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

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Report on Active and Planned Spacecraft and Experiments

August 1978

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Greenbelt, Maryland 20771
U.S.A.

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Telex No.: 89675 or 89676

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OF POOR QUALITY

REPORT ON ACTIVE AND PLANNED
SPACECRAFT AND EXPERIMENTS

Edited by

James I. Vette

Robert W. Vostreys

Richard Horowitz

National Space Science Data Center

August 1978

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

This *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 time period July 1, 1977, to June 30, 1978, are included, as well as those planned missions that have progressed beyond the experiment or investigation selection stage. The document provides a brief description for each spacecraft and experiment as well as the 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 June 30, 1978. 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.

James I. Vette
Robert W. Vostreys
Richard Horowitz

August 1978

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* 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).

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INTRODUCTION

1. INTRODUCTION

1.1 Purpose

This *Report on Active and Planned Spacecraft and Experiments* 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 the 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. One such program utilizing this report is the International Magnetospheric Study (IMS).

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 includes 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 in this report. Also not included 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 include information regarding classified spacecraft or experiments.

*The *SPACEWARN Bulletin* is prepared by the World Data Center A for Rockets and Satellites, Code 601, Goddard Space Flight Center, Greenbelt, Maryland 20771, U.S.A. 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.

1.3 Organization

This report includes two major sections with descriptive material introducing each section.

Section 2, "Descriptions of Active Spacecraft and Experiments," is a listing of descriptions of the spacecraft and experiments that were active sometime during the time period July 1, 1977, to June 30, 1978. The listing is arranged by spacecraft common name and the last name of the principal investigator or team leader.

Section 3, "Descriptions of Planned Spacecraft and Experiments," is a listing of descriptions of the spacecraft and experiments that were planned missions as of June 30, 1978, for which experiments or investigations have been selected and NSSDC has at least minimal documentation.

Sections 4 and 5 are two 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 new missions that could not conveniently be presented in Section 2 or 3 appear in Appendix B. Several words and phrases used in this document are defined in Appendix C. A more comprehensive list of the abbreviations and acronyms used in this document are included in Appendix D.

1.4 Availability of This Report

Upon request, NSSDC will provide copies of this report and future supplements to an individual or organization 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 of this report.

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 collocated in 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 rather terse and 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 of this report would also be appreciated. In particular, it is hoped that principal experimenters and project offices will cooperate in bringing such matters to NSSDC's attention.

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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 July 1, 1977, to June 30, 1978. A few changes subsequent to this date may appear, depending on time 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-H instead of Explorer 47. 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 a brief description. The headings list characteristics of satellites and experiments. Definitions of many of the terms used in this section are included 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. These parameters consist of orbit type, epoch date, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, and probe missions. In addition, the heading contains the spacecraft weight, launch date, launch site, launch vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel -- project manager (PM), project scientist (PS), program manager (MG), program scientist (SC), mission manager (MM), and mission scientist (MS). The spacecraft brief description is immediately below each heading. This terminology is standard for NASA missions; the equivalent functions for the missions of other countries and/or agencies have been given the same position names.

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) or team members (TM) associated with the 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 Division)
CODE EC	(Communications Division)
CODE EM	(Space Processing Division)
CODE ER	(Resource Observations Division)
CODE RS	(Space Systems Division)
CODE SB	(Life Sciences Division)
CODE SC	(Astrophysics Division)
CODE SL	(Planetary Division)
CODE ST	(Solar Terrestrial Division)

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 July 1, 1977. Experiments that meet this same criteria are included.

*The addition of /CO-OP to any code indicates a cooperative effort between NASA and a second party.

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

SPACECRAFT COMMON NAME- 1976-059A
ALTERNATE NAMES- 02916, USAF OPERATIONAL SAT-76
NSSDC 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 - J.P. CONNER 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 RADIUS 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, HIGBIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR
NSSDC ID- 76-059A-01 INVESTIGATIVE PROGRAM
OPERATIONAL SATELLITE

INVESTIGATION DISCIPLINE(S)
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 ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRONS, 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 7 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- 09803, USAF OPERATIONAL SAT-77
NSSDC 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 - J.P. CONNER 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 RADIUS 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, HIGBIE-----

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTOR
NSSDC ID- 77-007A-01 INVESTIGATIVE PROGRAM
OPERATIONAL SATELLITE

INVESTIGATION DISCIPLINE(S)
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 ENERGETIC PARTICLE DETECTOR CONSISTED OF FOUR SOLID-STATE DETECTOR UNITS TO MEASURE ELECTRONS, 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 7 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.

***** AD-A*****

SPACECRAFT COMMON NAME- AD-A
ALTERNATE NAMES- EXPLORER 19, 00714

NSSDC ID- 63-053A

LAUNCH DATE- 12/19/63 WEIGHT- 7. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/28/77
ORBIT PERIOD- 110.6 MIN INCLINATION- 78.8 DEG
PERIAPSIS- 846. KM ALT APOAPSIS- 1673. KM ALT

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - C.W. COFFEE, JR. NASA-LARC
PS - R.F. FELLOWS (RETIRED) NASA HEADQUARTERS

BRIEF DESCRIPTION
EXPLORER 19 WAS THE SECOND IN A SERIES OF 3.66-M INFLATABLE SPHERES PLACED INTO ORBIT TO DETERMINE ATMOSPHERIC DENSITIES. EXPLORER 19 WAS LAUNCHED WHILE EXPLORER 9, THE FIRST SATELLITE IN THE SERIES, WAS STILL ACTIVE, SO THAT DENSITIES IN TWO DIFFERENT PORTIONS OF THE ATMOSPHERE COULD BE SAMPLED SIMULTANEOUSLY. THE SATELLITE CONSISTED OF ALTERNATING LAYERS OF ALUMINUM FOIL AND PLASTIC FILM. UNIFORMLY DISTRIBUTED OVER THE ALUMINUM OUTER SURFACE WERE 5-1-CM DOTS OF WHITE PAINT FOR THERMAL CONTROL. A 136.620-MHZ TRACKING BEACON, WHICH WAS POWERED BY FOUR SOLAR CELLS AND WAS MOUNTED ON THE SPACECRAFT SKIN, USED THE ELECTRICALLY SEPARATED HEMISPHERES OF THE BALLOON AS AN ANTENNA. THE SPACECRAFT WAS SUCCESSFULLY ORBITED, BUT ITS APOGEE WAS LOWER THAN PLANNED. THE BEACON DID NOT HAVE SUFFICIENT POWER TO BE RECEIVED BY GROUND TRACKING STATIONS, MAKING IT NECESSARY TO RELY SOLELY ON THE SAO BAKER-NUNN CAMERA NETWORK FOR TRACKING.

----- AD-A, JACCHIA-----

INVESTIGATION NAME- NONSYSTEMATIC CHANGES OF AIR DENSITY

NSSDC ID- 63-053A-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
AERONOMY

PERSONNEL
PI - L.G. JACCHIA SAO

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETERMINE NONSYSTEMATIC CHANGES OF UPPER ATMOSPHERIC DENSITY BY CONDUCTING STUDIES OF THE DRAG ON A 3.6-M DIAMETER, LOW-DENSITY SPHERE CAUSED BY SHORT-TERM VARIATIONS IN SOLAR ACTIVITY. DENSITY VALUES NEAR PERIGEE WERE DEDUCED FROM SEQUENTIAL OBSERVATIONS OF THE SPACECRAFT POSITION USING OPTICAL (BAKER-NUNN CAMERA NETWORK) AND RADIO/RADAR TRACKING TECHNIQUES. THE GENERAL TECHNIQUES USED TO DEDUCE DENSITY VALUES FROM SATELLITE DRAG DATA CAN BE FOUND IN SMITHSONIAN ASTROPHYSICAL OBSERVATORY SPECIAL REPORT NO. 100 BY JACCHIA AND SLOWEY.

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----- AD-A, KEATING -----

INVESTIGATION NAME- SYSTEMATIC CHANGES OF AIR DENSITY

NSSDC ID- 63-053A-02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - G.M. KEATING NASA-LARC
OI - W.J. O'SULLIVAN, JR. NASA-LARC
OI - C.W. COFFEE, JR. NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WAS TO DETERMINE ATMOSPHERIC DENSITY AS A FUNCTION OF ALTITUDE, LATITUDE, AND TIME BY MEASURING ATMOSPHERIC DRAG ON A LOW MASS-TO-AREA RATIO (0.7680 KG PER SQUARE METER) SPHERICAL SATELLITE. THE ORBIT WAS SUN SYNCHRONIZED SO THAT NEAR-POLAR DENSITIES WOULD ALWAYS BE OBTAINED ALONG NOON AND MIDNIGHT MERIDIANS.

***** AD-C*****

SPACECRAFT COMMON NAME- AD-C
ALTERNATE NAMES- PL-683J, EXPLORER 39
03337

NSSDC ID- 68-066A

LAUNCH DATE- 08/08/68 WEIGHT- 9.4 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/28/77
ORBIT PERIOD- 114.4 MIN INCLINATION- 80.6 DEG
PERIAPSIS- 684. KM ALT APOAPSIS- 2174. KM ALT

PERSONNEL

MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - C.W. COFFEE, JR. NASA-LARC
PS - R.F. FELLOWS (RETIRED) NASA HEADQUARTERS

BRIEF DESCRIPTION

EXPLORER 39 WAS AN INFLATABLE SPHERE, 3.66 M IN DIAMETER. IT WAS ORBITED TO MAKE DENSITY ATMOSPHERE DETERMINATIONS. THE SPACECRAFT WAS SUCCESSFULLY LAUNCHED INTO A NEARLY POLAR, HIGHLY ELLIPTICAL ORBIT. IT WAS FOLDED AND CARRIED INTO ORBIT, TOGETHER WITH EJECTION AND INFLATION EQUIPMENT, AS PART OF THE PAYLOAD OF EXPLORER 40 (NSSDC ID 68-066B). TWO DENSITY EXPERIMENTS WERE PERFORMED. ONE INVOLVED THE STUDY OF SYSTEMATIC DENSITY VARIATION, AND THE OTHER WAS CONCERNED WITH NONSYSTEMATIC DENSITY CHANGES. THE UPPER ATMOSPHERIC DENSITIES WERE DERIVED FROM SEQUENTIAL OBSERVATIONS OF THE SPHERE BY USE OF AN ATTACHED 136.620-MHZ RADIO TRACKING BEACON AND BY OPTICAL TRACKING. THE RADIO BEACON CEASED TRANSMITTING IN JUNE 1971. SINCE THAT TIME IT HAS BEEN NECESSARY TO RELY SOLELY ON THE SAO BAKER-NUNN CAMERA NETWORK FOR TRACKING. EXPLORER 39 HAS AN EXPECTED ORBITAL LIFETIME OF 50 YEARS.

----- AD-C, JACCHIA -----

INVESTIGATION NAME- NONSYSTEMATIC CHANGES OF AIR DENSITY

NSSDC ID- 68-066A-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
AERONOMY

PERSONNEL

PI - L.G. JACCHIA SAO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE NON-SYSTEMATIC UPPER ATMOSPHERIC DENSITY CHANGES. THE DATA ARE DERIVED FROM STUDIES OF THE DRAG ON A 3.6-METER DIAMETER LOW-DENSITY SPHERE CAUSED BY SHORT-TERM DIFFERENCES IN SOLAR ACTIVITY. DENSITY VALUES NEAR PERIGEE WERE DEDUCED FROM SEQUENTIAL OBSERVATIONS OF THE SPACECRAFT POSITION USING OPTICAL (BAKER-NUNN CAMERA NETWORK) AND RADIO AND/OR RADAR TRACKING TECHNIQUES. THE GENERAL TECHNIQUES USED TO DEDUCE DENSITY VALUES FROM SATELLITE DRAG DATA CAN BE FOUND IN SMITHSONIAN ASTROPHYSICAL OBSERVATORY SPECIAL REPORT NO. 100, BY JACCHIA AND SLOWEY. THIS EXPERIMENT HAS DETERMINED REASONABLE DENSITY VALUES, AND IS CAPABLE OF YIELDING LONG-TERM ATMOSPHERIC DENSITY VALUES, AS EXPLORER 39 HAS AN EXPECTED ORBITAL LIFETIME OF 50 YEARS.

----- AD-C, KEATING -----

INVESTIGATION NAME- SYSTEMATIC CHANGES OF AIR DENSITY

NSSDC ID- 68-066A-02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
AERONOMY

PERSONNEL

PI - G.M. KEATING NASA-LARC
OI - C.W. COFFEE, JR. NASA-LARC
OI - W.J. O'SULLIVAN, JR. NASA-LARC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE SYSTEMATIC CHANGES OF AIR DENSITY AS A FUNCTION OF ALTITUDE, LATITUDE, AND TIME OF DAY, BY MEASURING THE DRAG ON A 3.6-METER DIAMETER LOW-DENSITY SPHERE WITH GROUND TRACKING.

***** AE-C*****

SPACECRAFT COMMON NAME- AE-C
ALTERNATE NAMES- 5 6C, PL-721C
ATMOSPHERE EXPLORER-C, EXPLORER 51
6977

NSSDC ID- 73-101A

LAUNCH DATE- 12/16/73 WEIGHT- 658. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/16/73
ORBIT PERIOD- 132.3 MIN INCLINATION- 68.1 DEG
PERIAPSIS- 149.0 KM ALT APOAPSIS- 4294.0 KM ALT

PERSONNEL

MG - F.W. GAETANO NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - J.E. KUPPERIAN, JR. NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE AE-C MISSION WAS TO INVESTIGATE THE THERMOSPHERE, WITH EMPHASIS ON THE ENERGY TRANSFER, AND PROCESSES THAT GOVERN ITS STATE. THE STUDY OF PHOTOCHEMICAL PROCESSES ACCOMPANYING THE ABSORPTION OF SOLAR UV RADIATION IN THE EARTH'S ATMOSPHERE WAS ACCOMPLISHED BY MAKING CLOSELY COORDINATED MEASUREMENTS OF REACTING CONSTITUENTS AND THE SOLAR INPUT. THE AE SPACECRAFT WAS A MULTI-SIDED POLYHEDRON WITH A DIAMETER OF APPROXIMATELY 1.4 M AND WEIGHED ABOUT 675 KG INCLUDING 85 KG OF INSTRUMENTATION. THE INITIAL ELLIPTICAL ORBIT WAS ALTERED MANY TIMES IN THE FIRST YEAR OF LIFE BY MEANS OF AN ORBOARD PROPULSION SYSTEM EMPLOYING A 3.5 LB THRUSTER. THE PURPOSE OF THESE CHANGES WAS TO ALTER THE PERIGEE HEIGHT TO 129 KM. AFTER THIS PERIOD, THE ORBIT WAS CIRCULARIZED AND WAS RAISED PERIODICALLY TO ABOUT 390 KM WHEN IT WOULD DECAY TO 250 KM ALTITUDE. DURING THE FIRST YEAR, THE LATITUDE OF PERIGEE MOVED FROM ABOUT 10 DEG N UP TO 68 DEG N AND THEN DOWN TO ABOUT 60 DEG S. DURING THIS PERIOD ABOUT TWO CYCLES THROUGH ALL LOCAL TIMES WERE COMPLETED. THE SPACECRAFT COULD BE OPERATED IN EITHER OF TWO MODES - SPINNING AT A NOMINAL 4 RPM OR DESPUN TO 1 REVOLUTION PER ORBIT. THE SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE. POWER WAS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT USED A PCM TELEMETRY DATA SYSTEM THAT OPERATED IN REAL TIME OR A TAPE RECORDER MODE. MORE DETAILS CAN BE FOUND ON PP. 263-269 OF 'RADIO SCIENCE,' 8, 4, APRIL 1973. THE PAYLOAD INCLUDED INSTRUMENTATION FOR THE MEASUREMENT OF SOLAR UV, THE COMPOSITION OF POSITIVE IONS AND NEUTRAL PARTICLES; THE DENSITY AND TEMPERATURE OF NEUTRAL PARTICLES, POSITIVE IONS AND ELECTRONS; THE MEASUREMENT OF AIRGLOW EMISSIONS, PHOTOCHEMICAL ENERGY SPECTRA, AND PROTON AND ELECTRON FLUXES UP TO 25 KEV.

----- AE-C, BARTH -----

INVESTIGATION NAME- ULTRAVIOLET NITRIC-OXIDE (UVNO)

NSSDC ID- 73-101A-13

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH U OF COLORADO

BRIEF DESCRIPTION

THIS ULTRAVIOLET NITRIC-OXIDE EXPERIMENT (UVNO) CONSISTED OF A TWO-CHANNEL FIXED-GRATING EBERT SPECTROMETER WHICH MEASURED THE AIRGLOW IN THE (1, 0) GAMMA BAND IN A 12-A REGION CENTERED AT 2150 A. THE OBSERVED INTENSITY WAS PRODUCED BY RESONANCE FLUORESCENCE BY SUNLIGHT OF THE NITRIC-OXIDE MOLECULES IN THE INSTRUMENT'S FIELD OF VIEW. THE INTENSITY PROFILES OBTAINED YIELDED ALTITUDE PROFILES OF NITRIC-OXIDE DENSITY AS A FUNCTION OF TIME AND LOCATION. PROFILES WERE MEASURED ALONG THE TRACK OF THE SATELLITE AT ALL TIMES WHEN IT WAS ON THE SUNLIT SIDE OF THE EARTH. THE REMOTE SENSING CHARACTER OF THE UVNO EXPERIMENT PERMITTED MEASUREMENTS OF NITRIC-OXIDE TO BE MADE AT ALTITUDES BOTH ABOVE AND BELOW SATELLITE PERIGEE. AS THE SPACECRAFT SPINS, THE SPECTROMETER,

ORDER OF 0.001 SQ CM STER, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE SENSED -- 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-C, HANSON-----

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

NSSDC ID- 73-101A-04 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - W.B. HANSON U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS
OI - S. SANATANI 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-S 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 AMU 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 4-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-C, HAYS-----

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 73-101A-14 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - P.B. HAYS U OF MICHIGAN
OI - G.G. SHEPHERD YORK U

BRIEF DESCRIPTION
THIS EXPERIMENT CONTAINED A FILTER PHOTOMETER DESIGNED TO MONITOR VARIOUS AIRGLOW AND AURORAL FEATURES WHICH LIE IN THE SPECTRAL RANGE BETWEEN 3000 A AND 7500 A. THE PRIMARY INFORMATION OBTAINED FROM THIS EXPERIMENT WAS THE RATES OF EXCITATION OF THE ATOMIC AND MOLECULAR CONSTITUENTS OF THE THERMOSPHERE. FOR THE AE-C MISSION, THE FOLLOWING SIX SPECIFIC LINES AND BANDS WERE CHOSEN FOR STUDY SINCE THEY PLAY AN IMPORTANT ROLE IN THE PHOTOCHEMICAL ENERGY BALANCE OF THE ATMOSPHERE -- 3371 A, 4278 A, 5200 A, 5577 A, 6300 A, AND 7319 A. THE EMISSIONS WERE MEASURED IN PAIRS -- 5577 AND 6300, 7319 AND CALIB, 3371 AND 5577, 5200 AND 7319, 4278 AND 3371, CALIB

AND 5200, AND 6300 AND 4278. TWO OPTICAL SYSTEMS VIEWED AT RIGHT ANGLES TO EACH OTHER. EACH ONE EMPLOYED A COMBINATION OF A SIMPLE OBJECTIVE LENS AND FIELD STOP TO DEFINE THE FIELD OF VIEW, AND EACH CONTAINED A MULTISTAGE LIGHT BAFFLE. THE WIDE-ANGLE HIGH SENSITIVITY SYSTEM (DESIGNATED CHANNEL 2) HAD A FIELD OF VIEW OF 3 DEG HALF-ANGLE, AND WAS USED TO MEASURE THE NIGHTGLOW, DAYGLOW ABOVE THE SATELLITE, AND OTHER WEAK EMISSION FEATURES. THE LESS SENSITIVE SYSTEM (DESIGNATED CHANNEL 1) HAD A FIELD OF VIEW OF APPROXIMATELY 3/4 DEG HALF-ANGLE AND WAS USED FOR DAYGLOW AND NIGHTGLOW HORIZON MEASUREMENTS, AS WELL AS DISCRETE AURORAL FEATURES WHICH SHOWED STRONG SPATIAL GRADIENTS. BOTH OPTICAL CHANNELS HAD A DIAMETER OF 2.2 CM. THEY SHARED A FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AT THE WAVELENGTHS IDENTIFIED ABOVE, AND TWO OTHER POSITIONS. ONE WAS A DARK POSITION FOR NOISE MEASUREMENTS, AND THE OTHER WAS A CALIBRATE POSITION. THE DYNAMIC RANGE OF THE INSTRUMENT WAS 1.E6 RAYLEIGHS. IN ORDER THAT THE SENSORS BE ABLE TO RESPOND IN A FRACTION OF A SECOND TO LARGE CHANGES IN SURFACE BRIGHTNESS WITHOUT ANY NOTICEABLE ENHANCEMENT IN THE BACKGROUND COUNT RATE, EACH ONE CONTAINED A 1/100 ATTENUATOR AND AN ELECTRONIC CIRCUIT TO BACK-BIAS THE CATHODE. WITH THESE PROTECTIVE FEATURES IT WAS POSSIBLE TO MEASURE A DARK FEATURE WITH NO APPARENT ENHANCEMENT IN BACKGROUND WITHIN 120 NS AFTER A DIRECT VIEW OF THE SUN. PHOTONS REACHING THE CATHODE WERE RECORDED USING A PULSE-COUNTING SYSTEM. THE INTEGRATION TIME WAS 33 MS FOR CHANNEL 1 AND 132 MS FOR CHANNEL 2. PRIMARY COMMAND AND TELEMETRY FORMATTING SYSTEMS WERE SHARED BY THE TWO CHANNELS. THE EXPERIMENT COULD BE COMMANDED INTO ANY ONE OF SEVERAL OPERATING MODES DEPENDING ON THE SCIENCE REQUIREMENTS AND SPACECRAFT ATTITUDE. FOR MORE EXPERIMENT DETAILS, SEE 'THE VISABLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER,' P. B. HAYS, ET AL, RADIO SCIENCE, 8, 4, 369, 1973.

----- AE-C, HINTEREGGER-----

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 73-101A-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - R.E. HINTEREGGER USAF GEOPHYS LAB
OI - D.E. BEDO USAF GEOPHYS LAB
OI - L.A. HALL USAF GEOPHYS LAB
OI - C.W. CHAGNON USAF GEOPHYS LAB
OI - J.E. MANSON 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 A 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 A DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 ARC MIN DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINT 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-C, HOFFMAN-----

INVESTIGATION NAME- MAGNETIC ION-MASS SPECTROMETER (MINS)

NSSDC ID- 73-101A-10 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.H. HOFFMAN U OF TEXAS, DALLAS

BRIEF DESCRIPTION
A MAGNETIC ION MASS SPECTROMETER WAS FLOWN TO MEASURE IN SITU THE CONCENTRATIONS OF THE AMBIENT ION SPECIES IN THE MASS RANGE FROM 1 TO 90 ATOMIC MASS UNITS (U). MOUNTED ON THE SATELLITE EQUATOR NORMAL TO THE SPIN AXIS, THE ENTRANCE APERTURE FACED FORWARD WHEN THE SPACECRAFT WAS IN THE DESPUN MODE. THE ELECTRIC AND MAGNETIC FIELDS WERE ARRANGED TO PRODUCE A MASS SPECTRUM ALONG THE FOCAL PLANE FOLLOWING THE MAGNETIC ANALYZER. THREE SLITS WERE PLACED ALONG THE FOCAL PLANE IN APPROPRIATE PLACES TO SIMULTANEOUSLY COLLECT IONS IN THE MASS RATIOS 1 TO 4 TO 16 U. IONOSPHERIC IONS WERE ACCELERATED INTO THE ANALYZER SYSTEM BY A NEGATIVE VOLTAGE THAT VARIED FROM -1060 TO -225 V. THE THREE MASS RANGES MEASURED

SIMULTANEOUSLY WERE 1 TO 4, 4 TO 16, AND 16 TO 64 U. FOLLOWING EACH SLIT WAS AN ELECTRON MULTIPLIER AND A LOGARITHMIC ELECTROMETER-AMPLIFIER DETECTOR. THE DETECTOR OUTPUT COULD BE MEASURED DIRECTLY FOR AN ANALOG OUTPUT, OR IT COULD BE FED TO A "PEAK" CIRCUIT THAT DETERMINED THE AMPLITUDE OF EACH PEAK IN THE SPECTRUM. ONLY THE AMPLITUDE OF EACH PEAK WAS TELEMETERED IN THE PRIMARY PEAKS MODE, AND IN THIS MODE THE TIME REQUIRED TO SIMULTANEOUSLY SWEEP ALL THREE MASS RANGES WAS 1 S. OTHER MODES OF OPERATION WERE POSSIBLE. IN THE ANALOG SHORT MODE, THE THREE MASS RANGES WERE SWEEPED IN 3 S, ALTERNATING WITH 1-S "PEAKS" MODE SCANS. AN 8-S SWEEP WAS REQUIRED IN THE ANALOG LONG MODE, AGAIN ALTERNATING WITH 1-S PEAKS MODE SCAN. AN OPTION EXISTED IN THE LOCKED MODE TO CONTINUOUSLY MEASURE ANY SET OF MASS NUMBERS IN THE RATIO 1 TO 4 TO 16 TO GIVE HIGH SPATIAL RESOLUTION. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE MAGNETIC ION-MASS SPECTROMETER ON ATMOSPHERE EXPLORER,' J. H. HOFFMAN, ET AL, RADIO SCIENCE, 8, 4, 315-322, APRIL 1973.

----- AE-C, HOFFMAN -----

INVESTIGATION NAME- LOW-ENERGY ELECTRONS (LEE)
 NSSDC ID- 73-101A-12 INVESTIGATIVE PROGRAM CODE ST
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - R.A. HOFFMAN NASA-GSFC
 OI - D.S. EVANS NOAA-ERL
 OE - J.L. BURCH U OF TEXAS, SAN ANTONIO

BRIEF DESCRIPTION
 THIS EXPERIMENT FURNISHED DIRECT MEASUREMENTS OF THE ENERGY INPUT INTO THE UPPER ATMOSPHERE DUE TO ELECTRONS AND PROTONS (IONS) IN THE ENERGY RANGE OF 0.2 TO 25 KEV. THE EXPERIMENT ACQUIRED DIFFERENTIAL MEASUREMENTS OF THE ENERGY INFLUX AND ANGULAR DISTRIBUTION. THERE WERE TWO DETECTORS MEASURING ELECTRONS AND PROTONS FROM 0.2 TO 25 KEV IN 16 LOGARITHMICALLY SPACED STEPS, AND ONE DETECTOR MEASURING 5 KEV ELECTRONS CONTINUOUSLY. EACH DETECTOR CONSISTED OF A CYLINDRICAL ELECTROSTATIC ANALYZER FOR SPECIES AND ENERGY SELECTION, AND A SPIRALTRON ELECTRON MULTIPLIER FOR PARTICLE DETECTION. ENERGY DISTRIBUTIONS WERE OBTAINED BY APPLYING DIFFERENT FIXED OR STEPPED VOLTAGES TO THE DEFLECTION PLATES; DISTRIBUTIONS IN ANGLE WERE MEASURED BY USING THE SPACECRAFT SPIN AND MOUNTING THE ANALYZERS AT AN ANGLE. IN THE SPINNING MODE, ANGULAR DISTRIBUTIONS OF BOTH PROTONS AND ELECTRONS WERE OBTAINED. IN THE DESPUN MODES, MEASUREMENTS WERE OBTAINED AT 45 DEG TO THE SPACECRAFT EQUATOR, AND RADIALLY AWAY FROM THE EARTH. DETECTOR LOOK ANGLES WERE CHOSEN TO GIVE OPTIMUM MAGNETIC PITCH-ANGLE COVERAGE WHEN THE SPACECRAFT WAS MOVING EITHER POLEWARD OR EQUATORWARD. ALL DETECTORS WERE IDENTICAL IN CONSTRUCTION AND USED 1- X 6-MM ENTRANCE APERTURES. ONLY ONE (MONITOR) MODE WAS AVAILABLE. IT CONSISTED OF CONTINUOUS MEASUREMENT OF 5-KEV ELECTRONS AT 45 DEG TO THE SPACECRAFT EQUATOR (+Y) AXIS. COUNTS WERE ACCUMULATED OVER 55.7 MS AND READ OUT EACH MAIN TELEMETRY FRAME (62.5 MS). THE TWO STEPPED DETECTORS MOVED ONE ENERGY STEP ABOUT EACH MAIN FRAME WITH THE SAME ACCUMULATION TIME REQUIRING ABOUT 1 S FOR A COMPLETE CYCLE OF STEPS. MORE COMPLETE DETAILS OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 393-400, APRIL 1973.

----- AE-C, RICE -----

INVESTIGATION NAME- COLD CATHODE ION GAUGE
 NSSDC ID- 73-101A-15 INVESTIGATIVE PROGRAM CODE ST
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
 THE COLD CATHODE ION GAUGE FLOWN ON AE-C WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WAS 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 TO 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 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 COULD BE OPERATED IN TWO MODES, SPINNING OR 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 WAS NOT TAPE RECORDED, BUT WAS OBSERVED IN REAL TIME.

----- AE-C, RICE -----

INVESTIGATION NAME- CAPACITANCE MANOMETER
 NSSDC ID- 73-101A-16 INVESTIGATIVE PROGRAM CODE ST
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
 THE CAPACITANCE MANOMETER WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATIONS. 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), MEASURED 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 DIFFERENTIAL BETWEEN THE TWO SIDES CAUSED A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH IS MEASURED BY AN AC BRIDGE CIRCUIT. AIR WAS PERMITTED 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.

----- AE-C, SPENCER -----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)
 NSSDC ID- 73-101A-09 INVESTIGATIVE PROGRAM CODE ST
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - N.W. SPENCER NASA-GSFC
 OI - G.R. CARGAN U OF MICHIGAN

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED 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 LEAD TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY WAS 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 THE STEPWISE FASHION TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICE CHAMBER. THESE CHAMBER DENSITY VARIATIONS WERE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE. 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 FROM A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WHOSE MASS-TO-CHARGE RATIO (M/E) IS 28, ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED IN A 16-BIT ACCUMULATOR. WHEN THE SATELLITE WAS IN THE SPINNING MODE, THE NITROGEN DENSITY WAS MEASURED ONCE PER SPIN PERIOD, NOMINALLY EVERY 15 S. THE NITROGEN KINETIC TEMPERATURE WAS MEASURED TWICE EACH SPIN PERIOD (WITHOUT THE BAFFLE OPERATING) AND ONCE PER SPIN PERIOD WITH BAFFLE OPERATION. WHEN THE SPACECRAFT WAS IN THE DESPUN MODE, THE NITROGEN DENSITY WAS MEASURED NEARLY CONTINUOUSLY, EXCEPT WHEN THE PARTICLE STREAM WAS INTERRUPTED BY THE BAFFLE. 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, 'THE NEUTRAL-ATMOSPHERE TEMPERATURE INSTRUMENT,' N. W. SPENCER, ET AL, RADIO SCIENCE, 8, 4, 287-296, 1973.

***** 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

ORIGINAL PAGE IS
 OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 117.29 MIN
PERIAPSIS- 156. KM ALT

EPOCH DATE- 11/25/75
INCLINATION- 19.7 DEG
APOAPSIS- 2983. KM ALT

PERSONNEL
MG - F.W. GAETAND
SC - E.R. SCHMERLING
PM - J.E. KUPPERIAN, JR.
PS - N.W. SPENCER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
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-D SPACECRAFT UNTIL ITS FAILURE ON 1/29/76 AND THEN BY AE-C. 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 SWEPT 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, SIMILAR TO AE-C, WAS RAISED TO THIS HEIGHT WHENEVER IT WOULD DECAY TO ABOUT 250 KM.

----- 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
OI - R.F. THEIS
OI - A. DALGARNO

NASA-GSFC
NASA-GSFC
HARVARD U

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 (NORMALLY PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER RADIIALLY 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 ONE SECOND TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 10,000 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 10,000 AND 10²⁷ PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY ABOVE 50 AND 10²⁶ PER CUBIC CM; AND ION MASS AT ION DENSITIES ABOVE 10,000 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 DIA. MORE DETAILED INFORMATION CAN BE FOUND IN 'RADIO SCIENCE,' 8, 4, APRIL 1973.

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

INVESTIGATION NAME- ION COMPOSITION AND CONCENTRATION (BIMS)

NSSDC ID- 75-107A-10

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

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

NASA-GSFC
NASA-GSFC
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 CC TO 5 MILLION IONS PER CC 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. THE INSTRUMENT CONFIGURATION SELECTED FOR A PARTICULAR PASS WILL DEPEND PRIMARILY ON THE DATA REQUIREMENTS OF THE SCIENCE PROBLEM UNDER INVESTIGATION AND ON THE SPACECRAFT SPIN MODE. MORE COMPLETE EXPERIMENT DETAILS CAN BE FOUND IN THE PAPER 'THE BENNETT ION-MASS SPECTROMETER ON ATMOSPHERE EXPLORER -C AND -E,' H. C. BRINTON ET AL, RADIO SCIENCE, 8, 4, 323-332, 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
OI - F.A. MARCOS

USAF GEOPHYS LAB
USAF GEOPHYS LAB

BRIEF DESCRIPTION

MESA OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 450 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 AXIS AND THE OTHER IN 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, DETERMINED THE SATELLITE MINIMUM ALTITUDE, MEASURED SPACECRAFT ROLL, AND PROVIDED SOME ATTITUDE-SENSING INFORMATION. SPACECRAFT MUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 G IN ORBIT ADJUST PROPULSION SYSTEM (OAPS) MONITOR MODE; 4.E-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.

----- AE-E, DOERING-----

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 75-107A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P. DOERING
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 FLOWS 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 STER, INDEPENDENT OF ELECTRON ENERGY. THREE SEPARATE ENERGY RANGES COULD BE SENSED -- 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.B. HANSON U OF TEXAS, DALLAS
 OI - D.R. ZUCCARO U OF TEXAS, DALLAS
 OI - S. SANATANI U OF TEXAS, DALLAS
 OI - C.R. LIPPENCOTT 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 CHARGES COULD BE OBSERVED FOR 3-S 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 AMU 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 4-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 U OF MICHIGAN
 OI - G.G. SHEPHERD YORK U
 OI - G.R. CARIGNAN U OF MICHIGAN
 OI - J.C.G. WALKER ARECIBO OBS

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, 5300 AND DARK, 5577 AND 7319, 2800 AND 5200, 6300 AND 5577, CALIB 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 STPAY 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 'THE VISIBLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER,' P.B. HAYS, ET AL, RADIO SCIENCE, 8, 4, 369, 1973.

----- 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 NASA-GSFC
 OI - C.A. REBER NASA-GSFC
 OI - G.R. CARIGNAN 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 WERE 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 (75-101A-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 HAS A RESOLUTION OF BETTER THAN 1 U FOR ALL MASSES BETWEEN 1 AND 44, AND THE MEASUREMENT SYSTEM HAS A DYNAMIC RANGE OF APPROXIMATELY 1.E8. THERE IS PROVISION FOR THE INSTRUMENT ORIFICE TO BE COVERED DURING SPACECRAFT THRUSTER OPERATIONS. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'A NEUTRAL-ATMOSPHERE COMPOSITION EXPERIMENT FOR THE ATMOSPHERE EXPLORER -C, -D, -E,' D. T. PELZ ET AL, RADIO SCIENCE, 8, 4, 272, 1973.

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

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 75-107A-06 INVESTIGATIVE PROGRAM CODE ST
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS
 SOLAR PHYSICS

PERSONNEL
 PI - H.E. HINTEREGGER USAF GEOPHYS LAB
 OI - D.E. BEDO USAF GEOPHYS LAB
 OI - L.A. HALL USAF GEOPHYS LAB
 OI - J.E. MANSON USAF GEOPHYS LAB
 OI - 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 A 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 A DEPENDING UPON THE PARTICULAR INSTRUMENT. THE FIELD OF VIEW VARIED FROM 60 X 60 ARC MIN DOWN TO 3 X 6 ARC MIN. ALL 24 MONOCHROMATOR-ENTRANCE AXES WERE CO-ALIGNED PARALLEL. A SOLAR POINT 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.

ORIGINAL PAGE IS
 OF POOR QUALITY

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

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

NSSDC ID- 75-107A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.O.C. NIER U OF MINNESOTA
OI - W.E. POTTER U OF MINNESOTA
OI - 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 MASSES IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (U). A DOUBLE-FOCUSING, MATTAICH-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 U 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 OF 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. IN THE FLY-THROUGH MODE, THE ION SOURCE VOLTAGES WERE ADJUSTED SO THAT THERE WAS NO ELECTRIC FIELD TO DRAW IONS OUT OF THE ELECTRON BEAM WHEN THEY WERE FORMED. 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. THE ELECTRON ACCELERATING POTENTIAL IS 75 EV IN NORMAL MODE OPERATION AND IS 25 EV IN THE FLY-THROUGH MODE. IN ANOTHER OPERATING MODE, THE INSTRUMENT SWITCHED AUTOMATICALLY TO A SEQUENCE OF MASSES OF PARTICULAR INTEREST SUCH AS, E.G., BETWEEN MASSES 16 AND 32 OR BETWEEN MASSES 28 AND 32. SWITCHING TOOK PLACE AT 1/16-S INTERVALS, AND IONS WERE COUNTED ONLY DURING THE LAST 0.05 S OF THE INTERVAL. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE OPEN SOURCE NEUTRAL MASS SPECTROMETER ON AE-C, -D, AND -E' A. O. C. NIER, ET AL, RADIO SCIENCE, 8, 4, 271, 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 CLOSED BY A PRESSURE DIFFERENTIAL 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.

----- 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 WAS 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 TO 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN 1.3E-3 TO 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 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 WAS NOT TAPE RECORDED, BUT OBSERVED IN REAL TIME.

----- 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
OI - G.R. CARRIGAN U OF MICHIGAN
OI - 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. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY WAS 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 ORIFICED 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 'THE NEUTRAL-ATMOSPHERE TEMPERATURE INSTRUMENT,' N. W. SPENCER, ET AL, RADIO SCIENCE, 8, 4, 287-296, 1973.

***** AT5 *****

SPACECRAFT COMMON NAME- AT5
ALTERNATE NAMES- PL-692B, AT5-E
04068

NSSDC ID- 69-069A

LAUNCH DATE- 08/12/69 WEIGHT- 821. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1435.9 MIN
PERIAPSIS- 35777. KM ALT
EPOCH DATE- 11/01/69
INCLINATION- 2.5 DEG
APOAPSIS- 35790. KM ALT

PERSONNEL
MG - W.M. LEW, JR. NASA HEADQUARTERS
SC - NONE ASSIGNED
PH - J.E. KUPPERIAN, JR. NASA-GSFC
PS - B. LEDLEY NASA-GSFC

BRIEF DESCRIPTION
ATS 5 WAS AN EQUATORIAL-ORBITING, SYNCHRONOUS-ALTITUDE TECHNOLOGY SATELLITE INTENDED TO TEST VARIOUS COMMUNICATIONS AND EARTH OBSERVATIONAL SYSTEMS. ALSO INCLUDED ON BOARD WERE PARTICLE, ELECTRIC FIELD, AND MAGNETIC FIELD EXPERIMENTS. BECAUSE OF A MALFUNCTION, THE INTENDED GRAVITY GRADIENT STABILIZATION MECHANISM COULD NOT BE DEPLOYED, AND ATS 5 WAS STABILIZED IN A SPINNING MODE ABOUT THE SPACECRAFT Z-AXIS AT APPROXIMATELY 71 RPM. ALL EXPERIMENTS THAT DEPENDED ON THE PLANNED GRAVITY GRADIENT STABILIZATION WERE ADVERSELY AFFECTED TO VARYING DEGREES, AND THE MISSION WAS DECLARED A FAILURE. HOWEVER, SOME OF THE SCIENCE EXPERIMENTS, INCLUDING THE MAGNETIC FIELD MONITOR AND THE PARTICLE EXPERIMENTS RETURNED USABLE DATA. ATS 5 WAS POSITIONED AT ABOUT 105 DEG W LONGITUDE OVER THE PACIFIC OCEAN.

----- ATS 5, DAROSA-----

INVESTIGATION NAME- RADIO BEACON
NSSDC ID- 69-069A-12 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - A.V. DAROSA STANFORD U
OI - O.K. GARRIOTT NASA-JSC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF PHASE-COHERENT RADIO FREQUENCIES CONTINUOUSLY TRANSMITTED AT 137.350 AND 412.050 MHZ (3RD HARMONIC). THE TOTAL ELECTRON CONTENT ALONG THE PROPAGATION PATH WAS CALCULATED BY ANALYSIS OF THE FARADAY ROTATION ANGLE MEASUREMENTS ON THE LOWER FREQUENCY, OR ANALYSIS OF DIFFERENTIAL DOPPLER FREQUENCY RECORDINGS OF BOTH FREQUENCIES. IONOSPHERIC IRREGULARITIES AND SCINTILLATION WAS ALSO OBSERVED.

----- ATS 5, MCILWAIN-----

INVESTIGATION NAME- OMNIDIRECTIONAL HIGH-ENERGY PARTICLE
DETECTOR
NSSDC ID- 69-069A-03 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - C.E. MCILWAIN U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION
THREE PLASTIC SCINTILLATOR DETECTORS, EACH WITH A 2-PI SOLID ANGLE FIELD OF VIEW, MEASURED ELECTRONS IN 12 INTERVALS IN THE ENERGY RANGE 0.5 TO 5 MEV. SOLAR COSMIC RAYS WITH ENERGIES GREATER THAN 12, 16, AND 24 MEV WERE ALSO MEASURED. THE DETECTORS HAVE FUNCTIONED NORMALLY FROM LAUNCH TO AUGUST 1972, AFTER WHICH TIME THE DATA ACQUISITION WAS LIMITED TO SELECTED TIMES. THE SPACECRAFT SPIN DID NOT DEGRADE THE EXPERIMENT DATA.

----- ATS 5, SUGIURA-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR
NSSDC ID- 69-069A-13 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - M. SUGIURA NASA-GSFC
OI - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO STUDY THE PROCESSES TAKING PLACE ON THE AURORAL MAGNETIC SHELLS. IT ALSO INTENDED TO PROVIDE CORRELATIVE DATA FOR THE OTHER EXPERIMENTS ON THE SATELLITE. THE EXPERIMENT WAS PART OF THE MAGNETIC STABILIZATION SYSTEM THAT WAS THE BACKUP FOR THE GRAVITY-GRADIENT STABILIZATION SYSTEM. THE SENSOR SYSTEM CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER. THE SYSTEM MEASURED THE MAGNETIC FIELD ALONG THREE AXES BY COMBINING A FINE RANGE (PLUS OR MINUS 25 GAMMAS) AND A COARSE RANGE OF 32 INCREMENTS (32.8 GAMMA EACH) TO GIVE THE TOTAL RANGE PLUS AND MINUS 500 GAMMAS. THE FINE AND COARSE READINGS WERE SAMPLED ON THE PFM TELEMETRY AT 5.12-S INTERVALS. THE FINE READINGS ONLY WERE RECORDED ON THE PCM TELEMETRY AT 2.97-S INTERVALS. THE PCM COARSE READINGS WERE SUBCOMMUTATED AT 95-S INTERVALS. A

10-GAMMA CALIBRATION PULSE WAS INITIATED TWICE A DAY FOR 5.6 MIN. THE FAST SPIN RATE OF THE SATELLITE, THE SLOW SAMPLE RATE OF THE DATA, AND THE RESULTING ALIGNING PROBLEMS DEGRADED THE DATA IN THE SPIN PLANE.

***** ATS 6*****

SPACECRAFT COMMON NAME- ATS 6
ALTERNATE NAMES- PL-721A, ATS-F, ATS-F
7318

NSSDC ID- 74-039A

LAUNCH DATE- 05/30/74 WEIGHT- 930. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/31/74
ORBIT PERIOD- 1436.3 MIN INCLINATION- 1.8 DEG
PERIAPSIS- 35763.0 KM ALT APOAPSIS- 35818.0 KM ALT
PERSONNEL
MG - W.M. LEW, JR. NASA HEADQUARTERS
SC - NONE ASSIGNED
PH - J.E. KUPPERIAN, JR. NASA-GSFC
PS - E.A. WOLFF NASA-GSFC

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVES OF ATS 6 (APPLICATIONS TECHNOLOGY SATELLITE) WERE TO ERECT IN ORBIT A LARGE HIGH-GAIN STEERABLE ANTENNA STRUCTURE CAPABLE OF PROVIDING A GOOD QUALITY TV SIGNAL TO A GROUND-BASED RECEIVER AND TO MEASURE AND EVALUATE THE PERFORMANCE OF SUCH AN ANTENNA. A SECONDARY OBJECTIVE WAS TO DEMONSTRATE NEW CONCEPTS ON SPACE TECHNOLOGY IN THE AREAS OF AIRCRAFT CONTROL, LASER COMMUNICATIONS, AND VISUAL AND INFRARED MAPPING OF THE EARTH/ATMOSPHERE SYSTEM. THE SPACECRAFT WAS ALSO CAPABLE OF -- (1) MEASURING RADIO FREQUENCY INTERFERENCE IN SHARED FREQUENCY BANDS AND PROPAGATION CHARACTERISTICS OF MILLIMETER WAVES, (2) PERFORMING SPACECRAFT-TO-SPACECRAFT COMMUNICATION AND TRACKING EXPERIMENTS, AND (3) MAKING PARTICLE AND RADIATION MEASUREMENTS OF THE GEOSYNCHRONOUS ENVIRONMENT. CONFIGURED SOMEWHAT LIKE AN OPEN PARASOL, THE ATS 6 SPACECRAFT CONSISTED OF FOUR MAJOR ASSEMBLIES -- (1) A 9.15-M-DIAM DISH ANTENNA, (2) TWO SOLAR CELL PADDLES MOUNTED AT RIGHT ANGLES TO EACH OTHER ON OPPOSITE SIDES OF AN UPPER EQUIPMENT MODULE, (3) AN EARTH-VIEWING EQUIPMENT MODULE (EVM) CONNECTED BY A TUBULAR MAST TO THE UPPER EQUIPMENT MODULE, AND (4) AN ATTITUDE CONTROL AND STABILIZATION SYSTEM. THE EVM, IN ADDITION TO HOUSING THE EARTH-VIEWING EXPERIMENTS, PROVIDED SUPPORT FOR THE PROPULSION SYSTEM AND TANKS, BATTERIES, A MULTIFREQUENCY TRANSPONDER, AND THE TELEMETRY, COMMAND, AND THERMAL CONTROL SYSTEMS. THE UPPER EQUIPMENT MODULE PROVIDED A PLATFORM FOR THE SPACE-VIEWING EXPERIMENTS. INERTIA WHEELS WILL BE THE PRIME MEANS FOR TORQUING THE SPACECRAFT, WITH BOTH HYDRAZINE AND AMMONIA MULTIJET THRUSTER SYSTEMS INCLUDED TO PROVIDE THE NECESSARY TORQUES FOR UNLOADING THE WHEELS. ALSO INCLUDED IS A SMALL ENVIRONMENT MEASUREMENT PACKAGE CONTAINING A MAGNETOMETER AND SEVERAL PARTICLE EXPERIMENTS.

----- ATS 6, ARNOLDY-----

INVESTIGATION NAME- LOW-ENERGY PROTON/ELECTRON EXPERIMENT
NSSDC ID- 74-039A-03 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - R.L. ARNOLDY U OF NEW HAMPSHIRE

BRIEF DESCRIPTION
THIS INVESTIGATION IS DESIGNED TO MONITOR SPECTRA AND PITCH ANGLE DISTRIBUTIONS OF BOTH ELECTRONS AND PROTONS FROM 0 TO 22 KEV. ELECTRON AND PROTON DATA FROM THE SAME DIRECTION ARE OBTAINED SIMULTANEOUSLY USING 4 DOUBLE 90-DEG CYLINDRICAL ELECTROSTATIC ANALYZERS AND 8 BENDIX-CHANNEL ELECTRON MULTIPLIERS. SWEEP MODE DETECTORS VIEW PITCH ANGLES OF 0 AND 90 DEG, WHILE THE PITCH MODE DETECTORS VIEW 45- AND 165-DEG PITCH ANGLES. THE FOUR PITCH MODE DETECTORS STEP THROUGH EIGHT ENERGY LEVELS AT ONE LEVEL/S. THE 4 SWEEP MODE DETECTORS SWEEP FROM APPROXIMATELY 16 KEV TO 0 ENERGY ONCE PER SECOND, OR CAN BE COMMANDED TO DWELL AT ANY OF 16 LEVELS UP TO APPROXIMATELY 22 KEV. THE SWEEP MODE DETECTORS HAVE TWO HIGH SPEED ACCUMULATORS THAT READ OUT EIGHT TIMES/FRAME, AND TWO ACCUMULATORS THAT READ OUT ONCE/FRAME. FOUR PERMUTATIONS OF DETECTORS WITH ACCUMULATORS ARE POSSIBLE BY COMMAND. IF THE DETECTORS ARE SWEEPING, THE SLOW ACCUMULATORS PROVIDE DATA INTEGRATED OVER THE SPECTRUM. BACKGROUND COUNT RATES ARE OBTAINED FOR 8 S APPROXIMATELY EVERY 94 MIN BY APPLICATION OF APPROXIMATELY 10 V OF CONSTANT REVERSE POLARITY ON THE ELECTROSTATIC ANALYZERS. GAIN LEVEL STABILITY OF THE CHANNEL ELECTRON MULTIPLIERS CAN BE CHECKED BY COMMAND TO LOWER THE PREAMPLIFIER THRESHOLD DISCRIMINATOR SETTINGS. FOR FURTHER DETAILS, SEE IEEE TRANS. ON AEROSPACE AND ELECTRONIC SYSTEMS, AES-11, 1155-1157, 1975.

ORIGINAL PAGE IS
OF POOR QUALITY

----- ATS 6, COLEMAN, JR.-----

INVESTIGATION NAME- MAGNETOMETER EXPERIMENT

NSSDC ID- 74-039A-02 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - P.J. COLEMAN, JR. U OF CALIF, LA
OI - W.O. CUMMINGS GRAMBLING COLLEGE

BRIEF DESCRIPTION A THREE-AXIS, BOOM-MOUNTED FLUXGATE MAGNETOMETER SYSTEM OBTAINED MEASUREMENTS OF THE AMBIENT MAGNETIC FIELD AT SYNCHRONOUS ALTITUDE. THE DETECTOR WAS SIMILAR TO THAT FLOWN BY UCLA ON OGO 5 AND ATS 1. IT CONSISTED OF A BASIC MAGNETOMETER WITH A DYNAMIC RANGE OF -16 TO +16 NT (GAMMA), AND A RESOLUTION OF 1/16 NT. COILS WERE USED TO NULL THE AMBIENT FIELD SUCH THAT THE RESULTANT WAS WITHIN THE DYNAMIC RANGE OF THE BASIC MAGNETOMETER. THIS OFFSET FIELD GENERATOR PERMITTED FIELDS FROM -512 TO +512 NT TO BE MEASURED (IN 16 STEPS). THE MAGNETOMETER WAS SAMPLED AT 8 VECTORS PER S, AND THE OFFSET FIELD STATE WAS SAMPLED AT 4 VECTORS PER S. THE ELECTRONICS AND SENSOR SYSTEM WAS EQUIPPED WITH AN 'ALIASING' FILTER, WITH AN UPPER LIMIT OF 2.25 HZ. AT 4 HZ, REJECTION WAS 20 DB. OFFSET STABILITY WAS ESTIMATED TO BE 1 NT PER 6 MONTHS. THE SPACECRAFT FIELD WAS ESTIMATED, DURING A ROLL MANEUVER, TO BE LESS THAN 2 NT TRANSVERSE AND LESS THAN 5 NT EARTHWARD. THE NOMINAL INSTRUMENT NOISE LEVEL WAS ESTIMATED TO BE SLIGHTLY IN EXCESS OF THE 1/16 NT DIGITAL RESOLUTION OF THE MAGNETOMETER.

----- ATS 6, DAVIES-----

INVESTIGATION NAME- RADIO BEACON

NSSDC ID- 74-039A-09 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S) IONOSPHERES AND RADIO PHYSICS

PERSONNEL PI - K. DAVIES NOAA-ERL
OI - R.D. FRITZ NOAA-ERL
OI - R.N. GRUBB NOAA-ERL

BRIEF DESCRIPTION THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY VARIATIONS OF IONOSPHERIC PARAMETERS (TOTAL ELECTRON CONTENT, SCINTILLATION, IRREGULARITIES, AND ABSORPTION) WITH TIME AND SOLAR AND MAGNETIC ACTIVITY, AND TO STUDY THE RELATION OF THESE VARIATIONS TO IONOSPHERIC PROCESSES. THE RADIO BEACON EXPERIMENT PROVIDED THREE COHERENT CARRIER FREQUENCIES (40,0160 MHZ, 140,056 MHZ AND 360,1440 MHZ) FOR INVESTIGATION OF PARTICLES AFFECTING RADIO PROPAGATION. THE BEACON WAS DESIGNED FOR SEVERAL TYPES OF MEASUREMENTS, PRINCIPALLY FARADAY ROTATION, DIFFERENTIAL PHASE (DOPPLER), PHASE AND AMPLITUDE SCINTILLATION, AND SIGNAL AMPLITUDE (ABSORPTION). THE 40-MHZ CARRIER WAS AMPLITUDE STABILIZED TO ENABLE ACCURATE ABSORPTION MEASUREMENTS TO BE MADE. DIFFERENTIAL FARADAY MEASUREMENTS WERE POSSIBLE WITH CARRIERS AND SIDEBANDS. THE MODE OF OPERATION CALLED FOR CONTINUOUS EMISSION ON ALL FREQUENCIES. RESEARCH ORGANIZATIONS FROM A NUMBER OF COUNTRIES CONDUCTED STUDIES OF THE RADIO BEACON USING GROUND RECEIVERS BASED ON A UNIT DESIGNED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. GROUND STATIONS RANGING FROM COMPUTER-CONTROLLED UNITS TO SIMPLE MANUAL UNITS WERE LOCATED AT POINTS IN NORTH AND SOUTH AMERICA, EUROPE, THE MIDDLE EAST, INDIA, AND AFRICA. MANY OF THE UNITS WERE MOBILE AND MOVED FROM CONTINENT TO CONTINENT TO KEEP THE SPACECRAFT IN SIGHT WHEN ITS ORBIT SHIFTED ALONG THE EQUATOR.

----- ATS 6, DUNKERLY-----

INVESTIGATION NAME- SOLAR CELL RADIATION DAMAGE

NSSDC ID- 74-039A-16 INVESTIGATIVE PROGRAM CODE EC
INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - W. DUNKERLY HUGHES AIRCRAFT CO

BRIEF DESCRIPTION THIS EXPERIMENT WAS FLOWN TO ISOLATE THE PREDOMINANT DEGRADATION MECHANISM(S) ASSOCIATED WITH PRESENTLY USED SOLAR CELLS, AND TO ELIMINATE ANOMALOUS DATA THROUGH INCREASED DATA POINTS AND IMPROVED INSTRUMENTATION ACCURACY. A TOTAL OF 80 SOLAR CELLS WERE INDIVIDUALLY MONITORED ON THE FLIGHT EXPERIMENT. TWELVE CURRENT-VOLTAGE POINTS AND TEMPERATURE DATA FOR EACH SOLAR CELL WERE TRANSMITTED TO GROUND ON A REAL-TIME BASIS. FIVE SOLAR CELLS OF 16 TYPES HAVE BEEN INCLUDED TO PROVIDE A STATISTICALLY MEANINGFUL SAMPLE SIZE. A SOLAR ASPECT SENSOR INSURED THAT THE SUN IS NORMAL TO THE TEST CELLS AT THE TIME OF THE MEASUREMENTS.

----- ATS 6, FRITZ-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS

NSSDC ID- 74-039A-01 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - T.A. FRITZ NOAA-ERL
OI - A. KONRADY NASA-JSC
OI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTED OF FOUR 2-ELEMENT SOLID-STATE TELESCOPES, MOUNTED IN A PLANE SUCH THAT TWO (A AND H) LINKED RADIALLY AWAY FROM THE EARTH. THE THIRD TELESCOPE (B) WAS AT 90 DEG RELATIVE TO A AND H AND LINKED 13 DEG EAST OF SOUTH, AND THE FOURTH TELESCOPE (C) LINKED NORTHWARD, 45 DEG FROM A AND H. TELESCOPES A, B, AND C HAD GEOMETRIC FACTORS (G.F.) 6.6E-4 THROUGH 7.E-4 CM-SQ STER, AND TELESCOPE H HAD A 1.E-3 CM-SQ STER G.F. THE APERTURE OF EACH TELESCOPE DERIVED A CONICAL OPENING OF 11 DEG FULL ANGLE. ONCE EVERY 4 S, TELESCOPES A, B, AND C EACH MEASURED PROTON FLUXES IN SIX CONTIGUOUS, LOGARITHMICALLY EQUAL ENERGY CHANNELS BETWEEN 25.5 AND 234 KEV AND, ONCE EVERY 16 S, 234 TO 2.8-MEV PROTON FLUXES. THESE MODES HAD NO ELECTRON OR HIGHER ENERGY PROTON BACKGROUND. FROM THE H TELESCOPE, DE/DX VS E FLUXES OF 1.2 TO 1.8 AND 1.8 TO 3.6 MEV ALPHA PARTICLES AND OF HEAVIER PARTICLES IN THE Z RANGES 3 THROUGH 6 AND 6 THROUGH 8 WERE OBTAINED ONCE EACH 128 S. IN ADDITION, FIVE FLUXES WERE DETERMINED FROM OUTPUT OF THE FIRST H SENSOR ONLY, BUT AT FIVE DISCRIMINATION LEVELS. THESE CORRESPONDED MAINLY TO ALPHA PARTICLES IN THE .5 TO .8 AND .8 TO 2.7 MEV RANGES AND HEAVIER PARTICLES WITH Z VALUES GREATER THAN 2, 5, AND 8. PROTON FLUXES IN SEVEN ADDITIONAL CHANNELS BETWEEN .362 AND 1.1 MEV WERE ALSO DETERMINED ONCE EACH 3.3 S BY USE OF APPROPRIATE H-TELESCOPE DISCRIMINATION LEVELS. FOR FURTHER DETAILS, SEE FRITZ AND KESSNA, IEEE TRANS, AES-11, 1145, 1975.

----- ATS 6, GALICINAO-----

INVESTIGATION NAME- TRACKING AND DATA RELAY

NSSDC ID- 74-039A-18 INVESTIGATIVE PROGRAM CODE EC
INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - I.Y. GALICINAO NASA-GSFC

BRIEF DESCRIPTION THIS EXPERIMENT PROVIDED EXPERIENCE AND INFORMATION USED IN DESIGNING TRACKING AND DATA RELAY SYSTEMS. THE SPECIFIC OBJECTIVES WERE TO -- (1) ESTABLISH THE ORBIT OF A LOW-ORBITING SPACECRAFT FROM A HIGHER ORBITING SPACECRAFT, AND (2) DEMONSTRATE THE TECHNOLOGY OF COMMAND AND TELEMETRY DATA TRANSMISSION BETWEEN A LOW-ALTITUDE SATELLITE AND A GROUND STATION USING A GEOSYNCHRONOUS SATELLITE AS A COMMUNICATIONS RELAY. THIS EXPERIMENT USED THE ATS 6 AS A REPEATER FOR INFORMATION TRANSMISSION BETWEEN EARTH AND A SECOND SATELLITE, SUCH AS NIMBUS. IT WAS A DUPLEX LINK THAT REQUIRED THE TRANSPONDER TO TRANSMIT AND RECEIVE ON TWO CHANNELS SIMULTANEOUSLY. SEVERAL SATELLITE-TO-SATELLITE EXPERIMENTS WERE PLANNED USING ATS 6, WHICH WAS IN A GEOSYNCHRONOUS-EQUATORIAL ORBIT AND THE GEODETIC EARTH ORBITING SATELLITE-C (GEOS 3), WHICH IS IN A NEAR-EARTH, NEAR-CIRCULAR ORBIT.

----- ATS 6, GALICINAO-----

INVESTIGATION NAME- POSITION, LOCATION AND AIRCRAFT COMMUNICATION

NSSDC ID- 74-039A-19 INVESTIGATIVE PROGRAM CODE EC
INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - I.Y. GALICINAO NASA-GSFC
OI - A.F. GHAS NASA-GSFC

BRIEF DESCRIPTION THE POSITION LOCATION AND AIRCRAFT COMMUNICATION EXPERIMENT (PLACE) WAS USED TO DETERMINE THE OPERATIONAL FEASIBILITY OF AIR TRAFFIC CONTROL AND MARITIME SATELLITE SYSTEMS OPERATING IN THE AERONAUTICAL L-BAND. THE FIRST OBJECTIVE WAS TO PROVE THE FEASIBILITY OF TWO-WAY COMMUNICATIONS RELAYED BY SATELLITE BETWEEN GROUND TERMINALS AND AIRCRAFT OR SHIPS, INCLUDING -- (1) THE USE OF ATS 6 AS A SYNCHRONOUS SATELLITE FOR RELAYING COMMUNICATIONS, (2) THE USE OF THE AERONAUTICAL L-BAND FOR SATELLITE/AIRCRAFT AND SATELLITE/SHIP LINKS, (3) THE USE OF BOTH VOICE AND DIGITAL TWO-WAY COMMUNICATION, AND (4) THE USE OF A SATELLITE FOR AIRCRAFT/GROUND AND SHIP/SHORE MULTIPLE ACCESS COMMUNICATIONS. THE SECOND OBJECTIVE WAS TO INVESTIGATE THE FEASIBILITY AND TO EVALUATE THE ABSOLUTE AND RELATIVE ACCURACIES OF SEVERAL POSITION LOCATION TECHNIQUES USING SATELLITES. THESE

TECHNIQUES RELAY VARIOUS SIGNALS FROM THE AIRCRAFT OR SHIP VIA THE SATELLITE TO THE CONTROL CENTER FOR DATA PROCESSING AND POSITION DETERMINATION.

----- ATS 6, KAMPINSKY-----

INVESTIGATION NAME- R.F. INTERFEROMETER SUBSYSTEM

NSSDC ID- 74-039A-29 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - A. KAMPINSKY NASA-GSFC

BRIEF DESCRIPTION THE RADIO FREQUENCY INTERFEROMETER (RFI), WHEN USED IN CONJUNCTION WITH TWO GROUND TRANSMITTERS, PROVIDES THE MEANS OF DETERMINING SPACECRAFT ATTITUDE IN ROLL, PITCH, AND COMPUTED YAW TO AN ACCURACY OF PLUS OR MINUS 0.018 DEG. WITHIN A 12.5-DEG CONICAL FOV AND TO PLUS OR MINUS 0.025 DEG WITHIN A 30-DEG CONICAL FOV CENTERED ON THE SPACECRAFT Z-AXIS. THE INTERFEROMETER CONTAINED -- (1) AN ANTENNA ARRAY, WHICH CONSISTED OF TWO ORTHOGONAL BASELINES WAS MOUNTED ON THE EARTH-VIEWING SURFACE OF THE EARTH-VIEWING MODULE, (2) A TWO-CHANNEL RECEIVER, ONE FOR REFERENCE SIGNAL AND ONE FOR COMPARISON SIGNAL, (3) A SPACECRAFT DATA CONVERTER, WHICH MEASURED THE PHASE RELATIONSHIP OF THE RECEIVER OUTPUT SIGNALS WITH RESPECT TO A COHERENT REFERENCE SIGNAL, AND WHICH CONVERTED THESE MEASUREMENTS TO DIGITAL FORM WHICH CAN BE TELEMETERED TO GROUND OR CONNECTED TO THE ALTITUDE CONTROL SYSTEM (A COMPLETE MEASUREMENT CAN BE MADE EVERY 230 MS AND TELEMETERED ONCE EVERY 3 S), AND (4) AN INTERFEROMETER HIGH-SPEED DATA LINK, WHICH WAS THE RESULTANT OUTPUT OF THE DIGITAL CONVERTER PHASE-COUNT GATE AND A 4-MHZ OSCILLATOR.

----- ATS 6, MASLEY-----

INVESTIGATION NAME- SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION

NSSDC ID- 74-039A-06 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - A.J. MASLEY AEROJET ELECTROSYSTEMS OI - P.R. SATTERBLOM MCDONNELL-DOUGLAS CORP

BRIEF DESCRIPTION TWO SOLID-STATE TELESCOPES, ONE DIRECTED PERPENDICULAR TO AND THE OTHER DIRECTED PARALLEL TO THE LOCAL MAGNETIC FIELD DIRECTION, EACH MEASURED PROTONS FROM 0.2 TO 300 MEV IN 12 ENERGY INTERVALS AND ALPHA PARTICLES FROM 1.2 TO 180 MEV IN 10 ENERGY INTERVALS. TWO MAGNETIC ELECTRON SPECTROMETERS, ORIENTED PARALLEL TO THE TWO TELESCOPES, MEASURED ELECTRONS FROM 50 TO 800 KEV IN FOUR ENERGY INTERVALS.

----- ATS 6, MILLER-----

INVESTIGATION NAME- TELEVISION RELAY USING SMALL TERMINALS

NSSDC ID- 74-039A-28 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - J.E. MILLER NASA-GSFC

BRIEF DESCRIPTION THE PURPOSE OF THE TELEVISION RELAY USING SMALL TERMINALS (TRUST) EXPERIMENT WAS TO ADVANCE AND PROMOTE THE TECHNOLOGY OF WIDE-BAND SATELLITE COMMUNICATIONS TO SMALL GROUND TERMINALS, BY DEVELOPING AND DEMONSTRATING A PILOT SYSTEM USING THE ATS 6 SPACECRAFT WITH ITS HIGH-GAIN PARABOLIC REFLECTOR. SPECIFIC GOALS WERE -- (1) TO TEST AND EVALUATE AN EXPERIMENTAL SYSTEM FOR FM RELAY OF BLACK AND WHITE AND COLOR TV SIGNALS (AND ASSOCIATED SOUND) BETWEEN THE ATS 6 SPACECRAFT AND A UHF RECEIVING FACILITY, (2) TO EVALUATE THE PERFORMANCE OF THE PILOT SYSTEM RELATIVE TO EXPERIMENT DESIGN OBJECTIVES AND INTERNATIONALLY RECOGNIZED AND ACCEPTED STANDARDS FOR TV-TRANSMISSION SYSTEMS, (3) TO OBSERVE THE EFFECTS OF IONOSPHERIC DISPERSION ON SYSTEM PERFORMANCE AS A FUNCTION OF ELECTRON DENSITY, GROUND STATION LOCATION, OTHER SYSTEM VARIABLES, AND COMPARE WITH THEORETICAL PREDICTIONS, AND (4) TO PROVIDE INTERESTED UNDERDEVELOPED COUNTRIES AN OPPORTUNITY TO PARTICIPATE IN TESTS AND DEMONSTRATIONS OF A HIGH EFFECTIVE ISOTROPIC RADIATIVE POWER (EIRP) SATELLITE SUITABLE FOR NATIONAL EDUCATION TV USING INEXPENSIVE RECEIVERS. THE BASIC EXPERIMENT SYSTEM CONSISTED OF A HIGH-POWER MICROWAVE TRANSMITTING TERMINAL FOR EARTH-TO-SATELLITE COMMUNICATIONS, THE SPACECRAFT WITH A MICROWAVE-TO-UHF COMMUNICATIONS REPEATER, AND A PILOT MOBILE UHF GROUND RECEIVING FACILITY.

----- ATS 6, PAULIKAS-----

INVESTIGATION NAME- OMNIDIRECTIONAL SPECTROMETER

NSSDC ID- 74-039A-07 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - G.A. PAULIKAS AEROSPACE CORP OI - J.B. BLAKE AEROSPACE CORP

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTED OF FOUR SOLID-STATE INSTRUMENTS. ONE OF THESE WAS A TWO ELEMENT TELESCOPE WITH A 30-DEG CONE ANGLE AND THE OTHER THREE WERE OMNIDIRECTIONAL DETECTORS. PARTICLES MEASURED WERE ELECTRONS BETWEEN 140 AND 600 KEV, ELECTRONS ABOVE 0.7, 1.55, AND 3.9 MEV, PROTONS IN THE INTERVALS FROM 2.3 TO 5.3, 3.4 TO 5.3, 12 TO 26, 20 TO 52, AND 40 TO 90 MEV, AND ALPHA PARTICLES IN THE INTERVALS FROM 9.4 TO 21.2, 13.4 TO 21.2, AND 46 TO 100 MEV. THE LOWEST ENERGY ELECTRON MODE AND THE TWO LOWEST ENERGY PROTON AND ALPHA PARTICLE MODES WERE DIRECTIONAL. ALL OTHER MODES WERE OMNIDIRECTIONAL. COUNTS WERE ACCUMULATED OVER 0.25 S EVERY 4 S FOR EACH ELECTRON MODE AND OVER 1 S EVERY 8 S FOR EACH PROTON MODE. FOR MORE DETAIL, SEE P 1138 OF 'IEEE TRANS..' AES-11, 6, NOVEMBER 1975. FOR MORE DETAILS SEE PAULIKAS, G.A., BLAKE, J.B., IMAMOTO, S.S., 'ATS 6 ENERGETIC PARTICLE RADIATION MEASUREMENTS AT SYNCHRONOUS ALTITUDE' IEEE TRANS AEROSPACE AND ELECTRONIC SYSTEMS, AES-11, NO. 6, PAGE 1138.

----- ATS 6, WHALEN-----

INVESTIGATION NAME- HEALTH AND EDUCATION TELECOMMUNICATIONS

NSSDC ID- 74-039A-24 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL PI - A.A. WHALEN NASA-GSFC

BRIEF DESCRIPTION THE S-BAND HEALTH, EDUCATION, TELECOMMUNICATIONS (HET) EXPERIMENT WAS FLOWN TO EVALUATE THE PERFORMANCE AND EFFECTIVENESS OF SATELLITE RELAY OF EDUCATIONAL PROGRAMMING AND HEALTH CARE DELIVERY TO FACILITIES SUCH AS SCHOOLS, NEW LEARNING CENTERS, HOSPITALS, CLINICS, AND COMMUNITY ANTENNA TELEVISION DISTRIBUTION SYSTEMS. THE SPACECRAFT WAS EQUIPPED WITH A TWO-CHANNEL TV TRANSMITTING CAPABILITY IN THE 2.5- TO 2.69-GHZ BAND. THE HET EXPERIMENT PROVIDED THE FIRST OPPORTUNITY TO USE SATELLITE COMMUNICATIONS FOR THE TRANSMISSION OF TV AND MULTIPLE VOICE CHANNELS TO LOW-COST EARTH STATIONS. THE SPACECRAFT INCLUDED A PRIME-FOCUS FEED COMPLEX HAVING A CROSSED-ARRAY OF SWITCHABLE BROADBAND S-BAND FEED ELEMENTS. TWO OF THESE FEED ELEMENTS WERE USED FOR THE HET EXPERIMENT. SIX EXPERIMENT COMPONENTS REQUIRING SEVEN DIFFERENT SPACECRAFT POINTINGS ARE INVOLVED IN THIS EXPERIMENT. THE SIX COMPONENTS ARE -- (1) APPALACHIAN REGIONAL COMMISSION EXPERIMENTS, (2) THE VETERANS ADMINISTRATION EXPERIMENTS, (3) SATELLITE TECHNOLOGY DEMONSTRATION, (4) WASHINGTON, ALASKA, MONTANA, AND IDAHO EXPERIMENTS, (5) ALASKA HEALTH SERVICES EXPERIMENTS, AND (6) ALASKA EDUCATION EXPERIMENTS.

***** BE-C*****

SPACECRAFT COMMON NAME- BE-C ALTERNATE NAMES- EXPLORER 27, 5 66C 01328

NSSDC ID- 65-032A

LAUNCH DATE- 04/29/65 WEIGHT- 60. KG LAUNCH SITE- Wallops Flight Center, UNITED STATES LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSS

ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/28/77 ORBIT PERIOD- 107.7 MIN INCLINATION- 41.1 DEG PERIAPSIS- 927. KM ALT APOAPSIS- 1320. KM ALT

PERSONNEL MG - NONE ASSIGNED NASA HEADQUARTERS PM - F.T. MARTIN NASA-GSFC PS - L.H. BRACE

BRIEF DESCRIPTION BE-C (EXPLORER 27) WAS A SMALL IONOSPHERIC RESEARCH SATELLITE INSTRUMENTED WITH AN ELECTROSTATIC PROBE, RADIO BEACONS, A PASSIVE LASER TRACKING REFLECTOR, AND A DOPPLER NAVIGATION EXPERIMENT. ITS PRIMARY OBJECTIVE WAS TO OBTAIN WORLDWIDE OBSERVATIONS OF TOTAL ELECTRON CONTENT BETWEEN THE SPACECRAFT AND THE EARTH. THE SATELLITE WAS INITIALLY SPIN STABILIZED, BUT DESPUN AFTER SOLAR PADDLE ERECTION. SUBSEQUENT STABILIZATION ORIENTED THE SATELLITE AXIS OF SYMMETRY WITH THE LOCAL MAGNETIC FIELD BY MEANS OF A STRONG BAR MAGNET AND

ORIGINAL PAGE IS OF POOR QUALITY

DAMPING RODS. A THREE-AXIS MAGNETOMETER AND SUN SENSORS PROVIDED INFORMATION ON THE SATELLITE ATTITUDE AND SPIN RATE. THERE WAS NO TAPE RECORDER ABOARD SO THAT SATELLITE PERFORMANCE DATA AND ELECTROSTATIC PROBE DATA WERE OBSERVED ONLY WHEN THE SATELLITE WAS WITHIN RANGE OF A GROUND TELEMETRY STATION. CONTINUOUS TRANSMITTERS OPERATED AT 162 AND 324 MHZ TO PERMIT PRECISE TRACKING BY 'TRANSIT' TRACKING STATIONS FOR NAVIGATION AND GEODETIC STUDIES.

----- BE-C, BERBERT-----

INVESTIGATION NAME- LASER TRACKING REFLECTOR

NSSDC ID- 65-032A-03 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S) GEODESY

PERSONNEL
PI - J.H. BERBERT NASA-GSFC
OI - C.C. STEPHANIDES NASA-GSFC

BRIEF DESCRIPTION
THE PASSIVE OPTICAL LASER EXPERIMENT, WHICH CONSISTED OF NINE PANELS ON THE SPACECRAFT, WAS USED TO DETERMINE THE SPACECRAFT RANGE AND ANGLE. EACH PANEL WAS COVERED WITH 4C QUARTZ CUBE-CORNER PRISMS THAT PROVIDED LASER TRACKING CAPABILITIES FOR OPTICAL TRACKING STUDIES. THE GROUND-BASED OPTICAL TRANSMITTER WAS A PULSED 1-MS RUBY LASER. A PHOTO DETECTOR DETERMINED WHETHER THE LASER BEAM INTERRUPTED THE SPACECRAFT.

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

SPACECRAFT COMMON NAME- COS-B
ALTERNATE NAMES- COSMIC RAY SATELLITE-B, PL-741B

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
UNITED STATES NASA-DSS

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
MG - W. KLEEN ESA
PM - G. ALTMANN 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-MEV TO 1-GEV ENERGY RANGE FROM A HIGHLY ELLIPTICAL ORBIT OF ROUGHLY 100,000-KM APOGEE, 35C-M 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, WEIGHING 277.5 KG (610 LB), 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, GIVE THE SPACECRAFT A TOTAL EFFECTIVE HEIGHT OF 172.2 CM. THE SPACECRAFT ENCLOSED A GAMMA-RAY ASTRONOMY EXPERIMENT CONSISTING OF A SPARK CHAMBER MOUNTED IN A CENTRAL TUBE AND SURROUNDED BY EQUIPMENT PLATFORMS, TRIGGERING TELESCOPES, PHOTOMULTIPLIERS, UPPER AND LOWER GEIGER COUNTERS, AND AN ENERGY CALORIMETER. 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-W REAL-TIME ONLY TRANSMITTER AND A PCM/PSK/PM UP-LINK/DOWN-LINK, RANGE-TONE COMMAND SYSTEM. POWER WAS SUPPLIED BY 948 SOLAR CELLS MOUNTED ON 12 SUBPANELS 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. MEMBERS OF THE UNIVERSITY AND RESEARCH GROUPS WHO INITIALLY CONCEIVED AND IMPLEMENTED THIS SATELLITE ARE LISTED IN APPENDIX B WITH THEIR AFFILIATIONS. OTHER INDIVIDUALS WHO JOINED THIS EFFORT ARE INCLUDED IN THE LIST.

----- 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.

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 RADIATION FROM ALL OBSERVED SOURCES, (5) TO SEARCH FOR LONG-TERM VARIATIONS IN THE STRENGTH OF SOURCES, AND (6) 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 DOME, (2) 16-DECK SPARK CHAMBER (SC), (3) HIGH-VOLTAGE TRIGGERING TELESCOPE (TT), (4) ENERGY CALORIMETER (E), AND (5) CASADE-PARTICLE PLASTIC SCINTILLATOR COUNTER (D). THE ANTICOINCIDENCE COUNTER WAS A DOME OF SCINTILLATION PLASTIC, 10 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 ION WHICH THE ARRIVAL DIRECTION OF THE GAMMA RAY COULD BE DETERMINED. THE RECHARGE TIME OF THE SC HIGH VOLTAGE WAS 0.1 SEC. THE TT CONSISTED OF THREE ELEMENTS -- A 4-MM-THICK SCINTILLATION COUNTER (C1) ABLE TO IDENTIFY EVENTS IN WHICH AN E-P PAIR LEFT THE SC, A CERENKOV COUNTER (C) OF 30-MM-THICK PLEXIGLASS THAT WAS SENSITIVE TO RELATIVISTIC PARTICLES MOVING IN A DOWNWARD DIRECTION, AND A SECOND SCINTILLATOR (C2) 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, D. THE OUTPUT OF D 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.

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

SPACECRAFT COMMON NAME- COSMOS 900
ALTERNATE NAMES- 09898, 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- 523. KM ALT

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

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

----- COSMOS 900, AFDNIN-----

INVESTIGATION NAME- FLAT RETARDING POTENTIAL ANALYZER

NSSDC ID- 77-023A-01 INVESTIGATIVE PROGRAM
SPACE PHYSICS

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
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

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

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

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

INVESTIGATION NAME- SPHERICAL ION TRAP WITH FLOATING
POTENTIAL

NSSDC ID- 77-023A-03 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. GDALEVICH IKI
OI - V.D. 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
SPACE PHYSICS

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
SPACE PHYSICS

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-C7 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - H.M. SCHUTTE IKI

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

----- COSMOS 900, SOSNOVETS-----

INVESTIGATION NAME- DIFFERENTIAL ENERGY SPECTROMETER

NSSDC ID- 77-023A-05 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - E.N. SOSNOVETS INST NUCLEAR PHYSICS
OI - M.I. PANASYUK INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES TRAPPED AND PRECIPITATING
ELECTRONS AND PROTONS FROM 30 TO 300 KEV.

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

INVESTIGATION NAME- DIFFERENTIAL LOW ENERGY SPECTROMETER

NSSDC ID- 77-023A-06 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - M.V. TELTSOV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES ELECTRONS AND PROTONS FROM 0.5
TO 20 KEV.

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

INVESTIGATION NAME- AURORAL PHOTOMETER

NSSDC ID- 77-023A-09 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - V.I. TULUPOV INST NUCLEAR PHYSICS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURES AURORAL LIGHT EMISSIONS AT 3914
A.

***** D5-B*****

SPACECRAFT COMMON NAME- D5-B
ALTERNATE NAMES- CASTOR, 07E02

NSSDC ID- 75-039B

LAUNCH DATE- 05/17/75 WEIGHT- 76. KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- DIAMANT

SPONSORING COUNTRY/AGENCY
FRANCE CNES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/18/75
ORBIT PERIOD- 100.3 MIN INCLINATION- 29.90 DEG
PERIAPSIS- 272. KM ALT APOAPSIS- 1271. KM ALT

PERSONNEL
PM - A. OLIVERO CNES
PS - F.E. BARLIER CERGA

BRIEF DESCRIPTION
THIS FRENCH SPACECRAFT HAD A 26-FACE POLYHEDRON SHAPE
WITH A DIAMETER OF 80 CM. THE PRIMARY MISSION OBJECTIVE WAS TO
STUDY THE UPPER ATMOSPHERE DENSITY VARIATIONS. SECONDARY
OBJECTIVES INCLUDED A STUDY OF GRAVITY FIELD PERTURBATIONS AND
A STUDY OF MICROMETEORITE IMPACTS. A THREE-AXIS MAGNETOMETER
WAS USED TO PROVIDE ATTITUDE INFORMATION. EACH ONE OF THE
SPACECRAFT FACES CONTAINED A LASER REFLECTOR. DATA WERE
MEASURED EITHER EVERY 0.1 S OR EVERY 2.8 S. THE DATA
TRANSMISSION RATE WAS 1024 BITS/S FROM THE TAPE RECORDER AND
EITHER 256 OR 512 BITS/S DIRECTLY FROM TELEMETRY. OPERATIONS
WERE CONDUCTED BY THE OPERATIONS CENTER IN TOULOUSE USING THE
CNES NETWORK OF TELEMETRY AND TELECOMMAND STATIONS.

ORIGINAL PAGE IS
OF POOR QUALITY

----- D5-B, BARLIER-----

INVESTIGATION NAME- UPPER ATMOSPHERE DENSITY STUDY USING ON-BOARD ACCELEROMETER

NSSDC ID- 75-039B-01 INVESTIGATIVE PROGRAM SCIENCE
INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS

PERSONNEL PI - F.E. BARLIER CERGA

BRIEF DESCRIPTION THIS ATMOSPHERIC DENSITY ACCELEROMETER EXPERIMENT PROVIDED DENSITY DATA FROM MEASUREMENTS OF THE SATELLITE DECELERATION DUE TO ATMOSPHERIC DRAG. THE ACCELEROMETER CONSISTED OF A BALL SUSPENDED IN A SPHERICAL CAVITY FORMING A CAPACITOR. DISPLACEMENT OF THE BALL WITH RESPECT TO THE CAVITY WAS MEASURED BY CAPACITANCE CHANGE. THE RANGE OF MEASUREMENT WAS 1.E-5 TO 1.E-9 M/S SQ WITH AN ACCURACY OF 1.5 PERCENT. IN-FLIGHT QUALIFICATION WAS ACHIEVED BY DISPLACING THE ACCELEROMETER WITH SMALL MASSES AND BY SPINNING THE SATELLITE TO INDUCE ARTIFICIAL INERTIA FORCES.

----- D5-B, BARLIER-----

INVESTIGATION NAME- MICROMETEORITE STUDY

NSSDC ID- 75-039B-03 INVESTIGATIVE PROGRAM SCIENCE
INVESTIGATION DISCIPLINE(S) INTERPLANETARY DUST

PERSONNEL PI - F.E. BARLIER CERGA

BRIEF DESCRIPTION THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY MICROMETEORITE IMPACTS.

***** DMSP-F1*****

SPACECRAFT COMMON NAME- DMSP-F1
ALTERNATE NAMES- DMSP 12535, DMSP BLOCK 5D-1 09415, DMSP5D1

NSSDC ID- 76-C91A

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 EPOCH DATE- 09/14/76
ORBIT PERIOD- 101.6 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 818. KM ALT APOAPSIS- 848. KM ALT

PERSONNEL PH - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION DMSP-F1 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 WERE 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 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 IS 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 100-SQ-FT SOLAR CELL PANEL. THE BLOCK 5D 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 OF BLOCK 5D 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 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 H (SSH), 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 ALLOWS FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED VIA SATCON 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 BLOCK 5D SATELLITE CAN BE FOUND ON THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-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 DMSP BLOCK 5D 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. THREE ONBOARD RECORDERS, 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 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 BLOCK 5D,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY-AUGUST 1975.

----- DMSP-F1, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH)

NSSDC ID- 76-091A-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 39 KM AT RADIR. RADIANCE DATA WAS 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 BLOCK 5D SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSP-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
O1 - S.J. IMANOTO	AEROSPACE CORP
O1 - N. KATZ	AEROSPACE CORP
O1 - 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 DMSP 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-DRIFTED, SILICON DETECTORS CENTERED UNDER HEMISPHERICAL SHELLS, AND HEAVILY SHIELDED (RELATIVE TO THE HEMISPHERICAL SHELL) OVER THE REAR 2 PI SOLID ANGLE. THE SHIELDING DOMES 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 SECONDS. PULSES, WHOSE AMPLITUDES EXCEED 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 REPRESENTS THE TOTAL ENERGY IN MEV DEPOSITED IN THE SILICON ACTIVE VOLUME DURING THE MISSION LIFE. MAXIMUM ACCUMULATED DOSE STORAGE CORRESPONDED TO 5.65 RADS. ADDITIONAL INFORMATION CAN BE OBTAINED FROM AEROSPACE CORPORATION PUBLICATION NUMBER TOR-0077(263D)-1, JUNE 1977.

----- DMSP-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
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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 3J 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-F2*****

SPACECRAFT COMMON NAME- DMSP-F2

ALTERNATE NAMES-

NSSDC ID- 77-044A

LAUNCH DATE- 06/35/77	WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES	
LAUNCH VEHICLE- THOR	

SPONSORING COUNTRY/AGENCY UNITED STATES	DOD-USAF
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INITIAL ORBIT PARAMETERS	
ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 06/06/77
ORBIT PERIOD- 101.7 MIN	INCLINATION- 99. DEG
PERIAPSIS- 611. KM ALT	APOAPSIS- 869. KM ALT

PERSONNEL

PM - W.D. MYER	USAF-SAMSO
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BRIEF DESCRIPTION

DMSP-F2 IS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM (DMSSP). 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

CONSISTS OF TWO SATELLITES IN 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 IS 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 100-50-FT 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 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, IN 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 H (SSH), 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 ALLOWS FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA ARE TRANSMITTED TO GROUND-RECEIVING SITES VIA TWO REDUNDANT S-BAND TRANSMITTERS. RECORDED DATA ARE 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 ARE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD. A MORE COMPLETE DESCRIPTION OF THE SATELLITE CAN BE FOUND ON THE REPORT, 'THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, 4, JULY - AUGUST 1975.

----- DMSP-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
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BRIEF DESCRIPTION

THE OPERATIONAL LINESCAN SYSTEM (OLS) WAS THE PRIMARY EXPERIMENT ON THE DMSP-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. THREE ONBOARD RECORDERS, 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 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-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
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ORIGINAL PAGE IS
OF POOR QUALITY

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, 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 39 KM AT NADIR. RADIANCE DATA 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-F3*****

SPACECRAFT COMMON NAME- DMSP-F3
ALTERNATE NAMES-

NSSDC ID- 78-042A

LAUNCH DATE- 05/01/78 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- 05/02/78
ORBIT PERIOD- 96.89 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 564. KM ALT APOAPSIS- 653. KM ALT

PERSONNEL
PH - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION

DMSP-F3 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 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 IS 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 100-SQ-FT 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 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, IN 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 H (SSH), 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-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-F2, ROTHWELL -----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 77-C44A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYSICS 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 ELECTRON COMING IN THE NADIR DIRECTION. 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-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 GEOPHYSICS 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 (F0F2). THE F0F2 PARAMETER IS USED IN CONSTRUCTING ELECTRON-DENSITY PROFILES USED IN FORECASTING THE STATE OF THE IONOSPHERE. THE INSTRUMENT COULD DETECT ELECTRIC FIELDS DOWN TO 1C MICROVOLTS/M.

----- DMSP-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) IS THE PRIMARY EXPERIMENT ON THE DMSP-F3 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) COVERS A TEMPERATURE RANGE OF 210 TO 330 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 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-F3, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- 78-042A-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSH) 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 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, 695, 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 2300 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-F3, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- 78-042A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYSICS 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 COMING IN THE NADIR DIRECTION. THE LARGE ESA HAS A FIELD OF VIEW (FOV) OF 1.6 BY 6.0 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 7 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-F3, SHRUM-----

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. SHRUM USAF TECH APPL CTR

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS 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 IS POSITIONED SO THAT ITS MOST SENSITIVE DIRECTION FACES 30 DEG FROM THE VERTICAL. PULSE-HEIGHT DISCRIMINATORS ARE 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.

***** ESA-GEOS 1*****

SPACECRAFT COMMON NAME- ESA-GEOS 1
ALTERNATE NAMES- GEOS, ESGEO
09931, ESA GEOS

NSSDC ID- 77-029A

LAUNCH DATE- 04/20/77 WEIGHT- 273.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC COMHENSURAT EPOCH DATE- 04/25/77
ORBIT PERIOD- 720.06 MIN INCLINATION- 26.25 DEG
PERIAPSIS- 2110. KM ALT APOAPSIS- 38357. KM ALT

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

BRIEF DESCRIPTION
THE ESA-GEOS SPACECRAFT WAS TO HAVE BEEN THE FIRST SATELLITE PLACED IN THE EQUATORIAL GEOSTATIONARY ORBIT THAT WAS DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. UNFORTUNATELY, A LAUNCH VEHICLE FAILURE MADE IT IMPOSSIBLE TO ACHIEVE THIS ORBIT AND RESULTED IN THE DECISION TO PLACE THE SPACECRAFT IN A 12-HOUR, COMHENSURATE, FINAL ORBIT WHERE THE INSTRUMENTS COULD MAKE THE PLANNED MEASUREMENTS FOR ABOUT 6 HOURS EACH REVOLUTION AT BETWEEN 5 AND 7 EARTH RADII. IN THIS ORBIT THE MISSION WAS STILL ABLE TO SERVE AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND CARRIED OUT PLANNED CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA AND CONJUGATE POINT MEASUREMENTS BETWEEN A STATION IN ICELAND AND IN ANTARCTICA. IN ADDITION, BECAUSE OF A SECOND DAILY APOGEE AT A DIFFERENT GEOGRAPHIC POSITION, CORRELATIVE MEASUREMENTS WITH IMS GROUND-BASED NETWORKS IN ALASKA AND WESTERN CANADA WERE ALSO CARRIED OUT. THE PAYLOAD CONSISTED OF INSTRUMENTS TO MEASURE -- (1) DC AND AC ELECTRIC AND MAGNETIC FIELDS; (2) GRADIENT OF THE MAGNETIC FIELD; (3) THERMAL AND SUPERTHERMAL 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. A DETAILED DESCRIPTION OF THE PAYLOAD CAN BE FOUND IN 'ESA SCIENTIFIC AND TECHNICAL REVIEW' (1975), 1, PP 173-196 BY K. KNOTT. THE SPACECRAFT WAS CYLINDRICAL WITH A HEIGHT OF 1.321 M. THE TOTAL MASS EXCLUSIVE OF PROPELLANTS WAS 273.6 KG. THERE WERE FOUR TELESCOPIC AXIAL BOOMS OF 2.5 M 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 OF 3 M LENGTH FOR A VARIETY OF INSTRUMENTS. THERE WERE SIX HYDRAZINE THRUSTERS; TWO WERE TO TILT AND PRECESS THE SPACECRAFT, TWO WERE USED TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE COULD BE MOVED TO DIFFERENT GEOGRAPHIC LOCATIONS, AND TWO WERE USED FOR SPIN UP AND SPIN DOWN. THE SPIN RATE WAS NOMINALLY 10 RPM. SINCE THIS MISSION WAS PLANNED FOR THE GEOSTATIONARY ORBIT, NO STORAGE OF DATA WAS PROVIDED. DATA WERE TELEMETERED IN REAL TIME AT 137.2 MHZ (186 AND 744 B/S) AND AT 2299.5 MHZ (11.91 OR 95.25 KB/S). ALTITUDE MEASUREMENTS WERE OBTAINED BY A SUN SENSOR, DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER WAS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE CYLINDRICAL 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 WAS ONLY 0.3 GAMMA. MORE DETAILED INFORMATION ON THE SPACECRAFT CAN BE FOUND IN 'ESA BULLETIN' NO. 9, MAY 1977.

----- ESA-GEOS 1, BEGHIN-----

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 77-029A-11 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. BEGHIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION
THIS INVESTIGATION WAS PART OF ESA EXPERIMENT NO. S-300 AND MADE USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE AXIAL BOOMS (PART OF 77-029A-10, UNGSTRUP) AND THE TWO VITREOUS CARBON SPHERES MOUNTED ON THE END OF THE 20 M RADIAL BOOMS (77-029A-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 COULD BE TELEMETERED DIRECTLY, AND SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATION COULD BE

EMPLOYED TO OBTAIN THE AUTO- AND/OR CROSS-CORRELATION UP TO 77 KHZ WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ.

----- ESA-GEOS 1, GEISS-----

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSSDC ID- 77-029A-03

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J. GEISS	U OF BERNE
PI - H.R. ROSENBAUER	MPI-AERONOMY
OI - P.X. EBERHARDT	U OF BERNE
OI - H. BALSIGER	U OF BERNE
OI - A. GHIEMETTI	U OF BERNE
OI - H. LOIDL	MPI-EXTRATERR PHYS
OI - D.T. YOUNG	U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-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 17.2 KEV IN 32 STEPS WITH A DELTA E/E OF 0.03 AND A MASS RANGE OF 1 TO 140 AMU IN 64 LOGARITHMICALLY SPACED STEPS. THERE WAS A THERMAL GRID 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 THE CFA WERE TRANSPARENT. THE DEVICE VIEWED PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW ENERGY IONS THE ACCEPTANCE ANGLES WERE PLUS OR MINUS 6 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 FIXED 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. EARLIER IN THE LIFE OF THE SATELLITE, A CORRELATIVE EXPERIMENT WITH THE CESIUM ION NEUTRALIZATION GUN ON ATS 6 WAS PERFORMED WHEN THE TWO SATELLITES WERE WITHIN SEVERAL KM ON THE SAME MAGNETIC FIELD LINE. THE ATS 6 GUN WAS FIRED FOR SOME PERIOD COMMENCING ABOUT 1 HOUR PRIOR TO THE ESA-GEOS 1 SATELLITE CROSSING THE MAGNETIC FIELD LINE SO THAT CESIUM IONS WOULD HAVE TIME TO POPULATE THE FLUX TUBE AND, SUBSEQUENTLY, BE DETECTED BY THIS EXPERIMENT. THIS WAS THE FIRST OF THIS TYPE OF CONTROLLED ACTIVE EXPERIMENT BETWEEN TWO SATELLITES.

----- ESA-GEOS 1, GENDRIN-----

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 77-029A-06

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

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 VLF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 HZ). EACH SEARCH COIL CONSISTED OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS IS 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 1.0E-1 AT 0.1 HZ, 2.0E-4 AT 10 HZ, AND ABOUT 3.0E-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, COMPRISE PART OF THE ESA WAVE EXPERIMENT NO. S-300. THESE COMPONENTS WERE EMPLOYED FOR THE SENSORS DESCRIBED IN 77-029A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGHIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR OUTPUT WERE TRANSMITTED VIA THE 95.25 KB/S 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 COULD ALSO OPERATE IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

----- ESA-GEOS 1, HULTQVIST-----

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

NSSDC ID- 77-029A-04

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G. HULTQVIST	KIRUNA GEOPHYS INST
OI - H. BORG	KIRUNA GEOPHYS INST
OI - L.A. HOLMGREN	KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-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 WERE PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF WILKEN (77-029A-01) IS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 10 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 VARIED 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 3.0E-4 CM SQ STER, CONSISTED OF FOUR NARROW ANGLE (2 DEG X 2 DEG, DELTA E/E OF 0.11) AND FOUR WIDE ANGLE (8 DEG X 7.5 DEG, DELTA E/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAD DELTA E/E OF 0.13, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.0E-3 CM SQ STER. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT PLANNED TO RELY HEAVILY ON REAL-TIME, GROUND COMPUTER CONTROL. THIS WAS POSSIBLE OVER THE EASTERN LONGITUDE APOGEE IN VIEW OF THE ESA-GEOS 1 GROUND STATION ANTENNA AT MICHELSTADT, FEDERAL REPUBLIC OF GERMANY, BUT NOT FOR THE OTHER DAILY APOGEE OVER THE PACIFIC OCEAN.

----- ESA-GEOS 1, MARIANI-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 77-029A-09

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F. MARIANI	SPACE PLASMA LAB
OI - M. CANDIDI	SPACE PLASMA LAB
OI - D.H. FAIRFIELD	NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLUXGATE MAGNETOMETER IS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDS FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE THE MAIN COMPONENT OF THE FIELD COINCIDES WITH THE Z-AXIS OF THE INSTRUMENT, WHICH IS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAS BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS FOR WHICH THE MAGNETIC FIELD COMPONENT IS ONLY A FRACTION OF THE TOTAL FIELD AND IS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MAKES THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES ARE PLUS OR MINUS 60 GAMMAS AND PLUS OR MINUS 180 GAMMAS RESPECTIVELY. IN Z-AXIS, WHERE THE FIELD IS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION, A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 60 GAMMAS IS USED. THE SIGNAL IS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60 GAMMAS EACH, SUCH THAT A RANGE PLUS OR MINUS 480 GAMMAS WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 USING A 9-BIT DIGITISATION IS OBTAINED. THE NOISE LEVEL OF THE SENSORS IS COMPARABLE TO THIS QUANTIZATION ERROR. THIS INSTRUMENT SATURATES AT GEOCENTRIC DISTANCES LESS THAN ABOUT 4.5 EARTH RADII.

----- ESA-GEOS 1, PEDERSEN-----

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 77-029A-07 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - A. PEDERSEN ESA-ESTEC
OI - D. JONES ESA-ESTEC
OI - K. KNOTT ESA-ESTEC
OI - R.J.L. GAARD ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTED OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20 M CABLE BOOMS, WHICH EXTEND RADIALLY FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS AND COMPRISED PART OF THE ESA NO. S-300 WAVE 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 77-029A-05 (PETIT), -10 (UNGSTRUP), AND -01 (BEGHIN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE WAS ABOUT 1.0E-4 V/M AT DC AND 1.0E-8 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 1, PETIT-----

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 77-029A-05 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - M. PETIT CNET

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 77-029A-07, PEDERSEN) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.3 TO 77 KHZ WERE EMPLOYED. ON TRANSMISSION OF A VLF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL WAS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDED THE SPECTRUM OF THE TRANSMITTED SIGNAL INCLUDED ONE OF THE RESONANCE FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY COULD BE INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ WERE TELEMETERED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDED AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ COULD BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 1, UNGSTRUP-----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 77-029A-10 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - E. UNGSTRUP 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 2.5 M AXIAL BOOMS. ONE OF THESE BOOMS ONLY EXTENDED TO 1.95 M, BUT THIS DID NOT AFFECT THE INSTRUMENT EXCEPT TO REQUIRE A RECALIBRATION. DIFFERENTIAL MEASUREMENTS FROM THESE SENSORS PROVIDED THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 50 HZ TO 77 KHZ COULD BE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ COULD BE TELEMETERED DIRECTLY, AND AUTO- AND/OR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ COULD BE ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ WAS 1.0E-6 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 1, WILKEN-----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 77-029A-01

INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B. WILKEN MPI-AERONOMY
OI - G. PFOTZER (RETIRED) MPI-AERONOMY
OI - E. KEPPLER MPI-AERONOMY
OI - A. KORTH MPI-AERONOMY
OI - J. MUENCH MPI-AERONOMY

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 HULTQVIST (77-029A-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 SERVED TO FOCUS 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 DEFLECTIN 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, 83, 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 APERTURES FOR PROTONS WERE 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS WERE 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF 1.0E-4 CM SQ STER 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 WAS DETECTED, AND A 15 CHANNEL PHA COULD BE USED FOR ANY ONE OF THE 10 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 14 DETECTORS; MODE 1, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR FOUR DETECTORS - GOOD TIME RESOLUTION ON 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 688 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS WAS 43 MS. THE SPECTRAL MEASUREMENTS HAVE A RESOLUTION OF DELTA E/E = 0.35.

----- ESA-GEOS 1, WRENN-----

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 77-029A-02 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - G.L. WRENN U COLLEGE LONDON
OI - R.L.F. BOYD U COLLEGE LONDON
OI - K. NORMAN U COLLEGE LONDON
OI - 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 18 DEG X 18 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF 6.0E-4 CM SQ STER. THE OTHER ANALYZER MADE AN ANGLE OF 160 DEG WITH RESPECT TO THE +Z AXIS WITH AN OPENING ANGLE OF 8 DEG X 30 DEG PROVIDING A G OF 5.0E-4 CM SQ STER. 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 -28 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.

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

SPACECRAFT COMMON NAME- ESA-GEOS 2
ALTERNATE NAMES- GEOSARI, 10981

NSSDC ID- 78-071A

LAUNCH DATE- 07/14/78 WEIGHT- 273. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

ORIGINAL PAGE IS OF POOR QUALITY

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1431.2 MIN
PERIAPSIS- 35615.5 KM ALT

EPOCH DATE- 08/06/78
INCLINATION- 0.772 DEG
APOAPSIS- 35774.1 KM ALT

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

BRIEF DESCRIPTION

ESA-GEOS 2 IS THE FIRST SPACECRAFT TO BE PLACED IN A EQUATORIAL GEOSTATIONARY ORBIT DEDICATED COMPLETELY TO SCIENTIFIC MEASUREMENTS. THE SPACECRAFT SERVES AS A CORE OR REFERENCE SPACECRAFT FOR THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND CARRIES OUT CORRELATIVE MEASUREMENTS WITH EXTENSIVE GROUND-BASED NETWORKS IN SCANDINAVIA. THE PAYLOAD CONSISTS 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 IS CYLINDRICAL WITH A HEIGHT OF 1.321 M. THE TOTAL MASS, EXCLUDING PROPELLANTS, IS 273.6 KG. THERE ARE FOUR TELESCOPIC AXIAL 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 ARE SIX HYDRAZINE THRUSTERS, TWO TO TILT AND PRECESS THE SPACECRAFT, TWO TO MODIFY THE ORBIT SO THE LONGITUDE OF THE APOGEE CAN BE CHANGED, AND TWO FOR SPIN UP AND SPIN DOWN. THE SPIN RATE IS NOMINALLY 10 RPM. DATA ARE TELEMETERED IN REAL TIME AT 137.2 MHZ (186 AND 744 BPS) AND AT 2299.5 MHZ (11.91 OR 95.25 KBS). ALTITUDE MEASUREMENTS ARE OBTAINED BY A SUN SENSOR, A DUAL INFRARED EARTH SENSOR, AND ACCELEROMETERS. POWER IS SUPPLIED BY 7200 SOLAR CELLS MOUNTED ON THE SPACECRAFT SURFACE. TO PREVENT SPACECRAFT DIFFERENTIAL CHARGING, 96 PERCENT OF THE SURFACE IS ELECTRICALLY CONDUCTIVE. BECAUSE OF THE IMPORTANCE OF THE MAGNETIC FIELD MEASUREMENTS THE SPACECRAFT RESIDUAL FIELD AT THE MAGNETOMETER IS ONLY 3.E-10 TESLAS (0.3 GAMMAS).

----- ESA-GEOS 2, BEGHIN-----

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 78-071A-11 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - C. BEGHIN CNRS, CTR FOR SPECTROM

BRIEF DESCRIPTION

THIS INVESTIGATION IS PART OF ESA EXPERIMENT NO. S-300 AND MAKES USE OF ONE SET OF MESHED ELECTRIC SPHERES MOUNTED ON THE END OF THE AXIAL 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 ARE USED AS TRANSMITTING ELEMENTS FOR FREQUENCIES FROM 0.2 TO 70 KHZ. THE SELF-IMPEDANCE OF THESE SPHERES AND THE MUTUAL IMPEDANCE BETWEEN THE MESHED AND LONG-BOOM CARBON SPHERES ARE MEASURED. STRONG RESONANCES AT THE HYBRID RESONANCE FREQUENCIES AND ANTI-RESONANCES AT THE GYRO FREQUENCIES ARE USED TO DETERMINE THE DENSITY OF THE SURROUNDING PLASMA. FREQUENCIES UP TO 450 HZ CAN BE TELEMETERED DIRECTLY, AND SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATION CAN BE EMPLOYED TO OBTAIN THE AUTO- AND/OR 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

NSSDC ID- 78-071A-03 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
P1 - J. GEISS U OF BERNE
P1 - H.R. ROSENBAUER MPI-AERONOMY
O1 - P.X. EBERHARDT U OF BERNE
O1 - H. BALSIGER U OF BERNE
O1 - A. GHIEMMETTI U OF BERNE
O1 - H. LOIDL MPI-EXTRATERR PHYS
O1 - D.T. YOUNG U OF BERNE

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-303) MEASURES THE ENERGY, ANGULAR DISTRIBUTION, AND COMPOSITION OF POSITIVE IONS USING A CYLINDRICAL ELECTROSTATIC ANALYZER (ESA) FOLLOWED BY A CROSSED ELECTRIC AND MAGNETIC FIELD ANALYZER (CEFA) TO SELECT THE ENERGY AND VELOCITY. THE ENERGY (PER UNIT CHARGE) RANGES FROM 0.001 TO 17.2 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 IS A THERMAL MODE IN WHICH A RETARDING GRID IN THE ENTRANCE SLIT IS USED FOR ANALYSIS BELOW 0.1 KEV. ALL PARTICLES THAT OVERCOME THIS GRID VOLTAGE ARE ACCELERATED TO 3 KEV BEFORE ENTERING THE ESA IN ITS LOWEST ENERGY STEP, WHERE BOTH THE ESA AND CEFA ARE TRANSPARENT. THE DEVICE VIEWS PERPENDICULAR TO THE SPIN OR Z AXIS. FOR LOW ENERGY IONS THE ACCEPTANCE ANGLES ARE PLUS OR MINUS 6 DEG IN AZIMUTH AND PLUS OR MINUS 30 DEG IN ELEVATION (REFERENCED TO THE Z AXIS). FOR THE HIGHEST ENERGIES, THESE ANGLES DECREASE TO 3.5 AND 7.1 DEG, RESPECTIVELY. THREE PERCENT OF THE IONS LEAVING THE ESA ARE COUNTED BY A CHANNELTRON. THE REMAINING 97 PERCENT ENTER THE CEFA AND THE OUTPUT IS DETECTED BY AN ELECTRON MULTIPLIER. THIS SIGNAL IS PULSE HEIGHT ANALYZED BY ONE FIXED AND ONE VARIABLE DISCRIMINATOR TO OBTAIN BETTER MASS DISCRIMINATION. THE MAIN PURPOSE OF THIS INVESTIGATION IS 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 CAN BE MEASURED TO DETERMINE THESE SOURCES. EARLY IN THE LIFE OF THE SATELLITE, A CORRELATIVE EXPERIMENT WITH THE CESIUM ION NEUTRALIZATION GUN ON ATS 6 IS PERFORMED WHEN THE TWO SATELLITES ARE WITHIN SEVERAL KM ON THE SAME MAGNETIC FIELD LINE. THE ATS 6 GUN IS FIRED FOR SOME PERIOD COMMENCING ABOUT 1 H PRIOR TO THE ESA-GEOS 2 SATELLITE CROSSING THE MAGNETIC FIELD LINE SO THAT CESIUM IONS CAN HAVE TIME TO POPULATE THE FLUX TUBE AND, SUBSEQUENTLY, BE DETECTED BY THIS EXPERIMENT. THIS IS THE FIRST OF THIS TYPE OF CONTROLLED ACTIVE EXPERIMENT BETWEEN TWO SATELLITES.

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

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 78-071A-06 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - R.E. GENDRIN CNET
O1 - J.M. ETCHETO CNET
O1 - E. UNGSTRUP DANISH SPACE RES INST

BRIEF DESCRIPTION

THE INSTRUMENT USES TWO SETS OF THREE-AXIS SEARCH COIL MAGNETOMETERS, ONE FOR THE VLF/ELF RANGE (0.1 TO 450 HZ) AND ONE FOR THE VLF RANGE (0.3 TO 30 HZ). EACH SEARCH COIL CONSISTS OF A HIGH-PERMEABILITY MATERIAL WITH A HIGH DENSITY PICK-UP WINDING. EACH SET OF THE THREE COILS IS 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, ARE 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, COMPRISE PART OF THE ESA WAVE EXPERIMENT NO. S-300. THESE COMPONENTS ARE EMPLOYED FOR THE SENSORS DESCRIBED IN 78-071A-07 (PEDERSEN) AND -10 (UNGSTRUP), AND ALSO THE INVESTIGATIONS DESCRIBED IN -05 (PETIT) AND -11 (BEGHIN). SIX ANALOG CHANNELS OF 450 HZ BANDWIDTH AND THE DIGITAL CORRELATOR OUTPUT ARE TRANSMITTED BY THE 95.25 KBS TELEMETRY MODE. THE SFAS COVERS THE FREQUENCY RANGE UP TO 77 KHZ IN 256 PARTLY OVERLAPPING STEPS. THE CORRELATOR PROVIDES AN AUTO-CORRELOGRAM OF 128 POINTS WITHIN 29 MS. ITS BANDWIDTH CAN BE SELECTED TO BE 2.5, 5.0, OR 10.0 KHZ. CROSS-CORRELOGRAM BETWEEN TWO SENSORS CAN BE PROVIDED. THE CORRELATOR CAN ALSO OPERATE IN A TIME-SHARING MODE BETWEEN AUTO- AND CROSS-CORRELATION.

----- ESA-GEOS 2, HULTGVIST-----

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

NSSDC ID- 78-071A-04 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - B.K.G. HULTGVIST KIRUNA GEOPHYS INST
O1 - H. BORG KIRUNA GEOPHYS INST
O1 - L.A. HOLMGREN KIRUNA GEOPHYS INST

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-310) MEASURES 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 IS 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 ARE PROVIDED TO STUDY WAVE-PARTICLE INTERACTIONS. THE EXPERIMENT OF WILKEN (78-071A-01) IS COMPLEMENTARY TO THIS ONE, EXTENDING TO HIGH ENERGY RANGES BOTH ELECTRON AND PROTON OBSERVATIONS. A TOTAL OF 10 CURVED-PLATE ANALYZERS WITH CHANNEL ELECTRON MULTIPLIERS FOR PARTICLE DETECTION ARE USED. ALTHOUGH NORMALLY EIGHT ANALYZERS ARE USED TO DETECT ELECTRONS AND TWO TO DETECT PROTONS, A COMPLEX ARRANGEMENT WITH FOUR SEPARATE HV SUPPLIES ALLOWS INDEPENDENT SWITCHING OF FOUR DETECTOR GROUPS. THE ANALYZING PLATE VOLTAGES CAN OPERATE IN A STEPPING MODE, A SWEEPING MODE, OR A CONSTANT-VOLTAGE MODE. IN ADDITION, THE TIME ACCUMULATION CAN BE VARIED WITH A NOMINAL FRAME DURATION OF 43 MS. HOWEVER, THIS DURATION CAN BE DECREASED BY A FACTOR OF FOUR AT THE EXPENSE OF OBTAINING DATA FROM CERTAIN DETECTORS IN THOSE CASES WHERE FAST TEMPORAL VARIATIONS ARE ENCOUNTERED IN THE LOSS CONE. THE ENERGY INTERVALS IN THE STEPPING MODE CONSIST OF 32 ENERGY STEPS. THE EIGHT NORMAL ELECTRON ANALYZERS, WITH GEOMETRIC FACTOR (G) OF 3.E-4 CM SQ SR, CONSIST OF FOUR NARROW ANGLE (2 DEG X 2 DEG, DELTA E/E OF 0.11) AND FOUR WIDE ANGLE (8 DEG X 7.5 DEG, DELTA E/E OF 0.09) DEVICES. THE TWO NORMAL PROTON ANALYZERS HAVE DELTA E/E OF 0.13, APERTURE OF 6 DEG X 3 DEG, AND G OF 1.E-3 CM SQ SR. APERTURE ANGULAR WIDTHS REFER TO ELEVATION AND AZIMUTH, RESPECTIVELY, IN RELATION TO THE SPACECRAFT SPIN AXIS. THIS EXPERIMENT PLANS TO RELY HEAVILY ON REAL-TIME, GROUND COMPUTER CONTROL. THIS IS POSSIBLE OVER THE EASTERN LONGITUDE APOGEE IN VIEW OF THE ESA-GEOS 2 GROUND STATION ANTENNA AT MICHELSTADT, FEDERAL REPUBLIC OF GERMANY, BUT NOT FOR THE OTHER DAILY APOGEE OVER THE PACIFIC OCEAN.

