic
 TOPS Thermal Noise Optical Optimization Communication System (NASA)
 TOS TIROS Operational Satellite (or System) (NASA)
 TOVS TIROS operational vertical sounder
 TPS thick plastic stack
 TRAAC Transit Research and Attitude Control (satellite, USN)
 TRANET Doppler Tracking Network (USN)
 TRANSP transportation
 TRS Tetrahedral Research Satellite (USAF)
 TRUST television relay using small terminals
 TRW Thompson, Ramo, Wooldridge (Inc.)
 TS thermal smoothed
 TT triggering telescope
 TTS Test and Training Satellite (NASA) (also called TATS, TETR)
 TWERLE tropical wind energy conversion and reference level
 experiment
 TX Texas

U university; atomic mass unit
 UA unified abstract
 UARS Upper Atmosphere Research Satellite(s)
 UCLA University of California at Los Angeles
 UHF ultrahigh frequency
 UK United Kingdom
 UKSRC United Kingdom Space Research Council
 ULEWAT ultralow-energy wide-angle telescope
 ULEZEQ ultralow-energy Z, E, Q
 US United States
 USA United States Army; United States of America
 USAF United States Air Force
 USB unified s-band; upper side band
 USGS United States Geological Survey
 USN United States Navy
 USSR Union of Soviet Socialist Republics
 UT universal time; Utah
 UV ultraviolet
 UVNO ultraviolet nitric-oxide experiment
 UVS ultraviolet spectrometer

V volt
 VA Virginia
 VAE visible airglow experiment
 VAR variation
 VAS VISSR atmospheric sounder
 VCGS vapor crystal growth system
 VCO voltage controlled oscillator
 VDC volts DC
 VEFI vector electric field instrument
 VHF very high frequency

VHRR	very high resolution radiometer
VIS	visual imaging spectrometer
VISSR	visible infrared spin-scan radiometer
VLF	very low frequency
VT	Vermont
VTPR	vertical temperature profile radiometer
W	watt; west
WA	Washington
WATS	wind and temperature spectrometer
WBM	wide-band module
WBVTR	wide-band video tape recorder
WDC	World Data Center
WDC-A-R&S	World Data Center A for Rockets and Satellites
WEFAX	weather facsimile
WFC	Wallops Flight Center (NASA); wave form channel
WGSPR	Working Group for Space Physics Research
WI	Wisconsin
WMO	World Meteorological Organization
WPM	words per minute
WRESAT	Weapons Research Establishment Satellite (Australia)
WS	Wallops Station (NASA; now Wallops Flight Center)
WSIR	wide swath imaging radar
WSMR	White Sands Missile Range
WTR	Western Test Range (also referred to as Vandenberg AFB)
WV	West Virginia
WWW	World Weather Watch
WY	Wyoming
XRFS	X-ray fluorescence spectrometer
XUV	extreme ultraviolet
YR	year
Z	atomic number
ZLE	zodiacal light/background starlight investigation