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National Space Science Data Center/
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Report on Active and Planned Spacecraft and Experiments

September 1977

NSSDC/WDC-A-R&S 77-03

REPORT ON ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

Edited by

James I. Vette
and
Robert W. Vostreys

National Space Science Data Center

September 1977

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 January 1, 1975, to June 30, 1977, are included, as well as those planned missions that have progressed beyond the experiment or investigation selection stage. The document provides brief descriptions for these spacecraft and experiments as well as approximate time periods when data are being accumulated. 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, 1977. 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 acquisition scientists and others 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

September 1977

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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 brief descriptions of the spacecraft and experiments as well as the approximate time periods when data are being accumulated, it is hoped that this document will be useful to many people interested in the scientific, applied, and operational uses of such data. 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.

The personnel at NSSDC have collected the information contained in this document from a variety of sources during the past several years; e.g., program offices, project offices, principal investigators and their staffs, publications, etc. The performance information of the spacecraft and experiments for active NASA and NASA-cooperative programs is based, to a large extent, on the project office status reports through June 30, 1977. NSSDC has attempted to update all performance information to that date. A few changes subsequent to this date may appear, depending on time availability.

1.3 Organization

This report includes four 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 January 1, 1975, to June 30, 1977. 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, 1977, 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 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.

*Note added in press: ESA is planning to launch the backup spacecraft, ESA-GEOS 2, carrying the same experiments. See the ESA-GEOS experiments. This is planned to be launched in the second quarter of 1978 into an equatorial, geostationary orbit.

2

DESCRIPTIONS OF ACTIVE SPACECRAFT AND EXPERIMENTS

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 January 1, 1975, to June 30, 1977. 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 or planned 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 and flyby 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), technical director (TD), and program director (PD). 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.

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 January 1, 1975. Experiments that meet this same criteria are included.

********** 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- 646. KM APOAPSIS- 1673. KM

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 INFLATIBLE 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.

------- 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 AFD, 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 APOAPSIS- 2174. KM

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- S 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 APOAPSIS- 4294.0 KM

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 ONBOARD 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 PERPENDICULAN 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, PHOTOELECTRON 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, WHICH LOOKED OUTWARD THROUGH THE RIM OF THE SATELLITE, REPEATEDLY HAD ITS FIELD OF VIEW CARRIED DOWN THROUGH THE ATMOSPHERE ONTO THE EARTH'S LIMB, AND ALTITUDE PROFILES OF THE EMITTED AIRGLOW INTENSITY WERE OBTAINED. BELOW SOME ALTITUDE THE MEASURED SIGNAL AT 2150 A WAS CONTAMINATED BY RAYLEIGH SCATTERED SUNLIGHT. TO CORRECT FOR THIS CONTAMINATION, A SECOND CHANNEL MEASURED ONLY SCATTERED LIGHT INTENSITY IN A 12-A REGION CENTERED AT 2190 A. THE TWO CHANNELS WERE OPTICALLY AND ELECTRICALLY INDEPENDENT. NITRIC-OXIDE AIRGLOW INTENSITY WAS DETERMINED BY TAKING THE DIFFERENCE BETWEEN THESE TWO MEASUREMENTS. FROM THE CORRECTED SIGNAL, NITRIC-OXIDE DENSITY PROFILES WERE OBTAINED BETWEEN APPROXIMATELY 80 KM AND 250 KM. THE SENSOR'S SPHERICAL FUSED QUARTZ TELESCOPE MIRROR HAD A 125-MM FOCAL LENGTH, AND FOCUSED INCIDENT LIGHT ON THE ENTRANCE SLIT OF THE SPECTROMETER. FROM THIS SLIT THE LIGHT STRUCK ONE HALF OF THE EBERT MIRROR AND WAS COLLIMATED ONTO THE GRATING. THE 3600-LINES-PER-MM GRATING RETURNED IT COLLIMATED TO THE OTHER HALF OF THE EBERT MIRROR, AND THE LIGHT WAS FOCUSED ON TWO EXIT SLITS. THE SPECTROMETER FIELD OF VIEW WAS 0 DEG 15 MIN BY 4 DEG 39 MIN. IN NORMAL OPERATION EACH CHANNEL WAS INTEGRATED FOR 20.6 MS AND WAS READ OUT ALTERNATELY AT 10.4-MS INTERVALS. THE INSTRUMENT HAD LINEAR RESPONSE CHARACTERISTICS, AND THE OBSERVATION OF A 1-KR EMISSION RATE PRODUCED, ON THE AVERAGE, 100 COUNTS PER INTEGRATION PERIOD IN THE 2150-A CHANNEL AND 60 COUNTS IN THE 2190-A CHANNEL. THE INSTRUMENT WAS PROTECTED AGAINST CONTAMINATION FROM INTERNAL SCATTERING OF OFF-AXIS UNDISPERSED LIGHT. MORE EXPERIMENT DETAILS CAN BE FOUND IN, 'THE UV NITRIC-OXIDE EXPERIMENT FOR THE ATMOSPHERE EXPLORER', C. A. BARTH, ET AL, RADIO SCIENCE, 8, 4, 379, 1973.

------- AE-C, BRACE----------

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBES (CEP)

NSSDC ID- 73-101A-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

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

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 RADIALLY SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED ONE SECOND TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 10,000 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 10,000 AND 10E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 10E6 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-C, BRINTON----------

INVESTIGATION NAME- BENNETT ION-MASS SPECTROMETER (BIMS)

NSSDC ID- 73-101A-11 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - H.C. BRINTON NASA-GSFC
OI - L.R. SCOTT NOAA-NESS
OI - M.W. PHARO NASA-GSFC
OI - H.A. TAYLOR, JR. NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS KNOWN TO MEASURE, THROUGHOUT THE AE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE OF 1 TO 72 ATOMIC MASS UNITS (U), AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER CC TO 5 MILLION IONS PER CC. ANY COMBINATION OF THE FOLLOWING THREE MASS RANGES, WHICH WERE EXPRESSED IN U, WERE SELECTED BY GROUND COMMAND -- RANGE A - 4 TO 1, RANGE B - 18 TO 2, RANGE C - 72 TO 8. EACH RANGE WAS NORMALLY SCANNED IN 1.6 S (APPROXIMATELY 12 KM ALONG ORBIT), BUT THE SCAN TIME PER RANGE WAS INCREASED TO 5.1 S BY COMMAND. NORMAL OPERATION CONSISTED IN SEQUENCE ABCABC (72 TO 1 U IN 4.8 S). LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION PERMITTED DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WERE -- GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. THE GUARD RING WAS NORMALLY AT GROUND POTENTIAL, BUT IT COULD BE PLACED AT -6 V BY COMMAND IF DESIRABLE, E.G., IF THE SPACECRAFT ACQUIRED A POSITIVE CHARGE. A THREE-STAGE BENNET TUBE WITH 7 TO 5 CYCLE DRIFT SPACES WAS FLOWN AND WAS 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 WITH A STACK OF WIRE-MESH GRIDS. THE FREQUENCY OF THE 30 V PEAK-TO-PEAK R.F. VOLTAGE VARIED WITH THE MASS RANGE MEASURED -- RANGE A - 10 MHZ, RANGE B - 5 MHZ, AND RANGE C - 2.5 MHZ. INTO THE VACUUM TIGHT ALUMINA-CERAMIC CYCLINDRICAL ANALYZER TUBE A SERIES OF 16 PARALLEL TUNGSTEN-MESH WERE BRAZED. THE BALANCE BETWEEN ION-CURRENT SENSITIVITY AND MASS-RESOLUTION IN A BENNETT SPECTROMETER COULD BE ALTERED BY CHANGING APPROPRIATE VOLTAGES. THESE CHANGES COULD BE CONTROLLED INDEPENDENTLY BY GROUND COMMAND FOR EACH ONE OF THE THREE MASS RANGES. PRIMARY ANALOG INSTRUMENT OUTPUT WAS A COMPRESSED ION CURRENT SPECTRUM WHICH DISPLAYED THE FULL DYNAMIC RANGE OF THE AMPLIFIER SYSTEM ON A SINGLE TELEMETRY CHANNEL. ONBOARD DATA PROCESSING PROVIDED A READOUT OF PRIMARY EXPERIMENT DATA IN THE FORM OF TWO DIGITAL WORDS FOR EACH PEAK

IN THE ION SPECTRUM. ONE 8-BIT WORD INDICATED PEAK AMPLITUDE (CURRENT) AND THE OTHER 8-BIT WORD IDENTIFIED SWEEP POSITION, I.E., SPECIES IDENTIFICATION. THE WORDS WERE READ OUT IN PAIRS AT THE MAIN FRAME TELEMETRY RATE OF 16 SAMPLES PER S. INSTRUMENT CONFIGURATION SELECTED FOR A PARTICULAR PASS DEPENDED PRIMARILY ON THE DATA REQUIREMENTS OF THE SCIENCE PROBLEM UNDER INVESTIGATION AND ON THE SPACECRAFT SPIN MODE. MORE COMPLETE 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-C, CHAMPION----------

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 73-101A-02 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

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

BRIEF DESCRIPTION
MESA OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLEAXIS 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 NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 G IN 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-C, DOERING----------

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 73-101A-03 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL
PI - J.P. DOERING JOHNS HOPKINS U
OI - C.O. BOSTROM APPLIED PHYSICS LAB
OI - J.C. ARMSTRONG UNKNOWN

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-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 3-5 PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 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 FEATURED IT WAS POSSIBLE TO MEASURE A DARK FEATURE

WITH NO APPARENT ENHANCEMENT IN BACKGROUND WITHIN 120 MS 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, HEATH----------

INVESTIGATION NAME- EXTREME SOLAR UV MONITOR (ESUM)

NSSDC ID- 73-101A-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.F.	HEATH	NASA-GSFC
OI - J.F.	OSANTOWSKI	NASA-GSFC

BRIEF DESCRIPTION

ESUM MADE ABSOLUTE BROADBAND SPECTRO-RADIOMETRIC MEASUREMENTS OF THE SOLAR EUV FLUX FROM 200 A THROUGH LYMAN-ALPHA AT 1216 A AND MADE PRECISE MEASUREMENTS OF THE TEMPORAL VARIABILITY - APPROXIMATELY ONE PERCENT PER SOLAR ROTATION. THE INSTRUMENT CONSISTED OF TWO IDENTICAL WINDOWLESS EUV PHOTODIODES WITH ALUMINUM OXIDE CATHODES AND A FILTER WHEEL CONTAINING TWO SET'S OF UNBACKED METALLIC FILTERS (ALUMINUM, TIN, INDIUM) AND AN OPEN POSITION. A VISIBLE LIGHT DIODE MEASURED THE PINHOLE TRANSMITTANCE OF THE FILTERS TO DETERMINE THE WHITE LIGHT BACKGROUND. THE TILT ANGLE OF THE INSTRUMENT RELATIVE TO THE +Z SPACECRAFT AXIS WAS OPTIMIZED FOR THE MAXIMUM VIEWING TIME OF THE SUN IN BOTH SPINNING AND DESPUN SPACECRAFT MODES. THE INSTRUMENT FIELD OF VIEW WAS 60 DEG. THE NOMINAL BANDWIDTHS (FOR 50 PERCENT OF SIGNAL) WERE 270 TO 550 A, 570 TO 584 A, 800 TO 935 A, AND 1216 A.

------- 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 - H.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 (MIMS)

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 SWEPT 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
OI - J.L.	BURCH	NASA-MSFC

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 ONCE 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, NIER----------

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

NSSDC ID- 73-101A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.O.C.	NIER	U OF MINNESOTA
OI - F.J.	HEYDEN	MANILA OBS
OI - K.	MAUERSBERGER	U OF MINNESOTA
OI - W.E.	POTTER	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 MATTACH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS FLOWN. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF 8, I.E., THE TWO MASS RANGES COVERED WERE 1 TO 8 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 SWEPT, IN THE COMMON MODE OF OPERATION, PEAK STEPPING WAS EMPLOYED WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. 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 WAS 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 WAS 75 EV IN NORMAL MODE OPERATION AND WAS 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 DETAILS CAN BE FOUND IN 'THE OPEN SOURCE NEUTRAL MASS SPECTROMETER ON AE-C, -D, AND -E,' A. E. O. NIER, ET AL, RADIO SCIENCE, 8, 4, P 271, 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. CARIGNAN 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 ORIFICED 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-D**********

SPACECRAFT COMMON NAME- AE-D
ALTERNATE NAMES- S-60, PL-7238
ATMOSPHERE EXPLORER-D, EXPLORER 54

NSSDC ID- 75-096A

LAUNCH DATE- 10/06/75 WEIGHT- 681. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/07/75
ORBIT PERIOD- 126.3 MIN INCLINATION- 90.1 DEG
PERIAPSIS- 154. KM APOAPSIS- 3816. KM

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - D.W. GRIMES NASA-GSFC
PS - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THE PURPOSE OF THE AE-D MISSION WAS TO CONTINUE THE INVESTIGATION BEGUN BY AE-C OF 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. THIS MISSION WAS PLANNED TO SAMPLE THE HIGH LATITUDE REGIONS AT THE SAME TIME THAT THE AE-E MISSION WAS SAMPLING THE EQUATORIAL AND LOW LATITUDE REGIONS. THE SAME TYPE OF SPACECRAFT AS AE-C WAS USED, AND THE PAYLOAD CONSISTED OF THE SAME TYPES OF INSTRUMENTS EXCEPT FOR DELETION OF THE EXTREME SOLAR UV MONITOR AND THE BENNETT ION MASS SPECTROMETER, WHICH WERE PART OF THE AE-E PAYLOAD. THE POLAR ORBIT PROVIDED THE SAMPLING OF ALL LATITUDES AND THE PERIGEE WOULD MOVE THROUGH ALL LATITUDES IN ABOUT 3 MONTHS AND

NSSDC ID- 75-096A-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
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 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-D, HAYS----------

INVESTIGATION NAME- VISIBLE AIRGLOW PHOTOMETER (VAE)

NSSDC ID- 75-096A-13 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
THE VISIBLE AIRGLOW EXPERIMENT PROVIDED VOLUME EMISSION RATES FOR SEVERAL DAYGLOW, NIGHTGLOW, AND AURORAL OPTICAL EMISSION FEATURES. A PHOTOMETER CONTAINING TWO SEPARATE OPTICAL CHANNELS WAS USED. SPECTRAL SELECTION WAS ACCOMPLISHED WITH A COMMON FILTER WHEEL THAT CONTAINED SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. THE WAVELENGTHS MEASURED IN PAIRS (IN ANGSTROMS) WERE -- 7319 AND 4861, 5200 AND DARK, 5577 AND 7319, 4278 AND 5200, 6300 AND 5577, CALIB AND 4278, AND 4861 AND 6300. THE TWO CHANNELS WERE SEPARATED IN ANGLE BY 90 DEG. ONE CHANNEL HAD A LARGE FIELD OF VIEW (3 DEG HALF-ANGLE) FOR HIGH SENSITIVITY, NORMALLY POINTING TOWARD THE LOCAL ZENITH, AND THE SECOND CHANNEL HAD A SMALL FIELD OF VIEW (0.75 DEG HALF-ANGLE) FOR HIGH SPATIAL RESOLUTION, POINTING TANGENT TO THE SURFACE OF THE EARTH WHEN THE SATELLITE WAS IN THE DESPUN MODE. BOTH CHANNELS WERE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING DAYTIME BY MULTISTAGE BAFFLE SYSTEMS. PHOTONS THAT HAD BEEN SPECTRALLY AND SPATIALLY SELECTED WERE SENSED BY A PULSE-COUNTING PHOTOMULTIPLIER SYSTEM CAPABLE OF COUNTING AT A RATE OF 5.E6 COUNTS/S. THE FILTERS COULD BE OPERATED IN SEVERAL MODES, E.G., FIXED FILTER AND AUTOMATIC FILTER CHANGES COULD BE SYNCHRONIZED EITHER TO SATELLITE ORIENTATION OR TO A FIXED-TIME BASE. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE VISABLE-AIGLOW EXPERIMENT ON ATMOSPHERE EXPLORER,' P.B. HAYS ET AL, RADIO SCIENCE, 8, 4, 369, APRIL 1973.