----- ESA-GEOS 2, MARIANI-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-071A-09 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.	MARIANI	SPACE PLASMA LAB
OI - M.	CANDIDI	SPACE PLASMA LAB
OI - D.H.	FAIRFIELD	NASA-GSFC

BRIEF DESCRIPTION

A TRIAXIAL FLUXGATE MAGNETOMETER IS EMPLOYED FOR SIMULTANEOUS MEASUREMENTS OF THE THREE COMPONENTS OF THE MAGNETIC FIELD. THE FREQUENCY RANGE COVERED BY THE INSTRUMENT EXTENDS FROM DC UP TO 5 HZ. IN THE NORMAL ORIENTATION OF THE SATELLITE THE MAIN COMPONENT OF THE FIELD COINCIDES WITH THE Z-AXIS OF THE INSTRUMENT, WHICH IS ALIGNED WITH THE SPIN AXIS OF THE SATELLITE. THE EXPERIMENT HAS BEEN DESIGNED WITH TWO SENSITIVITY RANGES FOR THE X AND Y COMPONENTS FOR WHICH THE MAGNETIC FIELD COMPONENT IS ONLY A FRACTION OF THE TOTAL FIELD AND IS MODULATED BY THE ROTATION OF THE SPACECRAFT. THIS LAST FEATURE MAKES THE RANGE SWITCH TECHNIQUE PREFERABLE TO A BIAS OFFSET TECHNIQUE. THE TWO SELECTED SENSITIVITY RANGES ARE PLUS OR MINUS 60.E-9 TESLAS (60 GAMMAS) AND PLUS OR MINUS 180.E-9 TESLAS (180 GAMMAS), RESPECTIVELY. IN Z-AXIS, WHERE THE FIELD IS HIGHER AND NOT MODULATED BY THE SATELLITE ROTATION, A SINGLE SENSITIVITY RANGE OF PLUS OR MINUS 60.E-9 TESLAS (60 GAMMAS) IS USED. THE SIGNAL IS KEPT WITHIN RANGE BY SUPERIMPOSING POSITIVE AND NEGATIVE BIAS LEVELS OF 60.E-9 TESLAS (60 GAMMAS) EACH, SUCH THAT A RANGE PLUS OR MINUS 480.E-9 TESLAS (480 GAMMAS) WITH A CONSTANT QUANTIZATION ERROR OF PLUS OR MINUS 0.125 USING A 9-BIT DIGITIZATION IS OBTAINED. THE NOISE LEVEL OF THE SENSORS IS COMPARABLE TO THIS QUANTIZATION ERROR. THIS INSTRUMENT SATURATES AT GEOCENTRIC DISTANCES LESS THAN ABOUT 4.5 EARTH RADII.

----- ESA-GEOS 2, HELZNER-----

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

NSSDC ID- 78-071A-08 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.	HELZNER	MPI-EXTRATERR PHYS
OI - H.	VOLK	MPI-NUCLEAR PHYS
OI - G.	METZNER	MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS INVESTIGATION (ESA EXPERIMENT NO. S-329) IS THE MEASUREMENT OF THE DC ELECTRIC FIELD IN THE PLANE PERPENDICULAR TO THE LOCAL MAGNETIC FIELD (B). THE INVESTIGATION ALSO MEASURES THE SPATIAL GRADIENT OF B 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 CAN BE ACHIEVED, AS WELL AS DETERMINING PLASMA CONVECTION AND PARTICLE FLOW WITHIN THE PLASMA SHEET. THE INSTRUMENT CONSISTS OF FOUR ELECTRON GUNS SPACED LOGARITHMICALLY FROM THE ELECTRON DETECTOR. TWO OF THE GUNS ARE MOUNTED ON ONE OF THE 3-M RADIAL BOOMS. THE GUNS ARE USED ONE AT A TIME TO GENERATE AN ELECTRON BEAM OF ABOUT 1.E-6 AMPS AND ENERGY ABOUT 1 KEV. BOTH PARAMETERS ARE VARIED BY TELECOMMAND. DEFLECTION PLATES ASSOCIATED WITH EACH GUN RECEIVE A SINUSOIDAL SIGNAL FROM THE MAGNETOMETER INVESTIGATION TO INSURE THAT THE BEAM IS ALWAYS AT RIGHT ANGLES TO B, IN SPITE OF THE ANGLE OF THE SPIN VECTOR TO B. THE ELECTRON DETECTOR CONSISTS OF DEFLECTION PLATES THAT REMOVE THE ELEVATION CORRECTION GIVEN TO THE BEAM BY THE MAGNETOMETER SIGNAL, A CURVED PLATE ENERGY FILTER, AND A PHOTOMULTIPLIER TUBE. BECAUSE THE MAXIMUM DISPLACEMENT OCCURS WHEN THE BEAM MAKES AN ANGLE OF 0 OR 180 DEG TO THE ELECTRIC FIELD, ALL POSSIBLE DISPLACEMENTS LESS THAN THIS OCCUR TWICE DURING A SPIN PERIOD. CONSEQUENTLY, THE BEAM SWEEPS ACROSS THE DETECTOR TWICE PER SPIN PERIOD PROVIDED THE MAXIMUM DISPLACEMENT IS LESS THAN THE DISTANCE BETWEEN THE GUN AND THE DETECTOR. THE VALUES OF THE SPIN ANGLE AT WHICH THE BEAM IS DETECTED AFTER ONE OR TWO SPIN PERIODS, AND THE DISTANCE BETWEEN THE GUN AND RECEIVER, ALLOW THE DETERMINATION OF THE ELECTRIC FIELD. A POSSIBLE CONTRIBUTION FROM THE GRADIENT OF B CAN BE DETERMINED BY VARYING THE ENERGY OF THE BEAM. THE INVESTIGATION RELIES ENTIRELY ON REAL-TIME CONTROL BY A GROUND-BASED COMPUTER. IT HAS FOUR BASIC MODES OF OPERATION: A SEARCH MODE, AN ADJUSTMENT MODE, AN OPTIMIZATION MODE, AND A NORMAL MODE. THE SEARCH MODE IS DESIGNED TO FIND THE SIGNAL AT NOMINAL BEAM PARAMETERS. IF THIS IS NOT ACHIEVED, THE ADJUSTMENT MODE IS USED TO VARY THESE PARAMETERS SYSTEMATICALLY. ONCE THE BEAM IS DETECTED THE OPTIMIZATION MODE DETERMINES THE BEST COMPROMISE BETWEEN BEAM CURRENT AND RECEIVED SIGNAL QUALITY. THEN THE NORMAL MODE STARTS, WHICH CONSISTS OF A CONTINUOUS MEASUREMENT OF THE ELECTRIC FIELD AND THE GRADIENT OF B, USING THE MOST APPROPRIATE OF THE FOUR GUNS. UNFORTUNATELY, THE THREE INNERMOST GUNS CEASED OPERATION EARLY IN THE LIFE OF THE EXPERIMENT, SO ONLY THE MORE INTENSE ELECTRIC FIELDS CAN BE STUDIED.

----- ESA-GEOS 2, PEDERSEN-----

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 78-071A-07 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - A.	PEDERSEN	ESA-ESTEC
OI - D.	JONES	ESA-ESTEC
OI - K.	KNOTT	ESA-ESTEC
OI - R.J.L.	GRARD	ESA-ESTEC

BRIEF DESCRIPTION

THIS INSTRUMENT CONSISTS OF TWO VITREOUS CARBON SPHERES MOUNTED AT THE TIPS OF THE 20-M CABLE BOOMS, WHICH EXTEND RADIALLY FROM THE SPACECRAFT PERPENDICULAR TO THE SPIN AXIS AND COMPRISE PART OF THE ESA NO. S-300 WAVE EXPERIMENT. THIS INVESTIGATION IS CONCERNED WITH THE DC SINGLE AXIS ELECTRIC FIELD ANALYSIS. THE TWO OUTPUT SIGNALS ARE EVALUATED IN TERMS OF DC ELECTRIC FIELD AND CONDITIONED FOR FURTHER TREATMENT IN THE ANALYSIS OF AC ELECTRIC FIELDS. THE OUTPUT FROM ONE SPHERE IS SIGNAL CONDITIONED ON A LINEAR SCALE; THE DIFFERENTIAL OUTPUT FROM THE TWO SPHERES IS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS ARE PASSED THROUGH 450 HZ TO 77 KHZ FILTERS. THESE FILTERED SIGNALS ARE 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 (UNGSTRUP), AND -01 (BEGHIN) INVESTIGATIONS. THE SENSITIVITY OF THIS PROBE IS ABOUT 1.E-4 V/M AT DC AND 1.E-8 V/M THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, PETIT-----

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 78-071A-05 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - P.	PETIT	CNET
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ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THIS INVESTIGATION (PART OF ESA EXPERIMENT NO. S-300) UTILIZES THE 20-M BOOMS (NORMAL TO THE SPACECRAFT SPIN AXIS) AS A DIPOLE ANTENNA, AND THE CARBON SPHERES (PART OF 78-071A-07, PEDERSEN) AS THE RECEIVING ELEMENT. FREQUENCIES FROM 0.3 TO 77 KHZ ARE EMPLOYED. ON TRANSMISSION OF A VLF SIGNAL OF LIMITED DURATION, A TRANSIENT SIGNAL IS OBSERVED FOR A MUCH LONGER PERIOD THAN THE PULSE LENGTH, PROVIDING THE SPECTRUM OF THE TRANSMITTED SIGNAL INCLUDES ONE OF THE RESONANCE FREQUENCIES OF THE PLASMA. THE AMBIENT PLASMA DENSITY CAN BE INFERRED FROM THE DETERMINATION OF THE RESONANT FREQUENCIES. RECEIVED FREQUENCIES UP TO 450 HZ ARE TELEMETERED DIRECTLY, AND SIX SWEEP-FREQUENCY ANALYZERS AND A DIGITAL CORRELATOR PROVIDE AUTO- AND CROSS-CORRELATIONS UP TO 77 KHZ. BANDWIDTHS OF 2.5, 5.0, OR 10.0 KHZ CAN BE SELECTED FOR THE CORRELATOR.

----- ESA-GEOS 2, UNGSTRUP -----

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 78-071A-10 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - E. UNGSTRUP DANISH SPACE RES INST

BRIEF DESCRIPTION

THIS INVESTIGATION IS PART OF THE ESA NO. S-300 WAVE EXPERIMENT AND EMPLOYS THE FOUR MESH SPHERES MOUNTED AT THE END OF THE 2.5-M AXIAL BOOMS. ONE OF THESE BOOMS ONLY EXTENDS TO 1.95 M, BUT THIS DOES NOT AFFECT THE INSTRUMENT EXCEPT TO REQUIRE A RECALIBRATION. DIFFERENTIAL MEASUREMENTS FROM THESE SENSORS PROVIDE THE THREE VECTOR COMPONENTS OF THE ELECTRIC FIELD. FREQUENCIES FROM 50 HZ TO 77 KHZ CAN BE ANALYZED WITH THE SWEEP-FREQUENCY ANALYZER AND THE DIGITAL CORRELATOR. FREQUENCIES UP TO 450 HZ CAN BE TELEMETERED DIRECTLY, AND AUTO- AND/OR CROSS-CORRELATION OF THE SENSOR OUTPUTS UP TO 77 KHZ CAN BE ACCOMPLISHED WITH SELECTABLE BANDWIDTHS OF 2.5, 5.0, 10.0 KHZ. THE SENSITIVITY OF THE MESH SPHERE PROBES AT 10 KHZ IS 1.E-6 V/M TIMES THE SQUARE ROOT OF HZ.

----- ESA-GEOS 2, WILKEN -----

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 78-071A-01 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - B. WILKEN MPI-AERONOMY
OI - G. PFOTZER (RETIRED) MPI-AERONOMY
OI - E. KEPPLER MPI-AERONOMY
OI - A. KORTH MPI-AERONOMY
OI - J. NUENCH MPI-AERONOMY

BRIEF DESCRIPTION

THIS INSTRUMENT (ESA EXPERIMENT NO. S-321) MEASURES THE ENERGY AND PITCH ANGLE DISTRIBUTION OF HIGHER ENERGY ELECTRONS AND PROTONS THAN THAT OF HULTQVIST (78-071A-04), AND IS COMPLEMENTARY TO THAT INSTRUMENT. THE DETECTOR SYSTEM CONSISTS OF TWO SEPARATE MAGNETIC SPECTROMETERS FOR ELECTRONS WITH TWO PROTON TELESCOPES ASSOCIATED WITH EACH OF THE MAGNETS THAT SERVE TO FOCUS THE ELECTRONS AWAY FROM THE PROTON DETECTORS. THERE ARE FIVE RECTANGULAR SOLID-STATE DETECTORS MOUNTED ALONG THE FOCAL LINE OF EACH SPECTROMETER TO MEASURE THE ELECTRONS. EACH SPECTROMETER COVERS AN ANGULAR APERTURE IN ELEVATION ANGLE (RELATIVE TO THE SPIN AXIS) OF 60 DEG. THE TWO DEFLECTION MAGNETS ARE POSITIONED SO THAT ELEVATION ANGLES (REFERRED TO THE SPIN AXIS) FROM 10 TO 120 DEG, ON 10 DEG CENTERS, ARE COVERED FOR ELECTRONS, GIVING ELEVATION ANGLES OF 23, 46, 83, AND 106 DEG FOR THE PROTON TELESCOPES. THESE TELESCOPES CONSIST 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 ARE COVERED. THE EFFECTIVE ANGULAR APERTURES FOR PROTONS ARE 10 DEG X 4 DEG (ELEVATION X AZIMUTH) AND FOR ELECTRONS ARE 6 DEG X 4 DEG. GEOMETRIC FACTORS IN UNITS OF 1.E-4 CM SQ SR ARE FIVE FOR PROTONS AND ONE FOR ELECTRONS. A 12-CHANNEL PULSE-HEIGHT ANALYZER (PHA) FOR PROTONS CAN BE USED FOR ANY ONE OF THE FOUR FRONT DETECTORS, PROVIDED A FRONT-REAR COINCIDENCE IS DETECTED, AND A 15-CHANNEL PHA CAN BE USED FOR ANY ONE OF THE 10 ELECTRON DETECTORS. THE SINGLES RATE FOR ONE OF THE FOUR PROTON DETECTORS AND THE COINCIDENCE RATE FROM ONE OF THE FOUR PROTON TELESCOPES CAN BE SELECTED. THERE ARE THREE MODES FOR DATA SELECTION -- MODE 0, INTEGRAL COUNT RATES AND SPECTRAL MEASUREMENTS FOR ALL 14 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 IS 688 MS; THE MINIMUM TIME FOR INTEGRAL FLUX VARIATIONS IS 43 MS. THE SPECTRAL MEASUREMENTS HAVE A RESOLUTION OF DELTA E/E = 0.35.

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

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 78-071A-C2 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - G.L. WRENN U COLLEGE LONDON
OI - R.L.F. BOYD U COLLEGE LONDON
OI - K. NORMAN U COLLEGE LONDON
OI - W.J. RAITT UTAH STATE U

BRIEF DESCRIPTION

THE INSTRUMENT (ESA EXPERIMENT NO. S-302) EMPLOYS 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 IS COVERED IN 64 STEPS WITH A RELATIVE ENERGY RESOLUTION OF 0.11. ONE ANALYZER HAS ITS APERTURE POINTING ALONG THE NEGATIVE (Z) SPIN AXIS WITH AN OPENING ANGLE OF 18 DEG X 18 DEG PROVIDING A GEOMETRICAL FACTOR (G) OF 6.E-4 CM SQ SR. THE OTHER ANALYZER MAKES 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.E-4 CM SQ SR. BOTH DETECTORS HAVE TO MEASURE THE SAME TYPE OF PARTICLES AT THE SAME TIME. THE COLLIMATORS OF THESE INSTRUMENTS CAN BE SET AT ANY VOLTAGE FROM -28 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 DETERMINES THE SPACECRAFT POTENTIAL.

***** GEOS 1*****

SPACECRAFT COMMON NAME- GEOS 1
ALTERNATE NAMES- GEOS-A, EXPLORER 29
D1726

NSSDC ID- 65-089A

LAUNCH DATE- 11/06/65 WEIGHT- 387. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PERSONNEL
PM - C.J. FINLEY NASA HEADQUARTERS
PS - J.P. MURPHY NASA HEADQUARTERS

BRIEF DESCRIPTION

THE GEOS 1 (EXPLORER 29) SPACECRAFT WAS A GRAVITY-GRADIENT-STABILIZED, SOLAR-CELL POWERED UNIT DESIGNED EXCLUSIVELY FOR GEODETIC STUDIES. IT WAS THE FIRST SUCCESSFUL ACTIVE SPACECRAFT OF THE NATIONAL GEODETIC SATELLITE PROGRAM. INSTRUMENTATION INCLUDED (1) FOUR OPTICAL BEACONS, (2) LASER REFLECTORS, (3) A RADIO RANGE TRANSPONDER, (4) DOPPLER BEACONS, AND (5) A RANGE AND RANGE RATE TRANSPONDER. THESE WERE DESIGNED TO OPERATE SIMULTANEOUSLY TO FULFILL THE OBJECTIVES OF LOCATING OBSERVATION POINTS (GEODETIC CONTROL STATIONS) IN A THREE DIMENSIONAL EARTH CENTER-OF-MASS COORDINATE SYSTEM WITHIN 10 M OF ACCURACY, OF DEFINING THE STRUCTURE OF THE EARTH'S IRREGULAR GRAVITATIONAL FIELD AND REFINE THE LOCATIONS AND MAGNITUDES OF THE LARGE GRAVITY ANOMALIES, AND OF COMPARING RESULTS OF THE VARIOUS SYSTEMS ONBOARD THE SPACECRAFT TO DETERMINE THE MOST ACCURATE AND RELIABLE SYSTEM. ACQUISITION AND RECORDING OF DATA WAS THE RESPONSIBILITY OF THE GSFC SPACE TRACKING AND DATA ACQUISITIONS NETWORK (STADAN). TEN MAJOR OBSERVING NETWORKS WERE USED.

----- GEOS 1, PLOTKIN -----

INVESTIGATION NAME- LASER TRACKING REFLECTOR

NSSDC ID- 65-089A-02 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - H.H. PLOTKIN NASA-GSFC

BRIEF DESCRIPTION

LASER CORNER REFLECTORS, COMPOSED OF FUSED QUARTZ CUBES WITH SILVERED REFLECTING SURFACES, WERE USED FOR DETERMINING THE SPACECRAFT'S RANGE AND ANGLE. THE 322 CUBES WERE MOUNTED ON FIBERGLASS PANELS ON THE BOTTOM RIM OF THE SPACECRAFT AND PROVIDED A TOTAL REFLECTING AREA OF 0.18 SQ. M. THE REFLECTORS CONSERVED THE NARROW BEAMWIDTH OF INCOMING LIGHT AND REFLECTED A MAXIMUM SIGNAL TO THE GROUND, ALMOST EXACTLY TO WHERE IT ORIGINATED. FIFTY PERCENT OF THE LIGHT WHICH STRUCK THE PRISM AREA AT A 90-DEG ANGLE WAS REFLECTED WITHIN A BEAM OF 20 ARC SECONDS. REFLECTED LIGHT RECEIVED BY GROUND TELESCOPES WAS AMPLIFIED BY A PHOTOMULTIPLIER TUBE THAT CONVERTED THE OPTICAL IMPULSE TO AN ELECTRICAL SIGNAL. THE TIME THE BEAM RETURNED TO EARTH WAS RECORDED BY A DIGITAL COUNTER. THE REFLECTED LASER

PULSE WAS ALSO PHOTOGRAPHED AGAINST THE STELLAR BACKGROUND. TOTAL TIME TRAVELED BY THE LIGHT PULSES WAS ALSO CONSIDERED IN THE OPTICAL LASER TRACKING SYSTEM.

***** GEOS 2*****

SPACECRAFT COMMON NAME- GEOS 2
ALTERNATE NAMES- GEOS-B, EXPLORER 36
J3C93

NSSDC ID- 68-002A

LAUNCH DATE- G1/11/68 WEIGHT- 469. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/28/77
ORBIT PERIOD- 112.2 MIN INCLINATION- 105.7 DEG
PERIAPSIS- 1383. KM ALT APOAPSIS- 1577. KM ALT

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

BRIEF DESCRIPTION
EXPLORER 36 (GEOS 2) WAS A GRAVITY-GRADIENT-STABILIZED, SOLAR-CELL-POWERED SPACECRAFT THAT CARRIED ELECTRONIC AND GEODETIC INSTRUMENTATION. THE GEODETIC INSTRUMENTATION SYSTEMS INCLUDED (1) FOUR OPTICAL BEACONS, (2) TWO C-BAND RADAR TRANSPONDERS, (3) A PASSIVE RADAR REFLECTOR, (4) A SECOR RADIO RANGE TRANSPONDER, (5) A GODDARD RANGE AND RANGE RATE (GRARR) TRANSPONDER, (6) LASER REFLECTORS, AND (7) DOPPLER BEACONS. NON-GEODETIC SYSTEMS INCLUDED A LASER DETECTOR AND A MINITRACK INTERFEROMETER BEACON. THE OBJECTIVES OF THE SPACECRAFT WERE TO OPTIMIZE OPTICAL STATION VISIBILITY PERIODS AND TO PROVIDE COMPLEMENTARY DATA FOR INCLINATION-DEPENDENT TERMS ESTABLISHED BY THE EXPLORER 29 (GEOS 1) GRAVIMETRIC STUDIES. THE SPACECRAFT WAS PLACED INTO A RETROGRADE ORBIT TO ACCOMPLISH THESE OBJECTIVES. OPERATIONAL PROBLEMS OCCURRED IN THE MAIN POWER SYSTEM, OPTICAL BEACON FLASH SYSTEM, AND THE SPACECRAFT CLOCK, AND ADJUSTMENTS IN SCHEDULING RESULTED IN NOMINAL OPERATIONS.

***** GEOS 2, PLOTKIN*****

INVESTIGATION NAME- LASER TRACKING REFLECTOR

NSSDC ID- 68-002A-02 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - H.H. PLOTKIN NASA-GSFC
OI - C.C. STEPHANIDES NASA-GSFC

BRIEF DESCRIPTION
LASER CORNER REFLECTORS, COMPOSED OF 322 FUSED QUARTZ CUBES WITH SILVERED REFLECTING SURFACES, WERE USED FOR DETERMINING THE SPACECRAFT RANGE AND ANGLE. THE CUBES, WHICH WERE MOUNTED ON FIBERGLASS PANELS ON THE BOTTOM RIM OF THE SPACECRAFT, PROVIDED A TOTAL REFLECTING AREA OF 0.18 SQ M. THE REFLECTORS CONSERVED THE NARROW BEAMWIDTH OF INCOMING LIGHT AND PROVIDED A MAXIMUM SIGNAL TO THE GROUND ALMOST EXACTLY TO WHERE IT ORIGINATED. FIFTY PERCENT OF THE LIGHT THAT STRUCK THE PRISM AREA AT A 90-DEG ANGLE WAS REFLECTED WITHIN A BEAM OF 20 ARC-S. REFLECTED LIGHT RECEIVED BY GROUND TELESCOPES WAS AMPLIFIED BY A PHOTOMULTIPLIER TUBE THAT CONVERTED THE OPTICAL IMPULSE TO AN ELECTRICAL SIGNAL. THE TIME REQUIRED FOR THE BEAM TO RETURN TO EARTH WAS RECORDED BY A DIGITAL COUNTER. THE REFLECTED LASER PULSE WAS ALSO PHOTOGRAPHED AGAINST THE STELLAR BACKGROUND, AND THE TOTAL TIME TRAVELED BY THE LIGHT PULSES WAS CONSIDERED IN THE OPTICAL LASER TRACKING SYSTEM. LASER TRACKING, IS THE RESPONSIBILITY OF AFRL, SAO, GSFC OPTICAL RESEARCH, AND INTERNATIONAL LASER STATIONS.

***** GEOS 3*****

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

NSSDC ID- 75-027A

LAUNCH DATE- 04/09/75 WEIGHT- 340. 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- 04/10/75
ORBIT PERIOD- 101.82 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-WFC

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 FLATS OF THE OCTAHEDRON WAS 1.22 M, AND THE SPACECRAFT WAS 1.11-M HIGH WITH A TOTAL WEIGHT OF 340 KG (748 LB). 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 TRANSPONDER SYSTEM. THIS SYSTEM WAS ALSO USED FOR PERIODIC GEOS-C TELEMETRY DATA RELAY 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 INTERDATUM TIES AND GRAVITY MODELS, AND TO SUPPORT THE CALIBRATION AND POSITION DETERMINATION OF NASA-STDN S-BAND TRACKING STATIONS.

***** GEOS 3, ANDERLE*****

INVESTIGATION NAME- US NAVY DOPPLER SYSTEM

NSSDC ID- 75-027A-05 INVESTIGATIVE PROGRAM
CODE ER
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 COHERENTLY 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 FIXED 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) -- ARE EXPECTED TO BE IN OPERATION. OBSERVATIONS MADE FROM THREE OR MORE KNOWN STATIONS ALLOWED DEDUCTION OF ORBITAL PARAMETERS. RANGE-RATE DATA FROM EITHER THE FIXED STATIONS OR THE GEOCEIVERS WERE ESTIMATED TO BE ACCURATE WITHIN 0.5 CM/S.

***** GEOS 3, GALICINAO*****

INVESTIGATION NAME- SATELLITE-TO-SATELLITE TRACKING

NSSDC ID- 75-027A-06 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - I.Y. GALICINAO NASA-GSFC

BRIEF DESCRIPTION
THE SATELLITE-TO-SATELLITE TRACKING (SST) SYSTEM USED CONSISTED OF -- (1) THE GROUND-BASED APPLICATION TECHNOLOGY SATELLITE RANGING (ATSR) 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

NSSDC 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...

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

INVESTIGATION NAME- RADAR ALTIMETER SYSTEM

NSSDC ID- 75-C27A-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...

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

INVESTIGATION NAME- S-BAND TRACKING SYSTEM

NSSDC ID- 75-027A-02 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S) NAVIGATION

PERSONNEL PI - I.M. SALZBERG NASA-GSFC

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...

APPROXIMATELY HEMISPHERICAL COVERAGE AND A MINIMUM OF 0-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...

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

INVESTIGATION NAME- LASER CUBE SYSTEM

NSSDC ID- 75-027A-04 INVESTIGATIVE PROGRAM CODE ER
INVESTIGATION DISCIPLINE(S) NAVIGATION GEODESY

PERSONNEL PI - C.C. STEPHANIDES NASA-GSFC

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...

***** 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 NASDA
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 PM - N. KODAIRA NATL SATELL DEV AGCY
PS - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION THE GEOSTATIONARY METEOROLOGICAL SATELLITE (GMS) IS JAPAN'S CONTRIBUTION TO THE INTERNATIONAL GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM). ESA, USSR, USA, AND JAPAN PLAN TO PROVIDE GEOSTATIONARY SATELLITES FOR THIS PROGRAM...

----- 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. 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 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, KOHNO-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 77-065A-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 1*****

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

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 MG - A.J. CERVENKA NASA HEADQUARTERS PM - R.H. PICKARD NASA-GSFC 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 CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 63 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.

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

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

NSSDC ID- 75-100A-01 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS

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 12.0 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-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 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 NA DIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSED THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 8 KM AT ZERO NA DIR 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), WALLOPS 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 OPERATIONAL WEATHER OBSERVATIONS

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 (WEXAF 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 53 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
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER 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 AMPLIFICATION 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
OPERATIONAL 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 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 5-MIL 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 50-MIL 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
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD 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 (+50, 100, 200, OR 400 GAMMAS), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 GAMMAS IN 40-GAMMA STEPS), AND AN IN-FLIGHT 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
ORBIT PERIOD- 1436. MIN
PERIAPSIS- 35266. KM ALT

EPOCH DATE- 06/21/77
INCLINATION- 0.88 DEG
APOAPSIS- 36304. KM ALT

PERSONNEL
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 2 IS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (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 MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDER 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 RADIIALLY OUT FROM THE THRUST 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 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 2, NESS STAFF -----

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

NSSDC ID- 77-048A-01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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 2 IS 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 IS 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 MICRON) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR 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-TO-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 NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. 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.

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

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 77-048A-05 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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 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 VARIES FROM 5C TO 300G 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
OPERATIONAL 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 PULSEHEIGHT DISCRIMINATION, ARE 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 MEASURE ELECTRONS GREATER THAN 2.8 MEV.

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

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 77-048A-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY 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 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 HAS A 5-MIL 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 50-MIL 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
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER IS A BIAXIAL, 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 IS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAS A SELECTABLE RANGE (5, 10, 20, OR 400 GAMMAS), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 GAMMAS IN 40-GAMMA STEPS), AND AN IN-FLIGHT

CALIBRATION CAPABILITY.

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

SPACECRAFT COMMON NAME- GOES 3
ALTERNATE NAMES- 10952

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
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION

GOES 3 IS A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS SPACECRAFT CARRIES (1) A VISIBLE-IRREDARED 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 MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 83 CM BEYOND THE CYLINDER 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 OUT FROM THE THRUST TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORMS THE OUTER WALLS OF THE SPACECRAFT AND PROVIDES 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 RESPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED ORBIT.

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

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

NSSDC ID- 78-062A-01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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 3 IS 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 IS 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 MICRON) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR 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-TO-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 NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED

SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WALLEPS 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.

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

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 78-062A-05 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING 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 16,000 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 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 BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIES 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 OPERATIONAL ENVIRON. MONITORING INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL OI - H.H. SAUER 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, ARE 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 MEASURE ELECTRONS GREATER THAN 2.8 MEV.

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

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 78-062A-03 INVESTIGATIVE PROGRAM OPERATIONAL 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 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 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 HAS A 5-MIL BERYLLIUM WINDOW TO EXCLUDE X RAYS OF LONGER WAVELENGTHS. THE OTHER CHAMBER WAS FILLED WITH XENON AT 1.5 TO 2 ATM, AND HAS A 50-MIL 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 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION THE MAGNETOMETER IS A BIAxIAL, 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 IS ALIGNED PARALLEL TO THE SPACECRAFT SPIN AXIS AND THE OTHER PERPENDICULAR TO THIS AXIS. EACH SENSOR HAS A SELECTABLE RANGE (50, 100, 200, OR 400 GAMMAS), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 GAMMAS IN 40-GAMMA STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** HAWKEYE 1*****

SPACECRAFT COMMON NAME- HAWKEYE 1 ALTERNATE NAMES- INJUN-F, NEUTRAL POINT EXPLORER EXPLOREP 52

NSSDC ID- 74-040A

LAUNCH DATE- 06/03/74 HEIGHT- 22.7 KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/04/74 ORBIT PERIOD- 3032.4 MIN INCLINATION- 89.8 DEG PERIAPSIS- 469.0 KM ALT APOAPSIS- 125570. KM ALT

PERSONNEL MG - J.R. HOLTZ NASA HEADQUARTERS SC - E.R. SCHMERLING NASA HEADQUARTERS PM - J.E. ROGERS U OF IOWA PM - C.W. COFFEE, JR. NASA-LARC PS - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION THE PRIMARY MISSION OBJECTIVE WAS TO CONDUCT PARTICLES AND FIELDS INVESTIGATIONS OF THE POLAR MAGNETOSPHERE OF THE EARTH OUT TO 21 EARTH RADII. SECONDARY OBJECTIVES WERE TO STUDY MAGNETIC FIELD AND PLASMA DISTRIBUTION MEASUREMENTS IN THE SOLAR WIND, AND TO STUDY TYPE III RADIO EMISSIONS CAUSED BY SOLAR ELECTRON STREAMS IN THE INTERPLANETARY MEDIUM. TO ACCOMPLISH THESE OBJECTIVES, THE SPACECRAFT WAS INSTRUMENTED WITH A MAGNETOMETER, AN ENERGETIC PLASMA ANALYZER, AND AN ELF-VLF WAVE INSTRUMENT. THE SPACECRAFT WAS SPIN STABILIZED WITH A NOMINAL ROTATIONAL PERIOD OF 11 SEC. IN CELESTRIAL COORDINATES, THE POSITIVE SPIN AXIS COORDINATES WERE RIGHT ASCENSION 299.4 DEG (PLUS OR MINUS 1.1 DEG) AND DECLINATION 8.6 DEG (PLUS OR MINUS 1.5 DEG). THERE WAS NO ONBOARD ORIENTATION OR SPIN RATE CONTROL, BUT THE ORIENTATION OF THE SPIN AXIS WAS STABLE. AN OPTICAL ASPECT SYSTEM OPERATED FROM LAUNCH UNTIL 9/3/74. AFTER THIS PERIOD, ASPECT HAD TO BE DETERMINED FROM MAGNETOMETER MEASUREMENTS. THE COMPLETE SPACECRAFT WITH INSTRUMENTS HAD A MASS OF 22.65 KG. POWER OF 22 TO 36 WATTS, DEPENDING ON SOLAR ASPECT, WAS OBTAINED FROM SOLAR CELLS. HAWKEYE 1 PARTICIPATED IN THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) AND DURING THE FIRST HALF OF 1977 DATA ACQUISITION WAS CONFINED TO IMS SPECIAL INTERVALS. FOR MORE DETAILS SEE U. OF IOWA SPECIAL REPORT, U. OF IOWA 77-6, "HAWKEYE 1," JANUARY 1977. DATA WERE OBTAINED IN REAL TIME ONLY AT A FREQUENCY OF 136 MHZ AND 400 MHZ AT 100 B/S (OR 200 B/S WITH CONVOLUTIONAL CODING) PLUS WIDEBAND VLF DATA.

----- HAWKEYE 1, FRANK-----

INVESTIGATION NAME- LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 74-040A-02 INVESTIGATIVE PROGRAM CODE ST INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS

PERSONNEL PI - L.A. FRANK U OF IOWA OI - J.D. CRAVEN U OF IOWA OI - D.M. YEAGER U OF IOWA

BRIEF DESCRIPTION THIS PARTICLE SPECTROMETER (LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER - LEPEDEK) EMPLOYED TWO ELECTROSTATIC ANALYZERS TO MEASURE PROTONS AND ELECTRONS SIMULTANEOUSLY. A GM TUBE WAS AN ADDITIONAL DETECTOR SENSITIVE TO PROTONS ABOVE 600 KEV AND ELECTRONS ABOVE 45 KEV. THE SENSORS WERE MOUNTED NORMAL TO THE SPACECRAFT SPIN AXIS. ANGULAR DISTRIBUTIONS OF PARTICLES WERE DETERMINED WITH A SECTOR RESOLUTION OF 50 DEG FOR ANALYZER VOLTAGE STEPS AND 10 DEG FOR ANALYZER VOLTAGE BEING SWEEP THROUGH ITS RANGE. THE ELECTROSTATIC ANALYZERS HAD A FIELD OF VIEW OF 8 DEG X 30 DEG AND MEASURED PROTONS AND ELECTRONS FROM 0.05 TO 40 KEV. THE GM

TUBE HAD A CONICAL FIELD OF VIEW OF 15 DEG HALF ANGLE. TWO MODES OF OPERATION WERE USED -- ONE INSTRUMENT CYCLE OF 156 INTENSITY MEASUREMENTS EVERY 46 S OR ONE CYCLE OF 312 INTENSITY MEASUREMENTS EVERY 92 S. FOR MORE DETAILS OF THE LEPEDEA INSTRUMENT SEE "J. GEOPHYS. RES." 72, 185, 1967.

----- HAWKEYE 1, GURNETT-----

INVESTIGATION NAME- ELF/VLF RECEIVERS
 NSSDC ID- 74-040A-03 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - D.A. GURNETT U OF IOWA
 OI - G.W. PFEIFFER U OF IOWA

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED ELECTRIC AND MAGNETIC FIELDS USING A 42.7-M ELECTRIC DIPOLE (TIP-TO-TIP) AND A SEARCH COIL ANTENNA DEPLOYED 1.5E M FROM THE SPACECRAFT. THE ELECTRIC FIELD SPECTRUM MEASUREMENTS WERE MADE IN 16 LOGARITHMICALLY SPACED FREQUENCY CHANNELS EXTENDING FROM 1.78 HZ TO 178 KHZ. DC ELECTRIC FIELDS WERE ALSO MEASURED. THE BANDWIDTH OF THESE CHANNELS VARIED FROM 7.5 TO 30 PERCENT DEPENDING ON CENTER FREQUENCY. CHANNEL SENSITIVITY AND DYNAMIC RANGE WERE 1.E-6 V/M AND 100 DB, RESPECTIVELY. A WIDEBAND RECEIVER WAS ALSO USED, WITH TWO SELECTABLE BANDWIDTH RANGES -- .15 TO 10 KHZ OR 1 TO 45 KHZ. THE MAGNETIC FIELD SPECTRUM WAS MEASURED IN EIGHT DISCRETE, LOGARITHMICALLY-SPACED CHANNELS FROM 1.78 HZ TO 5.62 KHZ. THE BANDWIDTH OF THESE CHANNELS VARIED FROM 7.5 TO 30 PERCENT DEPENDING ON FREQUENCY. THE DYNAMIC RANGE AND SENSITIVITY WAS 100 DB. AND 0.1 NT AT 1.78 HZ TO 3.4E-4 NT AT 5.62 KHZ. THE WIDEBAND RECEIVER DESCRIBED ABOVE COULD BE USED WITH THE MAGNETIC ANTENNA. EACH DISCRETE CHANNEL WAS SAMPLED ONCE EVERY 11.52 SEC.

----- HAWKEYE 1, VAN ALLEN-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER
 NSSDC ID- 74-C40A-01 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - J.A. VAN ALLEN U OF IOWA
 OI - L.J. CAHILL, JR. U OF MINNESOTA

BRIEF DESCRIPTION
 A 4-RANGE, TRIAXIAL FLUXGATE MAGNETOMETER MOUNTED ON A 1.52-M BOOM, WAS USED TO MEASURE THE AMBIENT MAGNETIC FIELD. THE THREE AXES WERE SAMPLED SEQUENTIALLY THREE TIMES EACH 5.72 S. SENSITIVITY AND (ACCURACY) WAS PLUS OR MINUS 150 (1.2), 450 (3.5), 1,500 (11.7) AND 25,000 (195.3) NT, RESPECTIVELY. THE SENSITIVITY WAS SWITCHED BY GROUND COMMAND. FREQUENCY RESPONSE WAS DC TO 1 HZ (FLAT); DOWN 3 DB AT 10 HZ; THEN FALLING AT 6 DB PER OCTAVE AT HIGHER FREQUENCIES. SATELLITE STRAY FIELDS WERE CONSTRAINED TO BE LESS THAN 0.1 NT, WHICH WAS ALSO THE RMS INSTRUMENT NOISE LEVEL. IN-FLIGHT CALIBRATION WAS PERFORMED ONCE EVERY 98 MINUTES.

***** HCMM*****

SPACECRAFT COMMON NAME- HCMM
 ALTERNATE NAMES- SATS, APPL EXPL MISSION A
 HEAT CAPACITY MAP MSN, AEM-A
 10818

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
 UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/27/78
 ORBIT PERIOD- 96.7 MIN INCLINATION- 97.6 DEG
 PERIAPSIS- 558. KM ALT APOAPSIS- 646. KM ALT

PERSONNEL
 MG - D.S. DILLER NASA HEADQUARTERS
 SC - B.B. SCHARDT- NASA HEADQUARTERS
 PM - C.L. WAGNER, JR. NASA-GSFC
 PS - J.C. PRICE NASA-GSFC

BRIEF DESCRIPTION
 THE OBJECTIVE OF THE HEAT CAPACITY MAPPING MISSION (HCMM) IS TO PROVIDE COMPREHENSIVE, ACCURATE, HIGH SPATIAL RESOLUTION THERMAL SURVEYS OF THE SURFACE OF THE EARTH. THE SPACECRAFT IS SPIN STABILIZED AT A RATE OF 14 RPM. THE HCMM CIRCULAR SUN-SYNCHRONOUS ORBIT ALLOWS THE SPACECRAFT TO SENSE SURFACE TEMPERATURE NEAR THE MAXIMUM AND MINIMUM OF THE DIURNAL CYCLE. THE ORBIT HAS AN ASCENDING DAYLIGHT MODE WITH NOMINAL EQUATORIAL CROSSING TIME OF 2:00 PM, AND PROVIDES A 1:30 PM TO

2:30 AM CROSSING TIME OVER MIDDLE NORTHERN LATITUDES. THE ORBIT ALSO ALLOWS FOR REFLECTANCE MEASUREMENTS DURING DAYLIGHT PASSES.

----- HCMM, BARNES-----

INVESTIGATION NAME- HEAT CAPACITY MAPPING RADIOMETER
 NSSDC ID- 78-041A-C1 INVESTIGATIVE PROGRAM
 CODE 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) ARE 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 TRANSMITS ANALOG DATA IN REAL TIME TO SELECTED RECEIVING STATIONS. IT IS 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 IS ALSO USED TO MAP THERMAL GRADIENTS IN BODIES OF WATER. THE RADIOMETER IS SIMILAR TO THE HIGH-RESOLUTION SURFACE COMPOSITION MAPPING RADIOMETER (HRSCMR) OF NIMBUS 5 (72-097A). THE HCMR HAS 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 ARE COVERED WITHIN THE 12-H PERIOD CORRESPONDING TO THE MAXIMUM AND MINIMUM OF TEMPERATURE OBSERVED. THE INSTRUMENT WILL OPERATE IN TWO CHANNELS, 10.5 TO 12.5 MICROMETERS (IR) AND 0.8 TO 1.1 MICROMETERS (VISIBLE). THE LATTER CHANNEL WILL BE MATCHED TO THE ERTS-1 (72-058A) BAND 4. THE INSTRUMENT UTILIZES A RADIATION COOLER TO COOL THE TWO Hg-CD-TE DETECTORS TO 100 K. THE EXPERIMENT INCLUDES AN ANALOG MULTIPLEXER THAT ACCEPTS THE ANALOG OUTPUT OF EACH DETECTOR AND MULTIPLEXES THEM IN A FORM SUITABLE FOR TRANSMISSION BY THE SPACECRAFT S-BAND TRANSMITTER. THE DATA ARE AVAILABLE THROUGH THE EROS DATA CENTER, SIOUX FALLS, S.D. MORE COMPLETE INFORMATION CAN BE FOUND IN SMITH, S.R. 'APPLICATIONS EXPLORER MISSIONS (AEM) MISSION PLANNER'S HANDBOOK.'

***** HEAO 1*****

SPACECRAFT COMMON NAME- HEAO 1
 ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-A, HEAO-A
 10217

NSSDC ID- 77-075A
 LAUNCH DATE- 08/12/77 WEIGHT- 2660. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/13/77
 ORBIT PERIOD- 93.5 MIN INCLINATION- 22.8 DEG
 PERIAPSIS- 440. KM ALT APOAPSIS- 452. KM ALT

PERSONNEL
 MG - R.E. HALPERN NASA HEADQUARTERS
 SC - A.G. OPP NASA HEADQUARTERS
 PM - F.A. SPEER NASA-MSFC
 PS - F.B. MCDONALD NASA-GSFC

BRIEF DESCRIPTION
 HIGH ENERGY ASTRONOMY OBSERVATORY 1 WAS THE FIRST IN A SERIES OF THREE SATELLITE OBSERVATORIES DESIGNED TO CONTINUE THE X-RAY AND GAMMA-RAY STUDIES INITIATED BY ANS, OAO 3, UK 5, THE OSO SERIES, THE SAS SERIES, AND THE GAMMA-RAY BURST DISCOVERIES OF THE VELA SATELLITES. THESE MISSIONS WERE DESIGNED TO SURVEY AND MAP THE CELESTIAL SPHERE FOR X-RAY SOURCES AT AN INTENSITY LEVEL OF 1.E-6 OF THE BRIGHTEST KNOWN SOURCE (SCO X-1), AND TO INVESTIGATE THE STRUCTURE AND SHAPE OF GALACTIC AND EXTRAGALACTIC COSMIC-RAY NUCLEI THROUGH THEIR INFLUENCE ON THE EARTH'S ATMOSPHERE. EACH SPACECRAFT OF THE SERIES HAD A COMMON SPACECRAFT EQUIPMENT MODULE (SEM) AND A UNIQUE EXPERIMENT MODULE (EM). THIS MISSION WAS SPECIFICALLY DESIGNED TO MAP X-RAY AND GAMMA-RAY SOURCES FROM 150 EV TO 10 MEV, TO ESTABLISH THE SIZE AND PRECISE LOCATION OF X-RAY SOURCES WITH AN ENERGY RANGE OF 1 KEV TO 15 KEV, TO DETERMINE THE CONTRIBUTION OF DISCRETE SOURCES TO THE X-RAY BACKGROUND, AND TO MEASURE TIME VARIATIONS OF X-RAY SOURCES. CONTINUOUS CELESTIAL SCANS WERE MADE PERPENDICULAR TO Z-AXIS (POINTING TO THE SUN) DURING THE INITIAL PHASE OF THE MISSION. SCAN RATE WAS 0.03 REVOLUTIONS/MIN. THE ENTIRE CELESTIAL SPHERE WOULD BE SCANNED IN 6 MONTHS. SPECIAL MANEUVERS OF UP TO 5 TIMES/WEEK, TO OFFSET FROM THE SUN UP TO 7 DEG FOR SHORT OBSERVATION PERIODS, WERE PART OF THE MISSION'S OBJECTIVES. WHEN PASSING

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 OF POOR QUALITY

OVER THE SOUTH ATLANTIC ANOMALY (SAA), HIGH VOLTAGE SUPPLIES WERE TURNED OFF OR REDUCED TO PREVENT DAMAGE DUE TO SATURATION EFFECTS. THE SIX-SIDED HEAD 1 WAS 5.68-M HIGH, 2.67-M IN DIAMETER, AND WEIGHED 2552 KG INCLUDING 1220 KG OF EXPERIMENTS. DOWNLINK TELEMETRY WAS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF THE TWO TAPE RECORDER SYSTEMS.

----- HEAD 1, BOLDT-----

INVESTIGATION NAME- COSMIC X-RAY EXPERIMENT

NSSDC ID- 77-075A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
 PI - E.A. BOLDT NASA-GSFC
 OI - G.P. GARMIRE CALIF INST OF TECH
 OI - C.S. BOUYER U OF CALIF, BERKELEY
 OI - R. CRUDDANCE U OF CALIF, BERKELEY
 OI - G.B. FIELD SAO
 OI - M.L. LANPTON U OF CALIF, BERKELEY
 OI - J.I. SILK U OF COLORADO
 OI - S.S. HOLT NASA-GSFC
 OI - G. AGRAWAL CALIF INST OF TECH
 OI - G.R. RIEGLER BENDIX CORP

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MEASURE THE DIFFUSE X-RAY BACKGROUND IN THE ENERGY RANGE OF 0.15 TO 60 KEV. OBJECTIVES WERE TO MEASURE RELATIVE DIFFUSION AND ABSORPTION OF DIFFUSE HARD AND SOFT X-RAYS AT HIGH GALACTIC LATITUDES, AND THEN CORRELATE THESE MEASUREMENTS WITH RADIO AND OPTICAL STUDIES; DETERMINE DISCRETE SOURCE BACKGROUND CONTRIBUTION; DETECT LARGE-SCALE GLOBAL ANISOTROPIES ASSOCIATED WITH SOLAR SYSTEM MOTION WITH RESPECT TO DISTANT EMISSION SOURCES; MAKE BROADBAND SPECTRAL CLASSIFICATIONS OF DIFFUSE AND DISCRETE X-RAY SOURCES; AND ESTABLISH TEMPORAL VARIATIONS OF MULTI-COMPONENT SPECTRAL SOURCES. THREE TYPES OF MULTIANODE, MULTILAYER COUNTERS WERE USED FOR THIS EXPERIMENT. THREE HIGH ENERGY DETECTORS (HED) WITH XENON FILLED COUNTERS COVERED THE ENERGY RANGE OF 3 TO 60 KEV WITH AN EFFECTIVE AREA OF 900 CM SQ. THE MINIMUM DETECTABLE FLUX IN A 1.0E3 S OBSERVATION WAS 1.0E-4/SQ CM-S-KEV FOR ENERGY BANDS 3 TO 20 KEV AND 20 TO 60 KEV. ONE MEDIUM ENERGY DETECTOR (MED) WITH AN ARGON/METHANE FILLED COUNTER COVERED THE ENERGY RANGE 1.5-15 KEV. THE EFFECTIVE AREA OF THIS COUNTER WAS 900 CM SQ. THE MINIMUM DETECTABLE FLUX IS THE SAME AS FOR THE HED'S. THE TWO LOW-ENERGY DETECTORS (LED) WERE THIN-WINDOW, PROPANE GAS, FLOW COUNTERS TO COVER THE ENERGY RANGE OF 0.15 TO 3 KEV. THE LED USED PERMANENT MAGNETS TO PREVENT INCIDENT ELECTRONS FROM REACHING THE DETECTOR WINDOW AND A SUNSHADE WHENEVER DIRECT SUNLIGHT WAS NEAR THE FIELD OF VIEW. IT HAD A 600 SQ CM EFFECTIVE AREA. THE MINIMUM DETECTABLE FLUX FOR A 1.0E3 S OBSERVATION WAS 1.0E-3/SQ CM-S-KEV FOR THE 0.15 TO 0.26 KEV BAND AND FOR THE 0.5 TO 3.0 KEV BAND.

----- HEAD 1, FRIEDMAN-----

INVESTIGATION NAME- LARGE AREA COSMIC X-RAY SURVEY

NSSDC ID- 77-075A-01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
 PI - H.D. FRIEDMAN US NAVAL RESEARCH LAB
 OI - T.A. CHUBB US NAVAL RESEARCH LAB
 OI - E.Y. BYRAM US NAVAL RESEARCH LAB
 OI - G.G. FRITZ US NAVAL RESEARCH LAB
 OI - J.F. MEEKINS US NAVAL RESEARCH LAB
 OI - F. SCHULMAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
 THIS INSTRUMENT WAS A MODULAR ASSEMBLY OF SEVEN LARGE-AREA, THIN-WINDOW, PROPORTIONAL COUNTER SENSOR MODULES TO RECORD INCIDENT X-RAY FLUXES. THE OBJECTIVES WERE TO MAP THE CELESTIAL SPHERE IN THE ENERGY RANGE FROM .15 TO 20 KEV WITH GREATER SENSITIVITY THAN ACHIEVED HERETOFORE AND TO MEASURE THE SPECTRA, LOCATION, AND TIME VARIATIONS OF X-RAY SOURCES WITH A 0.1 TO 1 DEG ANGULAR RESOLUTION. EACH OF THE SENSOR MODULES CONSISTED OF A PROPORTIONAL COUNTER BODY FRAME ON WHICH WAS MOUNTED A WINDOW SUPPORT STRUCTURE, COUNTER BACK STRUCTURE WITH INTEGRAL CONTROL COUNTER, COLLIMATOR ASSEMBLY, AND ELECTRONIC SUBASSEMBLIES. A HONEYCOMB CELL CONSTRUCTION FOR THE BASIC COUNTER PROVIDED X-RAY COLLIMATION OF 80 DEG BY 4 DEG FWHM. A BACK LAYER OF THE THREE-LAYERED COUNTER PROVIDED ANTICOINCIDENT PROTECTION AGAINST CHARGED PARTICLE EVENTS. THE FRONT LAYER WAS THE MAIN X-RAY SENSOR FOR MOST ENERGY RANGES. ALL THREE LAYERS PROVIDED DATA AT HIGHER ENERGIES. THE COLLIMATOR FOR EACH OF THE COUNTERS VIEWED THE SKY. THE COLLIMATOR ON SENSOR MODULES 1 THROUGH 4 PROVIDED 1 DEG BY 4 DEG COLLIMATION, ON SENSOR MODULES 5 AND 6 PROVIDED 1 DEG BY 0.5 DEG COLLIMATION, AND ON SENSOR MODULE 7 PROVIDED 4 DEG BY 2 DEG COLLIMATION. EACH OF THE SENSORS INCLUDED MOVABLE RADIOACTIVE CALIBRATION SOURCES TO PROVIDE A CHECK ON COUNTER OPERATION AND CHANNEL POSITION. THERE WAS ALSO A MAGNET ASSEMBLY TO DEFLECT LOW-ENERGY RADIATION BELT ELECTRONS. THE CONTROL COUNTER WAS A SMALL COUNTER AT THE BACK OF THE ASSEMBLY THAT SHARED THE COUNTING GAS WITH THE MAIN COUNTER. IT WAS EXCITED BY AN FE-55

SOURCE AND SERVED TO GENERATE THE PROPER OPERATING VOLTAGE ON THE MAIN COUNTER TO COMPENSATE FOR GAS DENSITY CHANGES AND HIGH VOLTAGE DRIFTS.

----- HEAD 1, GURSKY-----

INVESTIGATION NAME- X-RAY SCANNING MODULATION COLLIMATOR

NSSDC ID- 77-075A-03 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
 PI - H. GURSKY SAO
 OI - H.V.D. BRADT MASS INST OF TECH
 OI - G.W. CLARK MASS INST OF TECH
 OI - W.H.G. LEWIN MASS INST OF TECH
 OI - S. RAPPAPORT MASS INST OF TECH
 OI - G. SPADA MASS INST OF TECH
 OI - R. DOKSEY MASS INST OF TECH
 OI - R. GIACCONI SAO
 OI - P. GORENSTEIN SAO
 OI - E.M. KELLOGG SAO
 OI - H. TANANBAUM SAO
 OI - D. SCHWARTZ SAO

BRIEF DESCRIPTION
 THIS EXPERIMENT USED A SCANNING MODULATION COLLIMATOR (SMC) INSTRUMENT TO DETERMINE, FOR SELECTED X-RAY SOURCES, THEIR POSITION WITHIN 5 ARC-SEC, THEIR ANGULAR SIZE TO A PRECISION OF 5-10 ARC-SEC IN THREE ENERGY INTERVALS FROM 1-15 KEV; AND TO STUDY THE STRUCTURE OF THEIR X-RAY EMISSION TO A PRECISION OF 10 ARC-SEC IN THREE ENERGY INTERVALS FROM 1-15 KEV. THE SMC WAS COMPRISED OF TWO PARTS, EACH CONTAINING FOUR WIRE GRID PLANES. EACH PROVIDED A LOCATION AND ANGULAR SIZE MEASUREMENT IN ONE DIMENSION. AN ADDITIONAL COLLIMATOR LOCATED FORWARD TO THE FRONT GRID RESTRICTED THE OVERALL INSTANTANEOUS FIELD OF VIEW TO 4 DEG X 4 DEG FWHM FOR EACH SMC. THE OUTWARD VIEW DIRECTION IS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS (Z-AXIS) AND HENCE THE INSTRUMENT SCANS A GREAT CIRCLE BAND ON THE SKY. THE TWO PARTS OF THE SMC DIFFER BY HAVING THEIR PLANE OF MAXIMUM TRANSMISSION INCLINED +10 DEG AND -10 DEG TO THE SCAN DIRECTION. PRECISE TWO-DIMENSIONAL LOCATIONS ARE DETERMINED BY THE INTERSECTIONS OF THE LOCATIONS OBTAINED FROM EACH OF THE COLLIMATORS. THE ANGULAR RESPONSE OF THE TWO SMC COMPONENTS WAS 30 AND 120 ARC-SEC, WHICH EXTENDED THE DYNAMIC RANGE UP TO 16 ARC-MIN OVER WHICH ANGULAR SIZE AND STRUCTURE MEASUREMENTS WERE MADE. THE SMC INSTRUMENT WAS CAPABLE OF DETECTING X-RAY SOURCES WITH AN INTENSITY OF 1.0E-3 THAT OF THE CRAB NEBULA. THIS EXPERIMENT WAS ALSO EQUIPPED WITH TWO ASPECT SENSORS TO PROVIDE DATA ON THE STELLAR ORIENTATION OF THE COLLIMATOR AXES TO ACHIEVE THE 5 ARC-SEC POSITION OF SOURCES.

----- HEAD 1, PETERSON-----

INVESTIGATION NAME- LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY

NSSDC ID- 77-075A-04 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
 PI - L.E. PETERSON U OF CALIF, SAN DIEGO
 OI - W.H.G. LEWIN MASS INST OF TECH
 OI - R.M. PELLING U OF CALIF, SAN DIEGO
 OI - J.L. MATTESON U OF CALIF, SAN DIEGO
 OI - A. SCHEEMAKER U OF CALIF, SAN DIEGO
 OI - H.V.D. BRADT MASS INST OF TECH
 OI - G.W. CLARK MASS INST OF TECH
 OI - S. RAPPAPORT MASS INST OF TECH

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED POINT AND DIFFUSE SOURCES OF X-RAYS AND GAMMA RAYS IN THE 10 KEV TO 10 MEV RANGE. THE INSTRUMENT CONSISTED OF SEVEN NaI(Tl)/CSI(Na) PHOSWICH SCINTILLATORS SURROUNDED BY EIGHT LARGE CSI(Na) SCINTILLATORS THAT PROVIDED SHIELDING AND DEFINED THE FIELDS OF VIEW. THERE WERE THREE DETECTOR TYPES. THE INTERMEDIATE ENERGY DETECTORS HAD AN ENERGY RANGE OF 10-200 KEV, AN AREA OF 225 SQ CM, CSI SHIELDING OF 2 IN., AND A FIELD OF VIEW (FWHM) OF 1 DEG X 20 DEG. THE SLAT COLLIMATORS OF THE INTERMEDIATE ENERGY DETECTORS WERE POSITIONED AT 60 DEG RELATIVE TO THE SCAN DIRECTION, ALLOWING POINT SOURCE DETERMINATION TO 1 DEG OVER THE APPROXIMATELY 40-DEG-WIDE BAND SCANNED EACH SPACECRAFT ROTATION. THE POINT MODE DETECTORS HAD AN ENERGY RANGE OF 0.1-5 MEV, AN AREA OF 180 SQ CM, CSI SHIELDING OF ABOUT 4 IN., AND A FIELD OF VIEW (FWHM) OF 20 DEG. SOURCES DETECTED WERE IDENTIFIED WITH LOW ENERGY SOURCES BY SPECTRAL SIMILARITY WITH MEASUREMENTS MADE BY THE INTERMEDIATE ENERGY DETECTOR AT ABOUT 100 KEV. THE DIFFUSE MODE DETECTORS HAD AN ENERGY RANGE OF 0.2-10 MEV, AN AREA OF 125 SQ CM, CSI SHIELDING OF ABOUT 6 IN., AND A FIELD OF VIEW (FWHM) OF 10 DEG. POINT SOURCES MEASURED BY THE DIFFUSE MODE DETECTORS WERE RELATED TO THOSE WITH SIMILAR SPECTRA IN THE POINT MODE DETECTORS. EACH OF THE DETECTORS WAS EQUIPPED WITH A PULSE SHAPE ANALYZER AND DISCRIMINATOR WHICH DETECTED AND VETOED CSI(Na) EVENTS. THE COMBINATION OF SHIELD UPPER AND LOWER LEVEL DISCRIMINATORS (NOMINAL SETTINGS OF 5 MEV AND 0.1 MEV) USED FOR DETECTOR ANTICOINCIDENCE WERE SELECTABLE BY COMMAND. EVENT TIME WAS

NOMINALLY KNOWN TO 3.1 S ACCURACY. THIS COULD BE IMPROVED TO 5 MS OR 2.0E-5 S BY COMMAND. EVENTS SATISFYING THE ANTICOINCIDENCE CONDITION WERE PULSE HEIGHT ANALYZED AND TELEMETERED ON AN EVENT-BY-EVENT BASIS BY A MAIN PULSE HEIGHT ANALYZER (MPHA) SYSTEM. A ROVING PULSE HEIGHT ANALYZER (RPMA) PERFORMED ENERGY AND PULSE SHAPE ANALYZER CALIBRATIONS AND MONITORED SHIELD PERFORMANCE. IT WAS ALSO USED IN THE STUDY OF STRONG X-RAY SOURCES THAT WERE GREATER THAN THE MPMA SYSTEM'S READOUT RATE. THIS INSTRUMENT ALSO CONTAINED THREE PARTICLE MONITORS, WHICH MEASURED PROTON AND ELECTRON FLUXES IN THREE ENERGY RANGES. THERE WAS A HIGH RESOLUTION TIMING SYSTEM THAT MEASURED COSMIC GAMMA-RAY BURSTS, BY SUMMING THE SIGNALS OF THE EIGHT LARGE (CSINA) SHIELDS THAT HAVE A TOTAL OMNIDIRECTIONAL COLLECTION AREA OF ABOUT 2430 SQ CM, AND DISCRIMINATING THE SUMMED SIGNAL IN A SYSTEM WITH THRESHOLDS OF 0.1, 0.2, 0.4, 0.6, AND 1.6 MEV.

***** 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- 210. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
FED REP OF GERMANY BMWF
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
MC - F.D. - KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - A. KUTZER GES FÜR WELTRAUMFORSCH
PN - G.W. OUSLEY NASA-GSFC
PS - H. PORSCHÉ 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 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 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 ANTENNAS 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 PERHELION, 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.

----- 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. WEIKRAUCH MPI-PHYS ASTROPHYS

BRIEF DESCRIPTION
THE PURPOSE OF THE EXPERIMENT 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 COULD THEN BE 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 GM. MASS AND ENERGY DETERMINATION WILL BE POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 GM. FOR PARTICLES LARGER THAN 1.E-13 GM, A MASS SPECTRUM COULD BE GATHERED.

----- 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 SHARED THE 32 M TIP-TO-TIP ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 15 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 HAD CENTER FREQUENCIES FOR THE CHANNELS FROM 31 HZ TO 1.78 KHZ AND 16 PERCENT FROM 31 HZ TO 178 KHZ, AND BANDWIDTHS OF 20 PERCENT FOR THE REMAINING CHANNELS. THESE CHANNELS OVERLAPPED SO AS TO PROVIDE ESSENTIALLY CONTINUOUS FREQUENCY COVERAGE FOR THE RANGE OF ABOUT 20 HZ TO 200 KHZ. 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 JGR, 82, P 632, 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 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 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. THE DATA FROM THE WAVE FORM SAMPLER WERE STORED IN THE SPACECRAFT MEMORY FOR A SHORT PERIOD STARTING BEFORE AND ENDING AFTER THE SHOCK ALARM CIRCUIT HAD BEEN TRIGGERED. 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

ORIGINAL PAGE IS
OF POOR QUALITY

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, 1975.

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

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

NSSDC ID- 74-097A-06 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

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

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

BRIEF DESCRIPTION
THIS EXPERIMENT 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 .03 SEC. 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 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 0 DB IN GAIN. THE SECOND PROBLEM WAS UNEXPECTED INTERFERENCE BETWEEN 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, 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 MPI-AERONOMY
OI - B. WILKEN MPI-AERONOMY
OI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE OBJECTIVE OF THE EXPERIMENT 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 APERTURES POINTING INTO 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 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-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 U OF HAMBURG
OI - W.G. MELBOURNE 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

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

BRIEF DESCRIPTION
THE OBJECTIVE OF THE EXPERIMENT WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .GT. 1.3 MEV/NUCLEON, AND ELECTRONS .GT. 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 55 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 HAD BEEN 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, 37-45, AND .GT. 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .GT. 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 MPI-ASTRONOMIE
OI - E. PITZ MPI-ASTRONOMIE

BRIEF DESCRIPTION
THIS EXPERIMENT 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.

----- 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 - N.F. NESS NASA-GSFC
OI - F. MARIANI SPACE PLASMA LAB
OI - L.F. BURLAGA NASA-GSFC
OI - S.C. CANTARANO U OF ROME

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A BOOM-MOUNTED, TRIAXIAL-FLUXGATE MAGNETOMETER. AN AUTOMATIC IN-FLIGHT RANGE SWITCH SYSTEM SELECTS THE OPTIMUM OF FOUR RANGES THAT ARE MINUS TO PLUS 16, 48, 144, AND 432 GAMMAS PER SENSOR. THESE HAVE CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.33, 0.09, 0.28, AND 0.84 GAMMAS. A SENSOR FLIPPER IS ACTIVATED EVERY 36 H TO ASSIST IN SENSOR ZERO LEVEL DETERMINATION. FOR TELEMETRY BIT RATES ABOVE 256 BPS, VECTOR MEASUREMENTS ARE MADE AT RATES BETWEEN 1 AND 16 PER SECOND, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES ARE 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 BRAUNSCHWEIG TECH U
OI - A. MAIER BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
THE INSTRUMENT 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 13G AND 40G 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, 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 BRAUNSCHWEIG TECH U
OI - G. DEHMEL BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION
THIS EXPERIMENT 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 8 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 (NEUBAUER) OR GURNETT (-C4), 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, 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

PERSONNEL
PI - H.R. ROSENBAUER MPI-ACRONOMY
OI - H. PELLKOFER MPI-EXTRATERR PHYS
OI - J.H. WOLFE NASA-ARC

BRIEF DESCRIPTION
THIS EXPERIMENT EMPLOYED 3 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 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 OF THE USEFULNESS OF THE ION DATA. FOR MORE DETAILED INFORMATION SEE P 226 OF "RAUMFAHRTFORSCHUNG," 19, 1975. WHEN AN EVENT WAS DETECTED BY EXPERIMENT -04, A SHOCK ALARM MODE OF OPERATION WAS ENTERED IN WHICH FAST TIME RESOLUTION DATA WERE RECORDED INTO ONBOARD STORAGE MEMORY FOR A PERIOD BEFORE AND AFTER THE EVENT.

----- 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

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

BRIEF DESCRIPTION
THE DETECTOR COMPLEMENT 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 STER 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 STER) MEASURED PROTONS AND Z >= 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM STER) MEASURES 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 4096 AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND ARE 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, 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- 210. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 07/21/76
ORBIT PERIOD- 185.6 DAYS INCLINATION- 0. DEG
PERIAPSIS- 0.289 AU RAD APOAPSIS- 0.983 AU RAD

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PM - A. KUTZER GES FUR WELTRAUM
PM - G.W. OUSLEY NASA-GSFC
PS - H. PORSCHKE 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/CEPHTAUR 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 ZODICAL 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 ANTENNAS 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 PERIHELION, 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 WAS OBTAINED FROM HELIOS 2 THAN WAS AVAILABLE FROM HELIOS 1.

ORIGINAL PAGE IS OF POOR QUALITY

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

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 76-CO3A-12

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
INTERPLANETARY PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO INVESTIGATE SOME THEORIES ABOUT THE INTERPLANETARY DUST INCLUDING WHETHER -- (1) THE NUMBER OF PARTICLES INCREASES TOWARD THE SUN, (2) THE CUT OFF 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 PULSE HEIGHTS, THE MASS AND THE ENERGY OF THE DUST PARTICLES WAS 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 GM. MASS AND ENERGY DETERMINATION WAS POSSIBLE FOR PARTICLES LARGER THAN ABOUT 1.E-14 GM. FOR PARTICLES LARGER THAN 1.E-13 GM, A MASS SPECTRUM MAY BE GATHERED.

----- 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 SHARED THE 32 M TIP-TO-TIP ELECTRIC ANTENNA WITH EXPERIMENTS -05 AND -06. THE INSTRUMENT CONSISTED OF A 15 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 HAD CENTER FREQUENCIES FOR THE CHANNELS FROM 31 HZ TO 1.78 KHZ AND 16 PERCENT FROM 31 HZ TO 178 KHZ, AND BANDWIDTHS OF 20 PERCENT FOR THE REMAINING CHANNELS. THESE CHANNELS OVERLAPPED SO AS TO PROVIDE ESSENTIALLY CONTINUOUS FREQUENCY COVERAGE FOR THE RANGE OF ABOUT 20 HZ TO 200 KHZ. 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 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. INTERFERENCE OCCURED PRIMARILY IN THE LOWEST 8 CHANNELS WHICH WAS CAUSED BY SOLAR CELL NOISE, 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.

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

INVESTIGATION NAME- FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- 76-CO3A-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 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. THE DATA FROM THE WAVE FORM SAMPLER WERE STORED IN THE SPACECRAFT MEMORY FOR A SHORT PERIOD STARTING BEFORE AND ENDING AFTER THE SHOCK ALARM CIRCUIT HAD BEEN TRIGGERED. 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 206 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 246 OF "RAUMFAHRTFORSCHUNG," 19, 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
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT SHARED THE 32-M, TIP-TO-TIP, ELECTRIC DIPOLE ANTENNA WITH EXPERIMENTS -04 AND -05. A DUAL (REDUANT) 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 DEPENDENT 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 SEC. 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 250 OF "RAUMFAHRTFORSCHUNG," 19, 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 - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT 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 APERTURES POINTING INTO 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 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, KUNOW-----

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

PERSONNEL

PI - H. KUNOW U OF KIEL
OI - G.W. WIBBERENZ U OF KIEL
OI - G. GREEN U OF KIEL
OI - M. MUELLER-MELLIN U OF KIEL
OI - M. WITTE U OF KIEL
OI - H. HEMPE U OF KIEL

BRIEF DESCRIPTION

THE OBJECTIVE OF THE EXPERIMENT WAS TO STUDY HIGH-ENERGY, CHARGED, COSMIC-RAY PARTICLES OF SOLAR, PLANETARY, AND GALACTIC ORIGIN IN INTERPLANETARY SPACE. PROTONS AND ALPHA PARTICLES WITH ENERGIES .GT. 1.3 MEV/NUCLEON, AND ELECTRONS .GT. 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 55 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 HAD BEEN 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, 37-45, AND .GT. 45 MEV/NUCLEON) AND ELECTRONS IN FIVE ENERGY CHANNELS (0.3-0.8, 0.8-2, 2-3, 3-4, AND .GT. 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 CONSISTED OF THREE PHOTOMETERS LOOKING AT 15 DEG, 50 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.

----- 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 - N.F. NESS NASA-GSFC
OI - F. MARIANI SPACE PLASMA LAB
OI - L.F. BURLAGA NASA-GSFC
OI - S.C. CANTARANO U OF ROME

BRIEF DESCRIPTION

THIS EXPERIMENT 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 GAMMAS PER SENSOR. THESE HAD CORRESPONDING DIGITIZATION RESOLUTIONS OF MINUS TO PLUS 0.03, 0.09, 0.28, AND 0.84 GAMMAS. 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 SEC, DEPENDING ON BIT RATES. AT LOWER BIT RATES, AVERAGES AND VARIANCES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH.

----- 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.M. NEUBAUER BRAUNSCHWEIG TECH U
OI - A. MAIER BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THE INSTRUMENT 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, 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 BRAUNSCHWEIG TECH U
OI - G. DEHMEL BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT 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 8 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 (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, 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 - H.R. ROSENBAUER MPI-AERONOMY
OI - H. PELLKOFER MPI-EXTRATERR PHYS
OI - J.H. WOLFE NASA-ARC

BRIEF DESCRIPTION

THIS EXPERIMENT EMPLOYED 3 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 WAS 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, 1975. WHEN AN EVENT WAS DETECTED BY EXPERIMENT -04, A SHOCK ALARM MODE OF OPERATION WAS ENTERED IN WHICH FAST TIME RESOLUTION DATA WERE RECORDED INTO ONBOARD STORAGE MEMORY FOR A PERIOD BEFORE AND AFTER THE EVENT.

----- 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.H. TRAINOR	NASA-GSFC
OI - E.C. ROELOF	APPLIED PHYSICS LAB
OI - B.J. TEEGARDEN	NASA-GSFC
OI - F.B. McDONALD	NASA-GSFC
OI - K.G. MCCracken	CSIRO

BRIEF DESCRIPTION
THE DETECTOR COMPLEMENT 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 STER 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 STER) MEASURED PROTONS AND Z > 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM STER) MEASURES 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 4096 AND 8 BITS/S) AND FORMAT. UNDER OPTIMUM CONDITIONS, FIVE EVENTS PER SECOND ARE 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, FOR FURTHER DETAILS.

***** IMP-H*****

SPACECRAFT COMMON NAME- IMP-H
ALTERNATE NAMES- PL-713A, EXPLORER 47
IMP 7, 06197

NSSDC ID- 72-073A

LAUNCH DATE- 09/23/72 WEIGHT- 390. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/25/72
ORBIT PERIOD- 17702. MIN INCLINATION- 17.2 DEG
PERIAPSIS- 201599. KM ALT APOAPSIS- 235639. KM ALT

PERSONNEL

MG - J.R. HOLTZ	NASA HEADQUARTERS
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PM - M.A. DAVIS	NASA-GSFC
PS - J.H. KING	NASA-GSFC

BRIEF DESCRIPTION
IMP-H CONTINUED THE STUDY BEGUN BY EARLIER IMP SPACECRAFT OF THE INTERPLANETARY AND MAGNETOTAIL REGIONS FROM A NEARLY CIRCULAR ORBIT, NEAR 37 EARTH RADII. THIS 16-SIDED DRUM-SHAPED, SPACECRAFT WAS 157 CM HIGH AND 135 CM IN DIAM. IT WAS DESIGNED TO MEASURE ENERGETIC PARTICLES, PLASMA, AND ELECTRIC AND MAGNETIC FIELDS. THE SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN PERIOD WAS 1.3 S. THE SPACECRAFT WAS POWERED BY SOLAR CELLS AND A CHEMICAL BATTERY. SCIENTIFIC DATA WERE TELEMETERED TO EARTH AT 1600 BPS (WITH A SECONDARY 400-BPS RATE AVAILABLE).

----- IMP-H, BAME-----

INVESTIGATION NAME- SOLAR PLASMA ELECTROSTATIC ANALYZER

NSSDC ID- 72-073A-10 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

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

BRIEF DESCRIPTION
A HEMISPHERICAL ELECTROSTATIC ANALYZER WAS USED TO STUDY 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 (33 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 2 KEV (30 PERCENT SPACING, 15 PERCENT RESOLUTION) AND ELECTRONS FROM 5 EV TO 1 KEV (33 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 RESOLUTION) WERE STUDIED.

----- IMP-H, BRIDGE-----

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSSDC ID- 72-073A-02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

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

BRIEF DESCRIPTION
A MODULATED SPLIT-COLLECTOR FARADAY CUP, WHICH WAS 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 MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE MEASURED 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-H, CLINE-----

INVESTIGATION NAME- STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS

NSSDC ID- 72-073A-13 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
COSMIC RAYS

PERSONNEL

PI - T.L. CLINE	NASA-GSFC
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BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED GALACTIC AND SOLAR ELECTRONS AND POSITRONS IN THE KINETIC ENERGY RANGE 50 KEV TO 2 MEV. INFORMATION ON PROTONS BETWEEN 0.5 AND 4.0 MEV WAS ALSO OBTAINED. A COLLIMATED STILBENE CRYSTAL SCINTILLATOR LOOKING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS SERVED AS THE PRINCIPAL DETECTOR. A SIMILAR, FULLY SHIELDED CRYSTAL SERVED TO DETERMINE THE CONTRIBUTION TO THE PRINCIPAL DETECTOR COUNT RATE OF ELECTRONS AND PROTONS GENERATED WITHIN THE PRINCIPAL DETECTOR BY GAMMA RAYS AND NEUTRONS, RESPECTIVELY. A FULLY SHIELDED CSI CRYSTAL SERVED AS A GAMMA-RAY SPECTROMETER AND WAS USED IN COINCIDENCE WITH THE PRINCIPAL DETECTOR TO DISTINGUISH ELECTRONS FROM POSITRONS. COUNT RATES FROM EACH DETECTOR OBTAINED IN EIGHT ANGULAR SECTORS PER REVOLUTION WERE TELEMETERED. IN ADDITION, THE AMPLITUDE AND SHAPE OF THE PULSE GENERATED IN THE PRINCIPAL DETECTOR BY THE FIRST STOPPING PARTICLE IN EACH APPROPRIATE TELEMETRY FRAME WAS STUDIED. PULSE AMPLITUDE AND SHAPE WERE TO YIELD ENERGY (10 PERCENT RESOLUTION) AND PARTICLE SPECIES INFORMATION.

----- IMP-H, FRANK-----

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 72-C73A-04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK

U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURED THE ENERGY SPECTRA OF LOW-ENERGY ELECTRONS AND PROTONS IN THE GEOCENTRIC RANGE 30 TO 40 R(E) TO FURTHER UNDERSTAND GEOMAGNETIC STORMS, AURORA, TAIL AND NEUTRAL SHEET, AND OTHER MAGNETOSPHERIC PHENOMENA. THE DETECTOR WAS A DUAL-CHANNEL, CURVED-PLATE, ELECTROSTATIC ANALYZER (LEPEDEA - LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 EV AND 50 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG IN FOUR DIRECTIONS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THE DETECTOR WAS 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 68 S.

----- IMP-H, GLOECKLER-----

INVESTIGATION NAME- IONS AND ELECTRONS IN THE ENERGY RANGE
0.1 TO 2 MEV

NSSDC ID- 72-C73A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER
OI - C.Y. FAN
OI - D.K. HOVESTADT

U OF MARYLAND
U OF ARIZONA
MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES ASSOCIATED WITH SOLAR ACTIVITY AND INTERPLANETARY PROCESSES. THE DETECTORS USED WERE (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIGNATED 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 PARTICLE TELESCOPE CONSISTING OF A SILICON SURFACE BARRIER DETECTOR AND A FLAT TWO-CHAMBER PROPORTIONAL COUNTER ENCLOSED IN AN ANTICOINCIDENCE SCINTILLATOR CUP. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1- TO 2-MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF Z FROM 1 TO 8 (CHARGE GROUP RESOLUTION FOR Z BETWEEN 9 AND 26). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH ELEMENT OF THE TELESCOPE, WERE INCLUDED IN THE EXPERIMENT PAYLOAD. THE TELESCOPE FAILED ON NOVEMBER 25, 1972, WHEN THE WINDOW ON THE PROPORTIONAL COUNTER WEAKENED AND BURST DUE TO EXPOSURE TO UV RADIATION.

----- IMP-H, KRIMIGIS-----

INVESTIGATION NAME- CHARGED PARTICLE MEASUREMENTS EXPERIMENT

NSSDC ID- 72-073A-08

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS
OI - T.P. ARMSTRONG
OI - J.A. VAN ALLEN

APPLIED PHYSICS LAB
U OF KANSAS
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 ATOMIC NUMBERS RANGING FROM 2 TO 5 WITH ENERGIES GREATER THAN 8 MEV, HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 32 MEV, AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER SQ CM-S-STER). 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 SQ CM-S-STER). PARTICLES AND X-RAYS PRIMARILY OF SOLAR ORIGIN WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED COSMIC RAYS AND MAGNETOTAL PARTICLES TO BE OBSERVED.

----- IMP-H, McDONALD-----

INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 72-073A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.B. McDONALD
OI - D.E. HAGGE
OI - B.J. TEEGARDEN

NASA-GSFC
UNKMOHH
NASA-GSFC

BRIEF DESCRIPTION

THE GSFC COSMIC-RAY EXPERIMENT MEASURED ENERGY SPECTRA, COMPOSITION, AND ANGULAR DISTRIBUTION OF SOLAR AND GALACTIC ELECTRONS, PROTONS, AND HEAVIER NUCLEI UP TO Z = 30. THREE DISTINCT DETECTOR SYSTEMS WERE USED. THE FIRST SYSTEM CONSISTED OF A PAIR OF SOLID-STATE TELESCOPES THAT MEASURED INTEGRAL FLUXES ABOVE 150, 350, AND 700 KEV AND OF PROTONS ABOVE 0.05, 0.15, 0.70, 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 DE/DX VS E TELESCOPE THAT LOOKED PERPENDICULAR TO THE SPIN AXIS. THIS TELESCOPE MEASURED NUCLEI FROM 1 TO 16 U 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 DE/DX, BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM WAS A THREE-ELEMENT CSI SCINTILLATOR TELESCOPE WHOSE AXIS MADE AN ANGLE OF 39 DEG WITH RESPECT TO THE SPIN AXIS. THE INSTRUMENT RESPONDED TO ELECTRONS BETWEEN 2 AND 12 MEV AND NUCLEI FROM 1 TO 30 U 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 BIDIRECTIONAL TRIPLE DE/DX DETECTOR. FLUX DIRECTIONALITY INFORMATION WAS OBTAINED BY DIVIDING CERTAIN PORTIONS OF THE DATA FROM EACH DETECTOR SYSTEM INTO EIGHT ANGULAR SECTORS.

----- IMP-H, OGILVIE-----

INVESTIGATION NAME- SOLAR WIND ION COMPOSITION

NSSDC ID- 72-073A-12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.W. OGILVIE

NASA-GSFC

BRIEF DESCRIPTION

AN ELECTROSTATIC ANALYZER AND WEIN-TYPE VELOCITY SELECTOR WERE USED TO GAIN EXPLORATORY DATA ON HEAVY ION COMPOSITION IN THE SOLAR WIND. THE BULK VELOCITIES OF 4 HE++, 4 HE+, 3 HE++, AND O (ISOTOPES INDISTINGUISHABLE) IONS IN ALL IONIZATION STATES WERE SEPARATELY STUDIED. DURING 30 SUCCESSIVE SPACECRAFT SPIN PERIODS, IONS OF A GIVEN SPECIES WERE STUDIED IN 30 LOGARITHMICALLY EQUISPACED BULK VELOCITY CHANNELS FROM 200 TO 600 KM/S. A COMPLETE SET OF MEASUREMENTS REQUIRED ABOUT 10 MIN AND CONSISTED OF 30 ONE-STEP SEQUENCES FOR 4 HE++ IONS AND FIVE 30-STEP SEQUENCES FOR EACH OF THE THREE OTHER SPECIES.

----- IMP-H, SCARF-----

INVESTIGATION NAME- PLASMA WAVE

NSSDC ID- 72-073A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.L. SCARF
OI - G.M. CROOK
OI - I.M. GREEN
OI - R.W. FREDERICKS

TRW SYSTEMS GROUP
GAINES M. CROOK ASSOC
TRW SYSTEMS GROUP
TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTRIC FIELD COMPONENTS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS AND THE MAGNETIC FIELD COMPONENT PARALLEL TO THAT AXIS WERE MEASURED BY AN ELECTRIC DIPOLE ANTENNA AND A SEARCH COIL MAGNETOMETER. BOTH SENSORS WERE MOUNTED ON A 3.05-M BOOM. DATA WERE OBTAINED IN EIGHT FREQUENCY CHANNELS FROM 10 HZ TO 100 KHZ IN EITHER THE NORMAL MODE OR THE SNAPSHOT MODE. TWO CHANNELS, CENTERED AT 67 AND 600 HZ, HAD 10-DB FALL-OFF POINTS OF 17 AND 150 HZ, AND 270 AND 810 HZ, RESPECTIVELY. THE REMAINING SIX CHANNELS WERE NARROW-BANDWIDTH CHANNELS CENTERED AT 1.3, 2.3, 5.4, 10.5, 30, AND 70 KHZ. IN THE NORMAL MODE, THE ANTENNA WAS FIRST SAMPLED IN A GIVEN FREQUENCY CHANNEL MANY TIMES DURING A GIVEN MEASUREMENT PERIOD (COMPARABLE TO THE SPACECRAFT SPIN PERIOD). DURING THE NEXT PERIOD, THE SEARCH COIL WAS SAMPLED MANY TIMES IN THE SAME FREQUENCY CHANNEL. NEXT, THE ANTENNA WAS SAMPLED IN THE NEXT FREQUENCY CHANNEL, FOLLOWED BY THE SEARCH COIL IN THAT CHANNEL. THE FREQUENCY CHANNELS WERE INCREMENTED, AND THE SAMPLED SENSORS WERE ALTERNATED UNTIL A FULL SET OF DATA WAS OBTAINED IN 16 MEASUREMENT PERIODS (APPROXIMATELY 20 S). IN THE SNAPSHOT MODE, ONLY ELECTRIC FIELD DATA WERE TRANSMITTED, AS FOLLOWS. THE ANTENNA WAS FIRST SAMPLED IN A GIVEN FREQUENCY CHANNEL MANY TIMES DURING A GIVEN MEASUREMENT PERIOD. IN THE NEXT PERIOD, THE ANTENNA WAS SAMPLED IN TWO SEQUENCES OF EIGHT FREQUENCY

CHANNELS. THIS TWO-PERIOD MEASUREMENT WAS EXECUTED EIGHT TIMES, EACH TIME INCREMENTING THE FREQUENCY CHANNEL STUDIED IN EVERY OTHER PERIOD BY ONE. THUS, A FULL SET OF DATA AGAIN REQUIRED 16 MEASUREMENT PERIODS. IN ADDITION, AN ANALOG MODE, SAMPLING THE ANTENNA AND SEARCH COIL FROM 13 TO 100 HZ, WAS USED IN CONJUNCTION WITH THE SPECIAL PURPOSE ANALOG TELEMETRY TEST TO BE CONDUCTED. UNFORTUNATELY THIS TELEMETRY SYSTEM DID NOT WORK WELL, AND NO USABLE DATA WERE OBTAINED IN THIS MODE OF OPERATION. FOR THE DIGITAL MODES, SOME INTERFERENCE WAS EXPERIENCED FROM THE ASYMMETRIC PLASMA SHEATH ASSOCIATED WITH THE POLAR CELL ARRAYS. THIS INTERFERENCE LIMITED THE SENSITIVITY OF THE MAGNETIC FIELD MEASUREMENTS AND INTRODUCED COMPLEXITY INTO ANALYSIS OF THE ELECTRIC FIELD MEASUREMENTS.

----- IMP-H, SIMPSON-----

INVESTIGATION NAME- SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE

NSSDC ID- 72-073A-37 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

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 THROUGH NI 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 SECTORS.

----- IMP-H, STONE-----

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPE

NSSDC ID- 72-073A-06 INVESTIGATIVE PROGRAM CODE ST

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 SOLAR AND GALACTIC ELECTRONS, POSITRONS, AND NUCLEI, AND TO SEPARATE ISOTOPE THROUGH OXYGEN. THE ENERGY RANGES COVERED WERE 0.16 TO 5 MEV (ELECTRONS), 0.16 TO 2 MEV (POSITRONS), AND ABOUT 1 TO 40 MEV/N (NUCLEI). THE INSTRUMENT WAS A TELESCOPE CONSISTING OF 11 COLINEAR, FULLY DEPLETED, SILICON SURFACE BARRIER DETECTORS INSIDE A PLASTIC SCINTILLATOR ANTICOINCIDENCE SHIELD. FOUR OF THE TOP FIVE SENSORS WERE ANNULAR WHILE THE REMAINDER WERE SOLID DISKS. THIS ARRANGEMENT GAVE NARROW GEOMETRY (ANTICOINCIDENCE IN ANNULAR SENSORS) AND WIDE GEOMETRY MODES WITH HALF-ANGLE ACCEPTANCE CONES OF ABOUT 24 AND 36 DEG. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. DATA RETURNED CONSISTED OF 8-SECTORED AND SPIN-INTEGRATED COUNT RATES FOR 3 DIFFERENT COINCIDENCE/ ANTICOINCIDENCE MODES AND 2 PARAMETER PULSE HEIGHT ANALYSES FOR 32 PARTICLES EVERY 20.45 S. THE COINCIDENCE MODE CHOSEN FOR PULSE HEIGHT ANALYSIS IN ANY 0.64 S INTERVAL WAS FIXED BY A FIVE-LEVEL PRIORITY SYSTEM. THE PRINCIPAL CONTRIBUTORS TO EACH COINCIDENCE MODE RATE WERE -- (1) 0.16- TO 5-MEV ELECTRONS AND 1- TO 43-MEV/N NUCLEI, (2) 1- TO 5-MEV ELECTRONS AND 13- TO 43-MEV/N NUCLEI, (3) NEUTRALS, SUCH AS GAMMA RAYS, (4) 0.2- TO 1-MEV ELECTRONS, (5) 1- TO 3-MEV ELECTRONS, (6) 1.2- TO 2.4-MEV/N NUCLEI, (7) 4- TO 13-MEV/N NUCLEI, AND (8) ELECTRONS ABOVE 3 MEV AND NUCLEI ABOVE 30 MEV/N.

----- IMP-H, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 72-073A-05 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - J.H. 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 FLANKS 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 KEV (F) AND Z GREATER THAN OR EQUAL TO 2 ABOVE 0.6 (G1) AND 1.0 MEV (G2) AND Z GREATER THAN OR EQUAL TO 3 ABOVE 2.0 MEV (G3). THE TELESCOPE MEASURED PROTONS IN THREE RANGES BETWEEN 2.1 AND 25 MEV (L4, L5, L6), Z GREATER THAN OR EQUAL TO 1 IN THREE RANGES BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3), ALPHA PARTICLES BETWEEN 8.4 AND 35.0 MEV IN TWO RANGES L11, L12), Z 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 IS GIVEN BY D. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 40, OCT. 1977.

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

SPACECRAFT COMMON NAME- IMP-J

ALTERNATE NAMES- PL-723A, IMP 8
EXPLORER 5C, 6893

NSSDC ID- 73-078A

LAUNCH DATE- 10/26/73 WEIGHT- 371. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY NASA-OSS
UNITED STATES

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/29/73
ORBIT PERIOD- 17280. MIN INCLINATION- 28.7 DEG
PERIAPSIS- 141224. KM ALT APOAPSIS- 28940. KM ALT

PERSONNEL

MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - M.A. DAVIS NASA-GSFC
PS - J.H. KING NASA-GSFC

BRIEF DESCRIPTION

IMP 8 (EXPLORER 5C), THE LAST SATELLITE OF THE IMP SERIES, WAS A DRUM-SHAPED SPACECRAFT, 135.6 CM ACROSS AND 157.4 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 45 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

PERSONNEL

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

BRIEF DESCRIPTION

THE INSTRUMENT WAS DESIGNED TO MEASURE AMBIENT ELECTRIC FIELDS IN THE SOLAR WIND AND THE EARTH'S MAGNETOSHEATH FROM TO 1 KHZ IN FREQUENCY. THE SENSOR CONSISTED OF A PAIR OF 70-M WIRE ANTENNAS (140 M, 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. THE DC ELECTRIC FIELD PROJECTED INTO THE PLANE PERPENDICULAR TO THE SPIN AXIS (THE ECLIPTIC PLANE), 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 KHZ. 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 CM TO THE POWER -3, 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- 73-078A-10 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE 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 IS 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 RESOLUTION) WERE STUDIED.

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

INVESTIGATION NAME- SOLAR PLASMA FARADAY CUP

NSSDC ID- 73-078A-02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.S. BRIDGE MASS INST OF TECH
OI - A.J. LAZARUS MASS INST OF TECH
OI - J.H. BINSACK MASS INST OF TECH
OI - 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 30 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 MORE CLOSELY ABOUT THE SPACECRAFT SUNLINE.

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

INVESTIGATION NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 73-078A-04 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - L.A. FRANK U OF IOWA

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 (LEPEDEA - LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER) WITH 16 ENERGY INTERVALS BETWEEN 5 EV AND 50 KEV. IT HAD AN ANGULAR FIELD OF VIEW OF 9 DEG BY 25 DEG. THE DETECTOR MAY 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 IS MEASURED EVERY 68 S.

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

INVESTIGATION NAME- SOLID-STATE DETECTORS

NSSDC ID- 73-078A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - G. GLOECKLER U OF MARYLAND
OI - C.Y. FAN U OF ARIZONA
OI - D.K. HOVESTADT MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 MEASURES PARTICLE ENERGIES FROM 0.1 TO 10 MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIES POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF Z FROM 1 TO 8 (NO CHARGE RESOLUTION FOR Z GREATER THAN 8). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH DETECTOR, ARE INCLUDED IN THE EXPERIMENT PAYLOAD.

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

INVESTIGATION NAME- ELECTROSTATIC WAVES AND RADIO NOISE

NSSDC ID- 73-078A-12 INVESTIGATIVE PROGRAM
CODE ST

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

PERSONNEL

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

BRIEF DESCRIPTION

A WIDE-BAND RECEIVER WAS USED TO OBSERVE HIGH-RESOLUTION FREQUENCY-TIME SPECTRA, AND A SIX-CHANNEL NARROW-BAND RECEIVER WITH A VARIABLE CENTER FREQUENCY WILL BE 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 ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS APPLIED PHYSICS LAB
OI - T.P. ARMSTRONG U OF KANSAS
OI - 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 8 MEV, HEAVY PARTICLES WITH Z VALUES RANGING BETWEEN 6 AND 8 WITH ENERGIES GREATER THAN 32 MEV, AND INTEGRAL PROTONS AND ALPHAS OF ENERGIES GREATER THAN 50 MEV/NUCLEON, ALL WITH DYNAMIC RANGES OF 1 TO 1 MILLION (PER SQ CM-S-STER). FIVE THIN WINDOW GEIGER-MUELLER TUBES CAN OBSERVE 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 SQ CM-S-STER). PARTICLES AND X-RAYS PRIMARILY OF SOLAR ORIGIN WILL BE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED OBSERVATION OF COSMIC RAYS AND MAGNETOTAIL PARTICLES OBSERVED.

ORIGINAL PAGE IS
OF POOR QUALITY.

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

INVESTIGATION NAME- SOLAR AND COSMIC-RAY PARTICLES
NSSDC ID- 73-078A-09 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - F.B. McDONALD NASA-GSFC
OI - D.E. HAGGE UNKNOWN
OI - B.J. TEEGARDEN 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 Z = 30. 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, .15, .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 DE/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 DE/DX BUT NOT IN THE E SENSOR. THE THIRD DETECTOR SYSTEM WAS 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 BIDIRECTIONAL 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 ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - N.F. NESS NASA-GSFC
OI - C.S. SCEARCE NASA-GSFC
OI - J.B. SEEK NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A BOON-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 GAMMAS. 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-GAMMA RANGE. THE DIGITATION ACCURACY IN THIS RANGE IS ABOUT PLUS OR MINUS 0.3 GAMMA. 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-E AND LOW-Z
NSSDC ID- 73-078A-07 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

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 THROUGH NI OR 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.

----- IMP-J, STONE-----

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES
NSSDC ID- 73-078A-06 INVESTIGATIVE PROGRAM
CODE ST

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 ISOTOPES 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 ANNULAR, PERMITTING MEASUREMENTS IN BOTH NARROW GEOMETRY (TYPICAL GEOMETRICAL FACTOR WAS 0.2 SQ CM STER) AND WIDE GEOMETRY (TYPICAL GEOMETRIC FACTOR WAS 1.5 SQ CM STER) 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 ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - J.H. 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 FLANKS 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 KEV (F) 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 2.1 AND 25 MEV (L4, L5, L6), 2 GREATER THAN OR EQUAL TO 1 IN THREE RANGES BETWEEN 0.05 AND 2.1 MEV (L1, L2, L3), ALPHA PARTICLES BETWEEN 8.4 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 IS GIVEN BY D. J. WILLIAMS IN NOAA TECHNICAL REPORT ERL 393-SEL 40, OCT. 1977.

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

SPACECRAFT COMMON NAME- ISEE 1
ALTERNATE NAMES- IMP-K, 10422
MOTHER, INTNL SUN EARTH EXPL-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 EPOCH DATE- 10/23/77
ORBIT PERIOD- 3446.4 MIN INCLINATION- 28.7 DEG
PERIAPSIS- 281. KM ALT APOAPSIS- 13120. KM ALT

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - J.J. MADDEN NASA-GSFC
PS - K.W. OGILVIE NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS MOTHER SPACECRAFT IS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A, B, AND C). THE PURPOSES OF THE MISSION ARE--(1) TO INVESTIGATE SOLAR/TERRESTRIAL 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 EXTENDS THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTS OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE TO 23 EARTH RADII. THE SPACECRAFT MAINTAINS A SMALL SEPARATION DISTANCE, AND MAKES 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 WILL BE 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	U OF CALIF, BERKELEY
OI - C.I. MENG	APPLIED PHYSICS LAB
OI - F.V. CRONITTI	U OF CALIF, LA
OI - J.M. BOSQUED	CESR
OI - R. PELLAT	CTR FOR THEORETIC PHYS
OI - G.K. PARKS	U OF WASHINGTON
OI - R.P. LIN	U OF CALIF, BERKELEY
OI - H. REME	CESR

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS: 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS ARE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS: 8 TO 200 KEV, 30 TO 200-KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD CAN BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTS OF A PAIR OF SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (ONE WITH A FOIL AND ONE WITHOUT A FOIL) AND A FOUR FIXED-ENERGY ELECTRIC FIELD PARTICLE ANALYZERS. THE TELESCOPES HAVE A VIEWING CONE WITH HALF ANGLE 40 DEG, ORIENTED AT ABOUT 20 DEG TO THE SPIN AXIS.

----- ISEE 1, BANE -----

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. BANE	LOS ALAMOS SCI LAB
OI - H. WIGGENRIEDER	MPI-EXTRATERR PHYS
OI - K. SCHINDLER	RUHR-U BOCHUM
OI - J.R. ASBRIDGE	LOS ALAMOS SCI LAB
OI - H.R. ROSENBAUER	MPI-AERONOMY
OI - H. VOLK	MPI-NUCLEAR PHYS
OI - M.D. MONTGOMERY	LOS ALAMOS SCI LAB
OI - G. PASCHMANN	MPI-EXTRATERR PHYS
OI - W.C. FELDMAN	LOS ALAMOS SCI LAB
OI - E.W. HONES, JR.	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 43 KEV AND ELECTRONS FROM 5 EV TO 20 KEV ARE MEASURED IN ONE, TWO, AND THREE DIMENSIONS BY THREE 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS. THE EXPERIMENT, WHICH UTILIZES CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS, OPERATES 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	NASA-GSFC
OI - D.K. HOVESTADT	MPI-EXTRATERR PHYS
OI - B.J. TEEGARDEN	NASA-GSFC
OI - G. GLOECKLER	U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO RECOGNIZE AND RECORD THE TIME HISTORY OF GAMMA-RAY BURSTS. TWO SENSORS ARE USED: A 4-CM DIAM. CESIUM IODIDE SCINTILLATOR SYSTEM AND A 6-CM-SQUARED SOLID-STATE (CADMIUM TELLURIDE) ARRAY. AN INTENSITY INCREASE IN EITHER OF THE SENSORS CAN 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 ARE ALSO STORED IN MEMORY. ALL STORED INFORMATION IS THEN READ OUT AT A VERY LOW BIT RATE DURING THE SUCCEEDING SEVERAL HOURS. THREE TRIGGERS ARE USED BASED ON TOTAL COUNTS IN 4 MS, 32 MS, AND 256 MS. SIX MEMORIES ARE 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. VASYLLUNAS	MPI-AERONOMY
OI - C.F. KENNEL	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE 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 IS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR PI STER SOLID-ANGLE IS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE IS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR IS 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	TRM SYSTEMS GROUP
OI - R.W. FREDERICKS	TRM SYSTEMS GROUP
OI - E.J. SMITH	NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR (BUT SIMPLER) EXPERIMENT ON ISEE 2, IS DESIGNED TO MEASURE WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND. THREE ELECTRIC DIPOLE ANTENNAS AND A TRIAXIAL SEARCH COIL ANTENNA ARE USED. THE INSTRUMENTATION CONSISTS 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 REQUIRES 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 ARE SAMPLED SIMULTANEOUSLY; (3) A WAVE NORMAL ANALYZER TO PROVIDE COMPONENTS FOR COMPUTING THE WAVE NORMAL AND THE POYNTING FLUX. THIS ANALYZER HAS A 10 HZ BANDWIDTH, AND COVERS 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 PROVIDES THE SIGNALS FOR LONG

BASILINE INTERFEROMETER MEASUREMENTS BETWEEN ISEE 1 AND ISEE 2. THERE ARE TWO BASIC FREQUENCY CHANNELS: 10 HZ TO 1 KHZ AND 650 HZ TO 10 OR 40 KHZ. IN ADDITION, THE FREQUENCY RANGE CAN 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

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES THE PLASMA ELECTRON DENSITY NEAR THE MOTHER SATELLITE AND ALSO THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER SPACECRAFT. THE EXPERIMENT CONSISTS OF TWO DISTINCT PARTS -- (1) THE MOTHER SPACECRAFT THAT CARRIES AN EXPERIMENT (THE SOUNDER) TO DETECT RESONANCES OF THE AMBIENT PLASMA. AFTER AN ANTENNA HAS BEEN MOMENTARILY EXCITED AT ONE OF THE CHARACTERISTIC FREQUENCIES OF THE PLASMA IN WHICH IT IS IMMERSSED, A PRONOUNCED 'RINGING' IS OBSERVED. THESE RESONANCES OCCUR AT THE PLASMA FREQUENCY, THE UPPER HYBRID RESONANCE, THE CYCLOTRON FREQUENCY AND ITS HARMONICS, AND THE MEASUREMENT OF THEIR FREQUENCIES PERMITS THE DETERMINATION OF SEVERAL PLASMA PARAMETERS, INCLUDING THE ELECTRON DENSITY. IN THIS EXPERIMENT, THE TRANSMITTER IS DESIGNED TO STEP THROUGH 128 SUB-BANDS, COVERING THE CHARACTERISTIC RESONANCE FREQUENCIES OF THE PLASMA, FROM 0.3 TO 50.9 KHZ, AND FROM 0 TO 353 KHZ. (2) THE INTEGRATED DENSITY BETWEEN THE MOTHER AND THE DAUGHTER IS OBTAINED FROM A SECOND EXPERIMENT (THE PROPAGATION EXPERIMENT) THAT MEASURES 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 IS 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 IS 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

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS INTENDED TO PROVIDE DATA TO STUDY INTERACTIONS BETWEEN DISCRETE VLF WAVES AND ENERGETIC PARTICLES IN THE MAGNETOSPHERE. THE VLF WAVES ARE PRODUCED BY A GROUND-BASED TRANSMITTER. INJECTION OF THE WAVE BEYOND THE IONOSPHERE IS 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 ARE RECORDED THROUGH A LOOP ANTENNA BY A 1- TO 32-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS ARE 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	NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 IS APPLIED USING LONG-WIRE ANTENNA-PROBES WITH AN EFFECTIVE ELECTRIC FIELD BASELINE OF 179 METERS. THE DC DIFFERENTIAL VOLTAGE IS MEASURED 8 OR 32 TIMES PER SECOND, DEPENDING ON BIT RATE. IN ADDITION, THE DC FIELD IS 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 ARE 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 HAVE A TWO-STEP VARIABLE GAIN AMPLIFIER CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE IS 0.005 MV/M. THE AC MEASUREMENT ELECTRONICS CONSIST OF TWO AMPLIFIER SECTIONS. ONE AMPLIFIER IS USED FOR LOW-FREQUENCY CHANNELS, AND ONE FOR HIGH-FREQUENCY CHANNELS. GAIN LINES FOR EACH AMPLIFIER ARE CONTROLLABLE INDEPENDENTLY FROM THE GROUND. IN THE HIGHEST GAIN MODE, EACH ANALYZER CHANNEL HAS A SENSITIVITY OF 0.04 MICROVOLTS/M RMS. THE EXPERIMENT CAN BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR A FREE STATE AS CONTROLLED FROM GROUND. IN ADDITION, THE AC PORTION CAN BE RUN IN AN AVERAGING MODE, OR AN ALTERNATING AVERAGING AND PEAK AMPLITUDE DETECTION MODE KEYED TO THE TELEMETRY READDUT 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 - N. SCHOLER	MPI-EXTRATERR PHYS
OI - L.A. FISK	U OF NEW HAMPSHIRE
OI - C.Y. FAN	U OF ARIZONA
OI - G. GLOECKLER	U OF MARYLAND

BRIEF DESCRIPTION

THIS INSTRUMENT, CARRIED ON ISEE 1 AND ISEE 3, IS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/CHARGE 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 ARE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS ARE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE IS POSSIBLE. THE INSTRUMENT CONSISTS OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) IS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE IS APPROXIMATELY 3 TO 560 KEV/CHARGE. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) IS A DE/DX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZEQ (ULTRALOW-ENERGY Z, E, AND Q) IS 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 IS 0.4 TO 6 MEV/NUCLEON. DATA CAN BE OBTAINED IN 45-DEG SECTORS.

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

INVESTIGATION NAME- QUASI-STATIC ELECTRIC FIELDS

NSSDC ID- 77-102A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - F.S. MOZER	U OF CALIF, BERKELEY
OI - M.C. KELLEY	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO STUDY THE QUASI-STATIC ELECTRIC FIELD IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE 8-CM-DIAM SPHERES ARE SEPARATED BY 73.5 M AND ARE 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 IS INCLUDED ON THE SPACECRAFT BODY. THE INSTRUMENT IS DESIGNED TO BE SENSITIVE TO FIELDS FROM 0.1 TO 200 MV/M IN THE FREQUENCY BAND OF 5 TO 12 HZ. THE EXPERIMENT ALSO MEASURES 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
CODE 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 STUDIES 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 ARE USED TO MAKE THREE-DIMENSIONAL MEASUREMENTS OF THE ELECTRON DISTRIBUTION FUNCTION. THERE ARE THREE MODES OF OPERATION, WITH THE FOLLOWING NOMINAL ENERGY RANGES: SOLARWIND, 7 TO 500 EV; MAGNETOSHEATH, 10 EV TO 2 KEV; AND MAGNETOTAIL AND SOLAR-1C5 EV TO 7.05 KEV. ENERGY RESOLUTION (DELTA E/E) IS 0.07. THE ENTIRE SET OF SIX SIMULTANEOUS SPECTROMETER MEASUREMENTS ARE TAKEN WHILE THE SATELLITE ROTATES THROUGH 60 DEG. EACH SPECTROMETER AXIS CONSISTS OF THE CURVED PLATE ANALYZER AND TWO CHANNELTRON DETECTORS.

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

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 77-102A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

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

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

BRIEF DESCRIPTION

IN THIS TRIAXIAL FLUXGATE MAGNETOMETER, THREE RING CORE SENSORS IN AN ORTHOGONAL TRIAD ARE ENCLOSED IN A FLIPPER MECHANISM AT THE END OF THE MAGNETOMETER BOOM. THE ELECTRONICS UNIT IS ON THE MAIN BODY OF THE SPACECRAFT AT THE FOOT OF THE BOOM. THE MAGNETOMETER HAS TWO OPERATING RANGES OF PLUS OR MINUS 8192 GAMMAS AND PLUS OR MINUS 256 GAMMAS IN EACH VECTOR COMPONENT. THE DATA ARE DIGITIZED AND AVERAGED WITHIN THE INSTRUMENT TO PROVIDE INCREASED RESOLUTION AND TO PROVIDE NYQUIST FILTERING. THERE ARE TWO MODES FOR THE TRANSMISSION OF THE AVERAGED DATA. IN THE DOUBLE-PRECISION MODE OF OPERATION 16-BIT SAMPLES OF DATA ARE TRANSMITTED. THIS PROVIDES A MAXIMUM RESOLUTION OF PLUS OR MINUS 1/4 GAMMA OR 1/128 GAMMA IN THE LOW AND HIGH SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 5 CONSECUTIVE BITS OF THE ABOVE 16 BITS ARE SELECTED BY GROUND COMMAND FOR TRANSMISSION AND THE TELEMETRY BANDWIDTHS OF THE MAGNETOMETER ARE DOUBLED. THIS BANDWIDTH VARIES 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

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.X. EBERHARDT
OI - H. BALSIGER
OI - C.R. CHAPPELL
OI - A. GHIEMMETTI
OI - D.T. YOUNG

LOCKHEED PALO ALTO
MPI-EXTRATERR PHYS
MPI-AERONOMY
LOCKHEED PALO ALTO
LOCKHEED PALO ALTO
U OF BERNE
U OF BERNE
U OF BERNE
NASA-MSFC
U OF BERNE
U OF BERNE

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS 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 IS FLOWN THAT HAS AN ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL, ELECTROSTATIC/MAGNETIC MASS ANALYZER. A COMBINATION OF ELECTRON MULTIPLIERS IS USED AS THE DETECTORS. THE ENERGY-PER-UNIT-CHARGE RANGE MEASURED IS FROM 0 TO 17 KEV

PER CHARGE. THE MASS-PER-UNIT-CHARGE RANGE MEASURED EXTENDS FROM 1 TO GREATER THAN 150 AMU PER CHARGE.

----- 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 IS 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 ARE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRUM AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USE SILICON SURFACE BARRIER TOTALLY DEPLOYED 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 ARE MEASURED. A SEPARATE SOLID-STATE DETECTOR SYSTEM MEASURES 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 COMMON NAME- ISEE 2

ALTERNATE NAMES- IMP-K PRIME, IME-D
10423, INTNL SUN EARTH EXPL-B

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
SC - E.R. SCHMERLING
PM - A. HAWKYARD
PS - A.C. DURNAY

NASA HEADQUARTERS
NASA HEADQUARTERS
ESA-ESTEC
ESA-ESTEC

BRIEF DESCRIPTION

THE EXPLORER CLASS DAUGHTER SPACECRAFT IS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION, (ISEE A, B, AND C). THE PURPOSES OF THE MISSION ARE -- (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 EXTENDS THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION CONSISTS OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE OF 23 EARTH RADII. THE SPACECRAFT MAINTAINS A SMALL SEPARATION DISTANCE, AND MAKES 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 WILL BE FIXED AT 19.8 RPM, DIFFERING SLIGHTLY FROM THE ISEE-A SPACECRAFT. FOR INSTRUMENT DESCRIPTIONS WRITTEN BY THE INVESTIGATORS, SEE ISEE TRANSACTIONS ON GEOSCIENCE ELECTRONICS, VOL. GE-10, NO. 3, JULY, 1976.

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

INVESTIGATION NAME- ELECTRONS AND PROTONS

NSSDC ID- 77-102B-08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

ORIGINAL PAGE IS
OF POOR QUALITY

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. REME CESR
 OI - R.P. LIN U OF CALIF, BERKELEY
 OI - G.X. PARKS U OF WASHINGTON

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE MEASURED AT 2 AND 6 KEV AND IN TWO BANDS; 8 TO 200 KEV AND 30 TO 200 KEV. PROTONS ARE MEASURED AT 2 AND 6 KEV AND IN THREE BANDS; 8 TO 200 KEV, 30 TO 200 KEV, AND 200 TO 380 KEV. THE 30 KEV THRESHOLD CAN BE COMMANDED TO 15 OR 60 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT CONSISTS 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 HAVE A VIEWING CONE WITH HALF ANGLE 49 DEGREES, ORIENTED AT ABOUT 20 DEGREES TO THE SPIN AXIS.