-------- AE-D, HEDIN----------

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION (NACE)

NSSDC ID- 75-096A-08 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
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 OTHER ONBOARD EXPERIMENTS, NAMELY -- OPEN-SOURCE SPECTROMETER (75-096A-07), SOLAR EUV SPECTROPHOTOMETER (75-096A-06), AND DENSITY-ACCELEROMETER (75-096A-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. FIVE DIFFERENT SEQUENCES OF MASS SELECTION WERE AVAILABLE AND, EXPRESSED IN ATOMIC MASS UNITS (U), WERE -- (1) GEOPHYSICAL -1, 2, 4, TOTAL, 16, 28, 32, SELECTED, 40, (2) ANALYTICAL - 12, 14, 18, 20, 22, 30, 44, CALIBRATE, ZERO, (3) INDIVIDUAL - SELECTED, SELECTED, SELECTED, . . . (ANY MASS 1 TO 44), (4) SWEEP DIGITAL - 1, 2, 3, 4, 5, . . . 45 (IN 3/16-U STEPS), (5) SWEEP ANALOG 2, 3, 4, 5, 45 (CONTINUOUS). THE FIVE OPERATIONAL FORMATS USED CAN BE SELECTED BY GROUND COMMAND, AND EACH ONE CONTAINED A DIFFERENT COMBINATION OF THE FIVE MASS SELECTION SEQUENCES LISTED ABOVE. 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 ANY INDIVIDUAL GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION WAS DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. WHEN THE SPACECRAFT WAS SPINNING AT 4 RPM, MEASUREMENTS OF THE PRINCIPAL ATMOSPHERIC SPECIES WERE OBTAINED AT 12-KM INTERVALS (1.5 S) ALONG THE SATELLITE TRACK, WHILE THE INSTRUMENT WAS FACING FORWARD. USING 'NORMAL' FORMAT, ALL MEASUREMENTS WERE MADE AT 12-KM INTERVALS WHEN THE SPACECRAFT WAS DESPUN. 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 A 14-STAGE ELECTRON MULTIPLIER, WHERE THEY WERE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. FOR EACH IMPACTING ION, THE MULTIPLIER OUTPUT WAS A PULSE OF 2.E6 ELECTRONS. THESE OUTPUT PULSES CONSTITUTED THE MEASUREMENT AND THE COUNT RATE WAS PROPORTIONAL TO THE CHAMBER DENSITY OF THE SELECTED SPECIES. THESE DENSITY VALUES WERE CONVERTED TO AMBIENT CONCENTRATIONS. THE ANALYZER NORMALLY OPERATED AT A RESOLUTION OF 1 U OVER THE MASS RANGE, SO THAT A MASS PEAK ONE-THOUSANDTH THE AMPLITUDE OF AN ADJACENT PEAK COULD BE MEASURED. FOR THE DYNAMIC RANGE REQUIRED, PULSES OCCURING DURING 0.015 S INTEGRATION INTERVALS WERE ACCUMULATED IN A 16-BIT COUNTER. MULTIPLE INTEGRATION PERIODS (UP TO 16) WERE ASSIGNED TO EACH MEASUREMENT FOR LESS DENSE ATMOSPHERIC SPECIES. AUTOMATICALLY SELECTED RANGES OF IONIZING ELECTRON CURRENTS WERE USED. THE OVERALL RANGE OF THE MEASUREMENTS WAS GREATER THAN 1.E7. THERE WAS A PROVISION FOR THE INSTRUMENT ORIFICE TO BE COVERED DURING SPACECRAFT THRUSTER OPERATIONS. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'A NEUTRAL-ATMOSPHERE COMPOSITION FOR THE ATMOSPHERE EXPLORER -C, -D, -E,' D. T. PELZ ET AL, RADIO SCIENCE, 8, 4, 272, APRIL 1973.

-------- AE-D, HINTEREGGER----------

INVESTIGATION NAME- SOLAR EUV SPECTROPHOTOMETER (EUVS)

NSSDC ID- 75-096A-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
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 - C.W.	CHAGNON	USAF GEOPHYS LAB
OI - J.F.	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 1050 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

ALL LOCAL TIMES IN 4 MONTHS. UNFORTUNATELY, A FAILURE IN THE SOLAR POWER PANELS RESULTED IN THE TERMINATION OF OPERATIONS ON 1/29/76 AFTER SLIGHTLY LESS THAN 4 MONTHS OF USEFUL LIFE. HOWEVER, ALL THE REGIONS AT THE PERIGEE ALTITUDES WERE SAMPLED DURING THIS TIME. THE SPACECRAFT RE-ENTERED THE ATMOSPHERE ABOUT 1 MONTH AFTER CESSATION OF TELEMETRY. TO CONTINUE THE CORRELATED OBSERVATIONS WITH THE AE-E MISSION, AE-C WAS REACTIVATED ON 2/20/76 TO REPLACE AE-D.

-------- AE-D, BARTH----------

INVESTIGATION NAME- ULTRAVIOLET NITRIC-OXIDE EXPERIMENT

NSSDC ID- 75-096A-11

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - C.A.	BARTH	U OF COLORADO
OI - D.W.	RUSCH	U OF COLORADO
OI - A.I.	STEWART	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 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 SPUN, THE SPECTROMETER, WHICH LOOKED OUTWARD THROUGH THE RIM OF THE SATELLITE, REPEATEDLY HAD ITS FIELD OF VIEW CARRIED DOWN THROUGH THE ATMOSPHERE ONTO THE EARTH'S LIMB, AND ALTITUDE PROFILES OF THE EMITTED AIRGLOW INTENSITY WERE OBTAINED. BELOW SOME ALTITUDES THE MEASURED SIGNAL AT 2150 A WAS CONTAMINATED BY RAYLEIGH SCATTERED SUNLIGHT. TO CORRECT FOR THIS CONTAMINATION, A SECOND CHANNEL MEASURED ONLY SCATTERED LIGHT INTENSITY IN A 12-A REGION CENTERED AT 2190 A. THE TWO CHANNELS WERE OPTICALLY AND ELECTRICALLY INDEPENDENT. NITRIC-OXIDE AIRGLOW INTENSITY WAS DETERMINED BY TAKING THE DIFFERENCE BETWEEN THESE TWO MEASUREMENTS. THE SENSOR'S SPHERICAL FUSED QUARTZ TELESCOPE MIRROR HAD A 125-MM FOCAL LENGTH, AND FOCUSED INCIDENT LIGHT ON THE ENTRANCE SLIT OF THE SPECTROMETER. FROM THIS SLIT THE LIGHT STRUCK ONE-HALF OF THE EBERT MIRROR AND WAS COLLIMATED ONTO THE GRATING. THE 3600-LINES-PER-MM GRATING RETURNED THE LIGHT COLLIMATED TO THE OTHER HALF OF THE EBERT MIRROR, AND FOCUSED IT ON TWO EXIT SLITS. THE SPECTROMETER FIELD OF VIEW WAS 0 DEG 15 MIN BY 4 DEG 30 MIN. IN NORMAL OPERATION EACH CHANNEL WAS INTEGRATED FOR 20.8 MS AND READ OUT ALTERNATELY AT 10.4-MS INTERVALS. THE INSTRUMENT HAD LINEAR RESPONSE CHARACTERISTICS. THE CAPABILITY EXISTED TO INHIBIT OPERATION OF THE 2190-A CHANNEL. WHEN THIS WAS DONE, THE INTEGRATION TIME OF THE 2150-A CHANNEL WAS HALVED AND THE ALTITUDE RESOLUTION OF THE NITRIC-OXIDE MEASUREMENT WAS DOUBLED. THE INSTRUMENT WAS PROTECTED AGAINST CONTAMINATION FROM INTERNAL SCATTERING OF OFF-AXIS UNDISPERSED LIGHT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE UV NITRIC-OXIDE EXPERIMENT FOR THE ATMOSPHERE EXPLORER,' C. A. BARTH ET AL, RADIO SCIENCE, 8, 4, 379, APRIL 1973.

-------- AE-D, BRACE----------

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE (CEP)

NSSDC ID- 75-096A-01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - L.H.	BRACE	NASA-GSFC
OI - R.F.	THEIS	NASA-GSFC
OI - A.	DALGARNO	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 RADIALLY SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED ONE SECOND TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 10,000 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 10,000 AND 10E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 10E6 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-D, CHAMPION----------

INVESTIGATION NAME- ATMOSPHERIC DENSITY ACCELEROMETER (MESA)

NSSDC ID- 75-096A-02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

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

BRIEF DESCRIPTION

MESA OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLEAXIS 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 NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 G IN 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-D, DOERING----------

INVESTIGATION NAME- PHOTOELECTRON SPECTROMETER (PES)

NSSDC ID- 75-096A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P.	DOERING	JOHNS HOPKINS U
OI - C.O.	BOSTROM	APPLIED PHYSICS LAB
OI - J.C.	ARMSTRONG	UNKNOWN

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-D, HANSON----------

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

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-D, HOFFMAN----------

INVESTIGATION NAME- MAGNETIC ION-MASS SPECTROMETER (MIMS)

NSSDC ID- 75-096A-10

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - J.H.	HOFFMAN	U OF TEXAS, DALLAS
OI - E.E.	FERGUSON	NOAA-ERL
OI - W.B.	HANSON	U OF TEXAS, DALLAS
OI - C.R.	LIPPENCOTT	U OF TEXAS, DALLAS

BRIEF DESCRIPTION

A MAGNETIC ION MASS SPECTROMETER WAS FLOWN TO MEASURE IN SITU THE CONCENTRATIONS OF THE AMBIENT POSITIVE 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 1-4-16 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 LOGARITHMIC ELECTROMETER-AMPLIFIER DETECTOR. THE DETECTOR OUTPUT WAS EITHER MEASURED DIRECTLY FOR AN ANALOG OUTPUT, OR WAS SUPPLIED TO A 'PEAK' CIRCUIT THAT DETERMINED THE AMPLITUDE OF EACH PEAK IN THE SPECTRUM. ONLY THE AMPLITUDE OF EACH PEAK WAS TELEMETERED IN THE 'PEAK' 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 SWEPT IN 3 S, ALTERNATING WITH 1-S 'PEAK' MODE SCANS. AN 8-S SWEEP TIME WAS REQUIRED IN THE ANALOG LONG MODE, AGAIN ALTERNATING WITH 1-S 'PEAK' MODE SCANS. AN OPTION EXISTED IN THE LOCKED MODE TO CONTINUOUSLY MEASURE ANY SET OF MASS NUMBERS IN THE RATIO 1-4-16 TO GIVE HIGH SPATIAL RESOLUTION. MORE EXPERIMENT DETAIL 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-D, HOFFMAN----------

INVESTIGATION NAME- LOW-ENERGY ELECTRONS (LEE)

NSSDC ID- 75-096A-12

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - R.A.	HOFFMAN	NASA-GSFC
OI - D.S.	EVANS	NOAA-ERL
OI - J.L.	BURCH	NASA-MSFC

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 0.2 TO 25 KEV. THE EXPERIMENT ACQUIRED DIFFERENTIAL MEASUREMENTS OF THE ENERGY INFLUX AND ANGULAR DISTRIBUTION. THERE WAS ONE DETECTOR MEASURING PROTONS FROM 0.2 TO 25 KEV IN 16 LOGARITHMICALLY SPACED STEPS. TWO ELECTRON (0.2 TO 25 KEV) STEPPED ENERGY ANALYZERS ORIENTED AT DIFFERENT ANGLES (TIME RESOLUTION OF 1 S), AND 16 FIXED-ENERGY DETECTORS, WHICH COULD OBTAIN HIGH TIME RESOLUTION (0.06 S) ANGULAR DISTRIBUTIONS AT 5 ENERGIES BETWEEN 0.2 AND 5 (OR 0.7 AND 17.5) KEV. EACH DETECTOR CONSISTED OF A CYLINDICAL 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 DETECTORS AT AN ANGLE. IN THE SPINNING MODE, ANGULAR DISTRIBUTIONS OF BOTH PROTONS AND ELECTRONS WERE OBTAINED. IN THE DESPUN MODES, MEASUREMENTS WERE OBTAINED AT PLUS OR MINUS 7 DEG, PLUS 35 DEG, AND PLUS 60 DEG FROM THE SPACECRAFT EQUATOR (NORMALLY 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 2- X 6-MM ENTRANCE APERTURES WITH THE EXCEPTION OF THE 12 LOWEST ENERGY (FIXED ENERGY) DETECTORS, WHICH USED 1-MM CIRCULAR APERTURES. THREE MODES OF OPERATION WERE AVAILABLE. IN THE MONITOR MODE, 3 STEPPED-ENERGY DETECTORS MEASURED ENERGY SPECTRA AT -7 AND +60 DEG FROM THE +Y AXIS (IN THE SPACECRAFT EQUATORIAL PLANE), AND IN THE TWO OTHER MODES (LOW ENERGY .2 TO 5 KEV, AND HIGH ENERGY .7 TO 18 KEV) UP TO 7 DIFFERENT ENERGIES WERE OBSERVED AT UP TO 4 DIFFERENT ANGLES. MORE DETAILS OF THIS EXPERIMENT MAY BE FOUND IN 'RADIO SCIENCE,' 8, 4, 393-400, APRIL 1973.

-------- AE-D, NIER----------

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

NSSDC ID- 75-096A-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 MATTACH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS FLOWN. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF 8, I.E., THE TWO MASS RANGES COVERED WERE 1 TO 8 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 SWEPT, IN THE COMMON MODE OF OPERATION PEAK STEPPING WAS EMPLOYED, WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. 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 OR THE ANALYZER. THE ELECTRON ACCELERATING POTENTIAL WAS 75 EV IN NORMAL MODE OPERATION AND 25 EV IN THE FLY-THROUGH MODE. IN ANOTHER OPERATING MODE, THE INSTRUMENT SWITCHED AUTOMATICALLY TO A SEQUENCE OF MASSED 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. E. O. NIER, ET AL, RADIO SCIENCE, 8, 4, 271, 1973.

-------- AE-D, RICE----------

INVESTIGATION NAME- CAPACITANCE MANOMETER

NSSDC ID- 75-096A-14

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), PROVIDED A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE VARIED FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB CONSISTED OF TWO SPHERICAL, THERMALLY CONTROLLED CHAMBERS, SEPARATED BY A THIN MEMBRANE STRETCHED FLAT AND UNDER RADIAL TENSION. ANY DEFLECTION OF THE DIAPHRAGM CAUSED BY A PRESSURE 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-D, RICE----------

INVESTIGATION NAME- COLD CATHODE ION GAUGE

NSSDC ID- 75-096A-15

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL
PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
THE COLD CATHODE-ION GAUGE FLOWN ON AE-D WAS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WERE CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), MEASURED ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 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 1100 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 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 WERE NOT TAPE RECORDED BUT WERE OBSERVED IN REAL TIME.

------- AE-D, SPENCER----------

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE (NATE)

NSSDC ID- 75-096A-09

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - N.W. SPENCER NASA-GSFC
OI - G.R. CARIGNAN 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-EDGE 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 ALSO WAS 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 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, THE IONIZED BEAM WAS DIRECTED TO A QUADRUPOLE ANALYZER, TUNED TO PASS THOSE PARTICLES WHOSE MASS-TO-CHARGE RATIO (M/E) IS 28. THIS IONIZED NITROGEN BEAM THEN PASSED ON TO AN ELECTRON MULTIPLIER. THE OUTPUT PULSES WERE AMPLIFIED AND COUNTED IN A 16-BIT ACCUMULATOR. 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, APRIL 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

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-GSS

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

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-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 NASA-GSFC
OI - R.F. THEIS NASA-GSFC
OI - A. DALGARNO 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 RADIALLY SO THAT IT COULD OBSERVE IN THE DIRECTION OF THE VELOCITY VECTOR ONCE EACH 15-S SPIN PERIOD. EACH INSTRUMENT WAS A RETARDING POTENTIAL LANGMUIR PROBE DEVICE THAT PRODUCED A CURRENT-VOLTAGE (I-V) CURVE FOR A KNOWN VOLTAGE PATTERN PLACED ON THE COLLECTOR. ELECTROMETERS WERE USED TO MEASURE THE CURRENT. THERE WERE TWO SYSTEMS OF OPERATION (ONE WITH TWO MODES AND ANOTHER WITH THREE MODES) USING COLLECTOR VOLTAGE PATTERNS BETWEEN PLUS AND MINUS 5 VOLTS. MOST MODES INVOLVED AN AUTOMATIC OR FIXED ADJUSTMENT OF COLLECTOR VOLTAGE LIMITS (AND/OR ELECTROMETER OUTPUT) SUCH THAT THE REGION OF INTEREST ON THE I-V PROFILE PROVIDED HIGH RESOLUTION. EACH SYSTEM WAS DESIGNED FOR USE WITH ONLY ONE OF THE PROBES, BUT THEY COULD BE INTERSWITCHED TO PROVIDE BACKUP REDUNDANCY. THE BEST MEASUREMENTS IN THE MOST FAVORABLE MODES PROVIDED ONE SECOND TIME RESOLUTION; ELECTRON TEMPERATURE BETWEEN 300 AND 10,000 DEG K (10 PERCENT ACCURACY); ION DENSITY BETWEEN 10,000 AND 10E7 PER CUBIC CM (10-20 PERCENT ACCURACY); ELECTRON DENSITY BETWEEN 50 AND 10E6 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

NSSDC ID- 75-107A-10

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - H.C. BRINTON NASA-GSFC
OI - R.W. PHARO, 3RD NASA-GSFC
OI - H.A. TAYLOR, JR. NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (U) AND IN THE AMBIENT DENSITY RANGE FROM 5 IONS PER 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		USAF GEOPHYS LAB
OI - F.A. MARCOS		USAF GEOPHYS LAB

BRIEF DESCRIPTION

MESA OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE OF 120 KM TO 400 KM BY THE MEASUREMENTS OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE INSTRUMENT CONSISTED OF THREE SINGLEAXIS 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 NUTATIONS OF LESS THAN 0.01 DEGREES WERE MONITORED. THE INSTRUMENT HAD THREE SENSITIVITY RANGES -- 8.E-3 G IN 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

NSSDC ID- 75-107A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - J.P. DOERING		JOHNS HOPKINS U
OI - C.O. BOSTROM		APPLIED PHYSICS LAB
OI - J.C. ARMSTRONG		UNKNOWN

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 CHANGES COULD BE OBSERVED FOR 3-5 PERIODS TO OBTAIN GRADIENTS OF ION CONCENTRATION. ELECTRON PARAMETERS WERE MEASURED IN A MANNER SIMILAR TO IONS EXCEPT FOR THE LINEAR SWEEP VOLTAGE (-3 OR -2 TO 0 V, UP OR DOWN) RANGE. IONS IN MASS RANGES 1 TO 4, 14 TO 16, 24 TO 32 AND GREATER THAN 40 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 STRAY LIGHT CONTAMINATION DURING THE DAYTIME WITH MULTISTAGE BAFFLE SYSTEMS. FILTERS WERE OPERATED IN SEVERAL MODES. THE TWO SEPARATE OPTICAL CHANNELS WERE MONITORED AT TIME INTERVALS CONSISTENT WITH THEIR ANGULAR RESOLUTION IN THE SPINNING MODE. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE VISABLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER,' P.B. HAYS, ET AL, RADIO SCIENCE, 8, 4, 369, 1973.

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

INVESTIGATION NAME- EXTREME SOLAR UV MONITOR (ESUM)

NSSDC ID- 75-107A-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - D.F.	HEATH	NASA-GSFC
OI - J.F.	OSANTOWSKI	NASA-GSFC

BRIEF DESCRIPTION

ESUM MADE ABSOLUTE BROADBAND SPECTRO-RADIOMETRIC MEASUREMENTS OF THE SOLAR EUV FLUX FROM 200 A THROUGH LYMAN-ALPHA AT 1216 A AND MADE PRECISE MEASUREMENTS OF THE TEMPORAL VARIABILITY - APPROXIMATELY ONE PERCENT PER SOLAR ROTATION. THE INSTRUMENT CONSISTED OF TWO IDENTICAL WINDOWLESS EUV PHOTODIODES WITH ALUMINUM OXIDE CATHODES AND A FILTER WHEEL CONTAINING TWO SET'S OF UNBACKED METALLIC FILTERS (ALUMINUM, TIN, INDIUM) AND AN OPEN POSITION. A VISIBLE LIGHT DIODE MEASURED THE PINHOLE TRANSMITTANCE OF THE FILTERS TO DETERMINE THE WHITE LIGHT BACKGROUND. THE TILT ANGLE OF THE INSTRUMENT RELATIVE TO THE +Z SPACECRAFT AXIS WAS OPTIMIZED FOR THE MAXIMUM VIEWING TIME OF THE SUN IN BOTH SPINNING AND DESPUN SPACECRAFT MODES. THE INSTRUMENT FIELD OF VIEW WAS 60 DEG. THE NOMINAL BANDWIDTHS (FOR 50 PERCENT OF SIGNAL) WERE 270 TO 550 A, 570 TO 584 A, 800 TO 935 A, AND 1216 A.

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

INVESTIGATION NAME- BACKSCATTER U/ SPECTROMETER (BUV)

NSSDC ID- 75-107A-16

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - D.F.	HEATH	NASA-GSFC

BRIEF DESCRIPTION

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

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

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION (NACE)

NSSDC ID- 75-107A-08

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - A.E.	HEDIN	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 - S.	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.

------- 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, MATTACH-HER JG 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 SWEPT, IN THE COMMON MODE OF OPERATION PEAK STEPPING WAS EMPLOYED, WITH READINGS ON THE PRINCIPAL PEAKS IN THE MASS SPECTRUM BEING REPEATED APPROXIMATELY EVERY 0.5 S AND OTHER SPECIES LESS FREQUENTLY. DATA BELOW 380 KM WERE MEASURED USING AN ELECTROMETER. IN ADDITION TO THE PEAK STEPPING MODE, THERE WERE SEVERAL OTHER OPERATING MODES WHICH WERE SELECTED BY GROUND COMMAND. 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 GUAGE 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 GUAGE 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 PRIMARIAU 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 GUAGE, 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 GUAGE 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 - H.W. SPENCER NASA-GSFC
OI - G.R. CARIGNAN 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.

********** AEROS 2**********

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

NSSDC ID- 74-055A

LAUNCH DATE- 07/16/74 WEIGHT- 125. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/17/74
ORBIT PERIOD- 95.5 MIN INCLINATION- 97.4 DEG
PERIAPSIS- 217. KM APOAPSIS- 868. KM

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - C.L. WAGNER, JR. NASA-GSFC
PM - N. KIEHNE GES FUR WELTRAUMFORSCH
PS - P. LAEMMERZAHL MPI-NUCLEAR PHYS
PS - S.J. BAUER NASA-GSFC

BRIEF DESCRIPTION
THE AEROS 2 SATELLITE HAD A CYLINDRICAL SHAPE, A DIAMETER OF 0.914 M, AND A HEIGHT OF 0.710 M. IT WAS LAUNCHED INTO AN ELLIPTICAL, POLAR, NEARLY SUN-SYNCHRONOUS EARTH ORBIT. THE SPACECRAFT WAS SPIN-STABILIZED AT 10 RPM AND ORIENTED WITH THE SPIN AXIS TOWARD THE SUN. THE PURPOSE OF THE MISSION WAS TO STUDY THE STATE AND BEHAVIOR OF THE UPPER ATMOSPHERE AND IONOSPHERIC F REGION, ESPECIALLY WITH REGARD TO THE INFLUENCE OF THE SOLAR ULTRAVIOLET RADIATION. FIVE EXPERIMENTS PROVIDED DATA WHICH INCLUDED THE TEMPERATURE AND DENSITY OF ELECTRONS, IONS, AND NEUTRAL PARTICLES, THE COMPOSITION OF IONS AND NEUTRAL PARTICLES, AND SOLAR ULTRAVIOLET FLUX.

-------- AEROS 2, KRANKOWSKY----------

INVESTIGATION NAME- MASS SPECTROMETER (MS)

NSSDC ID- 74-055A-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
IONOSPHERES

PERSONNEL
PI - D.K.H.KRANKOWSKY MPI-NUCLEAR PHYS
OI - P. LAEMMERZAHL MPI-NUCLEAR PHYS

BRIEF DESCRIPTION
PROVIDED MEASUREMENTS OF THE NEUTRAL AND IONIZED CONSTITUENTS IN THE UPPER ATMOSPHERE, THIS A QUADRUPOLE MASS SPECTROMETER. THE MAJOR SENSOR COMPONENTS WERE THE STAINLESS STEEL ION SOURCE, QUADRUPOLE ANALYZER, AND THE ION DETECTION SYSTEM. THE MASS RANGE FROM 1 TO 44 U WAS THE SAME FOR BOTH THE NEUTRAL AND ION MEASUREMENT MODE, AND WAS COVERED IN 610 MS. IN THE STANDARD FORMAT FOR COLLECTING DATA, NEUTRAL MEASUREMENTS WERE MADE FOR ONE SPIN PERIOD FOLLOWED BY ION MEASUREMENTS DURING THE NEXT SPIN PERIOD. IN THE NEUTRAL MODE OF OPERATION, THE GAS PARTICLES WERE IONIZED BY A 75-EV, 100-MICROAMP ELECTRON BEAM EMITTED FROM EITHER OF TWO FILAMENTS. THE POSITIVE SOURCE POTENTIAL PREVENTED POSITIVE IONS FROM ENTERING THE ION SOURCE. WHEN OPERATING IN THE ION MODE, THE SOURCE POTENTIALS WERE CHANGED TO SAMPLE THE ATMOSPHERIC IONS. LEAVING THE ANALYZER, THE ION CURRENT ENTERED A 16-STAGE, COPPER-BERYLLIUM ELECTRON MULTIPLIER. THE

ELECTRON MULTIPLIER OUTPUT CURRENT WAS RECORDED BY A LOG ELECTROMETER WITH A RANGE FROM 5.E-12 TO 5.E-6 AMP. APPROXIMATELY ONE-HALF OF THE ION BEAM TO THE MULTIPLIER WAS INTERRUPTED BY AN ION COLLECTOR GRID AND RECORDED BY A LINEAR ELECTROMETER. THE FULL RANGE SENSITIVITY OF THIS ELECTROMETER CHANGED PERIODICALLY FROM 1.E-10 TO 1.E-11 AMP. NEGLECTING THE RAM CONTRIBUTION, THE BASIC SENSITIVITY OF THE INSTRUMENT WAS 0.23 AMP/TORR. IN THE ION MODE FOR SMALL ANGLES OF ATTACK, THE SENSITIVITY WAS 1.E-18 AMP/IONS M TO THE MINUS 3. OVERALL SENSITIVITY WAS ADJUSTABLE BY COMMAND. MORE EXPERIMENT DETAILS CAN BE FOUND IN THE PAPER BY D.K.H. KRANKOWSKY, ET AL, JOURNAL OF GEOPHYSICS, 40, 5, 601, 1974.