----- 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

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE 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 CONE FOR PROTONS AND ONE FOR ELECTRONS) ELECTROSTATIC ANALYZERS IS FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR PI STER SOLID-ANGLE IS COVERED FOR PARTICLE VELOCITY VECTORS. A GM TUBE IS ALSO INCLUDED, WITH A CONICAL FIELD OF VIEW OF 40 DEG FULL ANGLE, PERPENDICULAR TO THE SPIN AXIS. THIS DETECTOR IS 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. SCARF 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) MEASURE WAVE PHENOMENON OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE MOTHER SPACECRAFT. THE ANTENNAS ARE MOUNTED PERPENDICULAR TO THE SPIN AXIS. THE INSTRUMENTATION IS 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 ARE 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 ARE TWO BASIC FREQUENCY CHANNELS, FROM 10 HZ TO 1 KHZ AND FROM 650 HZ TO 10 KHZ. IN ADDITION, THE FREQUENCY RANGE CAN 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

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. GRAND ESA-ESTEC

BRIEF DESCRIPTION

THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER IS 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 IS 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, KEPPLER-----

INVESTIGATION NAME- EMERGETIC ELECTRONS AND PROTONS

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

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRA AND ANGULAR DISTRIBUTIONS. THESE DETECTORS USE 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 (TO 1.2 MEV FOR 90 DEG) ARE MEASURED. DATA IS ACCUMULATED IN UP TO 32 SECTORS PER SPIN.

----- ISEE 2, MORENO-----

INVESTIGATION NAME- SOLAR WIND IONS

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

PERSONNEL

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

BRIEF DESCRIPTION

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

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

INVESTIGATION NAME- FAST PLASMA

NSSDC ID- 77-102B-01 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE 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) ARE 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
OI - R.L. MCPHERSON	U OF CALIF, LA
OI - P.C. HEDGECOCK	IMPERIAL COLLEGE
OI - E.W. GREENSTADT	TRW SYSTEMS GROUP
OI - M.G. KIVELSON	U OF CALIF, LA

BRIEF DESCRIPTION

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

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

SPACECRAFT COMMON NAME- ISEE 3

ALTERNATE NAMES- STP PROBE, IME-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-OSS
 INTERNATIONAL ESA

PLANNED FINAL ORBIT PARAMETERS

THE SPACECRAFT IS TO BE INJECTED INTO ITS FINAL ORBIT AROUND LIBRATION POINT L₁ ALONG THE EARTH-SUN LINE ON 11/25/78, AT 1.566 KM FROM EARTH. THE HALO ORBIT PERIOD WILL BE 178 DAYS.

PERSONNEL

MG - F.W. GAETANO	NASA HEADQUARTERS
SC - E.R. SCHMERLING	NASA HEADQUARTERS
PM - J.J. MADDEN	NASA-GSFC
PS - T.T. VON ROSENVIINGE	NASA-GSFC

BRIEF DESCRIPTION

THE EXPLORER CLASS HELIOCENTRIC SPACECRAFT IS PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A,B, AND C). THE PURPOSES OF THE MISSION ARE (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 EXTENDS THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE LAUNCH OF THREE COORDINATED SPACECRAFT IN THIS MISSION PERMITS THE SEPARATION OF SPATIAL AND TEMPORAL EFFECTS. THE HELIOCENTRIC SPACECRAFT HAS A SPIN AXIS NORMAL TO THE ECLIPTIC PLANE AND A SPIN RATE OF ABOUT 23 RPM. IT IS PLACED INTO AN ELLIPTICAL HALO ORBIT ABOUT THE LIBRATION POINT (L₁) 235 EARTH RADII ON THE SUN SIDE OF THE EARTH, WHERE IT CONTINUOUSLY

MONITORS CHANGES IN THE NEAR-EARTH INTERPLANETARY MEDIUM. BECAUSE BOTH THE MOTHER AND DAUGHTER SPACECRAFT HAVE ECCENTRIC GEOCENTRIC ORBITS, IT IS HOPED THAT THIS MISSION WILL MEASURE THE CAUSE/EFFECT RELATIONSHIPS BETWEEN THE INCIDENT SOLAR PLASMA AND THE MAGNETOSPHERE. FINALLY, THE HELIOCENTRIC SPACECRAFT ALSO PROVIDES 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 3, ANDERSON-----

INVESTIGATION NAME- INTERPLANETARY AND SOLAR ELECTRONS

NSSDC ID- 78-079A-09 INVESTIGATIVE PROGRAM
 CODE ST

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SOLAR PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE 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 ARE SECTORED INTO ANGULAR SECTORS ABOUT EITHER THE MAGNETIC FIELD OR THE SUN DIRECTION. THE TELESCOPE YIELDS 8 OR 16 SECTORS; AND THE ANALYZER YIELDS 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. KLEBSADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO PROVIDE CONTINUOUS COVERAGE OF SOLAR FLARE X-RAYS AND TRANSIENT COSMIC GAMMA-RAY BURSTS. DETECTORS ARE A XENON-FILLED PROPORTIONAL COUNTER (5-14 KEV IN 6 CHANNELS) AND A SODIUM IODIDE SCINTILLATOR (12-1250 KEV IN 12 CHANNELS). THERE ARE FOUR OPERATING MODES: NORMAL, FLARE-1, FLARE-2, AND GAMMA BURST. IN NORMAL MODE, TIME RESOLUTION IS 0.5 TO 4 S, DEPENDING ON THE CHANNEL. IN GAMMA BURST MODE, BEST TIME RESOLUTION IS 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 IS 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 IS STUDIED, UNPERTURBED BY THE EARTH'S BOW SHOCK. ION VELOCITY DISTRIBUTIONS ARE MEASURED BY A 135-DEG SPHERICAL ELECTROSTATIC ANALYZER IN BOTH TWO AND THREE DIMENSIONS. STEP ENERGY RESOLUTION FOR EACH ENERGY WINDOW IS 4.2 PERCENT. ELECTRON VELOCITY DISTRIBUTIONS ARE MEASURED BY A 90-DEG SPHERICAL ELECTROSTATIC ANALYZER, ALSO IN TWO AND THREE DIMENSIONS. THE ENERGY WINDOW PER STEP FOR ELECTRONS IS 10 PERCENT. CHANNELTRON ELECTRON MULTIPLIERS ARE USED AS DETECTORS FOR EACH OF THE ANALYZERS. SOLAR WIND ELECTRONS ARE MEASURED IN 15 CONTIGUOUS CHANNELS FROM 8.5 TO 1140 EV. A SPECIAL PHOTOELECTRON RANGE OF 1.6 TO 220 EV CAN BE COMMANDED. VARIOUS MIXTURES OF DATA FOR 2-D AND 3-D DISTRIBUTION FUNCTIONS

CAN BE SELECTED. IONS ARE MEASURED IN 32 CHANNELS FROM 237 EV PER CHARGE TO 10.7 KEV PER CHARGE. VARIOUS MODES ARE 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 IS DESIGNED TO DETERMINE THE ISOTOPIC ABUNDANCE IN THE PRIMARY COSMIC RAYS FOR HYDROGEN THROUGH NICKEL. THE INSTRUMENT USES A 10-ELEMENT, SOLID-STATE, PARTICLE TELESCOPE CONSISTING OF LITHIUM-DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED RUN FROM APPROXIMATELY 20 TO APPROXIMATELY 500 MEV PER NUCLEON. DIRECTION OF INCIDENT NUCLEI IS 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.Y. 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, IS DESIGNED TO MEASURE SOLAR, INTERPLANETARY, AND MAGNETOSPHERIC ENERGETIC IONS IN NUMEROUS BANDS WITHIN THE ENERGY RANGE 2 KEV/CHARGE 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 ARE DETERMINED. IN THE RANGE 0.3 TO 80 MEV/NUCLEON, THE ENERGY SPECTRA, ANISOTROPIES, AND COMPOSITION OF ENERGETIC IONS ARE DETERMINED. IN THE LIMITED RANGE 0.4 TO 6 MEV/NUCLEON, SIMULTANEOUS DETERMINATION OF IONIC AND NUCLEAR CHARGE IS POSSIBLE. THE INSTRUMENT CONSISTS OF THREE DIFFERENT SENSOR SYSTEMS. ULECA (ULTRALOW-ENERGY CHARGE ANALYZER) IS AN ELECTROSTATIC ANALYZER WITH SOLID STATE DETECTORS. ITS ENERGY RANGE IS APPROXIMATELY 3. TO 560 KEV/CHARGE. ULEWAT (ULTRALOW-ENERGY WIDE-ANGLE TELESCOPE) IS A DE/DX - E THIN-WINDOW FLOW THROUGH PROPORTIONAL COUNTER/SOLID STATE DETECTOR TELESCOPE COVERING THE RANGE 0.2 TO 80 MEV/NUCLEON (FE). ULEZEQ (ULTRALOW-ENERGY Z, E, AND Q) IS 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 IS 0.4 TO 6 MEV/NUCLEON. DATA CAN BE OBTAINED IN 45-DEG SECTORS.

----- ISEE 3, HYNDS-----

INVESTIGATION NAME- PROTONS
 NSSDC ID- 78-079A-08 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - R.J. HYNDS IMPERIAL COLLEGE
 OI - J.J. VAN ROOIJEN U OF UTRECHT
 OI - J.N. VAN GILS U OF UTRECHT
 OI - R.M. VAN DEN NIEUWENHOF U OF UTRECHT
 OI - K.P. MENZEL ESA-ESTEC
 OI - A.C. DURNEY ESA-ESTEC
 OI - T.R. SANDERSON 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 IS DESIGNED TO STUDY LOW-ENERGY SOLAR PROTON ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. THE INSTRUMENT MEASURES 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 ARE GROUPED INTO EIGHT 45-DEG SECTORS. THE INSTRUMENT CONSISTS 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 IS DESIGNED TO STUDY PARTICLE PROPAGATION WITHIN THE SOLAR SYSTEM AND THE PROPERTIES OF THE INTERPLANETARY MEDIUM. THE FOLLOWING SPECIES ARE 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 IS USED TO MAKE THESE MEASUREMENTS. IT CONSISTS 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 IS BASED ON THAT USED IN EXPERIMENT 68-C14A-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.H. ACUNA NASA-GSFC
 OI - M.A. COPLAN U OF MARYLAND
 OI - D.L. LIND NASA-JSC

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTS OF A HEMISPHERICAL ELECTROSTATIC ENERGY ANALYZER AND A WIND VELOCITY FILTER CONFIGURED AS A MASS SPECTROMETER TO DETERMINE THE CHARGE STATE AND ISOTOPIC CONSTITUTION OF THE SOLAR WIND. THE INSTRUMENT HAS 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 IS 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, ARE 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 IS INCLUDED FOR MEASUREMENT OF THE MAGNETIC FIELD. THIS UNIT USES THE SEARCH COIL, BUT IS 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 - H.T. TSURUTANI NASA-JPL

BRIEF DESCRIPTION

THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTS OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS ARE 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 GAMMAS) ARE AVAILABLE. THE INSTRUMENT RANGES UP AND DOWN AUTOMATICALLY OR MAY BE COMMANDED INTO A SPECIFIC RANGE. THE FIELD EQUIVALENT NOISE POWER SPECTRAL DENSITY IS 2.E-4 GAMMA SQUARED PER HERTZ (INDEPENDENT OF FREQUENCY), OR 0.01 GAMMA RMS IN THE PASSBAND 0 TO 0.5 HZ. A SINGLE-AXIS SPECTRUM ANALYZER MEASURES 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. FAIRBERG NASA-GSFC
OI - R.G. STONE NASA-GSFC
OI - S.R. MOSIER NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO MEASURE THE DIRECTION (2 ANGLES) OF TYPE III SOLAR BURSTS AT 24 FREQUENCIES STEPPED FROM 35 KHZ TO 2 MHZ. RELYING ON SOLAR ROTATION, ONE CAN 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 CONSISTS PRIMARILY OF TWO DIPOLE ANTENNAS AND A FOUR-CHANNEL RADIO METER, WITH BANDWIDTHS OF 3 KHZ AND 10 KHZ. FREQUENCY SEQUENCE IS 72 STEPS COVERING 108 S. SELF-CALIBRATION OCCURS 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 IS DESIGNED TO STUDY THE ISOTOPIIC 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 ARE TO BE RESOLVED -- LITHIUM THROUGH NICKEL (Z FROM 3 THROUGH 28 AND A FROM 6 THROUGH 64) IN THE ENERGY RANGE FROM 5 TO 250 MEV/NUCLEON. THE MASS RESOLUTION IS LESS THAN OR APPROXIMATELY EQUAL TO 0.3 AMU 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. HOVESTADT MPI-EXTRATERR PHYS
OI - T.L. CLINE NASA-GSFC
OI - G. GLOECKLER U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 ARE: (1) A 4-CM DIAM. BY 3-CM THICK GERMANIUM CRYSTAL, RADIATIVELY COOLED TO OPERATE AT APPROXIMATELY 101 DEGREES K. ENERGY RESOLUTION IS LESS THAN 3.5 KEV AT 1 MEV. A 4096-CHANNEL ADC DIGITIZES THE SIGNALS FOR INPUT TO THE GAMMA-BURST DIGITAL INSTRUMENTATION, WHICH IS 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 ARE 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 ARE USED, FED FROM ANY OF THE 3 DETECTORS BY COMMAND. THE STORED VALUES ARE TIME INTERVALS OVER WHICH A FIXED NUMBER (1-128) OF COUNTS IS ACCUMULATED. THE TIME INTERVAL CLOCK FREQUENCY IS SELECTABLE FROM 1 TO 8 KHZ. SPECTRAL INFORMATION FROM EITHER OF DETECTORS (1) AND (2) IS STORED IN A THIRD MEMORY OF 3072 16-BIT WORDS. TWELVE BITS ARE USED FOR PULSE HEIGHT DATA AND FOUR BITS FOR TIME. THE COUNTING RATES INPUT TO THE TIME HISTORY MEMORIES CAUSE A TRIGGER TO OCCUR IF RATES EXCEED A COMMANDABLE VALUE. WHEN THIS OCCURS, ALL THREE MEMORIES ARE ALLOWED TO FILL. THEY CAN BE DUMPED AT A VERY LOW BIT RATE EITHER AUTOMATICALLY OR BY COMMAND.

----- ISEE 3, VON ROSENVIINGE-----

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 ROSENVIINGE NASA-GSFC
OI - L.A. FISK U OF NEW HAMPSHIRE
OI - F.B. MCDONALD NASA-GSFC
OI - J.H. TRAINOR NASA-GSFC
OI - M.A. VAN HOLLEBEKE U OF MARYLAND

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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, COMPRISE THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 30 ARE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 1 TO 500 MEV/NUCLEON. UNIT MASS RESOLUTION IS 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 ARE MEASURED IN THE ENERGY RANGE APPROXIMATELY 2 TO 10 MEV. ANISOTROPY INFORMATION IS OBTAINED FOR THE ELECTRONS AND NUCLEI WITH Z EQUAL 1 TO 26.

----- ISEE 3, WILCOX-----

INVESTIGATION NAME- GROUND BASED SOLAR STUDIES

NSSDC ID- 78-079A-13 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY MAGNETIC FIELDS

PERSONNEL

PI - J.M. WILCOX STANFORD U

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS 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 IS 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, Q3669

NSSDC ID- 69-009A

LAUNCH DATE- 01/30/69 WEIGHT- 241. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

ORIGINAL PAGE IS
OF POOR QUALITY

SPONSORING COUNTRY/AGENCY

CANADA CRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/04/69
ORBIT PERIOD- 128.42 MIN INCLINATION- 88.42 DEG
PERTAPSIS- . 578. KM ALT APOAPSIS- 3526. KM ALT

PERSONNEL

MG - F.W. GAETANO NASA HEADQUARTERS
MG - C.D. FLORIDA COMMUN RESEARCH CENTRE
PH - C.A. FRANKLIN COMMUN RESEARCH CENTRE
PM - L.H. BRACE NASA-GSFC
PS - L.H. BRACE NASA-GSFC
PS - G.L. NELMS DEFENCE RESEARCH ESTAB

BRIEF DESCRIPTION

ISIS 1 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH SWEEP- AND FIXED-FREQUENCY IONOSONDES, 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 (78.9 AND 20.2 M LONG, RESPECTIVELY). THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.9 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-H 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 WAS DUMPED ONLY AT OTTAWA. FOR NON-TAPE-RECORDED OBSERVATIONS, DATA FOR THE SATELLITE AND SUBSATELLITE REGIONS COULD BE OBSERVED 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 80 DEG W MERIDIAN AND IN AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA.

----- ISIS 1, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 69-009A-35 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.E. BARRINGTON COMMUN RESEARCH CENTRE
OI - F.H. PALMER COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THE VLF EXPERIMENT WAS LOW-FREQUENCY, BROADBAND RECEIVER THAT SENSED SIGNALS RECEIVED BY THE 79-M DIPOLE (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 3.5-S 'FRAME' PERIOD. THE TRANSMISSION AT 0.3 KHZ OCCURED FOR ABOUT 2 S, THE NONLINEAR SWEEP TO 11 KHZ REQUIRED 0.9 S, TRANSMISSION AT 11 KHZ FOR ABOUT 0.3 S, AND THE NONLINEAR SWEEP BACK TO 0 TOOK ABOUT 0.3 S. 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. EXCITER OPERATION PERMITTED THE CONTROLLED STUDY OF ION RESONANCES IN ADDITION TO STUDY OF NATURAL AND OTHER MAN-MADE VLF RADIO NOISE. 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. FURTHER DETAILS CAN BE FOUND IN THE 'ISIS A TECHNICAL PLAN.'

----- ISIS 1, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 69-009A-37 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - L.H. BRACE NASA-GSFC
OI - J.A. FINDLAY 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. THIS CYLINDRICAL PROBE WAS A TYPE OF LANGMUIR PROBE THAT OBSERVED CURRENT FLOW FOR A GIVEN VOLTAGE PROFILE PLACED ON THE COLLECTOR. FROM THIS CURRENT-VOLTAGE PROFILE, THE ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE EXTENDING FROM THE SC. THE AXIAL PROBE EXTENDED 48.3 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 100 TO 1,500,000 ELECTRONS PER CM CUBED, AND TEMPERATURES FROM ABOUT 400 TO 50,000 K.

----- ISIS 1, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 69-009A-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT UNKNOWN
OI - R.G. NORTON NOAA-ERL
OI - J.N. WARNOCK NOAA
OI - G.L. NELMS DEFENCE RESEARCH ESTAB
OI - G.E.K. LOCKWOOD COMMUN RESEARCH CENTRE
OI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
OI - C.E. PETRIE COMMUN RESEARCH CENTRE
OI - T.E. VAN ZANDT NOAA-ERL

BRIEF DESCRIPTION

THE FIXED-FREQUENCY SOUNDER OPERATED FROM THE SAME ANTENNA, TRANSMITTER, AND RECEIVER USED FOR THE SWEEP-FREQUENCY EXPERIMENT. IT NORMALLY OPERATED FOR 5 S DURING THE FREQUENCY FLYBACK PERIOD OF THE SWEEP-FREQUENCY OPERATION THAT WAS EVERY 19 OR 29 S. ONE OF SIX FREQUENCIES (0.25, 0.48, 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 THE FIXED FREQUENCY OF 0.82 MHZ AND SWEEP RECEPTION. 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 (A FRACTION OF GEOGRAPHICAL POSITION). THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF THE 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 0.3 TO 20 MHZ. THE DYNAMIC RANGE WAS 50 DB, AND THE BANDWIDTH WAS 55 KHZ. THE ANTENNAS USED WERE 18.75-M AND 73.15-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.B. 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
 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. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE SECOND SET CONSISTED OF SOLID-STATE SILICON JUNCTION DETECTORS. THESE RESPONDED TO ELECTRONS GREATER THAN 25 AND 140 KEV, ELECTRONS IN THE RANGE 200 TO 770 KEV, AND PROTONS GREATER THAN 200 AND 400 KEV. THE THIRD SET CONSISTED OF FIVE SILICON JUNCTION DETECTORS THAT RESPONDED TO PROTONS BETWEEN 0.15 AND 30 MEV. THE FOURTH SET CONSISTED OF CESTUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS. EACH SYSTEM OPERATED IN TWO MODES AND RESPONDED TO ELECTRONS GREATER THAN 5, 40, AND 60 KEV AND PROTONS GREATER THAN 50 KEV AND IN THE RANGE 50 TO 70 KEV.

----- ISIS 1, SAGALYN-----

INVESTIGATION NAME- SPHERICAL ELECTROSTATIC ANALYZER

NSSDC ID- 69-009A-08 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES
 PARTICLES AND FIELDS
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - R.E. SAGALYN USAF GEOPHYSICS LAB
 OI - M. SMIDY USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
 THE OBJECTIVE OF THE SPHERICAL ELECTROSTATIC ANALYZER (SEA) EXPERIMENT WAS TO MEASURE THE TEMPORAL AND SPATIAL VARIATIONS IN THE CONCENTRATIONS 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 CENTIMETER (LOGARITHMIC AMPLIFIERS WERE USED IN THE INPUT CIRCUIT), (B) THE KINETIC TEMPERATURE OF THE THERMAL IONS IN THE RANGE FROM 700 TO 4000 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. TWO UNITS MADE UP THE EXPERIMENT PACKAGE -- A 96-CM BOOM THAT SUPPORTED THE SENSOR AND MADE POSSIBLE OMNIDIRECTIONAL MEASUREMENTS, AND AN ELECTRONIC PACKAGE (CONSIDERED TO INCLUDE THE SENSOR) TO PERFORM THE MEASUREMENTS AND TO PROCESS THE DATA INTO A SUITABLE FORM FOR TELEMETRY. THE SENSOR WAS MADE UP OF THREE CONCENTRIC SPHERICAL MESHED GRIDS HAVING RADII OF 3.18, 2.54, AND 1.90 CM. THE INNERMOST GRID WAS THE COLLECTOR. THESE GRIDS WERE MADE FROM TUNGSTEN MESH AND HAD A TRANSPARENCY OF 80 TO 90 PERCENT. TO MEASURE THE PARAMETERS LISTED ABOVE, SUITABLE SWEEP AND STEP VOLTAGES WERE APPLIED TO THE GRIDS. THIS INSTRUMENT WAS OPERATED IN SEVERAL MODES. THE ION DENSITIES WERE SAMPLED 60 TIMES A SECOND, CORRESPONDING TO A SPATIAL RESOLUTION OF 150 M. ONCE PER MIN THE RATIO OF MASS TO TEMPERATURE WAS SAMPLED, AND THE ENERGY DISTRIBUTION WAS SAMPLED ONCE EVERY 2 MIN.

----- ISIS 1, WHITTEKER-----

INVESTIGATION NAME- SLEEP-FREQUENCY SOUNDER

NSSDC ID- 69-009A-01 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
 OI - G.E.K. LOCKWOOD COMMUN RESEARCH CENTRE
 OI - G.L. NELMS DEFENCE RESEARCH ESTAB
 OI - J.E. JACKSON NASA-GSFC
 OI - J.W. KING APPLETON LAB
 OI - J. TURNER IONOSPHERIC PRÉD SERV
 OI - M. SYLVAIN LGE
 OI - O. HOLT AURORAL OBS
 OI - Y. OGATA RADIO RESEARCH LAB
 OI - R. RAGHAVARAO PHYSICAL RESEARCH LAB
 OI - W. CALVERT UNKNOWN
 OI - T.E. VAN ZANDT NOAA-ERL
 OI - L. COLIN NASA-ARC
 OI - R.B. NORTON NOAA-ERL
 OI - C.E. PETRIE COMMUN RESEARCH CENTRE
 OI - K.L. CHAM NASA-ARC
 OI - R.S. UNWIN DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION
 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 20-S PERIOD. IN ADDITION TO THE SLEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS

POSSIBLE WHERE THE TRANSMITTER FREQUENCY WAS FIXED AT 0.82 MHZ WHILE THE RECEIVER SWEEP. SEVERAL VIRTUAL HEIGHT (DELAY TIME) TRACES WERE NORMALLY OBSERVED DUE TO GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL HEIGHT 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 FROM WAS AN IONOGRAM SHOWING VIRTUAL HEIGHT AS A FUNCTION OF FREQUENCY. TWO OTHER FORMS OF DATA WERE COMMONLY PREPARED FROM THE IONOGRAMS. THEY WERE DIGITAL FREQUENCY AND/OR VIRTUAL HEIGHT VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES AND COMPUTATIONS OF ELECTRON DENSITY PROFILES.

***** ISIS 2*****

SPACECRAFT COMMON NAME- ISIS 2
 ALTERNATE NAMES- ISIS-B, PL-701F
 OS104

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-055

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/02/71
 ORBIT PERIOD- 113.6 MIN INCLINATION- 88.1 DEG
 PERIAPSIS- 1358. KM ALT APOAPSIS- 1428. KM ALT

PERSONNEL
 MG - F.W. GAETANO NASA HEADQUARTERS
 MG - C.D. FLORIDA COMMUN RESEARCH CENTRE
 SC - E.R. SCHMERLING NASA HEADQUARTERS
 PM - C.A. FRANKLIN COMMUN RESEARCH CENTRE
 PM - L.H. BRACE NASA-GSFC
 PS - L.H. BRACE NASA-GSFC
 PS - G.L. NELMS DEFENCE RESEARCH ESTAB

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 (78.9 AND 20.2 M LONG) FOR THE SOUNDING, VLF, AND COSMIC NOISE EXPERIMENTS. THE SPACECRAFT WAS NOMINALLY SPIN-STABILIZED WITH SPIN AXIS IN THE ORBIT PLANE TO ABOUT 2 RPM AFTER ANTENNA DEPLOYMENT. A CARTWHEEL MODE WITH THE AXIS PERPENDICULAR TO THE ORBIT PLANE WAS MADE AVAILABLE OCCASIONALLY FOR PERIODS OF A FEW MONTHS. THIS WAS DONE 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-H 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.

----- ISIS 2, ANGER-----

INVESTIGATION NAME- 3914- AND 5577-A PHOTOMETER

NSSDC ID- 71-024A-11 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 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 Å 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 180 DEG APART, AND THEN TO FOCUS THIS LIGHT AT A COMMON POINT ON THE SINGLE IMAGE DISSECTOR PHOTOMETER TUBE. FOR EACH DIRECTION, THE LIGHT PASSED THROUGH ITS OWN LENS, INTERFERENCE FILTER, AND MIRROR. ONE FILTER OPERATED IN THE RANGE 5561 PLUS OR MINUS 9 Å (AT THE HALF-MAXIMUM POINTS), AND THE OTHER FILTER OPERATED AT 3915 PLUS OR MINUS 13 Å. ONLY ONE OF THE TWO OPTICAL SYSTEMS POINTED AT THE EARTH AT ANY ONE TIME, WHILE THE OTHER FACED INTO SPACE. WHEN THE SPACECRAFT

ORIGINAL PAGE IS
 OF POOR QUALITY

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 REPETITIVELY SCANNED AT A HIGH SPEED ACROSS THE NARROW DIMENSION OF EACH 5-DEG BAND AND DIVIDED IT INTO SEPARATELY RESOLVED 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. THE ELECTRONIC PORTION OF THE INSTRUMENT CONSISTED OF MODULES THAT AMPLIFIED AND COUNTED OUTPUT PULSES FROM THE IMAGE DISSECTOR TUBE AND CONVERTED THESE INTO A HIGH-RATE PULSE CODE MODULATED OUTPUT AND A LOW-RATE ANALOG OUTPUT. THE DATA ARE USED TO STUDY THE LARGE-SCALE DISTRIBUTION AND MORPHOLOGY OF AURORAS, AND TO COMPARE WITH OTHER MEASUREMENTS FROM THIS AND OTHER SPACECRAFT AND GROUND-BASED INSTRUMENTS. COMPLETE DETAILS ABOUT THE EXPERIMENT CAN BE FOUND IN THE REPORT 'THE ISIS-2 SCANNING AURORAL PHOTOMETER,' C. D. ANGER, T. FANOTT, J. McNALLY, AND H. S. KERR, APPLIED OPTICS, 12, 8, 1753-1766, AUGUST 1973.

----- ISIS 2, BARRINGTON-----

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 71-024A-03 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

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 VERY LOW-FREQUENCY (VLF) EXPERIMENT WAS A LOW-FREQUENCY (LF) BROADBAND RECEIVER THAT OBSERVED SIGNALS FROM THE 79-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 IONOSPHERE. THE VLF RECEIVER HAD A WIDE DYNAMIC RANGE THAT WAS ACHIEVED BY USE OF AN AUTOMATIC GAIN CONTROL (AGC) SYSTEM. THIS VLF EXPERIMENT INCLUDED AN ONBOARD EXCITER THAT SWEEPED AT A NONLINEAR RATE FROM 50 TO 0 HZ, THEN TO 9500 HZ, OVER A PERIOD OF 1.0 S. THIS PERMITTED THE CONTROLLED STUDY OF ION RESONANCES STIMULATED BY THE EXCITER, IN ADDITION TO STUDY OF NATURAL AND OTHER MAN-MADE VLF RADIO NOISE. THE 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 WHEN THE SPACECRAFT TAPE RECORDER WAS OPERATING. TAPE RECORDED (AND BACKUP REAL-TIME CAPABILITY) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

----- ISIS 2, BRACE-----

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 71-024A-07 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - L.H. BRACE NASA-GSFC
OI - J.A. FINDLAY 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 THE CHARACTERISTICS OF THE SC ION SHEATH. THIS CYLINDRICAL PROBE WAS A TYPE OF LANGMUIR PROBE THAT OBSERVED CURRENT FLOW TO THE PROBE FOR A GIVEN VOLTAGE PROFILE PLACED ON THE COLLECTOR. FROM THIS CURRENT-VOLTAGE PROFILE, ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE EXTENDING FROM THE SC. THE AXIAL PROBE EXTENDED 48.3 CM FROM THE SC, ALONG THE SPIN AXIS, AND WAS CENTERED BETWEEN THE FOUR TELEMETRY ANTENNAS ON THE UNDERSIDE OF THE SC. THIS PROBE WAS CAPABLE OF MEASUREMENTS UNPERTURBED 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, WHICH WERE FREE OF SC WAKE EFFECTS. THE PROBES CONSISTED OF THREE CONCENTRIC, ELECTRICALLY-ISOLATED, STAINLESS STEEL TUBES. THE OUTER (0.24 CM IN 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 2.3 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 DRIVER GUARD. DURING EACH 2-MIN SEQUENCE, A VOLT-AMPERE CURVE WAS OBTAINED THAT CAN BE INTERPRETED IN ELECTRON DENSITIES OVER A RANGE FROM 100 TO 1,500,000 ELECTRONS

PER CM CUBED, AND IN TEMPERATURE VALUES FROM 400 TO 50,000 K.

----- ISIS 2, CALVERT-----

INVESTIGATION NAME- FIXED-FREQUENCY SOUNDER

NSSDC ID- 71-024A-02 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - W. CALVERT UNKNOWN
OI - R.B. NORTON NOAA-ERL
OI - G.L. NELMS DEFENCE RESEARCH ESTAB
OI - C.E. PETRIE COMMUN RESEARCH CENTRE
OI - G.E.K. LOCKWOOD COMMUN RESEARCH CENTRE
OI - J.H. WHITTEKER COMMUN RESEARCH CENTRE
OI - J.M. WARNOCK NOAA
OI - T.E. VAN ZANDT NOAA-ERL

BRIEF DESCRIPTION

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, 0.48, 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. 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 (A FUNCTION OF GEOGRAPHICAL POSITION). THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF THE TELEMETRY STATION.

----- ISIS 2, HARTZ-----

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 71-024A-10 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - T.R. HARTZ COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSPHERE 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 20.2-M AND 78.9-M DIPOLES.

----- ISIS 2, HOFFMAN-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 71-024A-06 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

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 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 AMU AND 8 TO 64 AMU. 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 8 S. THIS EXPERIMENT OPERATED NOMINALLY AFTER LAUNCH WITH MOST OF THE DATA OBTAINED IN THE PEAK 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 DATA FROM THE SOUNDER ON BOARD. OTHER COMPARISONS WERE MADE 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-08 INVESTIGATIVE PROGRAM CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S) IONOSPHERES PLANETARY ATMOSPHERES
PERSONNEL PI - E.J. MAIER NASA-GSFC
OI - M. SMIDDY USAF GEOPHYSICS LAB
OI - B.E. TROY, JR. US NAVAL RESEARCH LAB
OI - J.L. DONLEY NASA-GSFC

BRIEF DESCRIPTION THIS EXPERIMENT MEASURED ION AND/OR ELECTRON CURRENT IN ORDER TO STUDY HEAT TRANSFER PROCESSES THAT ARE IMPORTANT IN THE DYNAMICS OF THE IONOSPHERE. 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 CURVES PROVIDE 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.P. MCDIARMID NATL RES COUNC OF CAN
OI - J.R. BURROWS NATL RES COUNC OF CAN

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST DETECTOR 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 TWO GEIGER COUNTERS WERE CORRECTED FOR SATURATION AND DEADTIME. ALL OTHER COUNTERS WERE CORRECTED FOR DEADTIME ONLY. 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 4.0, 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 26.2, 21.6, 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 AXES 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 10 R TO MORE THAN 1 MEGARAYLEIGH. SUNLIGHT COULD ENTER THE OPTICAL SYSTEMS DIRECTLY IN ADDITION TO EARTH-REFLECTED LIGHT. THE INSTRUMENT BAFFLE 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 GIVE ACCURATE LOW LIGHT LEVEL READINGS, AS WELL AS COVER THE FULL DYNAMIC RANGE AND TO PRESENT THE MEASUREMENTS IN A FORM COMPATIBLE WITH ENCODING AS AN 8-BIT BINARY WORD FOR TELEMETRY, A HYBRID LINEAR-LOG AMPLIFIER SYSTEM WAS USED. THE ELECTRONIC SYSTEM PULSE COUNTED AT LOW LIGHT LEVELS AND AMPLIFIED ON A LOG SCALE FOR HIGHER LIGHT LEVELS. IT WAS COMPOSED OF A PREAMP, TWO SIGNAL PROCESSING CHANNELS (LINEAR AND LOGARITHMIC), AND AN OUTPUT COMMUTATOR TO SELECT BETWEEN THEM AS WELL AS TO INTERFACE THEM TO THE SPACECRAFT SYSTEM. ALSO PROVIDED WERE CALIBRATION AND PROTECTION CIRCUITRY TO OPERATE THE CALIBRATE LAMPS AND TO PROTECT THE PHOTOTUBE FROM THE EFFECTS OF EXPOSURE TO HIGH LIGHT LEVELS. 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, 8, AUGUST 1975.

----- 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.H. WHITTEKER COMMUN RESEARCH CENTRE
OI - G.E.K. LOCKWOOD COMMUN RESEARCH CENTRE
OI - G.L. NELMS DEFENCE RESEARCH ESTAB
OI - J. TURNER IONOSPHERIC PRED SERV
OI - M. SYLVAIN LGE
OI - O. HOLT 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 - T.E. VAN ZANDT NOAA-ERL
OI - L. COLIN NASA-ARC
OI - W. CALVERT UNKNOWN
OI - R.B. NORTON NOAA-ERL
OI - J.W. KING APPLETON LAB
OI - K.L. CHAN NASA-ARC
OI - R.S. UNWIN DEPT OF SCI+INDUST RES

BRIEF DESCRIPTION THE ISIS 2 IONOMONDE 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 FORM WAS AN IONOGRAM (GRAPH) SHOWING VIRTUAL RANGE AS A FUNCTION OF RADIO FREQUENCY. TWO OTHER FORMS OF DATA WERE COMMONLY PREPARED FROM THE IONOGRAMS. THEY WERE DIGITAL FREQUENCY AND/OR VIRTUAL HEIGHT VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES AND COMPUTATIONS OF ELECTRON DENSITY PROFILES.

***** ISS-8*****

SPACECRAFT COMMON NAME- ISS-B
ALTERNATE NAMES- IONOSP SOUNDING SAT 2, 10674
UME 2, ISS-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

ORIGINAL PAGE IS OF POOR QUALITY

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 107. MIN
PERIAPSIS- 972. KM ALT

EPOCH DATE- 02/17/78
INCLINATION- 69.4 DEG
APOAPSIS- 1225. KM ALT

PERSONNEL

PI - N. MATUURA
PI - R. MAEDA
OI - Y. TAKENOSHITA

RADIO RESEARCH LAB
RADIO RESEARCH LAB
RADIO RESEARCH LAB

PERSONNEL

PM - N. WAKAI
PS - N. MATUURA

RADIO RESEARCH LAB
RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) IS PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS). ITS OBJECTIVES ARE TO ACCUMULATE DATA FOR STUDY OF THE TOPSIDE IONOSPHERE AND TO SURVEY RADIO NOISE AT FOUR FREQUENCIES, FROM BOTH EARTH AND COSMIC SOURCES. IT IS PLANNED TO PREPARE WORLD-WIDE MAPS OF F2 CRITICAL FREQUENCY FROM THE IONOSPHERE SOUNDING DATA. THE ISS 2 IS A SMALL OBSERVATORY WITH FOUR EXPERIMENTS ON BOARD. THE SPACECRAFT, A RIGHT CYLINDER, 82-CM LONG AND 93.5-CM IN DIAMETER, IS SPIN STABILIZED AT ABOUT 10 RPM WITH THE SPIN AXIS NORMAL TO THE ECLIPTIC PLANE. TWO PAIRS OF CROSSED DIPOLE ANTENNAS EXTEND FROM THE CENTRAL PART OF THE SATELLITE AND LIE PERPENDICULAR TO THE SPIN AXIS. THESE ANTENNAS, 36.8- AND 11.4-M LONG, ARE UNFURLED IN ORBIT AND ARE SHARED BY IONOSPHERIC SOUNDING AND RADIO NOISE EXPERIMENTS. A SPHERICAL RETARDING POTENTIAL TRAP SENSOR IS MOUNTED ON A BOOM PERPENDICULAR TO THE SPIN AXIS. A MAGNETIC ATTITUDE SENSOR IS MOUNTED ON A SIMILAR BOOM ON THE OPPOSITE SIDE OF THE SPACECRAFT. THE REMAINING EXPERIMENT INVOLVES A BENNETT-TYPE MASS SPECTROMETER WITH TWO SENSORS FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT. SPACECRAFT ATTITUDE IS DETERMINED BY MEANS OF A MAGNETOMETER, A SOLAR SENSOR, AND AN EARTH HORIZON SENSOR. SMALL TELEMETRY AND COMMAND ANTENNAS EXTEND FROM THE SPACECRAFT. THE SPACECRAFT IS POWERED FROM A BATTERY-SOLAR-CELL SYSTEM WITH SOLAR CELLS COVERING MOST OF THE CYLINDRICAL SURFACE. ONE RECORDER ON BOARD PERMITS SPACECRAFT OPERATION IN EITHER A RECORDED (FOR UP TO 112 MIN) OR REAL-TIME MODE. READOUT AND REAL-TIME OPERATION ARE PLANNED TO BE FROM KAGOSHIMA, JAPAN, AND SOYWA STATION, ANTARCTICA.

----- ISS-B, IWAMOTO-----

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- 78-018A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - I. IWAMOTO

RADIO RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IS FLOWN TO MEASURE THE POSITIVE ION COMPOSITION OVER THE SPACECRAFT ORBIT. TWO BENNETT-TYPE ION MASS SPECTROMETERS ARE FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT TO LOOK IN OPPOSITE DIRECTIONS ALONG THE SPIN AXIS. THE INSIDE DIAMETER OF THESE CYLINDRICAL SENSORS IS 36 MM. THE MASS RANGE COVERED IS 1 TO 20 U, AND THE ION CONCENTRATIONS ARE MEASURED OVER THE RANGE FROM 1 TO 1.E4 IONS PER CC.

----- ISS-B, KOTAKI-----

INVESTIGATION NAME- RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ

NSSDC ID- 78-018A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - M. KOTAKI

RADIO RESEARCH LAB

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE 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 ARE NOISE INTENSITY (RESOLUTION OF 1/12.8 SEC) AND OCCURRENCE FREQUENCY OF IMPULSIVE NOISE (G.T. 15 DB ABOVE RESOLVED INTENSITY).

----- ISS-B, MATUURA-----

INVESTIGATION NAME- SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)

NSSDC ID- 78-018A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

BRIEF DESCRIPTION

THE IONOSPHERE SOUNDING SATELLITE (ISS) IONOSPHERE IS A PULSED RADIO TRANSMITTER AND RECEIVER THAT RECORDS THE TIME DELAY BETWEEN A TRANSMITTED PULSE AND ITS RETURN. FREQUENCIES BETWEEN 0.5 AND 14.8 MHZ ARE SAMPLED IN 0.1-MHZ STEPS TO PROVIDE VIRTUAL RANGE (DELAY TIME) OF SIGNAL REFLECTIONS. MORE THAN ONE VIRTUAL RANGE VS FREQUENCY TRACE IS OFTEN OBSERVED. THESE RESULT FROM GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, ETC. VIRTUAL RANGE AT A GIVEN FREQUENCY IS 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, IS USED TO DISPLAY THESE OBSERVATIONS. TWO OTHER FORMS OF DATA ARE PREPARED FROM THESE IONOGRAMS. THEY ARE 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, REQUIRES 16 S TO SAMPLE ALL FREQUENCIES (ONE IONOGRAM). A TOP-A MODE IS ALSO AVAILABLE. IN THE TOP-A MODE, AN ITERATIVE LOGIC IS 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 ARE PREPARED. FOR BOTH THE TOP-A AND TOP-B MODES, THE COMPLETE CYCLE TIME BETWEEN SUCCESSIVE IONOGRAMS OR SUCCESSIVE CRITICAL FREQUENCY OBSERVATIONS IS 64 S.

----- ISS-B, MORI-----

INVESTIGATION NAME- RETARDING POTENTIAL TRAP

NSSDC ID- 78-012A-C3

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL

PI - N. MORI

RADIO RESEARCH LAB

BRIEF DESCRIPTION

THIS PROBE IS A SPHERICAL RETARDING POTENTIAL TRAP DESIGNED TO OBSERVE AMBIENT ION AND ELECTRON DENSITIES RANGING FROM 10.E3 TO 10.E6 PER CC. AMBIENT ION AND ELECTRON TEMPERATURES IN THE RANGE 500 TO 5000-DEG K ARE 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 IS MOUNTED ON A BOOM EXTENDING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. IT CONSISTS OF A 2-CM DIAMETER COLLECTOR, CONCENTRICALLY ENVELOPED BY 6- AND 10-CM DIAMETER SPHERICAL, WIRE GRIDS. THE CURRENT VOLTAGE ANALOG DATA ARE TELEMETERED AND SUBSEQUENTLY ANALYZED BY THE EXPERIMENTER.

***** IUE*****

SPACECRAFT COMMON NAME- IUE

ALTERNATE NAMES- INT ULTRAVIOLET EXPL, SAS-D
10637

NSSDC 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
INTERNATIONAL

NASA-GSS
ESA

INITIAL ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1435.7 MIN
PERIAPSIS- 25669. KM ALT

EPOCH DATE- 01/27/78
INCLINATION- 28.6 DEG
APOAPSIS- 45887. KM ALT

PERSONNEL

MG - L. DONDEY
SC - N.G. ROMAN
PM - G.W. LONGANECKER
PS - A. BOGGESS

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-D) SATELLITE IS A SPACEBORNE ULTRAVIOLET ASTRONOMICAL OBSERVATORY FOR USE AS AN INTERNATIONAL FACILITY. THE IUE CONTAINS A 45-CM TELESCOPE SOLELY FOR SPECTROSCOPY IN THE WAVELENGTH RANGE OF 1100 TO 3300 A. THE SATELLITE AND OPTICAL INSTRUMENTATION ARE PROVIDED BY THE GODDARD SPACE FLIGHT CENTER (GSFC). THE TELEVISION CAMERAS USED AS DETECTORS ARE PROVIDED BY THE UNITED KINGDOM SPACE 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 IS DIRECTED FROM A CONTROL CENTER AT GSFC, AND ONE-THIRD OF THE TIME THE SATELLITE

IS OPERATED FROM THE EUROPEAN CONTROL CENTER NEAR MADRID. THE IUE OBSERVATORY IS IN A SYNCHRONOUS ORBIT. THE 45-CM RITCHIEY-CHRETIEN F/15 TELESCOPE FEEDS A SPECTROGRAPH PACKAGE. THE SPECTROGRAPH PACKAGE, USING SEC VIDICON CAMERAS AS DETECTORS, COVERS THE SPECTRAL RANGE FROM 1100 TO 3300 Å. IT OPERATES IN EITHER A HIGH-RESOLUTION OR A LOW-RESOLUTION MODE WITH RESOLUTIONS OF APPROXIMATELY 0.2 AND 6 Å, RESPECTIVELY. THE SEC VIDICONS CAN INTEGRATE THE SIGNAL FOR UP TO 1 H. THIS INTEGRATION TIME LIMITS DETECTION IN THE HIGH- AND LOW-RESOLUTION MODES TO APPROXIMATELY 5 AND 0.03 PHOTONS/(CM SQ-Å-ANGSTROM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. GUEST INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

----- IUE, BOSTROM-----

INVESTIGATION NAME- PARTICLE FLUX MONITOR

NSSDC ID- 78-012A-02 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - J.W. KOHL APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THE PARTICLE FLUX MONITOR EXPERIMENT WAS PLACED IN IUE TO MONITOR THE TRAPPED ELECTRON FLUXES THAT AFFECT THE SENSITIVITY OF THE ULTRAVIOLET SENSOR IN THE IUE SPECTROGRAPH PACKAGE EXPERIMENT. NSSDC ID 78-012A-01. THE PARTICLE FLUX MONITOR IS A LITHIUM-DRIFTED SILICON DETECTOR WITH A HALF-ANGLE CONICAL FIELD OF VIEW OF 16 DEG. IT HAS AN ALUMINUM ABSORBER OF 0.357 G/SQ CM IN FRONT OF THE COLLIMATOR AND A BRASS SHIELDING HAVING A MINIMUM THICKNESS OF 2.31 G/SQ CM. THE EFFECTIVE ENERGY THRESHOLD FOR ELECTRON MEASUREMENTS IS 1.3 MEV. THE EXPERIMENT IS ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 15 MEV.

----- IUE, FACILITY INVESTIGA.-----

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 - FACILITY INVESTIGA. NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT INCLUDES THE ULTRAVIOLET SPECTROGRAPH PACKAGE CARRIED BY THE IUE, CONSISTING OF TWO PHYSICALLY DISTINCT ECHELLE-SPECTROGRAPH/CAMERA UNITS CAPABLE OF ASTRONOMICAL OBSERVATIONS. EACH SPECTROGRAPH IS A THREE-ELEMENT ECHELLE SYSTEM, COMPOSED OF AN OFF-AXIS PARABOLOIDAL COLLIMATOR, AN ECHELLE GRATING, AND A SPHERICAL FIRST-ORDER GRATING THAT IS USED TO SEPARATE THE ECHELLE ORDERS AND FOCUS THE SPECTRAL DISPLAY ON AN IMAGE CONVERTER-PLUS-SEC VIDICON CAMERA. (FOR EACH UNIT THERE IS A SPARE CAMERA). THE CAMERA UNITS ARE ABLE TO INTEGRATE THE SIGNAL. THE READOUT/PREPARATION CYCLE FOR THE CAMERAS TAKES APPROXIMATELY 4 MIN. WAVELENGTH CALIBRATION IS PROVIDED BY THE USE OF A HOLLOW CATHODE COMPARISON LAMP. THE PHOTOMETRIC CALIBRATION IS ACCOMPLISHED BY OBSERVING STANDARD STARS WHOSE SPECTRAL FLUXES HAVE BEEN PREVIOUSLY CALIBRATED BY OTHER MEANS. BOTH ECHELLE-SPECTROGRAPH/CAMERA UNITS ARE CAPABLE OF HIGH-RESOLUTION (0.2 Å) OR LOW-RESOLUTION (6Å) PERFORMANCE. THE DUAL HIGH/LOW RESOLUTION CAPABILITY IS IMPLEMENTED BY THE INSERTION OF A FLAT IN FRONT OF THE ECHELLE GRATING, SO THAT THE ONLY DISPERSION IS PROVIDED BY THE SPHERICAL GRATING. AS THE SEC VIDICONS CAN INTEGRATE THE SIGNAL FOR UP TO 1 H, DATA WITH A SIGNAL-TO-NOISE RATIO OF 50 CAN BE OBTAINED FOR A 80 STAR OF THE 9TH AND 14TH MAGNITUDE IN THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. THE DISTINGUISHING CHARACTERISTICS OF THE UNITS ARE THEIR WAVELENGTH COVERAGE. ONE UNIT COVERS THE WAVELENGTH RANGE FROM 1192 TO 1924 Å IN THE HIGH-RESOLUTION MODE, AND 1135 TO 2085 Å IN THE LOW-RESOLUTION MODE. FOR THE OTHER UNIT, THE RANGES ARE FROM 1893 TO 3031 Å AND 1800 TO 3255 Å FOR THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. EACH UNIT ALSO HAS 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 CAN BE BLOCKED BY A COMMON SHUTTER, BUT THE 3-ARC-S APERTURE WILL ALWAYS BE OPEN. AS A RESULT, TWO APERTURE CONFIGURATIONS ARE 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 WILL BE LONG-WAVELENGTH AND/OR SHORT-WAVELENGTH SPECTROGRAPH, HIGH OR LOW RESOLUTION, AND LARGE OR SMALL APERTURES. EXPOSURES MAY BE MADE WITH THE TWO SPECTROGRAPHS SIMULTANEOUSLY, BUT REMEMBERING THAT THE ENTRANCE APERTURES FOR EACH ARE DISTINCT AND SEPARATED ON THE SKY BY ABOUT 1 MIN OF ARC. AN ADDITIONAL RESTRICTION IS THAT DATA CAN BE READ OUT OF ONLY ONE CAMERA AT A TIME. HOWEVER, ONE CAMERA MAY BE EXPOSING WHILE ONE CAMERA IS BEING READ OUT. THE CHOICE OF HIGH OR LOW RESOLUTION CAN BE MADE INDEPENDENTLY FOR THE TWO SPECTROGRAPHS SO THAT THE OPERATIONAL MODES OF THE UNITS NEED NOT BE THE SAME.

***** KYOKKO*****

SPACECRAFT COMMON NAME- KYOKKO
ALTERNATE NAMES- EXOSPHERIC SAT. A, EXOS 1
EXOS A, 10664

NSSDC ID- 78-C14A

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- 3977 KM ALT

PERSONNEL
PM - K. HIRAO 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 35 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-M SQ) TO PROVIDE ALIGNMENT OF THE SPACECRAFT CENTER AXIS ALONG THE LOCAL GEOMAGNETIC FIELD LINE. TWO SETS OF CIRCULARLY POLARIZED QUADRUPLE ANTENNAE, ONE FOR UHF (400 MHZ) AND ANOTHER FOR VHF, EXTENDED FROM OPPOSITE ENDS OF THE SPACECRAFT. THE UHF ANTENNA WAS DPLEXED 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 2192 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 - Y. SAGAWA 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 QUADRAPOLE 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-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
AERONOMY
PARTICLES AND FIELDS

PERSONNEL
PI - E. KANEDA U OF TOKYO
OI - N. NIWA U OF TOKYO
OI - M. 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 FLOURIDE FACEPLATE THAT MADE IT SENSITIVE TO PHOTONS AROUND 1300 Å. 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.

***** LAGEOS*****

SPACECRAFT COMMON NAME- LAGEOS
ALTERNATE NAMES- LASER GEODYNAMIC SAT-

NSSDC ID- 76-039A

LAUNCH DATE- 05/04/76 WEIGHT- 411. 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- 05/05/76
ORBIT PERIOD- 225.41 MIN INCLINATION- 109.86 DEG
PERIAPSIS- 5837. KM ALT APOAPSIS- 5945. KM ALT

PERSONNEL
MG - C.J. FINLEY NASA-HEADQUARTERS
PM - C.W. JOHNSON NASA-MSFC
PM - C.C. STEPHANIDES NASA-GSFC
PS - D.E. SMITH NASA-GSFC

BRIEF DESCRIPTION
LAGEOS WAS A VERY DENSE (HIGH MASS-TO-AREA RATIO) LASER RETROREFLECTOR SATELLITE WHICH PROVIDED A PERMANENT REFERENCE POINT IN A VERY STABLE ORBIT FOR SUCH PRECISION EARTH-DYNAMICS MEASUREMENTS AS CRUSTAL MOTIONS, REGIONAL STRAINS, FAULT MOTIONS, POLAR MOTION AND EARTH-ROTATION VARIATIONS, SOLID EARTH TIDES, AND OTHER KINEMATIC AND DYNAMIC PARAMETERS ASSOCIATED WITH EARTHQUAKE ASSESSMENT AND ALLEVIATION. IN CONJUNCTION WITH APPROPRIATE LASER-TRACKING SYSTEMS, LAGEOS PERMITTED EXTREME PRECISION-RANGING MEASUREMENTS FOR BOTH GEOMETRIC MODE (MULTILATERATION) AND ORBITAL DYNAMIC MODE DETERMINATIONS OF POSITIONS OF POINTS ON THE EARTH. IT WAS THE FIRST SPACECRAFT DEDICATED EXCLUSIVELY TO HIGH-PRECISION LASER RANGING AND PROVIDED THE FIRST OPPORTUNITY TO ACQUIRE LASER-RANGING DATA THAT WERE NOT DEGRADED BY ERRORS ORIGINATING IN THE TARGET SATELLITE. THE HIGH-ACCURACY RANGE MEASUREMENTS FROM THIS PERMANENT-ORBITING REFERENCE POINT WERE USED TO ACCOMPLISH MANY EXTREME PRECISION EARTH-DYNAMICS MEASUREMENTS REQUIRED BY THE EARTHQUAKE HAZARD ASSESSMENT AND ALLEVIATION OBJECTIVES OF THE EARTH AND OCEAN PHYSICS APPLICATIONS PROGRAM (EOPAP). THE PERFORMANCE IN ORBIT OF LAGEOS IS LIMITED ONLY BY DEGRADATION OF THE RETROREFLECTORS, SO MANY DECADES OF USEFUL LIFE CAN BE EXPECTED. THE HIGH MASS-TO-AREA RATIO AND THE PRECISE, STABLE (ATTITUDE-INDEPENDENT) GEOMETRY OF THE SPACECRAFT, TOGETHER WITH THE ORBIT, MAKES THIS SATELLITE THE MOST PRECISE POSITION REFERENCE AVAILABLE. BECAUSE IT IS VISIBLE IN ALL PARTS OF THE WORLD AND HAS AN EXTENDED OPERATION LIFE IN ORBIT, LAGEOS CAN SERVE AS A FUNDAMENTAL STANDARD FOR DECADES.

----- LAGEOS, STEPHANIDES-----

INVESTIGATION NAME- LASER RETROREFLECTORS

NSSDC ID- 76-039A-01 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS
GEODESY

PERSONNEL
PI - C.C. STEPHANIDES NASA-GSFC
OI - H.H. PLOTKIN NASA-GSFC

BRIEF DESCRIPTION
LASER RETROREFLECTORS COVERING A VERY DENSE SPHERICAL SATELLITE WERE USED TO PROVIDE A PERMANENT REFERENCE POINT IN A VERY STABLE ORBIT FOR PRECISION EARTH-DYNAMICS MEASUREMENTS. THIS SPHERE WAS MACHINED LARGELY FROM DEPLETED URANIUM, WEIGHED ABOUT 411 KG, AND WAS COMPOSED OF A CUBICAL INNER CORE WITH SIX ATTACHED SPHERICAL CAPS. EACH OF THE SPHERICAL CAPS HAD MACHINED CAVITIES TO ACCOMMODATE THE RETROREFLECTORS. THE SATELLITE WAS PLACED AT A HIGH ORBITAL INCLINATION AT AN ALTITUDE OF ABOUT 5000 KM AND TRACKED BY A NETWORK OF 13 LASER STATIONS OPERATED BY BOTH U.S. AND FOREIGN AGENCIES. THE PERFORMANCE IN ORBIT IS LIMITED ONLY BY DEGRADATION OF THE RETROREFLECTORS, AND A MINIMUM LIFETIME OF 50 YEARS IS EXPECTED.

***** LANDSAT 1*****

SPACECRAFT COMMON NAME- LANDSAT 1
ALTERNATE NAMES- EARTH RES TECH SAT.-A, PL-724A
ERTS-A, O6126

NSSDC ID- 72-058A

LAUNCH DATE- 07/23/72 WEIGHT- 891. 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- 07/24/72
ORBIT PERIOD- 103.1 MIN INCLINATION- 99.1 DEG
PERIAPSIS- 897. KM ALT APOAPSIS- 917. KM ALT

PERSONNEL
 MG - H.B. MANNHEIMER NASA HEADQUARTERS
 SC - R.I. WHITHAN NASA HEADQUARTERS
 PM - R.K. BROWNING NASA-GSFC
 PS - S.C. FREDEN NASA-GSFC

PERSONNEL
 PI - J.E. PAINTER NASA-GSFC

BRIEF DESCRIPTION
 LANDSAT 1 (FORMERLY ERTS 1) WAS A MODIFIED VERSION OF THE NIMBUS 4 METEOROLOGICAL SATELLITE. 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 FOUR-CHANNEL MULTISPECTRAL SCANNER (MSS), (2) A THREE-CAMERA RETURN BEAM VIDICON (RBV) TO OBTAIN BOTH VISIBLE AND IR PHOTOGRAPHIC AND RADIOMETRIC IMAGES OF THE EARTH, AND (3) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE, INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT 1 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 MAINTAINED 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 TAPE-RECORDER MODES AT 2265.5 MHZ, WHILE INFORMATION FROM THE MSS WAS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

BRIEF DESCRIPTION
 THE PURPOSE OF THE LANDSAT 1 (FORMERLY ERTS 1) DATA COLLECTION SYSTEM (DCS) WAS TO PROVIDE USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS WAS COMPOSED OF -- (1) THE DATA COLLECTION PLATFORMS (DCP'S), (2) THE SATELLITE EQUIPMENT, AND (3) THE GROUND DATA CENTERS, INCLUDING REMOTE RECEIVING SITES AND THE GROUND DATA HANDLING SYSTEM AT GSFC. THE DCS PROVIDED A CONTINUAL FLOW OF INFORMATION TO BE USED FOR MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES. THESE DATA COULD ALSO LEAD 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 NOMINAL ORBIT OF APPROXIMATELY 900 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 TRANSMITTER FREQUENCY WAS 1.55 MHZ. THE DCS EQUIPMENT, ESSENTIALLY A RECEIVER, RECEIVED AND RETRANSMITTED DATA (AT 2287.5) TO SELECTED GROUND RECEIVING STATIONS. THERE WAS NO SIGNAL MULTIPLEXING OR DATA PROCESSING ON THE SATELLITE. THE LANDSAT DCS COULD ACCOMMODATE UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL U.S. THE DCS INITIALLY CONSISTED OF A PILOT GROUP OF ONLY SIX DCP'S, WITH USER AGENCIES PROCURING, INSTRUMENTING, AND DEVELOPING ADDITIONAL PLATFORMS ACCORDING TO THEIR NEEDS. DATA FROM THIS EXPERIMENT ARE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

***** LANDSAT 2*****

----- LANDSAT 1, ARLUSKAS-----

SPACECRAFT COMMON NAME- LANDSAT 2
 ALTERNATE NAMES- EARTH RES TECH SAT.-B, PL-733D
 ERTS-B, 07615

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)
 NSSDC ID- 72-058A-02 INVESTIGATIVE PROGRAM
 CODE ER
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY

NSSDC ID- 75-004A
 LAUNCH DATE- 01/22/75 WEIGHT- 816. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- DELTA

PERSONNEL
 PI - J. ARLUSKAS NASA-GSFC

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSTA

BRIEF DESCRIPTION
 THE LANDSAT 1 (FORMERLY ERTS 1) MULTISPECTRAL SCANNER (MSS) WAS DESIGNED TO PROVIDE REPETITIVE DAYTIME ACQUISITION OF HIGH-RESOLUTION, MULTISPECTRAL DATA OF THE EARTH'S SURFACE ON A GLOBAL BASIS AND TO DEMONSTRATE THAT REMOTE SENSING FROM SPACE IS A FEASIBLE AND PRACTICAL APPROACH TO EFFICIENT MANAGEMENT OF THE EARTH'S RESOURCES. IN ADDITION TO OBTAINING DATA FOR USE IN EARTH RESOURCE TYPE STUDIES, THE MSS SYSTEM WAS USED TO CONDUCT OCEANOGRAPHIC AND METEOROLOGICAL STUDIES, 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, AND BAND 4, 0.8 TO 1.1 MICROMETERS. 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 OF THE TELESCOPE 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 FOUR SPECTRAL BANDS -- BANDS 1 THROUGH 3 USED PHOTOMULTIPLIER TUBES AS DETECTORS, AND BAND 4 USED SILICON PHOTODIODES. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 24 CHANNELS OF VIDED DATA. THE DATA WERE TIME-MULTIPLEXED AND THEN CONVERTED TO A PULSE-CODE MODULATED SIGNAL BY AN A/D CONVERTER. THE DATA WERE THEN TRANSMITTED (2229.5 MHZ) DIRECTLY TO AN ACQUISITION STATION OR, IN THE CASE OF REMOTE AREAS, 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 AVAILABLE TO APPROVED INVESTIGATORS AND AGENCIES 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.

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/25/75
 ORBIT PERIOD- 103.28 MIN INCLINATION- 99.09 DEG
 PERIAPSIS- 907. KM ALT APOAPSIS- 918. KM ALT

PERSONNEL
 MG - H.B. MANNHEIMER NASA HEADQUARTERS
 SC - R.I. WHITHAN NASA HEADQUARTERS
 PM - R.K. BROWNING 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 1, PAINTER-----

----- LANDSAT 2, ARLUSKAS-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)
 NSSDC ID- 72-058A-03 INVESTIGATIVE PROGRAM
 CODE ER
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY

NSSDC ID- 75-004A-02 INVESTIGATIVE PROGRAM
 CODE ER
 INVESTIGATION DISCIPLINE(S)
 EARTH RESOURCES SURVEY
 METEOROLOGY

ORIGINAL PAGE IS
 OF POOR QUALITY

PERSONNEL
PI - J. ARLUSKAS

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 2 MULTISPECTRAL SCANNER (MSS) WAS DESIGNED TO PROVIDE 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 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 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. SIX 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. A MULTIPLEXER INCLUDED IN THE MSS SYSTEM PROCESSED THE SCANNER'S 26 CHANNELS OF DATA. THESE DATA WERE TIME-MULTIPLEXED 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 2, PAINTER-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 75-004A-03

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.E. PAINTER

NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE LANDSAT 2 DATA COLLECTION SYSTEM (DCS) WAS TO PROVIDE USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS WAS COMPOSED OF -- (1) THE DATA COLLECTION PLATFORMS (DCP'S), (2) THE SATELLITE EQUIPMENT, AND (3) THE GROUND DATA CENTERS, INCLUDING REMOTE RECEIVING SITES AND THE GROUND DATA HANDLING SYSTEM AT GSFC. THE DCS PROVIDED A CONTINUAL FLOW OF INFORMATION FOR BETTER MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES. THESE DATA COULD ALSO LEAD 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 TRANSMITTER FREQUENCY WAS 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 DCS COULD ACCOMMODATE UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL US. THE DCS INITIALLY CONSISTED OF ONLY A SMALL NUMBER OF INITIAL DCP'S WITH USER AGENCIES PROCURING, INSTRUMENTING, AND DEVELOPING ADDITIONAL PLATFORMS ACCORDING TO THEIR NEEDS. DATA FROM THIS EXPERIMENT ARE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

***** LANDSAT 3*****

SPACECRAFT COMMON NAME- LANDSAT 3
ALTERNATE NAMES- EARTH RES TECH SAT.-C, ERTS-C
10702

NSSDC ID- 78-026A

LAUNCH DATE- 03/05/78
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

WEIGHT- 960. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103.1 MIN
PERIAPSIS- 897. KM ALT

EPOCH DATE- 03/06/78
INCLINATION- 99.1 DEG
APOAPSIS- 914. KM ALT

PERSONNEL

MG - H.B. MANNHEIMER
SC - R.I. WHITMAN
PM - R.K. BROWNING
PS - S.C. FREDEN

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-GSFC
NASA-GSFC

BRIEF DESCRIPTION

LANDSAT 3 IS 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 SERVES AS A STABILIZED, EARTH-ORIENTED PLATFORM FOR OBTAINING INFORMATION ON AGRICULTURAL AND FORESTRY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, HYDROLOGY AND WATER RESOURCES, GEOGRAPHY, CARTOGRAPHY, ENVIRONMENTAL POLLUTION, OCEANOGRAPHY AND MARINE RESOURCES, AND METEOROLOGICAL PHENOMENA. TO ACCOMPLISH THESE OBJECTIVES THE SPACECRAFT IS 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 RADIO-METRIC 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-C CARRIES 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 PERMITS THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1.0 DEG IN ALL THREE AXES. SPACECRAFT COMMUNICATIONS INCLUDE 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 TWO-CAMERA RBV SYSTEM ARE TRANSMITTED IN BOTH REAL TIME AND FROM THE WIDE-BAND RECORDER SYSTEM AT 2265.5 MHZ, WHILE INFORMATION FROM THE MSS IS CONSTRAINED TO A 20-MHZ RF BANDWIDTH AT 2229.5 MHZ.

----- LANDSAT 3, ARLUSKAS-----

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 78-026A-02

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - J. ARLUSKAS

NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 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 OBTAIN DATA IN VARIOUS 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 REFLECTOR-TYPE TELESCOPE, SCANNING MIRROR, FILTERS, DETECTORS, AND ASSOCIATED ELECTRONICS. THE SCANNER OPERATES 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, GIVES LANDSAT 3 NIGHTTIME SENSING CAPABILITIES, A FEATURE LACKING IN THE MSS IN LANDSAT 1. INCOMING RADIATION IS COLLECTED BY THE SCANNING MIRROR, WHICH OSCILLATES 2.89 DEG TO EITHER SIDE OF NADIR AND SCAN CROSS-TRACK SWATHS 185-KM WIDE. THE ALONG-TRACK SCAN IS PRODUCED BY THE ORBITAL MOTION OF THE SPACECRAFT. 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 ARE USED TO PRODUCE THE DESIRED 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. THE MINIMUM DIMENSIONS THAT ARE RESOLVED BY THE MSS ARE 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 ARE TIME-MULTIPLEXED AND THEN CONVERTED TO A PCM SIGNAL BY AN A/D CONVERTER. THE DATA ARE 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 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, PAINTER-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 78-C26A-03 INVESTIGATIVE PROGRAM CODE ER

INVESTIGATION DISCIPLINE(S) METEOROLOGY EARTH RESOURCES SURVEY

PERSONNEL PI - J.E. PAINTER NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 DATA COLLECTION SYSTEM (DCS) PROVIDES USERS WITH NEAR REAL-TIME DATA COLLECTED FROM VARIOUS REMOTE LOCATIONS. THE DCS IS COMPOSED OF -- (1) THE DATA COLLECTION PLATFORMS (DCP'S) WHICH MAY BE 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 SPACEBORNE DCS PROVIDES A CONTINUAL FLOW OF INFORMATION FOR BETTER MANAGEMENT OF WILDLIFE, MARINE, AGRICULTURE, WATER, AND FORESTRY RESOURCES AND LEADS TO IMPROVED WEATHER FORECASTS, POLLUTION CONTROL, AND EARTHQUAKE PREDICTION AND WARNING. THE ENVIRONMENTAL SENSORS MOUNTED ON A DCP ARE SELECTED BY INDIVIDUAL INVESTIGATORS TO SATISFY THEIR PARTICULAR REQUIREMENTS. FROM A PLANNED ORBIT OF 912 KM, THE SPACECRAFT IS 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, RECEIVES AND RETRANSMITS DATA (AT 2287.5 MHZ) TO SELECTED GROUND RECEIVING STATIONS. THERE IS NO SIGNAL MULTIPLEXING OR DATA PROCESSING ON THE SATELLITE. THE LANDSAT-C DCS ACCOMMODATES UP TO 1000 DCP'S DEPLOYED THROUGHOUT THE CONTINENTAL US. DATA FROM THIS EXPERIMENT ARE HANDLED AND DISTRIBUTED TO THE VARIOUS PLATFORM INVESTIGATORS BY THE NASA DATA PROCESSING FACILITY, GSFC, GREENBELT, MD.

----- LANDSAT 3, WEINSTEIN-----

INVESTIGATION NAME- RETURN BEAM VIDICON CAMERA (RBV)

NSSDC ID- 78-C26A-01 INVESTIGATIVE PROGRAM CODE ER

INVESTIGATION DISCIPLINE(S) EARTH RESOURCES SURVEY

PERSONNEL PI - O. WEINSTEIN NASA-GSFC OI - T.M. RAGLAND NASA-GSFC

BRIEF DESCRIPTION

THE LANDSAT 3 RETURN BEAM VIDICON (RBV) CAMERA SYSTEM CONTAINS TWO IDENTICAL CAMERAS COVERING THE SPECTRAL BAND FROM 0.53 TO 0.75 MICROMETER. THE TWO EARTH-ORIENTED CAMERAS ARE MOUNTED TO A COMMON BASE, STRUCTUALLY ISOLATED FROM THE SPACECRAFT TO MAINTAIN ACCURATE ALIGNMENT. EACH CAMERA CONTAINS AN OPTICAL LENS, A RBV SENSOR, A THERMOELECTRIC COOLER, DEFLECTION AND FOCUS COILS, A MECHANICAL SHUTTER, ERASE LAMPS, AND SENSOR ELECTRONICS. THE CAMERAS ARE ALIGNED TO VIEW ADJACENT 84-KM SQUARE GROUND SCENES WHICH OVERLAP SLIGHTLY SO THAT THE TOTAL WIDTH OF THE GROUND SCENE IS 185 KM. THE CAMERAS ARE OPERATED EVERY 12.5 S TO PRODUCE OVERLAPPING IMAGES ALONG THE DIRECTION OF SPACECRAFT MOTION. AFTER SHUTTERING, THE IMAGE IS SCANNED BY AN ELECTRON BEAM TO PRODUCE A VIDEO OUTPUT SIGNAL. THE TIMING CYCLE IS ARRANGED SO THAT A 3.5-S OFFSET IS 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 ARE TRANSMITTED (AT 2265.5 MHZ) IN BOTH REAL-TIME AND TAPE-RECORDER MODES. FROM A NOMINAL SPACECRAFT ALTITUDE OF 912 KM, THE RBV WILL HAVE 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.

***** METEOSAT 1*****

SPACECRAFT COMMON NAME- METEOSAT 1 ALTERNATE NAMES- METEOROLOGICAL SAT-A, METOSAT 10469

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

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 - M. DELAHAIS ESA-ESTEC PS - D. LENNERTZ ESA-ESTEC

BRIEF DESCRIPTION

METOSAT IS A 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 TO BE 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 ATTAINED SYNCHRONOUS ORBIT.

----- 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-ESTEC

BRIEF DESCRIPTION

THE VISIBLE-IR RADIOMETER FLOWN ON METOSAT 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.

----- 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-ESTEC

ORIGINAL PAGE IS OF POOR QUALITY

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.

***** 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
MG - D.R. BROOME NASA HEADQUARTERS
SC - R.A. SCHIFFER NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - J.S. THEON NASA-GSFC

BRIEF DESCRIPTION

NIMBUS 4, THE FOURTH IN A SERIES OF SECOND-GENERATION METEOROLOGICAL R 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
OI - J.V. DAVE IBM CORPORATION
OI - A.J. KRUEGER NASA-GSFC
OI - 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-EGERT TYPE MONOCHROMATORS IN TANDEM. EACH MONOCHROMATOR HAD A 64-BY-64-MM GRATING WITH 2400 LINES PER MM. LIGHT FROM A 0.05-STER 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-721B
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- 1089. KM ALT APOAPSIS- 1101. KM ALT

PERSONNEL
MG - D.R. BROOME NASA HEADQUARTERS
SC - R.A. SCHIFFER NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - J.S. THEON 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-0P

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 1150 KM, THE RADIOMETER VIEWED A 48-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, STAELIN-----

INVESTIGATION NAME- NIMBUS 5 MICROWAVE SPECTROMETER (NEMS)

NSSDC ID- 72-097A-03 INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - D.H. STAELIN MASS INST OF TECH
OI - F.T. BARATH NASA-JPL
OI - M.E. GAUT ENVIRON RES + TECH INC
OI - P. THADDEUS NASA-GISS
OI - W.B. LENOIR NASA-JSC

BRIEF DESCRIPTION

THE NIMBUS 5 MICROWAVE SPECTROMETER (NEMS) WAS DESIGNED PRIMARILY TO DEMONSTRATE THE CAPABILITIES AND LIMITATIONS OF MICROWAVE SENSORS FOR MEASURING TROPOSPHERIC TEMPERATURE PROFILES, WATER VAPOR ABUNDANCES, CLOUD LIQUID WATER CONTENT, AND EARTH SURFACE TEMPERATURES. A SECONDARY PURPOSE WAS TO OBTAIN SUCH DATA FOR WEATHER PREDICTION PURPOSES. THE NEMS COULD CONTINUOUSLY MONITOR EMITTED THERMAL RADIATION AT WAVELENGTHS OF 11.1, 9.55, 5.58, 5.46, AND 5.10 MM. THE THREE CHANNELS NEAR THE 5-MM OXYGEN ABSORPTION BAND WERE USED PRIMARILY TO DETERMINE THE ATMOSPHERIC TEMPERATURE PROFILE. NEMS WOULD PROVIDE MEASUREMENTS FOR USE IN DERIVING TEMPERATURE PROFILES EVEN IN CLOUDCOVER CONDITIONS THAT NORMALLY RESTRICT THE USEFULNESS OF CONVENTIONAL IR DATA IN SUCH SITUATIONS. THE TWO WATER VAPOR CHANNELS NEAR 10 MM PERMITTED THE WATER VAPOR AND CLOUD LIQUID WATER CONTENT OVER OCEANS TO BE ESTIMATED AND ALSO YIELDED AN ESTIMATED TEMPERATURE ONCE THE SURFACE EMISSIVITY HAD BEEN CALIBRATED BY COMPARISON WITH DIRECT MEASUREMENTS. THE THREE OXYGEN CHANNELS SHARED A COMMON SIGNAL AND REFERENCE ANTENNA. BOTH WATER VAPOR CHANNELS HAD THEIR OWN SIGNAL AND REFERENCE ANTENNAS. FROM AN AVERAGE SATELLITE HEIGHT OF 1100 KM, THE NEMS VIEWED A 180-KM DIAMETER CIRCLE ON THE EARTH'S SURFACE. NEMS DATA WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- 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. CLOERSEN 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- 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 90 DEG TO EITHER SIDE OF NADIR. ANGULAR SEPARATION OF THE SCAN SPOTS ALLOWED FOR AN 8.5 PERCENT OVERLAP BETWEEN VIEW POSITIONS. FROM A MEAN 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

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- 05/12/75
ORBIT PERIOD- 107.3 MIN INCLINATION- 100. DEG
PERIAPSIS- 1093.00 KM ALT APOAPSIS- 1101.00 KM ALT

PERSONNEL

MG - D.R. BROOME NASA HEADQUARTERS
SC - R.A. SCHIFFER NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - J.S. THEON 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-0P

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON OXFORD U
OI - C.O. RODGERS OXFORD U
OI - E.J. WILLIAMSON CLARENDON LAB
OI - G.D. PESKETT CLARENDON LAB
OI - 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 STRUCTURE 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 INFIGHT 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 BOLLOMETER. 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 K AT 65 KM AND ABOUT PLUS OR MINUS 0.2 K NEAR 50 KM.

----- NIMBUS 6, JULIAN-----

INVESTIGATION NAME- TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (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
OI - W.W. KELLOGG NATL CTR FOR ATMOS RES
OI - V.E. SUOMI U OF WISCONSIN
OI - C.R. LAUGHLIN NASA-GSFC
OI - R.L. TALLEY PROGRAM METHODS, INC
OI - W.R. BANDEEN NASA-GSFC
OI - 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 6, SMITH-----

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 - W.L. SMITH NOAA-NESS
OI - A.J. DRUMMOND EPPLEY LAB, INC
OI - I. RUFF NOAA-NESS
OI - J.R. HICKEY EPPLEY LAB, INC
OI - W.J. SCHLES EPPLEY LAB, INC
OI - D.T. HILLEARY 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-DEC 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.

***** NOAA 4*****

SPACECRAFT COMMON NAME- NOAA 4
ALTERNATE NAMES- ITOS-G, 07529

NSSDC ID- 74-089A
LAUNCH DATE- 11/15/74 WEIGHT- 339.7 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/16/74
ORBIT PERIOD- 114.9 MIN INCLINATION- 101.7 DEG
PERIAPSIS- 1443.0 KM ALT APOAPSIS- 14570.0 KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PM - A. BUTERA NOAA-NESS
PS - I.L. GOLDBERG NASA-GSFC

BRIEF DESCRIPTION

ITOS-G WAS ONE IN A SERIES OF IMPROVED TIROS-M SATELLITES LAUNCHED WITH NEW METEOROLOGICAL SENSORS ON BOARD TO EXPAND THE OPERATIONAL CAPABILITY OF THE ITOS (NOAA) SYSTEM. THE PRIMARY OBJECTIVE OF THE ITOS-G METEOROLOGICAL SATELLITE WAS TO PROVIDE GLOBAL DAYTIME AND NIGHTTIME DIRECT READOUT CLOUDCOVER DATA ON A DAILY BASIS. THE SUN-SYNCHRONOUS SPACECRAFT ALSO SUPPLIED GLOBAL ATMOSPHERIC TEMPERATURE SOUNDINGS AND VERY HIGH RESOLUTION INFRARED CLOUDCOVER DATA OF SELECTED AREAS IN EITHER A DIRECT READOUT OR A TAPE RECORDER MODE. A SECONDARY OBJECTIVE WAS TO OBTAIN GLOBAL SOLAR PROTON DENSITY DATA ON A ROUTINE DAILY BASIS. THE PRIMARY SENSORS CONSISTED OF A VERY HIGH RESOLUTION RADIOMETER (VHRR), A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR), AND A SCANNING RADIOMETER (SR). THE VHRR, VTPR, AND SR WERE MOUNTED ON THE SATELLITE BASEPLATE WITH THEIR OPTICAL AXES DIRECTED VERTICALLY EARTHWARD. THE NEARLY CUBICAL SPACECRAFT MEASURED 1 BY 1.2 M. THE SATELLITE WAS EQUIPPED WITH THREE CURVED SOLAR PANELS THAT WERE FOLDED DURING LAUNCH AND DEPLOYED AFTER ORBIT WAS ACHIEVED. EACH PANEL MEASURED OVER 4.2M IN LENGTH WHEN UNFOLDED AND WAS COVERED WITH 3420 SOLAR CELLS MEASURING 2 BY 2 CM. THE ITOS DYNAMICS AND ATTITUDE CONTROL SYSTEM MAINTAINED DESIRED SPACECRAFT ORIENTATION THROUGH GYROSCOPIC PRINCIPLES INCORPORATED INTO THE SATELLITE DESIGN. EARTH ORIENTATION OF THE SATELLITE BODY WAS MAINTAINED BY TAKING ADVANTAGE OF THE PRECESSION INDUCED FROM A MOMENTUM FLYWHEEL SO THAT THE SATELLITE BODY PRECESSION RATE OF ONE REVOLUTION PER ORBIT WILL PROVIDE THE DESIRED 'EARTH LOOKING' ATTITUDE. MINOR ADJUSTMENTS IN ATTITUDE AND ORIENTATION WERE MADE BY MEANS OF MAGNETIC COILS AND BY VARYING THE SPEED OF THE MOMENTUM FLYWHEEL.

----- NOAA 4, NESS STAFF-----

INVESTIGATION NAME- SCANNING RADIOMETER (SR)

NSSDC ID- 74-089A-02 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE ITOS-G SCANNING RADIOMETER (SR) SUBSYSTEM CONSISTED OF TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR, AND TWO SR RECORDERS. THIS SUBSYSTEM PERMITTED THE DETERMINATION OF SURFACE TEMPERATURES OF THE GROUND, THE SEA, OR CLOUD TOPS VIEWED BY THE RADIOMETER. THE RADIOMETER MEASURED REFLECTED RADIATION FROM THE EARTH/ATMOSPHERE SYSTEM IN THE 0.52- TO 0.73-MICROMETER BAND DURING THE DAY AND EMITTED RADIATION FROM THE EARTH AND ITS ATMOSPHERE IN THE 10.5- TO 12.5-MICROMETER REGION DURING THE DAY AND NIGHT. UNLIKE A CAMERA, THE SR DID NOT TAKE A PICTURE, BUT INSTEAD FORMED AN IMAGE USING A CONTINUOUSLY ROTATING MIRROR. THE MIRROR SCANNED THE EARTH'S SURFACE PERPENDICULAR TO THE SATELLITE'S ORBITAL PATH AT A RATE OF 48 RPM. AS THE SATELLITE PROGRESSES ALONG ITS ORBITAL PATH, EACH ROTATION OF THE MIRROR PROVIDED ONE SCAN LINE OF PICTURE. RADIATION COLLECTED BY THE MIRROR WAS PASSED THROUGH A BEAM SPLITTER AND SPECTRAL FILTER TO PRODUCE THE DESIRED SPECTRAL SEPARATION. UP TO TWO FULL ORBITS OF DATA (145 MIN) CAN BE STORED ON MAGNETIC TAPE FOR SUBSEQUENT TRANSMISSION (1697.5 MB) TO AN ACQUISITION STATION. THE DATA WERE ALSO TRANSMITTED IN REAL TIME TO LOCAL APT STATIONS. ONCE THE SIGNAL WAS RECEIVED BY THE GROUND STATION, A CONTINUOUS PICTURE WAS FORMED BY USING A FACSIMILE RECORDER WHOSE SCAN IS IN PHASE WITH THE SATELLITE'S FORWARD MOTION. FROM A PLANNED ALTITUDE OF 1460 KM, THE RADIOMETER HAD A GROUND RESOLUTION OF APPROXIMATELY 4 KM AT NADIR AND WAS CAPABLE OF YIELDING RADIANCE TEMPERATURES BETWEEN 185 AND 330 K TO AN ACCURACY OF +4 AND -1 K, RESPECTIVELY. ALL OPERATIONAL DATA FROM THIS EXPERIMENT WERE HANDLED BY NOAA AND EVENTUALLY ARCHIVED AT THE NATIONAL CLIMATIC CENTER, ASHVILLE, NORTH CAROLINA. IDENTICAL EXPERIMENTS WERE FLOWN ON ITOS-D, -E, AND -F.

----- NOAA 4, WILLIAMS-----

INVESTIGATION NAME- SOLAR PROTON MONITOR
NSSDC ID- 74-089A-01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION
THIS EXPERIMENT CONTINUES THE ITOS SERIES OF JHU/APL EXPERIMENTS, WHICH ARE ALL THE SAME THROUGH ITOS-F. THREE SOLID-STATE DETECTORS MONITOR THE OMNIDIRECTIONAL FLUXES OF SOLAR PROTONS WITH ENERGIES ABOVE 10, 30, AND 60 MEV, RESPECTIVELY. TWO TELESCOPES CONSISTING OF SOLID-STATE DETECTORS EACH MEASURE DIRECTIONAL FLUXES OF PROTONS BETWEEN 3.27 MEV AND 3.2 MEV (IN THREE INTERVALS), PROTONS BETWEEN 3.2 AND 60 MEV, PROTONS ABOVE 60 MEV, AND ALPHA PARTICLES BETWEEN 12.5 AND 32 MEV. IN THE POLAR CAP REGION, WHICH IS OF THE GREATEST INTEREST, THE TELESCOPES VIEW PARALLEL TO, AND PERPENDICULAR TO, THE LOCAL MAGNETIC FIELD DIRECTION. AN ADDITIONAL SOLID STATE DETECTOR MEASURES DIRECTIONAL FLUXES OF ELECTRONS OF ENERGIES GREATER THAN 140 KEV. THIS DETECTOR LOOKS IN A DIRECTION PERPENDICULAR TO THE ORBIT PLANE.

***** NOAA 5*****

SPACECRAFT COMMON NAME- NOAA 5
ALTERNATE NAMES- ITOS-H, C9057

NSSDC ID- 76-077A
LAUNCH DATE- 07/29/76 WEIGHT- 336. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/30/76
ORBIT PERIOD- 116.2 MIN INCLINATION- 102.1 DEG
PERIAPSIS- 1532. KM ALT APOAPSIS- 1520. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - A. BUTERA NOAA-NESS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - I.L. GOLDBERG NASA-GSFC

BRIEF DESCRIPTION
NOAA 5 WAS ONE IN A SERIES OF IMPROVED TIROS-M TYPE SATELLITES LAUNCHED WITH NEW METEOROLOGICAL SENSORS ON BOARD TO EXPAND THE OPERATIONAL CAPABILITY OF THE ITOS (NOAA) SYSTEM. THE PRIMARY OBJECTIVES OF THE NOAA 5 (ITOS-H) METEOROLOGICAL SATELLITE WERE TO PROVIDE GLOBAL DAYTIME AND NIGHT TIME DIRECT READOUT CLOUDCOVER DATA ON A DAILY BASIS. THE SUN-SYNCHRONOUS SPACECRAFT WAS CAPABLE OF SUPPLYING GLOBAL ATMOSPHERIC TEMPERATURE SOUNDINGS AND VERY HIGH RESOLUTION INFRARED CLOUDCOVER DATA OF SELECTED AREAS IN EITHER A DIRECT READOUT OR A TAPE RECORDER MODE. A SECONDARY OBJECTIVE WAS TO OBTAIN GLOBAL SOLAR PROTON DENSITY DATA ON A ROUTINE, DAILY BASIS. THE

PRIMARY SENSORS CONSISTED OF A VERY HIGH RESOLUTION RADIOMETER (VHRR), A VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR), AND A SCANNING RADIOMETER (SR). THE VHRR, VTPR, AND SR WERE MOUNTED ON THE SATELLITE BASEPLATE WITH THEIR OPTICAL AXES DIRECTED VERTICALLY EARTHWARD. THE NEARLY CUBICAL SPACECRAFT MEASURED 1 X 1 X 1.2 M. THE SATELLITE WAS EQUIPPED WITH THREE CURVED SOLAR PANELS THAT WERE FOLDED DURING LAUNCH AND DEPLOYED AFTER ORBIT WAS ACHIEVED. EACH PANEL MEASURED OVER 4.2 M IN LENGTH WHEN UNFOLDED AND WAS COVERED WITH 3420 SOLAR CELLS, EACH MEASURING 2 X 2 CM. THE ITOS DYNAMICS AND ATTITUDE CONTROL SYSTEM MAINTAINED DESIRED SPACECRAFT ORIENTATION THROUGH GYROSCOPIC PRINCIPLES INCORPORATED INTO THE SATELLITE DESIGN. EARTH ORIENTATION OF THE SATELLITE BODY WAS MAINTAINED BY TAKING ADVANTAGE OF THE PRECESSION INDUCED FROM A MOMENTUM FLYWHEEL SO THAT THE SATELLITE BODY PRECESSION RATE OF ONE REVOLUTION PER ORBIT PROVIDED THE DESIRED 'EARTH LOOKING' ATTITUDE. MINOR ADJUSTMENTS IN ATTITUDE AND ORIENTATION WERE MADE BY MEANS OF MAGNETIC COILS AND BY VARYING THE SPEED OF THE MOMENTUM FLYWHEEL. THE SATELLITE WAS PLACED IN A SUN-SYNCHRONOUS ORBIT WITH EQUATORIAL CROSSING OF THE ASCENDING NODE NEAR 0330 A.M. LOCAL TIME.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- VERY HIGH RESOLUTION RADIOMETER (VHRR)
NSSDC ID- 76-077A-01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE ITOS-H VERY HIGH RESOLUTION RADIOMETER (VHRR) WAS CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME EARTH CLOUDCOVER PICTURES ON A REGULAR DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL SCANNING INSTRUMENT OPERATED IN BOTH REAL-TIME AND TAPE RECORDER MODES. THE FOUR-CHANNEL UNIT USED THE FOLLOWING SPECTRAL WAVELENGTHS -- CHANNEL 1 - 0.5 TO 0.7 MICROMETERS (VISIBLE), CHANNEL 2 - 0.75 TO 1.00 MICROMETERS (NEAR IR), CHANNEL 3 - 10.5 TO 12.5 MICROMETERS (IR WINDOW), AND CHANNEL 4 - 6.5 TO 7.0 MICROMETERS (WATER VAPOR). THE VISIBLE, NEAR IR, AND IR WINDOW CHANNELS HAD A GROUND RESOLUTION OF 1 KM. THE RESOLUTION OF THE WATER VAPOR CHANNEL WAS SOMEWHAT LESS -- ABOUT 4 KM AT NADIR. EACH CHANNEL HAD ITS OWN ELECTRONICS PACKAGE CONSISTING OF AN AMPLIFIER, AN ANALOG-TO-DIGITAL CONVERTER, AND OTHER AUXILIARY ELECTRONICS. IDENTICAL EXPERIMENTS WILL BE FLOWN ON ITOS-I AND -J.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)
NSSDC ID- 76-077A-02 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR) SUBSYSTEM WAS DESIGNED TO MAKE RADIANCE MEASUREMENTS IN THE 15-MICROMETER CO2 BAND THAT PERMIT SOUNDING OF THE VERTICAL TEMPERATURE PROFILE FROM THE EARTH'S SURFACE TO AN ALTITUDE OF 30 KM OVER EVERY PART OF THE EARTH AT LEAST TWICE DAILY. A 12-MICROMETER CLEAR WINDOW RADIANCE MEASUREMENT AND A 19-MICROMETER WATER VAPOR BAND WERE USED IN CONJUNCTION WITH SIX CO2 BAND MEASUREMENTS TO EVALUATE THE AMOUNT OF CLOUDCOVER, AND MEASUREMENTS WERE MADE CONTINUOUSLY BOTH DAY AND NIGHT. THE VTPR DATA WERE RECORDED THROUGHOUT THE ORBIT AND WERE PLAYED BACK UPON COMMAND WHEN THE SATELLITE WAS OVER A COMMAND AND DATA ACQUISITION (CDA) STATION. THE VTPR SUBSYSTEM CONSISTED OF AN OPTICAL SYSTEM, A DETECTOR, AND ASSOCIATED ELECTRONICS. AS THE SATELLITE PROCEEDED IN ITS ORBIT THE RADIOMETER SCANNED THE EARTH'S SURFACE PLUS OR MINUS 31.45 DEG FROM NADIR IN 23 DISCRETE STEPS. AT EACH STEP A RADIOMETRIC MEASUREMENT WAS MADE SEQUENTIALLY IN EACH OF THE EIGHT SPECTRAL BANDS. IMAGE MOTION COMPENSATION WAS PROVIDED BY STAGGERING THE FIELD STOPS LOCATED ON THE FILTER WHEEL. THE ASSOCIATED ELECTRONICS PROCESSED THE SEQUENTIAL ANALOG DATA AND CONVERTED IT TO DIGITAL FORMAT FOR FURTHER PROCESSING BY THE DATA COLLECTION PLATFORM (DCP) FOR REAL-TIME TRANSMISSION AND/OR RECORDING.

----- NOAA 5, NESS STAFF-----

INVESTIGATION NAME- SCANNING RADIOMETER (SR)
NSSDC ID- 76-077A-03 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE SCANNING RADIOMETER (SR) SUBSYSTEM WAS A REDUNDANT RADIOMETER AND TAPE RECORDER COMBINATION DESIGNED TO PROVIDE THE FOLLOWING DATA -- (1) REAL-TIME DAYLIGHT CLOUD COVER INFORMATION IN THE 0.5- TO 1.0-MICROMETER REGION, TRANSMITTED OVER THE VHF DATA LINK, (2) REAL-TIME DAY AND NIGHT THERMAL RADIATION INFORMATION IN THE 10.5- TO 12.5-MICROMETER REGION TRANSMITTED OVER THE VHF DATA LINK, (3) GLOBAL CLOUD COVER INFORMATION STORED ON RECORDERS AND PLAYED BACK TO COMMAND AND DATA ACQUISITION (CDA) STATIONS VIA THE S-BAND DATA LINK, AND (4) GLOBAL THERMAL RADIATION INFORMATION STORED ON RECORDERS AND PLAYED BACK TO CDA STATIONS VIA THE S-BAND DATA LINK. THE SR SUBSYSTEM ELEMENTS INCLUDED TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR, AND THREE SR RECORDERS. MAJOR CONTROL AND TIMING FUNCTIONS WERE PROVIDED BY THE SATELLITE'S TIME-BASE AND COMMAND-DISTRIBUTION UNITS. AS THE SATELLITE PROCEEDED IN ITS ORBIT, THE RADIOMETER, ONCE COMMANDED ON, SCANNED THE EARTH'S SURFACE FROM HORIZON TO HORIZON WITH A CONTINUOUSLY ROTATING MIRROR. THE SCAN MIRROR WAS INCLINED BY 45 DEG TO ITS AXIS OF ROTATION, WHICH WAS COINCIDENT WITH THE SATELLITE'S VELOCITY VECTOR. THUS, THE OPTICAL AXIS SCANNED IN A PLANE PERPENDICULAR TO THE SATELLITE'S VELOCITY VECTOR. IN THE TIME REQUIRED FOR ONE COMPLETE MIRROR ROTATION, THE SATELLITE PROGRESSED APPROXIMATELY 7.4 KM ALONG THE ORBIT TRACK. AN ADJACENT AREA WAS THEN SCANNED AND SCANS WERE REPEATED THROUGHOUT THE ORBIT TO GENERATE A CONTINUOUS PICTURE.

----- NOAA 5, WILLIAMS-----

INVESTIGATION NAME- SOLAR PROTON MONITOR (SPM)

NSSDC ID- 76-C77A-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO CONTINUOUSLY MONITOR DIRECTIONAL FLUXES OF -- (1) PROTONS IN FIVE CONTIGUOUS INTERVALS BETWEEN 0.15 AND 40 MEV (INTERVAL THRESHOLDS OF 0.15, 0.30, 0.60, 1.5, AND 6.5 MEV), (2) PROTONS IN THE RANGES 40 TO 600 AND 600 TO 1000 MEV, (3) PROTONS ABOVE 1000 MEV, (4) ALPHA PARTICLES IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.6 AND 100 MEV (INTERVAL THRESHOLDS OF 0.60, 0.90, 1.4, 3.5, AND 11 MEV), (5) ALPHA PARTICLES BETWEEN 330 AND 600 MEV, (6) ALPHA PARTICLES ABOVE 600 MEV, AND (7) ELECTRONS ABOVE 250 KEV. OMNIDIRECTIONAL FLUXES OF PROTONS ABOVE 10, 30, AND 60 MEV WERE MONITORED.

***** OAO 3*****

SPACECRAFT COMMON NAME- OAO 3
ALTERNATE NAMES- PL-7C10, 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-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/21/72
ORBIT PERIOD- 99.7 MIN INCLINATION- 35.0 DEG
PERIAPSIS- 739. KM ALT APOAPSIS- 751. KM ALT

PERSONNEL
MG - M.E. MCDONALD NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - J.E. KUPPERIAN, JR. 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 THE 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 70 A. THE OAO-3 SPACECRAFT WAS AN OCTAGONALLY SHAPED, ALUMINUM STRUCTURE WITH A 1.21 M(48 IN.), 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(193 IN.). TWO INERTIAL BALANCE BOOMS, ONE FORWARD AND ONE AFT, EXTENDED APPROXIMATELY 6.8 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 BORESIGHT STAR TRACKER SENSITIVE TO THE SIXTH MAGNITUDE CONTROLLED PITCH AND YAW TO WITHIN 5 ARC-SEC. IN ADDITION, THE HIGH RESOLUTION TELESCOPE EXPERIMENT HAD A FINE POINTING CONTROL, WHICH COULD CONTROL THE PITCH AND YAW TO WITHIN ONE TENTH ARC-SEC. 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 (136.26 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 1280 COMMANDS. DATA WERE STORED IN AN ON-BOARD TAPE RECORDER AND IN CORE STORAGE. AN ON-BOARD PROCESSOR WAS CARRIED THAT MONITORED TELEMETRY DATA, THAT COULD ISSUE COMMANDS, AND THAT WAS PROGRAMMED VIA THE COMMAND RECEIVER UPLINK.

----- 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 U COLLEGE LONDON
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION

THIS EXPERIMENT USED THREE TELESCOPES AND A COLLIMATED PROPORTIONAL COUNTER TO OBSERVE COSMIC X-RAY SOURCES BETWEEN 1 AND 70 A. BETWEEN 1 AND 3 A, A PROPORTIONAL COUNTER LOCATED BEHIND A COLLIMATOR WAS USED IN CONJUNCTION WITH PULSE-SHAPE DISCRIMINATION TO REJECT BACKGROUND COUNTS. FROM 3 TO 9 A AND 6 TO 18 A, PROPORTIONAL COUNTERS LOCATED AT THE FOCUS OF TWO GRAZING-INCIDENCE REFLECTING TELESCOPES (5.5 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 20 AND 70 A. 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 PRINCETON U
OI - J. ROGERSON, JR. PRINCETON U

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVE OF THIS EXPERIMENT WAS TO MAKE QUANTITATIVE OBSERVATIONS OF THE INTERSTELLAR ABSORPTION LINES IN THE SPECTRAL REGION 1000 TO 3300 A. THE SECONDARY OBJECTIVE WAS TO OBSERVE THE UV SPECTRA OF SELECTED BRIGHTER STARS IN DETAIL. THE PRIME OPTICAL SYSTEM WAS AN 80-CM DIAM 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 SLIT, 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-SEC. THIS GUIDANCE SYSTEM LOCKED ONTO A STAR AS WEAK AS 7TH MAGNITUDE. THE OVERALL SYSTEM COULD MAKE USEFUL MEASUREMENTS ON O- AND B-TYPE STARS OF 7TH MAGNITUDE.

***** OSO 8*****

SPACECRAFT COMMON NAME- OSO 8
ALTERNATE NAMES- OSO-1, OSO-EYE
7310

NSSDC ID- 75-057A

LAUNCH DATE- 06/21/75 WEIGHT- 4280. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/22/75
ORBIT PERIOD- 95.7 MIN INCLINATION- 32.9 DEG
PERIAPSIS- 544. KM ALT APOAPSIS- 559. KM ALT

PERSONNEL
 HG - M.E. MCDONALD NASA HEADQUARTERS
 SC - D. BOHLIN NASA HEADQUARTERS
 PM - J.E. KUPPERIAN, JR. NASA-GSFC
 PS - R. THOMAS NASA-GSFC

BRIEF DESCRIPTION
 THE OBJECTIVES OF THE OSO SATELLITE SERIES WERE TO PERFORM SOLAR PHYSICS EXPERIMENTS ABOVE THE ATMOSPHERE DURING A COMPLETE SOLAR CYCLE AND TO MAP THE ENTIRE CELESTIAL SPHERE FOR DIRECTION AND INTENSITY OF UV LIGHT, X-RAY RADIATION, AND GAMMA RADIATION. THE OSO 8 PLATFORM CONSISTED OF A SAIL SECTION, WHICH POINTED TWO EXPERIMENTS CONTINUALLY TOWARD THE SUN, AND A WHEEL SECTION, WHICH SPUN ABOUT AN AXIS PERPENDICULAR TO THE POINTING DIRECTION OF THE SAIL AND CARRIED FIVE EXPERIMENTS. GAS JETS AND A MAGNETIC TORQUING COIL PERFORMED ATTITUDE ADJUSTMENT. POINTING CONTROL PERMITTED THE POINTED EXPERIMENTS TO SCAN THE REGION OF THE SOLAR DISK IN A 40- BY 40-ARC-MIN TO 60- BY 60-ARC-MIN RASTER PATTERN. IN ADDITION, THE POINTED SECTION WAS CAPABLE OF BEING COMMANDED TO SELECT AND SCAN A 1- BY 1-ARC-MIN OR 5- BY 5-ARC-MIN REGION ANYWHERE ON THE SOLAR DISK. DATA WERE SIMULTANEOUSLY RECORDED ON TAPE AND TRANSMITTED BY PCM/PM TELEMETRY. A COMMAND SYSTEM PROVIDED FOR AT LEAST 512 GROUND-BASED COMMANDS.

----- OSO 8, ACTON-----

INVESTIGATION NAME- MAPPING X-RAY HELIOMETER
 NSSDC ID- 75-C57A-04 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS

PERSONNEL
 PI - L.W. ACTON LOCKHEED PALO ALTO
 OI - J.L. CULHANE U COLLEGE LONDON
 OI - R.C. CATURA LOCKHEED PALO ALTO

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED THE LOCATION, SPECTRUM, AND INTENSITY OF MODERATE ENERGY X RAYS (2 TO 30 KEV) FROM INDIVIDUAL SOLAR ACTIVE REGIONS (INCLUDING FLARING REGIONS) AND FROM EXTRASOLAR X-RAY SOURCES. THE INSTRUMENT CONSISTED OF THREE X-RAY COLLIMATOR-DETECTOR SYSTEMS, A POWER SUPPLY, AND A DATA ACCUMULATION/READOUT SYSTEM. THE COLLIMATORS WERE IDENTICAL BUT ORIENTED DIFFERENTLY AND HAD FIELDS OF VIEW OF 2.1 ARC-MIN BY 10 DEG, FWHM. ONE COLLIMATOR WAS ORIENTED SO THAT THE 2.1 ARC-MIN FIELD OF VIEW WAS PARALLEL TO THE SPACECRAFT SPIN AXIS. THE OTHER TWO COLLIMATORS WERE INCLINED PLUS AND MINUS 6J DEG RELATIVE TO THE SPIN AXIS. THE DETECTORS WERE PROPORTIONAL COUNTERS OF VARIOUS AREAS AND WINDOW THICKNESSES ALLOWING A WIDE DYNAMIC RANGE OF ACTIVITY TO BE OBSERVED.

----- OSO 8, BARTH-----

INVESTIGATION NAME- HIGH-RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS
 NSSDC ID- 75-057A-01 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS

PERSONNEL
 PI - C.A. BARTH U OF COLORADO
 OI - E.C. BRUNER, JR. LOCKHEED PALO ALTO
 OI - R.G. ATHAY HIGH ALTITUDE OBS

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED SOLAR ULTRAVIOLET LINES BETWEEN 1050 AND 2300 A AND THEIR VARIATION WITH TIME AND POSITION ON THE DISK. SPECTROHELIOGRAMS WERE ALSO GENERATED AT SELECTED WAVELENGTHS. THE INSTRUMENT CONSISTED OF AN EXTENDED FOCAL LENGTH CASSEGRAIN TELESCOPE, AN EBERT MONOCHROMATOR, AND A SMALL COMPUTER. THE TELESCOPE FOCUSED SUNLIGHT ON THE ENTRANCE SLIT (VARIABLE FROM 1 BY 5 ARC-S TO 1 ARC-S BY 15 ARC-MIN) OF THE MONOCHROMATOR. THE 3600 LINES/MM GRATING IN THE MONOCHROMATOR WAS USED IN SECOND ORDER. THE GRATING DRIVE MECHANISM WAS CAPABLE OF BEING PROGRAMMED TO SCAN -- (1) THE ENTIRE SPECTRUM, (2) SELECTED PORTIONS OF THE SPECTRUM, OR (3) SELECTED SINGLE WAVELENGTHS. TWO PHOTOMULTIPLIER TUBES, ONE COVERING THE RANGE FROM 1400 TO 2300 A AND THE OTHER COVERING WAVELENGTHS LESS THAN 1400 A, DETECTED THE RADIATION. THE SMALL COMPUTER CONTAINED WITHIN THE EXPERIMENT CONTROLLED THE EXPERIMENT AND ALLOWED FLEXIBLE OBSERVING PROGRAMS THROUGH AUTOMATED, DATA-DEPENDENT OBSERVING SEQUENCES.

----- OSO 8, BONNET-----

INVESTIGATION NAME- CHROMOSPHERE FINE-STRUCTURE STUDY
 NSSDC ID- 75-C57A-02 INVESTIGATIVE PROGRAM
 CODE ST/CO-OP
 INVESTIGATION DISCIPLINE(S)
 SOLAR PHYSICS

PERSONNEL
 PI - R.M. BONNET CNRS-SA
 OI - P. LEMAIRE CNRS-LPSP
 OI - A. VIDAL-MADJAR CNRS-SA
 OI - J.C. VIAL CNRS-SA

BRIEF DESCRIPTION
 THE EXPERIMENT WAS DESIGNED TO MEASURE SOLAR CHROMOSPHERIC SPATIAL AND WAVELENGTH STRUCTURE FOR THE FOLLOWING SPECTRAL LINES IN THE 1000-A TO 4000-A REGION -- LYMAN-ALPHA, LYMAN-BETA, THE H AND K LINES OF MAGNESIUM II, AND THE H AND K LINES OF CALCIUM II. THE INSTRUMENT, WHICH WAS COMPOSED OF A CASSEGRAIN TELESCOPE AND A GRATING SPECTROMETER, WAS CAPABLE OF OPERATING IN TWO MODES -- (1) IT COULD HOLD A FIXED SOLAR LOCATION AND SCAN THE SPECTRAL LINES, (2) IT COULD SIMULTANEOUSLY FIX ON THREE OF THE SIX SPECTRAL LINES AND SCAN A 1-ARC-MIN BY 1-ARC-MIN REGION OF THE SOLAR DISK. THE INSTRUMENT WAS CAPABLE OF ANGULAR RESOLUTIONS FROM 1 BY 1 ARC-S TO 1 BY 40 ARC-S AND A SPECTRAL RESOLUTION OF 0.02 A (EXCEPT LYMAN BETA, 0.06A). INSTRUMENT SEQUENCING WAS CONTROLLED BY GROUND COMMAND ONLY.

----- OSO 8, FROST-----

INVESTIGATION NAME- HIGH-ENERGY CELESTIAL X RAYS
 NSSDC ID- 75-057A-07 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - K.J. FROST NASA-GSFC
 OI - B.R. DENNIS NASA-GSFC

BRIEF DESCRIPTION
 THE PURPOSE OF THIS EXPERIMENT WAS TO MEASURE THE ENERGY SPECTRA OF ALL KNOWN X-RAY SOURCES ABOVE THE INTENSITY THRESHOLD OF 1.E-6 PHOTONS/CM-SQ-S-KEV IN THE ENERGY REGION .01 TO 1 MEV. THE INSTRUMENT CONSISTED OF 57-CM-SQ CSI (SODIUM) SCINTILLATION CRYSTALS SURROUNDED BY A HONEYCOMB-TYPE CSI (SODIUM) ANTICOINCIDENCE COLLIMATOR, THAT PROVIDED AN ACCEPTANCE ANGLE OF 6.30 DEG FROM THE VIEWING AXIS. THE INSTRUMENT WAS MOUNTED ON THE OSO WHEEL SECTION NEARLY PARALLEL TO THE SATELLITE SPIN AXIS.

----- OSO 8, KRAUSHAAR-----

INVESTIGATION NAME- SOFT X-RAY BACKGROUND RADIATION INVESTIGATION
 NSSDC ID- 75-057A-05 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL
 PI - W.L. KRAUSHAAR U OF WISCONSIN
 OI - A.N. BUNNER U OF WISCONSIN

BRIEF DESCRIPTION
 THE EXPERIMENT WAS DESIGNED TO MEASURE GALACTIC LATITUDE DEPENDENCE OF THE X-RAY BACKGROUND RADIATION IN THE 0.150- TO 45-KEV REGION, EMPHASIZING THE SOFT X-RAY PORTION. TWO SETS OF THREE PROPORTIONAL COUNTERS MOUNTED ON THE OSO WHEEL VIEWED PARALLEL AND ANTIPARALLEL TO THE WHEEL SPIN DIRECTION THROUGH A 3.5- BY 3.5-DEG (FULL-WIDTH, HALF-MAXIMUM) COLLIMATOR. SENSITIVITY WAS EXPECTED TO BE ABOUT 1 PERCENT STATISTICAL ACCURACY NEAR THE GALACTIC POLES, AND ENERGY RESOLUTION WAS PROVIDED BY SELECTED FILTERS. SINCE TWO OF THE COUNTERS HAD THIN POLYCARBONATE WINDOWS THROUGH WHICH METHANE DIFFUSED, A HIGH PRESSURE METHANE RESERVOIR CARRIED ON THE SPACECRAFT REPLENISHED THOSE COUNTERS THROUGH A GAS FLOW SYSTEM.

----- OSO 8, NOVICK-----

INVESTIGATION NAME- HIGH-SENSITIVITY CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS
 NSSDC ID- 75-057A-03 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 SOLAR PHYSICS

PERSONNEL
 PI - R. NOVICK COLUMBIA U
 OI - J.R. ANGEL U OF ARIZONA
 OI - P.A. VANDENBOUT COLUMBIA U
 OI - M. WEISSKOPF COLUMBIA U
 OI - R.S. WOLFF COLUMBIA U

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MONITOR CONTINUOUSLY THE SUN'S EMISSION IN THE 2-8 KEV RANGE, TO OBTAIN COMPLETE SOLAR SPECTRA OF THE SUN EVERY 10 SECONDS DURING FLARES, TO OBTAIN HIGH RESOLUTION SPECTRA OF MANY CELESTIAL X-RAY OBJECTS, AND TO MEASURE THE POLARIZATION OF X-RAY EMISSION FROM STELLAR SOURCES. THIS INSTRUMENT PACKAGE IS MOUNTED IN THE WHEEL SECTION. THE SPECTROMETER IS ORIENTED PERPENDICULAR TO THE SPIN AXIS AND USES LARGE AREA PANELS OF CRYSTALS (1100 SQ CM OF

ORIGINAL PAGE IS
 OF POOR QUALITY

GRAPHITE, 194 SQ CM OF PET) TO REFLECT, VIA BRAGG REFLECTION, MONOCHROMATIC SOLAR X RAYS INTO PROPORTIONAL COUNTER DETECTORS. THE POLARIMETER WAS ORIENTED PARALLEL TO THE SPIN AXIS AND UTILIZED BRAGG ANGLE REFLECTION TO MEASURE POLARIZATION IN X RAYS FROM CELESTIAL SOURCES.