------- AEROS 2, NESKE----------

INVESTIGATION NAME- ELECTRON CONCENTRATION IN THE IONOSPHERE

NSSDC ID- 74-055A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - E.	NESKE	INST FUR PHYS WELTRAUM
OI - R.	KIST	INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION
THE IMPEDANCE PROBE AND VEHICLE BODY COMPRISED TWO PLATES OF A CONDENSER. IMPEDANCE CHANGES DUE TO THE CHANGE IN DIELECTRIC (PLASMA) CHARACTERISTICS OF THE CONDENSER WERE OBSERVED BY MEASURING RESONANCE FREQUENCIES BETWEEN THE CAPACITATOR AND VARIABLE DRIVING FREQUENCIES. THE ELECTRON DENSITY WAS COMPUTED FROM THE OBSERVED RESONANCE FREQUENCY. FREQUENCIES RANGED FROM 0.6 TO 10 MHZ, WHICH CORRESPONDED TO ELECTRON DENSITIES FROM 5.E3 TO 1.E6 ELECTRONS/CM CUBED.

------- AEROS 2, ROEMER----------

INVESTIGATION NAME- ATMOSPHERIC DRAG ANALYSIS

NSSDC ID- 74-055A-06

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - M.	ROEMER	U OF BONN
OI - C.	WULF-MATHIES	U OF BONN

BRIEF DESCRIPTION
THIS EXPERIMENT PROVIDED INDIRECT MEASUREMENTS OF UPPER ATMOSPHERIC DENSITY NEAR SATELLITE PERIGEE. THE DENSITY VALUES WERE DERIVED FROM SEQUENTIAL OBSERVATIONS OF THE SATELLITE'S POSITION. THE SATELLITE TRACKING YIELDED SYSTEMATIC CHANGES IN DENSITY AS A FUNCTION OF ALTITUDE, LATITUDE, AND TIME. THE DATA OBTAINED WAS CORRELATED WITH DENSITY VALUES SIMULTANEOUSLY DERIVED FROM DIRECT MEASUREMENTS USING AN ONBOARD NEUTRAL DENSITY GAUGE.

------- AEROS 2, SCHMIDTKE----------

INVESTIGATION NAME- SOLAR EUV RADIATION

NSSDC ID- 74-055A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - G.	SCHMIDTKE	INST FUR PHYS WELTRAUM
OI - W.	SCHWEIZER	INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A GRATING SPECTROMETER, A SOLAR COLLIMATOR, AND A PHOTOMULTIPLIER. IT OPERATED IN TWO CHANNELS, 150 TO 510 A AND 300 TO 1070 A, AND MEASURED THE FLUX AND SPECTRAL DISTRIBUTION OF THE SOLAR EUV RADIATION AND ITS TEMPORAL AND SPATIAL VARIATIONS.

------- AEROS 2, SPENCER----------

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE

NSSDC ID- 74-055A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.W.	SPENCER	NASA-GSFC
OI - D.T.	PELZ	NASA-GSFC
OI - G.P.	NEWTON	NASA-GSFC
OI - G.R.	CARIGNAN	U OF MICHIGAN
OI - H.B.	NIEMANN	NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO PROVIDE IN SITU MEASUREMENTS OF THE KINETIC TEMPERATURE OF MOLECULAR NITROGEN IN THE THERMOSPHERE, THE TOTAL GAS DENSITY, AND THE MOLECULAR NITROGEN DENSITY. THE SENSOR, MOUNTED AT THE SPACECRAFT PERIPHERY, WAS A QUADRUPOLE MASS SPECTROMETER WHOSE ION SOURCE WAS COUPLED THROUGH A HIGH CONDUCTANCE PATH TO A SPHERICAL STAINLESS STEEL ANTECHAMBER, WHICH WAS OPEN TO THE ATMOSPHERE THROUGH A CIRCULAR KNIFE-EDGE ORIFICE. THE MEASUREMENT SYSTEM WAS DESIGNED TO PROVIDE A DIGITAL OUTPUT THAT WAS PROPORTIONAL TO THE INSTANTANEOUS DENSITY OF NEUTRAL MOLECULAR NITROGEN IN THE SPHERICAL ANTECHAMBER. ANALYSIS OF THE MEASURED MOLECULAR NITROGEN DENSITY VARIATION OVER A SPIN CYCLE, WITH A KNOWLEDGE OF THE SATELLITE MOTION AND ORIENTATION, LED TO A DETERMINATION OF AMBIENT TEMPERATURE INDEPENDENT OF SCALE HEIGHT. THE VOLTAGES WERE PERIODICALLY CHANGED TO PERMIT THE MEASUREMENT OF THE CONCENTRATIONS OF THE OTHER NEUTRAL GAS SPECIES, SO THAT THE TOTAL GAS DENSITY COULD BE DETERMINED. THE SENSOR WAS VACUUM SEALED PRIOR TO LAUNCH, AND OPENED IN ORBIT. THE ELECTRONICS SYSTEM INCLUDED A PULSE COUNTER, DATA PROCESSOR, POWER SUPPLIES, AND LOGIC. THE INSTANTANEOUS VALUE OF THE DENSITY WAS SAMPLED 44 TIMES PER SPIN PERIOD, WITH INCREASED TIME RESOLUTION IN THE REGION WHERE THE ORIFICE PLANE MADE A 90 DEG ANGLE WITH THE VELOCITY VECTOR. FOR A TEMPERATURE UNCERTAINTY OF 5 PERCENT AND A DENSITY UNCERTAINTY OF 2.5 PERCENT, THE UPPER ALTITUDE LIMITS WERE 270 AND 380 KM, DEPENDING ON THE EXOSPHERIC TEMPERATURE. AT THE PERIGEE ALTITUDE OF 275 KM, THE MAXIMUM OUTPUT WAS ON RANGE FOR EXOSPHERIC TEMPERATURES UP TO APPROXIMATELY 1000 K. MORE DETAILS ARE GIVEN IN THE PAPER BY N.W. SPENCER, ET AL., JOURNAL OF GEOPHYSICS, 40, 5, 613, 1974.

------- AEROS 2, SPENNER----------

INVESTIGATION NAME- ENERGY DISTRIBUTION OF IONS AND ELECTRONS

NSSDC ID- 74-055A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - K.	SPENNER	INST FUR PHYS WELTRAUM
OI - A.	DUMBS	INST FUR PHYS WELTRAUM

BRIEF DESCRIPTION
A RETARDING POTENTIAL ANALYZER MEASURED THE ENERGY DISTRIBUTION OF ELECTRONS AND IONS. THE CORRESPONDING TEMPERATURES WERE DERIVED FROM THESE DISTRIBUTIONS. THE EXPERIMENT OPERATED IN AN ELECTRON MODE AND IN AN ION MODE. THE INSTRUMENT WAS ESSENTIALLY A COLLECTOR, SHIELDED BY PARALLEL PLANE GRIDS. BY SWEEPING THE RETARDING VOLTAGE OF THE GRID, THE ENERGY SPECTRA OF THE IONOSPHERIC CHARGED PARTICLES WAS OBTAINED. THE PARTICLES ONLY PASSED THROUGH THE GRID AND REACHED THE COLLECTOR IF THEIR KINETIC ENERGY EXCEEDED THE RETARDING POTENTIAL.

********** ALOUETTE 2**********

SPACECRAFT COMMON NAME- ALOUETTE 2
ALTERNATE NAMES- ALOUETTE-B, S 27B
ISIS-X, 01804

NSSDC ID- 65-098A

LAUNCH DATE- 11/29/65 WEIGHT- 145. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY

CANADA	NASA-OSS
UNITED STATES	NASA-OSS

ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 02/28/71
ORBIT PERIOD- 120.7 MIN	INCLINATION- 79.1 DEG
PERIAPSIS- 508. KM	APOAPSIS 2922. KM

PERSONNEL

MG - F.W.	GAETANO	NASA HEADQUARTERS
MG - J.S.	JOHNSON	COMMUN RESEARCH CENTRE
SC - E.R.	SCHMERLING	NASA HEADQUARTERS
PM - E.D.	NELSON	NASA-GSFC
PS - G.L.	NELMS	DEFENCE RESEARCH ESTAB

BRIEF DESCRIPTION
ALOUETTE 2 WAS A SMALL IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP FREQUENCY IONSPHERIC SOUNDER, A VLF RECEIVER, TWO ENERGETIC PARTICLE EXPERIMENTS, A COSMIC NOISE EXPERIMENT, AND AN ELECTROSTATIC PROBE. THE SPACECRAFT USED TWO LONG DIPOLE ANTENNA (78.9 M AND 22.8 M LONG, RESPECTIVELY) FOR THE SOUNDER, VLF, AND COSMIC EXPERIMENTS. THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.25 RPM AFTER ANTENNA DEPLOYMENT.
END PLATES ON THE LONG ANTENNA CORRECTED THE RAPID DESPIN OCCURING ON ALOUETTE 1, WHICH WAS BELIEVED TO RESULT FROM THERMAL DISTORTION OF THE ANTENNA AND FROM RADIATION PRESSURE. THERE WAS NO TAPE RECORDER, SO THAT DATA WERE AVAILABLE ONLY FROM WHEN THE SPACECRAFT WAS IN LINE OF SIGHT OF TELEMETRY STATIONS. TELEMETRY STATIONS WERE LOCATED SO THAT PRIMARY DATA COVERAGE WAS NEAR THE 80 DEG W MERIDAN PLUS AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, INDIA, NORWAY, AND CENTRAL

AFRICA.

------- ALOUETTE 2, BELROSE----------

INVESTIGATION NAME- VLF RECEIVER

NSSDC ID- 65-098A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.S.	BELROSE	COMMUN RESEARCH CENTRE
OI - F.H.	PALMER	COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THE VLF EXPERIMENT WAS A WIDEBAND HIGH-GAIN RECEIVER WITH A PASSBAND FROM 0.05 TO 30 KHZ THAT USED THE LONG SOUNDER ANTENNA. THE INSTRUMENT WAS A CONSIDERABLY IMPROVED VERSION OF THE ALOUETTE 1 RECEIVER. THE STANDARD VLF DATA FORM WAS A SONOGRAM (GRAPH) THAT SHOWED SIGNAL AS A FUNCTION OF TIME AND FREQUENCY. WHISTLERS, IONOSPHERIC NOISE, VLF NOISE, ETC. WERE OBSERVED IN THIS VERY LOW REGION OF THE RADIO FREQUENCY SPECTRUM.

------- ALOUETTE 2, BRACE----------

INVESTIGATION NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 65-098A-05

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - L.H.	BRACE	NASA-GSFC

BRIEF DESCRIPTION
THIS CYLINDRICAL ELECTROSTATIC PROBE OBSERVED ELECTRON DENSITY IN THE IONOSPHERE. IT WAS A TYPE OF LANGMUIR PROBE CONSISTING OF A COLLECTOR ELECTRODE EXTENDING FROM THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE GUARD RING EXTENDED 23 CM FROM THE SPACECRAFT AND THE COLLECTOR ELECTRODE EXTENDED 46 CM. TWO SENSORS WERE MOUNTED ON OPPOSITE SIDES OF THE LOWER PORTION OF THE SATELLITE AND BOTH EXTENDED DOWNWARD AT AN ANGLE OF 45 DEG TO THE SPACECRAFT SPIN AXIS, WHICH WAS ORIENTED IN A NORTHWARD DIRECTION IN THE ORBITAL PLANE. THE SENSORS WERE OPERATED SEQUENTIALLY.

------- ALOUETTE 2, HARTZ----------

INVESTIGATION NAME- COSMIC RADIO NOISE

NSSDC ID- 65-098A-03

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - T.R.	HARTZ	COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS EXPERIMENT USED THE IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGE TO MEASURE BACKGROUND RADIO NOISE FROM THE IONOSPHERE, GALAXY, AND SUN. THE ANTENNAS WERE DIPOLES 23 AND 73 M LONG. THE RECEIVER SWEPT THE RANGE 0.1 TO 15 MHZ EVERY 32 S. THE RECEIVER BANDWIDTH WAS 40 KHZ, AND THE DYNAMIC RANGE WAS 80 DB. THE RECEIVER SENSITIVITY PERMITTED GALACTIC RADIO EMISSION OBSERVATIONS AT FREQUENCIES GREATER THAN 0.6 MHZ. THE EXPERIMENT FUNCTIONED SATISFACTORILY, PROVIDING GOOD FREQUENCY RESOLUTION WITH RELATIVELY POOR FLUX RESOLUTION.

------- ALOUETTE 2, MCDIARMID----------

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 65-098A-04

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - I.B.	MCDIARMID	NATL RES COUNC OF CAN

BRIEF DESCRIPTION
THE ALOUETTE 2 COSMIC PARTICLE DETECTION EXPERIMENT WAS COMPOSED OF SEVEN DETECTORS. FOUR OF THESE WERE GEIGER-MUELLER TUBES. THE FIRST RESPONDED TO ELECTRONS GREATER THAN 3.9 MEV AND PROTONS GREATER THAN 40 MEV. THE SECOND HAD A MAGNETIC BROOM AND RESPONDED TO ELECTRONS GREATER THAN 250 KEV AND PROTONS GREATER THAN 500 KEV. THE THIRD RESPONDED TO ELECTRONS GREATER THAN 40 KEV AND PROTONS GREATER THAN 500 KEV. THESE THREE GM TUBES WERE PERPENDICULAR TO THE SPIN AXIS. THE FOURTH GM TUBE WAS 10 DEG FROM THE SPIN AXIS AND RESPONDED TO ELECTRONS GREATER THAN 40 KEV AND PROTONS GREATER THAN 500 KEV. THE FIFTH DETECTOR WAS A SILICON JUNCTION THAT DETECTED PROTONS AND ALPHA PARTICLES WITH MINIMUM ENERGIES OF 1 AND 5 MEV, RESPECTIVELY, AND MAXIMUM ENERGIES OF 8 AND 24 MEV, RESPECTIVELY. THE SIXTH DETECTOR WAS A GEIGER TELESCOPE THAT DETECTED PROTONS GREATER THAN 100 MEV. THE SEVENTH DETECTOR WAS A PLASTIC SCINTILLATOR THAT DETERMINED THE PROTON SPECTRA IN THE ENERGY RANGE FROM 100 TO 600 MEV. PARTICLES ASSOCIATED WITH AURORAL AND SOLAR EVENTS WERE STUDIED. NO ALPHA PARTICLE DATA WERE OBTAINED FROM THIS EXPERIMENT.

------- ALOUETTE 2, WHITTEKER----------

INVESTIGATION NAME- SWEEP FREQUENCY SOUNDER

NSSDC ID- 65-098A-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.H.	WHITTEKER	COMMUN RESEARCH CENTRE
OI - J.E.	JACKSON	NASA-GSFC
OI - J.W.	KING	APPLETON LAB
OI - L.	COLIN	NASA-ARC
OI - J.	TURNER	IONOSPHERIC PRED SERV
OI - C.	TAIEB	CNET
OI - O.	HOLT	AURORAL OBS
OI - G.L.	NELMS	DEFENCE RESEARCH ESTAB
OI - Y.	OGATA	RADIO RESEARCH LAB
OI - R.	RAGHAVARAO	PHYSICAL RESEARCH LAB
OI - G.E.K	LOCKWOOD	COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THE SWEEP FREQUENCY IONOSONDE WAS A RADIO TRANSMITTER/RECEIVER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.12 AND 14.5 MHZ WERE SAMPLED ONCE EVERY 32 S. A MULTIPLICITY OF DELAY TIMES WAS USUALLY OBSERVED DUE TO BIREFRINGENCE OF THE IONOSPHERE, NONVERTICAL PROPAGATION, GROUND ECHOES, PLASMA RESONANCES, ETC. DELAY TIME WAS PRIMARILY A FUNCTION OF DISTANCE TRAVERSED BY THE SIGNAL, ELECTRON DENSITY ALONG THE PROPAGATION PATH, AND MODE OF PROPAGATION. THE STANDARD DATA FORM IS AN IONOGRAM (GRAPH) SHOWING DELAY TIME (VIRTUAL DISTANCE OF SIGNAL REFLECTION FROM THE SATELLITE) VERSUS FREQUENCY. TWO OTHER COMMON FORMS OF DATA WERE PREPARED FROM THE IONOGRAMS. THEY ARE DIGITAL FREQUENCY AND/OR VIRTUAL HEIGHT VALUES OF CHARACTERISTIC IONOSPHERIC FEATURES AND COMPUTATIONS OF ELECTRON DENSITY PROFILES.

********** ANS**********

SPACECRAFT COMMON NAME- ANS
ALTERNATE NAMES- ASTRO NETHERLAND SAT.

NSSDC ID- 74-070A

LAUNCH DATE- 08/30/74 WEIGHT- 129.8 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY

THE NETHERLANDS	NIVR
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/31/74
ORBIT PERIOD- 99.0 MIN INCLINATION- 98.1 DEG
PERIAPSIS- 254.0 KM APOAPSIS- 1167.0 KM

PERSONNEL

MG - J.R.	HOLTZ	NASA HEADQUARTERS
SC - N.G.	ROMAN	NASA HEADQUARTERS
PM - W.	BLOEMENDAL	FOKKER AIRCRAFT CO
PM - E.W.	HYMOWITZ	NASA-GSFC
PS - T.P.	STECHER	NASA-GSFC

BRIEF DESCRIPTION
THE ASTRONOMICAL NETHERLANDS SATELLITE (ANS) WAS AN EARTH-ORBITING SUN-SYNCHRONOUS SATELLITE, DESIGNED AS AN ASTRONOMICAL OBSERVATORY. THE SPACECRAFT WAS ATTITUDE-CONTROLLED BY MAGNETIC COILS, REACTION WHEELS, AND A YO-YO. ATTITUDE SENSING WAS CARRIED OUT BY SOLAR SENSORS, HORIZON SENSORS, AND STAR SENSORS. TWO GUIDE STARS NEAR THE OBJECT BEING OBSERVED SERVED AS THE FINAL POINTING REFERENCES. EXPERIMENTS ON BOARD OBSERVED CELESTIAL OBJECTS IN UV AND X-RAY WAVELENGTHS.

------- ANS, BRINKMAN----------

INVESTIGATION NAME- LOW-ENERGY X-RAY EXPERIMENT

NSSDC ID- 74-070A-02

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - A.C.	BRINKMAN	U OF UTRECHT

BRIEF DESCRIPTION
THE INSTRUMENTATION CONSISTS OF A MYLAR-WINDOW PROPORTIONAL COUNTER (44- TO 55-A PASSBAND), LOCATED AT THE FOCUS OF A GRAZING INCIDENCE RING PARABOLOID TELESCOPE, AND A TITANIUM-WINDOW PROPORTIONAL COUNTER (PASSBANDS OF 27- TO 35-A, 4- TO 12-A, AND 2- TO 4-A) LOCATED BEHIND A HONEYCOMB COLLIMATOR. THE SENSORS, WHICH OBSERVED X RAYS FROM COSMIC

SOURCES, REQUIRED AN INSTRUMENT POINTING ACCURACY OF 0.1 DEG.

------- ANS, GURSKY----------

INVESTIGATION NAME- HIGH ANGULAR AND SPECTRAL RESOLUTION OBSERVATIONS OF COSMIC X-RAY SOURCES

NSSDC ID- 74-070A-03

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - H.	GURSKY	HARVARD COLLEGE OBS
OI - H.W.	SCHNOPPER	MASS INST OF TECH

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETECT COSMIC X-RAY EMISSIONS IN THE ENERGY RANGE FROM 1 TO 30 KEV. THE PRINCIPAL SCIENTIFIC OBJECTIVES OF THE EXPERIMENT WERE -- (1) TO GATHER SPECTRAL DATA WITH AN ENERGY RESOLUTION OF 20 PERCENT, (2) TO DETECT SILICON EMISSION LINES IN THE 1- TO 4-KEV RANGE AT AN ENERGY RESOLUTION OF 0.15 PERCENT, (3) TO STUDY PERIODIC AND RANDOM INTENSITY VARIATIONS OF SOURCES OVER A TIME RANGE OF 4 MILLISECONDS TO SEVERAL MINUTES, (4) TO OBTAIN DATA ON X-RAY LIGHT CURVES, AND (5) TO DEFINE POSITIONS OF SOURCES WITH A PRECISION APPROACHING 1 ARC-MIN. THE EXPERIMENTAL PACKAGE CONTAINED THREE MAJOR COMPONENTS -- (1) A COLLIMATOR ASSEMBLY, (2) A LARGE AREA DETECTOR (LAD) UNIT FOR MEASURING 1- TO 30-KEV X-RAYS, AND (3) A BRAGG-CRYSTAL SPECTROMETER TUNED FOR DETECTION OF SILICON LINES IN THE 1- TO 4-KEV INTERVAL. THE LAD AND BRAGG SPECTROMETER DETECTORS WERE VERY SENSITIVE, BEING ABLE TO DETECT 3.E-3 PHOTONS/(SQ CM-S). X-RAYS INCIDENT ON THE FRONT FACE OF THE PACKAGE PASSED THROUGH THE COLLIMATOR ASSEMBLY ONTO EITHER THE LAD OR A SERIES OF FOUR BRAGG CRYSTALS THAT WERE ORIENTED AT ABOUT 45 DEG WITH RESPECT TO THE INCIDENT BEAM. THE COLLIMATOR IN FRONT OF THE LAD WAS A COMBINATION OF A FINE COLLIMATOR (10 ARC-MIN FWHM) AND A COARSE COLLIMATOR (3 DEG FWHM), WITH THE POINTING OF EACH COLLIMATOR BEING CENTERED ON SLIGHTLY DIFFERENT POINTS ON THE SKY. EACH COLLIMATOR HAD A SEPARATE ARGON FILLED PROPORTIONAL COUNTER WITH A 9.4-MG/SQ CM BERYLLIUM WINDOW. THE EFFECTIVE COLLECTION AREA OF EACH COUNTER WAS ABOUT 40 SQ-CM, AFTER CORRECTION FOR THE COLLIMATOR TRANSMISSION, AND EACH HAD A DETECTION EFFICIENCY IN EXCESS OF 10 PERCENT. THE OUTPUT FROM A LAD COUNTER WAS PROCESSED BY A 15-CHANNEL LOGARITHMIC PULSE-HEIGHT ANALYZER, ALL CHANNELS OF WHICH WERE RECORDED IN MEMORY EITHER EVERY 4 S OR 64 S. HIGHER TIME RESOLUTIONS OF 1 TO 4 MILLISECONDS WERE POSSIBLE THROUGH THE USE OF A SCHEME, WHICH RECORDED THE TIME OF ARRIVAL OF THE FIRST SIX EVENTS OCCURING EACH SECOND IN THE LAD. IN ADDITION, A SINGLE CHANNEL ANALYZER WAS USED TO RECORD THE INTEGRATED COUNTS IN THE 1.3- TO 7-KEV RANGE IN 1-, 4-, OR 16-S INTERVALS. ONLY THE COARSE COLLIMATOR FED X RAYS ONTO THE FOUR BRAGG PET CRYSTALS. THE DIFFRACTED X RAYS WERE THEN DETECTED BY TWO ARGON-FILLED PROPORTIONAL COUNTERS WITH 4.7-MG/SQ-CM BERYLLIUM WINDOWS. THE EFFECTIVE DETECTION AREA OF EACH COUNTER WAS 6 SQ-CM WITHIN THE 2-EV RESOLUTION OF THE CRYSTAL TAKING ACCOUNT OF PROJECTION EFFECTS AND PEAK REFLECTIVITY OF THE CRYSTAL. THE OUTPUT FROM A BRAGG DETECTOR WAS FILTERED BY AN EIGHT-CHANNEL LOGARITHMIC PULSE-HEIGHT ANALYZER OPERATING IN THE ENERGY INTERVAL FROM 1- TO 4.2-KEV. FOR BOTH THE LAD AND BRAGG DETECTORS EFFECTIVE NON-X-RAY EVENT REJECTION WAS ACCOMPLISHED BY PULSE SHAPE DISCRIMINATION OF THE PROPORTIONAL COUNTER SIGNALS.

------- ANS, VANDUINEN----------

INVESTIGATION NAME- UV TELESCOPE

NSSDC ID- 74-070A-01

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - R.J.	VANDUINEN	U OF GRONINGEN
OI - J.	DORGMAN	U OF GRONINGEN

BRIEF DESCRIPTION
THIS EXPERIMENT, WHICH REQUIRED A POINTING ACCURACY OF 1 ARC-MIN, CONSISTED OF A SMALL CASSEGRAIN TELESCOPE COUPLED TO A GRATING SPECTROGRAPH. THE SPECTROGRAPH COVERED FIVE WAVELENGTH BANDS BETWEEN 1500 AND 3295 A, USING PHOTOMULTIPLIERS AS DETECTORS. THE EXPERIMENT WAS DESIGNED TO BE SENSITIVE ENOUGH TO OBSERVE STARS UP TO THE 10TH MAGNITUDE.

********** APOLLO 11 LM/EASEP**********

SPACECRAFT COMMON NAME- APOLLO 11 LM/EASEP
ALTERNATE NAMES- 04041, APOLLO 11 LM

NSSDC ID- 69-059C

LAUNCH DATE- 07/16/69 WEIGHT- 4240. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OMSF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL

MG - F.I.	ROBERSON	NASA HEADQUARTERS
SC - J.B.	HANLEY	NASA HEADQUARTERS
PM - W.F.	EICHELMAN	NASA-JSC
PS -	NONE ASSIGNED	

BRIEF DESCRIPTION
THE LUNAR MODULE (LM) WAS A TWO-STAGE VEHICLE DESIGNED FOR SPACE OPERATIONS NEAR AND ON THE MOON. THE LM STOOD 7 M HIGH AND WAS 9.4 M WIDE (DIAGONALLY ACROSS THE LANDING GEAR). THE ASCENT AND DESCENT STAGES OF THE LM OPERATED AS A UNIT UNTIL STAGING, WHEN THE ASCENT STAGE FUNCTIONED AS A SINGLE SPACECRAFT FOR RENDEZVOUS AND DOCKING WITH THE COMMAND MODULE (CM). INCLUDED IN THE DESCENT STAGE WERE THE EARLY APOLLO SCIENTIFIC EXPERIMENT PACKAGE (EASEP) EXPERIMENTS, WHICH WERE SELF-CONTAINED. ALSO CARRIED ON THE LM WERE THE LUNAR SURFACE SOLAR WIND COMPOSITION, THE SOIL MECHANICS, AND THE SAMPLE COLLECTION EXPERIMENTS. THE EASEP EXPERIMENTS INCLUDED THE PASSIVE SEISMOGRAPH, THE DUST DETECTOR, AND THE LASER RANGING RETROREFLECTOR. THE LM WAS ON THE LUNAR SURFACE JULY 20-21, 1969.

------- APOLLO 11 LM/EASEP, ALLEY----------

INVESTIGATION NAME- LASER RANGING RETROREFLECTOR

NSSDC ID- 69-059C-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - C.O.	ALLEY	U OF MARYLAND

BRIEF DESCRIPTION
THE LASER RANGING RETROREFLECTOR (LRRR), WHICH WAS LEFT ON THE LUNAR SURFACE BY THE APOLLO 11 CREW, WAS A RETROREFLECTOR ARRAY WITH A FOLDING SUPPORT STRUCTURE FOR AIMING AND ALIGNING THE ARRAY TOWARD EARTH. THE ARRAY WAS BUILT OF CUBES OF FUSED SILICA. LASER RANGING BEAMS FROM EARTH WERE REFLECTED BACK TO THEIR POINT OF ORIGIN FOR PRECISE MEASUREMENT OF EARTH-MOON DISTANCES, MOTION OF THE MOON'S CENTER OF MASS, LUNAR RADIUS, AND EARTH GEOPHYSICAL INFORMATION.