----- OSO 8, SERLEMITSOS-----

INVESTIGATION NAME- COSMIC X-RAY SPECTROSCOPY

NSSDC ID- 75-057A-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - P.J. SERLEMITSOS	NASA-GSFC
O1 - E.A. BOLDT	NASA-GSFC
O1 - S.S. HOLT	NASA-GSFC
O1 - D. SCHWARTZ	SAO

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE SPECTRA OF SOURCES AND THE DIFFUSE COSMIC X-RAY BACKGROUND IN THE ENERGY RANGE 2 TO 60 KEV AND TO MEASURE INTENSITY VARIATIONS AND POSSIBLE EMISSION LINES OF DISCRETE X-RAY SOURCES. PROPORTIONAL CHAMBERS (MULTI-ANODE PROPORTIONAL COUNTERS) ARE USED AS DETECTORS. ONE DETECTOR COMPONENT, CONSISTING OF A PROPANE-NEON FILLED CHAMBER AND A XENON-METHANE FILLED CHAMBER (240 SQ CM) WAS LOCATED BEHIND A 5-DEG COLLIMATOR AND ORIENTED PARALLEL TO THE SPACECRAFT SPIN AXIS. A SINGLE-VOLUME, ARGON-METHANE FILLED CHAMBER (75 SQ CM) WAS LOCATED BEHIND A 3-DEG COLLIMATOR AND WAS OFFSET SLIGHTLY FROM ANTI-PARALLEL TO THE SPIN AXIS. A XENON-METHANE FILLED CHAMBER (270 SQ CM) WAS LOCATED BEHIND A 5-DEG COLLIMATOR AND WAS ORIENTED ANTI-PARALLEL TO THE SPIN AXIS. DATA WERE ACCUMULATED IN A BUFFER MEMORY FOR 1-MIN INTERVALS, THE DATA FROM THE OFFSET DETECTOR BEING SECTORED IN AZIMUTH.

----- OSO 8, WELLER, JR.-----

INVESTIGATION NAME- EUV FROM EARTH AND SPACE

NSSDC ID- 75-057A-08 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - C.S. WELLER, JR.	US NAVAL RESEARCH LAB
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BRIEF DESCRIPTION

THIS EXPERIMENT, MOUNTED IN THE WHEEL SECTION, OBTAINED SPATIAL AND TEMPORAL MEASUREMENTS OF EXTREME ULTRAVIOLET (EUV) EMISSIONS OF HYDROGEN, HELIUM, AND OXYGEN IN THE EARTH'S ATMOSPHERE AND IN INTERPLANETARY AND GALACTIC SPACE. THREE PHOTOMETERS WERE DESIGNED TO MEASURE EUV RESONANCE RADIATION IN VARIOUS WAVELENGTHS FROM 170 TO 1080 A AND IN PORTIONS OF THE 1125- TO 1230-A BAND. EACH PHOTOMETER CONSISTED OF A CONTINUOUS-CHANNEL ELECTRON MULTIPLIER USED AS A PHOTON DETECTOR, TOGETHER WITH A THIN METAL FILM OR A MAGNESIUM FLUORIDE-OXYGEN CELL TO SERVE AS OPTICAL BANDPASS FILTERS. THERE WERE FOUR SUCH BANDPASS FILTERS -- (1) A THIN FILM OF 1000-A-THICK ALUMINUM AND 500-A-THICK CARBON (BANDWIDTH OF 170 TO 440 A), (2) A THIN FILM OF 1000-A-THICK ALUMINUM (BANDWIDTH OF 170 TO 800 A), (3) A THIN FILM OF 1500-A-THICK INDIUM (BANDWIDTH OF 730 TO 1080 A), AND (4) A CELL WITH A MAGNESIUM FLUORIDE WINDOW (BANDWIDTH OF 1130 TO 1500 A). THESE BANDPASS FILTERS WERE MOUNTED ON A WHEEL IN FRONT OF THE PHOTON DETECTORS AND WERE ROTATED AT REGULAR INTERVALS TO CHANGE THE FILTERS. THIS MADE THREE OF THE INDICATED WAVELENGTH RANGES OPERATIONAL AT ANY GIVEN TIME. THE INSTRUMENT WAS MOUNTED WITH THE PHOTOMETER AXES AT A SMALL ANGLE TO THE SATELLITE-SUN LINE AND WITH SUFFICIENT BAFFLING THAT THE PHOTOMETERS WOULD NEVER "SEE" THE SUN.

***** 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-055

ORBIT PARAMETERS

ORBIT TYPE- HELIOCENTRIC	EPOCH DATE- 07/15/75
ORBIT PERIOD- 311.1 DAYS	INCLINATION- 0.168 DEG
PERIAPSIS- 0.813 AU RAD	APOAPSIS- 0.983 AU RAD

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

PIONEER 6 WAS THE FIRST IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, AND 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 SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL

PI - J.D. ANDERSON	NASA-JPL
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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 STATION EQUIPMENT TO OBTAIN DOPPLER MEASUREMENTS.

----- PIONEER 6, ANDERSON-----

INVESTIGATION NAME- RELATIVITY INVESTIGATION

NSSDC ID- 65-105A-10 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS

PERSONNEL

PI - J.D. ANDERSON	NASA-JPL
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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 TRANSPONDER 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 SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H.S. BRIDGE
 OI - A.J. LAZARUS
 OI - F. SCHERB

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 97 AND 1580 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 (BOTH 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-SEC GROUP OF MEASUREMENTS VARIED 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.Y. FAN
 OI - J.A. SIMPSON
 OI - J.E. LAMPORT

U OF ARIZONA
 U OF CHICAGO
 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. 294 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 01 OUTPUT (128 CHANNEL) AND 03 OUTPUT (32 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. FOR FURTHER DETAILS, SEE FAN ET AL, JGR, 73, 1555, 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 IS TO EXPLORE THE STRUCTURE OF THE CORONA AND SOLAR EVENTS BY USING TELEMETRY SIGNALS AND THEIR SPECTRAL LINE BROADENING AS THEY PASS THROUGH THE SOLAR CORONA AND APPROACH THE SUN'S LIMB DURING SUPERIOR CONJUNCTION OCCULTATION. NORMALLY THE SIGNALS CONSIST OF VERY NARROW-BAND (MONOCHROMATIC) AND SPECTRALLY PURE CARRIER WAVES AND A SET OF MODULATION SIDE BANDS. THE CARRIER WAVE FREQUENCY IS NOMINALLY 2295 HZ AND THE SIDE BANDS ARE SEPARATED BY MULTIPLES OF 2 KHZ AND ARE REMOVED BY FILTERING. DATA ARE COLLECTED IN THE FORM OF SPECTROGRAMS, EACH CONSISTING OF A 15-MIN OBSERVATION. THE THREE PARAMETERS OF INTEREST ARE THE SIGNAL POWER, CENTER FREQUENCY, AND BANDWIDTH. THE INSTRUMENTATION CONSISTS OF THE SPACECRAFT S-BAND TELEMETRY SYSTEM AND JPL'S 64-M RECEIVER ANTENNA, WHICH HAS A BEAMWIDTH OF ONLY 0.14 DEG AT 2300 MHZ (S-BAND). IT IS EXTREMELY SENSITIVE, HAVING AN EQUIVALENT NOISE TEMPERATURE OF ONLY 25 K. THE RECEIVER IS TUNED CONTINUOUSLY ACCORDING TO AN EPHEMERIS, WITH AN ACCURACY TO 0.05 HZ. THIS IS NECESSARY IN ORDER TO COMPENSATE FOR FREQUENCY SHIFTS RESULTING FROM ORBITAL VELOCITIES OF THE SPACECRAFT AND EARTH'S SPIN. THE FREQUENCY BANDWIDTH IS 100 HZ FOR EACH SPECTRUM, DEFINED BY A FILTER AT THE LAST STAGE OF THE RECEIVER. FREQUENCY RESOLUTION IS 0.2 HZ OVER THE 150-HZ BANDWIDTH.

----- PIONEER 6, LEVY-----

INVESTIGATION NAME- SUPERIOR CONJUNCTION FARADAY ROTATION

NSSDC ID- 65-105A-06

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 HIGH ENERGY ASTROPHYSICS

PERSONNEL

PI - G.S. LEVY

NASA-JPL

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED MEASUREMENTS OF THE POLARIZATION OF THE SPACECRAFT TELEMETRY SIGNAL TO OBTAIN MEASUREMENTS OF THE RELATIVE FARADAY ROTATION DUE TO THE INTERPLANETARY MEDIUM AND THE EARTH'S IONOSPHERE.

----- 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
 OI - W.C. BARTLEY
 OI - U.R. RAO

CSIRO
 NATL ACADEMY OF SCI
 ISSP, VSSC

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 (TL) SCINTILLATOR CRYSTAL THAT WAS SET INTO AN ANTICOINCIDENCE 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 123.8 TO 303.6 MEV. COUNTS IN THE TWO LOWER ENERGY WINDOWS WERE DUE MAINLY TO PROTONS WITH THE WINDOW ENERGIES, WHILE ONLY PARTICLES OF Z GREATER THAN OR EQUAL TO 2 CONTRIBUTED TO THE HIGHEST ENERGY WINDOW COUNT RATE. (PROTONS ABOVE 90 MEV GAVE ANTICOINCIDENCE 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 ANTICOINCIDENCE REQUIREMENT) WERE COUNTED, WAS ALSO USED. ACCUMULATION TIMES FOR EACH OF THE 12 DIRECTIONAL MODES AND FOR THE OMNIDIRECTIONAL MODE VARIED BETWEEN 14 S AND 112 S (SPACECRAFT SPIN PERIOD WAS ABOUT 1 S) DEPENDING ON THE TELEMETRY BIT RATE. SEE THE SPACECRAFT BRIEF DESCRIPTION (65-105A) FOR INFORMATION ON PERCENT TIME COVERAGE VS TIME. 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.H. 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 (512 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 (48 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 SEC). 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 SEC FOR A COMPLETE SET OF ION MEASUREMENTS AND 16 SEC FOR A COMPLETE SET OF ELECTRON MEASUREMENTS. AT 64 BPS, THE ION AND ELECTRON MEASUREMENTS WERE TAKEN AND TELEMETERED EVERY 84 SEC. AT 16 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 336 SEC. AT 8 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 672 SEC.

***** PIONEER 7*****

SPACECRAFT COMMON NAME- PIONEER 7
ALTERNATE NAMES- PIONEER-B, 02398

NSSDC ID- 66-075A

LAUNCH DATE- 08/17/66 WEIGHT- 138. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 02/12/76
ORBIT PERIOD- 402.9 DAYS INCLINATION- 0.098 DEG
PERIAPSIS- 1.009 AU RAD APOAPSIS- 1.125 AU RAD

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SG - A.G. OPP NASA HEADQUARTERS
PH - C.F. HALL NASA-ARC
PS - J.H. WOLFE NASA-ARC

BRIEF DESCRIPTION
PIONEER 7 WAS THE SECOND 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 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 APPROXIMATELY 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 USED FOR THE TWO HIGHEST BIT RATES. ANOTHER WAS USED FOR 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 (1) REAL TIME, (2) TELEMETRY STORE, (3) DUTY CYCLE STORE, AND (4) 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 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 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 7, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS
NSSDC ID- 66-075A-07 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE 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 IS 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 IS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATE THE EARTH. DATA ARE TRANSMITTED CONTINUOUSLY AND ARE RECEIVED AT GROUND-BASED DEEP SPACE NETWORK STATIONS WITH 26.5-M DIAMETER ANTENNAS AND WITH THE 64-M ANTENNA IN CALIFORNIA.

----- PIONEER 7, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY
NSSDC ID- 66-075A-05 INVESTIGATIVE PROGRAM
CODE SL
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 ISSP, VSSC

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 (TL) SCINTILLATOR CRYSTAL THAT WAS SET INTO AN ANTICOINCIDENCE PLASTIC SCINTILLATOR COLLIMATOR CUP. SEPARATE PHOTOMULTIPLIER TUBES VIEWED THE TWO SCINTILLATORS. PULSES FROM THE CSI CRYSTAL THAT WERE NOT ACCOMPANIED BY PULSES FROM THE PLASTIC SCINTILLATOR WERE SORTED BY A THREE-WINDOW PULSE HEIGHT ANALYZER, THE WINDOWS CORRESPONDING TO ENERGY DEPOSITIONS OF 7.2 TO 47.4, 47.4 TO 64.5, AND 64.5 TO 81.2 MEV. NO POSITIVE SPECIES IDENTIFICATION WAS MADE, ALTHOUGH MOST OF THE COUNTS IN EACH WINDOW WERE USUALLY DUE TO PROTONS WITH THE WINDOW ENERGIES. 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 EITHER NEAR A SECTOR BOUNDARY OR IN THE MIDDLE OF A SECTOR, DEPENDING ON THE OPERATING MODE. HOWEVER, WHEN LARGE FLUXES WERE ENCOUNTERED, EACH ANGULAR SECTOR WAS REDUCED TO 11.2 DEG, WITH THE SUN EITHER IN A SECTOR OR NEAR THE MIDPOINT BETWEEN TWO SECTORS. A SPIN-INTEGRATED (ISOTROPIC) MODE, IN WHICH ALL PARTICLES DEPOSITING 7.2 MEV IN THE CSI CRYSTAL (NO ANTICOINCIDENCE REQUIREMENT) WERE COUNTED, WAS ALSO USED. ACCUMULATION TIMES FOR EACH OF THE 12 DIRECTIONAL MODES AND FOR THE ONNIDIRECTIONAL MODE VARIED BETWEEN 14 AND 112 S (SPACECRAFT SPIN PERIOD WAS ABOUT 1 S) DEPENDING ON THE TELEMETRY BIT RATE. SEE BARTLEY ET AL., REV. SCI. INSTRUM., 38, PAGE 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 7, SIMPSON-----

INVESTIGATION NAME- COSMIC-RAY TELESCOPE
NSSDC ID- 66-075A-06 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - J.A. SIMPSON U OF CHICAGO
OI - C.Y. FAN U OF ARIZONA
OI - J.E. LAMPART 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 12.7 MEV, 12.7 TO 73.0 MEV, 73.0 TO 165 MEV, AND E.G.T. 165 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.5 TO 52 MEV, 52 TO 280 MEV, AND E.G.T. 280 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.

----- PIONEER 7, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER
NSSDC ID- 66-075A-03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - J.H. WOLFE NASA-ARC
OI - R.W. SILVA TRW SYSTEMS GROUP

BRIEF DESCRIPTION

A QUADRISPHERICAL ELECTROSTATIC ANALYZER WITH EIGHT CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF THE ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 16 LOGARITHMICALLY EQUISPACED ENERGY PER UNIT 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 ENERGY PER CHARGE STEPS RANGING FROM 0 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 (512 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 F/Q STEP. DURING 24 SUCCESSIVE OPERATIONS OF THE FULL SCAN MODE (48 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, 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 36 S. AT 8 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 672 S.

***** PIONEER 8*****

SPACECRAFT COMMON NAME- PIONEER 8
ALTERNATE NAMES- PIONEER-C, 03006

NSSDC ID- 67-123A

LAUNCH DATE- 12/13/67 WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 09/17/75
ORBIT PERIOD- 387.5 DAYS INCLINATION- G.057 DEG
PERIAPSIS- G.992 AU RAD APOAPSIS- 1.088 AU RAD

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

PIONEER 8 WAS THE THIRD IN A SERIES OF SOLAR-ORBITING, SPIN-STABILIZED, 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. ITS MAIN ANTENNA WAS A HIGH-GAIN DIRECTIONAL ANTENNA. THE SPACECRAFT WAS SPIN-STABILIZED AT ABOUT 63 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 WERE USED PRIMARILY FOR 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. THE THIRD WAS USED FOR DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT WAS USED MAINLY FOR ENGINEERING DATA. THE FOUR OPERATING MODES WERE (1) REAL TIME, (2) TELEMETRY STORE, (3) DUTY CYCLE STORE, AND (4) 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 8, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 67-123A-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE 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 IS 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 IS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATE THE EARTH. DATA ARE TRANSMITTED CONTINUOUSLY AND ARE RECEIVED AT GROUND-BASED DEEP SPACE NETWORK STATIONS WITH 26.5-M DIAMETER ANTENNAS AND WITH THE 64-M ANTENNA IN CALIFORNIA.

----- PIONEER 8, BERG-----

INVESTIGATION NAME- COSMIC DUST DETECTOR

NSSDC ID- 67-123A-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL
PI - O.E. BERG (RETIRED) NASA-GSFC
OI - L. SECRETAN (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, WHICH WAS MOUNTED IN THE EQUATOR OF THE SATELLITE WITH ITS AXIS RADIAL TO THE SATELLITE SPIN AXIS FACING IN THE ECLIPTIC PLANE, CONSISTED OF A FRONT FILM-GRID SENSOR ARRAY AND A REAR FILM-GRID SENSOR ARRAY, SPACED 5 CM APART, AND AN ACOUSTICAL IMPACT PLATE UPON WHICH THE REAR FILM WAS MOUNTED. THE SENSOR ARRAYS CONSISTED OF FOUR VERTICAL FILM STRIPS CROSSED BY FOUR HORIZONTAL GRID STRIPS TO FORM 16 FRONT AND 16 REAR FILM-GRID ARRAYS (EACH 2.5 CM SQ), CREATING 256 POSSIBLE COMBINATIONS. EACH GRID STRIP AND FILM STRIP WAS CONNECTED TO A SEPARATE OUTPUT AMPLIFIER WHOSE SIGNALS WERE USED TO DETERMINE THE SEGMENT IN WHICH AN IMPACT OCCURRED. THE FRONT FILM SENSOR, WHICH WAS RECESSED 3 CM INTO THE EXPERIMENT HOUSING, CONSISTED OF AN EIGHT-LAYER COMPOSITE -- 700-A PARYLENE ENCAPSULATION, 500-A COPPER, 300-A ALUMINUM, 3000-A PARYLENE SUBSTRATE, 300-A ALUMINUM, 500-A COPPER, SUPPORT MESH, AND 500-A PARYLENE ENCAPSULATION. EACH OF THE REAR SENSOR-ARRAY FILM STRIPS CONSISTED OF A 60-MICROMETER MOLYBDENUM SHEET CEMENTED TO A QUARTZ ACOUSTICAL SENSOR PLATE. THE OPERATION OF THE SENSORS WAS BASED ON TWO BASIC MEASURABLE PHENOMENA THAT OCCUR WHEN A HYPERVELOCITY PARTICLE IMPACTS ON A SURFACE -- (1) FORMATION OF PLASMA AND (2) TRANSFER OF MOMENTUM. WHEN THE FRONT FILM WAS PENETRATED BY A PARTICLE, A TIME-OF-FLIGHT 4-MHZ ELECTRONIC CLOCK WAS ACTIVATED. THE CLOCK WAS SHUT OFF WHEN THE PARTICLE IMPACTED ON THE REAR FILM THUS MEASURING PARTICLE SPEED AND DIRECTION. THREE GENERAL COSMIC DUST PARTICLE TYPES WERE DETECTABLE -- (1) HIGH-ENERGY, HYPERVELOCITY PARTICLES (GREATER THAN 1 ERG), WHICH PRODUCED RESPONSES AT BOTH FRONT AND REAR FILM SENSORS, (2) LOW-ENERGY, HYPERVELOCITY PARTICLES (LESS THAN 1 ERG), WHICH PRODUCED RESPONSES ONLY AT THE FRONT FILM SENSOR, AND (3) RELATIVELY LARGE HIGH-VELOCITY PARTICLES (GREATER THAN 0.1 NANOGRAMS), WHICH COULD PASS THROUGH THE FRONT AND REAR FILM SENSOR ARRAYS WITHOUT GENERATING A DETECTABLE PLASMA BUT COULD STILL IMPART A MEASURABLE IMPULSE TO THE ACOUSTICAL SENSOR. THE ACOUSTICAL SENSORS WERE DESIGNED TO PERFORM AN IN-FLIGHT STUDY ON THE RELIABILITY OF THE MICROPHONE AS A COSMIC DUST SENSOR IN ADDITION TO PERFORMING AS AN IMPACT SENSOR FOR THIS EXPERIMENT. IN-FLIGHT CALIBRATION WAS PROVIDED AND INITIATED BY GROUND COMMAND AND MONITORED THE EXPERIMENT ELECTRONICS IN ADDITION TO PROVIDING A CHECK ON THE PHYSICAL CONDITION OF THE PLASMA SENSORS. THE SENSORS WERE CALIBRATED PRIOR TO THE FLIGHT BY

IMPACTS WITH IRON SPHERES RANGING IN MASS FROM 1 NANOGRAM TO 0.1 PICOGRAM, ACCELERATED BY A 2-MV ELECTROSTATIC ACCELERATOR TO 2 TO 10 KM/S.

----- PIONEER 8, ESHLEMAN-----

INVESTIGATION NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 67-123A-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES
PARTICLES AND FIELDS
INTERPLANETARY DUST

PERSONNEL

PI - V.R. ESHLEMAN	STANFORD U
OI - T.A. CROFT	SRI INTERNATIONAL
OI - H.T. HOWARD	STANFORD U
OI - R.L. LEADABRAND	SRI INTERNATIONAL
OI - R.A. LONG	SRI INTERNATIONAL
OI - A.M. PETERSON	STANFORD U

BRIEF DESCRIPTION

BOTH 423.3-MHZ AND ITS 2/17 SUBHARMONIC 49.8-MHZ SIGNALS WERE TRANSMITTED FROM A 46-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 TELEMETRED TO THE GROUND STATION. FROM CALCULATED TOTAL ELECTRON CONTENT VALUES, THE IONOSPHERIC EFFECT (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. FOR SEMILAR EXPERIMENTS COVERING OTHER TIME PERIODS, SEE 68-100A-03, 66-075A-04, 65-105A-04, AND 67-060A-02. A MORE DETAILED DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN 'JGR,' 17, 3325-3327, AND IN 'RADIO SCIENCE,' 6, 55-63.

----- PIONEER 8, MCCracken-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 67-123A-05 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G. MCCracken	CSIRO
OI - U.R. RAO	ISSP, VSSC
OI - W.C. BARTLEY	HATL ACADEMY OF SCI

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTED OF A CSI SCINTILLATOR AND THREE SOLID-STATE TELESCOPES. THE CSI SCINTILLATOR WAS COLLIMATED BY AN ANTICOINCIDENCE PLASTIC SCINTILLATOR AND HAD A CONICAL APERTURE WITH A 38.2-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 MEAN VIEWING DIRECTIONS OF THE TELESCOPES WERE IN THE ECLIPTIC PLANE AND 48 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 7.4 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 40 MEV/NUCLEON (INTERVAL LOWER LIMITS AT 4.5, 7.0, 9.6, 13, 21, AND 26 MEV/NUCLEON), WHILE EACH OF THE SOLID-STATE TELESCOPES SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 1 TO 2, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV AND ALPHA PARTICLES IN THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 244-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 BUKATA ET AL, IEEE TRANS. NUC. SCI., NS-17, 18-24, 1970, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

----- PIONEER 8, NESS-----

INVESTIGATION NAME- SINGLE-AXIS MAGNETOMETER

NSSDC ID- 67-123A-01 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F. NESS	NASA-GSFC
OI - S.C. CANTARANO	U OF ROME
OI - F. MARIANI	SPACE PLASMA LAB

BRIEF DESCRIPTION

A SINGLE, BOOM-MOUNTED UNIAXIAL FLUXGATE MAGNETOMETER, WITH MODE-DEPENDENT RANGES OF PLUS OR MINUS 32 GAMMAS AND PLUS OR MINUS 96 GAMMAS AND CORRESPONDING RESOLUTIONS OF PLUS OR MINUS 0.125 GAMMA AND PLUS OR MINUS 0.375 GAMMA, OBTAINED A VECTOR MAGNETIC FIELD MEASUREMENT BY MEANS OF THREE MEASUREMENTS TAKEN AT EQUAL TIME INTERVALS DURING EACH SPACECRAFT SPIN PERIOD (APPROXIMATELY 1 S). AT TELEMETRY BIT RATES LESS THAN OR EQUAL TO 16 BPS, AVERAGES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH. FOR FURTHER DETAILS, SEE MARIANI AND NESS, JGR, 74, 5633, 1969.

----- PIONEER 8, SCARF-----

INVESTIGATION NAME- PLASMA WAVE DETECTOR

NSSDC ID- 67-123A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
OI - I.M. GREEN	TRW SYSTEMS GROUP

BRIEF DESCRIPTION

ELECTROSTATIC AND ELECTROMAGNETIC PLASMA WAVES WERE MEASURED IN THE SOLAR WIND NEAR 1 AU USING AN UNBALANCED DIPOLE ANTENNA. THE 423-MHZ STANFORD UNIVERSITY ANTENNA, WHICH SERVED AS THE SENSOR, WAS CAPACITIVELY COUPLED TO THREE CHANNELS. CHANNEL 1 WAS A 15 PERCENT BANDPASS FILTER CENTERED AT 400 HZ, A TYPICAL INTERPLANETARY ELECTRON CYCLOTRON FREQUENCY. CHANNEL 2 WAS A 15 PERCENT BANDPASS FILTER CENTERED AT 22 KHZ, A TYPICAL INTERPLANETARY ELECTRON PLASMA FREQUENCY. THE BROADBAND CHANNEL FROM 100 HZ TO 100 KHZ 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 IN 16 STEPS PER TELEMETRY SEQUENCE. THE TRIGGER LEVELS TOGETHER WITH THE COUNT RATE AT EACH LEVEL GAVE A MEASURE OF THE BROADBAND POWER SPECTRUM. ALMOST ALL OF THE TIME THIS MEASUREMENT AMOUNTS TO THE POWER SPECTRUM AT NEAR 100 HZ. AT THE HIGHEST TELEMETRY RATE OF PIONEER 8, THIS SEQUENCE WAS REPEATED EVERY 7.47 MIN.

----- PIONEER 8, WEBBER-----

INVESTIGATION NAME- COSMIC-RAY GRADIENT DETECTOR

NSSDC ID- 67-123A-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.R. WEBBER	U OF NEW HAMPSHIRE
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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 0.34 AND 8.4 MEV, PROTONS IN SIX CONTIGUOUS ENERGY INTERVALS BETWEEN 3.49 AND 64.3 MEV (ONE OF FIVE COUNT RATES WAS DUE TO THE SUM OF COUNTS IN TWO NONCONTIGUOUS ENERGY INTERVALS), AND ALPHA PARTICLES IN FOUR CONTIGUOUS ENERGY INTERVALS BETWEEN 6.64 AND 64.1 MEV/NUCLEON (ONE OF THREE COUNT RATES WAS DUE TO THE SUM OF COUNTS IN TWO NONCONTIGUOUS ENERGY INTERVALS). 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. AT LOW TELEMETRY BIT RATES ACCUMULATOR SATURATION RENDERED SOME COUNTING MODES TO BE OF NO VALUE. FOR FURTHER DETAILS, SEE J. GEOPHYS RES, 76, 1605, 1971.

----- PIONEER 8, WOLFE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER
NSSDC ID- 67-123A-02 , INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - J.H. WOLFE NASA-ARC
OI - D.D. MCKIBBIN 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 12 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 15 TO 85 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 62 S AND ONE SET OF ELECTRON MEASUREMENTS 36 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 28 S. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 S. AT 16 BPS, IT TOOK 1610 S, AND, AT 8 BPS, IT TOOK 3220 S.

***** PIONEER 9*****

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-D, PL-684K
35333
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-OS5
ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 02/27/76
ORBIT PERIOD- 297.6 DAYS INCLINATION- 0.086 DEG
PERIAPSIS- 0.754 AU RAD APOAPSIS- 0.990 AU RAD
PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PH - C.F. HALL NASA-ARC
PS - J.H. WOLFE 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 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 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 BPS. 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-06 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS

PERSONNEL
PI - J.D. ANDERSON NASA-JPL

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE 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 IS 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 IS PERPENDICULAR TO THE ECLIPTIC, RADIO SIGNALS FROM THE ANTENNA CONTINUOUSLY ILLUMINATE THE EARTH. DATA ARE TRANSMITTED CONTINUOUSLY AND ARE 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 SL
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 5 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 SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - V.R. ESHLEMAN STANFORD U
OI - T.A. CROFT SRI INTERNATIONAL
OI - H.T. HOWARD STANFORD U
OI - R.L. LEADABRAND SRI INTERNATIONAL
OI - R.A. LONG SRI INTERNATIONAL
OI - A.M. PETERSON STANFORD U

BRIEF DESCRIPTION

BOTH 423.3-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. FOR SIMILAR EXPERIMENTS FOR OTHER TIME PERIODS SEE 67-123A-03, 66-075A-04, 65-105A-G4, AND 67-060A-02. MORE DETAILED DESCRIPTIONS OF THE EXPERIMENT CAN BE FOUND IN J. GEOPHYS. RES., 71, 3325-3327, AND IN RADIO SCIENCE, 6, 55-63.

----- PIONEER 9, MCCRACKEN-----

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 68-100A-05

INVESTIGATIVE PROGRAM
CODE SL/CO-OPINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G. MCCRACKEN	CSIRO
OI - U.R. RAO	ISSP, VSSC
OI - W.C. BARTLEY	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 ANTICOINCIDENCE PLASTIC SCINTILLATOR AND HAD A CONICAL APERTURE WITH A 38.2-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 MEAN VIEWING DIRECTIONS OF THE TELESCOPES WERE IN THE ECLIPTIC PLANE AND 48 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 7.4 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 40 MEV/NUCLEON (INTERVAL LOWER LIMITS AT 4.5, 7.0, 9.6, 13, 21, AND 28 MEV/NUCLEON), WHILE EACH OF THE SOLID-STATE TELESCOPES SEPARATELY MEASURED PROTONS IN THE ENERGY RANGES 1 TO 3, 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 BUKATA 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

NSSDC ID- 68-100A-07

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L. SCARF	TRW SYSTEMS GROUP
OI - I.M. GREEN	TRW SYSTEMS GROUP
OI - G.M. CROOK	GAINES M. CROOK ASSOC
OI - R.W. FREDERICKS	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 HZ. 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-HZ 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 HZ. THE TELEMETRY SEQUENCE WAS REPEATED OVER TIME INTERVALS FROM 7 MIN 28 S TO 472 MIN 52 S.

----- PIONEER 9, SONETT-----

INVESTIGATION NAME- TRIAXIAL MAGNETOMETER

NSSDC ID- 68-100A-01

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.P. SONETT	U OF ARIZONA
OI - D.S. COLBURN	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 24 HR, 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 GAMMAS WITH A RESOLUTION OF PLUS OR MINUS 0.2 GAMMA, 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

NSSDC ID- 68-100A-06

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.R. WEBBER	U OF NEW HAMPSHIRE
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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 THOSE 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

NSSDC ID- 68-100A-02

INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H. WOLFE	NASA-ARC
OI - D.D. MCKIBBIN	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 12 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 85 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 62 S AND ONE SET OF ELECTRONS MEASUREMENTS 38 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 28 S. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 S. AT 16 BPS, IT TOOK 1610 S, AND, AT 8 BPS, IT TOOK 3220 S.

***** PIONEER 10*****

SPACECRAFT COMMON NAME- PIONEER 10
ALTERNATE NAMES- PIONEER-F, PL-7230
05860

NSSDC ID- 72-012A

LAUNCH DATE- 03/03/72 WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- JUPITER FLYBY

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PH - C.F. HALL NASA-ARC
PS - J.H. WOLFE 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 BODY WAS MOUNTED BEHIND A 2.74-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 STRUTS, 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 THERMONUCLEAR GENERATORS (RTG), WHICH WERE HELD ABOUT 3 M FROM 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. ALTITUDE 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 4.8 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 38 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 METEORIODS, SEALED PRESSURIZED CELLS OF

ARGON AND NITROGEN GAS FOR MEASURING THE PENETRATION OF METEORIODS, 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. 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 17 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. THUS, THE SE/C CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SP/C 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 (C3, SP/C, AND SE/C) WERE READ OUT THROUGH A COMMON ELECTROMETER. DUE TO A MALFUNCTION THAT OCCURRED BETWEEN LAUNCH AND JOVIAN ENCOUNTER, THESE THREE CHANNELS PRODUCED NO USEABLE 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 5 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-ANTTILA U OF ARIZONA
OI - C.E. KENKNIGHT 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 A, RED - 5800 TO 7000 A) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE-RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN SATELLITES. THE POLARIMETRIC AND RADIOMETRIC 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 RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN 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 RADIOMETRIC 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 MAXSUTOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC 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. (NOTE - THIS EXPERIMENT WAS ALSO ABOARD PIONEER 11.)

----- 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 U OF SOUTHERN CALIF

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, KINHARD-----

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04 INVESTIGATIVE PROGRAM CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 INTERPLANETARY DUST

PERSONNEL
 PI - W.H. KINHARD NASA-LARC
 OI - R.E. TURNER NASA-MSFC
 OI - J.M. ALVAREZ NASA-LARC
 OI - D.H. HUMES NASA-LARC
 OI - R.L. O'NEAL 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 M SQ. EACH PANEL OF GAS-FILLED CELLS CONSISTED OF A 1-MIL-THICK AND A 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 POCKET 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 1-MIL-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 HANOGRAM 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, KLIORÉ-----

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. KLIORÉ NASA-JPL
 OI - G. FJELDBO NASA-JPL
 OI - D.L. CAIN NASA-JPL
 OI - B.L. SEIDEL NASA-JPL
 OI - S.I. RASOOL NASA HEADQUARTERS

BRIEF DESCRIPTION
 THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 WATTS) 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.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 - J.H. TRAINOR NASA-GSFC
 OI - B.J. TEEGARDEN NASA-GSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTED OF THREE MULTIELEMENT 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 NODES. 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, MUNCH-----

INVESTIGATION NAME- INFRARED RADIOMETERS

NSSDC ID- 72-012A-08 INVESTIGATIVE PROGRAM CODE SL
 INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 PLANETARY ATMOSPHERES
 PLANETOLOGY

PERSONNEL
 PI - G. MUNCH CALIF INST OF TECH
 OI - G. NEUGEBAUER CALIF INST OF TECH
 OI - S.C. CHASE, JR. SANTA BARBARA RES CTR

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO MEASURE THE IRRADIANCE OF JUPITER'S ATMOSPHERE AND SURFACE IN TWO RANGES OF THERMAL (IR) WAVELENGTHS -- 14 TO 25 MICRONS AND 19 TO 56 MICRONS. THESE MEASUREMENTS PROVIDED DATA ON THE NET THERMAL ENERGY FLUX OF JUPITER AND ITS DEVIATION FROM A BLACKBODY SPECTRUM. IN ADDITION, DETAILED INFORMATION WAS PROVIDED ON THE ATMOSPHERIC THERMAL STRUCTURE AND CHEMICAL COMPOSITION OF THE PLANET. THE INSTRUMENTATION FOR THIS EXPERIMENT WAS SIMILAR TO THAT CARRIED ON THE MARINER MARS 1969 FLIGHTS BUT HAD HIGHER RESOLUTION. IT WAS A TWO-CHANNEL IR RADIOMETER EMPLOYING A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOCOUPLES, ILLUMINATED THROUGH APPROPRIATE OPTICS BY A 7.62-CM REFLECTING CASSEGRAIN TELESCOPE WITH A 1-DEG BY 0.3-DEG FIELD OF VIEW. ANALYSIS OF THE DATA WAS TO HELP RESOLVE -- (1) WHETHER JUPITER IS RADIATING A SIGNIFICANT AMOUNT OF INTERNAL ENERGY, (2) THE EXISTENCE OF A FROZEN METHANE POLAR CAP, (3) THE BRIGHTNESS TEMPERATURE ON THE DARK HEMISPHERE, AND (4) THE EXISTENCE OF THERMAL

DISCONTINUITIES IN THE ATMOSPHERE.

----- 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 U OF CHICAGO
OI - J.J. O'GALLAGHER U OF MARYLAND
OI - A. TUZZOLINO 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 62 MEV FOR PROTONS AND 10 TO 150 MEV/NUCLEON 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-SHIELD 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, SOBERMAN-----

INVESTIGATION NAME- ASTEROID/METEOROID ASTRONOMY

NSSDC ID- 72-012A-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY
INTERPLANETARY DUST

PERSONNEL

PI - R.K. SOBERMAN GENERAL ELECTRIC CO
OI - H.A. ZOOK NASA-JSC

BRIEF DESCRIPTION

THE OVERALL OBJECTIVE OF THIS EXPERIMENT WAS TO INVESTIGATE DUST PARTICLES AND METEORIODS IN INTERPLANETARY SPACE. IT WAS ESSENTIALLY TWO EXPERIMENTS, USING TWO DIFFERENT TECHNIQUES. ONE METHOD WAS TO DETECT PARTICLES BY THE REFLECTION OF LIGHT FROM THEM, AND THE OTHER METHOD WAS TO DETECT THEM BY THEIR IMPACTS. THE OBJECTIVES WERE TO DETERMINE DISTANCE, TRAJECTORY, VELOCITY, RELATIVE SIZE, AND FLUX OF PARTICLES RANGING IN SIZE FROM MINUTE PARTICLES A FEW METERS FROM THE TELESCOPE TO DISTANT ASTEROIDS. THE EQUIPMENT FOR THE DETECTION OF REFLECTION CONSISTED OF FOUR NON-IMAGING RITCHEY-CHRETIEN TELESCOPES WITH PRIMARY MIRRORS OF 20-CM (8 IN.) DIAMETER, AND 25-CM (10 IN.) FOCAL LENGTH, FIELDS OF VIEW (FOV) OF 0.2 RAD (8 DEG) EACH, SECONDARY OPTICS, AND A PHOTOMULTIPLIER TUBE. THE LATTER DETECTS THE REFLECTED LIGHT COLLECTED BY THE TELESCOPE. AN EVENT WAS RECORDED WHEN AT LEAST THREE OF THE FOUR TELESCOPES SAW THE OBJECT. ENTRY AND DEPARTURE TIMES OF THE LIGHT ENABLED DETERMINATION OF RANGE AND VELOCITY. THE EQUIPMENT FOR THE IMPACT MODE CONSISTED OF 13 PANELS CONTAINING 18 SEALED CELLS, PRESSURIZED WITH ARGON AND NITROGEN GAS, COVERING 0.65 SQ M (6.9 SQ FT) OF THE BACK OF THE MAIN ANTENNA DISH. PENETRATION BY A PARTICLE RESULTED IN LOSS OF GAS AT A RATE PROPORTIONAL TO THE HOLE, WHICH WOULD BE RELATED TO ITS MASS AND VELOCITY. PENETRATIONS WERE REGISTERED FROM PARTICLES AS SMALL AS .00000010 G.

----- 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, WEINBERG-----

INVESTIGATION NAME- ZODIACAL-LIGHT TWO-COLOR
PHOTOPOLARIMETRY

NSSDC ID- 72-012A-14 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
ZODIACAL LIGHT

PERSONNEL

PI - J.L. WEINBERG STATE U OF NEW YORK
OI - M.S. HANNER STATE U OF NEW YORK

BRIEF DESCRIPTION

THE IMAGING PHOTOPOLARIMETER (IPP) EXPERIMENT WAS USED TO OBTAIN MAPS OF THE ZODIACAL LIGHT DISTRIBUTION IN TWO COLORS, BLUE (3900 TO 4900 Å) AND RED (5800 TO 7000 Å). IN EACH COLOR, THE MAPS WERE CONSTRUCTED OUT OF THE INTEGRATED-DETECTOR-RESPONSE (1/64 OF A ROLL PERIOD), SPIN-SCAN POINT-IMAGING DATA OBTAINED BY VIEWING THROUGH A 40- BY 40-MRAD SQ FIELD-STOP APERTURE. THIS WORK WAS PERFORMED DURING THE CRUISE PORTION OF THE MISSION. DETAILED SIMULTANEOUS RADIOMETRIC AND POLARIMETRIC MAPS OF BOTH SKY COLORS WERE MADE AS THE SPACECRAFT SWEEPED OUT A 360-DEG CLOCK ANGLE SWATH, AND THE TELESCOPE AND OPTICS WERE STEPPED IN CONE ANGLE (THE ANGLE BETWEEN SPACECRAFT SPIN AXIS AND THE TELESCOPE OPTICAL AXIS). AT EACH DISCRETE CONE ANGLE, A 20-ROLL MEASUREMENT CYCLE OCCURRED, CONSISTING OF 10 ROLLS FOR THE ACCUMULATION OF THE DATA AND FOR CALIBRATION, ALTERNATED WITH 10-ROLL PERIODS USED FOR THE TELEMETRY OF THE DATA. DURING A DATA ROLL, THE SIGNALS FROM FOUR DETECTORS (2/COLOR) WERE INTEGRATED OVER A TIME INTERVAL EQUAL TO 1/64 OF THE ROLL PERIOD. THE FOUR CHANNELS PROVIDED SIMULTANEOUS MEASUREMENTS AT TWO ORTHOGONAL POLARIZATION AZIMUTHS IN THE TWO SPECTRAL BANDS. THE POLARIZATION WAS SAMPLED PARALLEL AND PERPENDICULAR TO THE PLANE CONTAINING THE SPACECRAFT SPIN AXIS AND THE OPTICAL AXIS OF THE TELESCOPE. RADIOACTIVE CALIBRATION WAS PROVIDED BY A RADIOISOTOPE-ACTIVATED PHOSPHOR SOURCE. ALL SUCH DATA WERE FORMATTED TO PRODUCE A SKY MAP, 360 DEG IN CLOCK ANGLE BY 141 DEG IN CONE ANGLE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUOTOV CATADIOPTRIC TELESCOPE (F/3.4), (2) A FOCAL PLANE WHEEL CONTAINING FIELD-OF-VIEW APERTURES, DEPOLARIZERS, CALIBRATION SOURCE, ETC., (3) A WOLLASTON PRISM TO SPLIT LIGHT INTO TWO ORTHOGONALLY POLARIZED BEAMS, (4) A 45-DEG DICHROMATIC MIRROR THAT REFLECTED WAVELENGTHS LESS THAN 5500 Å (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, 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 NASA-ARC
OI - L.A. FRANK U OF IOWA
OI - R. LUST MPI-HEADQUARTERS
OI - D.S. INTRILIGATOR U OF SOUTHERN CALIF
OI - D.D. MCKIBBIN NASA-ARC
OI - V.T. ZAVIENTSEFF NASA-ARC
OI - F.L. SCARF TRW SYSTEMS GROUP
OI - H.R. COLLARD NASA-ARC
OI - W.C. FELDMAN LOS ALAMOS SCI LAB
OI - Z.A. SMITH 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 0.1 TO 18 KEV FOR PROTONS AND APPROXIMATELY 1-500 EV FOR ELECTRONS. THE HIGH RESOLUTION ANALYZER WITH A COUNTOUT OF 9 KEV/Q 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+9/59 CM-S 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-OSS

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 MISSION WAS THE SECOND SPACE MISSION IN A SERIES TO INVESTIGATE JUPITER AND THE OUTER SOLAR SYSTEM. PIONEER 11, LIKE PIONEER 10, USED JUPITER'S GRAVITATIONAL FIELD TO ALTER ITS TRAJECTORY RADICALLY. ALTHOUGH IT TOO WILL ESCAPE THE SOLAR SYSTEM, IT WILL PASS CLOSE TO THE PLANET SATURN IN SEPTEMBER 1979. 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 WILL DECREASE TO 130 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. VELOCITY OF THE SPACECRAFT WAS INITIALLY ABOUT 51,500 KM/H (32,000 MI/H, 9 MI/S). 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, PRODUCE 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 ARE RECEIVED AT THE DEEP SPACE NETWORK. THE SPACECRAFT IS 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 PHOTOGRAPH 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 METEOROIDS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING PENETRATION OF METEOROIDS, 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, CONTAINS PLAQUES THAT HAVE DRAWINGS DEPICTING MAN, WOMAN, AND LOCATION OF THE SUN AND EARTH IN THE GALAXY.

----- 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
CELESTIAL MECHANICS

PERSONNEL
PI - M.H. ACUNA NASA-GSFC
OI - N.F. NESS NASA-GSFC

BRIEF DESCRIPTION
THIS INSTRUMENT, DESIGNED TO MEASURE THE JOVIAN MAGNETIC FIELD, CONSISTED OF A SINGLE-RANGE TRIAXIAL FLUXGATE MAGNETOMETER SENSOR AND ASSOCIATED ELECTRONICS CAPABLE OF MEASURING FIELDS FROM 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 GAMMAS FOR FIELDS LESS THAN 2 GAUSS. THESE ARE MADE ONE 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 SCIENTIFIC RESULTS CAN BE FOUND IN 'JGR,' 81, 2917, 1976.

----- PIONEER 11, ANDERSON-----

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 73-019A-09 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
ASTRONOMY

PERSONNEL
PI - J.D. ANDERSON NASA-JPL
OI - G.W. HULL 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 11, FILLIUS-----

INVESTIGATION NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 73-019A-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 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. THUS, THE SE 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 108 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. COFFEN	NASA-GISS
OI - J. HAMEEN-ANTTILA	U OF ARIZONA
OI - C.E. KENKNIGHT	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 JOVIAN ENCOUNTER TO MAKE SIMULTANEOUS, TWO COLOR (BLUE - 3900 TO 4900 A, RED - 5800 TO 7000 A) POLARIMETRIC AND RADIOMETRIC MEASUREMENTS, AND MODERATE RESOLUTION (ABOUT 200 KM AT BEST) SPIN-SCAN IMAGES OF JUPITER AND THE JOVIAN 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. THAT IS, PRIMARY RADIOMETRIC 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 MATSUOTO 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 A (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 S-11 PHOTOCATHODES, RED - S-20) PHOTOCATHODES TO REGISTER THE INTENSITY IN EACH POLARIZATION COMPONENT. (NOTE - THIS EXPERIMENT WAS ALSO ABOARD PIONEER 10.)

----- PIONEER 11, JUDGE-----

INVESTIGATION NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 73-019A-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.L. JUDGE	U OF SOUTHERN CALIF
OI - R.W. CARLSON	U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THIS EXPERIMENT, 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 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 METEOROIDS 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 2-MIL-THICK STAINLESS STEEL OUTER LAYER WELDED TO A 1-MIL-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 METEOROIDS TO BE DETERMINED. THE PANELS DETECTED IMPACTS, WITH PARTICLES HAVING A MASS OF GREATER THAN 1.E-8 GM. THE PANELS COVERED 0.46M SQ. 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 BOUNDRIES AND WITHIN THE ASTEROID BELT.

----- PIONEER 11, KLIORRE-----

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 73-019A-10 INVESTIGATIVE PROGRAM
PLANETARY

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J. KLIORRE	NASA-JPL
OI - G. FJELDBO	NASA-JPL
OI - D.L. CAIN	NASA-JPL
OI - B.L. SEIBEL	NASA-JPL
OI - S.I. RASOOL	NASA HEADQUARTERS

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED THE S-BAND (2292 MHZ, 8 WATTS) 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 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. YERGARDEN	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, MUNCH-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 73-019A-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL
 PI - G. MUNCH
 OI - R.W. BOESE
 OI - S.C. CHASE, JR.
 OI - A.P. INGERSOL
 OI - G. NEUGEBAUER
 OI - L.M. TRAFTON

CALIF INST OF TECH
 NASA-ARC
 SANTA BARBARA RES CTR
 CALIF INST OF TECH
 CALIF INST OF TECH
 U OF TEXAS, AUSTIN

NSSDC ID- 73-019A-11 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 MAGNETOSPHERIC PHYSICS

BRIEF DESCRIPTION

THE PIONEER 11 INFRARED RADIOMETER EXPERIMENT MEASURED THE JOVIAN 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 38-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, SIMPSON-----

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 73-019A-02 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 COSMIC 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 THROUGHOUT 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 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. SONETT 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 IS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 GAMMA TO PLUS OR MINUS 10 GAUSS. THE LINEARITY IS 0.1 PERCENT, THE NOISE THRESHOLD IS 0.01 GAMMA RMS FOR 0-1 HZ. THE ACCURACY IS 0.5 PERCENT OF FULL SCALE RANGE. THE EXPERIMENTER HAS USED RTH COORDINATES IN HIS DATA ANALYSIS. IN THIS SYSTEM, R (OR X) IS RADIIALLY OUTWARD FROM THE SUN, T (OR Y) IS PARALLEL TO THE SUN'S EQUATORIAL PLANE AND HAS ITS DIRECTION GIVEN BY THE CROSS PRODUCT OF THE SUN'S SPIN VECTOR INTO THE RADIAL DIRECTION (I.E., INTO R) AND N (OR Z) COMPLETES 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

PERSONNEL
 PI - J.A. VAN ALLEN U OF IOWA

BRIEF DESCRIPTION

THIS EXPERIMENT USES SEVEN MINIATURE GEIGER TUBES IN THREE ARRAYS TO MEASURE PROTON AND ELECTRON FLUXES NEAR JUPITER. 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-HFADQUARTERS
 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.R. COLLARD NASA-ARC
 OI - W.C. FELDMAN LOS ALAMOS SCI LAB
 OI - B.D. MCKIBBIN 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/Q 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/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/SQ CM-S AND THE PROTON TEMPERATURE DOWN TO 2.0E+3 DEG K COULD BE ASCERTAINED.

***** PIONEER VENUS 1*****

SPACECRAFT COMMON 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 NASA-OSS
UNITED STATES

PLANNED FINAL ORBIT PARAMETERS
ORBIT TYPE- VENUSCENTRIC EPOCH DATE- 12/04/78
ORBIT PERIOD- 144G. MIN INCLINATION- 105. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 66614. KM ALT

PERSONNEL
MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - R.E. MURPHY NASA HEADQUARTERS
PM - C.F. HALL NASA-ARC
PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION
PIONEER VENUS 1 IS THE FIRST OF TWO MISSIONS TO CONDUCT A COMPREHENSIVE INVESTIGATION OF VENUS' ATMOSPHERE. THE SPACECRAFT IS A SOLAR-POWERED CYLINDER ABOUT 250 CM IN DIAMETER WHOSE SPIN AXIS IS SPIN-STABILIZED PERPENDICULAR TO THE ECLIPTIC PLANE. A HIGH-GAIN ANTENNA IS MECHANICALLY DESPUN TO REMAIN FOCUSED ON THE EARTH. THE INSTRUMENTS ARE MOUNTED ON A SHELF 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 IS 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. ALL EXPERIMENTS ARE FUNCTIONAL AND THE SCHEDULED DATE FOR THE INSERTION OF THE SPACECRAFT INTO A HIGHLY ELLIPTICAL ORBIT AROUND VENUS IS DECEMBER 1978.

----- 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.H. BRACE NASA-GSFC
OI - M.B. MCELROY HARVARD U
OI - A. PEDERSEN ESA-ESTEC
OI - A.F. MAGY U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A PAIR OF CYLINDRICAL LANGMUIR PROBES OF THE TYPE BEING USED ON AE. TWO PROBES ARE REQUIRED, SO THAT ONE IS ALWAYS OUT OF THE WAKE OF THE SPACECRAFT. IN FLIGHT ANALYSIS, 56 MEASUREMENTS TAKEN AT A RATE OF ONE PER SECOND PROVIDE HIGH SPATIAL RESOLUTION FOR THE MEASUREMENTS OF NE AND TE. THE RESULTS OF THESE HIGH RESOLUTION MEASUREMENTS ARE USED BOTH TO STUDY THE UPPER ATMOSPHERE AND IONOSPHERE AND TO INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH THE VENUSIAN IONOSPHERE. THIS EXPERIMENT PROVIDES MEASUREMENTS OVER THE WHOLE REGION TRAVERSED BY THE ORBITTER, COVERING A LARGE RANGE OF SOLAR ASPECT ANGLES, TO YIELD A MORE COMPLETE CONFIGURATION OF THE PHYSICAL PROPERTIES OF THE IONOPAUSE REGION.

----- PIONEER VENUS 1, CROFT-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-C51A-03 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
YL - T.A. CROFT SRI INTERNATIONAL
YM - G.M. KEATING NASA-LARC
YN - A.J. KLIORRE NASA-JPL
ZO - R. PHILLIPS NASA-JPL
ZM - I.I. SHAPIRO MASS INST OF TECH
ZP - R. WOO NASA-JPL

BRIEF DESCRIPTION
THE RADIO SCIENCE TEAM HAS 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 INCLUDE 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 EXPERIMENT COMBINES RESULTS OBTAINED FROM THE ORBITER MISSION WITH RESULTS FROM THE MULTIPROBE 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 LOS ALAMOS SCI LAB
OI - J.P. CONNER LOS ALAMOS SCI LAB
OI - P.R. HIGBIE LOS ALAMOS SCI LAB
OI - R.W. KLEBSADEL LOS ALAMOS SCI LAB
OI - R.A. OLSON LOS ALAMOS SCI LAB
OI - I.B. STRONG LOS ALAMOS SCI LAB
OI - R.E. SPALDING SANDIA LABORATORIES

BRIEF DESCRIPTION
AN OMNIDIRECTIONAL GAMMA-RAY DETECTOR EMPLOYING TWO PHOSWICH SCINTILLATION SPECTROMETERS SENSITIVE TO PROTONS FROM 0.2 TO 2.0 MEV ARE USED WITH LOGIC CIRCUITRY TO DETECT THE BEGINNING OF A GAMMA EVENT AND TO INITIATE A PERIOD OF RAPID DATA COLLECTION. DATA IS STORED IN A MEMORY UNIT FOR SUBSEQUENT TRANSMISSION TO EARTH. CONFIRMATION THAT A TRUE GAMMA EVENT HAS OCCURED IS OBTAINED BY COMPARISON WITH RESULTS FROM OTHER EXPERIMENTS IN EARTH SATELLITES. THIS EXPERIMENT PROVIDES 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 NASA-GISS
OI - P.H. STONE MASS INST OF TECH
OI - A.A. LACIS NASA-GISS
OI - D.L. COFFEEN NASA-GISS
OI - L. TRAVIS NASA-GISS

BRIEF DESCRIPTION
THIS EXPERIMENT USES 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 IS 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 LOCKHEED PALO ALTO
OI - K. SPENNER INST FUR PHYS WELTRAM
OI - R.C. WHITTEN NASA-ARC

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THIS INVESTIGATION USES 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 IS AN ADAPTATION OF THE INSTRUMENT FLOWN ON THE GERMAN AEROS SATELLITE IN 1972. EITHER ONE OF TWO SENSOR HEADS MAY BE USED, EACH CONSISTING OF A MULTIGRID CUP AND ELECTROMETER, WHICH CAN OPERATE IN ELECTRON, ION, OR PHOTOELECTRON MODES, INITIATED BY SPACECRAFT ROLL PULSES. THE MEASUREMENTS TAKEN WHEN THE SENSOR AXIS IS CLOSEST TO THE PLASMA FLOW VELOCITY VECTOR ARE TRANSMITTED. THE AIMS OF THE INVESTIGATION ARE TO IMPROVE KNOWLEDGE OF THE IMPORTANT IONIC REACTIONS IN THE VENUSIAN IONOSPHERE, TO STUDY THE PLASMA TRANSPORT PROCESSES TO DETERMINE IF VENUS HAS A POLAR WIND, TO STUDY THE PROCESSES AT THE SOLAR WIND-IONOSPHERE BOUNDARY, AND TO STUDY SIMILAR AIMS CONCERNING THE AMBIENT ELECTRON POPULATION.

----- PIONEER VENUS 1, MASURSKY-----

INVESTIGATION NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- 78-051A-08 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION 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 ARE 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 INCLUDE GEOMETRIC ARRAYS OF RADAR PROFILES AND TOPOGRAPHIC CONTOUR DATA. THESE ARE 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
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - G.E. MCGILL U OF MASSACHUSETTS

BRIEF DESCRIPTION

INVESTIGATIONS OF THE TOPOGRAPHY AND GEOLOGY OF VENUS ARE 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 SLINVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.F. NAGY U OF MICHIGAN

BRIEF DESCRIPTION

INVESTIGATIONS OF THE IONOSPHERE OF VENUS ARE 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 SLINVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B. NIEMANN	NASA-GSFC
O1 - G.R. CARIGNAN	U OF MICHIGAN
O1 - R.E. HARTLE	NASA-GSFC
O1 - N.W. SPENCER	NASA-GSFC

BRIEF DESCRIPTION

THE EXPERIMENT USES A QUADRUPOLE MASS SPECTROMETER WITH THREE ION SOURCE OPERATING MODES AND THREE MASS SCANNING MODES. THE ION SOURCE CAN BE OPERATED ALTERNATELY IN OPEN AND CLOSED CONFIGURATIONS TO INCREASE ACCURACY. AN ADAPTIVE MASS SCAN IS USED TO REDUCE THE BIT RATE REQUIRED FOR A GIVEN INFORMATION RETURN RATE. THE RESOLUTION IS $1.E-4$ FOR ADJACENT MASSES, AND THE MASS RANGE IS 1 TO 45 U. VERTICAL AND HORIZONTAL DENSITY VARIATIONS OF THE MAJOR NEUTRAL CONSTITUENTS OF THE UPPER ATMOSPHERE OF VENUS ARE DETECTED AND MEASURED TO DEFINE THE DYNAMIC, CHEMICAL, AND THERMAL STATES OF THE UPPER ATMOSPHERE. IMPORTANT CONSTITUENTS TO BE MEASURED ARE HE, O, O(2), CO, CO(2) AND/OR N(2), AND A. IT MAY ALSO BE POSSIBLE TO STUDY H, D AND/OR H(2), C, AND NO.

----- PIONEER VENUS 1, PETTENGILL-----

INVESTIGATION NAME- RADAR ALTIMETER

NSSDC ID- 78-051A-02 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL

PI - G. PETTENGILL	MASS INST OF TECH
O1 - W.E. BROWN, JR.	NASA-JPL
O1 - W.M. KAULA	U OF CALIF, LA
O1 - D.H. STAELIN	MASS INST OF TECH

BRIEF DESCRIPTION

A RADAR ALTIMETER IS 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 IS 9.0 KG (20 LB), AND THE POWER CONSUMPTION IS 25 W.

----- PIONEER VENUS 1, RUSSELL-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 78-051A-12 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T. RUSSELL	U OF CALIF, LA
O1 - P.J. COLEMAN, JR.	U OF CALIF, LA
O1 - F.V. CORONITI	U OF CALIF, LA
O1 - C.F. KENNEL	U OF CALIF, LA
O1 - R.L. MCPHERROW	U OF CALIF, LA
O1 - G.L. SISCOE	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT USES 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 HAS BEEN USED ON THE APOLLO 15 AND 16 SUBSATELLITES. THE OBJECTIVES ARE 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 VENETIAN BOW SHOCK. INTERPLANETARY OBJECTIVES ARE 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 IS 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 IS COASTING THROUGH THE INTERPLANETARY REGION IN THE APOAPSIS MODE, THE SAMPLE RATE IS PLANNED TO BE ONE VECTOR PER 8 SEC. WHILE THE SPACECRAFT IS PASSING THROUGH THE VENUSIAN IONOSPHERE IN THE PERIAPSIS MODE, THE SAMPLE RATE IS PLANNED TO BE 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

OI - C.D. RODGERS
OI - E.J. WILLIAMSON
OI - R.E. DICKINSON
OI - J.C. GILLE

OXFORD U
CLARENDON LAB
NATL CTR FOR ATMOS RES
NATL CTR FOR ATMOS RES

PERSONNEL

PI - F.L. SCARF TRN SYSTEMS GROUP
OI - I.M. GREEN TRN SYSTEMS GROUP

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS 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 ARE 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 ARE ALSO STUDIED. A SELF-CONTAINED BALANCED V-TYPE ANTENNA WITH A DIFFERENTIAL PREAMPLIFIER IS EMPLOYED TO MAKE THE MEASUREMENTS. AT THE 512-BIT-PER-S SATELLITE MODE, ONE FREQUENCY SCAN PER S IS OBTAINED.

----- PIONEER VENUS 1, SCHUBERT-----

INVESTIGATION NAME- PARTICIPATING THEORIST SCHUBERT

NSSDC ID- 78-051A-14

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
PLANETEOLOGY

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. KERMAN NASA-GSFC
OI - T.M. DONAHUE U OF MICHIGAN
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 ARE DETERMINED AND INTERPRETED IN TERMS OF VERTICAL AND HORIZONTAL COMPONENTS. THE INSTRUMENT USED IS 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 IS 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. MCKIBBIN NASA-ARC
OI - J.D. MIHALOV NASA-ARC
OI - R.C. WHITTEN NASA-ARC
OI - D.S. INTRILIGATOR U OF SOUTHERN CALIF

BRIEF DESCRIPTION

THE INSTRUMENT FOR THIS EXPERIMENT IS A QUADRISPHERICAL ELECTROSTATIC ANALYZER (DETECTOR B OF THE PIONEERS 10-11 PLASMA INSTRUMENT), WITH FIVE CURRENT COLLECTORS AND ELECTROMETERS. THE ENERGY/CHARGE RANGE IS 50-8000 (IONS) IN 32 STEPS AND 1-500 (ELECTRONS) IN 16 STEPS. THE ANGULAR RANGE COVERED IS PLUS OR MINUS 85 DEG ELEVATION BY 360 DEG AZIMUTH, AND THE DETECTOR FIELD OF VIEW IS 15 DEG TIMES 25 DEG OR 15 DEG TIMES 45 DEG, DEPENDING ON POSITION. THE LOGIC DESIGN IS ESSENTIALLY THAT USED ON PIONEER 8 AND 9. THE OBJECTIVES ARE TO MEASURE SOLAR WIND CONDITIONS OUTSIDE THE VENETIAN BOW SHOCK, INSIDE THE MAGNETOSHEATH FLOW FIELD, AND TO STUDY THE IONOPAUSE STRUCTURE. SOLAR WIND MEASUREMENTS ARE MADE DURING THE TRANSIT TO VENUS, PARTICULARLY TO STUDY MACROSCALE PROBLEMS AND TO DETERMINE AVERAGE GRADIENTS. THE NEAR-PLANET WAKE REGION IS ALSO AVAILABLE FOR STUDY.

***** PIONEER VENUS 2*****

SPACECRAFT COMMON NAME- PIONEER VENUS 2
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078A

LAUNCH DATE- 08/08/78 WEIGHT- 380. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL

PI - F. TAYLOR NASA-JPL
OI - H.H. AUMANN NASA-JPL
OI - M.T. CHAHINE NASA-JPL
OI - C.B. FARMER NASA-JPL
OI - J.V. MARTONCHIK NASA-JPL
OI - A.P. INGERSOL CALIF INST OF TECH
OI - J.T. HOUGHTON OXFORD U
OI - G.D. PESKETT CLARENDON LAB

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
 MG - F.D. KOCHENDORFER NASA HEADQUARTERS
 SC - R.E. MURPHY NASA HEADQUARTERS
 PM - C.F. HALL NASA-ARC
 PS - L. COLIN NASA-ARC

NSSDC ID- 78-078A-09 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY

BRIEF DESCRIPTION

THIS SPACECRAFT IS THE BUS PORTION OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES ARE CARRIED BY THIS BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT IS SPIN STABILIZED. THE TRIP TO VENUS TAKES 125 DAYS. THE FOUR PROBES SEPARATE FROM THE BUS ABOUT 10 TO 20 DAYS BEFORE ENTRY. THE LARGE PROBE TAKES 1-1/2 H TO DESCEND THROUGH THE ATMOSPHERE, WHILE THE THREE SMALLER PROBES REACH THE SURFACE OF THE PLANET 75 MIN AFTER ENTRY. THE BUS PORTION OF THE SPACECRAFT IS TARGETED TO ENTER THE VENUSIAN ATMOSPHERE AT A SHALLOW ENTRY ANGLE AND TRANSMIT DATA TO EARTH UNTIL THE BUS IS DESTROYED BY THE HEAT OF ATMOSPHERIC FRICTION DURING ITS DESCENT. INVESTIGATIONS EMPHASIZE THE STUDY OF THE STRUCTURE AND COMPOSITION OF THE ATMOSPHERE DOWN TO THE SURFACE, THE NATURE AND COMPOSITION OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES WERE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

PERSONNEL
 PI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION

A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES THE INTERDISCIPLINARY ASPECTS OF ATMOSPHERIC CHEMISTRY AND RADIATIVE TRANSPORT THEORY TO ARRIVE AT AN UNDERSTANDING OF THE AERONOMY OF THE ATMOSPHERE OF VENUS.

----- PIONEER VENUS 2, GOODY-----

INVESTIGATION NAME- PARTICIPATING THEORIST GOODY

NSSDC ID- 78-078A-10 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY
 METEOROLOGY

PERSONNEL
 PI - R.M. GOODY HARVARD U

BRIEF DESCRIPTION

A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES THE THEORY OF THE CIRCULATION OF THE LOWER ATMOSPHERE AND THE RECOMBINATION OF THE PRODUCTS OF PHOTOLYSIS.

----- PIONEER VENUS 2, HUNTEN-----

INVESTIGATION NAME- PARTICIPATING THEORIST HUNTEN

NSSDC ID- 78-078A-11 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY
 METEOROLOGY

PERSONNEL
 PI - D.M. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION

A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES A DETAILED DESCRIPTION OF THE CLOUDS AND THE HEAT BALANCE OF THE ATMOSPHERE AND SURFACE OF VENUS AND A DETERMINATION OF THE DYNAMICS AND AERONOMY OF THE UPPER ATMOSPHERE.

----- PIONEER VENUS 2, PETTENGILL-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 78-078A-07 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY
 METEOROLOGY
 PLANETARY IONOSPHERES

PERSONNEL
 TL - G. PETTENGILL MASS INST OF TECH
 TM - T.A. CROFT SRI INTERNATIONAL
 TN - A.J. KLIORE NASA-JPL
 TH - R. WOO NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM HAS THE RESPONSIBILITY FOR PLANNING, COORDINATING, AND RECOMMENDING SCIENTIFIC USES OF RADIO SIGNALS FOR THE MISSION, AND OF EXECUTING APPROVED EXPERIMENTS AND CONDUCTING THE DATA ANALYSIS REQUIRED. THE MAJOR AREAS OF RESPONSIBILITY ARE IN THE USE OF S-BAND TELEMETRY SIGNALS TO OBTAIN PRECISE TRAJECTORY AND DESCENT DATA OF THE ENTRY PROBES FOR DETERMINATION OF ATMOSPHERIC MOTIONS, WINDS, AND TURBULENCE. ALSO, THE TEAM IS RESPONSIBLE FOR THE DEVELOPMENT AND ANALYSIS OF RECOMMENDATIONS PERTAINING TO THE APPLICATIONS OF VERY LONG BASELINE INTERFEROMETRY TECHNIQUES TO THE MISSION.

----- PIONEER VENUS 2, BAUER-----

INVESTIGATION NAME- PARTICIPATING THEORIST BAUER

NSSDC ID- 78-078A-08 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY
 INTERPLANETARY PHYSICS
 IONOSPHERES

PERSONNEL
 PI - S.J. BAUER NASA-GSFC

BRIEF DESCRIPTION

A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES ANALYSIS AND INTERPRETATION OF THE INSITU ION COMPOSITION, ELECTRON DENSITY AND TEMPERATURE, AND NEUTRAL COMPOSITION MEASUREMENTS TO PRODUCE A SELF-CONSISTENT MODEL OF THE DAYSIDE UPPER ATMOSPHERE AND IONOSPHERE OF VENUS, INCLUDING THE ROLE OF CHEMICAL AND TRANSPORT PROCESSES, AS WELL AS AN UNDERSTANDING OF THE TYPE OF INTERACTION BETWEEN THE SOLAR WIND AND THE VENUS IONOSPHERE.

----- PIONEER VENUS 2, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078A-06 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 METEOROLOGY
 PLANETOLOGY

PERSONNEL
 PI - C.C. COUNSELMAN MASS INST OF TECH
 OI - I.I. SHAPIRO MASS INST OF TECH
 OI - R. PRINN MASS INST OF TECH
 OI - J. CHARNEY MASS INST OF TECH
 OI - G. PETTENGILL MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVES APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS ARE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY ARE USED, IF FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS 2, DONAHUE-----

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

----- PIONEER VENUS 2, POLLACK-----

INVESTIGATION NAME- PARTICIPATING THEORIST POLLACK
NSSDC ID- 78-078A-12 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY GEODESY AND CARTOGRAPHY

PERSONNEL PI - J.B. POLLACK NASA-ARC

BRIEF DESCRIPTION A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA.

----- PIONEER VENUS 2, SPENCER-----

INVESTIGATION NAME- PARTICIPATING THEORIST SPENCER
NSSDC ID- 78-078A-13 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION A NUMBER OF THEORISTS HAVE BEEN SELECTED TO PARTICIPATE AS MEMBERS OF THE SCIENCE STEERING GROUP IN DEFINING THE SCIENTIFIC OBJECTIVES, STRATEGY, AND PLANNING FOR THE MISSION, IN COORDINATING THE EXPERIMENTS, AND IN THE ANALYSIS OF FLIGHT EXPERIMENT DATA.

----- PIONEER VENUS 2, TAYLOR, JR.-----

INVESTIGATION NAME- ION-MASS SPECTROMETER
NSSDC ID- 78-C78A-02 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES PLANETARY IONOSPHERES AERONOMY

PERSONNEL PI - H.A. TAYLOR, JR. NASA-GSFC
OI - S.J. BAUER NASA-GSFC
OI - T.M. DONAHUE U OF MICHIGAN
OI - P.A. CLOUTIER RICE U
OI - R.E. HARILE NASA-GSFC
OI - H.C. BRINTON NASA-GSFC
OI - F.C. MICHEL RICE U

BRIEF DESCRIPTION THIS ION MASS SPECTROMETER EXPERIMENT OBTAINS MEASUREMENTS WHICH PROVIDE INFORMATION ON THE SOLAR WIND INTERACTION WITH VENUS, UPPER ATMOSPHERE PHOTOCHEMISTRY, AND THE MASS AND HEAT TRANSPORT CHARACTERISTICS OF THE ATMOSPHERE.

----- PIONEER VENUS 2, VON ZAHN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER
NSSDC ID- 78-078A-03 INVESTIGATIVE PROGRAM CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - U. VON ZAHN U OF SOHN
OI - A.O.C. NIEN U OF MINNESOTA
OI - D.M. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION THIS NEUTRAL PARTICLE MASS SPECTROMETER EXPERIMENT WILL OBTAIN MEASUREMENTS WHICH PROVIDE INFORMATION ON THE ORIGIN AND EVOLUTION OF VENUS' ATMOSPHERE, THE PRESENT ENERGY BALANCE AND DYNAMICS OF THE UPPER ATMOSPHERE, AND THE INTERACTION OF THE UPPER ATMOSPHERE WITH SOLAR RADIATION AND THE INTERPLANETARY MEDIUM.

***** PIONEER VENUS PROBE LRG*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE LRG
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078D
LAUNCH DATE- 08/08/78 WEIGHT- 300. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS ORBIT TYPE- VENUS PROBE

PERSONNEL MG - F.D. KOCHENDORFER NASA HEADQUARTERS
SC - M.A. MITZ NASA HEADQUARTERS
PM - C.F. HALL NASA-ARC
PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION THIS SPACECRAFT IS THE LARGE PROBE PORTION OF THE PIONEER-VENUS MULTIPROBE MISSION ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES ARE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE.

----- PIONEER VENUS PROBE LRG, BOESE-----

INVESTIGATION NAME- INFRARED RADIOMETER
NSSDC ID- 78-078D-05 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - R.W. BOESE NASA-ARC
OI - J.B. POLLACK NASA-ARC
OI - J.H. MILLER NASA-ARC
OI - L.P. GIVER NASA-ARC

BRIEF DESCRIPTION THE OBJECTIVES OF THIS EXPERIMENT ARE TO MEASURE THE ATMOSPHERE THERMAL FLUX PROFILE, DETECT CLOUD LAYERS AND INFER THEIR COMPOSITION, AND ESTIMATE THE ATMOSPHERIC WATER VAPOR CONTENT.

----- PIONEER VENUS PROBE LRG, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING
NSSDC ID- 78-078D-09 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES METEOROLOGY PLANETOLOGY

PERSONNEL PI - C.C. COUNSELMAN MASS INST OF TECH
OI - G. PETTENGILL MASS INST OF TECH
OI - I.I. SHAPIRO MASS INST OF TECH
OI - R. PRINN MASS INST OF TECH
OI - J. CHARNEY MASS INST OF TECH

ORIGINAL PAGE IS OF POOR QUALITY

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVES APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS ARE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY ARE USED, IF FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE LRG, HOFFMAN-----

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- 78-078D-06 INVESTIGATIVE PROGRAM CODE SL INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - J.H. HOFFMAN U OF TEXAS, DALLAS OI - R.R. HODGES, JR. U OF TEXAS, DALLAS OI - M. KOLPIN TRW SYSTEMS GROUP OI - M.B. MCELROY HARVARD U OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE COMPOSITION OF THE LOWER ATMOSPHERE OF VENUS. THIS INVESTIGATION USES A CERAMIC MICRO LEAK GAS INLET AND A DOUBLE-FOCUSING MAGNETIC DEFLECTION MASS SPECTROMETER. ABOUT 50 ANALYSES OF THE VENUSIAN ATMOSPHERE ARE PLANNED DURING THE PROBE DESCENT. A SEPARATE SAMPLE OF THE ATMOSPHERE IS ANALYZED FOR RARE GASSES. THE ANALYZER HAS A MASS RANGE OF 1 TO 212 U AND A DYNAMIC RANGE OF 1.E7. THE INSTRUMENT IS BASED ON A DESIGN FLOWN PREVIOUSLY.

----- PIONEER VENUS PROBE LRG, KNOLLENBERG-----

INVESTIGATION NAME- CLOUD PARTICLE SIZE SPECTROMETER

NSSDC ID- 78-078D-03 INVESTIGATIVE PROGRAM CODE SL INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - R. KNOLLENBERG U OF CHICAGO OI - D.M. HUNTEN U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO MEASURE VENUS' CLOUD PARTICLE SIZES AND CONCENTRATIONS. A LASER IS USED TO ILLUMINATE CLOUD PARTICLES. OPTICAL LENSES WILL IMAGE THE PARTICLE SHADOWS ON ARRAYS OF DETECTORS. THE PARTICLE SHADOWS ARE USED TO DETERMINE PARTICLE SIZE AND CONCENTRATION. THE FLIGHT SENSOR IS SIMILAR TO THOSE FLOWN IN AIRCRAFT AND BALLOONS.

----- PIONEER VENUS PROBE LRG, OYAMA-----

INVESTIGATION NAME- GAS CHROMATOGRAPH

NSSDC ID- 78-078D-04 INVESTIGATIVE PROGRAM CODE SL INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - V.J. OYAMA NASA-ARC OI - J.B. POLLACK NASA-ARC OI - G. CARLE NASA-ARC OI - F. WOELLER NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO DETERMINE THE COMPOSITION OF VENUS' LOWER ATMOSPHERE. FROM THESE MEASUREMENTS, DEDUCTIONS ARE MADE OF THE GASEOUS SOURCES OF INFRARED OPACITY, THE DEGREE OF DIFFERENTIATION OF VENUS' INTERIOR, THE DEGREE OF SIMILARITY BETWEEN THE SOLID BODIES OF EARTH AND VENUS, AND EVOLUTION OF VENUS' ATMOSPHERE. TWO GAS CHROMATOGRAPH COLUMNS ARE USED TO ANALYZE SAMPLES OF THE ATMOSPHERE DURING PROBE DESCENT. THREE OR FOUR SAMPLES WILL BE ANALYZED.

----- PIONEER VENUS PROBE LRG, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- 78-078D-02

INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY METEOROLOGY

PERSONNEL PI - B. RAGENT NASA-ARC PI - J.E. BLAMONT CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USES A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATES THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORIES. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES INDICATES THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATES AT ABOUT 900 A. THE EXPERIMENT WEIGHS ABOUT 6.5 KG AND USES ABOUT 1.3 W OF POWER.

----- PIONEER VENUS PROBE LRG, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078D-01 INVESTIGATIVE PROGRAM CODE SL INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL PI - A. SEIFF NASA-ARC OI - S.C. SOMMER NASA-ARC OI - R.C. BLANCHARD NASA-LARC OI - D.B. KIRK NASA-ARC OI - R.E. YOUNG NASA-ARC OI - J. OERR US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDE A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY ARE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS ARE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY ARE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THE LARGE PROBE TRAJECTORY WITH THOSE MEASURED BY THE SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE ARE DETERMINED. THE INSTRUMENTS WEIGH ABOUT 2.5 KG AND CONSUME ABOUT 4.7 W OF POWER.

----- PIONEER VENUS PROBE LRG, TOMASKO-----

INVESTIGATION NAME- SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE

NSSDC ID- 78-078D-07 INVESTIGATIVE PROGRAM CODE SL INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL PI - M.G. TOMASKO U OF ARIZONA OI - W. WOLFE U OF ARIZONA OI - A. CLEMENTS U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE REGIONS IN VENUS' ATMOSPHERE WHERE SOLAR ENERGY IS DEPOSITED. SIX NARROW-FIELD-OF-VIEW DETECTORS ARE USED TO MEASURE THE INTENSITY OF SCATTERED SOLAR LIGHT. AS THE PROBE DESCENDS THROUGH THE ATMOSPHERE, THE DIFFERENCE BETWEEN UPWARD-LOOKING AND DOWNWARD-LOOKING DETECTORS WILL INDICATE THE NET DOWNWARD FLUX.

***** PIONEER VENUS PROBE SH*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SH ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078E

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG LAUNCH SITE- CAPE CANAVERAL, UNITED STATES LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL
 MG - F.D. KOCHENDORFER NASA HEADQUARTERS
 SC - M.A. MITZ NASA HEADQUARTERS
 PM - C.F. HALL NASA-ARC
 PS - L. COLIN NASA-ARC

PERSONNEL
 PI - A. SEIFF NASA-ARC
 OI - S.C. SOMMER NASA-ARC
 OI - D.B. KIRK NASA-ARC
 OI - R.C. BLANCHARD NASA-LARC
 OI - R.E. YOUNG NASA-ARC
 OI - J. DERR US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

THIS SPACECRAFT IS THE FIRST SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES ARE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERS THE ATMOSPHERE AND OBTAINS ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZE THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER-VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES ARE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDE A SINGLE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY ARE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAST VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST RT106-2001). THE MEASUREMENTS ARE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY ARE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THE LARGE PROBE TRAJECTORY WITH THOSE MEASURED BY THE SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE ARE DETERMINED. THE INSTRUMENTS WEIGH ABOUT 1.2 KG AND CONSUME ABOUT 4.8 W OF POWER.

----- PIONEER VENUS PROBE SM, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY LONG BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078E-03 INVESTIGATIVE PROGRAM CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 METEOROLOGY
 PLANETOLOGY

PERSONNEL
 PI - C.C. COUNSELMAN MASS INST OF TECH
 OI - I.I. SHAPIRO MASS INST OF TECH
 OI - R. PRINW MASS INST OF TECH
 OI - J. CHARNEY MASS INST OF TECH
 OI - G. PETTENGILL MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVES APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS ARE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY ARE USED, IF FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078E-04 INVESTIGATIVE PROGRAM CODE SL/CO-0P
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY

PERSONNEL
 PI - V.E. SUOMI U OF WISCONSIN
 OI - J. LENOBLE U OF LILLE
 OI - L.A. SRODOVSKY U OF WISCONSIN
 OI - A. FYMAT NASA-JPL
 OI - G.E. DANIELSON NASA-JPL
 OI - M. HERMAN U OF LILLE

BRIEF DESCRIPTION

THE OBJECTIVES ARE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USES A SMALL JET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2- TO 4-MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRY NET INFRARED FLUX SENSORS COVERING THE 1- TO 25-MICROMETER REGION. THE INSTRUMENT WEIGHS ABOUT 0.4 KG AND USES 2.2 W OF POWER.

***** PIONEER VENUS PROBE SM2*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM2
 ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078F

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-055

INITIAL ORBIT PARAMETERS
 ORBIT TYPE- VENUS PROBE

PERSONNEL
 MG - F.D. KOCHENDORFER NASA HEADQUARTERS
 SC - M.A. MITZ NASA HEADQUARTERS
 PM - C.F. HALL NASA-ARC
 PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT IS THE SECOND SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES ARE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERS THE ATMOSPHERE AND OBTAINS ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZE THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER-VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES ARE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE SM, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- 78-078E-02 INVESTIGATIVE PROGRAM CODE SL/CO-0P
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 AERONOMY
 METEOROLOGY

PERSONNEL
 PI - B. RAGENT NASA-ARC
 PI - J.E. BLAMONT CNRS-SA

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USES A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE FLIGHT HISTORY OF THE BACKSCATTERED SIGNAL INDICATES THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORIES. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES INDICATES THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATES AT ABOUT 9000 A. THE EXPERIMENT WEIGHS ABOUT 0.6 KG AND USES ABOUT 1.3 W OF POWER.

----- PIONEER VENUS PROBE SM, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078E-01 INVESTIGATIVE PROGRAM CODE SL
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

ORIGINAL PAGE IS
 OF POOR QUALITY

----- PIONEER VENUS PROBE SM2, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078F-03 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES METEOROLOGY PLANETOLOGY

PERSONNEL PI - C.C. COUNSELMAN MASS INST OF TECH OI - I.I. SHAPIRO MASS INST OF TECH OI - R. PRINN MASS INST OF TECH OI - J. CHARNEY MASS INST OF TECH OI - G. PETTENGILL MASS INST OF TECH

BRIEF DESCRIPTION THIS EXPERIMENT INVOLVES APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS ARE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY ARE USED, IF FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM2, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- 78-078F-02 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY METEOROLOGY

PERSONNEL PI - B. RAGENT NASA-ARC PI - J.E. BLANMONT CNRS-SA

BRIEF DESCRIPTION THIS EXPERIMENT CONSISTS OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USES A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATES THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORIES. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES INDICATES THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATES AT ABOUT 9300 A. THE EXPERIMENT WEIGHS ABOUT 2.6 KG AND USES ABOUT 1.2 W OF POWER.

----- PIONEER VENUS PROBE SM2, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 78-078F-01 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL PI - A. SEIFF NASA-ARC OI - S.C. SOMMER NASA-ARC OI - D.B. KIRK NASA-ARC OI - R.C. BLANCHARD NASA-LARC OI - R.E. YOUNG NASA-ARC OI - J. DERR US GEOLOGICAL SURVEY

BRIEF DESCRIPTION THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDE A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY ARE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS ARE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY ARE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THE LARGE PROBE TRAJECTORY WITH THOSE MEASURED BY THE SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE ARE DETERMINED. THE INSTRUMENTS WEIGH ABOUT 1.2 KG AND CONSUME ABOUT 3.4 W OF POWER.

----- PIONEER VENUS PROBE SM2, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 78-078F-04 INVESTIGATIVE PROGRAM CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES AERONOMY

PERSONNEL

PI - V.E. SUOMI U OF WISCONSIN OI - J. LEROBLE U OF LILLE OI - L.A. SROMOVSKY U OF WISCONSIN OI - A. FYMAT NASA-JPL OI - G.E. DANIELSON NASA-JPL OI - M. HERMAN U OF LILLE

BRIEF DESCRIPTION

THE OBJECTIVES ARE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USES A SMALL NET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2 TO 4 MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRY NET INFRARED FLUX SENSORS COVERING THE 1 TO 25 MICROMETER REGION. THE INSTRUMENT WEIGHS ABOUT 0.4 KG AND USES 2.2 W OF POWER.

***** PIONEER VENUS PROBE SM3*****

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM3 ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- 78-078G

LAUNCH DATE- 08/08/78 WEIGHT- 75. KG LAUNCH SITE- CAPE CANAVERAL, UNITED STATES LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS ORBIT TYPE- VENUS PROBE

PERSONNEL HG - F.D. KOCHENDORFER NASA HEADQUARTERS SC - M.A. MITZ NASA HEADQUARTERS PM - C.F. HALL NASA-ARC PS - L. COLIN NASA-ARC

BRIEF DESCRIPTION

THIS SPACECRAFT IS THE THIRD SMALL PROBE OF THE PIONEER-VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES ARE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS ENTERS THE ATMOSPHERE AND OBTAINS ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS EMPHASIZE THE STUDY OF THE STRUCTURE COMPOSITION AND NATURE OF THE ATMOSPHERE DOWN TO THE SURFACE, AND OF THE CLOUDS, THE RADIATION FIELD AND ENERGY EXCHANGE IN THE LOWER ATMOSPHERE, AND LOCAL INFORMATION ON THE ATMOSPHERIC CIRCULATION PATTERN. A SISTER MISSION, PIONEER-VENUS ORBITER, PLACED AN ORBITING SPACECRAFT AROUND VENUS 2 WEEKS BEFORE THE PROBES ARE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

----- PIONEER VENUS PROBE SM3, COUNSELMAN-----

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- 78-078G-03 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES METEOROLOGY PLANETOLOGY

PERSONNEL PI - C.C. COUNSELMAN MASS INST OF TECH OI - I.I. SHAPIRO MASS INST OF TECH OI - R. PRINN MASS INST OF TECH OI - J. CHARNEY MASS INST OF TECH OI - G. PETTENGILL MASS INST OF TECH

BRIEF DESCRIPTION

THIS EXPERIMENT INVOLVES APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) IN ORDER TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS ARE USED IN MODELING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY ARE USED, IF FEASIBLE, TO INFER CHARACTERISTICS OF VENUS' GRAVITY FIELD FOR USE WITH PROBE ENTRY OPERATIONS AS WELL AS IN LATER SCIENTIFIC EVALUATION.

----- PIONEER VENUS PROBE SM3, RAGENT-----

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- 78-078G-02

INVESTIGATIVE PROGRAM
CODE SL/CO-0P

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

SAS

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 5713, MIN
PERIAPSIS- 510. KM ALT

EPOCH DATE- 11/26/76
INCLINATION- 65. DEG
APOAPSIS- 199000. KM ALT

PERSONNEL

PI - B. RAGENT
PI - J.E. BLAMONT

NASA-ARC
CNRS-SA

PERSONNEL

PM - UNKNOWN
PS - A.A. GALEEV

IKI

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT USES A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL INDICATES THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORIES. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES INDICATES THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER OPERATES AT ABOUT 9000 A. THE EXPERIMENT WEIGHS ABOUT 0.6 KG AND USES ABOUT 1.3 W OF POWER.

BRIEF DESCRIPTION

PROGNOZ 5 CARRIED SCIENTIFIC APPARATUS FOR RESEARCH OF RADIATION FROM THE SUN, SOLAR WIND, MAGNETIC FIELDS IN CIRCUMTERRESTRIAL SPACE, RADIO TRANSMITTER, RADIO SYSTEM FOR PRECISE MEASUREMENTS OF ORBIT ELEMENTS, AND RADIO TELEMETRY SYSTEM.

----- PROGNOZ 5, EROSHENKO-----

INVESTIGATION NAME- THREE-AXIS FLUXGATE MAGNETOMETER

----- PIONEER VENUS PROBE SM3, SEIFF-----

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- 76-112A-01

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

NSSDC ID- 78-078G-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - YE.G. EROSHENKO

IZMIRAN

PERSONNEL

PI - A. SEIFF
OI - S.C. SOMMER
OI - R.C. BLANCHARD
OI - D.B. KIRK
OI - R.E. YOUNG
OI - J. DERR

NASA-ARC
NASA-ARC
NASA-LARC
NASA-ARC
NASA-ARC
US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

A THREE-AXIS FLUXGATE MAGNETOMETER WAS FLOWN TO MEASURE VECTOR FIELDS FROM 1 TO 60 GAMMAS.

----- PROGNOZ 5, GRIGORYEVA-----

INVESTIGATION NAME- KILOMETRIC/HECTOMETRIC RECEIVER

BRIEF DESCRIPTION

THE INSTRUMENTS FOR THIS EXPERIMENT INCLUDE A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY ARE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS ARE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY ARE ALSO USED TO DETERMINE VERTICAL WIND VELOCITY, HORIZONTAL WIND VELOCITY, AND TURBULENCE. BY COMPARING ATMOSPHERE CONDITIONS ALONG THE LARGE PROBE TRAJECTORY WITH THOSE MEASURED BY THE SMALL PROBES, CIRCULATION MODELS OF THE ATMOSPHERE ARE DETERMINED. THE INSTRUMENTS WEIGH ABOUT 1.2 KG AND CONSUME ABOUT 3.4 W OF POWER.

NSSDC ID- 76-112A-05

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - V.P. GRIGORYEVA

STERNBERG ASTRON INST

BRIEF DESCRIPTION

A KILOMETRIC/HECTOMETRIC RECEIVER WAS FLOWN TO MEASURE ELECTRIC AND MAGNETIC FIELDS FROM 50 KHZ TO 1 MHZ IN 10 CHANNELS.

----- PROGNOZ 5, GRINGAUZ-----

INVESTIGATION NAME- PLASMA DETECTOR

----- PIONEER VENUS PROBE SM3, SUOMI-----

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- 76-112A-02

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

NSSDC ID- 78-078G-04

INVESTIGATIVE PROGRAM
CODE SL/CO-0P

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - K.I. GRINGAUZ

IKI

PERSONNEL

PI - V.E. SUOMI
OI - J. LENOBLE
OI - A. FYMAT
OI - L.A. SRONOVSKY
OI - G.E. DANIELSON
OI - M. HERMAN

U OF WISCONSIN
U OF LILLE
NASA-JPL
U OF WISCONSIN
NASA-JPL
U OF LILLE

BRIEF DESCRIPTION

A PLASMA DETECTOR WAS FLOWN TO MEASURE ION SPECTRA FROM 0.1 TO 4.4 KEV. AN ELECTRON PROBE WAS ALSO INCLUDED TO MEASURE DENSITY AND TEMPERATURE BELOW 300 EV.

----- PROGNOZ 5, KACHAROV-----

INVESTIGATION NAME- SOLAP X-RAYS

BRIEF DESCRIPTION

THE OBJECTIVES ARE TO LOCATE REGIONS OF RADIATIVE CONVERGENCE AND DIVERGENCE AS A FUNCTION OF ALTITUDE AND TO INDICATE THE HEIGHT AT WHICH SOLAR ENERGY IS ABSORBED BY THE ATMOSPHERE. THIS EXPERIMENT USES A SMALL NET FLUX RADIOMETER ON THE PROBE TARGETED TO THE DAYSIDE OF VENUS TO MEASURE THE NET SOLAR FLUX IN THE 0.2- TO 4-MICROMETER REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET CARRY NET INFRARED FLUX SENSORS COVERING THE 1- TO 25 MICROMETER REGION. THE INSTRUMENT WEIGHS ABOUT 0.4 KG AND USES 2.2 W OF POWER.

NSSDC ID- 76-112A-03

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - G.YE. KACHAROV

LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

SOLAR X-RAYS WERE MEASURED FROM 2 TO 511 KEV.

----- PROGNOZ 5, KURT-----

INVESTIGATION NAME- INTERPLANETARY UV EMISSION PHOTOMETER - HYDROGEN AND HELIUM

SPACECRAFT COMMON NAME- PROGNOZ 5
ALTERNATE NAMES- 99557

NSSDC ID- 76-112A

LAUNCH DATE- 11/25/76 WEIGHT- 930. KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODOROME), U.S.S.R.
LAUNCH VEHICLE- A-2-E

NSSDC ID- 76-112A-08

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY PHYSICS
ASTRONOMY

C-2

PERSONNEL
PI - V.G. KURT
PI - J.L. BERTAUX

IKI
CNRS-SA

NSSDC ID- 77-093A

LAUNCH DATE- 09/22/77
LAUNCH/SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

WEIGHT- KG
U.S.S.R.

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

SAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3888. MIN
PERIAPSIS- 498. KM ALT

EPOCH DATE- 09/23/77
INCLINATION- 85. DEG
APOAPSIS- 197900. KM ALT

PERSONNEL
PM - UNKNOWN
PS - A. GALEEV IKI

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO (1) STUDY THE INTERPLANETARY MEDIUM NEUTRAL HYDROGEN, HELIUM DENSITY, AND TEMPERATURE, (2) STUDY THE RATIO OF NEUTRAL HE TO ATOMIC HYDROGEN, (3) OBSERVE HE IONS IN PLASMASPHERE AND INTERPLANETARY MEDIUM, AND (4) TO STUDY THE GEORONA. THE THIN FILM PHOTOMETERS USED SPIRALTRONS AND THIN FILM FILTERS. ABSORPTION CELLS WERE ALSO USED. SPECIFICALLY, THE 304-A HE POSITIVE ION LINE, THE 584-A HE SOLAR LINE, AND THE 584-A HE LINE WERE MEASURED USING THIN FILM FILTERS. THE 1216-A H LYMAN-ALPHA LINE WAS MEASURED WITH AN ABSORPTION CELL.

----- PROGNOZ 5, LICKIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 76-112A-07
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - O.B. LICKIN IKI
PI - B. VALNICEK ASTRONOMICAL INST

BRIEF DESCRIPTION
SOFT X-RAYS WERE MEASURED IN ENERGY RANGE FROM 2 TO 100 KEV IN FIVE BANDS.

----- PROGNOZ 5, LOGACHEV-----

INVESTIGATION NAME- ENERGETIC PARTICLES CHARGE COMPOSITION

NSSDC ID- 76-112A-04
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - YU.I. LOGACHEV INST NUCLEAR PHYS

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE WAS TO MEASURE SPECTRA, ANISOTROPY, AND CHARGE COMPOSITION ABOVE 500 MEV/NUCLEON FOR 2 FROM 2 TO 6, 6 TO 10, 15 TO 35, AND 35 TO 50.

----- PROGNOZ 5, LUTSENKO-----

INVESTIGATION NAME- ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION

NSSDC ID- 76-112A-06
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - V.N. LUTSENKO IKI

BRIEF DESCRIPTION
THE EXPERIMENT WAS FLOWN TO MEASURE ENERGETIC PARTICLE CHARGE AND MASS COMPOSITION IN THE ENERGY RANGE FROM 7 TO 30 MEV/NUCLEON.

----- PROGNOZ 5, ZERTSALOV-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 76-112A-09
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - A.A. ZERTSALOV IKI
PI - J.M. BOSQUED CESR

BRIEF DESCRIPTION
PLASMA SPECTROMETERS WERE FLOWN TO MEASURE ELECTRONS FROM 3 EV TO 15 KEV, PROTONS FROM 3 EV TO 15 KEV, AND POSITIVE IONS FROM 3 EV TO 4 KEV WITH MASS RESOLUTION.

***** PROGNOZ 6 *****

SPACECRAFT COMMON NAME- PROGNOZ 6
ALTERNATE NAMES- 13370

BRIEF DESCRIPTION

THE SPACECRAFT WAS A MEMBER OF A CONTINUING SERIES TO MEASURE CHARGED PARTICLES, PLASMA, MAGNETIC FIELDS, AND SOLAR 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) ACCELERATION PROCESSES IN THE SOLAR CORONA AND FLARE ACCELERATION OF CHARGED PARTICLES, (2) PROPAGATION OF ACCELERATED PARTICLES FROM THE SOLAR CORONA TO INTERPLANETARY SPACE, (3) PARTICLE ACCELERATION FROM INTERPLANETARY SHOCK FRONTS, (4) CHEMICAL AND CHARGE COMPOSITION OF THE SOLAR WIND AND SOLAR ENERGETIC PARTICLES, (5) INSTABILITY PROCESSES IN INTERPLANETARY PLASMA AND WAVE ENVIRONMENTS, (6) PROPAGATION AND PENETRATION INTO THE MAGNETOSPHERE OF SOLAR PLASMA AND ENERGETIC PARTICLES, (7) MAGNETOTAIL PLASMA DYNAMICS DURING SUBSTORMS, (8) DISCRETE GAMMA RAY LINES OF SOLAR AND GALACTIC ORIGIN, AND (9) UV-EMISSION IN THE UPPER ATMOSPHERE AND THE INTERPLANETARY MEDIUM. DATA WERE OBTAINED FROM A 5 MEGABIT STORAGE DURING EACH PERIGEE SO THAT CONTINUOUS DATA ACQUISITION OVER THE WHOLE ORBIT WAS ACHIEVED.

----- PROGNOZ 6, EROSHENKO-----

INVESTIGATION NAME- THREE-AXIS FLUXGATE MAGNETOMETER

NSSDC ID- 77-093A-01
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - YE.G. EROSHENKO IZMIRAN

BRIEF DESCRIPTION
A THREE-AXIS FLUXGATE MAGNETOMETER WAS USED TO MEASURE VECTOR MAGNETIC FIELDS FROM 1 TO 60 GAMMA WITH AN INTENSITY RESOLUTION OF 0.5 GAMMAS. BOTH INTERPLANETARY AND GEOMAGNETIC TAIL FIELDS WERE CAPABLE OF BEING MEASURED.

----- PROGNOZ 6, ESTULIN-----

INVESTIGATION NAME- GAMMA-RAY SPECTROMETER

NSSDC ID- 77-093A-05
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - I.V. ESTULIN IKI
PI - G. VEDRENNE CESR

BRIEF DESCRIPTION
THIS INVESTIGATION WAS CONCERNED WITH THE COSMIC GAMMA RAY SPECTRUM AND GAMMA RAY BURSTS. THE ENERGY RANGE COVERED WAS 0.1 TO 3 MEV. ONE DETECTOR OBSERVED THE SUN AND ANOTHER WAS POINTED IN THE AN/I-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.

----- PROGNOZ 6, GRINGAUZ-----

INVESTIGATION NAME- PLASMA DETECTOR

NSSDC ID- 77-093A-02
INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

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 0.01 TO 5.4 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/CUBIC CM, TEMPERATURES FROM 20 TO 20,000 K, AND BULK VELOCITY FROM 240 TO

870 KM/S WERE MEASURED. THE DENSITY OF ELECTRONS AND THEIR TEMPERATURES WERE ALSO MEASURED.

----- PROGNOZ 6, KACHAROV-----

INVESTIGATION NAME- SOLAR X-RAYS

NSSDC ID- 77-093A-03 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS X-RAY ASTRONOMY

PERSONNEL PI - G.YE. KACHAROV LENGRAD INST PHYS TECH

BRIEF DESCRIPTION SOLAR X-RAYS IN THE PHOTON ENERGY FROM 2 TO 511 KEV WERE MEASURED AND THE SPECTRUM OBTAINED. STANDARD SODIUM IODIDE CRYSTALS AND ANTICOINCIDENCE TECHNIQUES WERE EMPLOYED.

----- PROGNOZ 6, KURT-----

INVESTIGATION NAME- INTERPLANETARY UV EMISSION PHOTOMETER - HYDROGEN AND HELIUM

NSSDC ID- 77-093A-08 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) ASTRONOMY INTERPLANETARY PHYSICS SOLAR PHYSICS

PERSONNEL PI - V.G. KURT IKI PI - J.L. BERTAUX CNRS-SA

BRIEF DESCRIPTION THE OBJECTIVES OF THIS INVESTIGATION WERE TO (1) STUDY THE NEUTRAL HYDROGEN AND HELIUM DENSITY AND TEMPERATURE IN THE INTERPLANETARY MEDIUM (2) STUDY THE RATIO OF NEUTRAL HELIUM TO ATOMIC HYDROGEN (3) OBSERVE HELIUM IONS IN THE PLASMASPHERE AND THE INTERPLANETARY MEDIUM, AND (4) STUDY THE GEORONOA. THE INSTRUMENT CONSISTED OF THIN FILM FILTER PHOTOMETERS USING SPIRALTRONS TO MEASURE THE 304 A (HE+), 584 A (HE2), AND THE SOLAR 584 A LINES AND AN ABSORPTION CELL TO MEASURE THE 1216A LYMAN ALPHA LINE.

----- PROGNOZ 6, LICKIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- 77-093A-07 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL PI - O.B. LICKIN IKI PI - B. VALNICEK ASTRONOMICAL INST

BRIEF DESCRIPTION SOLAR X-RAYS IN THE 1 TO 200 KEV RANGE WERE MEASURED IN 5 CHANNELS. THE EXACT INSTRUMENTATION HAS NOT BEEN SPECIFIED BUT SODIUM IODIDE CRYSTALS AND PROBABLY PROPORTIONAL COUNTERS WERE USED.

----- PROGNOZ 6, LOGACHEV-----

INVESTIGATION NAME- ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 77-093A-04 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS MAGNETOSPHERIC PHYSICS INTERPLANETARY PHYSICS

PERSONNEL PI - YU.I. LOGACHEV INST NUCLEAR PHYS

BRIEF DESCRIPTION THE SPECTRUM OF PROTONS AND ELECTRONS IN THE ENERGY RANGE 0.03 TO 10 MEV WAS MEASURED. THE DETAILS OF THE INSTRUMENT HAVE NOT BEEN PROVIDED.

----- PROGNOZ 6, LUTSENKO-----

INVESTIGATION NAME- ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION

NSSDC ID- 77-093A-11 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) COSMIC RAYS PARTICLES AND FIELDS

PERSONNEL PI - V.N. LUTSENKO IKI PI - S. FISCHER ASTRO INST

BRIEF DESCRIPTION THE ENERGY AND MASS COMPOSITION OF CHARGED PARTICLES WERE MEASURED IN THE RANGE 5 TO 50 MEV/NUCLEON. THE INSTRUMENT (SOVIET-CZECHOSLOVAK EXPERIMENT TP-2) IS A 3-ELEMENT SOLID STATE DOUBLE DE/DX-E TELESCOPE WITH A PLASTIC SCINTILLATOR ANTI-COINCIDENCE CUP. THE TELESCOPE AXIS POINTS TO THE SUN. DETECTOR THICKNESSES ARE 100 MICRONS (D1, D2) AND 1800 MICRONS (D3). PULSES FROM CHARGED PARTICLES WITH Z FROM 1 TO 18 ARE ANALYZED. CHANNELS FOR 9 TYPES OF COINCIDENCE EVENTS HAVE BEEN IDENTIFIED. ENERGY RANGES HAVE BEEN IDENTIFIED FOR PROTONS AS P1 (1.4-3.4 MEV) AND P3 (5-18 MEV), AND FOR ALPHA PARTICLES AS A1 (1.4-3.4 MEV/NUCLEON) AND A3 (5-18 MEV/NUCLEON). GEOMETRIC FACTORS ARE 1.2 CM SQ SR FOR P1, A1, AND 0.1 CM SQ SR FOR P2, P3, A2, A3.

----- PROGNOZ 6, PISARENKO-----

INVESTIGATION NAME- ENERGETIC ELECTRON AND PROTON SPECTROMETER

NSSDC ID- 77-093A-09 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) INTERPLANETARY PHYSICS MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL PI - N.F. PISARENKO IKI PI - L. TREGER CENS

BRIEF DESCRIPTION ELECTRONS AND PROTONS WERE MEASURED IN VARIOUS SPECTRAL INTERVALS. PROTONS FROM 3 TO 500 MEV WERE SENSED; THE ELECTRON ENERGY RANGE WAS FROM 0.3 TO 20 MEV. A SOLID STATE DETECTOR TELESCOPE WAS PROBABLY USED FOR THIS INVESTIGATION.

----- PROGNOZ 6, SERVERNY-----

INVESTIGATION NAME- UV EMISSION SPECTROMETER

NSSDC ID- 77-093A-10 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS. INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS AERONOMY

PERSONNEL PI - A.B. SERVERNY 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 NOT BEEN SPECIFIED.

----- PROGNOZ 6, SKREBTSOV-----

INVESTIGATION NAME- PROTON AND HEAVY NUCLEI SPECTROMETER

NSSDC ID- 77-093A-06 INVESTIGATIVE PROGRAM SOLAR-TERRESTRIAL PHYSICS INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL PI - G.P. SKREBTSOV LENGRAD INST PHYS TECH

BRIEF DESCRIPTION MEASUREMENTS OF ENERGETIC PARTICLES WITHIN 0.8 TO 15 MEV/NUCLEON FOR Z GREATER THAN OR EQUAL TO 3 AND 0.2 TO 7.2 MEV/NUCLEON FOR Z EQUAL TO 1 AND 2 WERE OBTAINED. DETAILS OF THE INSTRUMENTATION HAVE NOT BEEN PROVIDED.

***** S3-2*****

SPACECRAFT COMMON NAME- S3-2 ALTERNATE NAMES- SESP S73-6

NSSDC ID- 75-114B

LAUNCH DATE- 12/03/75 WEIGHT- KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE-

SPONSORING COUNTRY/AGENCY UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/08/75 ORBIT PERIOD- 96.3 MIN INCLINATION- 96.3 DEG PERIAPSIS- 236. KM ALT APOAPSIS- 1558. KM ALT

PERSONNEL
PI - SAMS0 USAF-LAS
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THIS SPACECRAFT WAS A SPIN-STABILIZED OBSERVATORY MOUNTING 13 SCIENCE EXPERIMENT SENSORS. THE PLANNED POLAR ORBIT (APPROXIMATELY 230 BY 900 KM) COVERED A SUFFICIENT VOLUME OF SPACE TO OBSERVE DENSITY CHANGES IN THE LOWER PART OF THE ORBIT AND OTHER PARAMETERS AT HIGHER LEVELS THAT RELATED TO THESE DENSITY VARIATIONS.

----- S3-2, FENNELL-----

INVESTIGATION NAME- PROTON TIME-OF-FLIGHT AND PROTON ALPHA COUNTERS

NSSDC ID- 75-114B-14 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - J.F. FENNELL AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED PROTONS FROM ABOVE 0.4 TO ABOVE 9 MEV IN 6 CHANNELS, PROTONS ABOVE 400 KEV, AND ALPHAS FROM 1 TO 34 MEV.

----- S3-2, MARCOS-----

INVESTIGATION NAME- TRIAXIAL PIEZOELECTRIC ACCELEROMETER

NSSDC ID- 75-114B-10 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - F.A. MARCOS USAF GEOPHYS LAB
OI - J.P. MCISAAC USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED ATMOSPHERIC DENSITY AND ITS VARIATIONS IN THE REGION NEAR SATELLITE PERIGEE. THE EXPERIMENT CONSISTED OF A CANTILEVERED PYROELECTRIC BEAM LOADED WITH A MASS. ATMOSPHERIC DRAG CHANGES PRODUCING PRESSURE CHANGES IN THE BEAM PRODUCE AN ELECTRIC CURRENT. THE THREE-COMPONENT CURRENT VALUES WERE USED TO COMPUTE DENSITY VALUES IN THE ACCELERATING REGIONS OF THE ORBIT.

----- S3-2, MCISAAC-----

INVESTIGATION NAME- NEUTRAL DENSITY EXPERIMENTS (COLD AND HOT CATHODE GAUGES)

NSSDC ID- 75-114B-01 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.P. MCISAAC USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED NEUTRAL DENSITY VARIATIONS ABOVE 230 KM OVER A WIDE RANGE OF LATITUDE. OF PARTICULAR INTEREST WAS THE ASSOCIATION OF THE OBSERVED DENSITY VARIATIONS WITH GEOMAGNETIC AND SOLAR PARAMETERS TO BETTER IDENTIFY AND INVESTIGATE THE INTERRELATIONSHIPS WHICH OCCURRED. THE FREE IONS WERE REMOVED NEAR THE INSTRUMENT APERTURE BY NEGATIVELY CHARGED PLATES. THE NEUTRALS WERE PASSED BETWEEN A HOT FILAMENT AND A COLLECTOR, ARRANGED AXIALLY WITHIN A GRID COIL. THE FILAMENT EMITTED ELECTRONS AND IONIZED THE NEUTRALS, WHICH THEN (DUE TO THE POSITIVE GRID CHARGE) FORMED THE ION CURRENT TO THE COLLECTOR. DENSITIES WERE COMPUTED FROM THESE OBSERVED COLLECTOR-CURRENT VALUES. A COLD CATHODE INSTRUMENT WAS ALSO BE INCLUDED IN THIS EXPERIMENT AND OPERATED ON SIMILAR PRINCIPLES.

----- S3-2, PHILBRICK-----

INVESTIGATION NAME- VELOCITY MASS SPECTROMETER

NSSDC ID- 75-114B-02 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.R. PHILBRICK USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT IDENTIFIED ATMOSPHERIC CONSTITUENTS AND MEASURE THEIR DENSITIES. AMBIENT IONS WERE REMOVED, THE NEUTRALS IONIZED AND THE RESULTING IONS WERE THEN MASS SELECTED BY GRID-PRODUCED ELECTROSTATIC FIELDS. THE DIFFERENT IONS WERE BE SEQUENTIALLY SELECTED AND THEN GIVEN A KNOWN ACCELERATION. THE RESULTING TIME-OF-FLIGHT DOWN A DRIFT TUBE IDENTIFIED THE ION MASS, AND A COUNTER AT THE END OF THE TUBE OBSERVED THE CONSTITUENT DENSITIES.

----- S3-2, RICE-----

INVESTIGATION NAME- NEUTRAL DENSITY EXPERIMENT (COLD CATHODE GAGE)

NSSDC ID- 75-114B-03 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED ATMOSPHERIC NEUTRAL DENSITIES AND THEIR LOCALIZED VARIATIONS. THE INSTRUMENT, AFTER REMOVING AMBIENT IONS, IONIZED NEUTRAL PARTICLES BY ELECTRON EMISSION FROM THE CATHODE. THE MEASURED PARAMETER WAS THE ION CURRENT TO A COLLECTOR.

----- S3-2, RICE-----

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER (RPA)

NSSDC ID- 75-114B-11 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED UPWARD FLUX OF IONS FROM THE POLAR IONOSPHERE. DATA FROM THIS WERE USED IN CONJUNCTION WITH MEASUREMENTS OF OTHER POLAR REGION PARAMETERS AND THEIR VARIATIONS, INCLUDING COMPOSITION, CONSTITUENT AND TOTAL DENSITY, ENERGIZED PARTICLE FLUX, ETC. THE OBJECT OF THE STUDY WAS TO MORE ACCURATELY DEFINE PRODUCTION, LOSS, AND EQUILIBRIUM PROCESSES THAT OCCUR WITHIN AND NEAR THE AURORAL OVAL.

----- S3-2, RICE-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER (2-300 EV)

NSSDC ID- 75-114B-13 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.J. RICE AEROSPACE CORP
OI - P.J.L. WILDMAN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT USED AN ELECTROSTATIC ANALYZER TO OBSERVE ION AND ELECTRON DENSITY AS A FUNCTION OF ENERGY (2-300 EV) AND PITCH ANGLE.

----- S3-2, SHUMAN-----

INVESTIGATION NAME- MAGNETOMETER

NSSDC ID- 75-114B-08 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - B.M. SHUMAN USAF GEOPHYSICS LAB
OI - M. SMIDDY USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED MAGNETIC FIELDS ASSOCIATED WITH THE AURORAL REGION IN QUIET AND SUBSTORM PERIODS. THESE OBSERVATIONS WERE USED IN CONJUNCTION WITH OBSERVATIONS FROM OTHER EXPERIMENTS TO STUDY THE MECHANISMS OF ENERGY FLOW INTO THE AURORAL REGIONS DURING QUIET AND SUBSTORM PERIODS. MODELS ASSOCIATING AURORAL-EVENT SOURCES AND TAIL-REGION PARTICLES WERE IMPROVED.

----- S3-2, SMIDDY-----

INVESTIGATION NAME- ELECTRIC FIELD OBSERVATIONS

NSSDC ID- 75-1148-D7 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - M. SMIDDY USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE-COMPONENT OBSERVATIONS OF THE IONOSPHERIC ELECTRIC FIELDS ASSOCIATED WITH THE AURORAL ELECTROJET. THESE OBSERVATIONS WERE USED IN CONJUNCTION WITH OBSERVATIONS FROM OTHER EXPERIMENTS TO STUDY THE MECHANISMS OF ENERGY FLOW INTO THE AURORAL REGIONS DURING QUIET AND SUBSTORM PERIODS.

----- S3-2, VAMPOLA-----

INVESTIGATION NAME- ENERGETIC ELECTRON (0.1- 1.0 MEV) SENSOR

NSSDC ID- 75-1148-06 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - A.L. VAMPOLA AEROSPACE CORP
OI - W. MOOMEY LOS ALAMOS SCI LAB
OI - W.A. KOLASINSKI AEROSPACE CORP
OI - J.F. FENNELL AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT EMPLOYED AN ELECTROMAGNETIC ANALYZER TO OBSERVE FLUX, ENERGY SPECTRA, AND DIRECTION OF ELECTRONS IN THE 0.1-TO 1.0-MEV ENERGY RANGE. OBSERVATIONS WERE MADE OVER THE ENTIRE ORBIT (200 TO 900 KM) DURING A PERIOD OF INCREASING SOLAR ACTIVITY. THEY WERE USED WITH OTHER OBSERVATIONS MADE FROM THIS SPACECRAFT TO HELP DETERMINE CAUSES FOR DENSITY VARIATIONS IN THE NEUTRAL ATMOSPHERE.

----- S3-2, VANCOUR-----

INVESTIGATION NAME- ELECTROSTATIC ANALYZER (1-20 KEV)

NSSDC ID- 75-1148-09 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.P. VANCOUR USAF GEOPHYSICS LAB
OI - M. SMIDDY USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED PROTON AND ELECTRON FLUX FROM 1 TO 23 KEV ASSOCIATED WITH THE AURORAL REGIONS DURING QUIET AND SUBSTORM PERIODS. THESE DATA WERE USED IN CONJUNCTION WITH OBSERVATIONS FROM OTHER EXPERIMENTS TO STUDY THE MECHANISMS OF ENERGY FLOW INTO THE AURORAL REGIONS. MODELS ASSOCIATING AURORAL-EVENT ENERGY SOURCES AND TAIL-REGION PARTICLES WERE IMPROVED.

----- S3-2, WILDMAN-----

INVESTIGATION NAME- SPHERICAL ELECTRON SENSOR AND PLANAR APERTURE ION SENSORS

NSSDC ID- 75-1148-12 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - P.J.L. WILDMAN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A SPHERICAL ELECTRON SENSOR AND TWO ARRAYS OF FOUR PLANAR APERTURE ION SENSORS. BOTH IONS AND ELECTRONS FROM 0.1 TO 33 EV WERE MEASURED. ELECTRON DENSITIES FROM 10 TO 3.0 E+5 CM TO THE POWER -3 AND TEMPERATURES FROM 500 TO 10,000 DEG WERE OBTAINED. FOR IONS, THE DENSITY COULD BE OBTAINED BELOW ALTITUDE OF 5,000 KM.

----- S3-2, YATES-----

INVESTIGATION NAME- LOW ENERGY PROTON SPECTROMETER

NSSDC ID- 75-1148-04 INVESTIGATIVE PROGRAM

SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS INSTRUMENT CONSISTED OF A SOLID-STATE PARTICLE TELESCOPE TO MEASURE PROTONS FROM 0.1 TO 6 MEV. THE ENERGY SPECTRUM WAS OBTAINED BY A 12-CHANNEL ANALYZER. TRAPPED PROTONS IN BOTH THE INNER AND-OUTER ZONE COULD BE MEASURED ALONG WITH SOLAR PROTONS WHEN THE SATELLITE PASSED OVER THE POLAR CAPS.

----- S3-2, YATES-----

INVESTIGATION NAME- PROTON-ALPHA PARTICLE DETECTOR

NSSDC ID- 75-1148-05 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB
OI - W. MOOMEY LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED PROTONS AND ALPHA PARTICLES BETWEEN 200 AND 900 KM. THESE OBSERVATIONS WERE MADE OVER THE ENTIRE ORBIT DURING A PERIOD OF INCREASING SOLAR ACTIVITY. THE RELATIVE EFFECT OF PROTON AND ALPHA PARTICLE VARIATIONS ON NEUTRAL DENSITIES MEASURED FROM THIS SPACECRAFT WERE STUDIED.

***** S3-3*****

SPACECRAFT COMMON NAME- S3-3
ALTERNATE NAMES- SESP 574-2A, 574-2
SS74-2A

NSSDC ID- 76-065B

LAUNCH DATE- 07/08/76 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE-

SPONSORING COUNTRY/AGENCY
UNITED STATES 00D-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/08/76
ORBIT PERIOD- 176.6 MIN INCLINATION- 97.5 DEG
PERIAPSIS- 246. KM ALT APOAPSIS- 7856. KM ALT

PERSONNEL
PM - SAMSO USAF-LAS
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THIS SPACECRAFT WAS A SMALL OBSERVATORY IN A NEAR-POLAR ORBIT WITH EIGHT DIFFERENT SENSORS ON BOARD. IT WAS DESIGNED TO OBSERVE VARIOUS MAGNETOSPHERIC PARAMETERS AND THEIR INTERRELATIONSHIPS. SENSORS, WHICH OBSERVED ENERGETIC PROTONS AND ALPHA PARTICLES, ALSO PROVIDED REAL-TIME OBSERVATIONS FOR USE BY THE SPACE FORECAST FACILITY (USAF-AWS).

----- S3-3, FENNELL-----

INVESTIGATION NAME- ION-ELECTRON MASS SPECTROMETER

NSSDC ID- 76-065B-08 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - J.F. FENNELL AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE H-HE PARTICLE DISTRIBUTION AT INJECTION INTO RADIATION BELTS AND THROUGHOUT THE OUTER REGIONS OF THE MAGNETOSPHERE. THIS INSTRUMENT MEASURED THE FLUX OF 1H+, 4HE++ IN THE ENERGY RANGE FROM 0.09 TO 4 KEV/CHARGE AND ELECTRONS FROM 0.17 TO 8.4 KEV.

----- S3-3, MOZER-----

INVESTIGATION NAME- DC ELECTRIC FIELDS

ORIGINAL PAGE IS
OF POOR QUALITY

NSSDC ID- 76-0658-01 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - F.S. MOZER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT MADE VECTOR ELECTRIC FIELD MEASUREMENTS, UNDER VARIOUS CONDITIONS, AT A VARIETY OF MAGNETOSPHERIC LOCATIONS. THE MEASUREMENTS WERE USED IN STUDYING VARIATIONS IN RADIO FREQUENCY, WAVE PROPAGATION, OPTICAL EMISSIONS, ETC., OBSERVED WITH OTHER EXPERIMENTAL EQUIPMENT.

----- S3-3, SHARP-----
INVESTIGATION NAME- LOW-ENERGY PARTICLE SPECTROMETER

NSSDC ID- 76-0658-02 INVESTIGATIVE PROGRAM
SESP

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

PERSONNEL
PI - R.D. SHARP LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS INSTRUMENT CONSISTED OF AN ELECTROSTATIC ANALYZER FOLLOWED BY A CROSSED ELECTRIC-MAGNETIC FIELD VELOCITY SELECTOR TO MEASURE IONS FROM 1 TO 32 MASS UNITS (U) AND ABOVE 32 U. THE ENERGY/CHARGE RANGED FROM 0.5 TO 16 KEV. ELECTRONS WERE MEASURED FROM 0.07 TO 24 KEV. OBSERVATIONS WERE MADE PERPENDICULAR TO THE ORBIT PLANE.

----- S3-3, VAMPOLA-----
INVESTIGATION NAME- ENERGETIC ELECTRON MAGNETIC SPECTROMETER

NSSDC ID- 76-0658-07 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - A.L. VAMPOLA AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A 12-CHANNEL MAGNETIC SPECTROMETER USED TO OBTAIN VALUES AND MONITOR CHANGES IN THE EQUATORIAL PITCH-ANGLE AND ENERGY DISTRIBUTION OF 0.012- TO 1.6-MEV ELECTRONS AS A FUNCTION OF MAGNETIC ACTIVITY. THE EXPERIMENT ALSO MEASURED PROTONS FROM 0.08 TO 3 MEV AND ALPHA PARTICLES ABOVE 4 MEV.

----- S3-3, WILDMAN-----
INVESTIGATION NAME- ELECTRIC FIELDS-ION DRIFT

NSSDC ID- 76-0658-05 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - P.J.L. WILDMAN USAF GEOPHYS LAB
OI - R.C. SAGALYN USAF GEOPHYSICS LAB
OI - M. SMIDDY USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A SPHERICAL ELECTRON SENSOR AND TWO ARRAYS OF FOUR PLANAR APERTURE ION SENSORS. BOTH IONS AND ELECTRONS FROM 0.1 TO 30 EV WERE MEASURED. ELECTRON DENSITIES FROM 10 TO 3.0 E+5 CM TO THE POWER -3 AND TEMPERATURES FROM 500 TO 10,000 DEG WERE OBTAINED. FOR IONS, THE DENSITY COULD BE OBTAINED BELOW ALTITUDE OF 5,000 KM.

----- S3-3, YATES-----
INVESTIGATION NAME- LOW-ENERGY PHOTON SPECTROMETERS

NSSDC ID- 76-0658-03 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED PROTONS (0.1 TO 100 MEV) TRAPPED WITHIN THE GEOMAGNETIC CAVITY. DATA WERE MADE AVAILABLE FOR REAL-TIME USE AND RECORDED FOR LONG-TERM STUDY. THE DATA WERE USED TO AID THE USAF AIR WEATHER SERVICE IN PROVIDING SPACE ENVIRONMENT FORECASTS AND TO DEVELOP IMPROVED TECHNIQUES FOR PERFORMING THESE FORECASTS.

----- S3-3, YATES-----
INVESTIGATION NAME- PROTON TELESCOPE

NSSDC ID- 76-0658-04 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED ALPHA-PARTICLE POPULATION (20-100 MEV) WITHIN THE GEOMAGNETIC CAVITY. DATA WERE MADE AVAILABLE FOR REAL-TIME USE AND ALSO RECORDED FOR LONG-TERM STUDY. THE PRIMARY USE OF THE DATA WAS BY USAF AIR WEATHER SERVICE IN PROVIDING SPACE ENVIRONMENT FORECASTS AND IN DEVELOPING IMPROVED TECHNIQUES FOR THESE FORECASTS.

***** SAS-C*****
SPACECRAFT COMMON NAME- SAS-C
ALTERNATE NAMES- PL-743D, SAS 3
EXPLORER 53

NSSDC ID- 75-037A
LAUNCH DATE- 05/07/75 WEIGHT- 193. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/06/75
ORBIT PERIOD- 94.9 MIN INCLINATION- 3.0 DEG
PERIAPSIS- 509. KM ALT APOAPSIS- 516. KM ALT

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - J.E. KUPPERIAN, JR. NASA-GSFC
PS - C.E. FICHTEL NASA-GSFC

BRIEF DESCRIPTION
SAS-C WAS THE THIRD OF A SERIES OF SMALL SPACECRAFT WHOSE OBJECTIVES WERE TO SURVEY THE CELESTIAL SPHERE FOR SOURCES RADIATING IN THE X-RAY, GAMMA-RAY, UV, AND OTHER SPECTRAL REGIONS. THE PRIMARY MISSIONS OF SAS 3 WERE TO MEASURE THE X-RAY EMISSION OF DISCRETE EXTRAGALACTIC SOURCES, TO MONITOR THE INTENSITY AND SPECTRA OF GALACTIC X-RAY SOURCES FROM 0.2 TO 60 KEV, AND TO MONITOR THE X-RAY INTENSITY OF SCORPIO-X-1. THE SPACECRAFT WAS LAUNCHED FROM THE SAN MARCO PLATFORM OFF THE COAST OF KENYA, AFRICA, INTO A NEAR CIRCULAR EQUATORIAL ORBIT. FOUR SOLAR PADDLES WERE USED IN CONJUNCTION WITH A 12-CELL, NICKEL-CADMIUM BATTERY TO PROVIDE 65 W OF AVERAGE POWER OVER THE ENTIRE ORBIT. THE SPACECRAFT WAS STABILIZED ALONG THE Z-AXIS AND ROTATES AT ABOUT 0.1 DEG/S. CHANGES TO THE SPIN AXIS ORIENTATION ARE BY GROUND COMMAND, EITHER DELAYED OR IN REAL TIME. THE SPACECRAFT COULD BE MADE TO DITHER BACK AND FORTH PLUS OR MINUS 2.5 DEG ACROSS A SELECTED SOURCE ALONG THE X-AXIS AT 0.01 DEG/SEC. THE EXPERIMENTS CAN LOOK ALONG THE Z-AXIS OF THE SPACECRAFT, PERPENDICULAR TO IT, OR AT AN ANGLE.

----- SAS-C, CLARK-----
INVESTIGATION NAME- ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES

NSSDC ID- 75-037A-01 INVESTIGATIVE PROGRAM
CODE SC

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK MASS INST OF TECH
OI - H.V.D. BRADT MASS INST OF TECH
OI - W.H.G. LEWIN MASS INST OF TECH
OI - H.W. SCHNOPPER MASS INST OF TECH

BRIEF DESCRIPTION
THIS EXPERIMENT DETERMINED THE POSITIONS OF VERY WEAK EXTRAGALACTIC X-RAY SOURCES. THE INSTRUMENT VIEWED A 100-DEG-SQ REGION OF THE SKY AROUND THE DIRECTION OF THE SPIN AXIS OF THE SATELLITE. THE NOMINAL TARGETS FOR A 1-YEAR STUDY WERE -- (1) THE VIRGO CLUSTER OF GALAXIES FOR 4 MONTHS, (2) THE GALACTIC EQUATOR FOR 2 MONTHS, (3) THE ANDROMEDA NEBULA FOR 3 MONTHS, AND (4) THE MAGELLANIC CLOUDS FOR 3 MONTHS. THE INSTRUMENTATION CONSISTED OF ONE 2.5-ARC-MIN AND ONE

4.5-ARC-MIN FWHM MODULATION COLLIMATOR, AS WELL AS PROPORTIONAL COUNTERS SENSITIVE OVER THE ENERGY RANGE FROM 1.5 TO 10 KEV. THE EFFECTIVE AREA OF EACH COLLIMATOR WAS ABOUT 225 CM-SQ. THE ASPECT SYSTEM PROVIDED INFORMATION ON THE ORIENTATION OF THE COLLIMATORS TO AN ACCURACY OF 15 ARC-S.

----- SAS-C, CLARK -----

INVESTIGATION NAME- ANALYSIS OF GALACTIC X-RAY SOURCES

NSSDC ID- 75-Q37A-02 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK MASS INST OF TECH
O1 - H.V.D.BRADT MASS INST OF TECH
O1 - W.H.G.LEWIN MASS INST OF TECH
O1 - H.W. SCHNOPPER MASS INST OF TECH

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WERE TO LOCATE GALACTIC X-RAY SOURCES TO 15 ARC-S AND TO MONITOR THESE SOURCES FOR INTENSITY VARIATIONS. THE SOURCE POSITIONS WERE DETERMINED WITH THE USE OF THE MODULATION COLLIMATORS OF THE EXTRAGALACTIC EXPERIMENT DURING THE NOMINAL 2-MONTH OBSERVATION OF THE GALACTIC EQUATOR. THE MONITORING OF THE X-RAY SKY WAS ACCOMPLISHED BY THE USE OF THREE SLAT COLLIMATORS. ONE COLLIMATOR, 1-BY-70-DEG FWHM, WAS ORIENTED PERPENDICULAR TO THE EQUATORIAL PLANE OF THE SATELLITE, WHILE THE OTHER TWO EACH OF 0.5-BY-45-DEG FWHM, WERE ORIENTED 30 DEG ABOVE AND 30 DEG BELOW THE FIRST. THE DETECTOR BEHIND EACH COLLIMATOR WAS A PROPORTIONAL COUNTER, SENSITIVE FROM 1.5 TO 13 KEV, WITH AN EFFECTIVE AREA OF ABOUT 100 CM SQ. THE 1.0-DEG COLLIMATOR HAD AN ADDITIONAL COUNTER OF THE SAME AREA, SENSITIVE FROM 8 TO 50 KEV. THREE LINES OF POSITION WERE OBTAINED FOR ANY GIVEN SOURCE WHEN THE SATELLITE IS BEING SPUN AT A STEADY ROTATION OF 4 ARC-MIN/S ABOUT THE Z-AXIS.

----- SAS-C, CLARK -----

INVESTIGATION NAME- CONTINUOUS X-RAY FLUCTUATION MONITOR OF SCORPIO X-1

NSSDC ID- 75-Q37A-03 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK MASS INST OF TECH
O1 - H.V.D.BRADT MASS INST OF TECH
O1 - W.H.G.LEWIN MASS INST OF TECH
O1 - H.W. SCHNOPPER MASS INST OF TECH

BRIEF DESCRIPTION
A 12-BY-50-DEG FWHM SLAT COLLIMATOR WAS ORIENTED WITH ITS LONG AXIS PERPENDICULAR TO THE SATELLITE SPIN AXIS SUCH THAT A GIVEN POINT ON THE SKY CAN BE MONITORED FOR ABOUT 25 PERCENT OF A ROTATION. THIS COLLIMATOR WAS INCLINED BY 31 DEG WITH RESPECT TO THE EQUATORIAL PLANE OF THE SATELLITE, SO THAT SCORPIO X-1 WAS OBSERVED WHILE THE Z-AXIS IS ORIENTED TO THE VIRGO CLUSTER OF GALAXIES. THE DETECTORS USED IN THIS EXPERIMENT WERE PROPORTIONAL COUNTERS WITH A 1-MIL BE WINDOW. THE ENERGY RANGE WAS FROM 1.0 TO 60 KEV, AND THE TOTAL EFFECTIVE AREA WAS ABOUT 40 CM² SQ.

----- SAS-C, CLARK -----

INVESTIGATION NAME- X-RAY ABSORPTION CONTOURS OF THE GALAXY

NSSDC ID- 75-Q37A-04 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK MASS INST OF TECH
O1 - H.V.D.BRADT MASS INST OF TECH
O1 - W.H.G.LEWIN MASS INST OF TECH
O1 - H.W. SCHNOPPER MASS INST OF TECH

BRIEF DESCRIPTION
THE DENSITY AND DISTRIBUTION OF THE INTERSTELLAR MATTER WAS DETERMINED BY MEASURING THE VARIATION IN THE INTENSITY OF THE LOW-ENERGY DIFFUSE X-RAY BACKGROUND AS A FUNCTION OF GALACTIC LATITUDE. A 1-MICROMETER POLYPROPYLENE WINDOW PROPORTIONAL COUNTER WAS USED FOR THE 0.1- TO 0.25-KEV AND 0.5- TO 1.0-KEV ENERGY RANGES, WHILE A 2-MICROMETER TITANIUM WINDOW COUNTER COVERED THE ENERGY RANGE FROM 0.3 TO 0.5 KEV. IN ADDITION, TWO 1-MIL PE WINDOW COUNTERS WERE USED FOR THE 1.0- TO 10-KEV ENERGY RANGE. THE COLLIMATORS IN THIS EXPERIMENT HAD FIELDS OF VIEW OF 3 DEG FOR THE 1-MICROMETER COUNTER, 2 DEG FOR THE 2-MICROMETER COUNTER, AND 2 DEG FOR THE 1-MIL COUNTERS.

***** SEASAT 1 *****

SPACECRAFT COMMON NAME- SEASAT 1
ALTERNATE NAMES- OCEAN DYNAMICS SAT-A, SEA SATELLITE-A
10967, SEASAT-A

NSSDC ID- 78-064A

LAUNCH DATE- 06/27/78 WEIGHT- 1800. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS-AGEN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/28/78
ORBIT PERIOD- 100.7 MIN INCLINATION- 108.0 DEG
PERIAPSIS- 769. KM ALT APOAPSIS- 799. KM ALT

PERSONNEL
MG - S.W. MCCANDLESS, JR. NASA HEADQUARTERS
PM - W.E. GIBERSON NASA-JPL
PS - J.A. DUNNE NASA-JPL

BRIEF DESCRIPTION
THE OCEAN DYNAMICS SATELLITE (SEASAT 1) IS DESIGNED TO PROVIDE MEASUREMENTS OF WAVE HEIGHT AND DIRECTION SPECTRUM, SURFACE WIND SPEED AND DIRECTION, SEA SURFACE TOPOGRAPHY, AND HIGH RESOLUTION RADAR AND INFRARED IMAGERY OF SELECTED AREAS OF THE OCEAN. THE INSTRUMENT PAYLOAD CONSISTS OF X-BAND COMPRESSED PULSE RADAR ALTIMETER, COHERENT SYNTHETIC APERTURE IMAGING RADAR, MICROWAVE WIND SCATTEROMETER, SCANNING MULTIFREQUENCY MICROWAVE RADIOMETER, AND INFRARED RADIOMETER. SOME OF THE ACCURACIES EXPECTED ARE DISTANCE BETWEEN SPACECRAFT AND OCEAN SURFACE TO 10 CM, WIND SPEEDS TO 6.6 FPS, AND SURFACE TEMPERATURES TO 1 DEG C.

----- SEASAT 1, MARSH -----

INVESTIGATION NAME- LASER TRACKING

NSSDC ID- 78-064A-06 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - J.G. MARSH NASA-GSFC

BRIEF DESCRIPTION
LASER CORNER REFLECTORS COMPOSED OF 96 FUSED SILICA 3.75-CM HEXAGONAL CORNER CUBE RETROREFLECTORS AND GROUND-BASED LASER SYSTEMS ARE USED TO OBTAIN PRECISE SATELLITE TRACKING INFORMATION. THE RETROREFLECTOR ARRAY IS CONFIGURED AS A SINGLE RING OF CUBE CORNERS 1.27 M IN DIAMETER. SIXTEEN OF THE CUBE CORNERS ARE TILTED AWAY FROM THE AXIS OF THE RING BY AN ANGLE OF 25 DEG AND THE REMAINING 80 CUBES BY AN ANGLE OF 50 DEG. BECAUSE OF THE GREAT DISTANCE OF THE ARRAY FROM THE CENTER OF MASS OF THE SATELLITE THE RANGE CORRECTION VARIES FROM -5.28 M AT ZENITH TO -3.08 M NEAR THE HORIZON. WHEN ILLUMINATED BY LASER LIGHT PULSES FROM THE GROUND EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTS THE LIGHT PULSES BACK TO A TELESCOPE/RECEIVER ON THE GROUND. A DIGITAL COUNTER RECORDS THE TIME OF FLIGHT OF THE LASER LIGHT PULSES FROM THE GROUND TO THE SATELLITE AND BACK TO THE GROUND. RANGE IS DETERMINED FROM THIS TIME. NASA, USAF, SAO AND FOREIGN LASER TRACKING STATIONS TRACK THIS SATELLITE.

----- SEASAT 1, MCLAIN -----

INVESTIGATION NAME- SCANNING VISUAL/INFRARED RADIOMETER

NSSDC ID- 78-064A-04 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL
PI - E.P. MCLAIN NOAA-NES
TM - R. BERNSTEIN SCRIPPS INST OCEANOGR
TM - O.K. HUH LOUISIANA STATE U
TM - W.L. BARNES NASA-GSFC
TM - F.M. VUKOVICH RESEARCH TRIANGLE INST
TM - K.D. FELLERMAN NASA-GSFC

BRIEF DESCRIPTION
THE SCANNING VISIBLE-IR RADIOMETER (SR) EXPERIMENT (1) OBTAINS IMAGES OF VISIBLE AND THERMAL IR EMISSION FROM OCEAN, COASTAL, AND ATMOSPHERIC FEATURES IN SUPPORT OF THE OTHER EXPERIMENTS AND (2) IDENTIFIES CURRENTS AND STORMS. THIS SENSOR, ORIGINALLY FLOWN ON THE ITOS SERIES SPACECRAFT, CONSISTS OF TWO SCANNING RADIOMETERS, A DUAL SR PROCESSOR AND TWO SR RECORDERS. THE RADIOMETER MEASURES REFLECTED RADIATION FROM THE EARTH/ATMOSPHERE SYSTEM IN THE 0.52- AND 0.73-MICROMETER BAND DURING THE DAY AND EMITTED RADIATION FROM THE EARTH AND ITS ATMOSPHERE IN THE 10.5- TO 12.5-MICROMETER REGION DURING THE DAY AND NIGHT.

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OF POOR QUALITY

----- SEASAT 1, PIERSON-----

INVESTIGATION NAME- MICROWAVE WIND SCATTEROMETER

NSSDC ID- 78-064A-03 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL

TL - W.J. PIERSON CUNY INST MAR+ATMOS SC
TM - W.L. GRANTHAM NASA-LARC
TM - G. FLITNER NOAA-NWS
TM - L. BAER OCEAN + ATMOSP SERVICE
TM - I.M. HALBERSTAN NASA-JPL
TM - W.L. JONES, JR. NASA-LARC
TM - D. MOORE U OF KANSAS

BRIEF DESCRIPTION

THE MICROWAVE WIND SCATTEROMETER EXPERIMENT IS DESIGNED TO USE AN ACTIVE RADAR SYSTEM TO MEASURE WIND SPEED AND DIRECTION. THE INSTRUMENT, DEVELOPED FROM THE SKYLAB EXPERIMENTAL SCATTEROMETER, DETERMINES WIND DIRECTION WITHIN 25 DEG AND WIND SPEED FROM LESS THAN 4 METERS/S TO GREATER THAN 26 METERS/S WITH AN ACCURACY OF 2 METERS/S. THE SCATTEROMETER TAKES MEASUREMENTS OVER TWO 460 KM-WIDE SWATHS EQUALLY DISPLACED ABOUT THE NADIR BY 235 KM. A HIGH WIND SWATH ADDS AN ADDITIONAL 260 KM TO EACH SIDE.

----- SEASAT 1, ROSS-----

INVESTIGATION NAME- SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR)

NSSDC ID- 78-064A-05 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) OCEANOGRAPHY

PERSONNEL

TL - D.B. ROSS NOAA-ERL
TM - J.W. SHERMAN, III NOAA-NESS
TM - F.T. BARATH NASA-JPL
TM - J. WATERS NASA-JPL
TM - J.P. HOLLINGER US NAVAL RESEARCH LAB
TM - T.I. WILHEIT, JR. NASA-GSFC
TM - N. HUANG NASA-WFC
TM - C.T. SWIFT NASA-LARC
TM - W.J. CAMPBELL US GEOLOGICAL SURVEY
TM - V.J. CARPONE OCEAN WEATHER INC

BRIEF DESCRIPTION

THE PRIMARY PURPOSE OF THE SCANNING MULTICHANNEL MICROWAVE RADIOMETER EXPERIMENT IS 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, ARE PARAMETERS WHICH ARE DERIVED. OCEAN ICE VS WATER IS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES ARE 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, AND 6.633 GHZ). THE ANTENNA IS A PARABOLIC REFLECTOR OFFSET FROM NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDES OBSERVATIONS FROM WITHIN CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THIS SAME EXPERIMENT IS ON NIMBUS-G.

----- SEASAT 1, TAPLEY-----

INVESTIGATION NAME- COMPRESSED PULSE RADAR ALTIMETER (RA)

NSSDC ID- 78-064A-01 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) NAVIGATION METEOROLOGY

PERSONNEL

TL - B.D. TAPLEY U OF TEXAS, AUSTIN
TM - S.L. SMITH, III USN SURF WEAPONS CNTR
TM - B.H. CHOVITZ NOAA-NOS
TM - W.F. TOWNSEND NASA-WFC
TM - J.T. MCGOOGAN NASA-WFC
TM - H.M. BYRNE NOAA-PMEL
TM - E.M. GAPOSCHKIN SAO
TM - P. DELEONIBUS US NAVAL RESEARCH LAB
TM - B. YAPLEE US NAVAL RESEARCH LAB
TM - C.J. COHEN USN SURF WEAPONS CNTR

BRIEF DESCRIPTION

THE COMPRESSED PULSE RADAR ALTIMETER EXPERIMENT (1) MEASURES THE ALTITUDE BETWEEN THE SPACECRAFT AND THE OCEAN SURFACE AND (2) MEASURES WAVE HEIGHT. THE ALTIMETER IS A MORE ACCURATE VERSION OF THE SKYLAB RADAR ALTIMETER, EXPERIMENT S-193 (NSSDC 73-027A-20), AND IS SIMILAR TO THE ALTIMETER THAT FLEW ON GEOS-C. THE ALTIMETER PRECISION OF PLUS OR MINUS 10 CM ALLOWS TIME VARYING FEATURES SUCH AS TIDES, WIND PILE-UP, AND STORM SURGES TO BE SENSED AND IDENTIFIED. IT IS ALSO CAPABLE OF LOCATING AND MAPPING OCEAN SURFACE CURRENTS WITH SPEEDS OF 30 TO 50 CM/S OR GREATER, BECAUSE THE SLOPE OF THE SURFACE IS PROPORTIONAL TO THE SURFACE SPEED. THE MEASUREMENT OF WAVE

HEIGHT, WHICH IS REQUIRED TO OBTAIN A 10-CM PRECISION IN ALTITUDE, CAN BE COMBINED WITH SURFACE WIND MEASUREMENTS TO DETERMINE SEA STATE.

----- SEASAT 1, TELEKI-----

INVESTIGATION NAME- COHERENT SYNTHETIC APERTURE IMAGING RADAR (SAR)

NSSDC ID- 78-064A-02 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) NAVIGATION METEOROLOGY

PERSONNEL

TL - P.G. TELEKI US GEOLOGICAL SURVEY
TM - D.B. ROSS NOAA-ERL
TM - W.J. CAMPBELL US GEOLOGICAL SURVEY
TM - A. LOOMIS NASA-JPL
TM - W.E. BROWN, JR. NASA-JPL
TM - F.T. BARATH NASA-JPL
TM - D.H. RODGERS NASA-JPL
TM - C.L. RUFENACH NOAA-ERL
TM - J.W. SHERMAN, III NOAA-NESS
TM - R. STEWART SCRIPPS INST OCEANOGR
TM - J. ZELENSKA ENVIRON RES INST OF MI
TM - O.H. SHEMDIN NASA-JPL

BRIEF DESCRIPTION

THE COHERENT, SYNTHETIC APERTURE, IMAGING RADAR EXPERIMENT IS DESIGNED TO USE WAVE PATTERN AND DYNAMIC BEHAVIOR INFORMATION TO OBTAIN IMAGES OF THE OCEAN. THE INSTRUMENT, FLOWN ON APOLLO 17 AS THE APOLLO LUNAR SOUNDER, YIELDS IMAGES OF WAVES WHOSE WAVE LENGTH IS IN THE RANGE OF 5 TO 1000 METERS AND CAN DETERMINE WAVE DIRECTION WITHIN 25 DEG WITH THE POSSIBILITY OF A 180 DEG AMBIGUITY FOR ONE-SIDE IMAGES. WAVE HEIGHT CAN ALSO BE DETERMINED FROM THE DATA FOR FULLY DEVELOPED SEAS. THE IMAGING RADAR CAN FUNCTION THROUGH CLOUDS AND NOMINAL RAIN TO PROVIDE WAVE PATTERNS NEAR SHORELINE AND HIGH-RESOLUTION PICTURES OF ICE, OIL SPILLS, CURRENT PATTERNS, AND SIMILAR FEATURES.

***** SIGNE 3*****

SPACECRAFT COMMON NAME- SIGNE 3
ALTERNATE NAMES- SOL INTER GAMMA NEUT EXP

NSSDC ID- 77-049A

LAUNCH DATE- 06/17/77 WEIGHT- 102. KG
LAUNCH SITE-
LAUNCH VEHICLE- UNKNOWN

SPONSORING COUNTRY/AGENCY
FRANCE CNES
U.S.S.R. INTERCOS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 06/19/77
ORBIT PERIOD- 94.395 MIN INCLINATION- 50.67 DEG
PERIAPSIS- 457.33 KM ALT APOAPSIS- 522.54 KM ALT

PERSONNEL

PM - A. MIZZI CNES
PM - KREMNEV SAS-IPA
PS - M. NIEL CESR
PS - G.O. THUILLIER CNRS

BRIEF DESCRIPTION

SIGNE 3 IS A FRENCH SATELLITE PLACED IN ORBIT BY THE SOVIET UNION UNDER A COOPERATIVE AGREEMENT. THIS SATELLITE IS PART OF THE D2 SERIES. IT CARRIES TWO SCIENTIFIC EXPERIMENTS, ONE FOR GAMMA-RAY ASTRONOMY IN THE ENERGY RANGE 20 KEV TO 10 MEV, AND ONE FOR CONTINUOUS MONITORING OF THE SOLAR SPECTRUM IN TWO ULTRAVIOLET BANDS (1800 TO 1950 A AND 2050 TO 2200 A). THE MAIN BODY OF THE SPACECRAFT IS A CYLINDER 70 CM IN DIAMETER AND 81 CM IN HEIGHT. ELECTRICAL POWER IS SUPPLIED BY FOUR SOLAR PANELS EXTENDING 1.3 M FROM THE SPACECRAFT AXIS. THE SOLAR ARRAY PROVIDES 50 W TO SILVER CADMIUM STORAGE BATTERIES. THE TELEMETRY EQUIPMENT CONSISTS OF A PCM-PM SYSTEM, USING A 136.7-MHZ, 0.5-W TRANSMITTER. REAL-TIME DATA RATE IS 250 BPS. AN ONBOARD TAPE RECORDER EXTENDED THE DATA COVERAGE UNTIL ITS FAILURE IN MARCH 1978. THE COMMAND SYSTEM OPERATES AT 148.5 MHZ AND PROVIDES 54 SEPARATE COMMANDS. THE TELEMETRY NETWORK INCLUDES THREE FRENCH STATIONS (TOULOUSE, PRETORIA, AND KOUROU) AND FIVE MASA STATIONS (ASCENSION IS., SANTIAGO, QUITO, ORRORAL, AND MERRIT IS.). THE SATELLITE CONTROL CENTER IS AT TOULOUSE. THE SATELLITE AXIS IS POINTED TOWARDS THE SUN AT A 10-DEG ANGLE WITH RESPECT TO THE SUN/EARTH LINE. NITROGEN GAS JETS ARE USED TO MAINTAIN THIS ORIENTATION.

----- SIGNE 3, NIEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 77-049A-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - M. NIEL CESR

BRIEF DESCRIPTION
THE PURPOSE OF THE GAMMA-RAY ASTRONOMY (GRA) INVESTIGATION IS TO SURVEY THE GAMMA RADIATION IN OUR GALAXY. THE DATA ARE USED TO INVESTIGATE THE CONCENTRATION OF INTERSTELLAR MATTER IN THE ARMS AND BETWEEN THE ARMS OF THE GALACTIC SPIRAL, TO LOCATE SOURCES OF INTENSE GAMMA-RAY RADIATION, TO STUDY THE ENERGY SPECTRUM OF THE GAMMA-RAY BACKGROUND, AND TO STUDY GAMMA-RAY BURSTS. THE EXPERIMENT INCLUDES A DIRECTIONAL PACKAGE CONTAINING SEVERAL SCINTILLATION DETECTORS WITH ASSOCIATED PHOTOMULTIPLIERS AND PREAMPLIFIERS. THE GAMMA-RAY TELESCOPE IS MOUNTED IN THE CENTRAL TUBE OF THE SPACECRAFT AND IS AIMED IN THE ANTI-SOLAR DIRECTION. THE TELESCOPE HAS A 20-DEG VIEWING ANGLE AND IT CAN SEE PLUS OR MINUS 20 DEG ABOUT THE ECLIPIC PLANE. A COMPLETE GALACTIC SURVEY, WHICH INCLUDES OBSERVATIONS OF BOTH THE GALACTIC CENTER AND THE GALACTIC ANTI-CENTER, IS ACCOMPLISHED IN 1 YR. THE INSTRUMENTATION YIELDS THE ENERGY SPECTRUM IN THE 20-KEV TO 8-MEV RANGE IN 14 BROAD BANDS AT A 16-S CYCLING RATE. THE ENERGY SPECTRUM IN THE 250-KEV TO 2.5-MEV RANGE IS ALSO MONITORED IN 256 NARROW (13 KEV) CHANNELS WITH EACH IMPULSE BEING TRANSMITTED IN REAL TIME. ONE COUNTING CHANNEL (ASSOCIATED WITH OMDIRECTIONAL DETECTORS) MEASURES ENERGY BURSTS GREATER THAN 6 KEV WITH A PRECISION OF 6 MILLISECONDS. ONE COUNTING CHANNEL (ASSOCIATED WITH DIRECTIONAL DETECTORS) MEASURES ENERGY BURSTS GREATER THAN 20 KEV WITH A PRECISION OF 32 MILLISECONDS.

----- SIGNE 3, THUILLIER-----

INVESTIGATION NAME- SOLAR MONITORING

NSSDC ID- 77-049A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA

BRIEF DESCRIPTION
THE PURPOSE OF THIS INVESTIGATION IS TO MONITOR TWO SOLAR UV BANDS CENTERED AT 1850 AND 2150 A, RESPECTIVELY, AND TO USE THESE DATA TO SEPARATE CHROMOSPHERIC RADIATION RELATED TO SOLAR ACTIVITY FROM PHOTOSPHERIC RADIATION, WHICH SHOULD BE CONSTANT WITH TIME. THIS INVESTIGATION IS THE FIRST OF A SERIES OF SUCH INVESTIGATIONS AIMED AT OBTAINING THESE DATA FOR A FULL SOLAR CYCLE. TO MINIMIZE EXPECTED DEGRADATION OF THE SOLAR SPECTROMETER, VERY STABLE COMPONENTS WERE SELECTED FOR THE OPTICAL SYSTEM (SUPRASIL LENSES); FOR THE DETECTORS (DIODES WITH VERY LOW QUANTUM OUTPUT); AND FOR THE ELECTRIC SYSTEM, WHICH ALSO MONITORS THE TEMPERATURE TO PERMIT CORRECTIONS FOR GAIN FLUCTUATIONS. THE SPECTROMETER, WHICH WAS AIMED IN THE SOLAR DIRECTION, DEGRADED MORE RAPIDLY THAN EXPECTED, AND AFTER DECEMBER 1977 IT CEASED TO YIELD USEFUL DATA.

***** SMS 1*****

SPACECRAFT COMMON NAME- SMS 1
ALTERNATE NAMES- SMS-A, SYNCH METEOROL SATELL A
AEROS, MEC1

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-GSFC

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/23/74
ORBIT PERIOD- 1340.4 MIN INCLINATION- 1.9 DEG
PERIAPSIS- 32345.0 KM ALT APOAPSIS- 35439.0 KM ALT

PERSONNEL
PM - A. BUTERA 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) TO PROVIDE HIGH QUALITY DAY/NIGHT CLOUDCOVER DATA AND MADE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM RELAYED 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) MEASURED PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAMETER 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 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 PROVIDE 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 UHF- 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
OPERATIONAL WEATHER OBSERVATIONS
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 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 MICROMETER) 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-CRETJEN 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), WALLOPS 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
OPERATIONAL WEATHER OBSERVATIONS
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 (HEFAX TYPE) DATA 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 SMS CONSISTED OF APPROXIMATELY 3500 DCP STATIONS

ORIGINAL PAGE IS
OF POOR QUALITY

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.

----- SMS 1, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 74-033A-02 INVESTIGATIVE PROGRAM
ENVIRON. MONITORING DEVELOPMENT
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER 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
ENVIRON. MONITORING DEVELOPMENT
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - R.F. DONNELLY 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 5-MIL 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 50-MIL 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
ENVIRON. MONITORING DEVELOPMENT
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION
A BIAXIAL, SHORT BOCM-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 GAMMAS), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 GAMMAS IN 40-GAMMA STEPS), AND AN IN-FLIGHT CALIBRATION CAPABILITY.

***** SMS 2*****

SPACECRAFT COMMON NAME- SMS 2
ALTERNATE NAMES- PL-731E, SYNCH METEOROL SATELL B
SMS-B, MECZ

NSSDC ID- 75-011A

LAUNCH DATE- 02/06/75 WEIGHT- 243. KS
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- 04/01/75
ORBIT PERIOD- 1436.2 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 35778. KM ALT APOAPSIS- 35799. KM ALT

PERSONNEL
PM - A. BUTERA NOAA-NESS
PS - W.E. SHENK NASA-GSFC

BRIEF DESCRIPTION
THE SMS 2, A NASA-DEVELOPED, NOAA-OPERATED SPACECRAFT, CARRIED (1) A VISIBLE-IRREDARED 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 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. 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-IRREDARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-011A-04 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

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

BRIEF DESCRIPTION
THE VISIBLE-IRREDARED 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 RITCHY-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 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 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), MALLOPS 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

NSSDC ID- 75-011A-05 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS

PERSONNEL PI - NESS STAFF NOAA-MESS

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 (WEFAX TYPE) DATA TO EXISTING SMALL GROUND-BASED ART RECEIVING STATIONS FROM A LARGER WEATHER CENTRAL FACILITY. THE MINIMUM DATA COLLECTION FOR ONE SPACECRAFT CONSISTED OF APPROXIMATELY 3500 DCP STATIONS CONTACTED IN 6 H. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6 H WAS BETWEEN 357K AND 620K 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

NSSDC ID- 75-011A-01 INVESTIGATIVE PROGRAM ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL OI - H.H. SAUER 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 PULSEHEIGHT DISCRIMINATION, ARE 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 4.0 MEV, AND ONE CHANNEL MEASURES ELECTRONS GREATER THAN 0.5 MEV.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-011A-02 INVESTIGATIVE PROGRAM ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL OI - R.F. DONNELLY 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 5-MIL 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 50-MIL BERYLLIUM WINDOW TO MEASURE X PAYS OF 0.5 TO 3 A.

----- SMS 2, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- 75-011A-03 INVESTIGATIVE PROGRAM ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL PI - D.J. WILLIAMS NOAA-ERL OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

A SHORT BOOM DEPLOYED .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 VECTOR MAGNETIC FIELD, SELECTABLE RANGE (+50, 100, 200, OR 400 GAMMAS), AN OFFSET FIELD CAPABILITY (PLUS OR MINUS 1200 GAMMAS IN 40-STEPS), AND AN INFIGHT CALIBRATION CAPABILITY.

***** SOLRAD 10*****

SPACECRAFT COMMON NAME- SOLRAD 10 ALTERNATE NAMES- EXPLORER 44, SOLAR EXPLORER-C SE-C, SOLRAD-C PL-703A

NSSDC ID- 71-056A

LAUNCH DATE- 07/08/71 WEIGHT- 260. KG LAUNCH SITE- Wallops Flight Center, United States LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSS UNITED STATES DOD-NAVY

INITIAL ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/09/71 ORBIT PERIOD- 95.3 MIN INCLINATION- 51.0 DEG PERIAPSIS- 436. KM ALT APOAPSIS- 630. KM ALT

PERSONNEL MG - J.R. HOLTZ NASA HEADQUARTERS SC - J.D. BOHLIN NASA HEADQUARTERS PM - E.W. PETERKIN US NAVAL RESEARCH LAB PS - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

SOLRAD 10, A SPIN-STABILIZED SATELLITE, WAS ONE IN A SERIES OF SPACECRAFT DESIGNED TO PROVIDE CONTINUOUS COVERAGE OF WAVELENGTH AND INTENSITY CHANGES IN SOLAR RADIATION IN THE UV, SOFT, AND HARD X-RAY REGIONS. (THE FIRST SPACECRAFT IN THIS SERIES, SR-1, WAS LAUNCHED IN 1960.) SOLRAD 10 ALSO MAPPED THE CELESTIAL SPHERE USING A HIGH-SENSITIVITY X-RAY DETECTOR. THE SPACECRAFT WAS A 12-SIDED CYLINDER THAT MEASURED 76 CM IN DIAMETER AND 58 CM IN HEIGHT. FOUR SYMMETRICALLY PLACED 17.8- BY 53.3-CM SOLAR CELL PANELS, HINGED AT THE CENTER SECTION OF THE STRUCTURE, SERVED AS THE ELEMENTS OF A TURNSTILE ANTENNA SYSTEM. EIGHTEEN SOLAR SENSORS WERE MOUNTED POINTING PARALLEL TO THE SPIN AXIS OF THE SATELLITE, WHICH POINTED DIRECTLY AT THE SOLAR DISK. THE PLANE OF ROTATION SHIFTED ABOUT 1 DEG/DAY SO THAT A STELLAR DETECTOR MOUNTED TO POINT RADIALLY OUTWARD FROM THE AXIS SCANNED THE CELESTIAL SPHERE. DATA FROM ALL DETECTORS WERE STORED IN A 54-KBS CORE MEMORY AND TELEMETRED ON COMMAND TO THE NRL TRACKING STATION AT BLOSSOM PT., MD. DATA WERE ALSO TRANSMITTED IN REAL TIME AT 137.710 MHZ.

----- SOLRAD 10, KREPLIN-----

INVESTIGATION NAME- SOLAR RADIATION DETECTORS

NSSDC ID- 71-056A-C1 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL PI - R.W. KREPLIN US NAVAL RESEARCH LAB OI - D.D. BROUSSEAU US NAVAL RESEARCH LAB OI - E.T. BYRAM US NAVAL RESEARCH LAB OI - J.H. CARVER U OF ADELAIDE OI - R.E. EISENHAUER US NAVAL RESEARCH LAB OI - G.G. FRITZ US NAVAL RESEARCH LAB OI - D.M. HORAN US NAVAL RESEARCH LAB OI - A.T. MCCLELLINTON, JR. PHOENIX CORP OI - R.G. TAYLOR US NAVAL RESEARCH LAB OI - J.G. WINKLER US NAVAL RESEARCH LAB

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO MONITOR THE SOLAR X-RAY FLUX IN EIGHT BANDS AND THE SOLAR UV FLUX IN FIVE BANDS AS PART OF A LONG-TERM PROJECT TO OBSERVE SOLAR X-RAY AND UV ACTIVITY WITH SETS OF STANDARDIZED SENSORS OVER AN ENTIRE SOLAR CYCLE. THE X-RAY BANDS OBSERVED WERE 0.05 TO 0.8 A, 0.1 TO 1.6 A, 0.5 TO 3 A, 1 TO 5 A, 1 TO 8 A, 8 TO 16 A, 1 TO 20 A, AND 44 TO 60 A. ALL THE DETECTORS FOR THESE BANDS, WITH THE EXCEPTION OF THAT FOR THE 0.05- TO 0.8-A BAND, WERE ION CHAMBERS FITTED WITH A VARIETY OF WINDOW MATERIAL (BERYLLIUM, ALUMINUM, AND MYLAR) OF VARIOUS THICKNESSES AND FILLED WITH SEVERAL DIFFERENT GASES (KRYPTON, ARGON, NITROGEN, CARBON TETRACHLORIDE, AND XENON) AT VARIOUS PRESSURES. THE 0.05- TO 0.8-A BAND HAD AS A DETECTOR A CESIUM IODIDE (NA) SCINTILLATING CRYSTAL SURROUNDED BY A PLASTIC SCINTILLATING MATERIAL VIEWED BY A SINGLE PHOTOMULTIPLIER. THIS DETECTOR WAS DESIGNED TO COLLECT DATA ON THE VERY HIGH-ENERGY SOLAR X-RAY EMISSION OBSERVED ONLY DURING SOLAR FLARES. THE UV BANDS OBSERVED WERE 170 TO 500 A, 170 TO 730 A, 1080 TO 1350 A, 1225 TO 1350 A, AND 1450 TO 1600 A. THE TWO SHORTER WAVELENGTH BANDS HAD LITHIUM FLUORIDE, PHOTSENSITIVE SURFACES PROTECTED BY ALUMINUM, ALUMINUM OXIDE, AND CARBON WINDOWS FOR DETECTORS, WHILE THE REMAINING BANDS HAD ION CHAMBERS WITH WINDOWS COMPOSED OF LITHIUM FLUORIDE, CALCIUM FLUORIDE, OR SILICON DIOXIDE, AND VARIOUS GAS FILTERS (NITRIC

ORIGINAL PAGE IS OF POOR QUALITY

OXIDE OR TRIETHYLAMINE E). SOME OF THE SOLAR DETECTORS WERE PROTECTED FROM CHARGED PARTICLES BY CONE-SHAPED ALUMINUM COLLIMATORS. THE DATA WERE TRANSMITTED OVER TWO TELEMETRY SYSTEMS IN ONE OF THREE FORMS -- STORED DATA, REAL-TIME DIGITAL (PCM) DATA, AND REAL-TIME ANALOG DATA. TELEMETRY SYSTEM 1 (TM 1) USED A PAM/PCM/FM/PM TRANSMITTER THAT OPERATED AT 137.710 MHZ WITH A RADIATED POWER OF 250 MW. UNDER NORMAL OPERATING CONDITIONS, TM 1 CONTINUOUSLY TRANSMITTED ANALOG AND PCM REAL-TIME DATA, ALTHOUGH THE REAL-TIME DIGITAL PCM WAS THE PRIMARY REAL-TIME TRANSMISSION FORMAT. TELEMETRY SYSTEM 2 (TM 2) USED A PCM/PM TRANSMITTER THAT OPERATED AT 136.380 MHZ WITH A RADIATED POWER OF 257 MW. TM 2 TRANSMITTED STORED DATA (UP TO ONE DATA SAMPLE PER MIN- FOR 14.25 H) ON COMMAND.

***** SOLRAD 11B*****

SPACECRAFT COMMON NAME- SOLRAD 11B
ALTERNATE NAMES- SOLRAD HI-TRIP, SESP P74-1D
SP74-1D, SESP NO. NRL-111-0264
SRD-11B

NSSDC ID- 76-0230

LAUNCH DATE- 03/15/76 WEIGHT- 102.15 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- 25.6 DEG
PERIAPSIS- 115720. KM ALT APOAPSIS- 116645. KM ALT

PERSONNEL
PM - E.W. PETERKIN 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 60 A, PROPORTIONAL COUNTERS AND SCINTILLATORS OBSERVING SOLAR X RAYS BETWEEN 2 AND 150 KEV, AN EUV DETECTOR COVERING THREE BANDS BETWEEN 170 AND 1000 A, A VARIABLE RESOLUTION EBERT-FASTIE SPECTROMETER COVERING THE WAVELENGTH RANGE OF 1100 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 AURORAL X-RAY DETECTOR, AND A PASSIVELY COOLED SOLID-STATE X-RAY DETECTOR TO MEASURE BACKGROUND X-RAY EMISSIONS.

----- SOLRAD 11B, FELDMAN-----

INVESTIGATION NAME- 1175- TO 1800-A SOLAR UV SPECTROMETER

NSSDC ID- 76-C23D-09 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - P.D. FELDMAN JOHNS HOPKINS U
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT USED A ROTATABLE GRATING, OPERATING IN FIRST ORDER TO MEASURE THE SOLAR ELECTROMAGNETIC SPECTRUM BETWEEN 1175 AND 1800 A. A PHOTOMULTIPLIER TUBE DETECTED RADIATION REFLECTED THROUGH AN OPTICAL SYSTEM FROM THE GRATING. TWO SCANNING RATES WERE AVAILABLE -- A FAST-RATE, LOW-RESOLUTION MODE IN WHICH THE ENTIRE 625-A RANGE WAS COVERED IN 93.75 S, USING 25-A SEGMENTS FOR EACH DATA SAMPLE, AND A SLOW-RATE, HIGH-RESOLUTION MODE IN WHICH THE 625-A RANGE WAS COVERED IN 12.5 MIN, USING 3-125-A SEGMENTS.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 1- TO 8-A SOLAR X-RAY MONITOR

NSSDC ID- 76-0230-04 INVESTIGATIVE PROGRAM
SESP
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. HORAN 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-AMPLIFIERS COULD BE CALIBRATED ON EACH RANGE WITHOUT DETACHING THE DETECTOR.

----- SOLRAD 11B, KREPLIN-----

INVESTIGATION NAME- 8- TO 16-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-05 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - R.G. TAYLOR US NAVAL RESEARCH LAB
OI - D.M. HORAN 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- 76-023D-06 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.W. KREPLIN US NAVAL RESEARCH LAB
OI - D.M. HORAN 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
SESP
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. HORAN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE SETS OF LITHIUM FLUORIDE PHOTSENSITIVE 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 250-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- 76-023D-12 INVESTIGATIVE PROGRAM
SESP
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. HORAN 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- 76-023D-13 INVESTIGATIVE PROGRAM
SESP
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. HORAN 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, LAZARUS-----

INVESTIGATION NAME- SOLAR WIND SPECTROMETER

NSSDC ID- 76-023D-15 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - A.J. LAZARUS MASS INST OF TECH
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
TWO MODULATED GRID FARADAY CUPS (ONE DIRECTED ALONG THE SPIN AXIS FACING THE SUN, AND ONE IN THE SPIN PLANE) WERE USED TO MEASURE IONS AND ELECTRONS IN THE SOLAR WIND (S/C SPIN IS ABOUT 4 RPM). THE SOLAR POINTING DETECTOR HAD A SPLIT COLLECTOR TO DETERMINE THE POSITIVE ION ENERGY SPECTRUM IN 24 CONTIGUOUS ENERGY WINDOWS FROM APPROXIMATELY 200 VOLTS TO 5000 VOLTS. DIRECTION OF FLOW TO WITHIN 2 DEG WAS DETERMINED BY COMPARISON OF CURRENTS OBSERVED IN THE THREE 120 DEG SECTORS OF THE CUP COLLECTOR. TOTAL ION FLUX WAS DETERMINED BY MODULATING THE ENERGY WINDOW BETWEEN APPROXIMATELY 200 AND 5000 VOLTS. ELECTRONS WERE DETECTED (IN THE S/C SPIN PLANE) WITH THE SECOND SOLID COLLECTOR CUP IN 4 CONTIGUOUS ENERGY WINDOWS FROM 20 TO 120 EV. THE EXPERIMENT, OPERATED IN THREE SAMPLING MODES -- NORMAL, FAST, AND FAST RATE FLUX MODES. IN NORMAL MODE, 33 SAMPLES DURING A 6.792-S CYCLE WERE TELEMETERED, -- 1-HOUSEKEEPING SAMPLE, 24 POSITIVE ION ENERGY CHANNEL SAMPLES, 4 ELECTRON CHANNEL SAMPLES, 1 SAMPLE FROM EACH OF THREE 120 DEG SECTORS OF THE SPLIT COLLECTOR CUP, AND 1 POSITIVE ION FLUX SAMPLE. THIS SEQUENCE WAS REPEATED EVERY 2 MIN. IN THE FAST MODE, 10 OF ELEVEN 6.792-S SEQUENCES WERE TELEMETERED EVERY 2 MIN. IN THE FAST RATE FLUX MODE, THE EXPERIMENT MEASURES THE TOTAL PROTON FLUX, TOTAL ELECTRON FLUX, AND THE THREE 120 DEG SECTOR FLUXES EVERY 1.332 S FOR 6 TIMES (6.192 S), WAITS 11 S, AND REPEATS THE 6 SEQUENCES.

----- SOLRAD 11B, MEEKINS-----

INVESTIGATION NAME- CONTINUUM (8.8 A) AND MAGNESIUM LINE
(9.17 A AND 8.42 A) MONITOR

NSSDC ID- 76-023D-03 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PERSONNEL
PI - J.F. MEEKINS 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.

----- SOLRAD 11B, YATES-----

INVESTIGATION NAME- LOW-ENERGY PROTON SPECTROMETER

NSSDC ID- 76-023D-21 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - X. YATES USAF GEOPHYS LAB
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
TWO TOTALLY DEPLETED SILICON SURFACE BARRIER DETECTORS, MOUNTED IN A SERIES, MEASURED PROTONS BETWEEN 150 KEV AND 6 MEV. PULSE HEIGHT ANALYSIS OF PULSES GENERATED IN THE FRONT DETECTOR, WHICH WERE UNACCOMPANIED BY PULSES IN THE REAR DETECTOR, SEPARATED THE PROTON COUNTS INTO 12 ENERGY CHANNELS. PERMANENT MAGNETS WERE USED TO DEFLECT INCIDENT ELECTRONS WITH ENERGIES LESS THAN 2 MEV. VERY LITTLE FLUX DIRECTIONALITY INFORMATION WAS OBTAINED.

***** STARLETTE*****

SPACECRAFT COMMON NAME- STARLETTE
ALTERNATE NAMES-

NSSDC ID- 75-G10A

LAUNCH DATE- 02/06/75 WEIGHT- 47.3 KG
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- DIAMANT

SPONSORING COUNTRY/AGENCY
FRANCE CNES

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/20/75
ORBIT PERIOD- 104.13 MIN INCLINATION- 49.82 DEG
PERIAPSIS- 806. KM ALT APOAPSIS- 1108. KM ALT

PERSONNEL
PM - UNKNOWN CNES

BRIEF DESCRIPTION
THE TWO PRIMARY GOALS OF THIS SATELLITE ARE TO MINIMIZE THE EFFECTS OF NON-GRAVITATIONAL FORCES AND TO OBTAIN THE HIGHEST POSSIBLE ACCURACY FOR LASER RANGE MEASUREMENTS. THE SATELLITE IS SPHERICALLY SHAPED WITH A 12-CM RADIUS. THE CORE IS AN ALLOY OF URANIUM 238 AND 1.5 PERCENT MOLYBDENUM. THE SKIN CONSISTS OF 20 SPHERICAL CAPS MADE OF AN ALLOY OF ALUMINUM AND 5 PERCENT MAGNESIUM WITH TRIANGULAR BASES. EACH CAP CONTAINS THREE LASER CORNER CUBES. THE CORNER CUBES ARE FUSED SILICA TRIHEDRONS WITH CIRCULAR APERTURES MADE OF SUPRASIL 1 WITH SILVER COATINGS COVERED BY INCONEL. FOR GROUPE 'DE RECHERCHES DE GEODESIE SPATIALE (GRGS), THE PRINCIPAL OBJECTIVE IS TO STUDY EARTH AND OCEAN TIDES BY: (1) THE DETERMINATION OF THE SECOND HARMONICS (AMPLITUDE AND PHASE) OF THE MAIN SEMIDIURNAL OCEANIC TIDES (M AND S) AND, IF POSSIBLE, OF THE DIURNAL K, O, AND P TIDES; AND (2) THE DETERMINATION OF THE DISSIPATION IN THE SOLID EARTH AND IN THE OCEANS (Q).

----- STARLETTE, STEPHANIDES-----

INVESTIGATION NAME- LASER CUBE SYSTEM

NSSDC ID- 75-G10A-01 INVESTIGATIVE PROGRAM
CODE ER
INVESTIGATION DISCIPLINE(S)
GEODESY

ORIGINAL PAGE IS
OF POOR QUALITY

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 IS 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. BOLDT 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 WAS 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 D. 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- 74-077A-04

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 WAS A POLARIMETER/SPECTROMETER OPERATING IN THE 2- TO 8-KEV RANGE. IT USED TWO LARGE PLANE CRYSTALS, LITHIUM HYDRIDE AND GRAPHITE, IN A BRAGG 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.

***** VELA 5A*****

SPACECRAFT COMMON NAME- VELA 5A
ALTERNATE NAMES- VELA 9 (TRW), O3954
VELA 5A (USAF)

NSSDC ID- 69-0460

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

MG - ARPA STAFF ARPA/WASH, DC
PM - SAMSU USAF-LAS
PS - R.W. KLEBESADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 5A WAS ONE OF TWO SPIN-STABILIZED, ICOSAHEDRAL 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, BAME-----

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-0460-05

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 V TO 5 KV. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KV AND 8.3 KV.

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----- VELA 5A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046D-37

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

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- 69-046D-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 -- 5.E-3 IN. OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 8 A. CHAMBER 2 -- 2.5E-4 IN. OF MYLAR OVERCOATED WITH ABOUT AN 8500-A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 2.5E-4 IN. OF MYLAR, 0.5 ATM OF NITROGEN, 1 TO 16 A AND 14 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 ONE-HALF-INCH-DIAMETER, 1-MM-THICK CRYSTAL COVERED BY A FLAT 10-MIL-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.E-2 ERGS/(SQ CM-S)) HAD A ONE-QUARTER-INCH-DIAMETER, 1-MM-THICK CRYSTAL AND A 0.68-INCH-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 10-MIL WINDOW MOUNTED ON THE FACE OF THE CRYSTAL. BOTH ION CHAMBERS AND SCINTILLATION DETECTORS WERE CAPABLE OF OBSERVATIONS WITH TIME RESOLUTIONS OF 2 SECONDS. THE AVERAGE DETECTIVE EFFICIENCIES FOR THE ION AND SCINTILLATION DETECTORS WERE OF THE ORDER OF 20 AND 60 PERCENT, RESPECTIVELY.

----- VELA 5A, KLEBESADEL-----

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 69-046D-08

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.W. KLEBESADEL 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-CUBED CESIUM IODIDE SCINTILLATION COUNTERS DISTRIBUTED TO ACHIEVE NEARLY ISOTROPIC SENSITIVITY. INDIVIDUAL DETECTORS RESPONDED TO ENERGY DEPOSITIONS OF 0.2 TO 1.C 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

MG - ARPA-STAFF ARPA/WASH,DC
PM - SAMSO USAF-LAS
PS - R.W. KLEBESADEL LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 5B WAS ONE OF TWO SPIN-STABILIZED, ICOSAHEDRAL 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 KV AND 8.3 KV. THE OTHER DETECTOR UNIT, WHICH FAILED, WAS DESIGNED TO STUDY 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.

----- VELA 5B, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046E-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

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 V TO 5 KV. THE OTHER UNIT STUDIED MAGNETOTAIL PROTONS OR ELECTRONS BETWEEN 20 EV AND 33 KEV AND SOLAR WIND HEAVY IONS IN THE ENERGY PER CHARGE RANGE BETWEEN 1 KV AND 8.3 KV.

----- VELA 6A, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-027A-07 INVESTIGATIVE PROGRAM
 NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

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 8 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 0.5- 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 -- 5.E-3 IN. OF BERYLLIUM, 0.9 ATM OF ARGON + 0.1 ATM OF HELIUM, 1 TO 8 A. CHAMBER 2 -- 2.5E-4 IN. OF MYLAR OVERCOATED WITH ABOUT AN 8500 A LAYER OF ALUMINUM, 0.5 ATM OF NITROGEN, 1 TO 16 A. CHAMBER 3 -- 2.5E-4 IN. 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 0.5- 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 ONE-HALF-INCH-DIAMETER, 1-MM-THICK CRYSTAL COVERED BY A FLAT 10-MIL-THICK BERYLLIUM WINDOW. THE LESS SENSITIVE DETECTOR (1.E=2 ERGS/SQ CM-S) HAD A ONE-QUARTER-IN.-DIAMETER, 1-MM-THICK CRYSTAL AND A 0.08 IN.-THICK BERYLLIUM DOME WINDOW IN ADDITION TO THE FLAT 10-MIL 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 DETECTIVE 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

PERSONNEL
 PI - P.R. HIGBIE LOS ALAMOS SCI LAB
 OI - M.D. MONTGOMERY 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

PERSONNEL
 PI - P.R. HIGBIE LOS ALAMOS SCI LAB
 OI - M.D. MONTGOMERY 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 LAID 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

PERSONNEL
 PI - R.W. KLEBESADEL 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-CUBED 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 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, 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 (YRW)
 04366, VELA 6B (USAF)

NSSDC 16- 73-C27B

LAUNCH DATE- 34/38/70
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

WEIGHT- 261. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 6745. MIN
PERIAPSIS- 111500. KM ALT

EPOCH DATE- 04/11/70
INCLINATION- 32.52 DEG
APOAPSIS- 112210. KM ALT

PERSONNEL

MG - ERDA-STAFF
PM - SANSO
PS - R.H. KLEBSADEL

ERDA/WASH,DC
USAF-LAS
LOS ALAMOS SCI LAB

BRIEF DESCRIPTION

VELA 6B WAS ONE OF TWO SPIN-STABILIZED, ICOSAHEDRAL 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 76 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, BAME-----

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 70-027B-07

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - S.J. BAME
OI - J.R. ASBRIDGE

LOS ALAMOS SCI LAB
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- 70-027B-03

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - P.R. HIGBIE
OI - H.D. MONTGOMERY

LOS ALAMOS SCI LAB
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 F PARTICLE DETECTOR.

----- VELA 6B, HIGBIE-----

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 73-C27B-04

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - P.R. HIGBIE
OI - H.D. MONTGOMERY

LOS ALAMOS SCI LAB
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 LAID IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

***** VIKING 1 LANDER*****

SPACECRAFT COMMON NAME- VIKING 1 LANDER
ALTERNATE NAMES- VIKING-B LANDER

NSSDC ID- 75-075C

LAUNCH DATE- 08/20/75
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

WEIGHT- 605. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES

NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL

MG - W. JAKOBOWSKI
SC - R.S. YOUNG
PM - K.S. WATKINS
PS - C.W. SNYDER

NASA HEADQUARTERS
NASA HEADQUARTERS
NASA-JPL
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 CRYSE 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.

----- VIKING 1 LANDER, HARGRAVES-----

INVESTIGATION NAME- MAGNETIC PROPERTIES

NSSDC ID- 75-075C-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - R.B. HARGRAVES

PRINCETON U

BRIEF DESCRIPTION

THE MAGNETIC PROPERTIES EXPERIMENT DETECTED THE PRESENCE OF MAGNETIC PARTICLES IN MARTIAN SURFACE MATERIAL. IT USED THREE PAIRS OF SAMARIUM-COBALT MAGNETS, TWO MOUNTED ON THE BACKHOE OF THE SURFACE-SAMPLER COLLECTOR HEAD AND ONE ON TOP OF THE LANDER. EACH PAIR CONSISTED OF AN OUTER RING MAGNET ABOUT 2.5 CM IN DIAMETER WITH AN INNER CORE MAGNET OF OPPOSITE POLARITY. THE MAGNETS WERE DIRECTLY IMAGED BY THE CAMERA SYSTEM IN BLACK AND WHITE AND IN COLOR. A 4-POWER MAGNIFYING MIRROR WAS USED FOR MAXIMUM RESOLUTION.

----- VIKING 1 LANDER, HESS-----

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-075C-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

TL - S.L. HESS
TM - C.B. LEOVY
TM - R.M. HENRY
TM - J.A. RYAN
TM - J.E. TILLMAN

FLORIDA STATE U
U OF WASHINGTON
NASA-LARC
CALIF ST U, FULLERTON
U OF WASHINGTON

ORIGINAL PAGE IS
OF POOR QUALITY

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 WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTABLE 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 1 LANDER, MICHAEL, JR. -----

INVESTIGATION NAME- LANDER RADIO SCIENCE

NSSDC ID- 75-075C-11 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 IONOSPHERES
 PLANETARY ATMOSPHERES
 PLANETOLOGY

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G. FJELDBO	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENKLE	NASA-JPL
TM - R.H. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	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 SURFACE. THEY ALSO PROVIDED MORE PRECISE INFORMATION ABOUT THE ORBITAL, ROTATIONAL, 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, MUTCH -----

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-075C-06 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 PLANETARY BIOLOGY
 PLANETOLOGY

PERSONNEL

TL - T.A. MUTCH	BROWN U
TM - C. SAGAN	CORNELL U
TM - A.B. BINDER	SCIENCE APPL, INC
TM - E.C. MORRIS	US GEOLOGICAL SURVEY
TM - F.D. HUCK	NASA-LARC
TM - E.C. LEVINHAL	STANFORD U
TM - S. LIEBES, JR.	STANFORD U
TM - J.B. POLLACK	NASA-ARC

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 0.04 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 23 DEG (HIGH RESOLUTION) OR 63 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, 149-241 (1975).

----- VIKING 1 LANDER, SHORTHILL -----

INVESTIGATION NAME- PHYSICAL PROPERTIES

NSSDC ID- 75-075C-C1 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

PERSONNEL

TL - R.W. SHORTHILL	U OF UTAH
TM - R.E. HUTTON	TRW SYSTEMS GROUP
TM - H.J. MOORE, II	US GEOLOGICAL SURVEY
TM - R.F. SCOTT	CALIF INST OF TECH

BRIEF DESCRIPTION

THE PURPOSE OF THE PHYSICAL PROPERTIES INVESTIGATION WAS TO DETERMINE THE PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ENVIRONMENT AT THE LANDING SITE, PRIMARILY USING ENGINEERING MEASUREMENTS AND SCIENTIFIC INSTRUMENTS REQUIRED TO MEET OTHER MISSION OBJECTIVES. IN PARTICULAR, IT ATTEMPTED TO DETERMINE SUCH PROPERTIES AS BULK DENSITY, BEARING STRENGTH, ANGLE OF REPOSE, COHESION, ANGLE OF INTERNAL FRICTION, PARTICLE CHARACTERISTICS, THERMAL PARAMETERS, EOLIAN TRANSPORTABILITY, TOPOGRAPHY, AND CERTAIN ENVIRONMENTAL PROPERTIES SUCH AS WIND, TEMPERATURE, AND SOLAR FLUX LEVELS. MAXIMUM USE WAS MADE OF HARDWARE AND INSTRUMENTS INTENDED FOR OTHER APPLICATIONS, SUCH AS THE MECHANICAL SUBSYSTEMS AND LANDER CAMERAS. ONLY PASSIVE DEVICES, SUCH AS MIRRORS AND LANDING LEG STROKE GAUGES, WERE ADDED FOR THIS EXPERIMENT.

----- VIKING 1 LANDER, TOULMIN, 3RD -----

INVESTIGATION NAME- INORGANIC ANALYSIS

NSSDC ID- 75-075C-13 INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

PERSONNEL

TL - P. TOULMIN, 3RD	US GEOLOGICAL SURVEY
TM - A.K. BAIRD	POMONA COLLEGE
TM - K. KEIL	U OF NEW MEXICO
TM - H.J. ROSE	US GEOLOGICAL SURVEY
TM - B.C. CLARK	MARTIN-MARIETTA AEROSP

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER (XRFS) IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS (PC'S) DETECTED X-RAYS EMITTED FROM SAMPLES OF MARTIAN SURFACE MATERIALS IRRADIATED BY X-RAYS FROM RADIOISOTOPE SOURCES (IRON-55 AND CADMIUM-109). THE OUTPUT OF THE PROPORTIONAL COUNTERS WAS SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING, SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WAS LOCATED INSIDE THE LANDER BODY, AND SAMPLES WERE DELIVERED TO IT BY THE LANDER SURFACE SAMPLER. CALIBRATION STANDARDS WERE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA YIELDED SURFACE COMPOSITION DATA WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS.

***** VIKING 1 ORBITER *****

SPACECRAFT COMMON NAME- VIKING 1 ORBITER
 ALTERNATE NAMES- PL-733B, VIKING-8 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 NASA-OSS
 UNITED STATES

ORBIT PARAMETERS

ORBIT TYPE- AREOCENTRIC	EPOCH DATE- 06/21/76
ORBIT PERIOD- 1479. MIN	INCLINATION- 37.9 DEG
PERIAPSIS- 1513. KM ALT	APOAPSIS- 32600. KM ALT

PERSONNEL

MG - W. JAKOBOWSKI	NASA HEADQUARTERS
SC - R.S. YOUNG	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	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 500-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).

----- VIKING 1 ORBITER, CARR-----

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	US GEOLOGICAL SURVEY
TM - W.A. BAUM	LOWELL OBSERVATORY
TM - H. MASURSKY	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA-JPL
TM - J.A. CUTTS	SCIENCE APPL, INC
TM - T.C. DUXBURY	NASA-JPL
TM - K.R. BLASIUS	PLANETARY SCIENCE INST
TM - R. GREELEY	ARIZONA STATE U
TM - J.E. GUEST	U OF LONDON
TM - K.A. HOWARD	US GEOLOGICAL SURVEY
TM - B.A. SMITH	U OF ARIZONA
TM - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - J. VEVERKA	CORNELL U
TM - J.B. WELLMAN	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 2.48 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
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER	NASA-JPL
TM - D.D. LAPORTE	SANTA BARBARA RES CTR
TM - D.W. DAVIES	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
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - H.H. KIEFFER	U OF CALIF, LA
TM - G. MUNCH	CALIF INST OF TECH
TM - E.D. MINER	NASA-JPL
TM - G. HEUGENBAUER	CALIF INST OF TECH
TM - S.C. CHASE, JR.	SANTA BARBARA RES CTR

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 RADIOMETER 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 C TO +57 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 IONOSPHERES

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G. FJELDBO	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENKLE	NASA-JPL
TM - R.H. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	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

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL
 MG - W. JAKOBOWSKI NASA HEADQUARTERS
 SC - R.S. YOUNG NASA HEADQUARTERS
 PM - K.S. WATKINS NASA-JPL
 PS - C.W. SNYDER NASA-JPL

PERSONNEL
 TL - S.L. HESS FLORIDA STATE U
 TM - C.H. LEOVY U OF WASHINGTON
 TM - R.M. HENRY NASA-LARC
 TM - J.A. RYAN CALIF ST U, FULLERTON
 TM - J.E. TILLMAN U OF WASHINGTON

BRIEF DESCRIPTION

THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED ON SEPTEMBER 3, 1976, IN THE CYDONIA 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.

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 WERE SELECTABLE BY GROUND COMMAND. THE SENSORS WERE MOUNTED ON AN ERECTABLE 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, ANDERSON-----

----- VIKING 2 LANDER, MICHAEL, JR.-----

INVESTIGATION NAME- SEISMOLOGY

INVESTIGATION NAME- LANDER RADIO SCIENCE

NSSDC ID- 75-083C-08

INVESTIGATIVE PROGRAM
 CODE SL

NSSDC ID- 75-083C-11

INVESTIGATIVE PROGRAM
 CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY
 PLANETARY PHYSICS

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY
 IONOSPHERES AND RADIO PHYSICS
 PLANETARY ATMOSPHERES
 PLANETOLOGY

PERSONNEL

TL - D.L. ANDERSON CALIF INST OF TECH
 TM - M.W. TOKSOZ MASS INST OF TECH
 TM - G.H. SUTTON U OF HAWAII
 TM - R.L. KOVACH STANFORD U
 TM - G.V. LATHAM U OF TEXAS, GALVESTON
 TM - F. DUENNEDIER U OF HAWAII

PERSONNEL

TL - W.H. MICHAEL, JR. NASA-LARC
 TM - I.I. SHAPIRO MASS INST OF TECH
 TM - G. FJELDBO NASA-JPL
 TM - J.G. DAVIES U OF MANCHESTER
 TM - D.L. CAIN NASA-JPL
 TM - M.D. GROSSI RAYTHEON CORP
 TM - G.L. TYLER STANFORD U
 TM - J.P. BRENKLE NASA-JPL
 TM - R.H. TOLSON NASA-LARC
 TM - C.T. STALZRIED NASA-JPL
 TM - G. BORN NASA-JPL
 TM - R. REASENBERG MASS INST OF TECH

BRIEF DESCRIPTION

THE SEISMOLOGY EXPERIMENT WAS DESIGNED TO DETERMINE THE LEVEL OF SEISMIC ACTIVITY ON MARS AND ITS INTERNAL STRUCTURE. THE SEISMOLOGY INSTRUMENT CONTAINED THREE MUTUALLY PERPENDICULAR SEISMOMETERS. EACH SEISMOMETER CONSISTED OF A MOVING COIL AND A FIXED MAGNET. THE OPERATING MODES WERE: SELECTION OF VARIOUS FILTERS FOR FREQUENCY CONTENT OR TO ADJUST TO BEST RECEPTION OF SPECIFIC TYPES OF DATA, A LOW SAMPLING RATE FOR GENERAL ACTIVITY, A HIGH DATA RATE FOR DETAILED EXAMINATION OF EVENTS, AND A COMPRESSED MEDIUM RATE FOR CONTINUOUS MONITORING OF MARSQUAKES THAT WERE DORMANT UNTIL ACTIVATED BY AN EVENT. THE DATA WERE COMPRESSED FOR TRANSMISSION TO EARTH BY AVERAGING THE AMPLITUDE OF NORMAL GROUND NOISE OVER A 15-S PERIOD. WHEN AN EVENT OCCURRED, A TRIGGER ACTIVATED A HIGHER DATA RATE MODE THAT SAMPLED THE AMPLITUDE OF THE OVERALL EVENT ENVELOPE, WHICH REQUIRED ONLY ONE AMPLITUDE SAMPLE PER SECOND TO INDICATE ITS SHAPE. AT THE SAME TIME, THE CHANGE IN POLARITY OF THE DATA SIGNAL (CAUSED BY CROSSING THE ZERO AXIS) WAS SAMPLED ONCE EACH SECOND. THE SHAPE OF THE ENVELOPE AND ITS INCREMENTAL FREQUENCY CONTENT WAS TRANSMITTED TO EARTH AND RECONSTRUCTED TO APPROXIMATE THE ORIGINAL EVENT. THE VIKING 1 SEISMOMETER FAILED TO UNCLAMP AND COULD NOT BE USED IN A SEISMIC NETWORK WITH THE VIKING 2 INSTRUMENT.

BRIEF DESCRIPTION

THIS EXPERIMENT USED THE S-BAND RADIO TRANSMITTER TO ACQUIRE DOPPLER AND RANGE DATA 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 SURFACE. THEY ALSO PROVIDE MORE PRECISE INFORMATION ABOUT THE ORBITAL, ROTATIONAL, AND PRECESSIONAL MOTION OF MARS THAN HAS 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 2 LANDER, HARGRAVES-----

----- VIKING 2 LANDER, HUTCH-----

INVESTIGATION NAME- MAGNETIC PROPERTIES

INVESTIGATION NAME- LANDER IMAGING

NSSDC ID- 75-083C-10

INVESTIGATIVE PROGRAM
 CODE SL

NSSDC ID- 75-083C-06

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETOLOGY

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 PLANETARY BIOLOGY
 PLANETOLOGY

PERSONNEL

TL - R.B. HARGRAVES PRINCETON U

PERSONNEL

TL - T.A. HUTCH BROWN U
 TM - C. SAGAN CORNELL U
 TM - A.B. BINDER SCIENCE APPL, INC
 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

BRIEF DESCRIPTION

THE MAGNETIC PROPERTIES EXPERIMENT DETECTED THE PRESENCE OF MAGNETIC PARTICLES IN MARTIAN SURFACE MATERIAL. IT USED THREE PAIRS OF SAMARIUM-COBALT MAGNETS, TWO MOUNTED ON THE BACKHOE OF THE SURFACE-SAMPLER COLLECTOR HEAD AND ONE ON TOP OF THE LANDER. EACH PAIR CONSISTED OF AN OUTER RING MAGNET ABOUT 2.5 CM IN DIAMETER WITH AN INNER CORE MAGNET OF OPPOSITE POLARITY. THE MAGNETS WERE DIRECTLY IMAGED BY THE CAMERA SYSTEM IN BLACK AND WHITE AND IN COLOR. A 4-POWER MAGNIFYING MIRROR WAS USED FOR MAXIMUM RESOLUTION.

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 0.24 DEG (HIGH RESOLUTION) OR G-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 30 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

INVESTIGATION NAME- METEOROLOGY

NSSDC ID- 75-083C-07

INVESTIGATIVE PROGRAM
 CODE SL

INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES

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).

----- VIKING 2 LANDEP, SHORTHILL-----

INVESTIGATION NAME- PHYSICAL PROPERTIES

NSSDC ID- 75-083C-01 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - R.W. SHORTHILL	U OF UTAH
TM - R.E. HUTTON	TRW SYSTEMS GROUP
TM - H.J. MOORE, II	US GEOLOGICAL SURVEY
TM - R.F. SCOTT	CALIF INST OF TECH

BRIEF DESCRIPTION

THE PURPOSE OF THE PHYSICAL PROPERTIES INVESTIGATION WAS TO DETERMINE THE PHYSICAL PROPERTIES OF THE MARTIAN SURFACE AND ENVIRONMENT AT THE LANDING SITE, PRIMARILY USING ENGINEERING MEASUREMENTS AND SCIENTIFIC INSTRUMENTS REQUIRED TO MEET OTHER MISSION OBJECTIVES. IN PARTICULAR, IT ATTEMPTED TO DETERMINE SUCH PROPERTIES AS BULK DENSITY, BEARING STRENGTH, ANGLE OF REPOSE, COHESION, ANGLE OF INTERNAL FRICTION, PARTICLE CHARACTERISTICS, THERMAL PARAMETERS, EOLIAN TRANSPORTABILITY, TOPOGRAPHY, AND CERTAIN ENVIRONMENTAL PROPERTIES SUCH AS WIND, TEMPERATURE, AND SOLAR FLUX LEVELS. MAXIMUM USE WAS MADE OF HARDWARE AND INSTRUMENTS INTENDED FOR OTHER APPLICATIONS, SUCH AS THE MECHANICAL SUBSYSTEMS AND LANDING CAMERAS. ONLY PASSIVE DEVICES, SUCH AS MIRRORS AND LANDING LEG STROKE GAGES, WERE ADDED FOR THIS EXPERIMENT.

----- VIKING 2 LANDEP, TOULMIN, 3RD-----

INVESTIGATION NAME- INORGANIC ANALYSIS

NSSDC ID- 75-063C-13 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - P. TOULMIN, 3RD	US GEOLOGICAL SURVEY
TM - A.K. BAIRD	POMONA COLLEGE
TM - K. KEIL	U OF NEW MEXICO
TM - H.J. ROSE	US GEOLOGICAL SURVEY
TM - R.C. CLARK	MARTIN-MARIETTA AEROSP

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER (XRF) IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS (PC'S) DETECTED X-RAYS EMITTED FROM SAMPLES OF MARTIAN SURFACE MATERIALS IRRADIATED BY X-RAYS FROM RADIOISOTOPE SOURCES (IRON-55 AND CADMIUM-109). THE OUTPUT OF THE PROPORTIONAL COUNTERS WAS SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING, SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WAS LOCATED INSIDE THE LANDING BODY, AND SAMPLES WERE DELIVERED TO IT BY THE LANDING SURFACE SAMPLER. CALIBRATION STANDARDS WERE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA YIELDED SURFACE COMPOSITION DATA WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS.

***** VIKING 2 ORBITER*****

SPACECRAFT COMMON NAME- VIKING 2 ORBITER
ALTERNATE NAMES- PL-733A, VIKING-A
VIKING-A ORBITER

NSSDC ID- 75-C83A

LAUNCH DATE- 09/29/75 WEIGHT- 1692. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-JSS

ORBIT PARAMETERS

ORBIT TYPE- AREOCENTRIC	EPOCH DATE- 06/09/76
ORBIT PERIOD- 1639. MIN	INCLINATION- 55.2 DEG
PERIAPSIS- 1499. KM ALT	APOAPSIS- 35600. KM ALT

PERSONNEL

MG - W. JAKOBOWSKI	NASA HEADQUARTERS
SC - R.S. YOUNG	NASA HEADQUARTERS
PM - K.S. WATKINS	NASA-JPL
PS - C.W. SNYDER	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 SEPTEMBER 3, 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 LANDING SEPARATION. THE ORBITER WAS A SOLAR-CELL-POWERED SATELLITE STABILIZED IN THREE AXES USING INERTIAL AND CELESTIAL REFERENCES. THERE WAS A 500-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). BECAUSE OF THE LOSS OF ATTITUDE FUEL, THE TRANSMITTERS AND EXPERIMENTS WERE TURNED OFF JULY 25, 1978.

----- VIKING 2 ORBITER, CARR-----

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-083A-01 INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

TL - M.H. CARR	US GEOLOGICAL SURVEY
TM - W.A. BAUM	LOWELL OBSERVATORY
TM - H. MASURSKY	US GEOLOGICAL SURVEY
TM - G.A. BRIGGS	NASA-JPL
TM - J.A. CUTTS	SCIENCE APPL, INC
TM - T.C. DUXBURY	NASA-JPL
TM - K.R. BLASIUS	PLANETARY SCIENCE INST
TM - R. GREELEY	ARIZONA STATE U
TM - J.F. GUEST	U OF LONDON
TM - K.A. HOWARD	US GEOLOGICAL SURVEY
TM - B.A. SMITH	U OF ARIZONA
TM - L.A. SODERBLOM	US GEOLOGICAL SURVEY
TM - J. VEVERKA	CORNELL U
TM - J.B. WELLMAN	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, LETTER A IS VIKING ORBITER 1, B IS VIKING ORBITER 2; AND THE LAST TWO DIGITS ARE THE FRAME NUMBER.

----- VIKING 2 ORBITER, FARMER-----

INVESTIGATION NAME- MARS ATMOSPHERIC WATER DETECTION (MAWD)

NSSDC ID- 75-C83A-C3 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - C.B. FARMER	NASA-JPL
TM - D.D. LAPORTE	SANTA BARBARA RES CTR
TM - D.W. DAVIES	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 IRM. 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 1000 MICROMETERS OF PRECIPITANT 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 2 ORBITER, KIEFFER-----

INVESTIGATION NAME- INFRARED THERMAL MAPPING (IRTM)

NSSDC ID- 75-083A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - H.H. KIEFFER	U OF CALIF, LA
TM - G. MUNCH	CALIF INST OF TECH
TM - E.D. MINER	NASA-JPL
TM - G. NEUGEBAUER	CALIF INST OF TECH
TM - S.C. CHASE, JR.	SANTA BARBARA RES CTR

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 HAS A MULTICHANNEL RADIOMETER 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 -13G C TO +57 C. THE FIELD OF VIEW WAS CIRCULAR, 5 MILLIRADIANS IN DIAMETER.

----- VIKING 2 ORBITER, MICHAEL, JR.-----

INVESTIGATION NAME- ORBITER RADIO SCIENCE

NSSDC ID- 75-083A-04

INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES

PERSONNEL

TL - W.H. MICHAEL, JR.	NASA-LARC
TM - I.I. SHAPIRO	MASS INST OF TECH
TM - G. FJELDBO	NASA-JPL
TM - J.G. DAVIES	U OF MANCHESTER
TM - D.L. CAIN	NASA-JPL
TM - M.D. GROSSI	RAYTHEON CORP
TM - G.L. TYLER	STANFORD U
TM - J.P. BRENKLE	NASA-JPL
TM - R.H. TOLSON	NASA-LARC
TM - C.T. STELZRIED	NASA-JPL
TM - G. BORN	NASA-JPL
TM - R. REASENBERG	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 WHEN THE SPACECRAFT WAS ON THE OPPOSITE SIDE OF THE SUN. 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.

***** VOYAGER 1*****

SPACECRAFT COMMON NAME- VOYAGER 1
ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A, NJS 77A
1C321

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- JUPITER FLYBY

PERSONNEL

MG - R.A. MILLS	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 THE TWO SPACECRAFT, VOYAGER 1 AND VOYAGER 2, ARE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS IS 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 ARE ATTAINED BY USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING TV, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOMETER, 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, BRIDGE-----

INVESTIGATION NAME- PLASMA SPECTROMETERS

NSSDC ID- 77-084A-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - H.S. BRIDGE	MASS INST OF TECH
OI - J.W. BELCHER	MASS INST OF TECH
OI - J.H. BINSACK	MASS INST OF TECH
OI - A.J. LAZARUS	MASS INST OF TECH
OI - S. OLBERT	MASS INST OF TECH
OI - V.M. VASYLIUNAS	NPI-ACRONOMY
OI - L.F. BURLAGA	NASA-GSFC
OI - R.E. HARTLE	NASA-GSFC
OI - K.W. OGILVIE	NASA-GSFC
OI - G.L. SISCOE	U OF CALIF, LA
OI - A.J. HUNDHAUSEN	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MAKES 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 DETERMINES THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS ARE 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 MEASURES 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/CO-OP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. BROADFOOT	KITT PEAK NATL OBS
OI - H.W. MOOS	JOHNS HOPKINS U
OI - M.J.S. BELTON	KITT PEAK NATL OBS
OI - D.F. STROBEL	KITT PEAK NATL OBS
OI - T.M. DONAHUE	U OF MICHIGAN
OI - M.B. MCELROY	HARVARD U
OI - J.C. MCCONNELL	HARVARD U
OI - R.M. GOODY	HARVARD U
OI - A. DALGARNO	HARVARD U
OI - J.E. BLAMONT	CNRS-SA
OI - J.L. BERTAUX	CNRS-SA

BRIEF DESCRIPTION

THE UV SPECTROMETER IS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURES RADIATION IN THE WAVELENGTH RANGE FROM 400 TO 1600 A. TWO MODES OF INSTRUMENT OPERATION ARE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION IS MEASURED. THIS RADIATION IS PREDOMINANTLY RESONANCE SCATTERED SOLAR RADIATION, WHERE THE SCATTERING IS BY MOLECULAR OR ATOMIC ATMOSPHERIC CONSTITUENTS SUCH AS, HYDROGEN (1216 A) OR HELIUM (584 A). IN THE OCCULTATION MODE SUNLIGHT IS REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM IS RECORDED. AS THE ATMOSPHERE MOVES BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE ARE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM IS 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 CAN BE INFERRED.

----- VOYAGER 1, ESHLEMAN-----

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 - V.R. ESHLEMAN	STANFORD U
TM - J.D. ANDERSON	NASA-JPL
TM - T.A. CROFT	SRI INTERNATIONAL
TM - G.L. TYLER	STANFORD U
TM - G. FJELBO	NASA-JPL
TM - G.S. LEVY	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USES THE TELECOMMUNICATIONS SYSTEM OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM IS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION ARE -- (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, 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
OI - B.J. CONRATH	NASA-GSFC
OI - V.G. KUNDE	NASA-GSFC
OI - P.D. LOWMAN, JR.	NASA-GSFC
OI - W.C. MAGUIRE	NASA-GSFC
OI - J.C. PEARL	NASA-GSFC
OI - J. PIRAGLIA	NASA-GSFC
OI - R.E. SAMUELSON	NASA-GSFC
OI - T.E. BURKE	NASA-JPL
OI - P.J. GIERASCH	CORNELL U
OI - C.A. PONNAMPERUMA	U OF MARYLAND

BRIEF DESCRIPTION

THIS INVESTIGATION IS 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 STUDIES BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION IS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H₂/HE RATIO, AND THE ABUNDANCE OF CH₄ AND NH₃. VERTICAL TEMPERATURE PROFILES ARE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS ARE 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
OI - C.Y. FAN	U OF ARIZONA
OI - G. GLOECKLER	U OF MARYLAND
OI - L.J. LANZEROTTI	BELL TELFFONE LAB
OI - T.P. ARMSTRONG	U OF KANSAS
OI - W.I. AXFORD	MPI-AERONOMY
OI - C.O. GOSTROM	APPLIED PHYSICS LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MAKES MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR IS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR IS 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) ARE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.5 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 1, LILLIE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSSDC ID- 77-084A-11 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
ZODIACAL LIGHT
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.F. LILLIE	U OF COLORADO
OI - C.W. HORD	U OF COLORADO
OI - K. PANG	U OF COLORADO
OI - J.E. HANSEN	NASA-GISS
OI - D.L. COFFEEN	NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF AN 8-IN. F/1.1 TELESCOPE THAT CAN SEND 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) CAN 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 SCALE HEIGHTS FOR BOTH PLANETS CAN 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 - M.F. NESS	NASA-GSFC
OI - M.H. ACUNA	NASA-GSFC
OI - K.W. BEHANNON	NASA-GSFC
OI - L.F. BURLAGA	NASA-GSFC
OI - R.P. LEPPING	NASA-GSFC
OI - F.M. NEUBAUER	BRAUNSCHWEIG TECH U

BRIEF DESCRIPTION

THIS EXPERIMENT IS 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 IS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS IS PLUS OR MINUS 0.1 GAMMA, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 GAMMA TO 20 GAUSS.

----- VOYAGER 1, SCARF-----

INVESTIGATION NAME- PLASMA WAVE

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
OI - D.A. GURNETT	U OF IOWA

BRIEF DESCRIPTION

THIS INVESTIGATION PROVIDES CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GIVES BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTION REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTS OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM

RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT IS FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT SHARES THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 1, SMITH-----

INVESTIGATION NAME- TV IMAGING

NSSDC ID- 77-084A-01 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.A. SMITH U OF ARIZONA
OI - G.A. BRIGGS NASA-JPL
OI - A.F. COOK SMITHSONIAN INST
OI - G.E. DANIELSON NASA-JPL
OI - M.E. DAVIES RAND CORP
OI - G.E. HUNT METEOROLOGICAL OFFICE
OI - T. OWEN STATE U OF NEW YORK
OI - C. SAGAN CORNELL U
OI - L.A. SODERBLOM US GEOLOGICAL SURVEY
OI - V.E. SUOMI U OF WISCONSIN

BRIEF DESCRIPTION
THE TV PHOTOGRAPHIC EXPERIMENT USES A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 TV SYSTEM. THIS SYSTEM INCLUDES ONE NARROW-ANGLE, LONG FOCAL LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDS ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT THE RESOLUTION WILL BE AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION IS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT ARE 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 INCLUDE 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 INCLUDE -- (1) 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 LMB 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 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 ARE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- 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
OI - J.R. JOKIPII U OF ARIZONA
OI - E.C. STONE CALIF INST OF TECH
OI - F.B. McDONALD NASA-GSFC
OI - B.J. TEEGARDEN NASA-GSFC
OI - J.H. TRAINOR NASA-GSFC
OI - W.R. WEBBER U OF NEW HAMPSHIRE

BRIEF DESCRIPTION
THIS INVESTIGATION STUDIES 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 INCLUDES A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERS 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 ARE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURES THE ENERGY AND DETERMINES THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURE THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN

ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON ARE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 1, WARWICK-----

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. WARWICK U OF COLORADO
OI - J.K. ALEXANDER, JR. NASA-GSFC
OI - T.D. CARR U OF FLORIDA
OI - F.T. HADDOCK U OF MICHIGAN
OI - D.H. STAELIN MASS INST OF TECH
OI - A. BOISCHOT PARIS OBSERVATORY
OI - C.C. HARVEY PARIS OBSERVATORY
OI - Y. LEBLANC PARIS OBSERVATORY
OI - W.E. BROWN, JR. NASA-JPL
OI - S. GULKIS NASA-JPL
OI - R. PHILLIPS NASA-JPL

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF A SWEET-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL IS 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 YIELDS 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 77E, NJS 77B
10271

NSSDC ID- 77-076A

LAUNCH DATE- 08/20/77 WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- JUPITER FLYBY

PERSONNEL
MG - R.A. MILLS 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 THE SPACECRAFT, VOYAGER 1 AND VOYAGER 2, ARE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS IS 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 ARE OBTAINED USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING TV, 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.

----- 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 - H.S. BRIDGE MASS INST OF TECH
OI - A.J. LAZARUS MASS INST OF TECH
OI - S. OLBERT MASS INST OF TECH
OI - J.W. BELCHER MASS INST OF TECH
OI - V.M. VASYLIUNAS MPI-AERONOMY
OI - L.F. BURLAGA NASA-GSFC
OI - J.H. BINSACK MASS INST OF TECH
OI - G.L. SISCOE U OF CALIF, LA
OI - A.J. HUNDHAUSEN NATL CTR FOR ATMOS RES
OI - R.E. HARTLE NASA-GSFC
OI - K.W. OGILVIE NASA-GSFC

BRIEF DESCRIPTION

THE PLASMA INVESTIGATION MAKES 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 DETERMINES THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS ARE EMPLOYED WITH $(\Delta E)/E$ EQUAL TO 29, 7.2, AND 1.6 PERCENT, ALLOWING A COVERAGE FROM SUBSONIC TO HIGHLY SUPERSONIC FLOW. THE SIDE-LOOKING FARADAY CUP MEASURES OF 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-0PINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L. BROADFOOT	KITT PEAK NATL OBS
OI - A. DALGARNO	HARVARD U
OI - J.C. HEDDINGELL	HARVARD U
OI - R.P. GOODY	HARVARD U
OI - T.M. DONAHUE	U OF MICHIGAN
OI - M.E. MCCLEROY	HARVARD U
OI - M.J.S. BELTON	KITT PEAK NATL OBS
OI - D.F. STROBEL	KITT PEAK NATL OBS
OI - H.W. MOOS	JOHNS HOPKINS U
OI - J.E. BLAMONT	CNRS-SA
OI - J.L. BERTAUX	CNRS-SA

BRIEF DESCRIPTION

THE UV SPECTROMETER IS DESIGNED TO MEASURE ATMOSPHERIC PROPERTIES AND MEASURES RADIATION IN THE WAVELENGTH RANGE FROM 420 TO 1600 Å. TWO MODES OF INSTRUMENT OPERATION ARE PLANNED, AIRGLOW AND OCCULTATION. IN THE AIRGLOW MODE THE ATMOSPHERIC RADIATION WILL BE 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 Å) OR HELIUM (584 Å). IN THE OCCULTATION MODE SUNLIGHT WILL BE REFLECTED INTO THE SPECTROMETER, AND THE SOLAR SPECTRUM WILL BE RECORDED. AS THE ATMOSPHERE MOVES BETWEEN THE SPACECRAFT AND THE SUN, THE ABSORPTION CHARACTERISTICS OF THE ATMOSPHERE WILL BE OBTAINED OVER THE MEASURED WAVELENGTH REGION. THE ABSORPTION SPECTRUM WILL BE 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 CAN BE INFERRED.

----- VOYAGER 2, ESHLEMAN-----

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- 77-076A-02 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - V.R. ESHLEMAN	STANFORD U
TM - G. FJELDBO	NASA-JPL
TM - G.S. LEVY	NASA-JPL
TM - T.A. CROFT	SRI INTERNATIONAL
TM - G.L. TYLER	STANFORD U
TM - J.D. ANDERSON	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USES THE TELECOMMUNICATIONS SYSTEMS OF THE VOYAGER SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM IS A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION ARE -- (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, HANEL-----

INVESTIGATION NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- 77-076A-03 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - R.A. HANEL	NASA-GSFC
OI - C.A. PONNAMPERUMA	U OF MARYLAND
OI - T.E. BURKE	NASA-JPL
OI - P.J. GIERASCH	CORNELL U
OI - J. PIRAGLIA	NASA-GSFC
OI - R.E. SAMUELSON	NASA-GSFC
OI - W.C. MAGUIRE	NASA-GSFC
OI - J.C. PEARL	NASA-GSFC
OI - V.G. KUNDE	NASA-GSFC
OI - P.D. LOWMAN, JR.	NASA-GSFC
OI - B.J. CONRATH	NASA-GSFC

BRIEF DESCRIPTION

THIS INVESTIGATION IS 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 STUDIES BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION IS ALSO INVESTIGATED, INCLUDING DETERMINATION OF THE H₂/HE RATIO, AND THE ABUNDANCE OF CH₄ AND NH₃. VERTICAL TEMPERATURE PROFILES ARE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS ARE CONDUCTED. THE INTERFEROMETER HAS A SPECTRAL RANGE OF 200 TO 4300 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 2, KRIMIGIS-----

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND
TELESCOPENSSDC ID- 77-076A-07 INVESTIGATIVE PROGRAM
CODE SL/CO-0PINVESTIGATION DISCIPLINE(S)
COSMIC RAYS
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - S.M. KRIMIGIS	APPLIED PHYSICS LAB
OI - C.O. BOSTROM	APPLIED PHYSICS LAB
OI - T.P. ARMSTRONG	U OF KANSAS
OI - W.I. AXFORD	MPI-AERONOMY
OI - G. GLOECKLER	U OF MARYLAND
OI - L.J. LANZERTTI	BELL TELEPHONE LAB
OI - C.Y. FAN	U OF ARIZONA

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR MAKES MEASUREMENTS IN (1) THE DISTANT MAGNETOSPHERE AND BOW SHOCK OF JUPITER, (2) THE POSSIBLE MAGNETOSPHERE OF SATURN, AND (3) THE TRAPPED RADIATION BELTS IN THE VICINITY OF JUPITER. ADDITIONALLY, THIS DETECTOR IS ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR IS 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) ARE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE TELESCOPE.

----- VOYAGER 2, LILLIE-----

INVESTIGATION NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 ÅNSSDC ID- 77-076A-11 INVESTIGATIVE PROGRAM
CODE SLINVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
ZODIACAL LIGHT
PLANETARY ATMOSPHERES

PERSONNEL

PI - C.F. LILLIE	U OF COLORADO
OI - C.W. HORD	U OF COLORADO
OI - K. PANG	U OF COLORADO
OI - J.E. HANSEN	NASA-GISS
OI - D.L. COFFEE	NASA-GISS

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF AN 8-IN. F/1.1 TELESCOPE, THAT SENDS 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) CAN 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 CAN ALSO BE DETERMINED FROM THESE DATA.

----- VOYAGER 2, NESS-----

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETERS
 NSSDC ID- 77-076A-05 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 PLANETARY MAGNETIC FIELD
 PARTICLES AND FIELDS
 INTERPLANETARY MAGNETIC FIELDS
 PERSONNEL
 PI - N.F. NESS NASA-GSFC
 OI - R.P. LEPPING NASA-GSFC
 OI - F.M. NEUBAUER BRAUNSCHWEIG TECH U
 OI - K.W. BEHANNON NASA-GSFC
 OI - L.F. BURLAGA NASA-GSFC
 OI - M.H. ACUHA NASA-GSFC

BRIEF DESCRIPTION
 THIS EXPERIMENT IS 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 IS CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS IS PLUS OR MINUS 0.1 GAMMA, AND THE RANGE OF MEASUREMENTS IS FROM 0.01 GAMMA TO 20 GAUSS.

----- VOYAGER 2, SCARF-----

INVESTIGATION NAME- PLASMA WAVE
 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
 OI - D.A. GURNETT U OF IOWA

BRIEF DESCRIPTION
 THIS INVESTIGATION PROVIDES CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT ALSO GIVES BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION CONSISTS OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND A LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT IS FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT SHARES THE 10-M ANTENNAS DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

----- VOYAGER 2, SMITH-----

INVESTIGATION NAME- TV IMAGING
 NSSDC ID- 77-076A-01 INVESTIGATIVE PROGRAM
 CODE SL
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 PLANETARY ATMOSPHERES
 PLANETOLOGY
 PERSONNEL
 PI - B.A. SMITH U OF ARIZONA
 OI - G.A. BRIGGS NASA-JPL
 OI - A.F. COOK SMITHSONIAN INST
 OI - G.E. DANIELSON NASA-JPL
 OI - M.E. DAVIES RAND CORP
 OI - G.E. HUNT METEOROLOGICAL OFFICE
 OI - T. OWEN STATE U OF NEW YORK
 OI - C. SAGAN CORNELL U
 OI - L.A. SODERBLOM US GEOLOGICAL SURVEY
 OI - V.E. SUONI U OF WISCONSIN

BRIEF DESCRIPTION
 THE TV PHOTOGRAPHIC EXPERIMENT USES A TWO-CAMERA SYSTEM, BASED ON THE MARINER 10 TV SYSTEM. THIS SYSTEM INCLUDES ONE NARROW-ANGLE, LONG FOCAL LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE DEPENDS GREATLY ON THE ACTUAL TRAJECTORY ON THIS MULTI-ENCOUNTER MISSION, BUT WILL BE AS HIGH AS 0.5 TO 1.0 KM ON THE CLOSEST APPROACHES TO SOME OBJECTS. AT JUPITER AND SATURN, THE RESOLUTION IS EXPECTED TO BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT ARE 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 INCLUDE 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 INCLUDE -- (1) 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 ARE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

----- 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
 OI - J.R. JOKIPII U OF ARIZONA
 OI - E.C. STONE CALIF INST OF TECH
 OI - F.B. McDONALD NASA-GSFC
 OI - B.J. TEEGARDEN NASA-GSFC
 OI - J.H. TRAINOR NASA-GSFC
 OI - W.R. WEBBER U OF NEW HAMPSHIRE

BRIEF DESCRIPTION
 THIS INVESTIGATION STUDIES 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 INCLUDES A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS COVERS 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 ARE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS MEASURES THE ENERGY AND DETERMINES THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS ALSO MEASURE THE ANISOTROPIES OF ELECTRONS AND NUCLEI. IN ADDITION, ELECTRONS IN THE ENERGY RANGE BETWEEN 3 AND 100 MEV/NUCLEON ARE MEASURED BY AN ELECTRON TELESCOPE (TET).

----- VOYAGER 2, WARWICK-----

INVESTIGATION NAME- PLANETARY RADIO ASTRONOMY
 NSSDC ID- 77-076A-10 INVESTIGATIVE PROGRAM
 CODE SL/CO-OP
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 SPACE PLASMAS
 PERSONNEL
 PI - J.W. WARWICK U OF COLORADO
 OI - W.E. BROWN, JR. NASA-JPL
 OI - S. GULKIS NASA-JPL
 OI - C.C. HARVEY PARIS OBSERVATORY
 OI - Y. LEBLANC PARIS OBSERVATORY
 OI - D.H. STAELIN MASS INST OF TECH
 OI - A. BOISCHOT PARIS OBSERVATORY
 OI - T.D. CARR U OF FLORIDA
 OI - F.T. HADDOCK U OF MICHIGAN
 OI - J.K. ALEXANDER, JR. NASA-GSFC
 OI - R. PHILLIPS NASA-JPL

BRIEF DESCRIPTION
 THIS EXPERIMENT CONSISTS OF A SWEEP-FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL IS 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 IS 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 June 30, 1978, had progressed beyond the experiment or investigation stage, and for which NSSDC has at least minimal documentation. A few changes subsequent to this date may appear, depending on time 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).

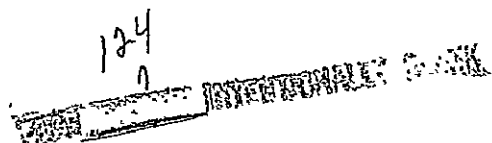
Each spacecraft or experiment entry in this section is composed of two parts -- a heading and a brief description. The headings list characteristics of satellites and experiments. Definitions of many of the terms used in this section are included in Appendix C.

3.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of planned orbit parameters. These parameters consist of orbit type, orbit period, apoapsis, periapsis, and inclination for the spacecraft. No orbit parameters are listed for lander, flyby, and probe missions. In addition, the heading contains the spacecraft weight, launch date, launch site, launch vehicle, spacecraft common and alternate names, NSSDC ID code, sponsoring country and agency, and spacecraft personnel -- project manager (PM), project scientist (PS), program manager (MG), program scientist (SC), mission manager (MM), and mission scientist (MS). The spacecraft brief description is immediately below each heading. This terminology is standard for NASA missions; the equivalent functions for the missions of other countries and/or agencies have been given the same position names.

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) or team members (TM) associated with the 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 Division)
CODE EC	(Communications Division)
CODE EM	(Space Processing Division)
CODE ER	(Resource Observations Division)
CODE RS	(Space Systems Division)
CODE SB	(Life Sciences Division)
CODE SC	(Astrophysics Division)
CODE SL	(Planetary Division)
CODE ST	(Solar Terrestrial Division)

3.3 Planned Spacecraft and Experiment Descriptions

A spacecraft is included in the planned section of this report if it is an approved mission or a proposed mission where the experiments or investigations have already been selected.

ORIGINAL PAGE IS
OF POOR QUALITY

*The addition of /CO-OP to any code indicates a cooperative effort between NASA and a second party.

***** ASTRO-A*****

SPACECRAFT COMMON NAME- ASTRO-A
ALTERNATE NAMES- ASTRONOMICAL SATELLITE-A

NSSDC ID- ASTRO-A

LAUNCH DATE- 02/00/81 WEIGHT- 180. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3S

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.2 MIN INCLINATION- 31. DEG
PERIAPSIS- 350. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
PI - Y. TANAKA U OF TOKYO
PS - Z. SUEMOTO 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 MEV, A PARTIAL DETECTOR THAT MONITORS ELECTRON FLUX ABOVE 100 KEV, AND PLASMA PROBES FOR THE MEASUREMENT OF ELECTRON DENSITY AND TEMPERATURE.

----- ASTRO-A, HIRAO-----

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. HIRAO U OF TOKYO
PI - H. OYA U OF TOHOKU
OI - K. OYAMA U OF TOKYO
OI - T. TAKAHASHI U OF TOHOKU

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 MEV RANGE

NSSDC ID- ASTRO-A-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - I. KONDO U OF TOKYO
PI - K. OKUDAIRA RIKKYO U
OI - Y. HIRASHIMA RIKKYO U
OI - 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-33 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - M. MATSUOKA U OF TOKYO
OI - K. KOYAMA U OF TOKYO
OI - H. 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
OI - 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-01 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - T. TAKAKURA U OF TOKYO
OI - S. MIYAMOTO OSAKA CITY U
OI - Y. OGAWARA U OF TOKYO
OI - K. OKI U OF TOKYO
OI - T. MURAKAMI 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 SEC.

----- 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 - H. 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.

***** CAMEO*****

SPACECRAFT COMMON NAME- CAMEO
ALTERNATE NAMES- CHEM ACT MATLS EJECT ORB

NSSDC ID- CAMEO

LAUNCH DATE- 09/18/78 WEIGHT- 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- 104. MIN INCLINATION- 99. DEG
PERIAPSIS- 955. KM ALT APOAPSIS- 955. KM ALT

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
 PM - J.P. HEPNER NASA-GSFC

BRIEF DESCRIPTION
 THIS MISSION EMPLOYS THE SECOND STAGE OF THE DELTA LAUNCH VEHICLE FOR THE NIMBUS-G SPACECRAFT TO PROVIDE TELEMETRY COMMAND, DATA STORAGE, AND HOUSE THE FOUR BARIUM AND ONE LITHIUM RELEASE CANNISTERS. THE PRIMARY OBJECTIVE OF THE INVESTIGATION IS TO STUDY THE MAGNETOSPHERE-IONOSPHERE INTERACTIONS BY OBSERVING THE DYNAMICS OF NEUTRAL AND ION CLOUDS RELEASED AT ORBITAL VELOCITIES NEAR THE EARTH.

----- CAMEO, HEPNER-----

INVESTIGATION NAME- BA AND LI RELEASE MODULES

NSSDC ID- CAMEO -01 INVESTIGATIVE PROGRAM CODE ST

INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - J.P. HEPNER NASA-GSFC

BRIEF DESCRIPTION
 THIS INVESTIGATION CONSISTS OF A SEQUENTIAL RELEASE OF FOUR BARIUM CANNISTERS AND A SINGLE LONG DURATION LITHIUM RELEASE FROM THE ORBITING SECOND STAGE OF THE NIMBUS-G DELTA LAUNCH VEHICLE. THE BARIUM RELEASES OCCUR ALONG A GEOGRAPHIC LATITUDE-LOCAL TIME LINE OVER NORTHERN ALASKA (75N-0232 TO 65N-0123), AND THE ISIS 2 SATELLITE PASSES THROUGH THIS REGION AT A HIGHER ALTITUDE. THE LITHIUM RELEASE LASTS FOR 50 S OVER NORTHERN SCANDINAVIA AND IS COORDINATED WITH THE ESA-GEOS 2 SATELLITE. OBSERVATIONS OF THE NEUTRAL AND ION CLOUDS ARE OBSERVED OPTICALLY BY VARIOUS GROUND SITES.