********** APOLLO 12 LM/ALSEP**********

SPACECRAFT COMMON NAME- APOLLO 12 LM/ALSEP
ALTERNATE NAMES- 04246, ALSEP 12
LEM 12, APOLLO 12C

NSSDC ID- 69-099C

LAUNCH DATE- 11/14/69 WEIGHT- 4379. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OMSF
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL

MG - F.I.	ROBERSON	NASA HEADQUARTERS
SC - J.B.	HANLEY	NASA HEADQUARTERS
PM - W.F.	EICHELMAN	NASA-JSC
PS -	NONE ASSIGNED	

BRIEF DESCRIPTION
THE LUNAR MODULE (LM) WAS A TWO-STAGE VEHICLE DESIGNED FOR SPACE OPERATIONS NEAR AND ON THE MOON. THE LM STOOD 7 M HIGH AND WAS 9.4 M WIDE (DIAGONALLY ACROSS THE LANDING GEAR). THE ASCENT AND DESCENT STAGES OF THE LM OPERATED AS A UNIT UNTIL STAGING, WHEN THE ASCENT STAGE FUNCTIONED AS A SINGLE SPACECRAFT FOR RENDEZVOUS AND DOCKING WITH THE COMMAND MODULE (CM). THE ALSEP EXPERIMENTS INCLUDED -- (1) THE PASSIVE SEISMOGRAPH, WHICH WAS DESIGNED TO MEASURE SEISMIC ACTIVITY AND PHYSICAL PROPERTIES OF THE LUNAR CRUST AND INTERIOR, (2) THE SUPRATHERMAL ION DETECTOR, DESIGNED TO MEASURE THE FLUX COMPOSITION, ENERGY, AND VELOCITY OF LOW-ENERGY POSITIVE IONS, (3) THE COLD CATHODE ION GAUGE, DESIGNED TO MEASURE THE ATMOSPHERE AND ANY VARIATIONS WITH TIME OR SOLAR ACTIVITY SUCH ATMOSPHERE MAY HAVE, (4) THE CHARGED PARTICLE LUNAR ENVIRONMENT EXPERIMENT, DESIGNED TO MEASURE PARTICLE ENERGIES OF SOLAR PROTONS AND ELECTRONS THAT REACH THE LUNAR SURFACE AND TO PROVIDE DATA ON ENERGY DISTRIBUTION OF THESE SOLAR PARTICLES, (5) THE LUNAR SURFACE MAGNETOMETER (LSM), DESIGNED TO MEASURE THE MAGNETIC FIELD AT THE LUNAR SURFACE, AND (6) THE SOLAR WIND SPECTROMETER, WHICH MEASURED THE FLUXES AND SPECTRA OF THE ELECTRONS AND PROTONS THAT EMANATE FROM THE SUN AND REACH THE LUNAR SURFACE. THE LM ITSELF WAS ON THE LUNAR SURFACE NOVEMBER 19-20, 1969.

------- APOLLO 12 LM/ALSEP, FREEMAN----------

INVESTIGATION NAME- SUPRATHERMAL ION DETECTOR

NSSDC ID- 69-099C-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.W.	FREEMAN	RICE U
OI - F.C.	MICHEL	RICE U
OI - H.K.	HILLS	RICE U

BRIEF DESCRIPTION

THIS EXPERIMENT, WHICH WAS PART OF THE ALSEP PACKAGE, STUDIED THE IONIC ENVIRONMENT OF THE MOON BY DETECTING FREE-STREAMING AND THERMALIZED SOLAR WIND IONS AND THOSE IONS THAT RESULT FROM ULTRAVIOLET IONIZATION OF THE LUNAR ATMOSPHERE. A LOW-ENERGY CURVED-PLATE MASS ANALYZER (MA), WITH A VELOCITY FILTER OF CROSSED ELECTRIC AND MAGNETIC FIELDS, DETERMINED THE PARTICLE FLUX IN 20 INTERVALS OVER THE RANGE 0.2 TO 48.6 EV PER UNIT CHARGE, WITH SPECIES DISCRIMINATION OF MASSES UP TO 1000 AMU. ANOTHER ANALYZER (TOTAL ION DETECTOR-TID) WITHOUT A VELOCITY FILTER DETECTED HIGHER-ENERGY PARTICLES IN 20 ENERGY INTERVALS BETWEEN 10 AND 3500 EV. THE POTENTIAL OF ONE INSTRUMENT (FOR EACH INSTRUMENT PLATE) RELATIVE TO THE LUNAR SURFACE WAS VARIED THROUGH 24 STEPS EVERY 9.6 MIN, AND FOR EACH STEP THE POTENTIAL OF THE OTHER INSTRUMENT PLATE RELATIVE TO THE FIRST IS VARIED THROUGH 20 STEPS. DUE TO ITS ORIENTATION, THIS INSTRUMENT DID NOT OBSERVE SOLAR WIND PARTICLES EXCEPT IN THE SHEATH AND TAIL. HOWEVER, IT DID OBSERVED UPSTREAMING PARTICLES FROM THE EARTH'S BOW SHOCK.

------- APOLLO 12 LM/ALSEP, LATHAM----------

INVESTIGATION NAME- PASSIVE SEISMIC (PSE)

NSSDC ID- 69-099C-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - G.V.	LATHAM	U OF TEXAS, GALVESTON
OI - F.	PRESS	MASS INST OF TECH
OI - G.H.	SUTTON	U OF HAWAII

BRIEF DESCRIPTION

THE PSE WAS PLACED ON THE LUNAR SURFACE AS PART OF THE ALSEP PACKAGE. IT WAS LOCATED AND DEPLOYED 100 M FROM THE LM IN THE VICINITY OF SURVEYOR 3. THE SEISMOGRAPH EXPERIMENT MEASURED SEISMIC ACTIVITY OF THE MOON AND OBTAINED INFORMATION ON THE PHYSICAL PROPERTIES OF THE LUNAR CRUST AND INTERIOR. THE PSE DETECTED SURFACE TILT PRODUCED BY TIDAL DEFORMATIONS, MOONQUAKES, AND METEORITE IMPACTS. IT WAS NUCLEAR POWERED (SNAP-27) AND COULD OPERATE CONTINUOUSLY. THE THREE COMPONENTS OF THE SENSOR ASSEMBLY WERE ALIGNED ALONG THE TWO HORIZONTAL AXES LPX, LPY, AND THE VERTICAL AXIS LPZ. A LEVELING STOOL, THERMAL SHROUD, AND RADIOISOTOPE HEATERS COMPRISED THE REST OF THE EXPERIMENT PACKAGE.

------- APOLLO 12 LM/ALSEP, SNYDER----------

INVESTIGATION NAME- SOLAR WIND SPECTROMETER

NSSDC ID- 69-099C-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SOLAR PHYSICS

PERSONNEL

PI - C.W.	SNYDER	NASA-JPL
OI - D.R.	CLAY	NASA-JPL
OI - M.M.	NEUGEBAUER	NASA-JPL

BRIEF DESCRIPTION

THE SOLAR WIND SPECTROMETER WAS PART OF THE APOLLO 12 ALSEP PACKAGE LEFT ON THE LUNAR SURFACE. IT CONSISTED OF SEVEN MODULATED FARADAY CUPS OPENED TOWARD DIFFERENT, BUT SLIGHTLY OVERLAPPING, PORTIONS OF THE LUNAR SKY. THE INSTRUMENT WAS USED TO OBSERVE THE DIRECTIONAL INTENSITIES OF THE ELECTRON (6-1330 EV) AND POSITIVE ION (18-9780 EV) COMPONENTS OF THE SOLAR WIND AND MAGNETOTAIL PLASMA THAT STRIKE THE SURFACE OF THE MOON.

********** APOLLO 14 LM/ALSEP**********

SPACECRAFT COMMON NAME- APOLLO 14 LM/ALSEP
ALTERNATE NAMES- ALSEP 14, LEM 14
04905, APOLLO 14C

NSSDC ID- 71-008C

LAUNCH DATE- 01/31/71 WEIGHT- 4857. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OMSF
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL

MG - F.I.	ROBERSON	NASA HEADQUARTERS
SC - J.B.	HANLEY	NASA HEADQUARTERS
PM - W.F.	EICHELMAN	NASA-JSC
PS -	NONE ASSIGNED	

BRIEF DESCRIPTION

THE APOLLO 14 LUNAR MODULE (LM) CONSISTED OF A LUNAR LANDING CRAFT AND AN APOLLO LUNAR SURFACE EXPERIMENT PACKAGE (ALSEP) THAT CONTAINED SCIENTIFIC EXPERIMENTS LEFT ON THE LUNAR SURFACE AFTER COMPLETION OF THE MANNED PORTION OF THE MISSION. THE LM LANDED IN THE LUNAR HIGHLANDS (3 DEG 39 MIN 1 S SOUTH LATITUDE, 17 DEG 27 MIN 55 S WEST LONGITUDE). THE NUCLEAR-POWERED ALSEP WAS DEPLOYED AT THE LANDING SITE AND INCLUDED EXPERIMENTS TO STUDY THE SEISMIC WAVES, MAGNETIC FIELDS, SOLAR WIND COMPOSITION AND INTERACTION WITH THE MOON, LUNAR ATMOSPHERE, AND IONIC ENVIRONMENT. THE LM WAS ON THE LUNAR SURFACE FEBRUARY 5-6, 1971.

------- APOLLO 14 LM/ALSEP, FALLER----------

INVESTIGATION NAME- LASER RANGING RETROREFLECTOR

NSSDC ID- 71-008C-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - J.	FALLER	U OF COLORADO

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO PERMIT GROUND-BASED STATIONS TO CONDUCT SHORT-PULSE LASER RANGING TO A CORNER REFLECTOR ARRAY ON THE LUNAR SURFACE AT THE FRA MAURO SITE. THIS INSTRUMENT, THOSE AT APOLLO 11 (TRANQUILITY BASE), AND AT THE APOLLO 15 SITE IN THE HADLEY/APENNINE REGION PROVIDED A NETWORK OF STATIONS (WELL-SEPARATED IN LONGITUDE AND LATITUDE) TO PERMIT A COMPLETE GEOMETRICAL SEPARATION OF THE LUNAR LIBRATIONS. THE REFLECTORS PERMITTED A DISCRIMINATION OF THE 3-YR PHYSICAL LIBRATIONS. THEY ALSO PROVIDED INFORMATION ABOUT THE EARTH AND ITS CONTINENTAL DRIFT MOTIONS, AS WELL AS VERY ACCURATE DETERMINATIONS OF THE EARTH-MOON DISTANCE AND THE MOON'S ORBITAL MOTIONS. THE EARTH'S NORTH POLE POSITION COULD BE DETERMINED TO PLUS OR MINUS 15 CM. THE INSTRUMENT WAS AN ARRAY OF 100 SMALL FUSED-SILICA CORNER CUBES, EACH 3.8 CM IN DIAMETER. IT WAS DEPLOYED ON THE FIRST EVA, 30 M WEST OF THE CENTRAL STATION (200 M WEST OF THE LM), WAS LEVELED, AND WAS FACED TOWARD THE EARTH. EACH CORNER CUBE REFLECTED LIGHT PARALLEL TO THE INCIDENT DIRECTION, INSURING THAT THE REFLECTED LASER PULSE RETURNED TO ITS PLACE OF ORIGIN ON THE EARTH.

------- APOLLO 14 LM/ALSEP, KOVACH----------

INVESTIGATION NAME- ACTIVE SEISMIC

NSSDC ID- 71-008C-05

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - R.L.	KOVACH	STANFORD U
OI - J.S.	WATKINS	U OF TEXAS, GALVESTON

BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO GENERATE AND MONITOR SEISMIC WAVES IN THE MOON NEAR THE SURFACE IN ORDER TO STUDY THE INTERNAL STRUCTURE TO A DEPTH OF 460 M. THE SEISMIC ENERGY SOURCE USED WAS THE 'THUMPER' DEVICE, WHICH CONTAINED 21 SMALL EXPLOSIVE CHARGES. THE MORTAR PACKAGE CONTAINING FOUR HIGH-EXPLOSIVE GRENADES WAS PLANTED 91 M FROM THE LM, BUT ITS DETONATION FROM EARTH WAS POSTPONED UNTIL THE OTHER EXPERIMENTS WERE COMPLETED TO AVOID DAMAGING THEM. THE THUMPER DEVICE PROVIDED DATA THAT INDICATED THAT TWO P-WAVE VELOCITIES WERE MEASURED AT THE FRA MAURO SITE. THE NEAR SURFACE HAS A SEISMIC WAVE VELOCITY OF 104 M/S, AND A SUBLAYER STARTING AT A DEPTH OF 8.5 M HAS A VELOCITY OF 299 M/S. ESTIMATES OF THE THICKNESS OF THIS SUBSTRATUM RANGE FROM 38 TO 76 M, WHICH IS PROBABLY INDICATIVE OF THE DEPTH OF THE FRA MAURO FORMATION. THE EQUIPMENT CONSISTED OF A STAFF WITH THE CHARGE INITIATORS MOUNTED ON THE LOWER END OF ITS BASE, A CABLE CONNECTING THE STAFF (THUMPER) TO THE CENTRAL STATION, GEOPHONES (MINIATURE SEISMOMETERS) FOR RECORDING THE WAVES, AND A THREE-CHANNEL AMPLIFIER WITH LOG COMPRESSOR FOR TELEMETERING TO THE EARTH.

------- APOLLO 14 LM/ALSEP, LATHAM----------

INVESTIGATION NAME- PASSIVE SEISMIC (PSE)

NSSDC ID- 71-068C-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

PI - G.V.	LATHAM	U OF TEXAS, GALVESTON
OI - W.M.	EWING(DECEASED)	
OI - F.	PRESS	MASS INST OF TECH
OI - G.H.	SUTTON	U OF HAWAII

BRIEF DESCRIPTION
THE PSE WAS PLACED ON THE LUNAR SURFACE AS PART OF THE ALSEP. IT WAS LOCATED AND DEPLOYED 98 M FROM THE LM. THIS EXPERIMENT WAS DESIGNED TO MEASURE SEISMIC ACTIVITY OF THE MOON AND TO OBTAIN INFORMATION ON THE PHYSICAL PROPERTIES OF THE LUNAR CRUST AND INTERIOR. THE PSE WAS ALSO DESIGNED TO DETECT SURFACE TILT PRODUCED BY TIDAL DEFORMATIONS, MOONQUAKES, AND METEORITE IMPACTS. THE EXPERIMENT WAS NUCLEAR POWERED (SNAP-27) AND COULD OPERATE CONTINUOUSLY. THE COMPONENTS WERE THE SENSOR ASSEMBLY, THE LEVELING STOOL, THE THERMAL SHROUD, AND THE RADIOISOTOPE HEATERS. READINGS FROM THE SENSORS WERE SENT TO THE ALSEP CENTRAL STATION, WHICH TRANSMITTED THE DATA BACK TO EARTH.