***** CCE*****

SPACECRAFT COMMON NAME- CCE
 ALTERNATE NAMES- AMPTE/CHARGE COMP EXPL, CHARGE COMPOSITION EXPL

NSSDC ID- CCE

LAUNCH DATE- L7/0C/81 WEIGHT- 55. KG
 LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
 LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 952.6 MIN INCLINATION- 2. DEG
 PERIAPSIS- 200. KM ALT APOAPSIS- 51000. KM ALT

PERSONNEL
 JG - F.W. GAETANO NASA HEADQUARTERS
 SC - E.R. SCHMERLING NASA HEADQUARTERS
 PM - G.W. OUSLEY NASA-GSFC
 PS - H.H. ACUNA NASA-GSFC

BRIEF DESCRIPTION
 THE PURPOSES OF THIS MISSION WERE TO STUDY THE ACCESS OF SOLAR WIND IONS TO THE MAGNETOSPHERE AND THE CONVECTIVE-DIFFUSIVE TRANSPORT AND ENERGIZATION OF MAGNETOSPHERIC PARTICLES. THE PROGRAM CONSISTED OF THIS SPACECRAFT AND THE IRM SPACECRAFT USED TO RELEASE THREE SEPARATE ION RELEASES, WHICH WERE DETECTED BY INSTRUMENTS ON THE CCE. THE SPACECRAFT WAS POWERED BY 4 SOLAR CELL PANELS THAT PROVIDED 77 W AND HAD A BATTERY. THE SPACECRAFT WAS SPIN STABILIZED AT 12 RPM WITH THE SPIN AXIS IN THE ORBIT PLANE. THE ATTITUDE SYSTEM CONSISTED OF A SUN SENSOR AND A 3-AXIS MAGNETOMETER. THE THERMAL CONTROL WAS PASSIVE. THE TELEMETRY SYSTEM WAS A 1-W, S-BAND TRANSMITTER WITH 2 OPPOSITELY POLARIZED ANTENNAS. THE VECTOR MAGNETOMETER WAS ALSO USED TO DETERMINE THE PITCH ANGLES OF THE PARTICLES MEASURED BY THE THREE INSTRUMENTS, WHICH WERE PROVIDED BY THE INVESTIGATORS. THE SCIENTIFIC TEAM IS LISTED IN APPENDIX B.

----- CCE, CLOECKLER-----

INVESTIGATION NAME- CHARGE-ENERGY-MASS SPECTROMETER (CHEM)

NSSDC ID- CCE -03 INVESTIGATIVE PROGRAM CODE ST/CO-OP

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

PERSONNEL
 PI - G. GLOECKLER U OF MARYLAND
 OI - D.K. HOVESTADT MPI-EXTRATERR PHYS
 OI - G. PASCHMANN MPI-EXTRATERR PHYS
 OI - B. WILKEN MPI-AERONOMY
 OI - W.I. AXFORD MPI-AERONOMY

BRIEF DESCRIPTION
 THE INSTRUMENT CONSISTED OF AN ENTRANCE COLLIMATOR AND AN ELECTROSTATIC ANALYZER SECTION, FOLLOWED BY A TIME-OF-FLIGHT AND TOTAL ENERGY MEASUREMENT. THE ENERGY RANGE COVERED WAS FROM 2 TO 200 KEV/Q WITH A GEOMETRIC FACTOR OF $2 \times 1.0^{-05} \text{ SQ CM/SR}$. ENERGY RESOLUTION WAS 5 PERCENT AND ALL CHARGE STATES AND ISOTOPE OF H AND HE, LI WITH ITS CHARGE STATES, AND MAJOR ELEMENTS AND CHARGE STATES UP TO AND INCLUDING FE WERE RESOLVED.

----- CCE, MCENTIRE-----

INVESTIGATION NAME- MEDIUM ENERGY PARTICLE ANALYZER (MEPA)

NSSDC ID- CCE -02 INVESTIGATIVE PROGRAM CODE ST

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

PERSONNEL
 PI - R.W. MCENTIRE APPLIED PHYSICS LAB
 OI - S.M. KRIMIGIS APPLIED PHYSICS LAB

BRIEF DESCRIPTION
 THE INSTRUMENT CONSISTED OF A SOLID STATE DETECTOR TELESCOPE WITH A THIN FRONT ELEMENT AND A 7.5 CM SEPARATION BETWEEN THE FRONT AND REAR DETECTORS. PARTICLE DE/DX WAS MEASURED IN THE FRONT DETECTOR, TIME OF FLIGHT WAS MEASURED BETWEEN THE TWO DETECTORS, AND RESIDUAL PARTICLE ENERGY WAS MEASURED IN THE REAR DETECTOR. THE PARTICLE CHARGE RANGE WAS GREATER THAN OR EQUAL TO 3 AND THE ENERGY RANGE WAS GREATER THAN OR EQUAL TO 0.1 TO LESS THAN 10 MEV/NUCLEON.

----- CCE, SHELLEY-----

INVESTIGATION NAME- PLASMA COMPOSITION

NSSDC ID- CCE -01 INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
 SPACE PLASMAS
 MAGNETOSPHERIC PHYSICS

PERSONNEL
 PI - E.G. SHELLEY LOCKHEED PALO ALTO
 OI - R.D. SHARP LOCKHEED PALO ALTO
 OI - G. HAERENDEL MPI-EXTRATERR PHYS
 OI - H.R. ROSENBAUER MPI-AERONOMY
 OI - R.G. JOHNSON LOCKHEED PALO ALTO
 OI - P.X. EBERHARDT U OF BERNE
 OI - H. BALSIGER U OF BERNE
 OI - J. GEISS U OF BERNE
 OI - D.T. YOUNG U OF BERNE
 OI - A. GRIELKETTI U OF BERNE

BRIEF DESCRIPTION
 THE INSTRUMENT CONSISTED OF AN ENTRANCE COLLIMATOR AND RETARDING POTENTIAL ANALYZER, A CURVED-PLATE ELECTROSTATIC ENERGY, AND A COMBINED ELECTROSTATIC-MAGNETIC MASS AND ANALYZER IN SERIES. THE ENERGY RANGE COVERED WAS C TO 17 KEV/Q WITH A GEOMETRIC FACTOR RANGING FROM 2 TO $5 \times 1.0^{-02} \text{ SQ CM/SR}$, AN ENERGY RESOLUTION OF 5 PERCENT, AND A MASS/Q RESOLUTION OF 25 PERCENT. THIS INSTRUMENT CLEARLY SEPARATED LI + AND EU + TRACER IONS FROM THE BACKGROUND. IT IS NEARLY IDENTICAL TO THE ONE FLOWN ON ISEE 1 BY THE SAME GROUP OF INVESTIGATORS.

***** COBE*****

SPACECRAFT COMMON NAME- COBE
 ALTERNATE NAMES- COSMIC BACKGROUND EXPL

NSSDC ID- COBE

LAUNCH DATE- 10/00/83 WEIGHT- 1200. KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
 UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 102. MIN INCLINATION- 99. DEG
 PERIAPSIS- 7276. KM ALT APOAPSIS- 7276. KM ALT

PERSONNEL
 MG - F.O. MARTIN NASA HEADQUARTERS
 NG - L. DONDEY NASA HEADQUARTERS
 SC - N.W. BOGCESS NASA HEADQUARTERS
 PM - G.W. LONGMUECKER NASA-GSFC
 PS - J.C. MATHER NASA-GSFC

BRIEF DESCRIPTION

THE PURPOSE OF THE COBE MISSION IS TO TAKE PRECISE MEASUREMENTS OF THE DIFFUSE RADIATION BETWEEN 8 MICROMETERS AND 13 MM OVER THE WHOLE CELESTIAL SPHERE. THE FOLLOWING QUANTITIES ARE MEASURED: (1) THE SPECTRUM OF THE THREE-K RADIATION OVER THE RANGE 0.33 TO 3.3 MM, (2) THE ISOTROPY OF THIS RADIATION FROM 3.3 TO 13 MM, AND (3) THE SPECTRUM AND ANGULAR DISTRIBUTION FROM 8 TO 300 MICROMETERS. THE SPACECRAFT CONSISTS OF A 600-KG MODIFIED AEM BASE MODULE TO WHICH A LARGE 500-KG CONICAL SUN SHADE/GROUPO PLANE EXPERIMENT MODULE IS ATTACHED. THE EXPERIMENT MODULE CONTAINS A LIQUID HE DEWAR FILLED WITH 70 KG OF 2 K SUPERFLUID. THE TWO MODULES ROTATE AT ONE RPM ABOUT THE AXIS OF CONICAL 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 170 W. THE COMMUNICATIONS AND DATA HANDLING SYSTEM PROVIDES FOR CONTROL OF ALL SPACECRAFT AND EXPERIMENT FUNCTIONS. A NASA STANDARD TDRS TRANSPONDER 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 BUBBLE MEMORY STORAGE SYSTEM. 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. AFTER COMPLETION OF THE 1-YR MISSION, THE PROPULSION SYSTEM WILL BE RE-ACTIVATED TO DECREASE THE ALTITUDE FOR A SHUTTLE RETRIEVAL. 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 6 MONTHS OR TWICE DURING THE 1-YR LIFETIME OF THE LIQUID HE. 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.

----- COBE, HAUSER-----

INVESTIGATION NAME- DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)

NSSDC ID- COBE -02 INVESTIGATIVE PROGRAM CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - M.G. HAUSER NASA-GSFC
OI - J.C. MATHER NASA-GSFC
OI - D.T. WILKINSON PRINCETON U
OI - S. GULKIS NASA-JPL
OI - R. WEISS MASS INST OF TECH
OI - G.F. SMOOT 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 MID-INFRARED RADIATION FROM 8 TO 300 MICROMETERS. THE INSTRUMENT MEASURES THE ABSOLUTE FLUX IN 6 OCTAVE WAVELENGTH BANDS WITH A 1-DEG FIELD OF VIEW POINTED ALONG THE SPIN AXIS. DETECTORS (PHOTOCONDUCTORS) AND FILTERS FOR THE 8-120 MICROMETER CHANNELS ARE THE SAME AS FOR THE IRAS MISSION. COMPOSITE BOLOMETERS ARE USED FOR THE ADDITIONAL LONG-WAVELENGTH CHANNELS. SENSITIVITY OF THE DEVICE IS 3.E-16 W/SQ CM-SR-MICROMETER AT 300 MICROMETERS, RISING TO 1.E-13 W/SQ CM-SR-MICROMETER AT 8 MICROMETERS. THE TELESCOPE IS WELL-BAFFLED TO PREVENT STRAY LIGHT FROM ENTERING THE INSTRUMENT.

----- COBE, MATHER-----

INVESTIGATION NAME- FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)

NSSDC ID- COBE -01 INVESTIGATIVE PROGRAM CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - J.C. MATHER NASA-GSFC
OI - R. WEISS MASS INST OF TECH
OI - M.G. HAUSER NASA-GSFC
OI - D.T. WILKINSON PRINCETON U
OI - G.F. SMOOT LAWRENCE BERKELEY LAB
OI - 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 1.07 MM FOR EACH 7-DEG FIELD OF VIEW ON THE SKY (OVER THE RANGE 0.32 TO 3.3 MM). THE FIRAS USES A SPECIAL FLARED TRUMPET HORN FLUX COLLECTOR HAVING VERY LOW SIDELobe LEVELS, AN EXTERNAL CALIBRATOR COVERING THE ENTIRE BEAM, AND REQUIRES PRECISE TEMPERATURE REGULATION AND CALIBRATION. THE ENTIRE INSTRUMENT IS OPERATED AT A TEMPERATURE NEAR 3 K TO MATCH THE BACKGROUND TEMPERATURE. 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 3C KG, USES 12 W, AND HAS A DATA RATE OF 280 BPS.

----- COBE, NOT SELECTED YET-----

INVESTIGATION NAME- DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)

NSSDC ID- COBE -03 INVESTIGATIVE PROGRAM CODE SC
INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - NOT SELECTED YET
OI - S. GULKIS NASA-JPL
OI - G.F. SMOOT LAWRENCE BERKELEY LAB
OI - D.T. WILKINSON PRINCETON U
OI - J.C. MATHER NASA-GSFC
OI - M.G. HAUSER NASA-GSFC
OI - 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, 55, AND 9C 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 K), BY SPACECRAFT SPIN, AND BY THE ABILITY TO INTEGRATE OVER THE ENTIRE YEAR. SENSITIVITY TO LARGE-SCALE ANISOTROPIES IS ABOUT .00003 K.

***** CORSA-B*****

SPACECRAFT COMMON NAME- CORSA-B
ALTERNATE NAMES- COSMIC RADIATION SAT B

NSSDC ID- CORSA-B

LAUNCH DATE- 02/00/79 WEIGHT- 100. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3C

SPONSORING COUNTRY/AGENCY ISAS
JAPAN

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 105. MIN INCLINATION- 31. DEG
PERIAPSIS- 35C. KM ALT APOAPSIS- 550. KM ALT

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

BRIEF DESCRIPTION

THE COSMIC RADIATION SATELLITE, CORSA-B, HAS THE SHAPE OF AN OCTAGONAL RIGHT PRISM WITH A MAXIMUM WIDTH OF 8C CM AND A HEIGHT OF 65 CM. THE SPACECRAFT IS SPIN-STABILIZED WITH A SPIN RATE OF 5 RPM. THE SPIN AXIS IS MANEUVERED BY MEANS OF MAGNETIC TORQUING TOWARDS THE CELESTIAL OBJECTS TO BE OBSERVED. X-RAY DETECTORS LOOK PARALLEL AND PERPENDICULAR TO THE SPIN AXIS, OBSERVING X-RAY SOURCES OVER A WIDE ENERGY RANGE WITH SHORT TIME RESOLUTION.

----- CORSA-B, MAKINO-----

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

NSSDC ID- CORSA-B-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 SURVEYS THE SKY AND MONITORS 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.

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OF POOR QUALITY

----- CORSA-B, MIYAMOTO-----

INVESTIGATION NAME- MONITOR OF X-RAY SOURCES

NSSDC ID- CORSA-B-01 INVESTIGATIVE PROGRAM SCIENTIFIC SATELLITE INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL P1 - S. MIYAMOTO OSAKA CITY U P1 - Y. OGAWARA U OF TOKYO P1 - I. KONDO U OF TOKYO P1 - M. YOSHINORI ST PAUL U

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

***** DMSP-F4*****

SPACECRAFT COMMON NAME- DMSP-F4 ALTERNATE NAMES-

NSSDC ID- DMSP-F4

LAUNCH DATE- WEIGHT- 450. KG LAUNCH SITE- VANDENBERG AFB, UNITED STATES LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY UNITED STATES DOD-USAF

PERSONNEL PM - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION DMSP-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 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 IS 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 100-SQ-FT 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 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, IN 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 H (SSH), 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-F4, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSP-F4-01 INVESTIGATIVE PROGRAM OPERATIONAL METEOROLOGICAL SYS INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL P1 - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION THE OPERATIONAL LINESCAN SYSTEM (OLS) IS THE PRIMARY EXPERIMENT ON THE DMSP-F3 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) COVERS A TEMPERATURE RANGE OF 210 TO 310 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 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-F4, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER SPECIAL SENSOR H (SSH)

NSSDC ID- DMSP-F4-02 INVESTIGATIVE PROGRAM OPERATIONAL METEOROLOGICAL SYS INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL P1 - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION SPECIAL SENSOR H (SSH) IS A VERTICAL TEMPERATURE PROFILE RADIOMETER (VIPR). 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, 695, 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-F4, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- DMSP-F4-03 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING INVESTIGATION DISCIPLINE(S) AERONOMY PARTICLES AND FIELDS

PERSONNEL P1 - P.L. ROTHWELL USAF GEOPHYSICS 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 COMING IN THE NADIR DIRECTION. 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.

----- DMSF-F4, SNYDER-----

INVESTIGATION NAME- PASSIVE IONOSPHERIC MONITOR

NSSDC ID- DMSF-F4-04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - A.L. SNYDER USAF GEOPHYSICS 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 MANMADE 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.

***** DMSF-F5*****

SPACECRAFT COMMON NAME- DMSF-F5
ALTERNATE NAMES-

NSSDC ID- DMSF-F5

LAUNCH DATE- WEIGHT- 450. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PERSONNEL
PM - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION
DMSF-F5 IS 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 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 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 IS 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 100-SQ-FT 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 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, IN 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 H (SSH), 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.

----- DMSF-F5, AFGWC STAFF-----

INVESTIGATION NAME- OPERATIONAL LINESCAN SYSTEM (OLS)

NSSDC ID- DMSF-F5-01 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 DMSF-F3 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) COVERS A TEMPERATURE RANGE OF 210 TO 310 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 OF THIS EXPERIMENT IS CONTAINED IN THE REPORT, 'PRIMARY OPTICAL SUBSYSTEMS FOR DMSF,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, JULY - AUGUST 1975.

----- DMSF-F5, AFGWC STAFF-----

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER
SPECIAL SENSOR H (SSH)

NSSDC ID- DMSF-F5-02 INVESTIGATIVE PROGRAM
OPERATIONAL METEOROLOGICAL SYS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SPECIAL SENSOR H (SSH) 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 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, 695, 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, 'DMSF SPECIAL METEOROLOGICAL SENSOR H, OPTICAL SUBSYSTEM,' D. A. NICHOLS, OPTICAL ENGINEERING, 14, NO. 4, 284-288, JULY-AUGUST 1975.

----- DMSF-F5, ROTHWELL-----

INVESTIGATION NAME- PRECIPITATING ELECTRON SPECTROMETER

NSSDC ID- DMSF-F5-03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
AERONOMY

PERSONNEL
PI - P.L. ROTHWELL USAF GEOPHYSICS 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 COMING IN THE NADIR DIRECTION. 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 1500 EV. A COMPLETE EIGHT-POINT SPECTRUM FROM EACH UNIT IS OBTAINED IN 1 S.

ORIGINAL PAGE IS
OF POOR QUALITY

----- DMSP-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 GEOPHYSICS 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 IN THE TEMPERATURE RANGE FROM 200 TO 15,000 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-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 GEOPHYSICS 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 MANMADE 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.

***** DYNAMICS EXPLORER-A*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-A ALTERNATE NAMES-

NSSDC ID- DE-A

LAUNCH DATE- 02/22/81 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- 417. MIN INCLINATION- 90.0 DEG
PERIAPSIS- 275. KM ALT APOAPSIS- 23918. KM ALT

PERSONNEL MG - F.W. GAETANO NASA HEADQUARTERS
SC - D.P. CAUFFMAN 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, TENOUS, CONVECTING PLASMAS OF THE MAGNETOSPHERE AND THE COLLER, DENSER PLASMAS AND GASES ROTATING IN THE EARTH'S IONOSPHERE, UPPER ATMOSPHERE, AND PLASMASPHERE. TWO SATELLITES, LAUNCHED TOGETHER, DE-A AND -B, AND ARE PLACED IN POLAR COPLANAR ORBITS SO THAT SIMULTANEOUS MEASUREMENTS AT HIGH AND LOW ALTITUDES ON THE SAME FIELD LINES COULD BE OBTAINED. THE DE-A SPACECRAFT (HIGH ALTITUDE MISSION) USES AN ECLIPTICAL 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 55 KG. POWER IS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT IS SPIN STABILIZED, WITH A SPIN RATE OF 10 RPM, WITHIN ONE PERCENT. THE SPIN AXIS IS WITHIN ONE PERCENT OF THE ORBIT NORMAL TO THE PLANE. 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 S1
INVESTIGATION DISCIPLINE(S) SPACE PLASMAS PARTICLES AND FIELDS

PERSONNEL PI - J.L. BURCH U OF TEXAS, SAN ANTONIO
OI - R.A. 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 25 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 ISIS-2 TYPE) AND TWO SENSORS (ONE ELECTRON CHANNEL AND ONE ION CHANNEL). THE DETECTOR HEADS ARE MOUNTED ON THE MAIN BODY. ONE OF THE DETECTOR HEADS IS MOUNTED IN THE RADIAL DIRECTION, AND THE OTHERS AT PLUS OR MINUS 6 DEGREES AND PLUS OR MINUS 12 DEGREES FROM THIS DETECTOR IN A PLANE DEFINED BY THE SPIN AXIS AND RADIAL DETECTOR. ONE DETECTOR SWEEPS WITHIN A FEW DEGREES 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 S1
INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL PI - C.R. CHAPPELL NASA-MSFC
OI - P.M. BANKS UTAH STATE U
OI - W.B. HANSON U OF TEXAS, DALLAS
OI - J.H. HOFFMAN U OF TEXAS, DALLAS
OI - A.F. NAGY U OF MICHIGAN
OI - 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 64-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 0-65 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 64-U RANGE. THE INSTRUMENT CONSISTS OF A DETECTOR HEAD MOUNTED PERPENDICULAR TO THE SPIN AXIS SO THAT THE DETECTOR SWEEPS OUT AN ARC NEARLY IN THE MAGNETIC MERIDIAN PLANE. THE DETECTOR HEAD HAS 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 DETECTION 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
OI - C.F. KENNEL U OF CALIF, LA
OI - J.E. MAGGS U OF CALIF, LA

BRIEF DESCRIPTION
THE PRIMARY GOAL OF THIS INVESTIGATION IS TO USE THE EXPERIMENTAL RESULTS 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 HISS 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
OI - K.L. ACKERSON U OF IOWA
OI - R.L. CAROVILLANO BOSTON COLLEGE
OI - R.H. 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 ADVANCES 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 Å CENTERED AT 5577 Å, 6300 Å, AND 3914 Å, 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 MGF 2 OVERCOAT. THE COLLIMATION AND MIRROR DRIVE ARE SIMILAR TO THAT DESCRIBED PREVIOUSLY FOR THE VISIBLE IMAGING PHOTOMETER. A FILTER WHEEL WITH MGF 2, CAF 2, AND BAF 2 FILTERS ALLOWS GLOBAL IMAGING FROM 1370 Å TO 1700 Å, AT 1304 Å, 1356 Å, AND 1216 Å. THE DETECTOR IS A PHOTOMULTIPLIER TUBE WITH A CSI PHOTOCATHODE AND A MGF SUBSCRIPT 2 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
OI - T.F. BELL STANFORD U
OI - D.L. CARPENTER STANFORD U
OI - C.G. PARK STANFORD U
OI - 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 A BROAD-BAND MAGNETIC FIELD DETECTOR ON DE-A (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 SPACECRAFT INSTRUMENTATION FOR THIS EXPERIMENT CONSISTS OF THE LINEAR WIDE-BAND RECEIVER PROVIDED BY THE PLASMA WAVE INSTRUMENT. THE BROAD-BAND MAGNETIC FIELD DATA ARE OBTAINED FROM THE LOOP 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 2 HZ TO 2 MHZ, MAGNETIC FIELDS FROM 100 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 POYNTING 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 FIELD; (3) A LOW-FREQUENCY CORRELATOR CONTAINING TWO FILTER RECEIVERS AND PHASE DETECTORS. EIGHT FILTERS IN THE RANGE 1.78-100 HZ ARE SWEEP IN 8 SECONDS; (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.O. 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. GHIUMETTI 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 SATELLITE. IT CONSISTS OF A CURVED-PLATE ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL ELECTROSTATIC-MAGNETIC MASS 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 MASS 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.H. 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 CONVERTERS, 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. MAXIMUM POSSIBLE ERRORS FROM INSTRUMENTAL SOURCES ARE CONSERVATIVELY ESTIMATED WITHIN 0.005 PERCENT OF READING AND +.0005 TESLA IN HIGH-FIELD REGIONS. THE MAGNETOMETER'S DIGITAL COMPENSATION OF THE AMBIENT FIELD IS IN PRECISE .8 TESLA INCREMENTS.

***** DYNAMICS EXPLORER-B*****

SPACECRAFT COMMON NAME- DYNAMICS EXPLORER-B
ALTERNATE NAMES-

NSSDC ID- DE-B

LAUNCH DATE- 02/28/81 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- 100. MIN	INCLINATION- 90.0 DEG
PERIAPSIS- 275. KM ALT	APOAPSIS- 1200. KM ALT

PERSONNEL

MG - F.W. GAETANO	NASA HEADQUARTERS
SG - D.P. CAUFFMAN	NASA HEADQUARTERS
PM - G.O. 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 SUPRATHERMAL IONS AND PLASMA FLOW MEASUREMENTS AT THE FEET 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 3-AXIS STABILIZED WITH THE YAW AXIS ALIGNED TOWARD THE CENTER OF THE EARTH TO WITHIN ONE DEG. THE SPIN AXIS IS NORMAL TO THE ORBIT PLANE WITHIN ONE 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 Z 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 SUPPORTATIVE 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

PERSONNEL

PI - L.H. BRACE	NASA-GSFC
OI - W.R. HOEGY	NASA-GSFC
OI - R.F. THEIS	NASA-GSFC
OI - K.D. COLE	LA TROBE U.
OI - G.R. CARIGNAN	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. 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 SHORT 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 OF TWO TIMES PER SECOND.

----- DYNAMICS EXPLORER-B, CARIGNAN-----

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION

NSSDC ID- DE-B -03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G.R. CARIGNAN	U OF MICHIGAN
OI - H.W. SPENCER	NASA-GSFC
OI - C.A. REBER	NASA-GSFC
OI - A.E. HEDIN	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 ANTECHAMBER 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 2.6 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 46 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

PERSONNEL

PI - W.B. HANSON U OF TEXAS, DALLAS
OI - R.A. HEELIS U OF TEXAS, DALLAS
OI - D.R. ZUCCARO U OF TEXAS, DALLAS
OI - C.R. LIPPENCOTT 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 CUBIC CM, AND DETERMINES THE VALUE OF N(I) FROM ITS MAXIMUM VALUE DOWN TO APPROXIMATELY 10 IONS PER CUBIC 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 MEASUREMENTS ARE MADE WITH A MULTIGRIDDED PLANAR RETARDING POTENTIAL ANALYZER VERY SIMILAR IN CONCEPT AND GEOMETRY TO THE INSTRUMENTS CARRIED ON THE AE SATELLITES. 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; PLASMA DRIFT VELOCITY NORMAL TO THE SENSOR FACE; 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/CD-0P

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - P.B. HAYS U OF MICHIGAN
OI - R.G. ROBLE NATL CTR FOR ATMOS RES
OI - G.R. CARIGNAN U OF MICHIGAN
OI - A.F. NAGY U OF MICHIGAN
OI - D. REES 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 AIRFLOW 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 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.

----- 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. THIS INVESTIGATION YIELDS INFORMATION ON: (1) THE ION CONVECTION (ELECTRIC FIELD) PATTERN IN THE AURORAL AND POLAR IONOSPHERE; (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 U OF TEXAS, SAN ANTONIO

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 AURORAL 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 AURORAL 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 - N.C. MAYNARD
OI - J.P. HEPPNER

NASA-GSFC
NASA-GSFC

NSSDC ID- DE-B -11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

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 6 CYLINDRICAL ELEMENTS 11 M LONG AND 28 MILLIMETERS IN DIAMETER FOR EACH OF THE 6 ANTENNAS NECESSARY FOR THE AXIS MEASUREMENT. EACH ANTENNA IS INSULATED FROM THE PLASMA EXCEPT FOR THE OUTER 2-M. 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 (E12-OHM) PREAMPLIFIERS WHOSE OUTPUT ARE ACCURATELY SUBTRACTED AND DIGITIZED (14-BIT A-D CONVERSION FOR SENSITIVITY TO 0.1 MICROVOLTS/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.

----- DYNAMICS EXPLORER-B, MAYNARD-----

INVESTIGATION NAME- ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION

NSSDC ID- DE-B -12 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - H.G. MAYR NASA-GSFC
OI - G.P. NEWTON NASA-GSFC

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 THE SATELLITES, 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 THE 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- ATMOSPHERIC DYNAMICS AND ENERGETICS INVESTIGATION

PERSONNEL
PI - R.G. ROBLE

NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION

THIS INVESTIGATION 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 PEDERSON 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

NSSDC ID- DE-B -C4 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - H.W. SPENCER NASA-GSFC
OI - A.E. HEDIN NASA-GSFC
OI - W.R. HOEGY NASA-GSFC
OI - H.B. NIEMANN NASA-GSFC
OI - R.F. THEIS NASA-GSFC
OI - G.R. CARRIGAN 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 IONS IN THE IONOSPHERE, THE ACCELERATION OF IONS BY NEUTRALS 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. FROM THESE QUANTITATIVE MEASUREMENTS, THE WIND VECTOR IS COMPUTED. A RETARDING POTENTIAL QUADRUPOLE MASS SPECTROMETER, COUPLED TO THE ATMOSPHERE THROUGH A PRECISELY ORIFICED ANTECHAMBER, 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.

----- 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 - H. SUGIURA NASA-GSFC
OI - B.G. LEDLEY NASA-GSFC
OI - W.H. FARTHING NASA-GSFC
OI - L.J. CAILL, JR. 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 8.E-6-TESLA 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. MAXIMUM POSSIBLE ERRORS FROM INSTRUMENTAL SOURCES ARE CONSERVATIVELY ESTIMATED WITHIN 0.005 PERCENT OF READING AND +5.E-6 TESLAS IN HIGH FIELD REGIONS.

----- DYNAMICS EXPLORER-B, WINNINGHAM-----

INVESTIGATION NAME- LOW ALTITUDE PLASMA INSTRUMENT

NSSDC ID- DE-B -3E INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J.D. WINNINGHAM U OF TEXAS, DALLAS
OI - D.M. KLUMPAR U OF TEXAS, DALLAS
OI - R.A. HOFFMAN NASA-GSFC
OI - J.L. BURCH U OF TEXAS, SAN ANTONIO

BRIEF DESCRIPTION

THE LOW ALTITUDE PLASMA INSTRUMENT (LAPI) PROVIDES HIGH RESOLUTION MEASUREMENTS OF POSITIVE IONS AND ELECTRONS FROM 5 EV TO 25 KEV. 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 UP TO 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.

***** EUVE*****

SPACECRAFT COMMON NAME- EUVE
ALTERNATE NAMES- EXTREME UV EXPLORER, GERXSAT

NSSDC ID- EUVE

LAUNCH DATE- 10/07/82 WEIGHT- 400. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.6 MIN INCLINATION- 28. DEG
PERIAPSIS- 550. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL
MG - L. DOYDEY NASA HEADQUARTERS
SC - A.G. OPP NASA HEADQUARTERS
PS - S.T. WILLIS NASA-GSFC
PS - NOT SELECTED YET

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 130 AND 1000 A, 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
OI - W. CASH, JR. U OF CALIF, BERKELEY
OI - F. PARESCHE 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 CONVERTOR (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 75 - 120 A, 160 - 320 A, AND 390 - 550 A. THE FOURTH TELESCOPE OPERATES AT APPROXIMATELY 10 DEG FROM THE SPIN AXIS, IN THE WAVELENGTH RANGE 150 - 350 A, AND IS DESIGNED TO OBSERVE SELECTED INTERESTING OBJECTS.

***** EXOS-B*****

SPACECRAFT COMMON NAME- EXOS-B
ALTERNATE NAMES- EXOSPHERIC SAT. B

NSSDC ID- EXOS-B

LAUNCH DATE- 09/14/78 WEIGHT- 92. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3H

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 525. MIN INCLINATION- 31. DEG
PERIAPSIS- 250. KM ALT APOAPSIS- 3000. KM ALT

PERSONNEL

PM - T. OBAYASHI U OF TOKYO
PS - N. KAWASHIMA U OF TOKYO
PS - H. OYA U OF TOHOKU

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 TWO SETS OF 60-M EXTENDABLE ANTENNAS AND A 1-M BOOM 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. ALTITUDE WAS MEASURED WITH A SUN SENSOR TO AN ACCURACY OF 0.5 DEG. A 0.5-W 136-MHZ PCH/PH 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.

----- EXOS-B, AOYAMA-----

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- EXOS-B -C5 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - I. AOYAMA TOKAI U
OI - A. NISHIDA TOKYO U
OI - F. TOYAMA TOKAI U

BRIEF DESCRIPTION

MAGNETIC FIELD INTENSITIES ARE MEASURED USING A FLUXGATE MAGNETOMETER WITH ACCURACY OF SEVERAL GAMMAS. PC-1 PULSATION ACROSS THE PLASMAPAUSE IS STUDIED.

----- EXOS-B, KAWASHIMA-----

INVESTIGATION NAME- ENERGY SPECTRUM OF ELECTRONS AND PROTONS FROM 10 EV TO 20 KEV

NSSDC ID- EXOS-B -U6 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

ORIGINAL PAGE
OF POOR QUALITY

PERSONNEL
 PI - N. KAWASHIMA U OF TOKYO
 OI - T. MUKAI U OF TOKYO
 OI - T. ARAKAWA U OF TOKYO
 OI - M. EJIRI U OF TOKYO
 OI - H. KUBO U OF TOKYO
 OI - T. KIBUNE U OF TOKYO

BRIEF DESCRIPTION
 THIS EXPERIMENT MEASURED THE ENERGY SPECTRUM OF ELECTRONS AND PROTONS FROM 10 EV TO 20 KEV USING CHANNELTRON MULTIPLIERS. THE PITCH ANGLE DISTRIBUTION WAS NOT MEASURED BUT THE ENERGY RESOLUTION WAS CONTROLLABLE. THE FINE TIME STRUCTURE OF THE ENERGY SPECTRUM WAS DETECTED AS A COORDINATED MEASUREMENT WITH THE STIMULATED PLASMA WAVE EXPERIMENT.

----- EXOS-B, KAWASHIMA-----
 INVESTIGATION NAME- WAVE-PARTICLE INTERACTIONS
 NSSDC ID- EXOS-B -07 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE PLASMAS

PERSONNEL
 PI - N. KAWASHIMA U OF TOKYO
 OI - M. EJIRI 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 1 TO 200 EV 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.

----- EXOS-B, KIMURA-----
 INVESTIGATION NAME- ELECTROMAGNETIC FIELD FLUCTUATION DETECTORS
 NSSDC ID- EXOS-B -03 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - I. KIMURA KYOTO U
 OI - K. HASHIMOTO KYOTO U

BRIEF DESCRIPTION
 THIS EXPERIMENT WAS DESIGNED TO EXCITE PLASMA WAVES BY TRANSMITTING 300-W PULSES FROM A 120-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 FIXED FREQUENCIES TO OBTAIN ELECTRON TEMPERATURE, TEMPERATURE ANISOTROPY AND ELECTRON DENSITY. PLASMA INSTABILITIES AND NONLINEAR WAVE/PARTICLE INTERACTIONS WERE STUDIED.

----- EXOS-B, OBAYASHI-----
 INVESTIGATION NAME- IMPEDANCE AND ELECTRIC FIELD
 NSSDC ID- EXOS-B -04 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - T. OBAYASHI U OF TOKYO
 OI - M. EJIRI U OF TOKYO
 OI - K. YSURUDA U OF TOKYO
 OI - T. OGAWA KYOTO U

BRIEF DESCRIPTION
 A SWEEP FREQUENCY IMPEDANCE PROBE MEASURED FROM .02 TO 3 MHZ USING A 120-M (TIP-TO-TIP) ANTENNA. THIS PROVIDED BASIC DATA FOR CALIBRATION OF NATURAL PLASMA WAVES 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 200 HZ 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.

----- EXOS-B, OYA-----
 INVESTIGATION NAME- MAGNETOSPHERIC PLASMA PROBE

NSSDC ID- EXOS-B -01 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE PLASMAS
 IONOSPHERES AND RADIO PHYSICS

PERSONNEL
 PI - H. OYA U OF TOHOKU
 OI - T. KAMADA NAGOYA U
 OI - S. MIYATAKE ELECTRO-COMMUNICATNS U
 OI - A. MORIOKA U OF TOHOKU
 OI - K. AIKYO RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THE EXPERIMENT IS DESIGNED TO EXCITE PLASMA WAVES BY TRANSMITTING 400-WATT SIGNALS FROM A 120 M (TIP TO TIP) ANTENNA IN A FREQUENCY RANGE FROM 3 KHZ TO 10 MHZ. THE IMPRESSED FREQUENCIES CAN BE CHANGED IN A CONTINUOUS SWEEP OR STEPPED THROUGH FIXED FREQUENCIES TO INVESTIGATE THE RF HEATING EFFECT AND GENERATION OF INSTABILITIES. INVESTIGATION OF THE WAVE-WAVE INTERACTIONS AND NONLINEAR WAVE-PARTICLE INTERACTIONS IS ONE OF THE PRINCIPAL PURPOSES OF THIS EXPERIMENT.

----- EXOS-B, OYA-----
 INVESTIGATION NAME- NATURAL PLASMA WAVES
 NSSDC ID- EXOS-B -02 INVESTIGATIVE PROGRAM
 SCIENTIFIC SATELLITE
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS
 SPACE PLASMAS

PERSONNEL
 PI - H. OYA U OF TOHOKU
 OI - H. MATSUMOTO KYOTO U
 OI - J. OUTSU NAGOYA U
 OI - A. IWAI NAGOYA U
 OI - T. YOSHINO U OF ELECTRO-COMMUN
 OI - T. ONDOH RADIO RESEARCH LAB

BRIEF DESCRIPTION
 THIS EXPERIMENT USED A 120-M (TIP-TO-TIP) DIPOLE ANTENNA FOR DETECTING VLF WAVES UP TO 10 KHZ WITH A WIDEBAND RECEIVER AND HECTOMETRIC, DECAHMETRIC, AND KILOMETRIC WAVES IN THE RANGE FROM .02 TO 5 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 SIPLE STATION WERE PLANNED.

***** EXOS-C*****

SPACECRAFT COMMON NAME- EXOS-C
 ALTERNATE NAMES- EXOSPHERIC SAT. C

NSSDC ID- EXOS-C
 LAUNCH DATE- 00/00/78 WEIGHT- 100. KG
 LAUNCH SITE- KAGOSHIMA, JAPAN
 LAUNCH VEHICLE- M-4S

SPONSORING COUNTRY/AGENCY
 JAPAN ISAS

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 94.5 MIN INCLINATION- DEG
 PERIAPSIS- 500. KM ALT APOAPSIS- 500. KM ALT

PERSONNEL
 PM - H. 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 WAS REQUESTED 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

NSSDC ID- JOPO

LAUNCH DATE- 01/00/82 WEIGHT- 68D. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY NASA-OSS
UNITED STATES

PLANNED ORBIT PARAMETERS
ORBIT TYPE- JUPITER ORBITER
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- 425000. KM ALT APOAPSIS- 986000. KM ALT

PERSONNEL
MG - D.R. MCCULLAR NASA HEADQUARTERS
SC - R.E. MURPHY NASA HEADQUARTERS
PM - J. CASANI NASA-JPL
PM - W.S. SHIPLEY NASA-JPL
PS - T. JOHNSON NASA-JPL

BRIEF DESCRIPTION
THIS SPACECRAFT IS A SINGLE SPACECRAFT CONSISTING OF AN ORBITER AND AN ATMOSPHERIC ENTRY PROBE. IT WILL BE LAUNCHED IN JANUARY 1982, WILL RECEIVE A GRAVITY ASSIST FROM MARS, AND WILL ARRIVE AT JUPITER IN JUNE 1985. AT THIS TIME THE PROBE WILL DESCEND INTO THE JOVIAN ATMOSPHERE AND THE ORBITER WILL CONTINUE IN ORBIT AROUND JUPITER UNTIL MARCH 1987. SEVERAL ORBITER AND PROBE EXPERIMENTS WILL BE PERFORMED. THE SPACECRAFT IS A DUAL-SPIN DESIGN IN WHICH PART OF THE SPACECRAFT IS SPINNING AT THE RATE OF 5 RPM AND THE OTHER PART IS DESPUN OR NOT SPINNING. THE PROBE IS MOUNTED IN THE SPINNING SECTION. THE PROBE, WHICH HAS NO INDEPENDENT MANEUVER OR ATTITUDE CONTROL CAPABILITY, WILL BE RELEASED FROM THE ORBITER 100 DAYS PRIOR TO JUPITER ENCOUNTER, AFTER WHICH THE ORBITER EXECUTES A DEFLECTION MOVEMENT TO RAISE ITS PERIJOVE RADIUS TO SIX JUPITER RADII. FOLLOWING HIGH SPEED ENTRY BY PARACHUTE, THE PROBE TELEMETERS STORED AND REAL-TIME DATA TO THE ORBITER, WHICH SERVES AS A RELAY LINK TO EARTH. APPROXIMATELY 45 MIN OF DATA ARE TRANSMITTED TO THE ORBITER DURING THE SUBSONIC DESCENT PHASE. THE PROBE ENTRY IS TARGETED FOR 5.5 DEG S. LATITUDE. AFTER TERMINATION OF THE PROBE MISSION THE ORBITER REORIENTS AND FIRES THE MAIN ENGINE FOR THE JUPITER ORBIT INSERTION MANEUVER. THE ORBITER USES CLOSE ENCOUNTERS WITH THE JOVIAN SATELLITES GUNYMEDE AND CALISTO TO TURN THE ORBIT INTO JUPITER'S MAGNETOTAIL. THE ORBITER POWER SOURCE IS A MODULAR 500-W SELENIDE ISOTOPE GENERATOR (SIG) THAT PROVIDES 28 V OF DC CURRENT TO ALL SUBSYSTEMS. THE TWO SIG'S (250 W EACH) ARE LOCATED ON THE SPUN PART OF THE ORBITER. TEMPERATURE IS CONTROLLED BY RADIOISOTOPE HEATER UNITS (RHU'S). TELEMETRY IS BY A TWO-CHANNEL DOWNLINK, ONE FOR CONTINUOUS TRANSMISSION OF FIXED FORMAT (6.25 BS) ON THE S-BAND, AND THE OTHER FOR REAL-TIME PLAYBACK DATA AT RATES BETWEEN 2 AND 128 KBS ON THE X-BAND.

----- GALILEO ORBITER, ANDERSON-----
INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- JOPO -1# INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
RADIO PHYSICS

PERSONNEL
TL - J.O. ANDERSON NASA-JPL
TM - V.R. ESHLEMAN STANFORD U
TM - F.G. ESTABROOK NASA-JPL
TM - G. FJELDBO NASA-JPL
TM - E. GERARD PARIS OBSERVATORY
TM - S. GULKIS NASA-JPL
TM - A.J. KLIORE NASA-JPL
TM - R. WOO NASA-JPL
TM - G. 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 HEIGHT; (3) DETERMINE THE SIZES AND SHAPES 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 TRACKING; (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 IONOSPHERE; (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 E-15. 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 TRANSPONDER TO GENERATE A COHERENT S-X BAND DOWNLINK (2297 MHZ AND 8422 MHZ), USING AN EARTH-ORIENTED 5-M DISH ANTENNA. THE FREQUENCY STABILITY IS APPROXIMATELY 1 PART IN E11. 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

NSSDC ID- JOPO -1G INVESTIGATIVE PROGRAM
CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
TL - M.J.S. BELTON KITTY 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 BROWN U
TM - G. NEUKUM MPI-NUCLEAR PHYS
TM - G. SCHUBERT U OF CALIF, LA
TM - C.B. PILCHER U OF HAWAII
TM - J. VEVERKA CORNELL U
TM - M.H. CARR US GEOLOGICAL SURVEY
TM - J.B. 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 SYNOPTIC 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 EIGHT-POSITION FILTER WHEEL (FILTERS NOT SPECIFIED) IS USED. THE SPECTRAL RESPONSE IS 350 TO 1100 NANOMETERS. RESOLUTION IS 20 MICRORAD PER LINE PAIR, THE FIELD OF VIEW IS 0.008 RAD (0.46 DEG), THE MINIMUM EXPOSURE IS 5 MILLISECONDS, AND THE MAXIMUM FRAME RATE IS ABOUT 1/MIN. THE LINEAR DYNAMIC RANGE EXCEEDS 1000, WITH 6 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

NSSDC ID- JOPO -01 INVESTIGATIVE PROGRAM
CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - R.W. CARLSON U OF SOUTHERN CALIF
OI - T.V. JOHNSON NASA-JPL
OI - G.E. DANIELSON NASA-JPL
OI - F.P. FANALE NASA-JPL
OI - H.H. KIEFFER U OF CALIF, LA
OI - J.S. LEWIS MASS INST OF TECH
OI - H. MASURSKY US GEOLOGICAL SURVEY
OI - D.L. MATSON NASA-JPL
OI - T.B. MCCORD U OF HAWAII
OI - L.A. SOEBLOM US GEOLOGICAL SURVEY
OI - F. 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 INSB DETECTOR ARRAY IN ORDER TO PRODUCE MULTI-SPECTRAL LINE IMAGES OF SOURCES WITHOUT EXTERNAL SCANNING. ANGULAR RESOLUTION IS 3.5 MILLIRAD AND THE SPECTRAL RANGE IS 0.9 TO 3.0 MICROMETERS IN 144 CHANNELS AT A SPECTRAL RESOLUTION OF 0.3 MICROMETERS. THE TOTAL MASS OF THE SPECTROMETER IS 15 KG AND THE TOTAL CONTINUOUS POWER IS 4.5 W.

----- GALILEO ORBITER, FANALE-----

INVESTIGATION NAME- FORMATION AND EVOLUTION OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -12 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) PLANETOLOGY

PERSONNEL
PI - F.P. FANALE NASA-JPL

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

NSSDC ID- JOPO -24 INVESTIGATIVE PROGRAM CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S) SPACE PLASMAS PARTICLES AND FIELDS

PERSONNEL
PI - L.A. FRANK U OF IOWA
OI - F.V. COKONITI U OF CALIF, LA
OI - 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, COROTATIONAL 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 EXIT APERTURE ARE USED FOR MASS ANALYSIS, WITH A FRACTIONAL MASS RESOLUTION OF 0.18, SUFFICIENT TO IDENTIFY H+, HE+, HE++, 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 0.9 KG, AND THE TOTAL CONTINUOUS POWER IS 4.5 W.

----- GALILEO ORBITER, GIERASCH-----

INVESTIGATION NAME- JOVIAN ATMOSPHERIC DYNAMICS

NSSDC 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 NIMS 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, GRARD-----

INVESTIGATION NAME- ELECTRON EMITTER

NSSDC ID- JOPO -05 INVESTIGATIVE PROGRAM CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.J.L. GRARD ESA-ESTEC
OI - S.E. DEFOREST U OF CALIF, SAN DIEGO
OI - R.M. GOLDSTEIN NASA-JPL
OI - A. GOMFALONE 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 1.0 KG AND THE TOTAL CONTINUOUS POWER IS 2.5 W.

----- GALILEO ORBITER, GRUN-----

INVESTIGATION NAME- DUST

NSSDC ID- JOPO -09 INVESTIGATIVE PROGRAM CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S) INTERPLANETARY DUST

PERSONNEL
PI - E. GRUN MPI-NUCLEAR PHYS
OI - H. 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 E-7 TO E2 PER SECOND, THE PARTICLE MASS RANGE IS E-16 TO E-6 G, AND THE CHARGE RANGE IS E-14 TO E-10 C. THE INSTRUMENT PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. ITS TOTAL MASS IS 3.0 KG, AND THE TOTAL CONTINUOUS POWER IS 1.5 W.

----- GALILEO ORBITER, GURNETT-----

INVESTIGATION NAME- PLASMA WAVE SPECTROMETER

NSSDC ID- JOPO -07 INVESTIGATIVE PROGRAM CODE SL/CO-OP
INVESTIGATION DISCIPLINE(S) SPACE PLASMAS PARTICLES AND FIELDS

PERSONNEL
PI - D.A. GURNETT U OF IOWA
OI - R.E. GENDRIN CNET
OI - C.F. KENNEL U OF CALIF, LA
OI - F.L. SCARF TRW SYSTEMS GROUP
OI - S.O. 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 5.6 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 KG FOR THE SENSORS AND 1.9 KG FOR ELECTRONICS). THE TOTAL CONTINUOUS POWER IS 2.4 W.

----- GALILEO ORBITER, HORD-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER (UVS)

NSSDC ID- JOPO -02 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS PLANETARY ATMOSPHERES

PERSONNEL
PI - C.W. HORD U OF COLORADO
OI - C.A. BARTH U OF COLORADO
OI - K.K. KELLY U OF COLORADO
OI - A.L. LANE NASA-JPL
OI - A.I. STEWART U OF COLORADO
OI - G.E. THOMAS U OF COLORADO

ORIGINAL PAGE IS OF POOR QUALITY.

BRIF 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 NH3 AND OF UV-ACTIVE TRACE CONSTITUENTS, AND INVESTIGATE AURORAL EMISSIONS AND INTERACTIONS BETWEEN ATMOSPHERES AND THE JOVIAN PLASMASPHERE. INSTRUMENTATION CONSISTS OF A FASTIE-EBERT UV SPECTROMETER (WAVELENGTH RANGE OF 110 TO 430 NANOMETERS) WITH A CASSEGRAIN TELESCOPE HAVING A 5-CM APERTURE, 25-CM FOCAL LENGTH, AND A PROGRAMMABLE GRATING. THE SPECTRUM IS MEASURED WITH MICROCHANNEL DETECTORS AT A RESOLUTION OF 1 NAUTICAL MILE. THE SPECTROMETER IS MOUNTED ON THE ORBITER SCAN PLATFORM AND HAS A TOTAL MASS OF 3.1 KG. THE TOTAL CONTINUOUS POWER IS 3.8 W.

----- GALILEO ORBITER, HUNTEN-----

INVESTIGATION NAME- STRUCTURE AND AERONOMY OF THE ATMOSPHERES OF JUPITER AND ITS SATELLITES

NSSDC ID- JOPO -14 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - D.M. HUNTEN U OF ARIZONA

BRIF 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, KIVELSON-----

INVESTIGATION NAME- MAGNETOMETER

NSSDC ID- JOPO -03 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETOLOGY

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. MCPHERRON U OF CALIF, LA
OI - C.T. RUSSELL U OF CALIF, LA

BRIF 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 2.5.E-12 TO 1.6.E-5 TESLAS (0.0025 TO 1.6.E4 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 5.12.E-7 TESLAS (1 MILLIGAMMA - 512 GAMMAS), INBOUND SENSORS FOR HIGH FIELD READINGS OF 3.1.E-11 TO 1.6.E-5 TESLAS (31 MILLIGAMMAS - 16 KILOGAMMAS). ELECTRONICS ARE MOUNTED ON THE SPINNING SECTION AND INCLUDE OPTIMUM AVERAGING CAPABILITY. THE TOTAL MASS, EXCLUDING THE BOOM, IS 3.2 KG (1.0 FOR THE SENSORS, 2.2 FOR THE ELECTRONICS). THE TOTAL CONTINUOUS POWER IS 3.5 W.

----- GALILEO ORBITER, LACIS-----

INVESTIGATION NAME- PHOTOPOLARIMETER RADIOMETER

NSSDC ID- JOPO -08 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

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
OI - Y.-L. YUNG HARVARD U

BRIF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION 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 10-POSITION FILTER WHEEL, GIVING POLARIMETRY IN 3 SPECTRAL BANDS FROM 410 TO 1050 NANOMETERS AND PHOTOMETRY IN 7 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, ONE PERCENT RELATIVE PHOTOMETRY AND THREE PERCENT ABSOLUTE PHOTOMETRY; ONE PERCENT RELATIVE RADIOMETRY AND FIVE PERCENT ABSOLUTE RADIOMETRY. THE INSTRUMENT IS MOUNTED ON THE ORBITER SCAN PLATFORM. THE TOTAL MASS IS 2.9 KG AND THE TOTAL CONTINUOUS POWER IS 7.5 W.

----- GALILEO ORBITER, MASURSKY-----

INVESTIGATION NAME- GEOLOGY OF THE GALILEAN SATELLITES

NSSDC ID- JOPO -15 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - H. MASURSKY US GEOLOGICAL SURVEY

BRIF 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

NSSDC ID- JOPO -16 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - M.B. MCELROY HARVARD U

BRIF 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

NSSDC ID- JOPO -17 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - G.S. ORTON NASA-JPL

BRIF 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 PPR 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

NSSDC ID- JOPO -18 INVESTIGATIVE PROGRAM CODE SL
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - T. OWEN STATE U OF NEW YORK

BRIF DESCRIPTION

THIS INVESTIGATION USED DATA FROM THE MASS SPECTROMETER AND HELIUM INTERFEROMETER INVESTIGATIONS AND THE NIMS AND OTHER ORBITER INVESTIGATIONS TO ESTABLISH A DIRECT CALIBRATION OF JOVIAN 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

NSSDC ID- JOPO -10 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

NSSDC 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 -C6 INVESTIGATIVE PROGRAM
CODE SL/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - T.P. ARMSTRONG U OF KANSAS
OI - T.A. FRITZ NOAA-ERL
OI - S.M. KRINIGIS APPLIED PHYSICS LAB
OI - L.J. LANZEROTTI BELL TELEPHONE LAB
OI - R.W. MCENTIRE APPLIED PHYSICS LAB
OI - J.G. ROEDERER U OF ALASKA
OI - E.C. ROELOF APPLIED PHYSICS LAB
OI - W. STUDEHANN MPI-AERONOMY
OI - B. WILKEN 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
NON-THERMAL PROCESSES IN THE TRAPPED RADIATION. THE INSTRUMENT
PACKAGE CONSISTS OF A LOW-ENERGY MAGNETOSPHERIC MEASUREMENT
SYSTEM (LEMMS), A COMPOSITION MEASUREMENT SYSTEM (CMS), AND AN
INSTRUMENT STEPPING PLATFORM. THE LEMMS ENERGY RANGE AND
CHARGE RESPONSE (MAGNETIC DEFLECTION AND DE/DX, E TECHNIQUES)
IS, 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 - 130 MEV/NUCLEON RANGE. THE INSTRUMENT
PACKAGE IS MOUNTED ON THE SPINNING SECTION OF THE ORBITER. THE
TOTAL MASS IS 6.9 KG AND THE TOTAL CONTINUOUS POWER IS 5.9 W.

***** GALILEO PROBE*****

SPACECRAFT COMMON NAME- GALILEO PROBE
ALTERNATE NAMES- JUPITER ORBITER PROBE, JOP

NSSDC ID- JOP.

LAUNCH DATE- 01/00/82 WEIGHT- 245. 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
PM - J. CASANI NASA-JPL
PM - J. SPERANS NASA-ARC
PS - L. COLIN NASA-ARC
PS - T. JOHNSON NASA-JPL

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THE PROBE IS A STAGED-VENTED SYSTEM COMPRISED OF A DECELERATION MODULE AND A DESCENT MODULE. ITS MASS AND DIAMETER ARE 253 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

PERSONNEL

PI - R.W. BOESE NASA-ARC
OI - J.B. POLLACK NASA-ARC
OI - P.M. SILVAGGIO NASA-ARC

BRIEF DESCRIPTION

THE PURPOSES OF THIS INVESTIGATION ARE TO: (1) MEASURE VEPTICAL DISTRIBUTION OF NET FLUX OF SOLAR ENERGY AND PLANETARY EMISSION 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) AND A MULTIDETECTOR ARRAY (WITH CHANNELS AT APPROXIMATELY 0.3 - 3.0, 0.3 - 2000, 20-30, 30-40, AND 40 - 60 MICROMETERS. IT IS MOUNTED ON THE PROBE WITH EXTERNAL VIEWING AFTER SHIELD DEPLOYMENT. THE TOTAL MASS IS 2.3 KG AND THE TOTAL CONTINUOUS POWER IS 4.6 W.

----- GALILEO PROBE, LANZEROTTI-----

INVESTIGATION NAME- LIGHTNING

NSSDC ID- JOP -06 INVESTIGATIVE PROGRAM
CODE SL/CO-0P

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
SPACE PLASMAS

PERSONNEL

PI - L.J. LANZEROTTI BELL TELEPHONE LAB
OI - G. DEHMEI BRAUNSCHEIG TECH U
OI - F.O. GLEIM BRAUNSCHEIG TECH U
OI - E.P. KRIDER U OF ARIZONA
OI - K. RINNERT MPI-AERONOMY
OI - M. 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, 100 KHZ NARROW-BAND. THE TIME DOMAIN IS 1 HZ TO 100 KHZ, 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
PLANETOLOGY

PERSONNEL

PI - H.B. NIEMANN NASA-GSFC
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARIGNAN U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN
OI - R.E. HARTLE NASA-GSFC
OI - D.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 NE22 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 TANDEM GETTER, AND A SPUTTER ION PUMP. THE MASS RANGE IS 1-52, 84, AND 131 U. THE DYNAMIC RANGE IS E-2. 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 OUTLET PORT NEAR THE MINIMUM PRESSURE POINT. THE TOTAL MASS IS 6.6 KG AND THE TOTAL CONTINUOUS POWER IS 13.5 W.

----- GALILEO PROBE, RAGENT-----

INVESTIGATION NAME- NEPHELOMETER

NSSDC ID- JOP -05 INVESTIGATIVE PROGRAM
CODE SL/CO-0P

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - B. RAGENT NASA-ARC
OI - J.E. BLAMONT CNRS-SA
OI - G.W. GRAMS NATL CTR FOR ATMOS RES
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 ARE 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
PLANETOLOGY

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 (TEMPERATURE, PRESSURE, DENSITY, MOLECULAR WEIGHT) PROFILES OVER AN ALTITUDE RANGE FROM A THRESHOLD OF ABOUT 1000 KM ABOVE THE CLOUD DECK DOWN TO PROBE FAILURE (DEEPER THAN 15 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

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 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.

***** GOES-D*****

SPACECRAFT COMMON NAME- GOES-D
ALTERNATE NAMES-

NSSDC ID- GOES-D

LAUNCH DATE- 08/00/80 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHTEL-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-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 CYLINDRICAL SHAPED SPACECRAFT MEASURES 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDS AN ADDITIONAL 23 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
(VISSR)

NSSDC ID- GOES-D -01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

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

BRIEF DESCRIPTION

THE VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) FLOWN ON GOES-B IS 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 IS 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 MICRON) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR 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-TO-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 NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAODIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NAODIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. 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.

----- GOES-D, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND
TRANSMISSION SYSTEM

NSSDC ID- GOES-D -05 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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 (WEXAF 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 BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIES 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
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.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 0.3 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
OPERATIONAL 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.E6 ERG PER CM PER S AND 1 TO 8A, 1E-5 ERGS 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
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION
THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 GAMMA (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 GAMMA OVER A RANGE OF PLUS OR MINUS 50 GAMMA.

***** GOES-E*****

SPACECRAFT COMMON NAME- GOES-E
ALTERNATE NAMES-

NSSDC ID- GOES-E

LAUNCH DATE- 03/00/81 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. CERYENKA NASA HEADQUARTERS,
PM - R.H. PICKARD NASA-GSFC
PS - W.E. SHENK 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 190.5 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-E, NESS STAFF-----

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

NSSDC ID- GOES-E -01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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-E IS 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 IS 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 MICRON) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR 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-TO-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 NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NAIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NAIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. THE VISSR OUTPUT IS DIGITIZED AND TRANSMITTED TO THE NOAA COMMAND DATA ACQUISITION STATION, WOLLOPS 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.

----- GOES-E, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-E -05 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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 (WEXAF 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 BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIES 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

NSSDC ID- GOES-E -02 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
 OI - H.K. 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 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .GE. 500 KEV RANGE.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-E -03 INVESTIGATIVE PROGRAM
 OPERATIONAL 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.E-6 ERG PER SQ CM PER S AND 1 TO 8A, 1.E-5 ERGS PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

----- GOES-E, WILLIAMS-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-E -04 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 MAGNETOSPHERIC PHYSICS
 PARTICLES AND FIELDS

PERSONNEL

PI - D.J. WILLIAMS NOAA-ERL
 OI - J.N. BARFIELD NOAA-ERL

BRIEF DESCRIPTION

THE MAGNETOMETER WILL HAVE A RANGE OF PLUS OR MINUS 400 GAMMA (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 GAMMA OVER A RANGE OF PLUS OR MINUS 50 GAMMA.

***** GOES-F*****

SPACECRAFT COMMON NAME- GOES-F
 ALTERNATE NAMES-

NSSDC ID- GOES-F

LAUNCH DATE- 08/00/83 WEIGHT- 660. KG
 LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
 LAUNCH VEHICLE- SHTLE-SSUS

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

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 (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 190.5 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-F, NESS STAFF-----

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

NSSDC ID- GOES-F -01 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS

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-F IS 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 IS 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 MICRON) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RICHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR 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-TO-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 NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TAKES 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, EIGHT VISIBLE-SPECTRUM DETECTORS SWEEP THE EARTH, WITH A GROUND RESOLUTION OF 0.9 KM AT ZERO NADIR ANGLE. A MERCURY-CADMIUM TELLURIDE DETECTOR SENSES THE INFRARED PORTION OF THE SPECTRUM WITH A HORIZONTAL RESOLUTION OF APPROXIMATELY 9 KM AT ZERO NADIR ANGLE. THE INFRARED PORTION OF THE DETECTOR MEASURES RADIANCE TEMPERATURES BETWEEN 180 AND 315 DEG K WITH A PROPOSED SENSITIVITY BETWEEN 0.4 AND 1.4 K. 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.

----- GOES-F, NESS STAFF-----

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM

NSSDC ID- GOES-F -05 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS

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 (WEX 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 ARE BETWEEN 350 K AND 600 K 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.

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----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR
NSSDC ID- GOES-F -02 INVESTIGATIVE PROGRAM OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.H. SAUER NOAA-ERL

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM.

----- GOES-F, WILLIAMS-----

INVESTIGATION NAME- SOLAR X-RAY MONITOR
NSSDC ID- GOES-F -03 INVESTIGATIVE PROGRAM OPERATIONAL 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.E-6 ERG PER 50 CM PER S AND 1 TO 8A ERGS PER 50 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 OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - J.W. BARFIELD NOAA-ERL

BRIEF DESCRIPTION
THE MAGNETOMETER HAS A RANGE OF PLUS OR MINUS 400 GAMMA (WITHOUT SATURATION) AND A RESOLUTION OF 0.1 GAMMA OVER A RANGE OF PLUS OR MINUS 50 GAMMA.

***** HEAD-B*****

SPACECRAFT COMMON NAME- HEAD-B
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-B
NSSDC ID- HEAD-B
LAUNCH DATE- 11/17/78 WEIGHT- 2660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS
SPONSORING COUNTRY/AGENCY UNITED STATES NASA-OSS
PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.4 MIN INCLINATION- 23. DEG
PERIAPSIS- 435. KM APOAPSIS- 435. KM

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

BRIEF DESCRIPTION
THIS SECOND MISSION IS A POINTING MISSION PROVIDING MORE DETAILED INFORMATION ABOUT PREVIOUSLY IDENTIFIED X-RAY SOURCES. A LARGE GRAZING-INCIDENCE X-RAY TELESCOPE PROVIDES IMAGES OF SOURCES THAT ARE THEN ANALYZED BY INTERCHANGEABLE INSTRUMENTS AT THE FOCAL PLANE OF THE TELESCOPE.

USED TO POINT AND MANEUVER THE SPACECRAFT. GYROS, SUN SENSORS, AND STAR TRACKERS ARE EMPLOYED AS SENSING DEVICES.

----- HEAD-B, BOLDT-----

INVESTIGATION NAME- SOLID-STATE X-RAY DETECTOR
NSSDC ID- HEAD-B -05 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL
PI - E.A. BOLDT NASA-GSFC

BRIEF DESCRIPTION
THIS INSTRUMENT IS A COOLED SOLID-STATE SPECTROMETER AND IS USED TO DETECT WEAK SOURCES AND WEAK SPECTRAL FEATURES OVER A BROAD BAND OF ENERGIES BY EMPLOYING A NONDISPERSIVE SPECTRAL TECHNIQUE.

----- HEAD-B, CLARK-----

INVESTIGATION NAME- CURVED-CRYSTAL BRAGG X-RAY
NSSDC ID- HEAD-B -03 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL
PI - G.W. CLARK MASS INST OF TECH

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO SEARCH FOR X-RAY SPECTRAL LINE EMISSIONS ARISING FROM THE SELECTED CELESTIAL OBJECTS. THE SEARCH IS LIMITED TO THE ENERGY LEVEL FROM 0.1 TO 3 KEV.

----- HEAD-B, GIACCONI-----

INVESTIGATION NAME- MONITOR PROPORTIONAL COUNTER
NSSDC ID- HEAD-B -01 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZES A MONITOR COUNTER AS A SUPPORT INSTRUMENT FOR CALIBRATION AND NORMALIZATION OF THE FOCAL PLANE INSTRUMENTATION.

----- HEAD-B, GIACCONI-----

INVESTIGATION NAME- HIGH-RESOLUTION IMAGER
NSSDC ID- HEAD-B -02 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI SAO

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE 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.

----- HEAO-B, GURSKY-----

INVESTIGATION NAME- IMAGING PROPORTIONAL COUNTER

NSSDC ID- HEAO-B -04 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) X-RAY ASTRONOMY

PERSONNEL PI - H. GURSKY SAO

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT ARE (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 WILL BE 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-C*****

SPACECRAFT COMMON NAME- HEAO-C ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-C

NSSDC ID- HEAO-C

LAUNCH DATE- 09/17/79 WEIGHT- 2660. KG LAUNCH SITE- CAPE CANAVERAL, UNITED STATES LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY UNITED STATES NASA-055

PLANNED ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC ORBIT PERIOD- 93.7 MIN INCLINATION- 45. DEG PERIAPSIS- 489. KM ALT APOAPSIS- 480. KM ALT

PERSONNEL MG - R.E. HALPERN NASA HEADQUARTERS SC - A.G. OPP NASA HEADQUARTERS PM - F.A. SPEER NASA-MSFC PS - T.A. PARNELL NASA-MSFC

BRIEF DESCRIPTION

THIS THIRD MISSION PERFORMS A SKY SURVEY OF GAMMA RAYS AND COSMIC RAYS IN A MANNER SIMILAR TO HEAO 1. A HIGHER ORBITAL INCLINATION THAN THE PREVIOUS MISSIONS IN THIS SERIES IS PLANNED 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 ISOTOPIC 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 = 53, (2) SEARCH FOR SUPER-HEAVY NUCLEI UP TO Z = 120, AND MEASURE THE COMPOSITION OF THE NUCLEI WITH Z .GT. 26; (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-C, ISRAEL-----

INVESTIGATION NAME- HEAVY NUCLEI

NSSDC ID- HEAO-C -03 INVESTIGATIVE PROGRAM CODE SC

INVESTIGATION DISCIPLINE(S) COSMIC RAYS HIGH ENERGY ASTROPHYSICS

PERSONNEL PI - M.W. ISRAEL WASHINGTON U PI - E.C. STONE CALIF INST OF TECH PI - C.J. WADDINGTON U OF MINNESOTA OI - W.R. BINNS MCDONNELL-DOUGLAS CORP OI - J. KLARMANN WASHINGTON U OI - 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 SYNTHETICS, 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 A 4 SQ-M STER. 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-C, JACOBSON-----

INVESTIGATION NAME- GAMMA-RAY LINE SPECTROMETER

NSSDC ID- HEAO-C -01 INVESTIGATIVE PROGRAM CODE SC

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

PERSONNEL PI - A.S. JACOBSON NASA-JPL OI - J.R. ARNOLD U OF CALIF, SAN DIEGO OI - A.E. HEIZGER NASA-JPL OI - 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 SPECTRA 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/CM SQ/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 STER, (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.

----- HEAO-C, KOCH-----

INVESTIGATION NAME- ISOTOPIC COMPOSITION OF COSMIC RAYS

NSSDC ID- HEAO-C -04 INVESTIGATIVE PROGRAM CODE SC/CD-0P

INVESTIGATION DISCIPLINE(S) COSMIC RAYS HIGH ENERGY ASTROPHYSICS

PERSONNEL PI - L. KOCH CENS PI - B. PETERS DANISH SPACE RES INST OI - J.P. MEYER CENS OI - D. ROUSSEL CENS OI - A. SOUTOUL CENS OI - M. CASSE CENS OI - P. MESTREAU CENS OI - N. LUND DANISH SPACE RES INST OI - K. OMO DANISH SPACE RES INST OI - O. CORYDON-PETERSON DANISH SPACE RES INST

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 YIN (Z=50). CERENKOV COUNTERS AND HODOSCOPES 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.

***** IONOSONDE-IX*****

SPACECRAFT COMMON NAME- IONOSONDE-IX ALTERNATE NAMES-

NSSDC ID- IONO-IX

LAUNCH DATE- 00/00/79 WEIGHT- KG LAUNCH SITE- LAUNCH VEHICLE-

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

PLANNED ORBIT PARAMETERS ORBIT TYPE- GEOCENTRIC ORBIT PERIOD- MIN INCLINATION- DEG PERIAPSIS- KM ALT APOAPSIS- KM ALT

PERSONNEL PS - V.V. MIGULIN IZMIRAN

BRIEF DESCRIPTION

DURING INTERNATIONAL MAGNETOSPHERE STUDY PERIOD AN INTERCOSMOS SPACECRAFT, IONOSONDE-IX WILL BE LAUNCHED INTO A HIGH INCLINATION ELLIPTICAL ORBIT WITH A LOW APOGEE. THE MAIN SCIENTIFIC OBJECTIVES OF IONOSONDE-IX ARE (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

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VARIATIONS OF EMISSIONS IN THE 6300-6364 A BANDS AND 3914 A AND 5577 A LINES, (5) THE STUDY OF TIME AND SPACE VARIATIONS OF CHARGED PARTICLES WITH ENERGIES BETWEEN 10 EV AND 50 MEV AND THEIR IONOSPHERIC EFFECT, 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 OTHER SOCIALIST COUNTRIES. EXPERIMENT INFORMATION NOT SUPPLIED.

***** IR ASTRON. SAT.*****

SPACECRAFT COMMON NAME- IR ASTRON. SAT.
ALTERNATE NAMES- INFRA-RED ASTRONOM SAT, IRAS

NSSDC ID- IRAS

LAUNCH DATE- 02/00/81 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
NETHERLANDS NIVR
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 103.1 MIN INCLINATION- 99.0 DEG
PERIAPSIS- 900. KM ALT APOAPSIS- 900. KM ALT

PERSONNEL

MG - L. DONDEY NASA HEADQUARTERS
SC - N.W. BOGCESS NASA HEADQUARTERS
PM - E.K. CASANI NASA-JPL
PS - H.H. 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 FROM 8 TO 120 MICROMETERS. THE IRAS CONTAINS A 0.6-METER RITCHEY-CRÉTIEN TELESCOPE COOLED BY HELIUM TO A TEMPERATURE OF NEAR 10 K. AN ARRAY OF ABOUT 150 DETECTORS IS USED TO DETECT THE INFRARED FLUX IN BANDS CENTERED AT 10, 20, 50, 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- 11/00/81 WEIGHT- 55. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3102.3 MIN INCLINATION- 0. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 127560. KM ALT

PERSONNEL

PM - U. JONELEIT DFVLR
PS - G. HAERENDEL MPI-EXTRATERR PHYS

BRIEF DESCRIPTION

THIS SPACECRAFT CARRIED 2 LI AND 1 EU ION RELEASE CANNISTERS ALONG WITH A SUN SENSOR AND 3-AXIS MAGNETOMETER ATTITUDE DETERMINATION SYSTEM. THE POWER SYSTEM CONSISTED OF SOLAR PANELS TO PROVIDE 10 W, AND A BATTERY. THE SPACECRAFT SPIN STABILIZED AT 2.5 RPM. THE THERMAL SYSTEM EMPLOYED ACTIVE HEATERS AND MULTILAYER INSULATION. THE TELEMETRY SYSTEM WAS A 0.5 W S-BAND TRANSMITTER. THE SCHOENSTEDT MAGNETOMETER WAS SENSITIVE TO FIELDS FROM 0.5 TO 1.004 GAMMAS AND WAS 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 EU RELEASE MODULE

NSSDC ID- IRM -01 INVESTIGATIVE PROGRAM
CODE ST/CO-0P

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 TWO LI AND ONE EU ION RELEASE CANNISTERS. ONE LI RELEASE OF APPROXIMATELY E26 ATOMS, OCCURRING OUTSIDE THE MAGNETOSPHERE NEAR THE SUBSOLAR POINT, IS DETECTED INSIDE THE MAGNETOSPHERE BY INSTRUMENTS ON THE CCE SPACECRAFT. THE SECOND LI RELEASE AND THE EU RELEASE ARE WELL INSIDE THE GEOMAGNETIC TAIL.

***** LANDSAT-D*****

SPACECRAFT COMMON NAME- LANDSAT-D
ALTERNATE NAMES- LAND SATELLITE-D1, LFO-A
LANDSAT-D1

NSSDC ID- LAND-D

LAUNCH DATE- 09/00/81 WEIGHT- 1407. KC
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

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 - R.K. BROWNING 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. 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 INSTRUMENT 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 MULTIMISSIION 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 165 KM 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.

----- LANDSAT-D, RANGO-----

INVESTIGATION NAME- THEMATIC MAPPER

NSSDC ID- LAND-D -01 INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - A. RANGO NASA-GSFC

BRIEF DESCRIPTION

THE THEMATIC MAPPER (TM) IS A SIX-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. SIX 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.

***** MAG-1K*****

SPACECRAFT COMMON NAME- MAG-1K
ALTERNATE NAMES- MAGIC

NSSDC ID- MAGIC

LAUNCH DATE- 00/00/79 WEIGHT- KG
LAUNCH SITE-
LAUNCH VEHICLE-

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM ALT APOAPSIS- KM ALT

PERSONNEL PS - V.V. MIGULIN IZMIRAN

BRIEF DESCRIPTION
TO BE LAUNCHED DURING THE IMS PERIOD, THE SPACECRAFT EXPERIMENT HAS AS ITS OBJECTIVE TO STUDY THE CHARACTER OF THE IONOSPHERE-MAGNETOSPHERE COUPLING BY CONTINUING EXPERIMENTS SIMILAR TO THOSE ON INTERCOSMOS 10. BOTH REAL-TIME AND STORED DATA MODES ARE USED. THE SATELLITE MEASUREMENTS ARE ACCOMPANIED BY SIMULTANEOUS GROUND-BASED, BALLOON, AND ROCKET OBSERVATIONS. THE PARAMETERS MEASURED ARE -- GEOMAGNETIC FIELD (3 COMPONENTS), LOW-ENERGY PARTICLE FLUXES AND THEIR ANGULAR DISTRIBUTIONS (ELECTRONS AND POSITIVE IONS, 100 EV TO 5 KEV), VLF WAVES (100 H TO 16 KH) 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 NOT BEEN PROVIDED.

***** MAGSAT*****

SPACECRAFT COMMON NAME- MAGSAT
ALTERNATE NAMES- AEM-C, GLOBAL MAGNETIC SURV MSN
MAGSAT-F

NSSDC ID- AEM-C

LAUNCH DATE- 09/00/79 WEIGHT- 15E. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY NASA-OSTA
UNITED STATES

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.7 MIN INCLINATION- 96. DEG
PERIAPSIS- 325. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL MG - D.S. DILLEP NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PH - C.L. WAGNER, JR. NASA-GSFC
PS - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION
THE MAGSAT PROJECT IS A JOINT NASA/UNITED STATES GEOLOGICAL SURVEY (USGS) EFFORT TO MEASURE NEAR-EARTH MAGNETIC FIELDS ON A GLOBAL BASIS. OBJECTIVES INCLUDE 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 IS LAUNCHED INTO A LOW EARTH, NEAR POLAR, ORBIT BY THE SCOUT VEHICLE. THE BASIC SPACECRAFT IS MADE UP OF TWO DISTINCT PARTS -- THE INSTRUMENT MODULE THAT CONTAINS A VECTOR AND A SCALAR MAGNETOMETER AND THEIR UNIQUE SUPPORTING GEAR, AND THE BASE MODULE THAT CONTAINS THE NECESSARY DATA HANDLING, POWER, COMMUNICATIONS, COMMAND, AND ATTITUDE CONTROL SUBSYSTEMS TO SUPPORT THE INSTRUMENT MODULE. THE BASE MODULE COMPLETE WITH ITS SUBSYSTEMS IS COMPRISED OF RESIDUAL SMALL ASTRONOMY SATELLITE (SAS-C) HARDWARE. THE MAGNETOMETERS ARE 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) IS LESS THAN 1 GAMMA.

----- MAGSAT, LANGEL-----

INVESTIGATION-NAME- SCALAR MAGNETOMETER

NSSDC ID- AEM-C -01 INVESTIGATIVE PROGRAM
CODE ERUSGS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL PI - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION
THE SCALAR MAGNETOMETER HAS TWO DUAL-CELL, CESIUM-VAPOR SENSE HEADS WHOSE OUTPUT FREQUENCY IS PROPORTIONED 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 IS ON THE ORDER OF 0.5 GAMMA. A PERIOD COUNT SYSTEM CONVERTS THE MAGNETOMETER OUTPUT FREQUENCY TO A DIGITAL WORD ACCEPTABLE TO THE SPACECRAFT TELEMETRY SYSTEM. THIS DIGITAL DATA HAS A RESOLUTION AND ACCURACY OF BETWEEN 0.5 AND 1.0 GAMMA.

----- MAGSAT, LANGEL-----

INVESTIGATION NAME- VECTOR MAGNETOMETER

NSSDC ID- AEM-C -02 INVESTIGATIVE PROGRAM
CODE ERUSGS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
GEODYNAMICS

PERSONNEL PI - R.A. LANGEL NASA-GSFC

BRIEF DESCRIPTION
THE VECTOR MAGNETOMETER CONSISTS OF THREE FLUXGATE SENSING ELEMENTS ALIGNED ALONG ORTHOGONAL AXES. THE OUTPUT OF EACH VECTOR SENSOR IS CONVERTED TO A DIGITAL WORD BY AN ANALOG-TO-DIGITAL CONVERTER. THE OUTPUT OF ALL THESE AXES IS SAMPLED ESSENTIALLY SIMULTANEOUSLY. EACH VECTOR MEASUREMENT HAS A RESOLUTION OF BETTER THAN 1 GAMMA AND AN ABSOLUTE ACCURACY OF BETTER THAN 6 GAMMA R.S.S. WHEN REFERENCED TO A GEOCENTRIC COORDINATE SYSTEM.

***** NIMBUS-G*****

SPACECRAFT COMMON NAME- NIMBUS-G
ALTERNATE NAMES-

NSSDC ID- NIMBUS-G

LAUNCH DATE- 09/18/78 WEIGHT- 832. 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- 104.01 MIN INCLINATION- 99. DEG
PERIAPSIS- 955. KM ALT APOAPSIS- 955. KM ALT

PERSONNEL MG - D.R. BROOME NASA HEADQUARTERS
SC - R.A. SCHIFFER NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - W.R. BANDEEN NASA-GSFC

BRIEF DESCRIPTION
THE NIMBUS-G RESEARCH AND DEVELOPMENT SATELLITE SERVES 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 CONSISTS 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-G 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 HOUSES THE ELECTRONICS EQUIPMENT AND BATTERY MODULES. THE LOWER SURFACE OF THE TORUS PROVIDES MOUNTING SPACE FOR SENSORS AND ANTENNAS. A BOX-BEAM STRUCTURE MOUNTED WITHIN THE CENTER OF THE TORUS PROVIDES SUPPORT FOR THE LARGER SENSOR EXPERIMENTS. MOUNTED ON THE CONTROL HOUSING UNIT, WHICH IS LOCATED ON TOP OF THE SPACECRAFT, ARE SUN SENSORS, HORIZON SCANNERS, AND A COMMAND ANTENNA. AN ADVANCED ATTITUDE CONTROL SYSTEM PERMITS THE SPACECRAFT'S ORIENTATION TO BE CONTROLLED TO WITHIN PLUS OR MINUS 1 DEG IN ALL THREE AXES (PITCH, ROLL, AND YAW). EIGHT EXPERIMENTS HAVE BEEN SELECTED. THEY ARE (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 SMR, (7) - SOLAR BACKSCATTER UV AND TOTAL OZONE MAPPING SPECTROMETER SEUV/TOMS, AND (8) -

TEMPERATURE-HUMIDITY INFRARED RADIOMETER THIR. THIS COMPLEMENT OF SENSORS ARE CAPABLE OF OBSERVING SEVERAL PARAMETERS OF IMPORTANCE AT AND BELOW THE MESOSPHERIC LEVELS. A NEW CAPABILITY OF IMPORTANCE IS DIRECTED TOWARD OBSERVATION OF ATMOSPHERIC AND OCEAN POLLUTANTS. SUFFICIENT RUNTIME IS PLANNED FOR SEQUENTIAL MAPS (IMAGERY) OF THE PARAMETERS AVAILABLE FOR STUDY.

----- NIMBUS-G, ALLISON-----

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- NIMBS-G-10 INVESTIGATIVE PROGRAM CODE EB

INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - L.J. ALLISON NASA-GSFC

BRIEF DESCRIPTION

THE THIR EXPERIMENT OBJECTIVES ARE 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-G TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) DETECTS 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 MEASURES CLOUDTOP TEMPERATURES AND IS 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 OPERATES TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND STRATOSPHERE. DATA FROM THESE TWO CHANNELS ARE USED PRIMARILY TO SUPPORT OTHER, MORE SOPHISTICATED, METEOROLOGICAL EXPERIMENTS ONBOARD NIMBUS-G. THE INSTRUMENT CONSISTS OF A 12.7-CM CASSEGRAIN SYSTEM AND SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BLOMETERS. IN CONTRAST TO TV, NO IMAGE IS FORMED WITHIN THE RADIOMETER. INCOMING RADIANT ENERGY IS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATES THROUGH 360 DEG AT 48 RPM AND SCANS IN A PLANE NORMAL TO THE SPACECRAFT VELOCITY. THE ENERGY THEN IS FOCUSED ON A DICHOIC BEAM SPLITTER WHICH DIVIDES THE ENERGY SPECTRALLY AND SPATIALLY INTO THE TWO CHANNELS OF THIS SENSOR TRANSFORM THE RECEIVED RADIATION INTO ELECTRIC OUTPUT (VOLTAGES), WHICH ARE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

----- NIMBUS-G, GLOERSEN-----

INVESTIGATION NAME- SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMMR)

NSSDC ID- NIMBS-G-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.F. ROSS NOAA-ERL
 TM - P. GUDMANSEN 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 (SMMR) IS 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, ARE PARAMETERS WHICH ARE DERIVED. OCEAN ICE VS WATER IS ALSO DETERMINED. MICROWAVE BRIGHTNESS TEMPERATURES ARE 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, 6.633 GHZ. THE ANTENNA IS A PARABOLIC REFLECTOR OFFSET FROM NADIR BY 0.73 RAD. MOTION OF THE ANTENNA REFLECTOR PROVIDES OBSERVATIONS FROM WITHIN CONICAL VOLUME ALONG THE GROUND TRACK OF THE SPACECRAFT. THE SAME INSTRUMENT IS ON SEASAT-A AND SEASAT-B.

----- NIMBUS-G, HEATH-----

INVESTIGATION NAME- SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)

NSSDC ID- NIMBS-G-09

INVESTIGATIVE PROGRAM CODE ER/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-NWS
TM - A.F.S. GREEN	U OF FLORIDA
TM - D.M. CUNHOLD	MASS INST OF TECH
TM - W.L. IMHOF	LOCKHEED PALO ALTO
TM - A.J. KRUEGER	NASA-GSFC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE SBUV/TOMS ARE 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 MEASURES SOLAR UV THAT IS BACKSCATTERED BY THE EARTH'S ATMOSPHERE AT 12 WAVELENGTHS BETWEEN 2500 AND 3300 ANGSTROMS WITH A SPECTRAL BAND PASS OF 10 ANGSTROMS. THE INSTRUMENT FOV OF C.20 RAD IS DIRECTED AT THE NADIR. A PARALLEL PHOTOMETER CHANNEL AT 3400 ANGSTROMS MEASURES THE REFLECTIVITY OF THE ATMOSPHERE'S LOWER BOUNDARY IN THE SAME 0.21-RAD FOV. BOTH CHANNELS ALSO VIEW THE SUN FOR CALIBRATION THROUGH THE USE OF A DIFFUSER PLATE DEPLOYED NEAR THE TERMINATOR. THE CONTRIBUTION FUNCTIONS FOR THE EIGHT SHORTEST WAVELENGTHS ARE CENTERED AT LEVELS RANGING FROM 55 TO 28 KM AND ARE USED TO INFER THE VERTICAL OZONE PROFILE. THE FOUR LONGEST WAVELENGTHS HAVE CONTRIBUTION FUNCTIONS IN THE TROPOSPHERE WHICH ARE USED TO COMPUTE THE TOTAL OZONE AMOUNT. THE SBUV SPECTROMETER HAS A SECOND MODE OF OPERATION THAT ALLOWS A CONTINUOUS SPECTRAL SCAN FROM 1600 TO 4000 ANGSTROMS FOR DETAILED EXAMINATION OF THE EXTRATERRESTRIAL SOLAR SPECTRUM AND THEIR TEMPORAL VARIATIONS. THE TOMS SYSTEMS, OPERATING IN PARALLEL WITH THE SBUV, STEP SCANS ACROSS A 105-DEG FOV NORMAL TO THE ORBITAL TRACK WITH AN FOV OF APPROXIMATELY 0.652 RAD. AT EACH SCAN POSITION THE EARTH RADIANCE IS MONITORED AT SIX WAVELENGTHS BETWEEN 3170 AND 3800 ANGSTROMS TO INFER THE TOTAL OZONE AMOUNT. THE INSTRUMENT CONSISTS PRINCIPALLY OF THREE EBERT-FASTIE MONOCHROMETERS, TWO OF WHICH ARE OPERATED IN TANDEM FOR STRAY LIGHT REJECTION. TOMS USES THE THIRD MONOCHROMETER, WHICH IS EQUIPPED WITH A SPATIAL SCAN MECHANISM AT THE ENTRANCE SLIT. THE SIGNAL-TO-NOISE RATIO OF THE SBUV IS GREATER THAN 503. THE TOMS SIGNAL-TO-NOISE RATIO IS GREATER THAN 1.55.

----- NIMBUS-G, HOUGHTON-----

INVESTIGATION NAME- STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)

NSSDC ID- NIMBS-G-02

INVESTIGATIVE PROGRAM CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S) ATMOSPHERIC PHYSICS METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON	OXFORD U
OI - G.D. PESKETT	CLARENDON LAB
OI - C.D. RODGERS	OXFORD U
OI - E.J. WILLIAMSON	CLARENDON LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF SAMS IS TO OBSERVE EMISSION FROM THE LIMB OF THE ATMOSPHERE THROUGH VARIOUS PRESSURE MODULATOR RADIOMETERS AND TO DETERMINE TEMPERATURE AND VERTICAL CONCENTRATIONS OF H(2)O, N(2)O, CH(4), CO, AND NO IN THE STRATOSPHERE AND MESOSPHERE TO APPROXIMATELY 90 KM. MEASUREMENTS OF ZONAL WIND IN THIS REGION ARE BEING ATTEMPTED BY OBSERVING THE DOPPLER SHIFT OF ATMOSPHERIC EMISSION LINES. RADIATION FROM THE LIMB OF THE ATMOSPHERE IS INCIDENT ON A TELESCOPE OF 15-CM APERTURE. IN FRONT OF THE TELESCOPE A PLANE MIRROR SCANS THE LIMB, VIEW SPACE FOR CALIBRATION, AND VIEW 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), FOCUS ONTO A FIELD-SPLITTING MIRROR WHICH DIRECTS RADIATION TO SIX DETECTORS. THE REMAINING DIVISION INTO CHANNELS IS ACCOMPLISHED THROUGH DICHOIC BEAM SPLITTERS. THERE ARE SEVEN PRESSURE MODULATOR CELLS (PMC), TWO CONTAIN CO(2), THE REMAINDER N(2)O, NO, CH(4), CO, AND H(2)O. PRESSURE IN THE CELLS MAY 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 H(2)O CHANNEL ARE 2.7 MICROMETERS AND 25 TO 100 MICROMETERS. ALL OTHER CHANNELS LIE WITHIN THE RANGE OF 4.1 TO 15 MICROMETERS. WITHIN THE TELESCOPE, A CHOPPER OPERATING AT 250 HZ WILL ALLOW MEASUREMENT OF TWO SEPARATE SIGNALS FROM ALL DETECTORS, ONE AT 250 HZ AND ONE AT THE PMC FREQUENCY. COMPARISON OF THESE SIGNALS PERMITS ELIMINATING EMISSION FROM INTERFERING GASES WITHIN A PARTICULAR SPECTRAL INTERVAL. IN FRONT OF THE CHOPPER A SMALL BLACK BODY AT KNOWN TEMPERATURE CAN BE INTRODUCED FOR CALIBRATION. ACCURATE MEASUREMENT OF THE ATMOSPHERIC PRESSURE AT THE LEVEL BEING VIEWED IS OBTAINED FROM THE TWO SIGNALS FROM ONE CO(2) CHANNEL.

----- NIMBUS-G, HOVIS-----

INVESTIGATION NAME- COASTAL ZONE COLOR SCANNER

NSSDC ID- NIMBS-G-03

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

TL - W.A. HOVIS	NOAA-NESS
TM - H.L. RICHARD	NASA-GSFC
TH - C.S. YENTSCH	SIGELOW LAB OCEAN SCI
TM - D. CLARK	NOAA-NESS
TM - J.R. APEL	NOAA-PHEL
TM - S.Z. EL-SAYED	TEXAS A&M U
TM - H.R. GORDON	NOAA-PHEL
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 IS 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 IS MEASURED IN SIX CHANNELS TO SENSE COLOR CAUSED BY ABSORPTION DUE TO CHLOROPHYLL, SEDIMENTS, AND GELBSTOFFE IN COASTAL WATERS. SPECTRAL BANDS AT 443 AND 673 NANOMETERS CENTER ON THE MOST INTENSE ABSORPTION BANDS OF CHLOROPHYLL, WHILE THE BAND AT 553 NANOMETERS CENTERS ON THE 'HINGE POINT,' THE WAVELENGTH OF MINIMUM ABSORPTION. RATIOS OF MEASURED ENERGIES IN THESE CHANNELS ARE SHOWN TO CLOSELY PARALLEL SURFACE CHLOROPHYLL CONCENTRATIONS. DATA FROM THE SCANNING RADIOMETER IS PROCESSED, WITH ALGORITHMS DEVELOPED FROM THE FIELD EXPERIMENT DATA, TO PRODUCE MAPS OF CHLOROPHYLL ABSORPTION. THE TEMPERATURE OF COASTAL WATERS AND OCEAN CURRENTS ARE MEASURED IN A SPECTRAL BAND CENTERED AT 11.5 MICROMETERS. OBSERVATIONS ARE ALSO MADE IN TWO OTHER SPECTRAL BANDS, THE FIRST AT 523 NANOMETERS FOR CHLOROPHYLL CORRELATION AND 750 NANOMETERS FOR SURFACE VEGETATION. TO AVOID SUN GLINT, THE SCANNER MIRROR CAN BE TILTED ABOUT THE SENSOR PITCH AXIS ON COMMAND SO THAT THE LINE OF SIGHT OF THE SENSOR IS MOVED PLUS OR MINUS 0.35 RAD IN STEPS OF 0.035 RAD WITH RESPECT TO NADIR.

----- NIMBUS-G, JACOBOWITZ-----

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- NIMBS-G-07

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY

PERSONNEL

TL - H. JACOBOWITZ	NOAA-NESS
TM - T.H. VONDERHAAR	COLORADO STATE U
TM - F.B. HOUSE	DREXEL U
TM - K.L. COULSON	U OF CALIF, DAVIS
TM - J.R. HICKEY	EPPLEY LAB, INC
TM - L.L. STONE	NOAA-NESS
TM - A.P. INGERSOL	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-F ERB, IS 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 ARE USED TO DETERMINE OUTGOING RADIATION (REFLECTED AND EMITTED). THE ERB SUBSYSTEM CONSISTS 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 USE 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 VIEW IN FRONT OF THE OBSERVATORY IN THE X-Y PLANE. THE SOLAR CHANNELS OBTAIN USABLE SOLAR DATA ONLY DURING A PERIOD OF ABOUT 3 MIN IN EACH ORBIT WHEN THE SPACECRAFT IS OVER THE ANTARCTIC REGION. THEIR FULL RESPONSE FIELD OF VIEW (FOV) IS 0.18 RAD. THE SOLAR CHANNEL SUBASSEMBLY CAN BE PIVOTED PLUS OR MINUS 0.35 RAD IN THE X-Y PLANE TO COMPENSATE FOR SUN ANGLE DEVIATION IF REQUIRED. THE FOUR EARTH-FLUX CHANNELS ARE MOUNTED SO THEY CAN CONTINUOUSLY VIEW THE TOTAL EARTH DISK AND ARE CONTINUOUSLY SAMPLED AT FOUR PER S. DEMODULATOR OUTPUT SIGNALS ARE INTEGRATED FOR PERIODS OF AT LEAST 3.8 S. THERE ARE EIGHT NARROW FOV CHANNELS (FOUR SHORTWAVE AND FOUR LONGWAVE) MOUNTED IN THE SCANNING HEAD. THE HEAD IS GIMBAL MOUNTED IN THE RADIOMETER UNIT MAIN FRAME. THE FOV OF THE TELESCOPES ARE ASYMMETRIC (4.4 BY 89.4 MRAD) AND THE FOV OF THE SHORTWAVE AND LONGWAVE CHANNELS ARE COINCIDENT. THE 89.4 MRAD FOV OF THE FOUR PAIR OF CHANNELS ARE NOT CONTIGUOUS, BUT COVER ONLY ALTERNATE 89.4 MRAD ANGULAR INTERVALS ALONG THE HORIZON.

----- NIMBUS-G, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)

NSSDC ID- NIMBS-G-06

INVESTIGATIVE PROGRAM
CODE EB

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

TL - M.P. MCCORMICK	NASA-LARC
TM - T.J. PEPIN	U OF WYOMING
TM - G.W. GRAMS	NATL CTR FOR ATMOS RES
TM - B.M. HERMAN	U OF ARIZONA
TM - P.B. RUSSELL	SRI INTERNATIONAL

BRIEF DESCRIPTION

THE OBJECTIVE OF SAM II IS TO MAP THE CONCENTRATION AND OPTICAL PROPERTIES OF STRATOSPHERIC AEROSOLS AS A FUNCTION OF ALTITUDE, LATITUDE, AND LONGITUDE. WHEN NO CLOUDS ARE PRESENT IN THE INSTRUMENT FIELD OF VIEW (IFOV), THE TROPOSPHERIC AEROSOLS CAN ALSO BE MAPPED. THE INSTRUMENT, BASICALLY A SUN PHOTOMETER, MEASURES THE EXTINCTION OF SOLAR RADIATION AT 1.0-MICROMETER WAVELENGTH DURING SPACECRAFT SUNRISE AND SUNSET. THE PHOTOMETER VIEWS A PORTION OF THE SOLAR DISK WITH A 0.145-MRAD IFOV AND A SAMPLING RATE OF 50 SAMPLES PER SECOND. AS THE SPACECRAFT FIRST VIEWS THE SUNRISE, THE PHOTOMETER-POINTING AXIS IS DEPRESSED APPROXIMATELY 0.52 RAD WITH RESPECT TO THE SPACECRAFT HORIZONTAL. THE PHOTOMETER CONTINUES LOOKING AT THE SUN UNTIL ITS DEPRESSION ANGLE IS ON THE ORDER OF 0.44 RAD (APPROXIMATELY 1.4 MIN OBSERVING TIME). BEFORE SUNSET, THE PHOTOMETER HEAD ROTATES 3.14 RAD IN AZIMUTH AND VIEWS THE SUN FROM A DEPRESSION OF APPROXIMATELY 0.44 TO 0.52 RAD AS THE SPACECRAFT ORBITS TO THE DARK SIDE OF THE EARTH. FOR THE EXPECTED HIGH NOON ORBIT, LATITUDES OF BETWEEN 1.72 AND 1.40 RAD IN BOTH HEMISPHERES ARE SCANNED FOR 3 MONTHS. THE EXTINCTION MEASUREMENTS ARE 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 ARE ALSO MADE.

----- NIMBUS-G, RUSSELL, 3RD-----

INVESTIGATION NAME- LOWER ATMOSPHERIC COMPOSITION AND TEMPERATURE EXPERIMENT (LACATE)

NSSDC ID- NIMBS-G-01

INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL

TL - J.M. RUSSELL, 3RD	NASA-LARC
TL - J.C. GILLE	NATL CTR FOR ATMOS RES
TM - F.B. HOUSE	DREXEL U
TM - E.E. REMSBERG	NASA-LARC
TM - C.B. LOEY	U OF WASHINGTON
TM - S.R. DRAYSON	U OF MICHIGAN
TM - H. FISCHER	U OF MUNICH
TM - W.G. PLANET	NOAA-NESS
TM - A. GIRARD	ONERA
TM - J.E. HARRIES	NATL PHYSICAL LAB

BRIEF DESCRIPTION

THE OBJECTIVE OF THE LIMB INFRARED MONITOR OF THE STRATOSPHERE (LIMS) EXPERIMENT IS TO MAP THE VERTICAL PROFILES OF TEMPERATURE AND THE CONCENTRATION OF OZONE, WATER VAPOR, NITROGEN DIOXIDE, AND NITRIC ACID IN THE LOWER TO MIDDLE STRATOSPHERE RANGE, WITH EXTENSION TO THE STRATOPAUSE FOR WATER VAPOR AND INTO THE LOWER MESOSPHERE FOR TEMPERATURE AND OZONE. THE INSTRUMENT HAS A SIX-CHANNEL INFRARED (IR) RADIOMETER THAT INCORPORATES HG-CO-TE DETECTORS COOLED BY A TWO-STAGE SOLID CRYOGEN COOLER. THE RADIOMETER MAPS VERTICAL PROFILES OF THERMAL IR EMISSION COMING FROM THE HORIZON IN SIX BANDS (6.2, 9.5, 11.3, 14.9, AND 15.2 MICROMETERS) OF THE ATMOSPHERIC CONSTITUENTS OF INTEREST. TWO OF THE CHANNELS ARE USED TO DETERMINE RADIANCE PROFILES OF EMISSION BY CO2. THESE PROFILES ARE MATHEMATICALLY INVERTED TO OBTAIN TEMPERATURE VERSUS PRESSURE. THE INFERRED TEMPERATURE PROFILE, TOGETHER WITH RADIANCE PROFILES IN THE OTHER SPECTRAL BANDS, ARE THEN USED TO INFER THE VERTICAL DISTRIBUTION OF TRACE CONSTITUENTS. THE TEMPERATURE IS DETERMINED TO AN ACCURACY OF ABOUT 1.5 K. CONSTITUENT CONCENTRATIONS ARE DETERMINED WITH AN ACCURACY OF ABOUT 20 PERCENT, WITH THE EXCEPTION OF NO2 WHICH IS DETERMINED TO WITHIN ABOUT 50 PERCENT. INSTANTANEOUS VERTICAL FIELD-OF-VIEW AT THE HORIZON IS 2 KM FOR THE TEMPERATURE, OZONE, AND NITRIC ACID CHANNELS AND 4 KM FOR THE NO2 AND WATER VAPOR CHANNELS.

***** NOAA-A*****

SPACECRAFT COMMON NAME- NOAA-A
ALTERNATE NAMES- TIROS N

ORIGINAL PAGE IS
OF POOR QUALITY

NSSDC ID- NOAA-A

LAUNCH DATE- 10/01/78 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-A, A TIROS-N TYPE SPACECRAFT, IS 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 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 (DMSP-F1 OR 76-C91A) 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-A, NESS STAFF -----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-A -D1 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-A 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 K AT 300 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-A, NESS STAFF -----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-A -D2 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-A 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, 14.9, 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 (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-A, NESS STAFF -----

INVESTIGATION NAME- DATA COLLECTION SYSTEM

NSSDC ID- NOAA-A -D3 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-A 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 MS. 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-A, WILLIAMS -----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-A -D4 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURE TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-B *****

SPACECRAFT COMMON NAME- NOAA-B
ALTERNATE NAMES-

NSSDC ID- NOAA-B

LAUNCH DATE- 08/01/79 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 - H.L. GARBACZ NASA HEADQUARTERS
 PM - G.A. BRANCHFLGWER NASA-GSFC
 PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
 NOAA-B IS THE SECOND 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 CONSISTS 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-B, NESS STAFF -----
 INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)
 NSSDC ID- NOAA-B -01 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

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 K AT 300 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- NOAA-B -02 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 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 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 CFLLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN (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- NOAA-B -03 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 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 (COA) 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 MS. 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- NOAA-B -04 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - H.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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 KEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** NOAA-C *****
 SPACECRAFT COMMON NAME- NOAA-C
 ALTERNATE NAMES-
 NSSDC ID- NOAA-C
 LAUNCH DATE- 02/C1/80 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

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 101.5 MIN INCLINATION- 98.7 DEG
 PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

ORIGINAL PAGE IS
 OF POOR-QUALITY

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 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-C, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-C -01 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL	NESS STAFF	NOAA-NESS
PI -		

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 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 WILL HAVE A SPATIAL RESOLUTION OF 1.1 KM, AND THE TWO IR WINDOW CHANNELS WILL HAVE A THERMAL RESOLUTION OF 0.42 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
 OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL	NESS STAFF	NOAA-NESS
PI -		

BRIEF DESCRIPTION

THE NOAA-C OPERATIONAL SOUNDER WILL CONSIST 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), WILL HAVE 14 CHANNELS AND WILL MAKE 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, WILL HAVE THREE CHANNELS OPERATING AT 14.97 MICROMETER USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, WILL HAVE 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 WILL BE 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 WILL BE 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
 OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL	NESS STAFF	NOAA-NESS
PI -		

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 MS. 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
 OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL		
PI - D.J. WILLIAMS		NOAA-ERL
OI - H.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 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 1C, 3C, 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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 4C 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- 08/01/81 WEIGHT- 588.9 KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS F

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

PLANNED ORBIT PARAMETERS		
ORBIT TYPE- GEOCENTRIC		
ORBIT PERIOD- 101.5 MIN	INCLINATION-	96.7 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 CONSISTS 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 0.033 DEG/S.

----- NOAA-D, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)
 NSSDC ID- NOAA-D -D1 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 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 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 1.7 KM, AND THE TWO IR WINDOW CHANNELS HAVE A THERMAL RESOLUTION OF 0.12 K AT 300 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 -D2 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE NOAA-D 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 5. TO 60 GHZ OXYGEN (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 -D3 INVESTIGATIVE PROGRAM
 OPERATIONAL WEATHER OBSERVATIONS
 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 MS. 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 -D4 INVESTIGATIVE PROGRAM
 OPERATIONAL ENVIRON. MONITORING
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - H.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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT 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- 02/01/82 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-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

ORIGINAL PAGE IS
 OF POOR QUALITY

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-E, NESS STAFF -----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)
 NSSDC ID- NOAA-E -01 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS
 INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

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 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 K AT 300 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 OPERATIONAL WEATHER OBSERVATIONS
 INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

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 (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 OPERATIONAL WEATHER OBSERVATIONS
 INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

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 MS. 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 OPERATIONAL ENVIRON. MONITORING
 INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - H.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/H AND 25 MEV/H. 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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1000 MEV/H. 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- 05/01/83 WEIGHT- 568.9 KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS F

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

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 101.5 MIN INCLINATION- 95.7 DEG
 PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL
 MG - M.L.L. GARBACZ 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, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)
NSSDC ID- NOAA-F -01 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS
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.

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER
NSSDC ID- NOAA-F -02 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION THE NOAA-F 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).

----- NOAA-F, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)
NSSDC ID- NOAA-F -03 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS
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).

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 MS.

----- NOAA-F, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR
NSSDC ID- NOAA-F -04 INVESTIGATIVE PROGRAM OPERATIONAL 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 TIROS SPACECRAFT SERIES. THE EXPERIMENT PACKAGE CONSISTS OF FOUR DETECTOR SYSTEMS AND A DATA PROCESSING UNIT.

***** NOAA-G*****

SPACECRAFT COMMON NAME- NOAA-G
ALTERNATE NAMES-

NSSDC ID- NOAA-G

LAUNCH DATE- 02/00/84 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 INCLINATION- 98.7 DEG
PERIAPSIS- 833. KM ALT APOAPSIS- 833. KM ALT

PERSONNEL MG - H.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION NOAA-G WILL BE THE SEVENTH 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.

----- NOAA-G, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)
NSSDC ID- NOAA-G -01 INVESTIGATIVE PROGRAM OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S) METEOROLOGY

ORIGINAL PAGE IS OF POOR QUALITY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G 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), 3.725 MICROMETER TO DETECTOR CUT OFF 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 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, 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-G, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-G -02 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE NOAA-G OPERATIONAL SOUNDER WILL CONSIST 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), WILL HAVE 14 CHANNELS AND WILL MAKE 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, WILL HAVE THREE CHANNELS OPERATING AT 14.97 MICROMETER USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CARBON DIOXIDE. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, WILL HAVE 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 WILL BE 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 WILL BE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- NOAA-C, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-G -03 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION

THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-G WILL BE DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM WILL RECEIVE 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 WILL BE 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 WILL BE 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 MSEC. THIS SYSTEM WILL HAVE THE CAPABILITY OF ACQUIRING DATA FROM UP TO 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS WILL BE 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
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL
OI - H.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 14C KEV, AND PROTONS AND ELECTRONS (INSEPARABLE) ABOVE 750 KEV. THE HIGH-ENERGY PROTON ALPHA TELESCOPE (HEPAT) HAS A 50-DEG VIEWING CONE, VIEW IN THE ANTI-EARTH DIRECTION, AND IT 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.

***** SAGE*****

SPACECRAFT COMMON NAME- SAGE
ALTERNATE NAMES- AEM-B, STRAT AERD AND GAS EXP
APPL EXPL MISSION B, SAGM

NSSDC ID- AEM-B

LAUNCH DATE- 01/25/79 WEIGHT- 122. KG
LAUNCH SITE- Wallops Flight Center, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSTA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.6 MIN INCLINATION- 50. DEG
PERIAPSIS- 600. KM ALT APOAPSIS- 600. KM ALT

PERSONNEL
MG - D.S. DILLER NASA HEADQUARTERS
SC - S.H. MELFI NASA HEADQUARTERS
PM - C.L. WAGNER, JR. NASA-GSFC
PS - R.S. FRASER NASA-GSFC

BRIEF DESCRIPTION

THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) SPACECRAFT SERVES 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 OBTAINS AEROSOL AND OZONE INFORMATION BY MEASURING THE ATTENUATION OF SOLAR RADIATION BY THE EARTH'S ATMOSPHERE AT FOUR SEPARATE WAVELENGTHS. THE SPACECRAFT WILL BE LAUNCHED INTO A 600-KM CIRCULAR, 50-DEG INCLINED ORBIT BY A SCOUT-F.

----- SAGE, MCCORMICK-----

INVESTIGATION NAME- STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)

NSSDC ID- AEM-B -01 INVESTIGATIVE PROGRAM
CODE EB
INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH
METEOROLOGY

PERSONNEL
PI - M.P. MCCORMICK NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVES OF THE STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE) ARE TO DETERMINE THE SPATIAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS AND OZONE ON A GLOBAL SCALE. SPECIFIC OBJECTIVES ARE -- (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 CONSISTS OF A GREGORIAN TELESCOPE AND A DETECTOR SUBASSEMBLY WHICH MEASURES THE ATTENUATION OF SOLAR RADIATION AT FOUR WAVELENGTHS (.35, .46, .6, AND 1.0 MICROMETERS) DURING SOLAR OCCULTATION. AS THE SPACECRAFT EMERGES FROM THE EARTH'S SHADOW, THE SENSOR SCANS THE EARTH'S ATMOSPHERE FROM THE HORIZON UP, WHICH MEASURES THE ATTENUATION OF SOLAR RADIATION

BY DIFFERENT ATMOSPHERIC LAYERS. THIS PROCEDURE IS REPEATED DURING SPACECRAFT SUNSET. TWO VERTICAL SCANNINGS ARE OBTAINED DURING EACH ORBIT, WITH EACH SCAN REQUIRING APPROXIMATELY 1 MIN OF TIME TO COVER THE ATMOSPHERE ABOVE THE TROPOSPHERE. THE INSTRUMENT HAS A FIELD OF VIEW OF APPROXIMATELY 1 MIN OF ARC WHICH WILL RESULT IN A VERTICAL RESOLUTION OF LESS THAN 1 KM.

***** SAN MARCO-D/L*****

SPACECRAFT COMMON NAME- SAN MARCO-D/L
ALTERNATE NAMES-

NSSDC ID- SM-DL

LAUNCH DATE- 3 QTR 80 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- 95. MIN INCLINATION- 3. DEG
PERIAPSIS- 227. KM ALT APOAPSIS- 800. KM ALT

PERSONNEL

MG - F.W. GAETANO NASA HEADQUARTERS
SC - E. SCHMERLING NASA HEADQUARTERS
PM - A.J. CAPORALE NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THIS 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. A 30-CM WIDE BELT AROUND THE SATELLITE EQUATOR, IS COVERED WITH 1792 SOLAR CELLS THAT, WITH 2 RECHARGABLE BATTERIES, COMPRISES THE POWER SOURCE. THE SATELLITE EMPLOYS PASSIVE THERMAL CONTROL. ATTITUDE DATA ARE PROVIDED BY A SUN SENSOR AND A MAGNETOMETER. A MAGNETIC TORQUING SYSTEM IS USED TO CONTROL SPIN RATE AND SPACECRAFT ALTITUDE. A 5C-MIN CAPACITY TAPE RECORDER IS ON BOARD, ALONG WITH FIVE EXPERIMENTS, -- (1) DRAG BALANCE, (2) AIRGLOW SPECTROMETER, (3) ION VELOCITY, (4) ELECTRIC FIELD METER, AND (5) WIND AND TEMPERATURE. THIS SPACECRAFT IS TO STUDY RELATIONSHIPS BETWEEN SOLAR ACTIVITY AND METEOROLOGICAL PHENOMENA AND TO LOOK FOR LINKS BETWEEN TROPOSPHERIC AND THERMOSPHERIC PROCESSES.

----- SAN MARCO-D/L, BROGLIO-----

INVESTIGATION NAME- DRAG BALANCE AND AIR DENSITY

NSSDC ID- SM-DL -31 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - L. BROGLIO 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- IVM-ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER)

NSSDC ID- SM-DL -03 INVESTIGATIVE PROGRAM
CODE ST/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-AMPERAGE 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). FURTHER EXPERIMENT DETAILS MAY BE FOUND IN THE SAN MARCO-D PROJECT PLAN.

----- SAN MARCO-D/L, MAYNARD-----

INVESTIGATION NAME- 3-AXIS ELECTRIC FIELD

NSSDC ID- SM-DL -05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL

PI - N.C. MAYNARD NASA-GSFC
OI - J.P. HEPNER 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. MORE DETAILS OF THIS EXPERIMENT ARE FOUND IN THE 'SAN MARCO-D PROJECT PLAN.'

----- SAN MARCO-D/L, SCHMIDTKE-----

INVESTIGATION NAME- AIRGLOW-SOLAR SPECTROMETER

NSSDC ID- SM-DL -02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
AERONOMY
ATMOSPHERIC PHYSICS

PERSONNEL

PI - G. SCHMIDTKE INST FUR PHYS WELTRAUM
OI - F. FISCHER INST FUR PHYS WELTRAUM
OI - M. KNOTHE INST FUR PHYS WELTRAUM
OI - H. MASCHKE INST FUR PHYS WELTRAUM
OI - C. MUNTHNER INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION

THE SENSOR MEASURES THE EQUATORIAL DAY AND NIGHT AIRGLOW, THE SOLAR RADIATION REFLECTED FROM THE SURFACE AND CLOUDS, THE SOLAR RADIATION, AND THE RADIATION OF INTERPLANETARY AND INTERGALACTIC ORIGIN REACHING THE SATELLITE IN THE SPECTRAL RANGE FROM 700 TO 20 NM WITH A SPECTRAL RESOLUTION OF 0.7-4 NM. FOUR SPECTROMETERS, 4 GRATINGS, AND 17 MULTIPLIERS ARE USED.

----- SAN MARCO-D/L, SPENCER-----

INVESTIGATION NAME- WIND AND TEMPERATURE (NATE)

NSSDC ID- SM-DL -04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W. SPENCER NASA-GSFC
OI - G.R. CARIGNAN 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, ONE MOVING VERTICALLY IN FRONT OF THE SENSOR, AS NOW BEING EMPLOYED 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, USED. 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 (RPQ) 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 RPQ 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-

NSSDC ID- SM-DM

LAUNCH DATE- 1 QTR 80 WEIGHT- KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
ITALY CRA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 480. MIN INCLINATION- 3. DEG
PERIAPSIS- 420. KM ALT APOAPSIS- 27000. KM ALT

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - A.J. CAPORALE NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION

THIS IS A SMALL SPACECRAFT BUILT AROUND A SINGLE EXPERIMENT. ITS GENERAL APPEARANCE IS THAT OF TWO CYLINDERS WITH A COMMON AXIS, ONE WITH DIAMETER OF 70 CM AND HEIGHT OF 4.2 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 RECHARGABLE 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. 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. FURTHER DETAILS ON THIS SPACECRAFT CAN BE FOUND IN THE 'SAN MARCO D PROJECT PLAN.'

----- SAN MARCO-D/M, BUONGIORNO-----

INVESTIGATION NAME- IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT

NSSDC ID- SM-DM -01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - BUONCIORNO U OF ROME

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, CD, YF 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 15.01 MICROMETERS. BANDWIDTH FOR EACH OF THESE SIX BANDS IS LESS THAN .35 MICROMETERS, AND THE LOW EDGE OF THE BAND WIDTHS 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 MIN (SOUNDING, AND CALIBRATION OCCURS ONCE EACH FRAME. FURTHER DETAILS ARE FOUND IN THE 'PROJECT PLAN FOR SAN MARCO-D.'

***** SHUTTLE OFT 4*****

SPACECRAFT COMMON NAME- SHUTTLE OFT 4
ALTERNATE NAMES-

NSSDC ID- SHOFT-4

LAUNCH DATE- 06/00/80 WEIGHT- 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- 57. DEG
PERIAPSIS- 416. KM ALT APOAPSIS- 416. KM ALT

PERSONNEL
MM - K. KISSIN NASA-GSFC
MS - W.M. NEUPERT NASA-GSFC

BRIEF DESCRIPTION

SIX OF THE SEVEN EXPERIMENTS THAT MAKE UP THE SHUTTLE OFT 4 PAYLOAD, SHOFT-4-01 TO SHOFT-4-06, ARE MOUNTED ON THE SPACELAB PALLET AND THE SEVENTH EXPERIMENT, SHOFT-4-C7, 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 NAUTICAL MILES; (4) ELECTRICAL CHARGING PROPERTIES OF THE ORBITER VEHICLE; (5) THERMAL PROPERTIES OF THE CANISTER 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.

----- SHUTTLE OFT 4, BANKS-----

INVESTIGATION NAME- VEHICLE CHARGING AND POTENTIAL EXPERIMENT

NSSDC ID- SHOFT-4-G4 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
PARTICLES AND FIELDS

PERSONNEL
PI - P.H. BANKS UTAH STATE U
OI - W.J. RAITT UTAH STATE U
OI - P.R. WILLIAMSON UTAH 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) 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 FLECTRON EMISSION WITH SHORT (100 NANoseconds) PULSES AND CAPABLE OF DC OPERATION FOR EXTENDED PERIODS OF TIME. THE GUN OPERATES ON A CURRENT OF 0.1 AMPS AND A VOLTAGE OF 1 KV.

----- SHUTTLE OFT 4, BRUECKNER-----

INVESTIGATION NAME- SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR

NSSDC ID- SHOFT-4-03 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

BRIEF DESCRIPTION

THE OBJECTIVE OF THE 'SOLAR ULTRAVIOLET SPECTRAL IRRADIANCE MONITOR' EXPERIMENT IS TO MONITOR SOLAR SPECTRAL IRRADIANCE IN THE WAVELENGTH REGION 120-400 NANOMETERS. SPECIFICALLY, IT IS EXPECTED TO: (1) DETERMINE SOLAR FLUXES TO A HIGH DEGREE OF ACCURACY, (2) DETERMINE THE ENERGY BALANCE IN THE 120 TO 300-NANOMETERS REGION BY MEASURING SOLAR ULTRAVIOLET FLUX ABSORPTION, (3) LOOK FOR INDICATIONS THAT THE SOLAR ULTRAVIOLET OUTPUT BELOW 210 NANOMETERS IS VARIABLE IN THE CONTINUUM, (4) CONTRIBUTE TO A BETTER MODELING OF THE SUN'S

ATMOSPHERE, (5) MERGE THE 300 TO 400-NANOMETERS WAVELENGTH REGION MEASUREMENTS WITH HIGH ACCURACY GROUND-BASED MEASUREMENTS. THE INSTRUMENTATION CONSISTS OF TWO DOUBLE-DISPERSION SCANNING SPECTROMETERS, SEVEN DETECTORS, AND AN ULTRAVIOLET CALIBRATION SOURCE. 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.

----- SHUTTLE OFT 4, COWLES-----

INVESTIGATION NAME- INFLUENCE OF WEIGHTLESSNESS OF LIGNIFICATION OF PLANT SEEDLINGS

NSSDC ID- SHOFT-4-07 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - J.R. COWLES U OF HOUSTON
OI - H.W. 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 WERE FLOWN. MEASUREMENTS ARE 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.

----- SHUTTLE OFT 4, 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, AND (4) POLARIZATION ANGLE. 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 SCATTERED 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 USED 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.

----- SHUTTLE OFT 4, OLLENDORF-----

INVESTIGATION NAME- THERMAL CANISTER EXPERIMENT

NSSDC ID- SHOFT-4-05 INVESTIGATIVE PROGRAM
CODE RS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - S. OLLENDORF NASA-GSFC

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, CANISTER HEAT PIPES, VARIABLE CONDUCTANCE HEAT PIPES, AND A

RADIATOR AND RADIATOR HEAT PIPES 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.

----- SHUTTLE OFT 4, SHAWHAN-----

INVESTIGATION NAME- PLASMA DIAGNOSTIC PACKAGE

NSSDC ID- SHOFT-4-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

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

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, AND (3) DEMONSTRATE THE OPERATION OF THE PDP PRIOR TO ITS FLIGHT ON SPACELAB 2. 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 QUADRISPHERICAL LOW ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA) TO MEASURE NONTHERMAL ELECTRON AND PROTON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV, AN AC ELECTRIC WAVE ANALYZER TO MEASURE ELECTROMAGNETIC AND ELECTROSTATIC WAVES FROM 5 HZ TO 10 MHZ, AN AC MAGNETIC WAVE ANALYZER SEARCH COIL TO MEASURE MAGNETIC FIELDS AND ELECTROMAGNETIC WAVES FROM 5 HZ TO 20 KHZ, A DC ELECTRIC FIELD METER-SPINNING DOUBLE PROBE TO MEASURE ELECTRIC FIELDS FROM 1.E-3 TO 1 V/M, AND A LANGMUIR PROBE TO MEASURE DENSITIES FROM 1.E4 TO 1.E7 CUBIC CM AND TEMPERATURES IN THE RANGE FROM 500 TO 5000 K.

----- SHUTTLE OFT 4, WEINBERG-----

INVESTIGATION NAME- CHARACTERISTICS OF SHUTTLE/SPACELAB INDUCED ATMOSPHERE

NSSDC ID- SHOFT-4-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.L. WEINBERG 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 EARTH'S LIMB IN THE STUDY OF ATMOSPHERIC AEROSOLS. THE EXISTING SKYLAB PHOTOMETER/CAMERA SYSTEM ADAPTED TO BE PALLET MOUNTED WAS FLOWN. 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.

***** SME*****

SPACECRAFT COMMON NAME- SME
ALTERNATE NAMES- SOLAR MESOSPHERE EXPL

NSSDC ID- SME

LAUNCH DATE- 08/00/81 WEIGHT- 125. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.6 MIN INCLINATION- 97.6 DEG
PERIAPSIS- 500. KM ALT APOAPSIS- 500. KM ALT

PERSONNEL
 MG - F.W. GAETANO NASA HEADQUARTERS
 SC - S.G. TILFORD NASA HEADQUARTERS
 PM - J.J. PAULSON NASA-JPL
 PS - NOT ASSIGNED YET NASA-JPL

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 MEV. SPIN STABILIZED AT ABOUT 5 RPM, THE SATELLITE MOVES IN A 3 AM - 3 PM 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 FACES 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 -C1 INVESTIGATIVE PROGRAM
 CODE ST
 INVESTIGATION DISCIPLINE(S)
 PLANETARY ATMOSPHERES
 ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A. BARTH U OF COLORADO
 OI - G.J. ROTTMAN U OF COLORADO
 OI - R.J. THOMAS U OF COLORADO
 OI - J.C. GILLE NATL CTR FOR ATMOS RES
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. HORD U OF COLORADO
 OI - P.J. CRUTZEN NATL CTR FOR ATMOS RES
 OI - R.E. DICKINSON NATL CTR FOR ATMOS RES
 OI - P.L. BAILEY NATL CTR FOR ATMOS RES
 OI - J.F. NOXON NOAA
 OI - G.E. THOMAS U OF COLORADO
 OI - J. LONDON U OF COLORADO

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 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 U OF COLORADO
 OI - G.J. ROTTMAN 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. NOXON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. HORD 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 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 VIEW 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 U OF COLORADO
 OI - G.J. ROTTMAN 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. NOXON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. HORD 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 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 U OF COLORADO
 OI - G.J. ROTTMAN 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. NOXON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. HORD 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 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 U OF COLORADO
 OI - G.J. ROTTMAN 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. NOXON NOAA
 OI - A.I. STEWART U OF COLORADO
 OI - C.W. HORD U OF COLORADO
 OI - G.E. THOMAS U OF COLORADO
 OI - J. LONDON U OF COLORADO

01 - P.J. CRUTZEN NATL CTR FOR ATMOS RES
01 - 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 AM - 3 PM ORBIT THE SOLAR MONITOR SCANS THROUGH THE SUN ONCE PER SPACECRAFT REVOLUTION. THE ACCEPTANCE ANGLE OF THE INSTRUMENT IS PLUS OR MINUS 10 DEG.

----- SME, BARTH-----

INVESTIGATION NAME- SOLAR PROTON ALARM

NSSDC ID- SME -06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - C.A. BARTH U OF COLORADO
01 - G.J. ROTTMAN U OF COLORADO
01 - R.J. THOMAS U OF COLORADO
01 - J.C. GILLE NATL CTR FOR ATMOS RES
01 - P.L. BAILEY NATL CTR FOR ATMOS RES
01 - J.F. NOXON NOAA
01 - A.I. STEWART U OF COLORADO
01 - C.W. HORD U OF COLORADO
01 - G.E. THOMAS U OF COLORADO
01 - J. LONDON U OF COLORADO
01 - P.J. CRUTZEN NATL CTR FOR ATMOS RES
01 - 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.

***** SMH*****

SPACECRAFT COMMON NAME- SMH

ALTERNATE NAMES- SOLAR MAXIMUM MISSION

NSSDC ID- SMH

LAUNCH DATE- 10/18/79 WEIGHT- 2273. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.2 MIN INCLINATION- 28.6 DEG
PERIAPSIS- 575. KM ALT APOAPSIS- 575. KM ALT

PERSONNEL

MG - M.E. McDONALD NASA HEADQUARTERS
SC - J.D. BOHLIN NASA-GSFC
PH - P.T. BURR NASA-GSFC
PS - K.J. FROST NASA-GSFC

BRIEF DESCRIPTION

THE SOLAR MAXIMUM MISSION (SMH) 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 SMH SPACECRAFT IS DESIGNED SO THAT IT CAN BE RETRIEVED BY AN EARLY SHUTTLE FLIGHT, RETURNED TO EARTH, REFURBISHED AND FITTED WITH AN UPDATE PAYLOAD, AND RETURNED TO ORBIT FOR ANOTHER SOLAR-ORIENTED MISSION.

----- SPM, ACTON-----

INVESTIGATION NAME- SOFT X-RAY POLYCHROMATOR

NSSDC ID- SPM -04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - L.V. ACTON LOCKHEED PALO ALTO
PI - A.H. GABRIEL APPLETON LAB
PI - J.L. CULHANE U COLLEGE LONDON
01 - R.C. CATURA LOCKHEED PALO ALTO
01 - J.H. PARKINSON U COLLEGE LONDON
01 - C.G. RAPPLEY U COLLEGE LONDON
01 - B.B. JONES APPLETON LAB
01 - C. JORDAN OXFORD U
01 - C.J. WOLFSON LOCKHEED PALO ALTO
01 - B.C. FANCETT APPLETON LAB

BRIEF DESCRIPTION

THIS EXPERIMENT USES X-RAY EMISSION LINES IN THE 0.4-NM TO 2.24-NM SPECTRAL REGION AS DIAGNOSTIC TOOLS TO INVESTIGATE ASPECTS OF SOLAR ACTIVITY LEADING TO PLASMA TEMPERATURES IN THE 1.5 TO 50 MILLION K RANGE. THE INSTRUMENTATION INCLUDES TWO SYSTEMS, A FLAT CRYSTAL SPECTROMETER AND A BENT CRYSTAL SPECTROMETER. THE FLAT CRYSTAL SPECTROMETER COVERS FROM 1.4 TO 22.44 Å 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 1.769 AND 1.945 Å) AND THE CALCIUM XIX LINE BETWEEN 3.165 TO 3.231 Å. 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.

----- SMH, CHUPP-----

INVESTIGATION NAME- GAMMA RAY EXPERIMENT

NSSDC ID- SMH -07 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - E.L. CHUPP U OF NEW HAMPSHIRE
01 - D.J. FORREST U OF NEW HAMPSHIRE
01 - K. PINKAU MPI-EXTRATERR PHYS
01 - C. REPPIN MPI-EXTRATERR PHYS
01 - E. RIEGER MPI-EXTRATERR PHYS
01 - W.N. JOHNSON US NAVAL RESEARCH LAB
01 - R.L. KINZER US NAVAL RESEARCH LAB
01 - J.D. KURFESS US NAVAL RESEARCH LAB
01 - G.H. SHARE US NAVAL RESEARCH LAB
01 - A.S. JACOBSON NASA-JPL

BRIEF DESCRIPTION

THE PRIMARY SCIENTIFIC GOAL OF THIS EXPERIMENT IS THE STUDY OF GAMMA-RAY EMISSIONS FROM THE SUN BEFORE AND DURING SOLAR FLARES. THE MAIN DETECTOR IS A SET OF SEVEN 7.6- BY 7.6-CM SODIUM IODIDE SCINTILLATORS COVERING THE ENERGY RANGE FROM 0.3 TO 17 MEV WITH AN ENERGY RESOLUTION OF BETTER THAN 7 PERCENT AT 0.662 MEV AND TEMPORAL RESOLUTIONS RANGING FROM 16 S (FULL ENERGY RANGE) TO 1 S (SELECTED ENERGY INTERVAL) TO 0.064 S. A HIGH-ENERGY DETECTOR CONSISTS OF THE SODIUM IODIDE ARRAY AND A CESIUM IODIDE SCINTILLATOR COVERING FROM 10 TO 160 MEV WITH A TEMPORAL RESOLUTION OF TWO S FOR HIGH-ENERGY NEUTRONS AND GAMMA RAYS. TWO ADDITIONAL SODIUM IODIDE SCINTILLATORS FORM AN X-RAY DETECTOR SENSITIVE BETWEEN 10 AND 160 KEV WITH FOUR CHANNELS OF ENERGY RESOLUTION AND A TEMPORAL RESOLUTION OF 1 S.

----- SMH, DE JAGER-----

INVESTIGATION NAME- HARD X-RAY IMAGING SPECTROMETER

NSSDC ID- SMH -05 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - C. DE JAGER U OF UTRECHT
01 - H.F. VAN BEEK SPACE RESEARCH LAB
01 - A.P. WILLMORE 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, OR TWO ONE-DIMENSIONAL IMAGES CONSISTING OF TWELVE 4-ARC MIN BY 16-ARC S FAN BEAMS IN X AND 12 FAN BEAMS OF 16 ARC S BY 4 ARC MIN IN Y. THESE IMAGES ARE OBSERVED IN SIX ENERGY CHANNELS BETWEEN 3.5 AND 30 KEV, AND WITH A TEMPORAL RESOLUTION OF AT LEAST 1.5 S. A HIGH-ENERGY MONITOR OBSERVES THE ENTIRE SUN AT ENERGIES UP TO 40 KEV.

----- SMH, FROST-----

INVESTIGATION NAME- X-RAY SPECTROMETER

NSSDC ID- SMH -06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K.J. FROST NASA-GSFC
01 - L.E. ORWIG NASA-GSFC
01 - B.R. DENNIS NASA-GSFC
01 - T.L. CLINE NASA-GSFC
01 - U.D. DESAI NASA-GSFC

ORIGINAL PAGE IS
OF POOR QUALITY

BRIEF DESCRIPTION

THIS EXPERIMENT MEASURES FLARE X-RAY EMISSION WITH 16 CHANNEL ENERGY ANALYSIS AND 0.1-S TIME RESOLUTION IN THE ENERGY RANGE OF 20 TO 300 KEV. A SEARCH FOR TEMPORAL STRUCTURE IN THE X-RAY EMISSION WITH A TIME RESOLUTION OF 1 MILLISECOND IS CONDUCTED USING ONE CHANNEL BETWEEN 20 AND 300 KEV.

----- SMM, MACQUEEN-----

INVESTIGATION NAME- CORONAGRAPH/POLARIMETER

NSSDC ID- SMM -01 INVESTIGATIVE PROGRAM CODE ST/CO-0P
INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL

PI - R.M. MACQUEEN HIGH ALTITUDE OBS
OI - L.L. HOUSE HIGH ALTITUDE OBS
OI - W.J. WAGNER HIGH ALTITUDE OBS
OI - E.G. HILDNER HIGH ALTITUDE OBS
OI - G.A. DULK U OF COLORADO
OI - R.J. HANSEN HIGH ALTITUDE OBS
OI - R. KOPP LOS ALAMOS SCI LAB
OI - G.W. PNEUMAN HIGH ALTITUDE OBS
OI - C.W. QUERFELD HIGH ALTITUDE OBS
OI - H.U. SCHMIDT MPI-PHYS ASTROPHYS
OI - K.V. SHERIDAN 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 OCCULTED 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 MESHLESS 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 SOLAR RADII SQUARE 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 4400 A TO 6583 A, AND POLARIZATION IS MEASURED BY A SEQUENCE OF THREE POLARIZING ORIENTED 60 DEG APART (A CLEAR POSITION IS ALSO AVAILABLE). THE STRAY RADIANCE IS ABOUT 3.E-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.

----- SMM, TANDBERG-HANSEN-----

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER AND POLARIMETER

NSSDC ID- SMM -02 INVESTIGATIVE PROGRAM CODE ST
INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS

PERSONNEL

PI - E. TANDBERG-HANSEN NASA-MSFC
OI - R.G. ATHAY HIGH ALTITUDE OBS
OI - J.M. BECKERS SACRAMENTO PEAK OBS
OI - J.C. BRANDT NASA-GSFC
OI - E.C. BRUNER, JR. LOCKHEED PALO ALTO
OI - R.O. CHAPMAN NASA-GSFC
OI - B.E. WOODGATE 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 1100 TO 3600 A REGION WITH A SPECTRAL RESOLUTION OF ABOUT 0.013 A/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.

----- SMM, WILLSON-----

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR

NSSDC ID- SMM -06 INVESTIGATIVE PROGRAM CODE ST
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 0.1 PERCENT IN THE INTERNATIONAL SYSTEM OF UNITS.

***** SPACE SHUTTLE LDEF-A*****

SPACECRAFT COMMON NAME- SPACE SHUTTLE LDEF-A
ALTERNATE NAMES- LONG DURATION EXPOS.FAC., LDEF SHUTTLE OFT 6

NSSDC ID- SSLDEF

LAUNCH DATE- MAY 1980 WEIGHT- 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- 90.8 MIN INCLINATION- 57. DEG
PERIAPSIS- 296. KM ALT APOAPSIS- 296. KM ALT

PERSONNEL

PM - W.H. KINARD NASA-LARC

BRIEF DESCRIPTION

THE LONG DURATION EXPOSURE FACILITY (LDEF) IS A REUSABLE, UNMANNED, GRAVITY GRADIENT-STABILIZED, FREE-FLYING STRUCTURE ON WHICH MANY DIFFERENT EXPERIMENTS CAN BE MOUNTED. THE STRUCTURE IS A 12-SIDED REGULAR POLYGON HAVING A DIAMETER OF 4.27 M AND A LENGTH OF 9.14 M. THE LDEF IS PLACED IN ORBIT BY A SPACE SHUTTLE AND RECOVERED AFTER 6 TO 9 MONTHS IN ORBIT. THE STRUCTURE CAN ACCOMMODATE 76 EXPERIMENT TRAYS WHOSE LENGTHS ARE 1.27 M AND WHOSE WIDTHS ARE 0.97 M. MAXIMUM ALLOWED TRAY DEPTH AND WEIGHT ARE 0.36 M AND 79 KG, RESPECTIVELY. ACTIVE EXPERIMENTS, WHICH REQUIRE POWER SYSTEMS, DATA STORAGE, ETC., MUST INCLUDE THESE AS AN INTEGRAL PART OF THE EXPERIMENT TRAY ASSEMBLY.

***** SPACELAB 1*****

SPACECRAFT COMMON NAME- SPACELAB 1
ALTERNATE NAMES-

NSSDC ID- SPALAB1

LAUNCH DATE- 12/00/80 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- 90.8 MIN INCLINATION- 57. DEG
PERIAPSIS- 296. KM ALT APOAPSIS- 296. KM ALT

PERSONNEL

PM - R.E. PACE NASA-MSFC
MS - C.R. CHAPPELL NASA-MSFC
MG - R. NOBLITT NASA HEADQUARTERS
SC - W. TAYLOR NASA HEADQUARTERS
PM - 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 DEFINITION STUDY PHASE. AN IMAGING SPECTROMETRIC OBSERVATORY, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS, STUDIES OF THE IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT, HZE PARTICLE DOSIMETRY, MUTATION 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, ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY, GRILLE SPECTROMETER, WAVES IN THE OH EMISSIVE LAYER, TEMPERATURE-WIND IN MESOSPHERE-THERMOSPHERE, H AND D LYMAN ALPHA, SOLAR SPECTRUM FROM 1950 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 INTRATHORIC 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, 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 SPECTROM
OI - Y.	ARNAL	CNRS
OJ - M.	HAMELIN	CNRS
OI - D.	HENRY	CNRS
OI - M.	PIRRE	CNRS
OI - J.J.	BERTHELIER	CNRS
OI - J.	LAURENAT	CNRS
OI - B.W.	MASHLUM	NDRÉ
OI - J.	TROIM	NDRÉ
OI - R.	BOSWELL	ESA-ESTEC
OI - A.	GONFALONE	ESA-ESTEC
OI - T.R.	SANDERSON	ESA-ESTEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO USE AN ELECTRON AND ION BEAM GUN (UP TO 10 KEV), AN ASSOCIATED WAVE RECEIVER (UP TO 100 MHZ), HANOMETERSELECTRON TEMPERATURE PROBE, AND THREE PARTICLE DETECTORS TO -- (1) STUDY IONOSPHERIC NEUTRALIZATION PROCESSES BY STUDYING THE STABILITY OF THE ELECTRONIC POTENTIAL OF THE CUN 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 D+ INTERACTION WITH THE NEUTRAL ATMOSPHERE, AND (5) MONITOR THE SECONDARY ELECTRON FLUX. THE EQUIPMENT CONSISTS OF AN ACTIVE PACKAGE CONSISTING OF 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 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 (PDP) CONTAINING PLASTIC NUCLEAR TRACK DETECTORS, AN AGC1 CRYSTAL DETECTOR (CD), AND THERMOLUMINESCENCE DETECTOR (TLD) CHIPS, AND (2) A THICK PLASTIC STACK (TPS) CONSISTING OF A STACK OF 20G 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 PROTON PRECIPITATION IN THE AURORAL 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 PHOTOMETER WITH AN ATOMIC HYDROGEN ABSORPTION CELL AND AN ATOMIC DEUTERIUM ABSORPTION CELL, AND A SOLAR BLIND PHOTOMULTIPLIER FOR DETECTOR.

----- SPACELAB 1, BISWAS-----

INVESTIGATION NAME- IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES

NSSDC ID- SPALAB1-06

INVESTIGATIVE PROGRAM CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - S.	BISWAS	TATA INST OF FUND RES
PI - D.	LAL	PHYSICAL RESEARCH LAB
OI - R.	COWSIK	TATA INST OF FUND RES
OI - N.	DURGAPRASAD	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 CELLULOSE NITRATE (CN) WITH LEXAN POLYCARBONATE SHEETS AT THE BOTTOM, AND AN ELECTRONIC DRIVE SYSTEM.

----- SPACELAB 1, BOELLA-----

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 - G.	BOELLA	U OF MILAN
OI - R.L.F.	BOYD	U COLLEGE LONDON
OI - G.	BROWLIE	U COLLEGE LONDON
OI - J.L.L.	CULHANE	U COLLEGE LONDON
OI - J.	IVES	U COLLEGE LONDON
OI - P.W.	SANFORD	U COLLEGE LONDON
OI - R.D.	ANDRESEN	ESA-ESTEC
OI - A.	PEACOCK	ESA-ESTEC
OI - B.G.	TAYLOR	ESA-ESTEC
OI - S.	SALENI	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 FLOURESCENCE 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, 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.	DEHARVENG	CNRS-LAS
OI - R.	MALINA	U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM UV (1100-3500 Å) BROADBAND IMAGING BEARING AND LOW RESOLUTION (20-220 Å) SPECTROSCOPY OF -- GLOBULAR CLUSTERS, GALACTIC CLUSTERS, QUASI-STELLAR OBJECTS, NEARBY GALAXIES, UV STARS, EXTENDED SOURCES, GEORONAS, AND SPACELAB 1 CONTAMINANTS. THE EQUIPMENT CONSISTS OF A FAR ULTRAVIOLET SPACE TELESCOPE (FAUST) AND AN ELECTRONIC INTERFACE MODULE.

----- SPACELAB 1, BROWN-----

INVESTIGATION NAME- NUTATION OF HELIANTHUS 'ANNUUS

NSSDC ID- SPALAB1-12 INVESTIGATIVE PROGRAM
CODE SBINVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A.H. BROWN	U OF PENNSYLVANIA
OI - A.O. DAHL	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 NUTATIONAL 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, ROTON 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-OPINVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - H. BUCKER	U OF FRANKFURT
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BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO INCREASE THE KNOWLEDGE OF HZE PARTICLES EFFECT ON BIOLOGICAL SPECIMENS, 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
WEIGHTLESSNESSNSSDC ID- SPALAB1-36 INVESTIGATIVE PROGRAM
CODE SB/CO-OPINVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A. COGOLI	U OF ZURICH
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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-OPINVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - G.C. COURTES	CNRS-LAS
OI - M. VITON	CNRS-LAS
OI - J.P. SIVAN	CNRS-LAS
OI - H.L. ATKINS	NASA-MSEC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ZODIACAL LIGHT AND GEGENSCHNITT, EXTENDED GALACTIC OBJECTS, SKY BACKGROUND, CONTINUUM LIGHT AND EMISSION LINES IN HII 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 WIDE FIELD (60 DEG) ULTRAVIOLET (130 TO 363 NM) AND SPECTROGRAPHIC PHOTOGRAPHY. THE EQUIPMENT CONSISTS OF A WIDE-FIELD CAMERA CONSISTING OF A HYPERBOLIC COLLECTOR, INTERCHANGEABLE SCHMIDT CHAMBERS (INCLUDING PRISM, FLAT MIRRORS AND FILTERS), 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
CONSTANTNSSDC ID- SPALAB1-26 INVESTIGATIVE PROGRAM
CODE ST/CO-OPINVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D. CROMMELYNCK	ROY METEOROL INST BELG
OI - V. DOMINGO	ESA-ESTEC
OI - A.C. DURNEY	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.

----- SPACELAB 1, DEMOREST-----

INVESTIGATION NAME- TRIBIOLOGICAL STUDIES OF FLUID LUBRICANT
JOURNALNSSDC ID- SPALAB1-10 INVESTIGATIVE PROGRAM
CODE RSINVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL

PI - K.E. DEMOREST	NASA-MSFC
PI - A.F. WHITAKER	NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVES ARE TO -- 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 OPENING 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 FACILITATE PHOTOGRAPHY AND OBSERVATION, AND A CAMERA.

----- SPACELAB 1, ENGE-----

INVESTIGATION NAME- ISOTOPE STACK

NSSDC ID- SPALAB1-29 INVESTIGATIVE PROGRAM
CODE SC/CO-OPINVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL

PI - W. ENGE	INST P+A NUCLEAR PHYS
OI - R. BEAUJEAN	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 = 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 SEALED ALUMINUM CONTAINER.

----- 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.

----- 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 IS DEVELOPMENT OF 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 EQUIPMENT, CONSISTS OF (1) AN ANTENNA-PARABOLIC DISK WITH DIRECT HORN FEEDING, ACTUAL APERTURE 1DB, EFFECTIVE APERTURE ABOUT 2 M AZIMUTH AND 1 M ELEVATION, BEAMWIDTH OF 3 DEG, AND EFFICIENCY OF APPROXIMATELY 66 PERCENT, (2) A RECEIVER - COHERENT PULSE RECEIVER WITH FIXED NUMBER OF RANGE GATES, COHERENT PULSE RECEIVER AND A BROADBAND RADIOMETER, AND (3) HF ELECTRONICS - OPERATING FREQUENCY TBD, CARRIER FREQUENCY 2.50 MHZ, AND AVERAGE RF POWER OF ABOUT 25 W.

----- 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. VARIOUS ACCELERATION PROFILES ARE AVAILABLE, INCLUDING OSCILLATION AT A RATE OF 0.02 TO 1 HZ IN THE RANGE OF 0.1-0.5 G, WITH SINUSOIDAL AND CONSTANT ACCELERATION. POSITIONING IS AVAILABLE 360 DEG AROUND THE UPRIGHT AXIS, AND PLUS OR MINUS 90 DEG AROUND THE LATERAL AXIS.

----- 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 CONCEPTUAL DESIGN OF THE GRADIENT HEATING FACILITY FOR HIGH TEMPERATURE IS ORIENTED TOWARDS TYPICAL METALLURGICAL, CRYSTAL GROWTH, AND GLASS EXPERIMENTS.

----- SPACELAB 1, FARMER-----

INVESTIGATION NAME- ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY
 NSSDC ID- SPALAB1-05 INVESTIGATIVE PROGRAM
 CODE EB/CO-OP
 INVESTIGATION DISCIPLINE(S)
 ATMOSPHERIC PHYSICS

PERSONNEL
 PI - C.B. FARMER NASA-JPL
 OI - R. BEER NASA-JPL
 OI - J. BRECKINRIDGE NASA-JPL
 OI - R. NORTON NASA-JPL
 OI - O. RAPIER NASA-JPL
 OI - R. SCHINDLER NASA-JPL
 OI - F. TAYLOR NASA-JPL
 OI - R. TOTH NASA-JPL
 OI - R. ZANDER U OF LIEGE
 OI - J. SHAW OHIO STATE U
 OI - J. SUSKIND NASA-GISS
 OI - J.W. RUSSELL NASA-LARC

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS EXPERIMENT IS TO USE HIGH-RESOLUTION, BROADBAND (2-16 MICROMETERS) INFRARED ABSORPTION SPECTRA TO -- (1) DETERMINE THE VARIABILITY OF MINOR AND TRACE CONSTITUENTS OF THE UPPER ATMOSPHERE ON A GLOBAL SCALE, AND TO STUDY CHARACTERISTIC RESIDENCE TIMES FOR THESE CONSTITUENTS, THE MAGNITUDE OF THEIR SOURCE AND SINKS, AND THEIR EFFECTS ON THE STABILITY OF THE ATMOSPHERE, AND (2) PROVIDE A CALIBRATED SPECTRAL BACKGROUND ATLAS ESSENTIAL FOR THE DESIGN OF ADVANCED INSTRUMENTATION TO BE USED FOR GLOBAL MONITORING OF CRITICAL ATMOSPHERIC SPECIES. THE EQUIPMENT CONSISTS OF A RAPID-SCAN, FOURIER-INTERFERENCE, SPECTROMETER SYSTEM CONTAINING -- (1) AN OPTICAL SYSTEM CONSISTING OF THE BASIC INTERFEROMETER, FOREOPTICS, DETECTOR OPTICS, SUNTRACKER, PHOTO CAMERA, CRYOSTAT AND FILTER WHEEL, (2) A CONTINUOUS-SCAN SERVO SYSTEM, (3) AN IR SIGNAL HANDLING SYSTEM, (4) A DATA-HANDLING SYSTEM, (5) A CONTROL/MONITORING SYSTEM, AND (6) THE IR COOLING SYSTEM AND PRESSURIZATION SYSTEM.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN
 NSSDC ID- SPALAB1-31 INVESTIGATIVE PROGRAM
 CODE EB/CO-OP
 INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - O.H. GAUER U OF BERLIN
 OI - KOCH U OF BERLIN
 OI - ROCKER U OF BERLIN
 OI - KIRSCH U OF BERLIN

BRIEF DESCRIPTION
 THE EXPERIMENT OBJECTIVE IS TO PROCURE ABSOLUTE DATA THAT THE ADAPTION OF MINERAL AND WATER METABOLISM TO THE WEIGHTLESS CONDITION IS INITIATED BY THE ENGORGEMENT OF THE CEPHALAD CIRCULATION. THE EQUIPMENT CONTAINS A STRAIN GAGE MANOMETER, TAPE RECORDER, AND BATTERIES.

----- SPACELAB 1, GAUER-----

INVESTIGATION NAME- COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., 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 - KOCH U OF BERLIN
 OI - ROCKER U OF BERLIN
 OI - H. STOBOY U OF BERLIN

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.

----- SPACELAB 1, GIRARD-----

INVESTIGATION NAME- GRILLE SPECTROMETER

ORIGINAL PAGE IS
 OF POOR QUALITY

NSSDC ID- SPALAB1-18 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - A. GIRARD ONERA
OI - D. FRIMONT BIRA
OI - M. ACKERMAN BIRA

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.

----- SPACELAB 1, GREEN-----

INVESTIGATION NAME- ELECTRO-PHYSIOLOGICAL TAPE RECORDER

NSSDC ID- SPALAB1-35 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H.L. GREEN CLINICAL RES CENTER
OI - F.D. STOTT CLINICAL RES CENTER
OI - H.S. WOIFF CLINICAL RES CENTER

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO STUDY ACCLIMATISATION OF ASTRONAUTS TO ZERO GRAVITY BY MEANS OF AN ELECTROCARDIOGRAPH (ECG), ELECTROCEPHALOGRAPH (EEG), ELECTRO-OCULOGRAM (EOG), AND POSSIBLY ELECTROMYOGRAM (EMG) 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 SC

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL
PI - J.E. HART U OF COLORADO
OI - J. YODHRE 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, HERSE-----

INVESTIGATION NAME- WAVES IN THE OH EMISSIVE LAYER

NSSDC ID- SPALAB1-19 INVESTIGATIVE PROGRAM
CODE EB/CO-OP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M. HERSE 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 3.95 LENS.

----- 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 VETEPANS 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- SPALAB1-03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - S.B. MENDE LOCKHEED PALO ALTO
OI - R.H. EATHER BOSTON COLLEGE
OI - R.J. MAUMANN NASA-MSFC
OI - D.L. REASONER NASA-MSFC
OI - G.R. SWENSON NASA-MSFC
OI - B.J. DUNCAN NASA-MSFC
OI - 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) TO MEASURE SMALL PARTICULATE CONTAMINATION AROUND THE SHUTTLE/ SPACELAB. THE EQUIPMENT CONSISTS OF -- (1) A DUALCHANNEL 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 LOWRESOLUTION MICROCHANNEL PLATE ARRAY OPERATING IN A PHOTON COUNTING MODE, AND (4) COMS AND ONBOARD RECORDERS UTILIZED FOR DATA DISPLAY AND RECORDING.

----- SPACELAB 1, OBYASHI-----

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. OBAYASHI U OF TOKYO
 OI - J.M. SELLEN TRW SYSTEMS GROUP
 OI - J.L. BURCH U OF TEXAS, SAN ANTONIO
 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 ARCJET TO STUDY -- (1) AURORAL PRODUCTION IN THE UPPER ATMOSPHERE, (2) IONOSPHERE PARAMETERS SUCH AS ANOMALOUS REFLECTIVITY, 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.

----- 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)
 INTERPLANETARY PHYSICS
 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.

----- SPACELAB 1, RESCHKE-----
 INVESTIGATION NAME- VESTIBULO-SPINAL REFLEX MECHANISMS

NSSDC ID- SPALAB1-16 INVESTIGATIVE PROGRAM
 CODE SB

INVESTIGATION DISCIPLINE(S)
 SPACE BIOLOGY

PERSONNEL
 PI - M.F. RESCHKE NASA-JSC
 OI - J.L. HOMICK 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, STIMULOUS 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 TINS, 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 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 ADAPTATIONS 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 ECG 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 -- 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 PARAMETER, 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

INVESTIGATION DISCIPLINE(S)
 METEOROLOGY
 PLANETARY ATMOSPHERES

PERSONNEL
 PI - G. THUILLIER CNRS-SA
 OI - J.E. BLANONT CNRS-SA
 OI - M.L. DUBOIN CNRS-SA
 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.

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----- SPACELAB 1, THUILLIER-----

INVESTIGATION NAME- MEASUREMENT OF THE SOLAR SPECTRUM FROM
190 TO 4000 NANOMETERS

NSSDC ID- SPALAB1-21 INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G. THUILLIER CNRS-SA
PI - P. SIMON IASP
OI - J.E. BLAMONT CNRS-SA
OI - R. PASTIELS IASP
OI - D. LABS LANDESTERNWARTE

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO MEASURE THE SOLAR SPECTRAL IRRADIANCE 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 - 190.0 TO 370.0 NM (1 NM BANDPASS), VISIBLE - 350.0 TO 1100 NM (1 NM BANDPASS), AND IR - 1000 TO 4000 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 KITT PEAK NATL OBS
OI - D.E. SHERANSKY KITT PEAK NATL OBS
OI - B.R. SANDEL KITT PEAK NATL OBS
OI - S.K. ATREYA U OF MICHIGAN
OI - G.R. CARIGNAN U OF MICHIGAN
OI - J.C.G. WALKER ARECIBO OBS
OI - D.G. TORR U OF MICHIGAN
OI - T.M. DONAHUE U OF MICHIGAN

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT ARE -- (1) TO PRODUCE THE FIRST DAYTIME SPECTRUM (200-12,000 A, 3-6 A RESOLUTION) EMISSIONS OF ATMOSPHERIC METASTABLE SPECIES, ATMOSPHERIC MOLECULAR NITROGEN SYSTEMS, MESOSPHERE AND LOWER THERMOSPHERE TRACE CONSTITUENTS, ATMOSPHERIC HELIUM AND HYDROGEN, (2) TO MONITOR THE SHUTTLE INDUCED CONTAMINATION, AND (3) TO SERVE AS THE PRECURSOR FOR FUTURE SHUTTLE OBSERVING PROGRAMS USING THIS OBSERVATORY. THE EQUIPMENT CONSISTS OF (1) A BROADBAND INSTRUMENT DESIGNED FOR HIGH-SPEED OPERATION, (2) AN INSTRUMENT COMPOSED OF FIVE CO-ALIGNED IDENTICAL SPECTROMETERS, EACH RESTRICTED TO A GIVEN SPECTRAL RANGE WITHIN THE SELECTED FIELD OF VIEW, AND (3) A MIRROR ON THE COVER USED FOR IMAGE STABILIZING, HEIGHT SCANNING OR TRACKING.

----- 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 FREIBERG
OI - T. BRANDT KRUPP KRANKEN-ANGSTALN
OI - H. SCHERER U OF MUNICH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO USE THE SLED TO STUDY THE VISUO-VESTIBULAR COORDINATION AND OF THE INTEGRATION OF MULTISENSORY STIMULI WITHIN THE ORIENTATION CENTERS OF THE BRAIN BY SUBJECTING 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 OPTAKINETIC 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-OP
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 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. STUEDEMANN MPI-AERONOMY
OI - W. RIEDLER TECH U OF GRAZ

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO FLY A 2-PI FIELD OF VIEW ELECTROSTATIC ANALYZER TO MEASURE -- NATURAL ELECTRON FLUXES IN THE 0.5- TO 12.0-KEV RANGE TO STUDY PRECIPITATION PROCESS IN AURORAL EMISSION, EFFECTS OF THE ELECTRON ACCELERATOR (SEPA) 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/SPACELAB. 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

NSSDC 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 - H. ZIRIN CALIF INST OF TECH
OI - J. KENDALL, SR. CALIF INST OF TECH

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE TO MEASURE THE TOTAL SOLAR IRRADIANCE, TO MEASURE THE MAGNITUDE AND DIRECTION CHANGES IN THE TOTAL SOLAR IRRADIANCE, AND PROVIDE LONG TERM CORRELATION AND CALIBRATION WITH SATELLITE ROCKET AND FUTURE SHUTTLE FLIGHTS. THE EQUIPMENT CONSISTS OF AN ACTIVE CAVITY RADIOMETER TYPE IV (SELF-CALIBRATING PYRHELIOMETER), A POWER CONVERTER, AN ELECTRONIC UNIT, AND SUPPORT STRUCTURE.

----- SPACELAB 1, YOUNG-----

INVESTIGATION NAME- VESTIBULAR STUDIES

NSSDC ID- SPALAB1-13 INVESTIGATIVE PROGRAM
CODE SB/CO-OP
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - L.R. YOUNG MASS INST OF TECH
OI - G.M. JONES MCGILL U
OI - R.E. MALCOLM D+C INST OF ENVIRN MED
OI - K.E. HONEY D+C INST OF ENVIRN MED
OI - C.M. OWAN 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-

NSSDC ID- SPALAB2

LAUNCH DATE- 04/06/81 WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 93.3 MIN INCLINATION- 57. DEG
PERIAPSIS- 416. KM ALT APOAPSIS- 416. KM ALT

PERSONNEL
MM - R.E. PACE NASA-MSFC
MS - E.W. URBAN NASA-MSFC
MG - W.R. WITT NASA HEADQUARTERS
SC - J.D. ROSENTHAL NASA HEADQUARTERS
PM - O.C. JEAN NASA-MSFC

BRIEF DESCRIPTION
SPACELAB 2 CONSISTS OF THREE PALLETS AND A UNIQUE STRUCTURE (CALLED THE IGLOO) ON WHICH VARIOUS INSTRUMENTS ARE EXPOSED TO THE SPACE ENVIRONMENT. IN CONTRAST TO THE MULTIDISCIPLINARY NATURE OF SPACELAB 1, SPACELAB 2 EMPHASIZES ONLY PHYSICS AND ASTRONOMY. INCLUDED IN THE PAYLOAD IS THE INSTRUMENT POINTING SYSTEM (IPS) 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 METABOLISM 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 50 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 (CHASE), HIGH-RESOLUTION TELESCOPE AND SPECTROGRAPH (HRTS), SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM), 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)

NSSDC 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. MOE 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 FLARES, 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 (0.05 Å) OF UV SPECTRA (WAVELENGTHS 1176-1700 Å) COVERING A WIDE VARIETY OF CONTINUA 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 LMB 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 5 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 1600-Å BROAD-BAND SPECTROHELIOGRAPH, AND AN H ALPHA SPLIT DISPLAY SYSTEM HOUSED IN A THERMAL CONTROL CANISTER 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. TV TRANSMISSION IS AT 4.2 MHZ.

----- SPACELAB 2, BRUECKNER-----

INVESTIGATION NAME- SOLAR UV SPECTRAL IRRADIANCE MONITOR (SUSIM)

NSSDC 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 - D.K. PRINZ US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATIONS 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 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 208 NANOMETERS RELATIVE TO THE INTENSITIES OF THE CONTINUUM ABOVE 208 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 208 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). EXISTING CALIBRATION METHODS WERE IMPROVED, A NEW ENVIRONMENTAL CONTROL SCHEME WAS DEvised, AND AN ELABORATE COMBINATION OF IN-FLIGHT CALIBRATION AND REDUNDANT MEASURING METHODS ARE USED IN ORDER TO DISTINGUISH INSTRUMENT CHANGES FROM TRUE SOLAR FLUX VARIATIONS. 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 OUTGASING. 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-TO 6-NANOMETER LINE (H ALPHA) AND SEVEN SEGMENTS OF THE CONTINUUM FROM 145 TO 390 NANOMETERS. EIGHT NARROW-BAND CHANNELS (0.1-NANOMETER RESOLUTION) ARE MONITORED CONTINUOUSLY AND SCANNED IN 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, COMLES-----

INVESTIGATION NAME- INTERACTION OF OXYGEN AND GRAVITY INFLUENCED LIGNIFICATION

NSSDC ID- SPALAB2-C2 INVESTIGATIVE PROGRAM
CODE SB
INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

ORIGINAL PAGE IS
OF POOR QUALITY

PERSONNEL
PI - J.R. COWLES U OF HOUSTON
OI - H.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). THE INVESTIGATION CHAMBER IS 51 X 36 X 27 CM, HAS A MASS OF 25 KG, AND IS STORED ON THE ORBITER MID-DECK. IT REQUIRES 55 W AND 28 V OF DC CURRENT TO OPERATE AND EXPENDS A TOTAL ENERGY OF 12 KWH.

----- SPACELAB 2, FAZIO-----

INVESTIGATION NAME- SMALL, HELIUM-COOLED INFRARED TELESCOPE

NSSDC ID- SPALAB2-05 INVESTIGATIVE PROGRAM
CODE SC
INVESTIGATION DISCIPLINE(S)
DUST
ZODIACAL LIGHT
ASTRONOMY

PERSONNEL
PI - G.G. FAZIO SAO
OI - W.F. HOFFMANN U OF ARIZONA
OI - D.E. KLEINHANN SAO
OI - F.J. LOW U OF ARIZONA
OI - G.H. RIEKE U OF ARIZONA
OI - W.A. TRAUB SAO
OI - E.W. URBAN 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 SENSITIVITY 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 STRUCTURE; (2) MEASUREMENT OF DIFFUSE EMISSION FROM INTERGALACTIC MATERIAL AND/OR GALAXIES AND QUASARS. THIS INVESTIGATION COUPLED WITH THE INFRARED ASTRONOMY SATELLITE (IRAS) SELECTED CLUSTERS PROVIDES NEW INFORMATION ON THE INTERGALACTIC MEDIUM; (3) MEASUREMENT OF THE 30-DB DUST EMISSION, ESPECIALLY IF THE H₂O COLUMN DENSITY CAN BE HELD TO LESS THAN 1.E12 MOL/SQ CM. THE SCANNING AND ABSOLUTE FLUX MEASUREMENT CAPABILITY MAKES IT POSSIBLE TO MEASURE THE ZODIACAL LIGHT EMISSION AND DISTINGUISH IT FROM OTHER SOURCES BY ITS SPECTRAL AND SPATIAL DISTRIBUTION; AND (4) MEASUREMENT OF A LARGE NUMBER OF DISCRETE INFRARED SOURCES THAT OVERLAP WITH THE IRAS RESULTS. SPATIAL FILTERING PROVIDES 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 K. IT SCANS AT THE RATE OF 6 DEG/S AND COVERS A 90-DEG ARC ACROSS THE SKY. THE FOCAL PLANE CONTAINS 11 DETECTORS, 9 OF WHICH COVER THE REGION FROM 4 TO 120 MICROMETERS IN THREE NON-OVERLAPPING BROADBANDS (4 TO 9, 12 TO 24, AND 57 TO 120 MICROMETERS). TWO DETECTORS HAVE NARROW-BAND RESPONSES 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. THE PALLET DIMENSIONS ARE 165 X 91 X 340 CM WITH A TOTAL MASS OF 690 KG. THE INSTRUMENTATION USES 125 W AND 28 V OF DC POWER AND THE TOTAL ENERGY EXPENDED IS 25 KWH. DATA ARE TRANSMITTED AT 614 KBS (MAXIMUM).

----- SPACELAB 2, GABRIEL-----

INVESTIGATION NAME- SOLAR CORONAL HELIUM ABUNDANCE

NSSDC ID- SPALAB2-09 INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - A.H. GABRIEL APPLETON LAB
OI - J.L. CULHANE U COLLEGE LONDON
OI - B.E. PATCHETT APPLETON LAB
OI - K. STRONG U COLLEGE LONDON

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) DETERMINE TO A HIGH ACCURACY THE ABSOLUTE ABUNDANCE OF HELIUM IN THE SOLAR CORONA. THE INVESTIGATION EXAMINES BOTH THE DISK (LIGHT SOURCE) AND THE CORONA (SCATTERING REGION). THE ABUNDANCE OF HELIUM IS DETERMINED FROM THE MEASUREMENT OF THE PHOTOEXCITATION OF HYDROGEN LYMAN ALPHA 1216 A AND HELIUM II AT 304 A; (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 LIMB. THESE MAY DETERMINE THE ONSET OF THE SOLAR WIND AND THE REASONS FOR THE LARGE VARIATIONS IN THE RELATIVE ABUNDANCE OF HELIUM IN THE SOLAR WIND DETECTED NEAR EARTH; (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 LIMB OF THE SUN. THESE GIVE INFORMATION ON THE STRUCTURE OF CORONAL FEATURES SUCH AS ACTIVE REGIONS, CORONAL STREAMERS, AND HELMET STREAMERS; AND (4) MONITOR THE UV INTENSITY OF SHORT-TERM VARIABLE STARS AND DETERMINE THE LINE AND CONTINUUM INTENSITIES FOR A VARIETY OF SPECTRAL TYPES. FOR COOL STARS THIS INVOLVES CHROMOSPHERIC ACTIVITY AND FOR HOT STARS THE EUV FLUX LEVELS. THE INSTRUMENTATION IS COMPOSED OF A 1-M GRAZING-INCIDENCE SPECTROMETER USING A 1200-LINE/MM RULED GRATING. THE SUN'S IMAGE IS FOCUSED ONTO THE ENTRANCE SLIT PLANE BY MEANS OF A 28-CM FOCAL LENGTH GRAZING-INCIDENCE TELESCOPE OF WALTER TYPE 1 SECTOR DESIGN. THE SLIT IS ORIENTED TANGENTIALLY TO THE SOLAR LIMB AND CAN BE STEPPED RADIALLY IN STEPS OF 1 TO 8 ARC-MIN ABOVE THE LIMB BY A SERVO-DRIVEN LINEAR TRAVERSE ON THE TELESCOPE MIRROR. TEN TO 14 ELECTRON MULTIPLIERS ARE POSITIONED BEHIND DIFFERENT EXIT SLITS AT PRE-SELECTED SPECTRAL POSITIONS ON THE ROWLAND CIRCLE. TWO POSITIONS ARE AT 1216 A AND 304 A (FOR H/HE ABUNDANCES). THE OTHER SLITS COVER OTHER SUBSIDIARY REQUIREMENTS SUCH AS STRAY LIGHT EVALUATION. 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 LIMB 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 304-A 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 LIMB CROSSINGS AND GIVES DATA ON SHORT-TERM INTENSITY VARIATIONS IN STARS FOR WAVELENGTHS SHORTER THAN 1450 A. SIGNALS ARE COUNTED, MULTIPLEXED, AND INTERFACED WITH THE SPACELAB TELEMETRY SYSTEM FOR TRANSMISSION TO THE GROUND. THE DATA RATE IS 6.2 KBS. THE DIMENSIONS OF THE CHASE INSTRUMENT PALLET ARE 70 X 70 X 143 CM, THE ELECTRONICS ARE 30 X 30 X 30 CM, AND THE TOTAL MASS IS 160 KG. THE AVERAGE POWER IS 60 W, 28 V DC AND THE TOTAL ENERGY IS 8.9 KWH. THE ACCURACY IS 38.1 CM (15 IN.) AND THE STABILITY IS 12.7 CM (5 IN.).

----- 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 - W.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 CENTRIPITAL 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 FIXED 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. OPERATING MODES INCLUDE A CALIBRATION MODE, A TABLE-ROTATING MODE, AND A TABLE-FIXED MODE. THE MEASUREMENT PERIOD FOR ROTATION RATES USED VARIES FROM 10 S AT E-4 GRAVITY TO 1000 S AT E-8 GRAVITY. THE ACCELEROMETER TABLE ASSEMBLY PALLET IS 25 X 16 CM AND THE ELECTRONICS PALLET IS 21 X 13 X 9 CM. THE TOTAL ENERGY USED IS 3.8 KWH.

----- 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 - M.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 SLOSH MODES OF SUPERFLUID HELIUM. THE SLOSHING AMPLITUDES, FREQUENCIES, AND DAMPING MUST BE KNOWN FOR FUTURE EXPERIMENT DESIGN; (2) TAKE PRECISE MEASUREMENTS OF THE THERMAL FLUCTUATIONS AND DISTRIBUTIONS IN SUPERFLUID HELIUM IN ZERO GRAVITY. ZERO GRAVITY MAY INDUCE NONUNIFORMITIES THAT ARE NOT OBSERVED IN TERRESTRIAL LABS AT 1 GRAVITY. QUANTITATIVE MEASUREMENTS OF SPATIAL DISTRIBUTIONS AND THE SPECTRUM OF TEMPORAL FLUCTUATIONS ARE REQUIRED BY DESIGNERS OF FUTURE INVESTIGATIONS. 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 BY MEASURING TEMPERATURE DISTRIBUTIONS AND THE SPECTRUM OF TEMPERATURE FLUCTUATIONS WITHIN THE MAIN HELIUM DEWAR AND PRESSURES IN VENT CONTROL LINES. 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 CHANGER TEMPERATURES AND THE SUPERFLUID PLUG AND INSULATION PERFORMANCE. ACCELEROMETERS MONITOR VIBRATION EFFECTS IN ORDER TO CROSS-CORRELATE WITH THE BULK BEHAVIOR OBSERVATIONS. THE APPARATUS TO MEASURE THERMAL AND FLUID DYNAMICS USES AN OPEN FRAME STRUCTURE TO POSITION UP TO 1.0 LITER LIQUID-VAPOR PHASE SENSORS IN A 3-LITER VOLUME PARTIALLY FILLED WITH LIQUID HELIUM. THE FRAME ALSO HAS 25 SEMICONDUCTOR THERMOMETERS OF DIFFERING SENSITIVITY CAPABLE OF RESOLVING DIFFERENCES OF 1. MICROKELVINS AT FREQUENCIES UP TO 1 HZ. THE SPECTRUM OF TEMPERATURE FLUCTUATIONS IS MEASURED BY 9 CARBON-FILM DETECTORS OF 1-MICROKELVIN SENSITIVITY RESPONDING TO FREQUENCIES FROM DC TO 100 HZ. IN THE QUANTIZED SURFACE WAVE INVESTIGATION SUPERFLUID FILMS ARE CONTAINED IN POLISHED ANNULAR CHANNELS LOCATED IN SEVERAL SEALED CHAMBERS (EACH OF WHICH HAS A DIFFERENT FILM THICKNESS) IN THE SATURATED RANGE FROM 1 TO 10 MICROMETERS. A FILM HEATER IS PLACED IN EACH CHANNEL TO GENERATE CAPILLARY WAVES IN THE FILM WITH A PATH LENGTH OF $(2PI)(R)(N)$ (R = THE RADIUS OF THE PATH AND N = THE NUMBER OF TIMES THE PULSE CIRCULATES). MODERATELY ACCURATE ESTIMATES OF THE VELOCITY AND ATTENUATION OF QUANTIZED SURFACE WAVES IN THE CAPILLARY REGIME OF 1 TO 100 HZ IN THE FILMS OF 0.1- TO 1-MICROMETER THICKNESS ARE EXPECTED TO BE OBTAINED. THE CRYOSTAT PALLET IS 10 X 100 CM, THE PROCESSOR PALLET IS 45 X 17 X 23 CM AND THE VACUUM PUMP PALLET IS 30 X 30 X 45 CM.

----- SPACELAB 2, MENDILLO-----

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
IONOSPHERES

PERSONNEL
PI - M. MENDILLO BOSTON U
PI - A.V. DA ROSA STANFORD U
OI - M.D. PAPAGIANNIS BOSTON U
OI - M. KELLEY CORNELL U
OI - R.A. HELLIWELL STANFORD U
OI - P.A. BERNHARDT STANFORD U
OI - M.B. PONGRATZ LOS ALAMOS SCI LAB
OI - G.M. SMITH LOS ALAMOS SCI LAB
OI - D.J. BAKER UTAH STATE U
OI - R.D. HARRIS UTAH STATE U
OI - D.T. FARLEY CORNELL U
OI - D. ANDERSON NOAA-SEL

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS INVESTIGATION ARE TO: (1) STUDY THE IONOSPHERIC (F-REGION) DEPLETION AND RELATED EFFECTS CAUSED BY SHUTTLE THRUSTER FIRINGS IN BOTH HIGH AND LOW 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 LIMITING FLUXES, (3) PRODUCE CONTROLLED PERTURBATIONS IN THE PLASMASPHERE TO EXAMINE THE FORMATION OF ARTIFICIAL VLF DUCTS AND THE EQUATORIAL SPREAD OF F, AND (4) USE THE IONOSPHERIC DEPLETION REGION (HOLE) 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, MA; PUERTO RICO; ROBERVAL, QUEBEC, JIAMARCA; PERU, AND HOBART, AUSTRALIA. AIRGLOW OBSERVATIONS ARE ATTEMPTED WITH A HIGH-RESOLUTION FABRY-PEROT INTERFEROMETER AT 6300 A 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 SIDLE, 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 INTERESTING RADIO SOURCES, E.G. VELA AND GUM NEBULAE.

----- 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. HUELLER U OF CHICAGO
OI - J.E. LAMPORF 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 40 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 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 XENON-FILLED MULTIWIRE PROPORTIONAL CHAMBERS AND IS POSITIONED IN THE CENTER OF THE INSTRUMENT. TWO SCINTILLATORS ARE ADJACENT TO BOTH ENDS AND ARE HOUSED IN LIGHT INTEGRATION BOXES. 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 COATED WITH WHITE HIGHLY REFLECTIVE PAINT. THERE IS A GEOMETRIC FACTOR OF 5 SQ M/SR FOR THE TRANSITION DETECTOR AND 1 SQ M/SR FOR THE CERENKOV COUNTER TELESCOPE. TO DETECT THE LIGHT OF AN INCIDENT PARTICLE 24 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. DIMENSIONS OF THE DETECTOR ASSEMBLY PALLET ARE 280 X 280 X 370 CM WITH A TOTAL MASS OF 1784 KG. POWER IS 231 W AND 22 V OF DC CURRENT AND THE TOTAL ENERGY EXPENDED IS 44 KWH. THE DATA RATE IS 102 KBS.

----- SPACELAB 2, SCHNOES-----

INVESTIGATION NAME- VITAMIN D METABOLISM AND BONE DEMINERALIZATION

NSSDC ID- SPALAB2-01 INVESTIGATIVE PROGRAM CODE SB

INVESTIGATION DISCIPLINE(S) SPACE BIOLOGY

PERSONNEL

PI - H.K. SCHNOES U OF WISCONSIN
OI - H.F. DE LUCA U OF WISCONSIN
OI - E. HOLTEN NASA-ARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION IS TO DETERMINE THE VITAMIN D METABOLISM AND BONE DEMINERALIZATION OCCURRING IN THE SPACELAB 2 CREW MEMBERS. ALL ANALYTICAL STEPS ARE PERFORMED IN THE INVESTIGATORS' TERRESTRIAL LABORATORY. BLOOD IS DRAWN FROM EACH CREW MEMBER (TWO SAMPLES PRIOR TO, TWO DURING, AND TWO AFTER THE MISSION). BLOOD IS HEPARINIZED AND PLASMA IS OBTAINED BY CENTRIFUGATION AND STORED AT -20 DEG C. INSTRUMENTATION CONSISTS OF TWO BLOOD COLLECTION KITS MEASURING 30 X 20 X 8 CM, A CENTRIFUGE 47 X 39 X 23 CM, AND A FREEZER 53 X 56 X 46 CM, ALL LOCATED IN THE ORBITER MID-DECK. THE TOTAL MASS OF THE INSTRUMENTATION IS 46 KG. IT REQUIRES 200 W AND 28 V OF DC POWER AND IT USES A TOTAL ENERGY OF 0.3 KWH.

----- 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

BRIEF DESCRIPTION

THE OBJECTIVES OF THIS INVESTIGATION ARE TO MEASURE ELECTRIC FIELD WAVES AND THE PLASMA PARTICLE DISTRIBUTION FUNCTIONS RESULTING FROM THE STS OPERATING SYSTEMS, THE MOTION OF THE ORBITER THROUGH THE PLASMA, THE INJECTION OF ELECTRON BEAMS INTO THE PLASMA, AND THE UNPERTURBED MAGNETOSPHERE PHENOMENA. IT CONSISTS OF A FULLY INSTRUMENTED SUBSATELLITE SYSTEM WITH SENSORS TO MEASURE: ELECTRIC AND MAGNETIC FIELDS AND WAVES FROM 5 HZ TO 10 MHZ, PLASMA ION AND ELECTRON DISTRIBUTION FUNCTIONS FROM 2 EV TO 50 KEV, AND ELECTRON DENSITY AND TEMPERATURE. THE PLASMA DIAGNOSTIC PACKAGE (PDP) IS MOUNTED IN THE PALLET AREA ON A SPRING-DRIVEN EJECTION MECHANISM. THE REMOTE MANIPULATOR SYSTEM REMOVES THE PDP AND SCANS IT WITHIN THE ORBITER BAY TO SURVEY THE LOCALLY GENERATED FIELDS AND PLASMA. ONCE REPLACED ON THE EJECTION MECHANISM, THE PDP IS LAUNCHED TO CO-ORBIT WITH THE ORBITER AT RANGES UP TO 10 KM IN ORDER TO MEASURE NATURAL AND INDUCED WAVES, FIELDS, AND PLASMA IN THE ORBITER ENVIRONMENT. THE INSTRUMENTATION MEASURES 137 X 93 CM AND CONSISTS OF: (1) A QUADRISPHERICAL LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ANALYZER, (2) PLASMA WAVE ANALYZER/ELECTRIC DIPOLE AND MAGNETIC SEARCH COIL SENSORS, (3) A DC ELECTRIC FIELD METER OPERATING IN THE RANGE OF 2 MILLIVOLTS/M TO 2000 MILLIVOLTS/M, (4) A TRIAXIAL FLUXGATE MAGNETOMETER, AND (5) A LANGMUIR PROBE TO MEASURE ELECTRON DENSITY IN THE REGION OF E-4 TO E-7 CUBIC CM (-), AND ELECTRON TEMPERATURE FROM 500 TO 5000 K. IN ADDITION, THE INVESTIGATION CONSISTS OF A SPECIAL PURPOSE END EFFECTOR (81 X 35 CM), A LATCH MECHANISM ASSEMBLY (102 X 102 X 35 CM), A RECEIVER AND DATA PROCESSING ASSEMBLY, AND AN RF ANTENNA ASSEMBLY (27 X 33 X 61 CM). THE TOTAL MASS IS 395 KG, USES 50 W AND 28 V OF DC POWER FOR A TOTAL ENERGY OF 2.04 KWH. THE DATA ARE DIGITAL AT 337 KBS AND THE VIDEO OPERATES AT 4.2 MHZ. THE INVESTIGATION IS COORDINATED WITH SPALAB2-C4 (PLASMA DEPLETION).

----- 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.M. TITLE LOCKHEED PALO ALTO
OI - H.E. RAMSEY LOCKHEED PALO ALTO
OI - R.C. SMITHSON LOCKHEED PALO ALTO
OI - S.A. SCHOOLMAN LOCKHEED PALO ALTO
OI - T.D. TARBELL 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
OI - G.W. SIMON
OI - S.P. WORDEN
OI - J.B. ZIRKER

KITT PEAK NATL OBS
SACRAMENTO PEAK OBS
SACRAMENTO PEAK OBS
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 (POSSIBLE BECAUSE THE INSTRUMENT IS ABOVE THE ATMOSPHERE) AND DEDUCE THE SMALL-SCALE STRUCTURE AND EVOLUTION OF THESE FIELDS ON THE 15-TO 20-MIN 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, PORES, 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 THAT CAN BE SHIFTED IN STEPS AS SMALL AS 2 MILLIANGSTROMS USING ASSOCIATED BLOCKING FILTERS TO PERMIT THE FILTER TO OPERATE IN EIGHT SPECTRAL BANDS, EACH ABOUT 8A WIDE. A FILM CAMERA TAKES DIRECT FILTERGRAMS THROUGH THE TUNABLE FILTER. A 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. FILTERGRAMS ARE TAKEN IN ORTHOGONAL POLARIZATIONS AT 15 WAVELENGTHS SPACED 20 TO 35 MILLIANGSTROMS APART AND IN THE NEAR CONTINUUM. THEY ARE RECORDED ON 35MM FILM WITH A RESOLUTION ELEMENT OF 50 MICROMETERS PER SIDE. THE TELESCOPE PALLET IS 40 X 40 X 205 CM, THE PROCESSOR-PALLET IS 56 X 48 X 36 CM AND THE TOTAL MASS IS 183 KG. AN AVERAGE POWER OF 322 W, 28 V DC AND A TOTAL ENERGY OF 31.8 KWH ARE USED. THE DIGITAL DATA RATE IS 2 MEGABITS/S AND THERE IS TV TRANSMISSION AT 4.2 MHZ.

----- 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.H. HERRING U OF BIRMINGHAM
OI - G.M. SINNETT 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 CLUSTERS OF GALAXIES IN ORDER TO STUDY THE MECHANISMS INVOLVED IN THEIR EMISSION AND THE POSSIBLE PRESENCE OF A 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. IT IS HOPED THAT THE OBSERVATIONS WILL DISTINGUISH BETWEEN THE TWO COMPETING HYPOTHESES ON THE ORIGIN OF X-RAY EMISSION, THAT IS, THERMAL BREMSSTRAHLUNG FROM A HOT INTERGALACTIC GAS OR THE INVERSE COMPTON INTERACTIONS BETWEEN HIGH ENERGY ELECTRONS AND THE PHOTONS OF THE 2.7-K MICROWAVE BACKGROUND. 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 DECONVULVING THE PATTERN OF THE MASK HOLES THAT PRODUCE A SHADOWGRAM ON THE POSITION-SENSITIVE DETECTOR WHEN ILLUMINATED BY RADIATION FROM THE OBJECT. THE TWO TELESCOPES HAVE 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. THE TELESCOPE'S PALLET IS 206 CM X 335 M X 100 M AND THE ELECTRONICS PALLET IS 40 X 30 X 30 CM. THE TOTAL MASS IS 326 KG, AND POWER IS 160 W, 28 V OF DC CURRENT. THE TOTAL ENERGY USED IS 30 KWH AND THE DIGITAL DATA RATE IS 62 KBS.

***** ST *****

SPACECRAFT COMMON NAME- ST
ALTERNATE NAMES- LARGE SPACE TELESCOPE, SPACE TELESCOPE

NSSDC ID- LST

LAUNCH DATE- 11/00/83 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 INCLINATION- 28.8 DEG
PERIAPSIS- 500. KM ALT APOAPSIS- 500. KM ALT

PERSONNEL
PI - J.W. KELLER NASA HEADQUARTERS
SC - M.G. ROMAN NASA HEADQUARTERS
PM - W.C. KEATHLEY NASA-MSFC
PM - G.M. LEVIN NASA-GSFC
PS - C.R. O'DELL NASA-MSFC

BRIEF DESCRIPTION
THE SPACE TELESCOPE (ST) IS A SPACEBORNE, DIFFRACTION-LIMITED RITCHEY-CRÉTIEN 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 U OF WISCONSIN
OI - G.W. VAN CITTERS U OF TEXAS, AUSTIN
OI - E.L. ROBINSON U OF TEXAS, AUSTIN
OI - J.L. ELLIOT CORNELL U
OI - A.D. CODE U OF WISCONSIN

BRIEF DESCRIPTION
THE HIGH-SPEED PHOTOMETER (HSP) INVESTIGATION MAKES FAST-TIME-RESOLUTION (1 MILLISECOND AND SLOWER) PHOTOMETRIC OBSERVATIONS OF RAPIDLY VARYING OBJECTS IN THE SPECTRAL RANGE 1150-8500 Å AND LINEAR POLARIMETRIC OBSERVATIONS FROM 2100 TO 7000 Å 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 ARE 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 NASA-GSFC
OI - A. BOGCESS, 3RD NASA-GSFC
OI - E.A. BEAVER U OF CALIF, SAN DIEGO
OI - S.R. HEAP NASA-GSFC
OI - J.B. HUTCHINGS DOMINION ASTROPHYS OBS
OI - M.A. JURA U OF CALIF, LA
OI - J.L. LINSKY U OF COLORADO
OI - S.P. MARAN NASA-GSFC
OI - B.D. SAVAGE U OF WISCONSIN
OI - A.M. SMITH NASA-GSFC
OI - L.M. TRAFLET U OF TEXAS, AUSTIN
OI - R.J. WEYMAN 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 1100-3200 Å 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 CSI. THE TWO TARGET ENTRANCE APERTURES HAVE FIELDS OF VIEW OF 1 ARC-S SQ AND 0.3 ARC-S SQ, 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 U OF CALIF, SAN DIEGO
OI - F. BARTKO, JR. MARTIN-MARIETTA AEROSP
OI - E.A. BEAVER U OF CALIF, SAN DIEGO
OI - H.C. FORD U OF CALIF, LA
OI - B. MARGON U OF CALIF, LA
OI - A.F. DAVIDSEN JOHNS HOPKINS U
OI - E.M. BURRIDGE U OF CALIF, SAN DIEGO
OI - J.R. ANGEL U OF ARIZONA

BRIEF DESCRIPTION
THE FAINT OBJECT SPECTROGRAPH (FOS) INVESTIGATION OBTAINS SPECTRA OF ASTRONOMICAL OBJECTS AT THE FAINTEST POSSIBLE LIMITING MAGNITUDE IN ULTRAVIOLET AND VISIBLE WAVELENGTHS. THE SPECTROGRAPH COVERS A BROAD SPECTRAL RANGE AND IS INTENDED FOR SPECTROSCOPY PRIMARILY AT MODEST 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 1140-10,000 Å. 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 1800-2850 Å. 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 FAINTEST OBJECTS, INTEGRATION TIMES ARE LONG.

***** ST, JEFFERYS *****

INVESTIGATION NAME- ASTROMETRY SCIENCE

NSSDC ID- LST -09 INVESTIGATIVE PROGRAM
CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
 PI - W.H. JEFFERYS U OF TEXAS, AUSTIN
 OI - G.F. BENEDICT U OF TEXAS, AUSTIN
 OI - P.D. HENENWAY U OF TEXAS, AUSTIN
 OI - P.J. SHELUS U OF TEXAS, AUSTIN
 OI - R.L. DUNCOMBE U OF TEXAS, AUSTIN
 OI - W.F. VAN ALTENA YALE U
 OI - O.G. FRANZ LOWELL OBSERVATORY
 OI - L.W. FREDERICK 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 GIMBALLED MIRRORS SUCH THAT ANY STAR WITHIN ITS FOV CAN BE PLACED ON AN IMAGE DISSECTOR/INTERFEROMETER COMBINATION. THE ENCODER READINGS OF THE GIMBALLED 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 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 -08 INVESTIGATIVE PROGRAM
 CODE SC/CO-0P

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL

PI - H.C. VAN DE HULST HUYGENS LABORATORY
 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. BOXSENBERG U COLLEGE LONDON
 OI - H.J. DISNEY U COLLEGE CARDIFF
 OI - T.M. KAMPERMAN ASTRONOMICAL INST
 OI - C.D. MACKAY U OF CAMBRIDGE
 OI - R.W. WILSON EUROPEAN SO OBS, SWIZR
 OI - J.M. DEMARVENG 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 ARC-S SQ AND THE FIELD OF VIEW OF A 200 X 200 PIXEL CAMERA IS 4.4 X 4.4 ARC-S SQ. 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 1200 TO 8000 A AND THE DYNAMIC RANGE IS FROM 21ST TO 28TH VISUAL MAGNITUDE FOR POINT SOURCES, AND FROM 15TH TO 22ND VISUAL MAGNITUDE/ARC-S SQUARE FOR EXTENDED SOURCES.

----- ST, WESTPHAL-----

INVESTIGATION NAME- WIDE-FIELD CAMERA (WFC)

NSSDC ID- LST -07 INVESTIGATIVE PROGRAM
 CODE SC/CO-0P

INVESTIGATION DISCIPLINE(S)
 ASTRONOMY

PERSONNEL

PI - J.A. WESTPHAL CALIF INST OF TECH
 OI - W.A. BAUM LOWELL OBSERVATORY
 OI - D. CURRIE U OF MARYLAND
 OI - G.E. DANIELSON NASA-JPL
 OI - B.A. SMITH U OF ARIZONA
 OI - A.D. CODE U OF WISCONSIN
 OI - J.E. CUNN CALIF INST OF TECH
 OI - J. KRISTIAN CALIF INST OF TECH
 OI - C.R. LYND KITT PEAK MTL 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 BAY. 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 (1216 A) TO 3500 A, RISING RAPIDLY TO ABOUT 50 PERCENT FROM 4500 TO 8000 A, 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 ARC-MIN SQ AT A RESOLUTION OF 0.1 ARC-S PER PIXEL FOR THE WIDE-FIELD CAMERA AND 68.7 ARC-S SQ AT 0.363 APC-S PER PIXEL FOR THE PLANETARY CAMERA. THE INSTRUMENT CONTAINS SPACE FOR 50 FILTERS, POLARIZERS/FILTERS, AND TRANSMISSION GRATINGS.

***** STP P78-1*****

SPACECRAFT COMMON NAME- STP P78-1
 ALTERNATE NAMES- P78-1, SPACE TEST PROGRAM P78-1

NSSDC ID- P78-1

LAUNCH DATE- 12/29/78 WEIGHT- 849.6 KG
 LAUNCH SITE- VANDENBERG AFB, UNITED STATES
 LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
 UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- HELIOCENTRIC
 ORBIT PERIOD- 96.5 DAYS
 PERIAPSIS- 593. AU RAD

INCLINATION- 97.73 DEG
 APOAPSIS- 593. AU RAD

PERSONNEL

PM - W. WALKER USAF-SAMS0
 PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION

THE SPACE TEST PROGRAM (STP) P78-1 MISSION IS DESIGNED TO OBTAIN SCIENTIFIC DATA FROM EARTH AND SUN-ORIENTED EXPERIMENTS. THE SPACECRAFT IS SUN-ORIENTED AND HAS ITS SPIN AXIS PERPENDICULAR TO THE ORBIT PLANE AND THE SATELLITE SUN LINE. THE INSTRUMENTATION CONSISTS OF (1) A GAMMA-RAY SPECTROMETER AND PARTICLE DETECTORS, (2) A WHITE LIGHT CORONAGRAPH AND AN EXTREME ULTRAVIOLET (XUV) HELOGRAPH, (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- P78-1 -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 USES AN EXTREME ULTRAVIOLET (XUV) SPECTROMETER TO MEASURE IONIZATION EFFECTS OF XUV RADIATION IN THE UPPER ATMOSPHERE.

----- STP P78-1, IMHOF-----

INVESTIGATION NAME- GAMMA RAY SPECTROMETER

NSSDC ID- P78-1 -01

INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
 GAMMA-RAY ASTRONOMY

PERSONNEL

PI - W.L. IMHOF LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS INVESTIGATION USES A GAMMA-RAY SPECTROMETER TO MEASURE THE DISTRIBUTION OF GAMMA-RAY SOURCES AND THE CHARACTERISTICS OF ENERGETIC PARTICLE FLUXES AT LOW ALTITUDES.

----- STP P78-1, KREPLIN-----

INVESTIGATION NAME- SOLAR X-RAY SPECTROMETER

NSSDC ID- P78-1 -03

INVESTIGATIVE PROGRAM
 SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
 X-RAY ASTRONOMY

PERSONNEL

PI - R.W. KREPLIN US NAVAL RESEARCH LAB
 PI - P.B. LANDECKER AEROSPACE CORP

BRIEF DESCRIPTION
THIS INVESTIGATION USES AN X-RAY SPECTROMETER TO MONITOR SOLAR CORONAL X-RAYS FROM 0.30 TO 25 A. THE PURPOSE IS TO USE THESE DATA IN DEVELOPING A MODEL OF SOLAR ACTIVITY WITH THE ABILITY TO PREDICT LEVELS OF ACTIVITY AND THE OCCURRENCES OF FLARES.

----- STP P78-1, MICHELS-----

INVESTIGATION NAME- SOLAR WIND MONITOR
NSSDC ID- P78-1 -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 USES A WHITE LIGHT CORONAGRAPH AND AN EXTREME ULTRAVIOLET HELIOGRAPH TO MONITOR THE SUN'S INNER AND OUTER CORONA. THE PURPOSE OF THE INVESTIGATION IS TO DETERMINE THE CHARACTER OF THE PLASMA OUTFLOW AT THE SOURCE OF THE SOLAR WIND. THE INVESTIGATION ALSO MEASURES THE FORM AND STRUCTURE OF SOLAR FLARES, CORONAL HOLES, AND ALFVEN WAVES.

----- STP P78-1, PEPIN-----

INVESTIGATION NAME- PRELIMINARY AEROSOL MONITOR
NSSDC ID- P78-1 -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- P78-1 -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 USES AN X-RAY MONITOR TO DETERMINE THE FREQUENCY AND LOCATION OF SHORT-LIVED X-RAY BURSTS FROM SPACE. IT PROVIDES A LOW RESOLUTION MAPPING CAPABILITY FOR AURORAL X-RAY EMISSION.

----- STP P78-1, VANCOUR-----

INVESTIGATION NAME- HIGH LATITUDE PARTICLE SPECTROMETER
NSSDC ID- P78-1 -05 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS
PERSONNEL
PI - R.P. VANCOUR USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS INVESTIGATION USES A HIGH-LATITUDE PARTICLE SPECTROMETER TO ACQUIRE ELECTRON DATA IN HIGH LATITUDE AURORAL ZONES, PRIMARILY DURING MAGNETIC STORM AND SUBSTORM PERIODS.

***** STP P78-2*****

SPACECRAFT COMMON NAME- STP P78-2
ALTERNATE NAMES- SESP P78-2A, P78-2
SCATHA
NSSDC ID- P78-2
LAUNCH DATE- 01/25/79 WEIGHT- 343. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF
PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1418. MIN INCLINATION- 8.8 DEG
PERIAPSIS- 27850. KM ALT APOAPSIS- 42780. KM ALT

PERSONNEL
PM - J.C. DURRETT USAF-SAMSO

BRIEF DESCRIPTION
SPACECRAFT CHARGING AT HIGH ALTITUDES (SCATHA) IS A SATELLITE PROGRAM FOR MEASURING THE CHARACTERISTICS OF THE PLASMASHEATH CHARGING PROCESS. THIS PROGRAM DETERMINES THE RESPONSE OF THE SATELLITE TO THIS CHARGING AND EVALUATES 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 HAS A NEAR SYNCHRONOUS ORBIT AND SPINS ABOUT THE CYLINDER AXIS AT A RATE OF 1 RPM. THE SPIN VECTOR IS NORMAL TO THE EARTH-SUN LINE AND IN THE EQUATORIAL PLANE OF THE EARTH. THERE ARE THREE 3-M BOOMS, A 2-M AND A 7-M BOOM ALL FOR DEPLOYMENT OF EXPERIMENTS. IN ADDITION THERE IS A 100-M TIP-TO-TIP ELECTRIC FIELD ANTENNA. TELEMETRY CAPABILITY IS BOTH PCM AND FM AND DATA CAN BE STORED UP TO 12 HOURS USING ON-BOARD TAPE RECORDERS. MISSION LIFE IS ONE YEAR WITH POSSIBLE EXTENSION.

----- STP P78-2, AGGSON-----

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR
NSSDC ID- P78-2 -05 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES
PERSONNEL
PI - T.L. AGGSON NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC10) MEASURES THE ABSOLUTE POTENTIAL BETWEEN THE SATELLITE AND THE PLASMA USING A 100-M TIP-TO-TIP DIPOLE ANTENNA. THE ANTENNA ELEMENTS ARE COPPER-BERYLLIUM STEM EXTENDABLE ANTENNAS AND ARE 0.64 CM TUBES WHEN EXTENDED. THE ANTENNA ELEMENTS ARE INSULATED EXCEPT FOR A FEW METERS AT THE END. THUS FOR AMBIENT PLASMA CONDITIONS, THE CONDUCTING SEGMENTS OF THE ANTENNA ARE POSITIONED OUTSIDE THE SHEATH REGION. DC ELECTRIC FIELDS FROM 0.1 TO 20 MV/M ARE MEASURED AND AC FIELDS IN THE FREQUENCY RANGE FROM 3 TO 200 HZ ARE MEASURED FROM 1 TO 100 MICROVOLTS/H.

----- STP P78-2, BLAKE-----

INVESTIGATION NAME- ENERGETIC PROTON DETECTOR
NSSDC ID- P78-2 -14 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PERSONNEL
PI - J.B. BLAKE AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT (PART OF SC2) MEASURES 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, CHAPPELL-----

INVESTIGATION NAME- LIGHT ION MASS SPECTROMETER
NSSDC ID- P78-2 -09 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS
PERSONNEL
PI - C.R. CHAPPELL NASA-MSFC
OI - D.L. REASONER NASA-MSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC7) MEASURES THE ION DENSITY, TEMPERATURE, AND DRIFT. THE LIGHT ION SPECTROMETER IS BASICALLY THE SAME INSTRUMENT FLOWN ON OGO 5, EXCEPT THAT ONE ADDITIONAL SENSOR IS ADDED, AND RETARDING POTENTIAL GRIDS ARE INCORPORATED SO THAT PLASMA DRIFT CAN BE MEASURED.

----- STP P78-2, COHEN-----

INVESTIGATION NAME- ELECTRON GUN-ION GUN

ORIGINAL PAGE IS
OF POOR QUALITY

NSSDC ID- P78-2 -07

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - H.A. COHEN

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT (SC4) CONSISTS OF AN ELECTRON BEAM SYSTEM (EBS) AND A POSITIVE ION BEAM SYSTEM (PIBS), WHICH ARE FLOWN TO CONTROL THE EJECTION, RESPECTIVELY, OF NEGATIVE CHARGE (ELECTRONS) AND POSITIVE CHARGE (XENON IONS) FROM THE SPACE VEHICLE. THE EBS CONSISTS OF A CONTROL GRID AND AN INDIRECTLY HEATED OXIDE-COVERED CATHODE, WHICH IS KEPT AT A CONTROLLED NEGATIVE POTENTIAL WITH RESPECT TO THE SPACE VEHICLE. THE CONTROLLED NEGATIVE POTENTIAL DETERMINES THE ENERGY OF EJECTED ELECTRONS AND VARIES IN STEPS AS FOLLOWS (IN VOLTS) -- 50, 150, 300, 500, 1500, AND 3000. THE CONTROL GRID IS NORMALLY KEPT NEGATIVE WITH RESPECT TO THE CATHODE AND IS PULSED POSITIVELY TO ALLOW ELECTRON EJECTION CURRENT. THE DURATION AND ELECTRON CURRENT LEVEL OF THE PULSE ARE CONTROLLED BY GROUND COMMAND. A FOCUSING ELEMENT BETWEEN THE CONTROL GRID AND THE GROUND EXIT ANODE SERVES TO REDUCE THE BEAM DIVERGENCE. THE MAGNITUDE OF THE BEAM CURRENT CAN VARY SIX STEPS (IN MILLIAMPERES = 0.001, 0.01, 0.10, 1.0, 6.0, AND 15). THE MAXIMUM POWER DRAWN IS 42 W. MOUNTED IN BONDED ELECTRICAL CONTACT WITH THE SPACECRAFT FRAME GROUND, THE EBS IS ORIENTED SO THAT THE BEAM AXIS IS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. A PROTECTIVE APERTURE COVER IS REMOVED BY GROUND COMMAND WHEN THE SPACECRAFT IS IN ORBIT. THE PIBS CONSISTS OF A PENNING DISCHARGE-CHAMBER ION SOURCE AND A CONTROL GRID. THE ION SOURCE CONSISTS OF AN IONIZATION CHAMBER AND THE BEAM FORMATION ELECTRODES. A CYLINDER OF PRESSURED XENON CONSTITUTES THE GAS SOURCE AND IS CONTROLLED BY A LEAK VALVE WITH THE FLOW RATE COMMANDABLE FROM THE GROUND. THE INTENSITY AND DURATION OF THE ION BEAM IS 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 ARE (IN MILLIAMPERES) -- 0.3, 0.5, 1.0, 1.5, AND 2.0. DURING MAXIMUM BEAM EJECTION, THE POWER DRAWN IS 60 W. THE PIBS NOZZLE IS THE ELEMENT THAT CONTROLS THE NATURE OF THE EJECTED BEAM, AND THE THIN WIRES MOUNTED ON TOP OF THE NOZZLE CAN NEUTRALIZE ALL OR A FRACTION (INCLUDING ZERO) OF THE BEAM, DEPENDING ON SATELLITE EXPERIMENT REQUIREMENTS. THE EXPELLANT STORAGE TANK IS CONNECTED TO THE ION SOURCE THROUGH A PRESSURE REGULATOR, A SOLENOID-OPERATED LATCHING, A POROUS PLUG, AND AN INSULATOR. THE ION SOURCE IS MAINTAINED UNDER VACUUM AND OPENED TO THE ATMOSPHERE IN ORBIT ON COMMAND.

----- STP P78-2, DEFOREST-----

INVESTIGATION NAME- UCSD CHARGED PARTICLE DETECTOR

NSSDC ID- P78-2 -11

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - S.E. DEFOREST

U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC9) MEASURES THE ELECTRON AND ION DIFFERENTIAL FLUX, ENERGY, AND ANGLE RESOLUTION. THIS PARTICLE DETECTOR MEASURES ENERGY SPECTRA IN 64 STEPS BETWEEN 1 AND 70,000 EV. THE ACCEPTANCE ANGLE OF THE TELESCOPE IS 5 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- P78-2 -06

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.F. FENNEL

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC2) CONTAINS THREE ELECTROSTATIC ANALYZERS -- TWO ARE MOUNTED 180 DEG APART ON BOOMS, AND THE THIRD IS MOUNTED ON THE SPACECRAFT BODY. THE THREE SENSORS HAVE 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 IS 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 IS ALSO MEASURED. POTENTIAL MEASUREMENTS AT THREE POSITIONS IN THE PLASMA SHEATH ARE OBTAINED. THE EXPERIMENT IS FUNDED BY SAMSO.

----- STP P78-2, HARDY-----

INVESTIGATION NAME- RAPID SCAN PARTICLE DETECTOR

NSSDC ID- P78-2 -12

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.A. HARDY

USAF GEOPHYS LAB

BRIEF DESCRIPTION

THIS EXPERIMENT EMPLOYS CURVED PLATE ELECTROSTATIC ANALYZERS AND SOLID STATE SPECTROMETERS TO MEASURE THE FLUX OF ELECTRONS AND IONS. THE EXPERIMENT RETURNS A SPECTRUM FOR ROTI ELECTRONS AND IONS ONCE PER SECOND IN TWO ORTHOGONAL DIRECTIONS. THE ELECTRON FLUX IS MEASURED IN SIXTEEN ENERGY RANGES SPANNING FROM 50 EV TO 1.1 MEV. THE ION FLUX IS MEASURED IN EIGHTEEN ENERGY RANGES SPANNING FROM 50 EV TO 31 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- P78-2 -13

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - R.G. JOHNSON

LOCKHEED PALO ALTO

BRIEF DESCRIPTION

THIS EXPERIMENT (SC8) MEASURES THE FLUX OF IONS, WITH MASS RANGE 1 TO 150 U, IN THE ENERGY RANGE FROM 100 TO 20,000 EV. THE SENSOR IS AN ENERGETIC ION SPECTROMETER.

----- STP P78-2, KOONS-----

INVESTIGATION NAME- SPACECRAFT SURFACE POTENTIAL MONITOR

NSSDC ID- P78-2 -01

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - H.C. KOONS

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURES THE SURFACE POTENTIAL OF SEVEN DIFFERENT TYPES OF MATERIALS RELATIVE TO A GOLD CYLINDRICAL COMMON REFERENCE POINT ON THE SATELLITE. THE SAMPLE IS MOUNTED ON ONE SURFACE OF A DIELECTRIC SLAB, AND A CONDUCTING PLATE IS MOUNTED ON THE OTHER SURFACE. THE SURFACE POTENTIAL IS MEASURED FROM LEAKAGE CURRENTS AND BY A CHOPPED ELECTROMETER (MONROE DETECTORS). SOME OF THE MATERIALS USED ARE: SILICON CLOTH FABRIC SOLAR CELL COVER GLASSES, GOLD (REFERENCE), SILVER-TEFLON, AND KAPTON MULTILAYER INSULATION. FIVE OF THE SAMPLES ARE PLACED ON THE SIDES OF THE SATELLITE AND ROTATED IN AND OUT OF SUNLIGHT. FOUR SAMPLES ARE LOCATED AT THE END OF THE SPACECRAFT IN THE SHADOW. THIS EXPERIMENT IS FUNDED BY SAMSO.

----- STP P78-2, KOONS-----

INVESTIGATION NAME- CHARGING ELECTRICAL EFFECTS ANALYZER

NSSDC ID- P78-2 -02

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - H.C. KOONS

AEROSPACE CORP

BRIEF DESCRIPTION

THE EXPERIMENT (PART OF SC1) MEASURES ELECTROMAGNETIC INTERFERENCE IN THE RANGE 100 TO 1.E7 HZ. THREE SEPARATE INSTRUMENTS WILL BE USED. THE FREQUENCY RANGE FROM 2 TO 30 KHZ IS MEASURED WITH A SWEPT FREQUENCY ANALYZER. THE FREQUENCY BAND 100 TO 50 KHZ IS MONITORED BY A 10-CHANNEL, FIXED-FREQUENCY ANALYZER. THE CAPABILITY ALSO EXISTS TO TELEMETER BROADBAND, UNDETECTED SIGNALS FROM SENSORS IN THE FREQUENCY BAND 100 TO 5000 HZ. THE ANALYZER SAMPLES 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 IS FUNDED BY SAMSO.

----- STP P76-2, LEDLEY-----

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- P78-2 -03 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM/ CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - B.G. LEDLEY NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC11) OBTAINS TRIAXIAL MEASUREMENTS OF THE GEOMAGNETIC FIELD. A BOOM-MOUNTED (A 7-M BOOM) FLUXGATE MAGNETOMETER IS USED. TIME RESOLUTION IS FOUR VECTOR PER S. FIELD RESOLUTION IS 0.4 NANOTESLA FOR A DYNAMIC RANGE OF +500 NANOTESLA PER AXIS. SENSOR RESPONSE IS FROM DC TO 70 HZ.

----- STP P78-2, LEHN-----

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCES IN
RETARDING POTENTIAL ANALYZERS

NSSDC ID- P78-2 -03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - W.L. LEHN USAF MATERIALS LAB
O1 - D.F. HALL AEROSPACE CORP
O1 - D.E. PRINCE USAF MATERIALS LAB

BRIEF DESCRIPTION
IN THIS EXPERIMENT (ML12) TWO QUARTZ CRYSTAL MICROBALANCES ARE 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 IS 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 ARE MADE WITH AND WITHOUT THE RETARDING POTENTIAL BIAS. THE QUARTZ SENSORS HAVE AN ACTIVE TEMPERATURE CONTROL AND CAN BE OPERATED OVER A RANGE OF TEMPERATURES FROM -60 TO 63 DEG C.

----- STP P78-2, LEHN-----

INVESTIGATION NAME- THERMAL CONTROL SAMPLE MONITOR

NSSDC ID- P78-2 -04 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PLANETARY PHYSICS

PERSONNEL
PI - W.L. LEHN USAF MATERIALS LAB
O1 - D.F. HALL AEROSPACE CORP
O1 - D.E. PRINCE USAF MATERIALS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT EVALUATES THE PERFORMANCE OF THERMAL CONTROL MATERIALS AS A FUNCTION OF ORBIT CONTAMINATION CONDITIONS. THE SENSOR MEASURES THE BACKFACE TEMPERATURE OF EIGHT THERMAL CONTROL MATERIAL SAMPLES. THE INSTRUMENTS ARE POSITIONED CONTIGUOUS WITH THE QUARTZ CRYSTAL MONITORS. IT IS POSSIBLE TO HEAT THE SAMPLES AND TO PURGE CONTAMINANTS WHICH FREEZE OUT ON THE TEST SURFACE.

----- STP P78-2, REAGAN-----

INVESTIGATION NAME- HIGH-ENERGY PARTICLE DETECTOR

NSSDC ID- P78-2 -15 INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - J.B. REAGAN LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS EXPERIMENT (SC3) MEASURES THE ELECTRON FLUX IN THE 0.3 TO 2.1 MEV RANGE AND THE PROTON FLUX IN THE 1 TO 100 MEV RANGE AND ALPHA PARTICLES FROM 6 TO 60 MEV. A HIGH-ENERGY PARTICLE SPECTROMETER IS USED TO DETERMINE FLUX AND PITCH ANGLE DISTRIBUTIONS.

----- STP P76-2, SAGALYN-----

INVESTIGATION NAME- PLASMA PROBE

NSSDC ID- P78-2 -1C

INVESTIGATIVE PROGRAM
SPACE TEST PROGRAM

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THE PLASMA PROBE EXPERIMENT (SC6) MEASURES THE ELECTRON AND ION DENSITIES IN THE RANGE 1.0E-1 TO 1.0E+4 PER CM CUBED, ION AND ELECTRON TEMPERATURES IN THE RANGE 0 TO 100 EV AND VEHICLE POTENTIAL IN THE RANGE -100 TO +100 VOLTS. THE SENSORS CONSIST OF THREE PLANAR GRIDDED PROBES, TWO MOUNTED ON A 3 METER INSULATED BOOM AND THE OTHER BODY MOUNTED ON A CONDUCTING SURFACE.

***** STP P80-1*****

SPACECRAFT COMMON NAME- STP P80-1
ALTERNATE NAMES- SPACE TEST PROGRAM P80-1, P80-1

NSSDC ID- P80-1

LAUNCH DATE- 2 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
ORBIT PERIOD- 99.6 MIN INCLINATION- 72.5 DEG
PERIAPSIS- 740.8 KM ALT APOAPSIS- 740.8 KM ALT

PERSONNEL
PM - J.N. JENSEN USAF-SAMSO
PS - J.R. STEVENS AEROSPACE 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
O1 - 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.

ORIGINAL PAGE IS
OF POOR QUALITY

----- STP P80-1, POWER-----

INVESTIGATION NAME- ION AUXILIARY PROPULSION SYSTEM
HSSDC ID- P80-1 -32 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

HSSDC ID- P80-2
LAUNCH DATE- 1 QTR 81 WEIGHT- 2430. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99. MIN INCLINATION- 98.3 DEG
PERIAPSIS- 740. KM ALT APOAPSIS- 740. KM ALT

PERSONNEL
PM - W.J. NIEMANN USAF-SAMSO
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THE SPACE TEST PROGRAM P80-2 SPACECRAFT IS AN ASCENT AGENA (SIMILAR TO SEAST) 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 DIRECTED 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 ISOTOPIC COMPOSITION.

----- STP P80-2, LYONS-----

INVESTIGATION NAME- SATELLITE INFRARED (SIRE)
HSSDC ID- P80-2 -01 INVESTIGATIVE PROGRAM SPACE TEST PROGRAM
INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL
PI - J. LYONS USAF-SAMSO

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 GIMBALLED FOR ONE DEGREE OF FREEDOM SCANS, RELYING ON SPACECRAFT MANEUVERS AND OPTICAL FOV FOR ADDITIONAL OBSERVATIONAL SCOPE. THE REFRIGERATOR IS AN ELECTRICALLY POWERED VUILLUMIER CYCLE MACHINE OF THE TYPE FLOWN ON PREVIOUS STP FLIGHTS.

----- STP P80-2, SIMPSON-----

INVESTIGATION NAME- COSMIC RAY ISOTOPE (CRIE)
HSSDC ID- P80-2 -02 INVESTIGATIVE PROGRAM SPACE TEST PROGRAM/CODE ST
INVESTIGATION DISCIPLINE(S) SOLAR PHYSICS PARTICLES AND FIELDS

PERSONNEL
PI - J.A. SIMPSON U OF CHICAGO
O1 - M. GARCIA-MUNOZ U OF CHICAGO
O1 - J.P. WEFEL 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 ISOTOPIES 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 ISOTOPIES FROM HYDROGEN TO NICKEL IN THE ENERGY RANGE 20 TO 500 MEV/NUCLEON, AND ITS VIEW ANGLE IS 93 DEG (FULL CONE). THE LOW-ENERGY TELESCOPE IS USED TO RESOLVE ISOTOPIES 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.

***** TIROS-N*****

SPACECRAFT COMMON NAME- TIROS-N
ALTERNATE NAMES-

HSSDC ID- TIROS-N
LAUNCH DATE- 09/15/70 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

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- 830. KM ALT APOAPSIS- 830. KM ALT

PERSONNEL
MG - M.L. GARBACZ NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER NASA-GSFC
PS - A. ARKING NASA-GSFC

BRIEF DESCRIPTION
TIROS-N IS AN OPERATIONAL METEOROLOGICAL SATELLITE 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 0.235 DEG/S.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

HSSDC ID- TIROS-N-01 INVESTIGATIVE PROGRAM WEATHER OBS. DEVELOPMENT
INVESTIGATION DISCIPLINE(S) METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE TIROS-N 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 K AT 300 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.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER
 NSSDC ID- TIROS-N-02 INVESTIGATIVE PROGRAM
 WEATHER OBS. DEVELOPMENT
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE TIROS-N 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 HIGH RES INFRARED SPECTROMETER (HIRS/2), HAS 20 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, 15.5, 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 63 GHZ OXYGEN (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.

----- TIROS-N, NESS STAFF-----

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)
 NSSDC ID- TIROS-N-03 INVESTIGATIVE PROGRAM
 WEATHER OBS. DEVELOPMENT
 INVESTIGATION DISCIPLINE(S)
 METEOROLOGY

PERSONNEL
 PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
 THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON TIROS-N 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 RPMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 MS. THIS SYSTEM HAS THE CAPABILITY OF ACQUIRING DATA FROM UP TO 200 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

----- TIROS-N, WILLIAMS-----

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR
 NSSDC ID- TIROS-N-14 INVESTIGATIVE PROGRAM
 ENVIRON. MONITORING DEVELOPMENT
 INVESTIGATION DISCIPLINE(S)
 PARTICLES AND FIELDS

PERSONNEL
 PI - D.J. WILLIAMS NOAA-ERL
 OI - C.G. BOSTROM APPLIED PHYSICS LAB
 OI - H.H. SAUER NOAA-ERL

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, VIEW IN THE ANTI-EARTH DIRECTION, AND IT MEASURES PROTONS ABOVE 400 MEV AND PROTONS AND ALPHA PARTICLES ABOVE 600 AND 1200 MEV/N. THE TOTAL ENERGY DETECTOR (TED) MEASURES TOTAL ENERGY ABOVE 1 KEV.

***** UK 6*****

SPACECRAFT COMMON NAME- UK 6
 ALTERNATE NAMES- UNITED KINGDOM-6

NSSDC ID- UK-6
 LAUNCH DATE- 03/00/79 WEIGHT- 133.8 KG
 LAUNCH SITE- Wallops Flight Center, UNITED STATES
 LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY SRC
 UNITED KINGDOM

PLANNED ORBIT PARAMETERS
 ORBIT TYPE- GEOCENTRIC
 ORBIT PERIOD- 95.6 MIN INCLINATION- 55. DEG
 PERIAPSIS- 550. KM ALT APOAPSIS- 550. KM ALT

PERSONNEL
 PI - J.E. FOSTER APPLETON LAB
 PS - J.L. CULHANE U COLLEGE LONDON

BRIEF DESCRIPTION
 THE OBJECTIVE OF THIS SPACECRAFT IS TO UNDERTAKE STUDIES IN HIGH-ENERGY ASTROPHYSICS. TWO X-RAY EXPERIMENTS, ONE COSMIC RAY EXPERIMENT, AND THREE TECHNOLOGY EXPERIMENTS ARE CARRIED. THE SPACECRAFT IS SPIN STABILIZED, WITH THE SPIN AXIS COMMANDED INTO A SEQUENCE OF ORIENTATIONS TO ACCOMMODATE THE X-RAY EXPERIMENTS REQUIREMENTS.

----- UK 6, BOYD-----

INVESTIGATION NAME- X-RAY GRAZING INCIDENCE SYSTEM

NSSDC ID- UK-6 -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. SAHFORD U COLLEGE LONDON

BRIEF DESCRIPTION
 THIS SYSTEM CONSISTS OF FOUR GRAZING INCIDENCE HYPERBOLOID MIRRORS THAT REFLECT X-RAYS THROUGH AN APERTURE/FILTER TO FOUR CONTINUOUS-FLOW PROPANE GAS DETECTORS COVERED WITH A ONE-MICROMETER POLYPROPYLENE WINDOW. THE INSTRUMENT IS SENSITIVE TO X-RAYS FROM 0.1 TO 2 KEV AND HAS SEVEN SELECTABLE FIELDS OF VIEW FROM 0.2 TO 3.6 DEG. THE SYSTEM CAN BE OPERATED IN FOUR DIFFERENT MODES: SPECTRAL (32 CHANNELS OF PULSE HEIGHT), TIME (0.5 MICROSECONDS TO 16 SECONDS), PULSAR (PERIODS FROM 8 MS TO 4 HOURS), AND AUTOCORRELATOR (PERIODIC VARIATIONS FROM 128 MICROSECONDS TO 2 SECONDS). THE DETECTORS POINT ALONG THE SPACECRAFT SPIN AXIS.

----- UK 6, FOWLER-----

INVESTIGATION NAME- COSMIC RAY

NSSDC ID- UK-6 -01 INVESTIGATIVE PROGRAM
 CODE SC/CO-OP

INVESTIGATION DISCIPLINE(S)
 COSMIC RAYS

PERSONNEL
 PI - P.H. FOWLER U OF BRISTOL

BRIEF DESCRIPTION
 THE INSTRUMENT CONSISTS OF FOUR PI CERENKOV AND GAS SCINTILLATION COUNTERS WITH A GEOMETRIC FACTOR OF TWO SQ METER/SR THAT IS USED TO MEASURE THE CHARGE AND ENERGY SPECTRA OF THE ULTRAHEAVY COMPONENT OF COSMIC RADIATION WITH PARTICULAR EMPHASIS OF THE CHARGE REGION 2 GREATER THAN OR EQUAL TO 30.

----- UK 6, POUNDS-----

INVESTIGATION NAME- X-RAY PROPORTIONAL COUNTERS

NSSDC ID- UK-6 -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 CONSISTS OF AN ARRAY OF PROPORTIONAL COUNTERS THAT OPERATE OVER THE ENERGY RANGE 1.3 TO 30 KEV. BRIGHT X-RAY SOURCES CAN BE MEASURED TO SEVERAL MICROSECONDS TIME RESOLUTION, AND SPECTRA DATA IS OBTAINED IN 32 CHANNELS.