------- APOLLO 14 LM/ALSEP, O'BRIEN----------

INVESTIGATION NAME- CHARGED PARTICLE LUNAR ENVIRONMENT

NSSDC ID- 71-008C-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - B.J.	O'BRIEN	DEPT OF ENVIRON PROT
OI - D.L.	REASONER	NASA-MSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE THE ENERGY SPECTRA OF LOW-ENERGY CHARGED PARTICLES STRIKING THE LUNAR SURFACE. THE MAIN PART OF THE INSTRUMENTATION CONSISTED OF TWO ELECTROSTATIC ANALYZERS, ONE OF THESE POINTED TOWARD LOCAL LUNAR VERTICAL, AND THE OTHER TO A POINT 60 DEG FROM VERTICAL TOWARD LUNAR WEST. AS A FIRST APPROXIMATION, BOTH DETECTORS COULD BE CONSIDERED TO POINT IN THE ECLIPTIC PLANE. EACH ANALYZER CONSISTED OF A SET OF DIRECTION-DEFINING SLITS, DEFLECTION PLATES, FIVE SMALL-APERTURE, C-SHAPED CHANNEL ELECTRON MULTIPLIERS, AND ONE LARGE-APERTURE, CHANNEL ELECTRON MULTIPLIER. FOR A GIVEN APPLIED DEFLECTION VOLTAGE, THE FIVE MULTIPLIERS WERE ARRANGED TO COUNT PARTICLES OF ONE POLARITY WITH DIFFERING ENERGIES, WHILE THE LARGE-APERTURE MULTIPLIER MADE A WIDE-BAND MEASUREMENT OF PARTICLES OF THE OPPOSITE POLARITY. DURING EACH 19.2-S INTERVAL IN THE AUTOMATIC MODE OF EXPERIMENT OPERATION, DEFLECTION VOLTAGES OF ZERO (TWICE) AND PLUS AND MINUS 35, 350, AND 3500 WERE APPLIED TO THE DEFLECTION PLATES OF BOTH ANALYZERS FOR 2.4 S EACH VOLTAGE. THE LITTLE-USED MANUAL MODE PERMITTED THE CONTINUOUS APPLICATION OF A SINGLE DEFLECTION VOLTAGE, THUS INCREASING TEMPORAL RESOLUTION. FOR PARTICLES IN A LIMITED PORTION OF THE SPECTRUM. USEFUL DATA OBTAINED DURING EACH 19.2-S INTERVAL (AUTOMATIC MODE) WERE, FOR EACH ANALYZER, 1.2-S ACCUMULATED COUNTS OF ELECTRONS IN 18 ENERGY WINDOWS BETWEEN 40 EV AND 20 KEV, AND IONS IN 12 ENERGY WINDOWS BETWEEN 0.17 AND 20 KEV. THE EXPERIMENT WORKED NORMALLY FROM DEPLOYMENT (FEB. 5, 1971) UNTIL APRIL 8, 1971, WHEN THE ANALYZER POINTING AWAY FROM LUNAR VERTICAL FAILED. THE OTHER ANALYZER CONTINUED TO FUNCTION NORMALLY UNTIL JUNE 6, 1971, WHEN A PARTIAL FAILURE OCCURRED. OPERATION OF THIS ANALYZER WAS INTERMITTENT FOR THE REST OF 1971. DURING MOST OF 1972, OPERATION WAS CONTINUOUS DURING LUNAR NIGHT AND INTERMITTENT DURING LUNAR DAY. FROM DECEMBER 1972 TO FEBRUARY 1973 OPERATION WAS CONTINUOUS, AFTER WHICH TIME THE HIGH-VOLTAGE PROBLEMS OCCURRED AGAIN. FOR FURTHER DETAILS, SEE BURKE AND REASONER, PLANET. SPACE SCI., 20, 429, 1972.

********** APOLLO 15 LM/ALSEP**********

SPACECRAFT COMMON NAME- APOLLO 15 LM/ALSEP
ALTERNATE NAMES- APOLLO 15C, ALSEP 15
LEM 15, ROVER 15
05366

NSSDC ID- 71-063C

LAUNCH DATE- 07/26/71 WEIGHT- 12700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OMSF
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL

MG - F.I.	ROBERSON	NASA HEADQUARTERS
SC - J.D.	HANLEY	NASA HEADQUARTERS
PM - W.F.	EICHELMAN	NASA-JSC
PS -	NONE ASSIGNED	

BRIEF DESCRIPTION
THE APOLLO 15 LUNAR MODULE (LM) CONSISTED OF A LUNAR LANDING CRAFT, A LUNAR ROVING VEHICLE AND AN APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE (ALSEP) THAT CONTAINED SCIENTIFIC EXPERIMENTS TO BE LEFT ON THE MOON AFTER COMPLETION OF THE MANNED PORTION OF THE MISSION. THE LM LANDED IN THE NORTH CENTRAL PART OF THE MOON (26 DEG 4 MIN 54 S N LATITUDE, 3 DEG 39 MIN 30 S E LONGITUDE), AT THE FOOT OF THE APENNINE MOUNTAIN RANGE. THE ALSEP WAS DEPLOYED AT THE LANDING SITE. THE LRV WAS USED DURING THE EXTRAVEHICULAR ACTIVITIES (EVA) TO EXTEND THE RANGE OF MANNED LUNAR EXPLORATION. THE NUCLEAR-POWERED ALSEP CONTAINED SEISMIC, MAGNETIC FIELDS, LUNAR ATMOSPHERIC COMPOSITION, ION COMPOSITION, LUNAR DUST, SOLAR WIND COMPOSITION, HEAT LOSS, AND SOLAR CELL RADIATION DAMAGE EXPERIMENTS. THE LM WAS ON THE LUNAR SURFACE JULY 30-AUGUST 2, 1971.

------- APOLLO 15 LM/ALSEP, BATES----------

INVESTIGATION NAME- LUNAR DUST DETECTOR

NSSDC ID- 71-063C-09 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
DUST

PERSONNEL

PI - J.R.	BATES	NASA-JSC

BRIEF DESCRIPTION
THE FUNCTION OF THE EXPERIMENT WAS TO SEPARATE AND MEASURE HIGH-ENERGY RADIATION DAMAGE TO THREE SOLAR CELLS, TO MEASURE REDUCED SOLAR CELL OUTPUT DUE TO DUST ACCUMULATION, AND TO MEASURE REFLECTED INFRARED ENERGY AND TEMPERATURES FOR USE IN COMPUTING LUNAR SURFACE TEMPERATURES. THE DUST DETECTOR HAD TWO COMPONENTS -- A SENSOR PACKAGE MOUNTED TO THE TOP OF THE CENTRAL STATION SUN SHIELD, AND A PRINTED CIRCUIT BOARD LOCATED WITHIN THE CENTRAL STATION THAT INTERFACED WITH THE POWER DISTRIBUTION UNIT OF THE ALSEP DATA SUBSYSTEM. THE EXPERIMENT WAS SIMILAR TO THAT DEPLOYED ON APOLLO 12 AND 14.

------- APOLLO 15 LM/ALSEP, FALLER----------

INVESTIGATION NAME- LASER RANGING RETROREFLECTOR

NSSDC ID- 71-063C-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
CELESTIAL MECHANICS
GEODESY AND CARTOGRAPHY

PERSONNEL

PI - J.	FALLER	U OF COLORADO

BRIEF DESCRIPTION
THE LASER RANGING RETROREFLECTOR EXPERIMENT (LRRR), PART OF THE ALSEP PACKAGE, WAS A CORNER REFLECTOR FOR LASER RANGING FROM EARTH. THE RANGING DATA OBTAINED INCLUDED INFORMATION ON LUNAR MOTION, LUNAR LIBRATIONS, AND EARTH ROTATION. THE LRRR EXPERIMENT CONSISTED OF A FOLDED PANEL STRUCTURE INCORPORATING 300 INDIVIDUAL FUSED-SILICA OPTICAL CORNER REFLECTORS, A SIMPLE ALIGNMENT/LEVELING DEVICE, AND AN AIM-HANDLE MECHANISM. THE LUNAR ROVING VEHICLE (LRV) WAS USED TO CARRY THE LRRR TO THE HADLEY RILL SITE. THE LRRR BECAME PASSIVE AFTER DEPLOYMENT. A CAMERA (60-MM LENS) WAS USED TO PHOTOGRAPH THE EXPERIMENT. THE LRRR COULD BE USED INDEFINITELY AND PROVIDED DATA THAT, WHEN USED IN CONJUNCTION WITH DATA FROM THE APOLLO 11 AND 14 LRRR EXPERIMENTS, PERMITED MORE REFINED DISTANCE MEASUREMENTS THAN WERE PREVIOUSLY AVAILABLE. NOW THAT SMALLER TELESCOPES CAN BE USED, THE EXPERIMENT IS PROVIDING GREATER QUANTITIES OF MORE ACCURATE DATA.

------- APOLLO 15 LM/ALSEP, FREEMAN----------

INVESTIGATION NAME- SUPRATHERMAL ION DETECTOR

NSSDC ID- 71-063C-05 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.W.	FREEMAN	RICE U
OI - F.C.	MICHEL	RICE U
OI - H.K.	HILLS	RICE U

BRIEF DESCRIPTION
THE ALSEP SUPRATHERMAL ION DETECTOR EXPERIMENT MEASURED IONS GENERATED FROM ULTRAVIOLET IONIZATION OF THE LUNAR ATMOSPHERE AND FROM THE FREE-STREAMING SOLAR WIND/LUNAR SURFACE INTERACTION. FLUX, NUMBER DENSITY, VELOCITY, AND ENERGY PER UNIT CHARGE WERE DETERMINED FROM THE DATA OBTAINED. A CURVED-PLATE ANALYZER AND E-CROSS-B VELOCITY SELECTOR DETECTED IONS WITH NORMAL VELOCITIES FROM 0.4 TO 93.5 KM/S AND ENERGIES FROM 0.2 TO 48.6 EV. SPECIES DISCRIMINATION OF MASSES UP TO 120 U WAS POSSIBLE. A SEPARATE CURVED-PLATE ANALYZER COUNTED SOLAR WIND PROTONS IN 20 ENERGY INTERVALS FROM 10 TO 3500 EV. THE POTENTIAL OF ONE INSTRUMENT (FOR EACH INSTRUMENT PLATE) RELATIVE TO THE LUNAR SURFACE IS VARIED THROUGH 24 STEPS EVERY 9.6 MIN, AND FOR EACH SUCH STEP THE POTENTIAL OF THE OTHER INSTRUMENT PLATE RELATIVE TO THE FIRST IS VARIED THROUGH 20 STEPS.

------- APOLLO 15 LM/ALSEP, JOHNSON----------

INVESTIGATION NAME- COLD CATHODE ION GAUGE

NSSDC ID- 71-063C-07 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETARY ATMOSPHERES

PERSONNEL
PI - F.S. JOHNSON U OF TEXAS, DALLAS
OI - D.E. EVANS UNKNOWN

BRIEF DESCRIPTION
THE CCGE WAS DESIGNED TO MEASURE THE AMOUNT OF GAS PRESENT ON THE LUNAR SURFACE. A COLD CATHODE IONIZATION GAGE WAS USED FOR THIS PURPOSE. THE STAINLESS STEEL ENVELOPE AND ELECTRODES WERE PLACED IN AN AXIAL MAGNETIC FIELD OF 0.09 T (900G). A MAGNETIC SHIELD WAS MOUNTED AROUND THE GAGE AND ITS MAGNET. THE DEVICE WAS SENSITIVE TO GAS DENSITY RATHER THAN PRESSURE. THE RESPONSE VARIED SOMEWHAT WITH GAS COMPOSITION, BUT ERRORS DUE TO THE UNCERTAINTIES IN COMPOSITION WERE EXPECTED TO BE WITHIN A FACTOR OF TWO. THE CATHODE WAS CONNECTED TO AN AUTO-RANGING, AUTO-ZEROING ELECTROMETER THAT MEASURED CURRENTS IN THE RANGE 1.0E-13 TO 1.0E-16 AMPS. A TEMPERATURE DETECTOR WAS INCLUDED TO ENABLE CONVERSION OF THE READINGS TO EQUIVALENT PRESSURE. THE DATA FROM THE EXPERIMENT HAVE BEEN EXPRESSED AS EQUIVALENT DENSITY FOR A NITROGEN LUNAR ATMOSPHERE. THE CCGE HAD THREE AUTO-SWITCHED, OVERLAPPING, SENSITIVITY RANGES ENABLING DETECTION OF THE LUNAR ATMOSPHERE FROM 2.E+5 TO 1.E+11 PARTICLES/ CUBIC CM (EQUIVALENT NITROGEN). IN THE NORMAL GENERATIONAL MODE THE BASIC CYCLE REPEATED FIVE MEASUREMENTS (SEPARATED BY 2.4 S) AND THREE MEASUREMENTS (SEPARATED BY 40 S) EVERY 2.5 MIN. TEMPERATURE AND OTHER ENGINEERING AND CALIBRATION FUNCTIONS WERE ALSO SAMPLED WITHIN THIS 2.5-MIN CYCLE. IN A GROUND COMMANDED SPECIAL MODE, ONE MEASUREMENT WAS OBTAINED EVERY 2.4 S, WITH NO OTHER MEASUREMENTS BEING PERFORMED. EXPERIMENT OPERATION WAS ROUTINELY CURTAILED DURING LUNAR DAY TO AVOID ARCING OF THE HIGH VOLTAGE POWER SUPPLY. MORE DETAILS ARE AVAILABLE IN "APOLLO SCIENTIFIC EXPERIMENTS HANDBOOK," NASA TM X-58131, AUGUST 1974 (REVISED APRIL 1976).