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INDEX OF ACTIVE AND PLANNED SPACECRAFT
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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 July 1, 1977, and June 30, 1978, or planned as of June 30, 1978. 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 printed 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 June 30, 1978, 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	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	* NSSDC ID	*****CURRENT STATUS*****	DATA RATE	PAGE NO.		
*PRINC.INVEST.NAME	EXPERIMENT NAME				EPOCH MMDYY	STATUS			
1976-059A	UNITED STATES	DOD-USAF	06/26/76	GEOCENTRIC	76-059A	6/27/76	NORMAL	STND	11
HIGBIE	ENERGETIC PARTICLE DETECTOR				76-059A-01	6/27/76	NORMAL	STND	11
1977-007A	UNITED STATES	DOD-USAF	02/06/77	GEOCENTRIC	77-007A	2/07/77	NORMAL	STND	11
HIGBIE	ENERGETIC PARTICLE DETECTOR				77-007A-01	2/07/77	NORMAL	STND	11
AD-A	UNITED STATES	NASA-OSS	12/19/63	GEOCENTRIC	63-053A	12/19/63	INOPERABLE	ZERO	11
JACCHIA KEATING	NONSYSTEMATIC CHANGES OF AIR DENSITY				63-053A-01	12/19/63	NORMAL	SUBS	11
	SYSTEMATIC CHANGES OF AIR DENSITY				63-053A-02	12/19/63	NORMAL	SUBS	12
AD-C	UNITED STATES	NASA-OSS	08/08/68	GEOCENTRIC	68-066A	6/00/71	INOPERABLE	ZERO	12
JACCHIA KEATING	NONSYSTEMATIC CHANGES OF AIR DENSITY				68-066A-01	3/25/76	NORMAL	SUBS	12
	SYSTEMATIC CHANGES OF AIR DENSITY				68-066A-02	3/05/76	NORMAL	SUBS	12
AE 5	SEE AE-E								
AE-C	UNITED STATES	NASA-OSS	12/16/73	GEOCENTRIC	73-101A	2/28/76	NORMAL	STND	12
BARTH	ULTRAVIOLET NITRIC-OXIDE (UVNO)				73-101A-13	2/28/76	NORMAL	STND	12
BRACE	CYLINDRICAL ELECTROSTATIC PROBES (CEP)				73-101A-01	2/28/76	NORMAL	STND	13
BRINTON	BENNETT ION-MASS SPECTROMETER (BIMS)				73-101A-11	2/28/76	NORMAL	STND	13
CHAMPION	ATMOSPHERIC DENSITY ACCELEROMETER (MESA)				73-101A-02	2/28/76	NORMAL	STND	13
DOERING	PHOTOELECTRON SPECTROMETER (PES)				73-101A-03	2/28/76	NORMAL	STND	13
HANSON	RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)				73-101A-04	2/28/76	NORMAL	STND	14
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)				73-101A-14	2/28/76	NORMAL	STND	14
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)				73-101A-06	3/10/75	PARTIAL	STND	14
HOFFMAN	MAGNETIC ION-MASS SPECTROMETER (MINS)				73-101A-10	2/28/76	PARTIAL	STND	14
HOFFMAN	LOW-ENERGY ELECTRONS (LEE)				73-101A-12	2/28/76	NORMAL	STND	15
RICE	COLD CATHODE ION GAUGE				73-101A-15	1/00/78	NORMAL	ZERO	15
RICE	CAPACITANCE MANOMETER				73-101A-16	1/00/78	NORMAL	ZERO	15
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)				73-101A-09	2/28/76	PARTIAL	STND	15
AE-E	UNITED STATES	NASA-OSS	11/20/75	GEOCENTRIC	75-107A	11/20/75	NORMAL	STND	15
BRACE	CYLINDRICAL ELECTROSTATIC PROBE (CEP)				75-107A-01	12/00/75	NORMAL	STND	16
BRINTON	ION COMPOSITION AND CONCENTRATION (BIMS)				75-107A-10	12/11/75	NORMAL	STND	16
CHAMPION	ATMOSPHERIC DENSITY ACCELEROMETER (MESA)				75-107A-02	12/04/75	NORMAL	STND	16
DOERING	PHOTOELECTRON SPECTROMETER (PES)				75-107A-03	12/00/75	NORMAL	STND	16
HANSON	RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)				75-107A-04	12/00/75	NORMAL	STND	17
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)				75-107A-11	12/11/75	NORMAL	STND	17
HEDIN	NEUTRAL ATMOSPHERE COMPOSITION (NACE)				75-107A-08	12/11/75	NORMAL	STND	17
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)				75-107A-06	12/00/75	NORMAL	STND	17
NIER	OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)				75-107A-C7	12/11/75	NORMAL	STND	18
RICE	CAPACITANCE MANOMETER				75-107A-12	12/04/75	NORMAL	STND	18
RICE	COLD CATHODE ION GAUGE				75-107A-13	12/04/75	NORMAL	STND	18
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)				75-107A-09	12/11/75	NORMAL	STND	18
AEM-A	SEE HCMM								
AEM-B	SEE SAGE								
AEM-C	SEE MAGSAT								
AEROS	SEE SMS 1								
AMPTE/CHARGE COMP EXPL	SEE CCE								
AMPTE/ION RELEASE MODULE	SEE IRM								
APPL EXPL MISSION A	SEE HCMM								
APPL EXPL MISSION B	SEE SAGE								
ARIEL 5	SEE UK 5								
ASTRO-A	JAPAN	ISAS	02/00/81	GEOCENTRIC	ASTRO-A		APPROVED MISSION		127
HIRAO	ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES				ASTRO-A-06				127
KONDO	SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7 MEV RANGE				ASTRO-A-04				127
MATSUOKA	TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE				ASTRO-A-03				127
HISHI	SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE				ASTRO-A-02				127
TAKAKURA	SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING				ASTRO-A-C1				127
TAKEUCHI	ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR				ASTRO-A-05				127
ASTRONOMICAL SATELLITE-A	SEE ASTRO-A								

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*PRINC. INVEST. NAME	EXPERIMENT NAME				NSSDC ID	EPOCH MDDYY	STATUS	DATA RATE	PAGE NO.
ATMOSPHERE EXPLORER-C	SEE AE-C								
ATMOSPHERE EXPLORER-E	SEE AE-E								
ATS 5	UNITED STATES	NASA-OSTA	08/12/69	GEOCENTRIC	69-069A	0/01/73	PARTIAL	SUBS	18
DAROSA	RADIO BEACON				69-069A-12	3/00/76	PARTIAL	ZERO	19
MCILWAIN	OMNIDIRECTIONAL HIGH-ENERGY PARTICLE DETECTOR				69-069A-03	4/01/78	NORMAL	ZERO	19
SUGIURA	MAGNETIC FIELD MONITOR				69-069A-13	11/15/75	NORMAL	ZERO	19
ATS 5	UNITED STATES	NASA-OSTA	05/30/74	GEOCENTRIC	74-039A	5/30/74	NORMAL	STND	19
ARNOLDY	LOW-ENERGY PROTON/ELECTRON EXPERIMENT				74-039A-03	3/31/78	PARTIAL	ZERO	19
COLEMAN, JR.	MAGNETOMETER EXPERIMENT				74-039A-02	3/31/78	PARTIAL	ZERO	20
DAVIES	RADIO BEACON				74-039A-09	12/05/76	PARTIAL	STND	20
DUNKERLY	SOLAR CELL RADIATION DAMAGE				74-039A-16	3/31/78	PARTIAL	SUBS	20
FRITZ	MEASUREMENT OF LOW-ENERGY PROTONS				74-039A-01	3/31/78	NORMAL	ZERO	20
GALICINAO	TRACKING AND DATA RELAY				74-039A-18	8/01/76	NORMAL	SUBS	20
GALICINAO	POSITION, LOCATION AND AIRCRAFT COMMUNICATION				74-039A-19	8/01/76	NORMAL	SUBS	20
KAMPIRSKY	R.F. INTERFEROMETER SUBSYSTEM				74-039A-29	7/30/74	PARTIAL	STND	21
MASLEY	SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION				74-039A-06	3/31/78	NORMAL	ZERO	21
MILLER	TELEVISION RELAY USING SMALL TERMINALS				74-039A-28	5/30/74	NORMAL	STND	21
PAULIKAS	OMNIDIRECTIONAL SPECTROMETER				74-039A-07	3/31/78	NORMAL	ZERO	21
WHALEN	HEALTH AND EDUCATION TELECOMMUNICATIONS				74-039A-24	9/20/76	NORMAL	STND	21
ATS-E	SEE ATS 5								
ATS-F	SEE ATS 6								
BE-C	UNITED STATES	NASA-OSS	04/29/65	GEOCENTRIC	65-032A	2/13/70	PARTIAL	SUBS	21
BERBFRT	LASER TRACKING REFLECTOR				65-032A-03	2/13/70	PARTIAL	SUBS	22
BERKSAT	SEE EUVE								
CAMEO	UNITED STATES	NASA-OSS	09/18/78	GEOCENTRIC	CAMEO		APPROVED MISSION		127
HEPPNER	BA AND LI RELEASE MODULES				CAMEO -01				128
CASTOR	SEE D5-B								
CCE	UNITED STATES	NASA-OSS	07/00/81	GEOCENTRIC	CCE		PROPOSED MISSION		128
GLOECKLER	CHARGE-ENERGY-MASS SPECTROMETER (CHEM)				CCE -03				128
MCENTIRE	MEDIUM ENERGY PARTICLE ANALYZER (MEPA)				CCE -02				128
SHELLEY	PLASMA COMPOSITION				CCE -01				128
CHARGE COMPOSITION EXPL	SEE CCE								
CHEM ACT MATLS EJECT ORB	SEE CAMEO								
COBE	UNITED STATES	NASA-OSS	10/00/83	GEOCENTRIC	COBE		PROPOSED MISSION		128
HAUSER	DIFFUSE INFRARED BACKGROUND EXPERIMENT (DIRBE)				COBE -02				129
MATHER	FAR INFRARED ABSOLUTE SPECTROPHOTOMETER (FIRAS)				COBE -01				129
NOT SELECTED YET	DIFFERENTIAL MICROWAVE RADIOMETERS (DMR)				COBE -03				129
COPERNICUS	SEE OAO 3								
CORSA-B	JAPAN	ISAS	02/00/79	GEOCENTRIC	CORSA-B		APPROVED MISSION		129
MAKINO	DIFFUSE SOFT X-RAYS AND SOFT X-RAY SOURCES				CORSA-B-02				129
NIYAMOTO	MONITOR OF X-RAY SOURCES				CORSA-B-01				130
CGS-B	INTERNATIONAL	ESA	08/09/75	GEOCENTRIC	75-072A	8/09/75	NORMAL	STND	22
CARAVANE COLLABOR.	UNITED STATES	NASA-OSS			75-072A-01	8/09/75	NORMAL	STND	22
	GAMMA-RAY ASTRONOMY SPARK CHAMBER EXPERIMENT (25 - 1000 MEV)								
COSMIC BACKGROUND EXPL	SEE COBE								
COSMIC RADIATION SAT B	SEE CORS-A-B								
COSMIC RAY SATELLITE-B	SEE COS-B								
COSMOS 900	U.S.S.R.	SAS	03/30/77	GEOCENTRIC	77-023A	3/30/77	UNKNOWN		22
AFO'IN	FLAT RETARDING POTENTIAL ANALYZER				77-023A-01	3/30/77			23
AFO'IN	HIGH-FREQUENCY ELECTRON TEMPERATURE PROBE				77-023A-C2	3/30/77			23
GDALIEVICH	SPHERICAL ION TRAP WITH FLOATING POTENTIAL				77-023A-03	3/30/77			23
SDALIEVICH	CYLINDRICAL ELECTROSTATIC PROBE				77-023A-C4	3/30/77			23

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*PRINC. INVEST. NAME	EXPERIMENT NAME				NSSDC ID	EPOCH MNOODY	STATUS	DATA RATE	PAGE NO.
GORTCHAKOV	RELATIVISTIC PROTON AND ELECTRON COUNTER				77-023A-C8	3/30/77			23
SCHUTTE	PANORAMIC ELECTROSTATIC SPECTROMETER				77-023A-C7	3/30/77			23
SOSNOVETS	DIFFERENTIAL ENERGY SPECTROMETER				77-023A-05	3/30/77			23
TELTSOV	DIFFERENTIAL LOW ENERGY SPECTROMETER				77-023A-06	3/30/77			23
TULUPOV	AURORAL PHOTOMETER				77-023A-09	3/30/77			23
05-B		FRANCE	CNES	05/17/75	GEOCENTRIC				
BARLIER	UPPER ATMOSPHERE DENSITY STUDY USING ON-BOARD ACCELEROMETER				75-039B	7/01/76	NORMAL	SUBS	23
BARLIER	MICROMETEORITE STUDY				75-039B-01	7/01/76	NORMAL	SUBS	24
DMSP 12535	SEE DMSP-F1								
DMSP BLOCK 50-1	SEE DMSP-F1								
DMSP-F1		UNITED STATES	DOD-USAF	09/11/76	GEOCENTRIC				
AFGC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)				76-091A	7/05/77	NORMAL	STND	24
AFGC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER				76-091A-01	7/05/77	NORMAL	STND	24
	SPECIAL SENSOR H (SSH)				76-091A-C2	7/05/77	NORMAL	STND	24
BLAKE	RADIATION DOSIMETER				76-091A-03	7/05/77	NORMAL	STND	25
SHRUM	GAMMA RAY DETECTOR				76-091A-04	7/05/77	NORMAL	STND	25
DMSP-F2		UNITED STATES	DOD-USAF	06/05/77	GEOCENTRIC				
AFGC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)				77-044A	7/19/77	NORMAL	STND	25
AFGC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER				77-044A-C1	7/19/77	NORMAL	STND	25
	SPECIAL SENSOR H (SSH)				77-044A-02	7/19/77	NORMAL	STND	25
HIZERA	REMOTE X-RAY SENSOR - PRECIPITATING ELECTRONS				77-044A-C6	7/19/77	NORMAL	SUBS	26
ROTHWELL	PRECIPITATING ELECTRON SPECTROMETER				77-044A-03	7/19/77	NORMAL	STND	26
SNYDER	PASSIVE IONOSPHERIC MONITOR				77-044A-C4	7/19/77	NORMAL	SUBS	26
DMSP-F3		UNITED STATES	DOD-USAF	05/01/78	GEOCENTRIC				
AFGC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)				78-042A	5/01/78	NORMAL	STND	26
AFGC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER				78-042A-01	5/01/78	PARTIAL	STND	26
	SPECIAL SENSOR H (SSH)				78-042A-02	5/01/78	PARTIAL	STND	27
ROTHWELL	PRECIPITATING ELECTRON SPECTROMETER				78-042A-03	5/01/78	PARTIAL	STND	27
SHRUM	GAMMA-RAY DETECTOR				78-042A-04	5/01/78	NORMAL	STND	27
DMSP-F4		UNITED STATES	DOD-USAF				APPROVED MISSION		130
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PLÖTKIN	LASER TRACKING REFLECTOR				68-002A-02	6/10/77	NORMAL	ZERO	33
GEOS 3	UNITED STATES	NASA-OSTA	04/09/75	GEOCENTRIC	75-027A	4/09/75	NORMAL	STND	33
ANDERLE	US NAVY DOPPLER SYSTEM				75-027A-05	4/09/75	NORMAL	STND	33
GALICINAO	SATELLITE-TO-SATELLITE TRACKING				75-027A-06	4/09/75	NORMAL	SUBS	33
JACKSON	C-BAND SYSTEM				75-027A-03	4/09/75	NORMAL	STND	34
PURDY	RADAR ALTIMETER SYSTEM				75-027A-01	4/09/75	NORMAL	STND	34
SALZBERG	S-BAND TRACKING SYSTEM				75-027A-02	4/09/75	NORMAL	SUBS	34
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GLOBAL MAGNETIC SURV MSM	SEE MAGSAT								
GMS	JAPAN	NASDA	07/14/77	GEOCENTRIC	77-065A	8/15/77	NORMAL	STND	34
JMA STAFF	UNITED STATES	NASA-OSTA			77-065A-01	8/15/77	NORMAL	STND	35
JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)				77-065A-03	8/15/77	NORMAL	STND	35
KORNO	WEATHER COMMUNICATIONS FACILITY SPACE ENVIRONMENT MONITOR (SEM)				77-065A-02	8/15/77	NORMAL	STND	35
GOES 1	UNITED STATES	NOAA-NESS	10/16/75	GEOCENTRIC	75-100A	6/01/78	NORMAL	ZERO	35
NESS STAFF	UNITED STATES	NASA-OSTA			75-100A-01	6/01/78	NORMAL	ZERO	35
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)				75-100A-05	8/13/77	NORMAL	ZERO	35
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				75-100A-02	6/01/78	NORMAL	ZERO	36
WILLIAMS	ENERGETIC PARTICLE MONITOR				75-100A-03	6/01/78	NORMAL	ZERO	36
WILLIAMS	SOLAR X-RAY MONITOR				75-100A-04	6/01/78	PARTIAL	ZERO	36
WILLIAMS	MAGNETIC FIELD MONITOR								
GOES 2	UNITED STATES	NOAA-NESS	06/16/77	GEOCENTRIC	77-048A	6/16/77	NORMAL	STND	36
NESS STAFF	UNITED STATES	NASA-OSTA			77-048A-01	8/13/77	NORMAL	STND	36
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)				77-048A-05	8/13/77	NORMAL	STND	37
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				77-048A-02	7/20/77	NORMAL	STND	37
WILLIAMS	ENERGETIC PARTICLE MONITOR				77-048A-03	7/20/77	NORMAL	STND	37
WILLIAMS	SOLAR X-RAY MONITOR				77-048A-04	8/17/77	NORMAL	STND	37
WILLIAMS	MAGNETIC FIELD MONITOR								
GOES 3	UNITED STATES	NOAA-NESS	06/16/78	GEOCENTRIC	78-062A	6/16/78	NORMAL	STND	37
NESS STAFF	UNITED STATES	NASA-OSTA			78-062A-01	7/13/78	NORMAL	STND	37
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)				78-062A-05	7/13/78	NORMAL	STND	38
WILLIAMS	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				78-062A-02	7/03/78	NORMAL	STND	38
WILLIAMS	ENERGETIC PARTICLE MONITOR				78-062A-03	7/03/78	NORMAL	STND	38
WILLIAMS	SOLAR X-RAY MONITOR				78-062A-04	7/03/78	NORMAL	STND	38
WILLIAMS	MAGNETIC FIELD MONITOR								
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GOES-B	SEE GOES 2								
GOES-D	UNITED STATES	NOAA-NESS	08/00/80	GEOCENTRIC	GOES-D		APPROVED MISSION		145
NESS STAFF	UNITED STATES	NASA-OSTA			GOES-D -01				145
NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)				GOES-D -05				145
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WILLIAMS	SOLAR X-RAY MONITOR				GOES-D -04				146
WILLIAMS	MAGNETIC FIELD MONITOR								
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NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)				GOES-E -05				146
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NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM				GOES-F -05			147
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WILLIAMS	SOLAR X-RAY MONITOR				GOES-F -03			148
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-F -04			148
HANKEYE 1	UNITED STATES	NASA-OSS	06/03/74	GEOCENTRIC	74-040A	4/28/78	INOPERABLE	ZERO 38
FRANK	LOW-ENERGY PROTONS AND ELECTRONS				74-040A-02	4/28/78	INOPERABLE	ZERO 38
GURNETT	ELF/VLF RECEIVERS				74-040A-03	4/28/78	INOPERABLE	ZERO 39
VAN ALLEN	TRIAXIAL FLUXGATE MAGNETOMETER				74-040A-G1	4/28/78	INOPERABLE	ZERO 39
HCMM	UNITED STATES	NASA-OSTA	04/26/78	GEOCENTRIC	78-041A	4/26/78	NORMAL	STND 39
BARNES	HEAT CAPACITY MAPPING RADIOMETER				78-041A-01	4/26/78	NORMAL	STND 39
HEAO 1	UNITED STATES	NASA-OSS	08/12/77	GEOCENTRIC	77-075A	8/12/77	NORMAL	STND 39
BOLDT	COSMIC X-RAY EXPERIMENT				77-075A-02	9/03/77	PARTIAL	STND 40
FRIEDMAN	LARGE AREA COSMIC X-RAY SURVEY				77-075A-01	8/19/77	PARTIAL	STND 40
GURSKY	X-RAY SCANNING MODULATION COLLIMATOR				77-075A-03	8/19/77	PARTIAL	STND 40
PETERSON	LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY				77-075A-G4	8/12/77	NORMAL	STND 40
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FECHTIG	UNITED STATES	NASA-OSS			74-097A-12	12/10/74	NORMAL	STND 41
GURNETT	MICROMETEOROID DETECTOR AND ANALYZER				74-097A-04	3/10/75	PARTIAL	STND 41
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS				74-097A-05	3/10/75	PARTIAL	STND 41
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS				74-097A-06	3/10/75	PARTIAL	STND 42
KESSLER	50-KHZ TO 2-MHZ RADIO WAVE				74-097A-10	12/10/74	NORMAL	STND 42
KUNDT	ENERGETIC ELECTRON DETECTOR				74-097A-14	12/10/74	NORMAL	STND 42
KUNOW	CELESTIAL MECHANICS				74-097A-07	12/10/74	NORMAL	STND 42
LEINERT	COSMIC-RAY PARTICLES				74-097A-11	12/10/74	NORMAL	STND 42
NESS	ZODIACAL LIGHT PHOTOMETER				74-097A-02	12/10/74	NORMAL	STND 42
NEUBAUER	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS				74-097A-01	12/10/74	NORMAL	STND 43
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS				74-097A-03	12/10/74	NORMAL	STND 43
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TRAINOR	PLASMA DETECTORS				74-097A-08	12/10/74	NORMAL	STND 43
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS							
HELIOS-B	FED REP OF GERMANY	BMWF	01/15/76	HELIOCENTRIC	76-003A	1/15/76	NORMAL	STND 43
FECHTIG	UNITED STATES	NASA-OSS			76-003A-12	1/23/76	NORMAL	STND 44
GURNETT	MICROMETEOROID DETECTOR AND ANALYZER				76-003A-04	1/16/76	NORMAL	STND 44
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS				76-003A-05	1/16/76	NORMAL	STND 44
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS				76-003A-06	1/16/76	NORMAL	STND 44
KESSLER	50-KHZ TO 2-MHZ RADIO WAVE				76-003A-10	1/16/76	NORMAL	STND 44
KUNDT	ENERGETIC ELECTRON DETECTOR				76-003A-14	1/23/76	NORMAL	STND 45
KUNOW	CELESTIAL MECHANICS				76-003A-07	1/16/76	NORMAL	STND 45
LEINERT	COSMIC-RAY PARTICLES				76-003A-11	1/23/76	NORMAL	STND 45
NESS	ZODIACAL LIGHT PHOTOMETER				76-003A-02	1/16/76	NORMAL	STND 45
NEUBAUER	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS				76-003A-01	1/16/76	NORMAL	STND 45
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS				76-003A-03	1/16/76	NORMAL	STND 45
NEUBAUER	SEARCH COIL MAGNETOMETER							

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ROSEBAUER TRAINOR	PLASMA DETECTORS GALACTIC AND SOLAR COSMIC RAYS			76-003A-09 76-003A-08	1/16/76 1/16/76	NORMAL NORMAL	STND STND	45 46
HEL0S	SEE EXOSAT							
HI.ECCEN LUN OCCULT.SAT.	SEE EXOSAT							
HIGH ENERGY ASTRON OBS-A	SEE HEAO 1							
HIGH ENERGY ASTRON OBS-B	SEE HEAO-B							
HIGH ENERGY ASTRON OBS-C	SEE HEAO-C							
IME-D	SEE ISEE 2							
IME-H	SEE ISEE 3							
IMP 7	SEE IMP-H							
IMP 8	SEE IMP-J							
IMP-H	UNITED STATES	NASA-OSS	09/23/72	GEOCENTRIC				
BAME	SOLAR PLASMA ELECTROSTATIC ANALYZER			72-073A	9/23/72	NORMAL	STND	46
BRIDGE	SOLAR PLASMA FARADAY CUP			72-073A-10	9/23/72	NORMAL	STND	46
CLINE	STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS			72-073A-02 72-073A-13	12/11/73 10/13/72	PARTIAL NORMAL	STND STND	46 46
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			72-073A-04	9/23/72	NORMAL	STND	47
GLOECKLER	IONS AND ELECTRONS IN THE ENERGY RANGE 0.1 TO 2 MEV			72-073A-03	11/25/72	PARTIAL	STND	47
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			72-073A-08	12/11/73	PARTIAL	STND	47
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			72-073A-09	9/26/72	NORMAL	STND	47
OGILVIE	SOLAR WIND ION COMPOSITION			72-073A-12	9/24/72	NORMAL	STND	47
SCARF	PLASMA WAVE			72-073A-11	9/24/72	NORMAL	SUBS	47
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE			72-073A-07	9/18/74	PARTIAL	STND	48
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			72-073A-06	9/23/72	NORMAL	STND	48
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			72-073A-05	9/26/72	NORMAL	STND	48
IMP-J	UNITED STATES	NASA-OSS	10/26/73	GEOCENTRIC				
AGGSON	ELECTROSTATIC FIELDS			73-078A	10/26/73	NORMAL	STND	48
BAME	SOLAR PLASMA ELECTROSTATIC ANALYZER			73-078A-11	10/26/73	NORMAL	STND	48
BRIDGE	SOLAR PLASMA FARADAY CUP			73-078A-10	10/26/73	NORMAL	STND	49
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			73-078A-02 73-078A-04	10/26/73 10/26/73	NORMAL NORMAL	STND STND	49 49
GLOECKLER	SOLID-STATE DETECTORS			73-078A-03	10/26/73	NORMAL	STND	49
GURNETT	ELECTROSTATIC WAVES AND RADIO NOISE			73-078A-12	10/26/73	NORMAL	STND	49
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			73-078A-08	12/03/74	NORMAL	STND	49
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			73-078A-09	10/26/73	NORMAL	STND	50
NESS	MAGNETIC FIELD EXPERIMENT			73-078A-01	10/26/73	NORMAL	STND	50
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z			73-078A-07	10/26/73	NORMAL	STND	50
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			73-078A-06	10/26/73	NORMAL	STND	50
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			73-078A-05	10/26/73	NORMAL	STND	50
IMP-K	SEE ISEE 1							
IMP-K PRIME	SEE ISEE 2							
INFRA-RED ASTRONOM SAT	SEE IR ASTRON. SAT.							
INJUN-F	SEE HAWKEYE 1							
INT ULTRAVIOLET EXPL	SEE IUE							
INTNL SUN EARTH EXPL-A	SEE ISEE 1							
INTNL SUN EARTH EXPL-B	SEE ISEE 2							
INTNL SUN EARTH EXPL-C	SEE ISEE 3							
ION RELEASE MODULE	SEE IRM							
IONOSONDE-1K	U.S.S.R.	INTERCOS	00/00/79	GEOCENTRIC				
IONOSP SOUNDING SAT 2	SEE ISS-B							
IR ASTRON. SAT.	THE NETHERLANDS UNITED STATES	NIVR NASA-OSS	02/06/81	GEOCENTRIC				
				IRAS		APPROVED MISSION		150

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IRAS	SEE IR ASTRON. SAT.						
IRM	UNITED STATES LI AND EU RELEASE MODULE	NASA-OSS 11/00/81	GEOCENTRIC	IRM IRM -01	PROPOSED MISSION		150 150
ISEE 1	UNITED STATES	NASA-OSS	10/22/77 GEOCENTRIC	77-102A	10/22/77 NORMAL	STND	50
ANDERSON	ELECTRONS AND PROTONS			77-102A-10	10/22/77 NORMAL	STND	51
BAME	FAST PLASMA AND SOLAR WIND IONS			77-102A-01	10/22/77 NORMAL	STND	51
CLINE	GAMMA-RAY BURSTS			77-102A-14	10/22/77 NORMAL	STND	51
FRANK	HOT PLASMA			77-102A-03	10/22/77 NORMAL	STND	51
GURNETT	PLASMA WAVES			77-102A-07	10/22/77 NORMAL	STND	51
HARVEY	PLASMA DENSITY			77-102A-08	10/22/77 NORMAL	STND	52
HELLIWELL	VLF WAVE PROPAGATION			77-102A-13	10/22/77 NORMAL	STND	52
HEPPNER	DC ELECTRIC FIELD			77-102A-11	10/22/77 NORMAL	STND	52
HOVESTADT	LOW-ENERGY COSMIC RAYS			77-102A-05	10/22/77 NORMAL	STND	52
MOZER	QUASI-STATIC ELECTRIC FIELDS			77-102A-06	10/22/77 NORMAL	STND	52
OGILVIE	FAST ELECTRONS			77-102A-02	10/22/77 NORMAL	STND	53
RUSSELL	FLUXGATE MAGNETOMETER			77-102A-04	10/22/77 NORMAL	STND	53
SHARP	ION COMPOSITION			77-102A-12	4/13/78 PARTIAL	STND	53
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			77-102A-09	10/22/77 NORMAL	STND	53
ISEE 2	INTERNATIONAL UNITED STATES	ESA NASA-OSS	10/22/77 GEOCENTRIC	77-102B	10/22/77 NORMAL	STND	53
ANDERSON	ELECTRONS AND PROTONS			77-102B-08	10/22/77 NORMAL	STND	53
FRANK	HOT PLASMA			77-102B-03	1/10/78 PARTIAL	STND	54
GURNETT	PLASMA WAVES			77-102B-05	10/22/77 NORMAL	STND	54
HARVEY	RADIO PROPAGATION			77-102B-06	10/22/77 NORMAL	STND	54
KEPPLER	ENERGETIC ELECTRONS AND PROTONS			77-102B-07	10/22/77 NORMAL	STND	54
MORENO	SOLAR WIND IONS			77-102B-02	10/22/77 NORMAL	STND	54
PASCHMANN	FAST PLASMA			77-102B-01	10/22/77 NORMAL	STND	54
RUSSELL	FLUXGATE MAGNETOMETER			77-102B-04	10/22/77 NORMAL	STND	55
ISEE 3	UNITED STATES INTERNATIONAL	NASA-OSS ESA	08/12/78 HELIOCENTRIC	78-079A	8/12/78 NORMAL	STND	55
ANDERSON	INTERPLANETARY AND SOLAR ELECTRONS			78-079A-09	8/15/78 NORMAL	STND	55
ANDERSON	X- AND GAMMA-RAY BURSTS			78-079A-14	8/15/78 NORMAL	STND	55
BAME	SOLAR WIND PLASMA			78-079A-01	8/16/78 NORMAL	STND	55
HECKMAN	HIGH-ENERGY COSMIC RAY			78-079A-05	8/15/78 NORMAL	STND	56
HOVESTADT	LOW-ENERGY COSMIC RAYS			78-079A-03	8/15/78 NORMAL	STND	56
HYNDS	PROTONS			78-079A-08	8/15/78 NORMAL	STND	56
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI			78-079A-06	8/15/78 NORMAL	STND	56
OGILVIE	SOLAR WIND ION COMPOSITION			78-079A-11	8/18/78 NORMAL	STND	56
SCARF	PLASMA WAVES			78-079A-07	8/12/78 NORMAL	STND	56
SMITH	MAGNETIC FIELDS			78-079A-02	8/12/78 NORMAL	STND	57
STEINBERG	RADIO MAPPING			78-079A-10	8/15/78 NORMAL	STND	57
STONE	HIGH-ENERGY COSMIC RAYS			78-079A-12	8/15/78 NORMAL	STND	57
TEEGARDEN	GAMMA-RAY BURSTS			78-079A-15	8/15/78 NORMAL	STND	57
VON ROSENVIINGE	MEDIUM ENERGY COSMIC RAY			78-079A-04	8/15/78 NORMAL	STND	57
WILCOX	GROUND BASED SOLAR STUDIES			78-079A-13	NA	NA	57
ISEE-C	SEE ISEE 3						
ISIS 1	CANADA UNITED STATES	CRC NASA-OSS	01/30/69 GEOCENTRIC	69-009A	1/30/70 PARTIAL	SUBS	57
BARRINGTON	VLF RECEIVER			69-009A-03	1/30/70 NORMAL	SUBS	58
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			69-009A-07	1/30/70 NORMAL	SUBS	58
CALVERT	FIXED-FREQUENCY SOUNDER			69-009A-02	1/30/70 NORMAL	SUBS	58
HARTZ	COSMIC RADIO NOISE			69-009A-10	1/30/70 NORMAL	SUBS	58
MCDIARMID	ENERGETIC PARTICLE DETECTORS			69-009A-04	1/30/70 NORMAL	SUBS	58
SAGALYN	SPHERICAL ELECTROSTATIC ANALYZER			69-009A-08	1/30/70 NORMAL	SUBS	59
WHITTEKER	SWEEP-FREQUENCY SOUNDER			69-009A-01	1/30/70 NORMAL	SUBS	59
ISIS 2	CANADA UNITED STATES	CRC NASA-OSS	04/01/71 GEOCENTRIC	71-024A	2/04/73 PARTIAL	SUBS	59
ANGER	3914- AND 5577-A PHOTOMETER			71-024A-11	2/04/73 NORMAL	SUBS	59
BARRINGTON	VLF RECEIVER			71-024A-03	2/04/73 NORMAL	SUBS	60
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			71-024A-07	3/10/78 INOPERABLE	ZERO	60
CALVERT	FIXED-FREQUENCY SOUNDER			71-024A-02	2/04/73 NORMAL	SUBS	60
HARTZ	COSMIC RADIO NOISE			71-024A-10	2/04/73 NORMAL	SUBS	60
HOFFMAN	ION MASS SPECTROMETER			71-024A-06	2/04/73 NORMAL	SUBS	60
MAIER	RETARDING POTENTIAL ANALYZER			71-024A-08	2/04/73 NORMAL	SUBS	61
MCDIARMID	ENERGETIC PARTICLE DETECTORS			71-024A-04	2/04/73 PARTIAL	SUBS	61
SHEPHERD	6300-A PHOTOMETER			71-024A-12	2/04/73 NORMAL	SUBS	61
WHITTEKER	SWEEP-FREQUENCY SOUNDER			71-024A-01	2/04/73 NORMAL	SUBS	61
ISIS-A	SEE ISIS 1						
ISIS-B	SEE ISIS 2						
ISS-2	SEE ISS-B						
ISS-8	JAPAN	RRL	02/16/78 GEOCENTRIC	78-018A	2/16/78 NORMAL	STND	61

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IWAMOTO	ION MASS SPECTROMETER				78-018A-04	2/27/78	NORMAL	STND	62
KOTAKI	RADIO NOISE NEAR 2.5, 5, 10, AND 25 MHZ				78-018A-02	2/27/78	NORMAL	STND	62
HATUURA	SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)				78-018A-01	2/27/78	NORMAL	STND	62
MORI	RETARDING POTENTIAL TRAP				78-018A-03	2/27/78	NORMAL	STND	62
ITOS-G	SEE NOAA 4								
ITOS-H	SEE NOAA 5								
IUE	UNITED STATES INTERNATIONAL	NASA-OSS ESA	01/26/78	GEOCENTRIC	78-012A	1/26/78	NORMAL	STND	62
BOSTROM	PARTICLE FLUX MONITOR				78-012A-02	1/26/78	NORMAL	STND	63
FACILITY INVESTIGA.	LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE				78-012A-01	1/26/78	NORMAL	STND	63
JOP	SEE GALILEO PROBE								
JOP	SEE GALILEO ORBITER								
JUPITER ORBITER PROBE	SEE GALILEO PROBE								
JUPITER ORBITER PROBE	SEE GALILEO ORBITER								
RYOKKO	JAPAN	ISAS	02/04/78	GEOCENTRIC	78-014A	2/04/78	NORMAL	STND	63
IWAMOTO	ION MASS SPECTROMETER				78-014A-06	2/27/78	NORMAL	STND	63
KANEDA	UV AURORAL TV IMAGING				78-014A-03	2/24/78	NORMAL	STND	63
MUKAI	ELECTRON ENERGY ANALYZER				78-014A-02	2/23/78	NORMAL	STND	64
HAKAMURA	UV GLOW SPECTROPHOTOMETER				78-014A-05	2/28/78	NORMAL	STND	64
OYAMA	ELECTRON PROBES				78-014A-01	2/25/78	NORMAL	STND	64
YOSHINO	ELECTROSTATIC PLASMA WAVE MEASUREMENT				78-014A-04	2/23/78	NORMAL	STND	64
LAGEOS	UNITED STATES	NASA-OSTA	05/04/76	GEOCENTRIC	76-039A	5/04/76	NORMAL	STND	64
STEPHANIDES	LASER RETROFLECTORS				76-039A-01	5/05/76	NORMAL	STND	64
LAND SATELLITE-D1	SEE LANDSAT-D								
LANDSAT 1	UNITED STATES	NASA-OSTA	07/23/72	GEOCENTRIC	72-058A	1/26/78	PARTIAL	ZERO	64
ARLUSKAS	MULTISPECTRAL SCANNER (MSS)				72-058A-02	1/26/78	PARTIAL	ZERO	65
PAINTER	DATA COLLECTION SYSTEM (DCS)				72-058A-03	1/26/78	NORMAL	ZERO	65
LANDSAT 2	UNITED STATES	NASA-OSTA	01/22/75	GEOCENTRIC	75-004A	1/22/75	NORMAL	STND	65
ARLUSKAS	MULTISPECTRAL SCANNER (MSS)				75-004A-02	1/27/75	NORMAL	STND	65
PAINTER	DATA COLLECTION SYSTEM (DCS)				75-004A-03	1/23/75	NORMAL	STND	66
LANDSAT 3	UNITED STATES	NASA-OSTA	03/05/78	GEOCENTRIC	78-026A	3/05/78	NORMAL	STND	66
ARLUSKAS	MULTISPECTRAL SCANNER (MSS)				78-026A-02	7/11/78	PARTIAL	STND	66
PAINTER	DATA COLLECTION SYSTEM (DCS)				78-026A-03	3/05/78	NORMAL	STND	67
WEINSTEIN	RETURN BEAM VIDICON CAMERA (RBV)				78-026A-01	3/05/78	NORMAL	STND	67
LANDSAT-D	UNITED STATES	NASA-OSTA	09/00/81	GEOCENTRIC	LAND-D		APPROVED MISSION		150
RANGO	THEMATIC MAPPER				LAND-D -01				150
LANDSAT-D1	SEE LANDSAT-D								
LARGE SPACE TELESCOPE	SEE ST								
LASER GEODYNAMIC SAT.	SEE LAGEOS								
LDEF	SEE SPACE SHUTTLE LDEF-A								
LFO-A	SEE LANDSAT-D								
LONG DURATION EXPOS.FAC.	SEE SPACE SHUTTLE LDEF-A								
MAG-1K	U.S.S.R.	IZMIRAN	00/00/79	GEOCENTRIC	MAGIC		APPROVED MISSION		151
MAGIC	SEE MAG-1K								
MAGSAT	UNITED STATES	NASA-OSTA	09/00/79	GEOCENTRIC	AEM-C		APPROVED MISSION		151
LANGEL	SCALAR MAGNETOMETER				AEM-C -01				151
LANGEL	VECTOR MAGNETOMETER				AEM-C -02				151
MAGSAT-A	SEE MAGSAT								
MARINER 77A	SEE VOYAGER 1								
MARINER 77B	SEE VOYAGER 2								
MARINER JUPITER/SATURN A	SEE VOYAGER 1								
MARINER JUPITER/SATURN B	SEE VOYAGER 2								

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MEO1	SEE SMS 1							
MEO2	SEE SMS 2							
METEOROLOGICAL SAT-A	SEE METEOSAT 1							
METEOSAT 1	INTERNATIONAL	ESA	11/23/77	GEOCENTRIC	77-108A	11/23/77	NORMAL	STND 67
ESA STAFF	IMAGING RADIOMETER				77-108A-01	11/23/77	NORMAL	STND 67
ESA STAFF	DATA COLLECTION PLATFORM (DCP)				77-108A-02	11/23/77	NORMAL	STND 67
MJS 77A	SEE VOYAGER 1							
MJS 77B	SEE VOYAGER 2							
MOTHER	SEE ISEE 1							
NEUTRAL POINT EXPLORER	SEE HAWKEYE 1							
NIMBUS 4	UNITED STATES	NASA-OSTA	04/08/70	GEOCENTRIC	70-025A	10/17/77	PARTIAL	ZERO 68
HEATH	BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER				70-025A-05	10/17/77	NORMAL	ZERO 68
NIMBUS 5	UNITED STATES	NASA-OSTA	12/11/72	GEOCENTRIC	72-097A	1/04/73	PARTIAL	STND 68
HOUGHTON	SELECTIVE CHOPPER RADIOMETER (SCR)				72-097A-02	7/15/75	NORMAL	SUBS 69
STAELIN	NIMBUS 5 MICROWAVE SPECTROMETER (NEMS)				72-097A-03	8/15/75	NORMAL	SUBS 69
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)				72-097A-04	8/15/77	PARTIAL	SUBS 69
NIMBUS 6	UNITED STATES	NASA-OSTA	06/12/75	GEOCENTRIC	75-052A	6/12/75	NORMAL	STND 69
HOUGHTON	PRESSURE-MODULATED RADIOMETER (PMR)				75-052A-09	8/04/76	NORMAL	SUBS 69
JULIAM	TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE)				75-052A-01	6/19/75	NORMAL	STND 70
SMITH	EARTH RADIATION BUDGET (ERB)				75-052A-05	5/23/76	PARTIAL	SUBS 70
NIMBUS-D	SEE NIMBUS 4							
NIMBUS-E	SEE NIMBUS 5							
NIMBUS-F	SEE NIMBUS 6							
NIMBUS-G	UNITED STATES	NASA-OSTA	09/18/78	GEOCENTRIC	NIMBS-6		APPROVED MISSION	151
ALLISON	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)				NIMBS-6-1C			152
GLOERSEN	SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMHR)				NIMBS-6-C8			152
HEATH	SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)				NIMBS-6-C9			152
HOUGHTON	STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)				NIMBS-6-02			152
HOVIS	COASTAL ZONE COLOR SCANNER				NIMBS-6-03			153
JACOBOWITZ	EARTH RADIATION BUDGET (ERB)				NIMBS-6-07			153
MCCORMICK	STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)				NIMBS-6-06			153
RUSSELL, 3RD	LOWER ATMOSPHERIC COMPOSITION AND TEMPERATURE EXPERIMENT (LACATE)				NIMBS-6-01			153
NOAA 4	UNITED STATES	NOAA-NESS	11/15/74	GEOCENTRIC	74-089A	8/00/77	NORMAL	SUBS 70
NESS STAFF	SCANNING RADIOMETER (SR)				74-089A-02	8/06/78	INOPERABLE	ZERO 70
WILLIAMS	SOLAR PROTON MONITOR				74-089A-01	1/05/75	PARTIAL	SUBS 71
NOAA 5	UNITED STATES	NOAA-NESS	07/29/76	GEOCENTRIC	76-077A	7/30/76	NORMAL	STND 71
NESS STAFF	VERY HIGH RESOLUTION RADIOMETER (VHRR)				76-077A-01	11/30/77	NORMAL	STND 71
NESS STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)				76-077A-02	9/15/76	NORMAL	STND 71
NESS STAFF	SCANNING RADIOMETER (SR)				76-077A-C3	3/16/78	INOPERABLE	ZERO 71
WILLIAMS	SOLAR PROTON MONITOR (SPM)				76-077A-04	9/15/76	NORMAL	STND 72
NOAA-A	UNITED STATES	NOAA-NESS	10/01/78	GEOCENTRIC	NOAA-A		APPROVED MISSION	154
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)				NOAA-A -C1			154
NESS STAFF	OPERATIONAL VERTICAL SOUNDER				NOAA-A -02			154
NESS STAFF	DATA COLLECTION SYSTEM				NOAA-A -03			154
WILLIAMS	SPACE ENVIRONMENT MONITOR				NOAA-A -04			154
NOAA-B	UNITED STATES	NOAA-NESS	08/01/79	GEOCENTRIC	NOAA-B		APPROVED MISSION	154
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)				NOAA-B -01			155

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NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-B -02			155
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NOAA-C	UNITED STATES	NOAA-NESS 02/01/80	GEOCENTRIC	NOAA-C		APPROVED MISSION	155
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NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-C -03			156
WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-C -04			156
NOAA-D	UNITED STATES	NOAA-NESS 08/01/81	GEOCENTRIC	NOAA-D		APPROVED MISSION	156
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NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-D -02			157
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-D -03			157
WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-D -04			157
NOAA-E	UNITED STATES	NOAA-NESS 02/01/82	GEOCENTRIC	NOAA-E		APPROVED MISSION	157
NESS STAFF	UNITED STATES	NASA-OSTA					
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-E -01			158
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-E -02			158
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-E -03			158
WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-E -04			158
NOAA-F	UNITED STATES	NOAA-NESS 05/01/83	GEOCENTRIC	NOAA-F		APPROVED MISSION	158
NESS STAFF	UNITED STATES	NASA-OSTA					
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-F -01			159
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-F -02			159
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WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-F -04			159
NOAA-G	UNITED STATES	NOAA-NESS 02/00/84	GEOCENTRIC	NOAA-G		APPROVED MISSION	159
NESS STAFF	UNITED STATES	NASA-OSTA					
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NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-G -03			160
WILLIAMS	SPACE ENVIRONMENT MONITOR			NOAA-G -04			160
0A0 3	UNITED STATES	NASA-OSS 08/21/72	GEOCENTRIC	72-065A	8/21/72	NORMAL	STND 72
BOYD	STELLAR X-RAYS			72-065A-02	6/00/73	PARTIAL	STND 72
SPITZER	HIGH-RESOLUTION TELESCOPES			72-065A-01	8/21/72	NORMAL	STND 72
0A0-C	SEE 0A0 3						
OCEAN DYNAMICS SAT-A	SEE SEASAT *						
050 8	UNITED STATES	NASA-OSS 06/21/75	GEOCENTRIC	75-057A	6/22/75	NORMAL	STND 72
ACTON	MAPPING X-RAY HELIOMETER			75-057A-04	6/22/75	NORMAL	STND 73
BARTH	HIGH-RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS			75-057A-01	3/00/76	PARTIAL	STND 73
BONNET	CHROMOSPHERE FINE-STRUCTURE STUDY			75-057A-02	12/00/75	PARTIAL	STND 73
FROST	HIGH-ENERGY CELESTIAL X RAYS			75-057A-07	6/22/75	NORMAL	STND 73
KRAUSHAAR	SOFT X-RAY BACKGROUND RADIATION INVESTIGATION			75-057A-05	12/30/77	PARTIAL	STND 73
NOVICK	HIGH-SENSITIVITY CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS			75-057A-03	6/22/75	NORMAL	STND 73
SERLEMITSOS	COSMIC X-RAY SPECTROSCOPY			75-057A-06	6/22/75	NORMAL	STND 74
WELLER, JR.	EUV FROM EARTH AND SPACE			75-057A-08	1/01/78	PARTIAL	STND 74
050-EYE	SEE 050 8						
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OUTER PLANETS A	SEE VOYAGER 1						
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PIONEER 6	ANDERSON ANDERSON BRIDGE FAN GOLDSTEIN LEVY MCCRACKEN WOLFE	UNITED STATES NASA-OSS CELESTIAL MECHANICS RELATIVITY INVESTIGATION SOLAR WIND PLASMA FARADAY CUP COSMIC-RAY TELESCOPE SPECTRAL BROADENING SUPERIOR CONJUNCTION FARADAY ROTATION COSMIC-RAY ANISOTROPY ELECTROSTATIC ANALYZER	12/16/65	HELIOCENTRIC		65-105A 65-105A-07 65-105A-10 65-105A-02 65-105A-03 65-105A-09 65-105A-08 65-105A-05 65-105A-06	2/07/71 12/16/65 12/16/65 12/03/74 12/03/74 12/16/65 11/24/68 12/03/74 12/03/74	NORMAL NORMAL NORMAL PARTIAL NORMAL NORMAL NORMAL PARTIAL NORMAL	SUBS STND STND SUBS SUBS STND ZERO SUBS SUBS	74 74 74 74 75 75 75 75 75 75
PIONEER 7	ANDERSON MCCRACKEN SIMPSON WOLFE	UNITED STATES NASA-OSS CELESTIAL MECHANICS COSMIC-RAY ANISOTROPY COSMIC-RAY TELESCOPE ELECTROSTATIC ANALYZER	08/17/66	HELIOCENTRIC		66-075A 66-075A-07 66-075A-05 66-075A-06 66-075A-03	2/10/76 8/17/66 2/10/76 2/10/76 2/16/76	PARTIAL NORMAL PARTIAL PARTIAL PARTIAL	ZERO STND ZERO ZERO ZERO	76 76 76 76 76
PIONEER 8	ANDERSON BERG ESHLEMAN MCCRACKEN NESS SCARF WEBBER WOLFE	UNITED STATES NASA-OSS CELESTIAL MECHANICS COSMIC DUST DETECTOR TWO-FREQUENCY BEACON RECEIVER COSMIC-RAY ANISOTROPY SINGLE-AXIS MAGNETOMETER PLASMA WAVE DETECTOR COSMIC-RAY GRADIENT DETECTOR ELECTROSTATIC ANALYZER	12/13/67	HELIOCENTRIC		67-123A 67-123A-08 67-123A-04 67-123A-03 67-123A-05 67-123A-01 67-123A-07 67-123A-06 67-123A-02	5/02/71 12/13/67 1/21/78 1/21/78 1/21/78 1/21/77 1/21/78 1/21/78 10/10/77	NORMAL NORMAL INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE INOPERABLE	SUBS STND ZERO ZERO ZERO ZERO ZERO ZERO ZERO	77 77 77 78 78 78 78 78 78 79
PIONEER 9	ANDERSON BERG ESHLEMAN MCCRACKEN SCARF SONETT WEBBER WOLFE	UNITED STATES NASA-OSS CELESTIAL MECHANICS COSMIC DUST DETECTOR TWO-FREQUENCY BEACON RECEIVER COSMIC-RAY ANISOTROPY PLASMA WAVE DETECTOR TRIAxIAL MAGNETOMETER COSMIC-RAY TELESCOPE ELECTROSTATIC ANALYZER	11/08/68	HELIOCENTRIC		68-100A 68-100A-C8 68-100A-04 68-100A-03 68-100A-05 68-100A-07 68-100A-01 68-100A-06 68-100A-02	5/19/69 11/02/68 5/19/69 12/03/74 5/19/69 5/19/69 5/19/69 5/19/69 12/03/74	NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL	SUBS STND SUBS SUBS SUBS SUBS SUBS SUBS SUBS	79 79 79 79 80 80 80 80 80
PIONEER 10	ANDERSON FILLIUS GEHRELS JUDGE KINARD KLIORÉ MCDONALD MUNCH SIMPSON SOBERMAN VAN ALLEN WEINBERG WOLFE	UNITED STATES NASA-OSS CELESTIAL MECHANICS JOVIAN TRAPPED RADIATION IMAGING PHOTOPOLARIMETER (IPP) ULTRAVIOLET PHOTOMETRY METEOROID DETECTORS S-BAND OCCULTATION COSMIC-RAY SPECTRA INFRARED RADIOMETERS CHARGED PARTICLE COMPOSITION ASTEROID/METEOROID ASTRONOMY JOVIAN CHARGED PARTICLES ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY PLASMA	03/03/72	JUPITER FLYBY		72-012A 72-012A-09 72-012A-05 72-012A-07 72-012A-06 72-012A-04 72-012A-10 72-012A-12 72-012A-08 72-012A-02 72-012A-03 72-012A-11 72-012A-14 72-012A-13	3/03/72 3/03/72 12/19/73 3/03/72 3/03/72 3/03/72 12/05/73 3/03/72 12/10/73 3/03/72 8/03/76 3/03/72 1/30/76 3/03/72	NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL	STND STND STND STND STND STND ZERO STND STND STND ZERO STND ZERO	81 81 81 81 82 82 82 82 82 83 83 83 83 83
PIONEER 11	ACUNA ANDERSON FILLIUS GEHRELS JUDGE KINARD KLIORÉ MCDONALD MUNCH SIMPSON SMITH VAN ALLEN WOLFE	UNITED STATES NASA-OSS JOVIAN MAGNETIC FIELD CELESTIAL MECHANICS JOVIAN TRAPPED RADIATION IMAGING PHOTOPOLARIMETER (IPP) ULTRAVIOLET PHOTOMETRY METEOROID DETECTORS S-BAND OCCULTATION COSMIC-RAY SPECTRA INFRARED RADIOMETER CHARGED PARTICLE COMPOSITION MAGNETIC FIELDS JOVIAN CHARGED PARTICLES PLASMA	04/06/73	SATURN FLYBY		73-019A 73-019A-14 73-019A-09 73-019A-C5 73-019A-07 73-019A-06 73-019A-04 73-019A-10 73-019A-12 73-019A-08 73-019A-02 73-019A-01 73-019A-11 73-019A-13	4/06/73 1/30/76 4/06/73 4/06/73 4/06/73 4/06/73 4/06/73 12/04/74 4/06/73 12/09/74 4/06/73 4/06/73 4/06/73 4/06/73	NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL	STND ZERO STND STND STND STND STND ZERO STND ZERO STND STND STND	84 84 84 84 85 85 85 85 85 85 86 86 86 86
PIONEER VENUS 1	BRACE CROFT DONAHUE EVANS HANSEN KNUDSEN MASURSKY MCGILL NAGY NIEMANN PETTINGILL RUSSELL SCARF	UNITED STATES NASA-OSS LANGMUIR PROBE RADIO SCIENCE TEAM PARTICIPATING THEORIST DONAHUE TRANSIENT GAMMA-RAY SOURCES CLOUD PHOTOPOLARIMETER RETARDING POTENTIAL ANALYZER PARTICIPATING THEORIST MASURSKY PARTICIPATING THEORIST MCGILL PARTICIPATING THEORIST NAGY NEUTRAL PARTICLE MASS SPECTROMETER RADAR ALTIMETER TRIAxIAL FLUXGATE MAGNETOMETER ELECTRIC FIELD DETECTOR	05/20/78	VENUSCENTRIC		78-051A 78-051A-01 78-051A-03 78-051A-04 78-051A-C5 78-051A-06 78-051A-07 78-051A-C8 78-051A-09 78-051A-10 78-051A-11 78-051A-C2 78-051A-12 78-051A-13	5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78 5/20/78	NORMAL NORMAL NORMAL NA NORMAL NORMAL NORMAL NA NA NA NORMAL NORMAL NORMAL NORMAL	STND ZERO STND NA STND STND ZERO NA NA NA ZERO ZERO STND STND	87 87 87 87 87 87 87 88 88 88 88 88 88 89

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SCHUBERT	PARTICIPATING THEORIST SCHUBERT			78-051A-14	NA	NA	89
STEWART	PROGRAMMABLE ULTRAVIOLET SPECTROMETER			78-051A-15	5/20/78	NORMAL	89
TAYLOR	RADIOMETRIC TEMPERATURE-SOUNDING EXPERIMENT			78-051A-16	5/20/78	NORMAL	89
TAYLOR, JR.	ION MASS SPECTROMETER			78-051A-17	5/20/78	NORMAL	89
WOLFE	SOLAR WIND PLASMA DETECTOR			78-051A-18	5/20/78	NORMAL	89
*PIONEER VENUS 1978	SEE PIONEER VENUS 2						
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE LRG						
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM						
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM2						
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM3						
PIONEER VENUS 1978 ORBIT	SEE PIONEER VENUS 1						
PIONEER VENUS 2	UNITED STATES NASA-OSS 08/08/78 VENUS PROBE			78-078A	8/08/78	NORMAL	89
BAUER	PARTICIPATING THEORIST BAUER			78-078A-08	NA	NA	90
COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			78-078A-06	8/08/78	NORMAL	90
DONAHUE	PARTICIPATING THEORIST DONAHUE			78-078A-09	NA	NA	90
GOODY	PARTICIPATING THEORIST GOODY			78-078A-10	NA	NA	90
HUNTEN	PARTICIPATING THEORIST HUNTEN			78-078A-11	NA	NA	90
PETTINGILL	RADIO SCIENCE TEAM			78-078A-07	8/08/78	NORMAL	90
POLLACK	PARTICIPATING THEORIST POLLACK			78-078A-12	NA	NA	91
SPENCER	PARTICIPATING THEORIST SPENCER			78-078A-13	NA	NA	91
TAYLOR, JR.	ION-MASS SPECTROMETER			78-078A-02	8/08/78	NORMAL	91
VON ZAHN	NEUTRAL PARTICLE MASS SPECTROMETER			78-078A-03	8/08/78	NORMAL	91
PIONEER VENUS ORBITER	SEE PIONEER VENUS 1						
PIONEER VENUS PROBE LRG	UNITED STATES NASA-OSS 08/08/78 VENUS PROBE			78-078D	8/08/78	NORMAL	91
BOESE	INFRARED RADIOMETER			78-078D-05	8/08/78	NORMAL	91
COUNSELMAN	DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING			78-078D-09	8/08/78	NORMAL	91
HOFFMAN	NEUTRAL PARTICLE MASS SPECTROMETER			78-078D-06	8/08/78	NORMAL	92
KNOLLENBERG	CLOUD PARTICLE SIZE SPECTROMETER			78-078D-03	8/08/78	NORMAL	92
OYAMA	GAS CHROMATOGRAPH			78-078D-04	8/08/78	NORMAL	92
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			78-078D-02	8/08/78	NORMAL	92
SEIFF	ATMOSPHERE STRUCTURE			78-078D-01	8/08/78	NORMAL	92
TOMASKO	SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE			78-078D-07	8/08/78	NORMAL	92
PIONEER VENUS PROBE SM	UNITED STATES NASA-OSS 08/08/78 VENUS PROBE			78-078E	8/08/78	NORMAL	92
COUNSELMAN	DIFFERENTIAL VERY LONG BASELINE INTERFEROMETRIC TRACKING			78-078E-03	8/08/78	NORMAL	93
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			78-078E-02	8/08/78	NORMAL	93
SEIFF	ATMOSPHERE STRUCTURE			78-078E-01	8/08/78	NORMAL	93
SUOMI	INFRARED RADIOMETER			78-078E-04	8/08/78	NORMAL	93
PIONEER VENUS PROBE SM2	UNITED STATES NASA-OSS 08/08/78 VENUS PROBE			78-078F	8/08/78	NORMAL	93
COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			78-078F-03	8/08/78	NORMAL	94
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			78-078F-02	8/08/78	NORMAL	94
SEIFF	ATMOSPHERE STRUCTURE			78-078F-01	8/08/78	NORMAL	94
SUOMI	INFRARED RADIOMETER			78-078F-04	8/08/78	NORMAL	94
PIONEER VENUS PROBE SM3	UNITED STATES NASA-OSS 08/08/78 VENUS PROBE			78-078G	8/08/78	NORMAL	94
COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			78-078G-03	8/08/78	NORMAL	94
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			78-078G-02	8/08/78	NORMAL	95
SEIFF	ATMOSPHERE STRUCTURE			78-078G-01	8/08/78	NORMAL	95
SUOMI	INFRARED RADIOMETER			78-078G-04	8/08/78	NORMAL	95
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PIONEER-B	SEE PIONEER 7						
PIONEER-C	SEE PIONEER 8						
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PROGNOZ 5	U.S.S.R.	SAS	11/25/76	GEOCENTRIC	76-112A	7/20/77	INOPERABLE	ZERO	95
EROSHENKO	THREE-AXIS FLUXGATE MAGNETOMETER				76-112A-01	7/20/77	INOPERABLE	ZERO	95
GRIGORYEVA	KILOMETRIC/HECTOMETRIC RECEIVER				76-112A-05	7/20/77	INOPERABLE	ZERO	95
GRINGAUZ	PLASMA DETECTOR				76-112A-02	7/20/77	INOPERABLE	ZERO	95
KACHAROV	SOLAR X-RAYS				76-112A-03	7/20/77	INOPERABLE	ZERO	95
KURT	INTERPLANETARY UV EMISSION PHOTOMETER - HYDROGEN AND HELIUM				76-112A-08	7/20/77	INOPERABLE	ZERO	95
LICKIN	SOLAR X-RAY SPECTROMETER				76-112A-07	7/20/77	INOPERABLE	ZERO	96
LOGACHEV	ENERGETIC PARTICLES CHARGE COMPOSITION				76-112A-04	7/20/77	INOPERABLE	ZERO	96
LUTSENKO	ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION				76-112A-06	7/20/77	INOPERABLE	ZERO	96
ZERTSALOV	PLASMA SPECTROMETERS				76-112A-09	7/20/77	INOPERABLE	ZERO	96
PROGNOZ 6	U.S.S.R.	SAS	09/22/77	GEOCENTRIC	77-093A	3/00/78	NORMAL	SUBS	96
EROSHENKO	THREE-AXIS FLUXGATE MAGNETOMETER				77-093A-01	3/00/78	NORMAL	SUBS	96
ESTULIN	GAMMA-RAY SPECTROMETER				77-093A-05	3/00/78	NORMAL	SUBS	96
GRINGAUZ	PLASMA DETECTOR				77-093A-C2	3/00/78	NORMAL	SUBS	96
KACHAROV	SOLAR X-RAYS				77-093A-03	3/00/78	NORMAL	SUBS	97
KURT	INTERPLANETARY UV EMISSION PHOTOMETER - HYDROGEN AND HELIUM				77-093A-08	3/00/78	NORMAL	SUBS	97
LICKIN	SOLAR X-RAY SPECTROMETER				77-093A-07	3/00/78	NORMAL	SUBS	97
LOGACHEV	ELECTRON AND PROTON SPECTROMETER				77-093A-04	3/00/78	NORMAL	SUBS	97
LUTSENKO	ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION				77-093A-11	3/00/78	NORMAL	SUBS	97
PISARENKO	ENERGETIC ELECTRON AND PROTON SPECTROMETER				77-093A-09	3/00/78	NORMAL	SUBS	97
SERVERNYH	UV EMISSION SPECTROMETER				77-093A-10	3/00/78	NORMAL	SUBS	97
SKREBTSOV	PROTON AND HEAVY NUCLEI SPECTROMETER				77-093A-06	3/00/78	NORMAL	SUBS	97
S 6C	SEE AE-C								
S 6E	SEE AE-E								
S 66C	SEE BE-C								
S3-2	UNITED STATES	DOD-USAF	12/03/75	GEOCENTRIC	75-114B	5/01/78	INOPERABLE	ZERO	97
FENNELL	PROTON TIME-OF-FLIGHT AND PROTON ALPHA COUNTERS				75-114B-14	5/01/78	INOPERABLE	ZERO	98
MARCOS	TRIAXIAL PIEZOELECTRIC ACCELEROMETER				75-114B-10	5/01/78	INOPERABLE	ZERO	98
MCISAAC	NEUTRAL DENSITY EXPERIMENTS (COLD AND HOT CATHODE GAUGES)				75-114B-01	5/01/78	INOPERABLE	ZERO	98
PHILBRICK	VELOCITY MASS SPECTROMETER				75-114B-C2	5/01/78	INOPERABLE	ZERO	98
RICE	NEUTRAL DENSITY EXPERIMENT (COLD CATHODE GAGE)				75-114B-03	5/01/78	INOPERABLE	ZERO	98
RICE	RETARDING POTENTIAL ANALYZER (RPA)				75-114B-11	5/01/78	INOPERABLE	ZERO	98
RICE	ELECTROSTATIC ANALYZER (2-300 EV)				75-114B-13	5/01/78	INOPERABLE	ZERO	98
SHUMAN	MAGNETOMETER				75-114B-08	5/01/78	INOPERABLE	ZERO	98
SMIDDY	ELECTRIC FIELD OBSERVATIONS				75-114B-07	5/01/78	INOPERABLE	ZERO	99
VAMPOLA	ENERGETIC ELECTRON (0.1- 1.0 MEV) SENSOR				75-114B-06	5/01/78	INOPERABLE	ZERO	99
VANCOUR	ELECTROSTATIC ANALYZER (1-20 KEV)				75-114B-09	5/01/78	INOPERABLE	ZERO	99
WILDMAN	SPHERICAL ELECTRON SENSOR AND PLANAR APERTURE ION SENSORS				75-114B-12	5/01/78	INOPERABLE	ZERO	99
YATES	LOW ENERGY PROTON SPECTROMETER				75-114B-04	5/01/78	INOPERABLE	ZERO	99
YATES	PROTON-ALPHA PARTICLE DETECTOR				75-114B-05	5/01/78	INOPERABLE	ZERO	99
S3-3	UNITED STATES	DOD-USAF	07/08/76	GEOCENTRIC	76-065B	7/08/76	NORMAL	STND	99
FENNELL	ION-ELECTRON MASS SPECTROMETER				76-065B-08	7/08/76	NORMAL	STND	99
MOZER	DC ELECTRIC FIELDS				76-065B-01	7/09/76	NORMAL	STND	100
SHARP	LOW-ENERGY PARTICLE SPECTROMETER				76-065B-C2	7/08/76	NORMAL	STND	100
VAMPOLA	ENERGETIC ELECTRON MAGNETIC SPECTROMETER				76-065B-C7	7/08/76	NORMAL	STND	100
WILDMAN	ELECTRIC FIELDS-ION DRIFT				76-065B-05	7/08/76	NORMAL	STND	100
YATES	LOW-ENERGY PHOTON SPECTROMETERS				76-065B-03	7/08/76	NORMAL	STND	100
YATES	PROTON TELESCOPE				76-065B-04	7/08/76	NORMAL	STND	100
S74-2	SEE S3-3								
SAGE	UNITED STATES	NASA-OSTA	01/25/79	GEOCENTRIC	AEM-B		APPROVED MISSION		160
MCCORMICK	STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)				AEM-B -01				160
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CLARK		ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES		75-037A-01	5/10/75	NORMAL	STND 100
CLARK		ANALYSIS OF GALACTIC X-RAY SOURCES		75-037A-02	12/11/75	PARTIAL	STND 101
CLARK		CONTINUOUS X-RAY FLUCTUATION MONITOR OF SCORPIO X-1		75-037A-03	1/15/77	PARTIAL	STND 101
CLARK		X-RAY ABSORPTION CONTOURS OF THE GALAXY		75-037A-04	11/22/76	PARTIAL	STND 101
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SCATHA		SEE STP P76-2					
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MARSH		LASER TRACKING		78-064A-06	6/27/78	NORMAL	STND 101
MCLAIN		SCANNING VISUAL/INFRARED RADIOMETER		78-064A-04	6/27/78	NORMAL	STND 101
PIERSON		MICROWAVE WIND SCATTEROMETER		78-064A-03	6/27/78	NORMAL	STND 102
ROSS		SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR)		78-064A-05	6/27/78	NORMAL	STND 102
TAPLEY		COMPRESSED PULSE RADAR ALTIMETER (RA)		78-064A-01	6/27/78	NORMAL	STND 102
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SESP NO. NRL-111-0264		SEE SOLRAD 11B					
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SMS 1	UNITED STATES UNITED STATES	NOAA-NESS NASA-OSTA	05/17/74 GEOCENTRIC	74-033A	7/19/77	NORMAL	ZERO 103
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			74-033A-01	1/08/76	NORMAL	ZERO 103
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			74-033A-05	4/15/77	NORMAL	ZERO 103
WILLIAMS	ENERGETIC PARTICLE MONITOR			74-033A-02	7/19/77	NORMAL	ZERO 104
WILLIAMS	SOLAR X-RAY MONITOR			74-033A-03	7/18/77	NORMAL	ZERO 104
WILLIAMS	MAGNETIC FIELD MONITOR			74-033A-04	7/19/77	NORMAL	ZERO 104
SMS 2	UNITED STATES UNITED STATES	NOAA-NESS NASA-OSTA	02/06/75 GEOCENTRIC	75-011A	7/13/78	NORMAL	ZERO 104
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-011A-04	7/13/78	NORMAL	ZERO 104
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-011A-05	4/30/78	NORMAL	ZERO 105
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SOLAR EXPLORER-C	SEE SOLRAD 10						
SOLAR MAXIMUM MISSION	SEE SMM						
SOLAR MESOSPHERE EXPL	SEE SME						
SOLRAD 10	UNITED STATES UNITED STATES	NASA-OSS DOD-NAVY	07/08/71 GEOCENTRIC	71-058A	7/00/78	INOPERABLE	ZERO 105
KREPLIN	SOLAR RADIATION DETECTORS			71-058A-C1	7/00/78	INOPERABLE	ZERO 105
SOLRAD 11B	UNITED STATES	DOD-NAVY	03/15/76 GEOCENTRIC	76-023b	12/00/76	PARTIAL	SUBS 106
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KREPLIN	8- TO 16-A SOLAR X-RAY MONITOR			76-023b-05	12/00/76	NORMAL	SUBS 106
KREPLIN	44- TO 60-A SOLAR X-RAY MONITOR			76-023b-06	12/00/76	NORMAL	SUBS 106
KREPLIN	170- TO 1050-A SOLAR EUV MONITOR			76-023b-07	12/00/76	NORMAL	SUBS 106
KREPLIN	0.5- TO 3-A SOLAR X-RAY MONITOR			76-023b-12	12/00/76	NORMAL	SUBS 107
KREPLIN	2- TO 10-A SOLAR X-RAY MONITOR			76-023b-13	12/00/76	NORMAL	SUBS 107
LAZARUS	SOLAR WIND SPECTROMETER			76-023b-15	2/00/78	INOPERABLE	ZERO 107
MEEKINS	CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR			76-023b-03	12/00/76	NORMAL	SUBS 107
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APPENDIXES

APPENDIX A - OTHER RELEVANT SPACECRAFT

Spacecraft relevant to the purpose of this report and not included elsewhere are listed in this Appendix. The spacecraft include those that have previously been published in earlier reports of this series and now have a status of cancelled, failed at launch, or mission being rescoped. In addition, some spacecraft that were turned off but were still operable in the last report and dropped from this report are listed; it is extremely unlikely these will ever be re-activated. Some missions that are under study might be included if these seem likely to be approved in the near future. The investigators for these missions have not yet been chosen. The spacecraft are listed alphabetically by the NSSDC spacecraft common name. Listed with each spacecraft are the sponsoring country and agency, the actual or planned launch date, the type of orbit, 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>NSDC ID</u>	<u>Current Status</u>
AE-D	United States NASA-OSS	10/06/75	75-096A	Inoperable 1/29/76
AEROS 2	Fed Rep of Germany United States	GFW NASA-OSS	7/16/74	74-055A Inoperable 9/25/75
Alouette 2	Canada United States	CRC NASA-OSS	1/29/65	65-098A *Abandoned 11/29/75
ANS	The Netherlands United States	NIVR NASA-OSS	8/30/74	74-070A Decayed 6/14/77
Apollo 11 LM/EASEP	United States	NASA-QMSF	7/16/69	69-059C *Abandoned 10/01/77
Apollo 12 LM/ALSEP	United States United States	NASA-QMSF NASA-OSS	11/14/69	69-099C *Abandoned 10/01/77
Apollo 14 LM/ALSEP	United States United States	NASA-QMSF NASA-OSS	1/31/71	71-008C *Abandoned 10/01/77
Apollo 15 LM/ALSEP	United States United States	NASA-QMSF NASA-OSS	7/26/71	71-063C *Abandoned 10/01/77
Apollo 16 LM/ALSEP	United States United States	NASA-QMSF NASA-OSS	4/16/72	72-031C *Abandoned 10/01/77
Apollo 17 LM/ALSEP	United States United States	NASA-QMSF NASA-OSS	12/07/72	72-096C *Abandoned 10/01/77
Aryabhata	India	ISRO	4/19/75	75-035A Inoperable 9/23/76
ASTP-Apollo	United States	NASA-QMSF	7/15/75	75-066A Inoperable 7/24/75
ASTP-Soyuz	U.S.S.R.	SAS	7/15/75	75-065A Inoperable 7/24/75
Q2B	France	CNR5	9/27/75	75-092A Inoperable 12/28/76
DMSP (74-063A)	United States	DOD-USAF	8/09/74	74-063A Inoperable 11/07/74
ESSA 8	United States	ESSA	12/15/68	68-114A Inoperable 3/06/76
HEOS 1	International	ESA	12/05/68	68-109A Inoperable 10/18/75
HERMES	United States Canada	NASA-OA CRC	1/17/76	76-004A Normal (Technology Satellite, Not Suitable for Report)
INTASAT	Spain United States	CNIE-INTA NASA-OSS	11/15/74	74-089C Inoperable 10/06/76
Intercosmos 14	U.S.S.R.	Intercos	12/11/75	75-115A Inoperable 6/23/76
ISS 1	Japan Japan	NASDA RRL	2/29/76	76-019A Inoperable 4/02/76
Mariner 10	United States	NASA-OSS	11/03/73	73-085A Inoperable 3/24/75
Meteoroid Technology Satellite	United States	NASA-OAST	8/13/72	72-061A *Abandoned 6/05/75
Meteosat-B	International	ESA	11/09/78	METOS-B Canceled Mission
NOAA 3	United States United States	NOAA-NESS NASA-OA	11/06/73	73-086A Inoperable 8/00/76
One Meter UV Telescope	United States	NASA-OSS	00/00/82	QUVTEL Mission Being Rescoped
OSO 5	United States	NASA-OSS	1/22/69	69-006A Inoperable 8/25/75
OVS-6	United States	DOD-USAF	5/23/69	69-046B *Abandoned 8/00/76
Prognoz 4	U.S.S.R.	SAS	12/22/75	75-122A Inoperable 3/00/76
RAE-B	United States	NASA-OSS	6/10/73	73-039A *Abandoned 4/30/77
SS-1	United States	DOD-USAF	10/29/74	74-085C Inoperable 5/26/75
San Marco 4	United States Italy	NASA-OSS CRA	2/18/74	74-009A *Abandoned 5/04/76
SAS-A	United States	NASA-OSSA	12/12/70	70-107A Inoperable 1/04/75
Seasat-B	United States	NASA-OA	00/00/81	SEASAT-B Canceled Mission
Solrad 11A	United States	DOD-NAVY	3/15/76	76-023C Inoperable 6/12/77
SRATS	Japan	ISAS	2/24/75	75-014A *Abandoned 3/14/77

*The spacecraft is unlikely to be reactivated or is inoperable now. In the case of Apollo 11, 14, and 15 use is still being made of the laser ranging retroreflector but because these are passive devices continuation in this report is not appropriate.

APPENDIX B - SPECIAL INVESTIGATORS

B1. IUE Guest Investigators

The International Ultraviolet Explorer (IUE) has a facility class payload that is utilized for a number of different investigations. This spacecraft does not have individual principal investigators or team leaders associated with each experiment. Listed are the name of the guest investigator with his affiliation and the title of the investigation.

B2. 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 affiliations are listed.

B3. The Caravane Collaboration (COS-B)

The gamma-ray astronomy satellite, COS-B, was initially conceived and implemented by five university and research groups. The members of these groups and their affiliations are listed. Other individuals who joined this effort are included in the list.

B4. Individual Jupiter Orbiter Probe 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.

B5. 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 affiliations 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.

Bl. International Ultraviolet Explorer (IUE) Guest Investigators

Guest Investigators
and Investigations

- Barth - University of Colorado
The Determination of the Seasonal Dynamics of Mars from Observed
Ozone and Atmospheric Dust Variations
- Black - Harvard College Observatory
Investigation of Interstellar Carbon
Investigations of Stellar Chromospheres and Coronas
Ultraviolet Investigations of Stellar X-Ray Sources
- Boggess - NASA-GSFC
Observations of Planetary Nebulae and of Galactic H II Regions
Ultraviolet Observations of Quasi-Stellar Objects
- Bohm-Vitense - University of Washington
Ultraviolet Observations of A and F Stars
- Castor - University of Colorado
Spectroscopic Observations of O, Of, and Wolf-Rayet Stars
- Crampton - Dominion Astrophysical Observatory, Canada
Circumstellar Matter in Close Binaries
Evidence for Mass Loss in the Ultraviolet Spectra of Early-Type
Supergiants
- Conti - University of Colorado
Spectroscopic Observations of O, Of, and Wolf-Rayet Stars
- Dalgarno - Harvard College Observatory
Investigation of Interstellar Carbon
- Daltabuit - Instituto of Astronomia, Universidad Nacional Autonoma
de Mexico
Ultraviolet Photoelectric Photometry of Emission Line Objects
- Delsemme - University of Toledo
Observation of Comet Encke and Other Comets
- Doherty - Washburn Observatory, University of Wisconsin
Observations of Stellar MG II 2800 A Lines in Main-Sequence F-G
Stars

Guest Investigators
and Investigations

Donn - NASA-GSFC

The Search for Spectra of Interstellar Molecules Against Hot Stars,
Ultraviolet Cometary Observations

Dupree - Harvard College Observatory

Investigation of Interstellar Carbon
Investigations of Stellar Chromospheres and Coronas
Ultraviolet Investigations of Stellar X-Ray Sources

Estabrook - NASA-JPL

Ultraviolet Observations of Quasistellar Objects and the Intergalactic
Medium

Fiebelman - NASA-GSFC

Observations of Planetary Nebulae and of Galactic H II Regions

Gehrels - University of Arizona

Spectrophotometry of Planets

Greenstein - California Institute of Technology

Observations of Faint, High-Latitude Blue Stars

Gursky - Center for Astrophysics, SAO

Study of the Ultraviolet Spectra of Selected Galactic X-Ray Sources

Hackney - Western Kentucky University

Observations of the Ultraviolet Spectra of the Peculiar Radio Source
OJ 287 and Related Objects

Heap - NASA-GSFC ———

Hot Subluminous Stars

Hilditch - Dominion Astrophysical Observatory, Canada

Circumstellar Matter in Close Binaries

Hill - Dominion Astrophysical Observatory, Canada

Circumstellar Matter in Close Binaries
Evidence for Mass Loss in the Ultraviolet Spectra of Early-Type
Supergiants

Hummer - University of Colorado

Spectroscopic Observations of O, Of, and Wolf-Rayet Stars

Hutchings - Dominion Astrophysical Observatory, Canada

Circumstellar Matter in Close Binaries
Evidence of Mass Loss in the Ultraviolet Spectra of Early-Type
Supergiants

Guest Investigators
and Investigations

- Imhoff -- Ohio State University
Ultraviolet Spectra of T Tauri Stars
- Jackson - NASA-GSFC
Ultraviolet Cometary Observations
- Jenkins - Princeton University
The Study of Interstellar Absorption Lines
- Johnson - Lockheed Palo Alto Research Laboratory
Investigations of Circumstellar Matter
- Jugaku - Tokyo Astronomical Observatory
Ultraviolet Spectroscopy of Selected B and A Stars
- Kellogg - Center for Astrophysics, SAO
Study of the Ultraviolet Spectra of Selected Galactic X-Ray Sources
- Kleinmann - SAO
Lyman and Photometry of H II Region
- Klinglesmith - NASA-GSFC
Ultraviolet Studies of the Star A Centauri
- Kondo - NASA-JSC
Investigation of Mass Flow in Close Binary Systems
- Lane - NASA-JPL
The Determination of the Seasonal Dynamics of Mars from Observed
Ozone and Atmospheric Dust Variations
Ultraviolet Observations of Quasistellar Objects and the Intergalactic
Medium
- Leckrone - NASA-GSFC
Spectroscopy of the Bp, Ap, and Magnetic Variable Stars at Ultra-
violet Wavelengths
Ultraviolet Spectroscopy of Dwarf and Giant B and A Stars
- Liller - Harvard College Observatory
Ultraviolet Investigations of Stellar X-Ray Sources
- Lillia - Laboratory for Atmospheric & Space Physics
Spectroscopic Observations of O, Of, and Wolf-Rayet Stars
- Linsky - University of Colorado
Observations of Chromospheric Emission Lines from F-M Dwarfs and
Giants

Guest Investigators
and Investigations

- Matilsky - Center for Astrophysics, SAO
Study of the Ultraviolet Spectra of Selected Galactic X-Ray Sources
- McCluskey - NASA-JSC
Investigation of Mass Flow in Close Binary Systems
- McCracken - NASA-GSFC
Observations of Planetary Nebulae and of Galactic H II Regions
- Mentall - NASA-GSFC
The Search for Spectra of Interstellar Molecules Against Hot Stars
- Mihalas - High Altitude Observatory
Spectroscopic Observations of O, Of, and Wolf-Rayet Stars
- Moos - Johns Hopkins University
Ultraviolet Studies of the Outer Planets
- Morton - Princeton University
Ultraviolet Spectroscopy of Stellar and Extragalactic Objects
- Mumma - NASA-GSFC
The Search for Spectra of Interstellar Molecules Against Hot Stars
- Oke - California Institute of Technology
Observations of Faint, High-Latitude Blue Stars
Ultraviolet Spectroscopy of Peculiar Galaxies and Quasars
- Owen - State University of New York, Stony Brook
Ultraviolet Observations of Planets, Satellites, and Comets
- Ponnamperuma - University of Maryland
Ultraviolet Observations of Planets, Satellites, and Comets
- Plavec - University of California, Los Angeles
Problems of Mass Loss and Mass Transfer in Close Binary Systems
- Roeder - University of Toronto, Canada
Ultraviolet Spectra of Brighter, Low Redshift Quasars and Some Other
Related Objects
- Sagan - Cornell University
Ultraviolet Observations of Planets, Satellites, and Comets
- Sapar - W. Struve Astrophysical Observatory of Tartu, U.S.S.R.
Ultraviolet Observations of Early-Type Stars and Galaxies

Guest Investigators
and Investigations

Savage - University of Wisconsin, Madison
Interstellar Lyman-Alpha Observations

Schild - SAO
Lyman and Photometry of H II Region

Schmidt - California Institute of Technology
Ultraviolet Observations of Quasistellar Objects and the Intergalactic
Medium

Smith - NASA-GSFC
The Search for Spectra of Interstellar Molecules Against Hot Stars
Ultraviolet Emission Line Spectra in Bright Galaxies

Snyder - University of Virginia
The Search for Spectra of Interstellar Molecules Against Hot Stars

Sobieski - NASA-GSFC
Ultraviolet Spectroscopy of Peculiar Eclipsing Binary Stars

Spitzer - Princeton University
The Study of Interstellar Absorption Lines
Ultraviolet Spectroscopy of Stellar and Extragalactic Objects

Stecher - NASA-GSFC
The Physical State and the Distribution of Gas in Our Galaxy

Steif - NASA-GSFC
The Search for Spectra of Interstellar Molecules Against Hot Stars

Timothy - Harvard College Observatory
Investigations of Stellar Chromospheres and Coronas

Tomasko - University of Arizona
Spectrophotometry of Planets

Torres-Peimbert - Instituto of Astronomia, Universidad Nacional Autonoma
de Mexico
Ultraviolet Photoelectric Photometry of Emission Line Objects

Underhill - NASA-GSFC
Study of the Ultraviolet Spectra of Early-Type Supergiants

Vandenbout - University of Texas, Austin
Observations of Interstellar Molecules
The Interstellar Abundance of Light Elements
Ultraviolet Spectroscopy of X-Ray Emitting Binary Systems

Guest Investigators
and Investigations

Wahlquist - NASA-JPL

Ultraviolet Observations of Quasistellar Objects and the Intergalactic
Medium

West - NASA-GSFC

Ultraviolet Spectra of Wolf-Rayet Stars and Mass Losing Supergiants

Williams - University of Manchester, UK

The Physical State and the Distribution of Gas in Our Galaxy

Wing - Ohio State University

Exploratory Observations of the Ultraviolet Spectra of Late-Type
Stars

Zellner - University of Arizona

Spectrophotometry of Planets

B2. Joint Infrared Astronomy Satellite (IRAS) Science Working Group

<u>Member</u>	<u>Affiliation</u>
Aumann, H. H.	NASA-JPL
Beintema, D.	University of Groningen, The Netherlands
Borgman, J.	University of Groningen, The Netherlands
Clegg, P.	Queen Mary College, UK
Dejong, T.	University of Leiden, The Netherlands
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Habing, A.	University of Leiden, The Netherlands
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B4. INDIVIDUAL JUPITER ORBITER PROBE 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
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

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

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 Münich 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

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, Spectro-Photometry, and Polarimetry of the Galilean Satellites and Jupiter	To investigate the surface morphology and spectro-photometric 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

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	(1) 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 environments of the Galilean satellites. (2) To use phase and intensity scintillation data to study atmospheric turbulence and convection on Jupiter. (3) To investigate the use of bistatic radar techniques to study the surfaces of the Galilean satellites.	Von R. Eshleman Stanford University

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 $E-15$.	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

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 determines 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

B5. AMPTE/Charge Composition Explorer (CCE)/Ion Release
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APPENDIX C - DEFINITIONS

Several words and phrases are used in this report in a precise and specific sense. These terms are defined here to clarify the intended meaning to the reader.

- Active - As applied to a spacecraft mission or one of its experiments pertinent to this report, a general status-of-operation term that means the spacecraft or experiment has been launched and was reported to NSSDC to have either a "normal" or "partial" status.
- Apoapsis - The distance from the surface of the reference body to the furthest orbit point. This distance is expressed as astronomical units (AU) for heliocentric orbits, including planetary system flybys that became escape trajectories from the solar system; e.g., Pioneers 10 and 11. The units are kilometers (km) of altitude for all other orbits.
- Approved Mission - A planned spacecraft mission status term that means the spacecraft mission has been approved, and funding is or will be available to perform the mission.
- Brief Description - As applied to a spacecraft, a description containing a concise summary of the spacecraft mission, specifically outlining the overall objectives of the mission and the scientific studies being performed. As applied to an experiment, a description containing a concise summary of the experiment purpose and instrument characteristics, emphasizing those relevant to the scientific use of the resulting data.
- Canceled Mission - As applied to a spacecraft mission, a status term that means the mission was canceled and no funds are expected to become available to carry out the mission.

- Failed Mission - As applied to a spacecraft mission, a status term that means the 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 - As applied to a spacecraft, a status-of-operation term that means the spacecraft is no longer capable of producing any useful scientific data because of malfunction or failure of the spacecraft system, completion of the phase of the spacecraft trajectory in which useful measurements could be performed, or network support (tracking, command, and telemetry) has been discontinued, etc. As applied to an experiment, a status-of-operation term that means the experiment is no longer capable of producing any useful scientific data because of a malfunction or failure of the experiment system or critical parts of the spacecraft system, or the completion of the phase of the spacecraft trajectory in which useful measurements could be performed.
- Mission Being Rescoped - As applied to a spacecraft mission, a status term that means the mission has been redefined to an extent that the original mission plan and experiments are no longer valid and a new mission plan and experiments are under study.
- Normal - As applied to an active spacecraft, a status-of-operation term that means the spacecraft and other required systems are capable of working so that the data would be suitable for all of the scientific studies planned for the spacecraft when the spacecraft is turned on and the data are recorded. As applied to an active experiment, a status-of-operation term that means all experiment and spacecraft systems are working so that the data would be suitable for all of the scientific studies originally planned for the experiment.

- NSSDC ID Code - An identification code used in the NSSDC information system. In this system, each successfully launched spacecraft and 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 Maximum Mission, would be coded SMM. The experiments to be carried aboard this spacecraft would be coded SMM -01, SMM -02, etc. Once a spacecraft is launched, its prelaunch designation is changed to a postlaunch designation; e.g., Pioneer-G, which was launched on 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 any one of the following: geocentric, geocentric commensurate, selenocentric, heliocentric, Venuscentric, Marscentric, lunar lander, Venus lander, Mars lander, Jupiter lander, lunar flyby, Venus flyby, Mars flyby, Mercury flyby, Jupiter flyby, Venus probe, and Jupiter probe.
- Partial - As applied to a spacecraft, a status-of-operation term that means the spacecraft and other required systems are working, but not all systems are working as well as the design required. If the spacecraft was turned on and the data recorded, the data would be suitable for only a portion of the scientific studies planned for the spacecraft. As applied to an experiment, a status-of-operation term defined similarly to that for a spacecraft.
- Periapsis - The distance from the surface of the reference body to the nearest orbit point. This distance is expressed as astronomical units (AU) for heliocentric orbits, including planetary system flybys that became escape trajectories from the solar system; e.g., Pioneers 10 and 11. The units are kilometers (km) of altitude for all other orbits.

- Planned - As applied to a spacecraft mission pertinent to this report, a general status term that means the spacecraft mission was last reported to NSSDC as either "approved" or "proposed." As applied to an experiment, a term that indicates an experiment is expected to fly on a planned spacecraft mission.
- Proposed Mission - A planned mission status term that means the spacecraft design and the experiments have been selected; however, no funds have been approved to perform this mission.
- Standard - As applied to a spacecraft or experiment data acquisition rate, a term that means the 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 scientific studies.
- Substandard - As applied to a spacecraft or experiment data acquisition rate, a term that means the 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 the planned scientific studies.
- Unknown - As a general term, indicates information either unknown or unavailable at NSSDC.
- Zero - As applied to a data acquisition rate, a term that means the spacecraft or 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.

APPENDIX D - ABBREVIATIONS AND ACRONYMS

A	angstrom	CAL	calorie
ABMA	Army Ballistic Missile Agency	CAL TECH	California Institute of Technology
ACAD	Academy	CALSPHERE	calibration sphere
AGIC	Aeronautical Chart and Information Center (now Defense Mapping Agency Aerospace Center)	CAMEO	Chemically Active Materials Ejected In Orbit (satellite, NASA)
ACS	attitude control system	CAN	Canada
AD	Dual Air Density Explorer (satellite, NASA)	CAS	Cooperative Applications Satellite (France-NASA)
A/D	analog to digital	CAV	composite analog video
AE	Atmosphere Explorer (satellite, NASA)	CCE	Charge Composition Explorer (satellite, NASA)
AEC	Atomic Energy Commission	CDA	command and data acquisition (station)
AEROPROPUL	aeropropulsion	CDC	Control Data Corporation
AEROSAT	Aeronautical Satellite (NASA-ESA)	C+DH	control and data handling
AEROSP	aerospace	CBS	cadmium sulfide
AFB	Air Force Base	CENS	Centre d'Etudes Nucleaires de Saclay (France)
AFCLR	Air Force Cambridge Research Laboratories (now US Air Force Geophysics Laboratory)	CHEM	chemical
AFGL	Air Force Geophysics Laboratory	CM	command module, centimeter
AFO	Announcements of Flight Opportunities	CMD	command
AFSC	Air Force Systems Command	CNES	Centre National d'Etudes Spatiales (France)
AGC	automatic gain control	CNET	Centre National d'Etudes des Telecommuni- cations (France)
AGCY	agency	CNRS	Centre National de la Recherche Scienti- fique (France)
AIMP	Anchored Interplanetary Monitoring Platform (satellite, NASA)	COBE	Cosmic Background Explorer (satellite, NASA)
ALOSYN	Alouette topside sounder synoptic (data)	COM- COMSAT	commission Communications Satellite Corporation
ALPO	Apollo Lunar Polar Orbiter (satellite, NASA); Association of Lunar and Planetary Observers	CONIE	Comision Nacional de Investigacion del Espacio (Spain)
ALSEP	Apollo Lunar Surface Experiments Package (NASA)	CORSA	Cosmic-Ray Satellite (Japan)
ALT	altitude	COS	Cosmic-Ray Satellite (ESA); cosmic Committee on Space Research
AM	amplitude modulation	COSPAR	
AMP	ampere	COUNC	council
AMPS	Atmosphere, Magnetosphere, and Plasmas in Space (satellite, NASA)	CPS	cycles per second
AMS	Army Map Service (now Defense Mapping Agency Topographic Center)	CPU	central processing unit
ANSAT	Radio Amateur Satellite Corporation	CRC	Communications Research Centre (Canada)
AMU	atomic mass unit; astronaut maneuvering unit	CRFL	Central Radio Propagation Laboratories (later ITSA, formerly part of ESSA, now NOAA/ERL)
ANIK	Canadian Telecommunications Satellite, also referred to as TELESAT	CRREL	Cold Region Research & Engineering Laboratories
ANNA	Army, Navy, NASA, Air Force (geodetic satellite)	CRS	Commission for Space Research (Italy)
ANS	Astronomical Netherlands Satellite (The Netherlands-NASA)	CRT	cathode ray tube
AOSD	Advanced Orbiting Solar Observatory	CSI	cesium iodide
AP	magnetic activity index Ap	CSM	command service module
APL	Applied Physics Laboratory of Johns Hopkins University	CTR	center
APPL	application	CTS	Canadian Telecommunications Satellite
APT	automatic picture transmission	CZCS	coastal zone ocean color scanner
A/R	acquisition/reference		
ARC	Ames Research Center (NASA)	D	day
ARC-MIN	arc-minute	DAC	data acquisition camera
ARC-S	arc-second	DADE	Dual Air Density Explorer (satellite, NASA)
ARDC	Air Research and Development Command (now AFSC)	DAN	Danish
ARPA	Advanced Research Projects Agency	DAPP	Defense Acquisition and Processing Program (DOD)
ARSP	Aerospace Research Support Program (USAF)	DASA	Defense Atomic Support Agency
AS+E	American Science & Engineering, Inc.	DATS	Despun Antenna Test Satellite (DOD)
ASOS	antimony-sulfide oxy-sulfide	DB	decibel
ASTP	Apollo-Soyuz Test Project (USSR-NASA)	DCP	data collection platform
ASTROPHYS	astrophysics	DCS	direct couple system; data collection system
AT	atomic	DEF	defense
ATCOS	Atmospheric Composition Satellite (NASA)	DEG	degree
ATDA	Alternate Target Docking Adapter	DENPA	Density Phenomena (satellite, Japan)
ATFE	advanced thermal control flight experiment	DEV	development
ATM	Apollo Telescope Mount; atmosphere	DFI	development flight instrumentation
ATS	Applications Technology Satellite (NASA)	DFVLR	Deutsche Forschungs-und Versuchsanstalt für Luft-und Raumfahrt, English transla- tion, Research Laboratory for Aeronautics and Astronautics, Fed Rep of Germany
AT+T	American Telephone & Telegraph Corp.	DIAL/MIKA	Diamant Allemande/Mini Kapsel (satellite, Fed Rep of Germany-France)
AU	astronomical unit	DIAL/MIKA	Diamant Allemande/wissenschaftliche Kapsel (satellite, Fed Rep of Germany- France)
AUST	Australia	DIAM	diameter
AVCS	advanced Vidicon camera system	DIAPO	Diapason (satellite, France)
AVG	average	DIT	Drevel Institute of Technology
AVHRR	advanced very high resolution radiometer	DMAC	Defense Mapping Agency Aerospace Center
AWRE	Atomic Weapons Research Establishment (Australia)	DMATC	Defense Mapping Agency Topographic Center
		DME	Direct Measurements Explorer (satellite, NASA)
BCD	binary coded decimal	DNMP	Defense Military Satellite Program (DOD)
BE	Beacon Explorer (satellite, NASA); beryllium	DMJ	DME data multiplex unit
BEV	billion electron volts	DOD	Department of Defense
BIC	barrum iodide cloud	DODGE	Department of Defense Gravity Experiment (satellite, DOD)
BIOS	Biological Satellite (NASA)	DRID	direct readout image dissector (camera system)
BPI	bits per inch		
BPS	bits per second		
BTL	Bell Telephone Laboratories		
BUV	backscatter ultraviolet		
BV	billion volts		
B/W	black and white		
BWF	Bundesminister für Wissenschaftliche Forschung (Fed Rep of Germany)		

DRIR	direct readout infrared radiometer	G.E.T.	ground elapsed time
DRTE	Defence Research Telecommunications Establishment (now CRC)	GEX	gas exchange
DSAP	Defense System Applications Program (DOD)	GGSE	gravity gradient stabilization experiment
DSCS	Defense Satellite Communications System (DOD)	GHZ	gigahertz
DSIR	Department of Science and Industrial Research (England)	GISS	Goddard Institute for Space Studies (NASA)
DSN	Deep Space Network	GN	Geiger-Mueller, gram
DV	digital video	GNS	Geostationary Meteorological Satellite (Japan)
DYN	dynamic	GMT	Greenwich mean time
E	energy	GOES	Geosynchronous Operational Environmental Satellite (NASA-NOAA, also called SMS)
EASEP	Early Apollo Scientific Experiment Package	GP	Gravitational Redshift Space Probe (NASA)
ECS	Experimental Communications Satellite (NASA)	GRAVR	Gravitational Redshift Space Probe (NASA)
EDS	Environmental Data Service (NOAA)	GRE	ground reconstruction equipment; ground reconstruction electronics
EGO	Eccentric (Orbiting) Geophysical Observatory (satellite, NASA)	GREB	Galactic Radiation Experiment Background (satellite, USN)
EGRS	Engineers Satellite (DOD)	GRI	Groupe de Recherche Ionospherique (France)
ETRP	effective isotropic radiative power	GROC	Netherlands Committee for Geophysics and Space Research
EL	electric (data camera carried on Apollo)	GRS	German Research Satellite (NASA-Fed Rep of Germany)
ELDO	European Launch Development Organization (ESA)	GSD	Grid Sphere Drag (satellite, DOD)
ELEC	electric	GSE	geocentric solar ecliptic (coordinate system), ground support equipment
ELECTR	electronics	GSFC	Goddard Space Flight Center (NASA)
ELMS	Earth Limb Measurement Satellite (NASA-USAF)	GSM	geocentric solar magnetospheric (coordinate system)
EME	environmental measurement experiment	.GT.	greater than
ENR	Electromechanical Research (Company, England)	GUGMS	Glavnoye Upravleniye Gidrometeorologicheskoi Sluzhby (Main Administration of the Hydrometeorological Service, USSR)
ENVIRON	environment; environmental	GV	gigavolt
EOF	end of file	GVHRR	geosynchronous very high resolution radiometer
EOGO	Eccentric Orbiting Geophysical Observatory (satellite, NASA)	H	hour
EOS	Earth Observation Satellite (NASA)	HAO	High Altitude Observatory
EPE	Energetic Particle Explorer (satellite, NASA)	HCMN	Heat Capacity Map Mission (satellite, NASA)
E/Q	energy per unit charge	HCMR	Heat Capacity Mapping Radiometer
ERB	Earth radiation budget (experiment)	HCO	Harvard College Observatory
ERDC	Earth Resources Data Center	HDRSS	high data rate storage system
ERGS	Earth Geodetic Satellite (USAF)	HE	helium
ERL	Environmental Research Laboratory (NOAA)	HEAO	High-Energy Astrophysical Observatory (NASA)
EROS	Earth Resources Observation System	HEOS	High-Eccentricity Earth-Orbiting Satellite (ESA)
ERS	Environmental Research Satellite (USAF)	HET	health, education, telecommunications
ERT	extended range telescope	HETS	high-energy telescope system
ERTS	Earth Resources Technology Satellite (NASA)	HEW	health, education, and welfare
ESA	European Space Agency	HFE	heat-flow experiment, heat-flow electronics
ESMR	electrically scanning-microwave radiometer	HR	high resolution
ESOC	European Space Operations Centre (ESA)	HRIR	high-resolution infrared radiometer
ESRO	European Space Research Organization (now ESA)	HRIRS	high-resolution infrared radiometer sounder
ESSA	Environmental Science Services Administration (now NOAA)	H.S.	high school
ESTABL	establishment	HYDROMET	hydrometeorological
ESTEC	European Space Technology Center (ESA)	Hz	hertz (cycles per second)
ETR	Eastern Test Range (also referred to as Cape Canaveral)	IAP	Institute of Atmospheric Physics (USSR)
ETS	Engineering Test Satellite	IBM	International Business Machines (Corp)
EUV	extreme ultraviolet	ICBM	intercontinental ballistic missile
EV	electron volt	ICSU	International Council of Scientific Unions
EVA	extravehicular activity	ID	identification
EVM	Earth viewing (equipment) module	IDC	image dissector camera
EXOS	Exospheric Satellite (Japan)	IDCS	image dissector camera system
EXOSAT	European X-ray Observation Satellite (ESA)	IDCSP	Initial (or Interim) Defense Communication Satellite Program (or Project) (DOD)
EXTRATERR	extraterrestrial	IDSCS	Initial Defense Satellite Communication System (DOD)
FARO	Flare-Activated Radiobiological Observatory (satellite, DOD)	IDT	instrument definition team
FED	Federal	IE	Ionospheric Explorer (satellite, NASA-NBS)
FLT-SAT	Fleet Satellite (USN)	IFOV	instrument field of view
FM	frequency modulation	IGRF	International Geomagnetic Reference Field
FMDM	flex multiplexer/demultiplexer	IGY	International Geophysical Year
FMR	final meteorological radiation tape	IME	International Magnetospheric Explorer (satellite, NASA-ESA)
FOUND	foundation	IMP	Interplanetary Monitoring Platform (satellite, NASA)
FOV	field of view	IMS	International Magnetospheric Study
FPR	flat plate radiometer	INDASAT	Indian Scientific Satellite (ISRO-USSR)
FR	French Research (satellite, France)	INOP	inoperable
FRC	Flight Research Center (NASA)	INSAT	Indian National Satellite (ISRO-USSR)
FSC	FLEETSATCOM (satellite, USN-USAF)	INST	institute
FSK	frequency shift key	INTA	Instituto Nacional de Tecnica Aeroespacial (Spain); the National Institute of Aerospace Science
FWM	full width at half maximum	INTASAT	satellite (INTA, Spain)
FNS	filter wedge spectrometer	INTELSAT	International Telecommunications Satellite (NASA-COMSAT)
GARP	Global Atmospheric Research Program	ION COMP	Ionospheric Composition (satellite--see DIAP)
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 für Weltraumforschung (Center for Space Research, Fed Rep of Germany)		

IPA	Institute for Physics of the Atmosphere (SAS)	MARENTS	Modified Advanced Research Environmental Test Satellite (USAF)
IQSY	International Quiet Sun Year	MAS	Ministry of Aviation Supply (UK)
IR	infrared	MASC	magnetic attitude spin coil
IRAS	Infrared Astronomy Satellite	MASS	Massachusetts
IRBM	intermediate range ballistic missile	MATER	material
IRIG	Inter-Range Instrumentation Group	MB	millibar
IRIS	infrared-interferometer spectrometer; International Radiation Investigation Satellite (NASA-ESA)	MC	megacycle
IRIS	interrogation, recording, and location system	MCC	Mission Control Center
IRM	Ion Release Module (satellite, NASA)	MED	medicine; medical
IRR	infrared radiometry	METEC	Meteoroid Technology (satellite, NASA)
INTRN	infrared transmission	METEOSAT	Meteorological Satellite (ESA)
ISAS	Institute of Space & Aeronautical Science (Japan)	MEV	million electron volts
ISEE	International Sun-Earth Explorer (satellite, NASA-ESA)	MG	milligram
ISIS	International Satellite for Ionospheric Studies (NASA-Canada)	MHZ	megahertz
ISRO	Indian Space Research Organization	MIDAS	Missile Defense Alarm System (USAF)
ISS	Ionospheric Sounding Satellite (Japan)	MIN	minute
ITCZ	intertropical convergence zone	MIT	Massachusetts Institute of Technology
ITE	intersite transportation equipment	MJS	Mariner Jupiter/Saturn (spacecraft, NASA)
ITOS	Improved TIROS Operational Satellite (NOAA)	MM	millimeter
ITPR	infrared temperature profile radiometer	MMM	millimeter wave
ITR	incremental tape recorder	MOL	Manned Orbiting Laboratory (satellite, DOD)
ITSA	Institute for Telecommunication of Sciences and Aeronomy (formerly a subdivision of ESSA; now NOAA-ERL)	M-P	minus-plus
IU	instrument unit	MPI	Max-Planck-Institut (Fed Rep of Germany)
IUE	International Ultraviolet Explorer (satellite, NASA-UK-ESA)	MR	medium resolution
IUS	intermediate upper stage	MRIR	medium-resolution infrared radiometer
IUNDS	International URSIGRAM and World Days Service	MS	microsecond; millisecond
IZMIRAN	Institute of Terrestrial Magnetism and Aeronomy of the Academy of Sciences (USSR)	MSC	Manned Spacecraft Center (now Johnson Space Center)
		MSFC	Marshall Space Flight Center (NASA)
		MSN	mission
		MSS	Magnetic Storm Satellite (NASA-AFCRL); multispectral-scanner
		MSSCC	multicolor spin-scan cloudcover camera
		MTS	Meteoroid Technology Satellite (NASA)
		MUSE	monitor of ultraviolet solar energy
		MW	milliwatt
		NA	not applicable; Nora Alice (satellite, DOD)
JHU	Johns Hopkins University	NACE	neutral atmosphere composition experiment
JPL	Jet Propulsion Laboratory (NASA)	NADUC	Nimbus/ATS Data Utilization Center
JSC	Johnson Space Center (NASA)	NASA	National Aeronautics and Space Administration (Washington, D.C., Headquarters)
		NASC	National Aeronautics and Space Council
KBS	kilobits per second	NASDA	National Space Development Agency (Japan)
KEV	kiloelectron volt	NATL	national
KG	kilogram	NATO	North Atlantic Treaty Organization
KHZ	kilohertz	NBS	National Bureau of Standards
KM	kilometer	NCAR	National Center for Atmospheric Research
KP	magnetic activity index kp	NCC	National Climatic Center (NOAA)
KPND	Kitt Peak National Observatory	NDRE	Norwegian Defence Research Establishment
KSC	Kennedy Space Center (NASA)	NESS	Nimbus-E microwave spectrometer; Near-Earth Magnetospheric Satellite (ESA)
		NESSC	National Environmental Satellite Center (now NESS)
LA	Los Angeles	NESS	National Environmental Satellite Service (NOAA)
LAB	laboratory	NGSP	National Geodetic Satellite Program
LACATE	lower atmosphere composition and temperature	NHC	National Hurricane Center
LAGEOS	Laser Geodetic Earth-Orbiting Satellite (NASA)	NIH	National Institutes of Health
LARC	Langley Research Center (NASA)	NMC	National Meteorological Center
LAS	Large Astronomical Satellite (ESA)	NSRT	Nimbus meteorological radiation tape
LASL	Los Alamos Scientific Laboratory	NNN	no national name
LCS	Lincoln Calibration Sphere	NNSS	Navy Navigational Satellite System
.LE.	less than or equal to	NOAA	National Oceanic and Atmospheric Administration (formerly ESSA)
LEM	lunar excursion module	NOVSS	National Operational Meteorological Satellite System
LEPEDEA	low-energy proton and electron differential energy analyzer	NORAD	North American Air Defense Command
LERC	Lewis Research Center (NASA)	NORW	Norwegian
LES	Lincoln Experimental Satellite (DOD)	NOS	National Ocean Survey (NOAA)
LETS	low-energy telescope system	NOTS	Naval Ordnance Test Station
LL	Lincoln Laboratory (MIT)	NRC	National Research Council
LM	lunar module	NRL	Naval Research Laboratory
LMD	Laboratory of Meteorological Dynamics	NSA	National Security Agency
LOFTI	Low-Frequency Trans-Ionospheric (satellite, USN-NRL)	NSF	National Science Foundation
LOGACS	Low-G Accelerometer Calibration System (USAF)	NSSDC	National Space Science Data Center
LPSP	Laboratoire de Physique Stellaire et Planetaire (CNRS)	NUCL	nuclear
LR	labeled release	NWL	Naval Weapons Laboratory
LRIR	limb radiance inversion radiometer; low-resolution infrared radiometer	NWRC	National Weather Records Center (Presently NCC)
LRL	Lunar Receiving Laboratory (JSC)		
LRV	Lunar roving vehicle	OA	Office of Applications (NASA)
LST	Large Space Telescope (satellite, NASA)	OAO	Orbiting Astronomical Observatory (satellite, NASA)
.LT.	less than	OAPS	orbit adjust propulsion system
LTV	Lang-Temco-Vought (Company)	OAR	Office of Aerospace Research (USAF-AFSC)
		OART	Office of Advanced Research and Technology (NASA)
M	meter, milli- (prefix)	OAST	Office of Aeronautics and Space Technology (NASA)
MA	Mercury Atlas		
MAPS	measurement of air pollution from satellite		

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OBS	observatory	RES	research
O+C	operations and checkout	REXS	Radio Exploration Satellite (Japan)
OCC	OPLE Command Center	RF	radio frequency
OFO	Orbiting Frog Otolith (NASA experimental spacecraft)	RFI	radio frequency interference
OFT	orbital flight test	RM	Radiation Meteoroid (satellite, NASA); Radiometric Measurement (satellite, DOD)
OGO	Orbiting Geophysical Observatory (satellite, NASA)	RMS	root mean square; Radiation Meteoroid Satellite (NASA); Radiometric Measurement Satellite (DOD); remote manipulator system
OGPC	orbiter general purpose computer	RPA	retarding potential analyzer
OI	other investigator	RPM	revolutions per minute
OIB	orbiter interface box	RPS	revolutions per second
ONNI	low-resolution omnidirectional radiometer (on Explorer 7)	RRL	Radio Research Laboratories (Japan)
ONSF	Office of Manned Space Flight (NASA)	RSRS	Radio and Space Research Station (England)
ONERA	Office National d'Etudes et de Recherches Aeronautiques	RTD	Research Technology Division (USAF)
ONR	Office of Naval Research	RTG	radioisotope thermoelectric generator
OOI	orbiter operational instrumentation	RTTS	real-time transmission system
OPEP	orbital-plane experiment package		
OPF	Orbiter Processing Facility	s	second
OPLE	Omega position and location experiment	SAI	stratospheric aerosol measurement
OP OFF	operational off	SAHOS	Satellite Mission Observation System (satellite, USAF)
ORBIS	Orbiting Radio Beacon Ionospheric Satellite (NASA)	SAMS	stratospheric and mesospheric sounder
ORS	Octahedral Research Satellite (NASA); Orbiting Research Satellite (DOD)	SANSO	Space and Missile Systems Organization (USAF)
OSCAR	Orbiting Satellite Carrying Amateur Radio	SAO	Smithsonian Astrophysical Observatory
OSO	Orbiting Solar Observatory (satellite, NASA)	SAPPSAC	spacecraft attitude precision pointing and slewing adaptive control
OSS	Office of Space Science (NASA)	SAS	Small Astronomy Satellite (NASA), Soviet Academy of Sciences
OSSA	Office of Space Science and Applications (NASA; now two separate offices)	SATAR	Satellite for Aerospace Research (NASA)
OSTA	Office of Space and Terrestrial Applications	SATELL	satellite
OT	Operational TIROS (satellite, NASA)	SATS	Satellite Antenna Test System (NASA)
OTDA	Office of Tracking and Data Acquisition (NASA)	SBRC	Santa Barbara Research Center
OV	Orbiting Vehicle (satellite, USAF)	SC	project scientist
OVT	organic vapor trap	SCAMS	scanning microwave spectrometer
		SCEL	Signal Corps Engineering Laboratories
		SCH	school
		SCI	science
		SCHR	surface composition mapping radiometer
PAC	Packaged Attitude Control (satellite, NASA)	SCORE	Signal Communication by Orbiting Relay Equipment (satellite, DOD)
PAET	Planetary Atmosphere Experiment Test	SCR	selective chopper radiometer
PAGEOS	Passive Geodetic Earth-Orbiting Satellite (NASA)	SD	San Diego
PAM	pulse amplitude modulation	SDPF	Sensor Data Processing Facility
PCB	power control box	SE	Solar Explorer (satellite, NASA)
PCN	pulse coded modulation	SEASAT	Ocean Dynamic Satellite (NASA)
PD	project director	SEC	secondary electron conduction (vidicon tube)
PDP	plasma diagnostic package	SECOR	Sequential Collimation of Range (satellite, USAF)
PE	Planetary Explorer	SEM	space environment monitor
PEP	platform electronic package	SERT	Spinning Satellite for Electric Rocket Test (NASA)
PFM	pulse frequency modulation	SESP	Space Experiment Support Program
PHASR	Personnel Hazards Associated with Space Radiation (satellite, USAF)	SESP0	Space Environmental Support Project Office
PHYS	physics	SHS	Soviet Hydrometeorological Service
PI	principal investigator	SIBS	Salk Institute for Biological Studies
PIP	Payload Integration Plan	SIDS	Space Investigations Documentation System (NASA)
PIAEL	picture element	SIM	scientific instrument module
PL	prelaunch	SIRS	satellite infrared spectrometer; System for Information Retrieval and Storage (NSSDC)
PLACE	position location and aircraft communication experiment	SM	San Marco (satellite, NASA-Italy)
PM	pulse modulation, photomultiplier	SME	Solar Mesosphere Explorer (satellite, NASA)
PMEL	Pacific Marine Environmental Laboratory (NOAA)	SMN	solar maximum mission
PMR	pressure modulation radiometer; Pacific Missile Range	SMNR	scanning multispectral microwave radiometer
PMT	photomultiplier tube	SMS	Synchronous Meteorological Satellite (NASA)
P-N	positive-negative (junction)	SNAP	systems for nuclear auxiliary power
POCC	OFT Payloads Operations Control Center	SOEP	solar-oriented experiment package
POGO	Polar Orbiting Geophysical Observatory (satellite, NASA)	SOLRAD	Solar Radiation (satellite, NASA-DOD)
PPS	pulses per second	SPADES	Solar Perturbation and Atmospheric Density Measurement Satellite (DOD)
PR	pyrolytic release	SPHINX	Space Plasma High Voltage Interactive Experiment (satellite, NASA)
PROT	protection	SPIDPO	Shuttle Payload Integration and Development Program Office
PS	pressure sensor	SPM	solar proton monitor
PSE	passive seismograph experiment	SR	Solar Radiation (satellite, NASA), scanning radiometer, sounding rocket; steradian
PTL	Photographic Technology Laboratory (JSC)	SRATS	Solar Radiation and Thermospheric Structure (satellite, Japan)
QONAC	quarter-orbit magnetic attitude control (system)	SRC	Space Research Council, Science Research Council
RA	Ranger (spacecraft, NASA)	SRI	Stanford Research Institute
RAD	radium; radiation	SRT	supporting research and technology
RADCAT	Radar Calibration Target (satellite, ARPA)	SSC	Satellite Situation Center
RADOSE	Radiation Dosimeter (satellite, DOD)	SSCC	spin-scan cloudcover camera
RAE	Radio Astronomy Explorer (satellite, NASA)	SSD	Space Science Division (JPL)
RAM	random access memory (system)	SSPP	Shuttle Spacelab Payloads Project
RBV	return beam vidicon (camera)	SSS	Small Scientific Satellite (NASA)
RC	resistance capacitor	SST	satellite-to-satellite tracking
RCA	Radio Corporation of America	SSUS	solid spinning upper stage
R+D	research and development		
REP	republic		

STADAN	Spacecraft Tracking and Data Acquisition Network (now STDN)	TOVS	TIROS operational vertical sounder
STARAD	Starfish Radiation (satellite, NASA)	TRAAC	Transit Research and Attitude Control (satellite, USN)
STD	standard	TRANET	Doppler Tracking Network (USN)
STDN	Spaceflight Tracking and Data Network (NASA)	TRANSP	transportation
STER	steradian	TRS	Tetrahedral Research Satellite (USAF)
STL	Space Technology Laboratories (now TRW Systems Group)	TRUST	television relay using small terminals
STN	station	TRW	Thompson, Ramo, Wooldridge, Inc
STP	Solar Terrestrial Probe (satellite, NASA), Solar Terrestrial Physics	TTS	Test and Training Satellite (NASA) (also called TATS, TETR)
STRATOS	stratosphere	TWERLE	tropical wind energy conversion and reference level experiment
STS	Space Transportation Systems		
STUD	studies		
SUI	State University of Iowa (now University of Iowa)	U	university; atomic mass unit
SURCAL	Surveillance Calibration (satellite, DOD)	UCLA	University of California at Los Angeles
SUSIM	solar ultraviolet spectral irradiance monitor	UMF	ultrahigh frequency
SVC	service	UK	United Kingdom
SW	southwest	US	United States
SWRF	Sine Wave Response Filter (program)	USA	United States Army, United States of America
SYNCOM	Synchronous Communication (satellite, NASA)	USAF	United States Air Force
SYST	system	USN	United States Navy
		USSR	Union of Soviet Socialist Republics
		UT	universal time
		UV	ultraviolet
		UVMO	ultraviolet nitric-oxide experiment
		UVS	ultraviolet spectrometer
TAC	Technology Application Center		
TACOMSAT	Tactical Communications Satellite (DOD)	V	volt
TATS	Test and Training Satellite (NASA)	VAR	variation
TATSACOM	Tactical Satellite Communications (program, DOD)	VHF	very high frequency
TBD	to be determined	VHRR	very high resolution radiometer
TD	technical director	VISSR	visible infrared spin-scan radiometer
TD	Thor-Delta (satellite, ESA); launch vehicle (NASA-USAF)	VLF	very low frequency
TDP	Tracking Data Processor (program)	VTPR	vertical temperature profile radiometer
TDR	tracking & data relay		
TDRSS	tracking and data relay satellite system	W	watt
TEC	telemetry and command; transearth coast	WBVTR	wideband video tape recorder
TECH	technical, technology	WDC	World Data Center
TEI	transearth injection	WDC-A-RES	World Data Center A for Rockets and Satellites
TELESAT	satellite, Canada (also referred to as ANIK)	WEFAX	weather facsimile
TEMP	temporal, temperature	WFC	Wallops Flight Center (NASA)
TET	telescope and electron telescope	WGSFR	Working Group For Space Physics Research
TETR	Test and Training (satellite, NASA)	WMO	World Meteorological Organization
THIR	temperature-humidity infrared radiometer	WPM	words per minute
THORAD-AGE	Thor Augmented Delta Agena (launch vehicle)	WRESAT	Weapons Research Establishment Satellite (Australia)
TIMATION	Time Location System (USN)		
TIP	Tracking Impact Prediction (satellite, DOD)	WS	Wallops Station (NASA; now Wallops Flight Center)
TIROS	Television and Infrared Observation Satellite (NASA)	WSMR	White Sands Missile Range
TL	team leader	WTR	Western Test Range (also referred to as Vandenberg AFB)
TLI	translunar injection	WWW	World Weather Watch
TM	team member		
TOMS	total ozone mapping system		
TOPO	topographic		
TOPS	Thermal Noise Optical Optimization Communication System (NASA)		
TOPSI	topside (sounder) (satellite, NASA)	2	atomic number
TOS	TIROS Operational Satellite (or System) (NASA)		

Introduction

Descriptions of Active Spacecraft and Experiments

Descriptions of Planned Spacecraft and Experiments

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Investigator Name Index

Appendixes

NASA

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771