------- APOLLO 15 LM/ALSEP, LANGSETH----------

INVESTIGATION NAME- HEAT FLOW

NSSDC ID- 71-063C-06 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETOLOGY

PERSONNEL
PI - M.G. LANGSETH LAMONT-DOHERTY GEO OBS
OI - S.P. CLARK, JR. YALE U

BRIEF DESCRIPTION
THE HEAT FLOW EXPERIMENT (HFE), WHICH WAS PART OF THE ALSEP, WAS DESIGNED TO DETERMINE THE RATE OF HEAT LOSS FROM THE LUNAR INTERIOR. THE EXPERIMENT DETECTED LUNAR TEMPERATURES OF THE FOLLOWING TYPES AND RANGES, WITH CORRESPONDING ACCURACIES NOTED IN PARENTHESES -- HIGH-SENSITIVITY MEASUREMENTS OF PLUS OR MINUS 2 DEG C (0.003 DEG C) TEMPERATURE DIFFERENCE, LOW-SENSITIVITY MEASUREMENTS OF PLUS OR MINUS 20 DEG C (0.03 DEG C) TEMPERATURE DIFFERENCE, PROBE AMBIENT TEMPERATURES FROM 200 K TO 250 K (0.1 K), THERMOCOUPLE REFERENCE TEMPERATURE FROM -20 DEG C TO -60 DEG C (0.1 DEG C), AND PROBE CABLE AMBIENT TEMPERATURES FROM 90 K TO 250 K (0.3 K). THE INSTRUMENTATION CONSISTED OF TWO 1.2-M PROBES THAT WERE INSERTED INTO THE LUNAR SURFACE, A SPECIAL TOOL FOR PROBE INSERTION, AND AN ELECTRONICS PACKAGE THAT WAS CABLE-CONNECTED TO THE PROBES AND THE CENTRAL STATION. TO ENABLE PLACEMENT OF THE PROBES INTO THE LUNAR SURFACE, TWO 3-M HOLES WERE DRILLED IN THE SURFACE BY ASTRONAUT SCOTT USING THE APOLLO LUNAR SURFACE DRILL (ALSD). THE ALSD WAS EQUIPPED WITH CORE STEM CAPS AND RETAINERS, CORE STEMS, CORE BITS, A BORE BIT/DRILL ADAPTER, A TREADLE, AND A BORE STEM/CORE STEM WRENCH. THE BORE STEM ASSEMBLIES USED IN DRILLING REMAINED IN THE HOLES TO PROVIDE A CASING TO PREVENT COLLAPSE OF THE HOLE WALLS DURING INSERTION OF THE PROBES.

------- APOLLO 15 LM/ALSEP, LATHAM----------

INVESTIGATION NAME- PASSIVE SEISMIC

NSSDC ID- 71-063C-01 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PLANETOLOGY

PERSONNEL
PI - G.V. LATHAM U OF TEXAS, GALVESTON
OI - W.M. EWING(DECEASED)
OI - F. PRESS MASS INST OF TECH
OI - G.H. SUTTON U OF HAWAII

BRIEF DESCRIPTION
THE PASSIVE SEISMIC EXPERIMENT (PSE), PART OF THE APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE (ALSEP), MEASURED SEISMIC SIGNALS FROM BOTH EXTERNAL AND INTERNAL SOURCES OF SEISMIC ENERGY ON THE MOON. THE MEASUREMENTS OBTAINED HAVE BEEN USED TO DETERMINE THE INTERNAL STRUCTURE OF THE MOON, THE RATE OF ENERGY RELEASE, AND THE NUMBERS AND MASSES OF METEOROIDS IMPACTING THE LUNAR SURFACE. THE LUNAR SURFACE IMPACTS OF THE SPENT S-IVB AND LM ASCENT STAGES WERE USED AS EXTERNAL CALIBRATION SOURCES FOR THE SEISMOMETERS. THE KNOWN MASS AND VELOCITY OF THESE STAGES AT SURFACE IMPACT AND THE LUNAR IMPACT POINT COORDINATES ENABLED THE COMPUTATION OF ENERGY GENERATED AT IMPACT AND THE POINT OF ENERGY APPLICATION. (THE CALIBRATION CHARACTERISTICS WERE DETERMINED BY MEASURING SEISMOMETER RESPONSE TO THESE ENERGY SOURCES.) THE EXPERIMENT, WHICH WAS DEPLOYED 110 M WEST OF THE LM, CONSISTED OF TWO SEISMIC ASSEMBLIES -- A LONG PERIOD (LP) SEISMOMETER (TRIAXIAL, ORTHOGONAL) WITH A SEISMIC FREQUENCY RESPONSE FROM 0.004 TO 3 HZ (80-DB DYNAMIC RANGE) AND A SHORT PERIOD (SP) SEISMOMETER (UNIAXIAL, VERTICAL MOTION) WITH A SEISMIC FREQUENCY FROM 0.05 TO 20 HZ (80-DB DYNAMIC RANGE). THE MINIMUM DETECTABLE SIGNAL OF THE PSE SEISMOMETERS WAS 0.3 MICROMETER AT A FREQUENCY OF 1 HZ. THE SEISMOMETERS WERE HOUSED IN A DRUM-SHAPED ENCLOSURE ROUNDED IN THE BOTTOM. THIS ENCLOSURE RESTED ON A SUPPORT STRUCTURE (STOOL) AND WAS COVERED BY A THERMAL SHROUD AFTER DEPLOYMENT OF THE EXPERIMENT.

********** APOLLO 16 LM/ALSEP**********

SPACECRAFT COMMON NAME- APOLLO 16 LM/ALSEP
ALTERNATE NAMES- ALSEP 16, LEM 16
ROVER 16, 06005
APOLLO 16C

NSSDC ID- 72-031C

LAUNCH DATE- 04/16/72 WEIGHT- 5040. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
UNITED STATES NASA-OMSF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL
MG - F.I. ROBERSON NASA HEADQUARTERS
SC - J.B. HANLEY NASA HEADQUARTERS
PM - W.F. EICHELMAN NASA-JSC
PS - NONE ASSIGNED

BRIEF DESCRIPTION
THE APOLLO 16 LUNAR MODULE (LM) CONSISTED OF A LUNAR LANDING CRAFT, A LUNAR ROVING VEHICLE (LRV), AND AN APOLLO LUNAR SURFACE EXPERIMENTS PACKAGE (ALSEP) THAT CONTAINED SCIENTIFIC EXPERIMENTS LEFT ON THE LUNAR SURFACE AFTER COMPLETION OF THE MANNED PORTION OF THE MISSION. THE LM LANDED IN THE DESCARTES HIGHLAND REGION JUST NORTH OF THE CRATER DOLLAND AT 8 DEG 59 MIN 55 S SOUTH LATITUDE, AND 15 DEG 31 MIN 12 S EAST LONGITUDE. THE ALSEP WAS DEPLOYED AT THE LANDING SITE. THE LRV WAS USED DURING EXTRAVEHICULAR ACTIVITIES (EVA) TO EXTEND THE RANGE OF MANNED LUNAR EXPLORATION. THE NUCLEAR-POWERED ALSEP PACKAGE CONTAINED SEISMIC, MAGNETIC FIELD, AND HEAT FLOW EXPERIMENTS. THE LM ITSELF WAS ON THE LUNAR SURFACE APRIL 21-24, 1972.

------- APOLLO 16 LM/ALSEP, DYAL----------

INVESTIGATION NAME- LUNAR SURFACE MAGNETOMETER

NSSDC ID- 72-031C-03 INVESTIGATIVE PROGRAM CODE SL

INVESTIGATION DISCIPLINE(S) PARTICLES AND FIELDS

PERSONNEL
PI - P. DYAL NASA-ARC
OI - C.W. PARKIN NASA-ARC
OI - C.P. SONETT U OF ARIZONA

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER AND WAS PART OF A THREE-STATION NETWORK (APOLLO 12,15,16) INTENDED TO YIELD INFORMATION ON THE INTERNAL ELECTROMAGNETIC CHARACTERISTICS OF THE MOON. FLIPPABLE SENSORS WERE LOCATED 75 CM ABOVE THE LUNAR SURFACE AT THE ENDS OF THREE ORTHOGONAL 100-CM BOOMS. SENSOR ORIENTATION WAS INITIALLY DETERMINED BY THE ASTRONAUTS' USING A BUBBLE LEVEL AND A SHADOWGRAPH, AND HAS BEEN SUBSEQUENTLY MONITORED (WITH AN ACCURACY OF 0.2 DEGREES) BY GRAVITY-LEVEL SENSORS. EACH SENSOR COULD BE OPERATED IN THE RANGES FROM MINUS TO PLUS 50, 100, OR 200 GAMMAS, WITH A 0.1-GAMMA RESOLUTION. FREQUENCY RESPONSE WAS FROM 0 TO 3 HZ.

------- APOLLO 16 LM/ALSEP, KOVACH----------

INVESTIGATION NAME- ACTIVE SEISMIC

NSSDC ID- 72-031C-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - R.L. KOVACH STANFORD U
OI - J.S. WATKINS U OF TEXAS, GALVESTON

BRIEF DESCRIPTION
THE PURPOSE OF THE (S-033) ACTIVE SEISMIC EXPERIMENT (ASE) WAS TO ACQUIRE DATA TO DETERMINE THE PHYSICAL PROPERTIES OF THE LUNAR SURFACE AND SUBSURFACE MATERIALS. BOTH NATURAL AND ARTIFICIALLY PRODUCED SEISMIC WAVES WERE MONITORED. THE ARTIFICIAL WAVES WERE PRODUCED BY SHOTGUN-LIKE CHARGES FIRED BY A 'THUMPER' DEVICE AND EXPLOSIVE GRENADE CHARGES FIRED FROM A MORTAR BOX ASSEMBLY BY AN ASTRONAUT. THE EQUIPMENT CONSISTED OF A THUMPER/GEOPHONE ASSEMBLY, A MORTAR PACKAGE ASSEMBLY, INTERCONNECTING CABLES, AND AN ELECTRONICS ASSEMBLY HOUSED IN THE CENTRAL STATION. THE ASE GENERATED AND MONITORED SEISMIC WAVES IN THE RANGE 3 TO 250 HZ WITH A FREQUENCY RESPONSE OF PLUS OR MINUS 3 DB IN THE FREQUENCY RANGE OF 3 TO 100 HZ. NATURAL SEISMIC WAVES WERE ALSO MONITORED WITHIN THIS RANGE WHILE THE ALSEP STATION WAS OPERATING IN THE ASE MODE. THE DATA-GATHERING INTERVAL WAS SMALL, BECAUSE THE CENTRAL STATION OPERATED IN THE ASE MODE ON THE AVERAGE OF ONLY 30 MIN/WEEK. THE THUMPER CONTAINED 21 STANDARD INITIATORS MOUNTED PERPENDICULAR TO ITS BASE PLATE, WHICH WAS SELECTED AND FIXED BY AN ASTRONAUT. THE THUMPER WAS CABLE-CONNECTED TO THE CENTRAL STATION AND WAS FIRED AT INTERVALS OF 5 M. THUMPER FIRINGS BEYOND APPROXIMATELY 40 M PRODUCED WEAK SIGNALS. ONE P-WAVE VELOCITY OF 114 M/SEC WAS MEASURED. THE GEOPHONES WERE ELECTROMAGNETIC LISTENING DEVICES THAT WERE CABLE-CONNECTED TO THE CENTRAL STATION, WHERE THEY WERE AMPLIFIED, DIGITIZED, AND TRANSMITTED TO EARTH. THEY WERE PLACED AT DISTANCES OF 3, 43, AND 93 M FROM THE CENTRAL STATION. THE MORTAR BOX GRENADES WERE ROCKET-LAUNCHED BY EARTH COMMAND. THEY IMPACTED AT RANGES OF APPROXIMATELY 150, 300, AND 900 M FROM THE DEPLOYED MORTAR BOX ASSEMBLY. THE DECISION NOT TO LAUNCH GRENADE NO. 1 (1500 M) WAS MADE BECAUSE THE LAUNCH ASSEMBLY PITCH-ANGLE SENSOR WENT OFF-SCALE HIGH, MAKING THE PITCH POSITION OF THE ASSEMBLY UNCERTAIN.

------- APOLLO 16 LM/ALSEP, LATHAM----------

INVESTIGATION NAME- PASSIVE SEISMIC (PSE)

NSSDC ID- 72-031C-01 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - G.V. LATHAM U OF TEXAS, GALVESTON
OI - F. PRESS MASS INST OF TECH
OI - G.H. SUTTON U OF HAWAII

BRIEF DESCRIPTION
THE PURPOSE OF THE PSE (S-031), WHICH WAS PART OF THE ALSEP, WAS TO MEASURE SEISMIC SIGNALS FROM ALL EXTERNAL AND INTERNAL SOURCES OF SEISMIC ENERGY ON THE MOON. THE DATA FROM THIS EXPERIMENT WILL BE USED TO DETERMINE THE INTERNAL LUNAR STRUCTURE, RATE OF ENERGY RELEASE, AND NUMBERS AND MASSES OF IMPACTING METEORS. THIS EXPERIMENT USED THE DATA FROM EXPERIMENTS ON THE IMPACTS OF THE S-IV B AND LM ASCENT STAGES AS EXTERNAL CALIBRATION SOURCES. THE INSTRUMENT PACKAGE REPRESENTED THE FOURTH ACTIVE INSTRUMENT AVAILABLE IN THE LUNAR SEISMIC NETWORK AND ENABLED SCIENTISTS TO LOCATE REGIONS OF SEISMIC ACTIVITY MORE PRECISELY. THE INSTRUMENT PACKAGE WAS COMPOSED OF TWO ASSEMBLIES -- (1) A LONG-PERIOD, TRIAXIAL, ORTHOGONAL SEISMOMETER WITH A SEISMIC FREQUENCY RESPONSE FROM 0.004 TO 3 HZ (80-DB) DYNAMICAL RANGE AND (2) A SHORT-PERIOD, UNIAXIAL, VERTICAL MOTION SEISMOMETER WITH A SEISMIC FREQUENCY RESPONSE FROM 0.05 TO 20 HZ (80-DB) DYNAMICAL RANGE AND THE MINIMUM DETECTABLE SIGNALS OF 0.3 MICROMETER AT A FREQUENCY OF 1 HZ. THE INSTRUMENT PACKAGE WAS CABLE-CONNECTED TO THE CENTRAL ALSEP POWER STATION, WHICH WAS DEPLOYED BY THE ASTRONAUTS.

********** APOLLO 17 LM/ALSEP**********

SPACECRAFT COMMON NAME- APOLLO 17 LM/ALSEP
ALTERNATE NAMES- APOLLO 17C, 06307
LEM 17, ROVER 17
ALSEP 17

NSSDC ID- 72-096C

LAUNCH DATE- 12/07/72 WEIGHT- 5050. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OMSF
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- LUNAR LANDER

PERSONNEL
MG - F.I. ROBERSON NASA HEADQUARTERS
SC - J.B. HANLEY NASA HEADQUARTERS
PM - W.F. EICHELMAN NASA-JSC
PS - NONE ASSIGNED

BRIEF DESCRIPTION
THE APOLLO 17 LUNAR SURFACE EXPERIMENTS PACKAGE (ALSEP) WAS DEPLOYED BY THE ASTRONAUTS IN THE NORTHEASTERN PORTION OF THE MOON (LATITUDE 20 DEG 10 MIN N, LONGITUDE 30 DEG 48 MIN E) ON THE SOUTHEASTERN RIM OF MARE SERENITATIS IN A DARK DEPOSIT BETWEEN MASSIVE UNITS OF THE SOUTHWESTERN TAURUS MOUNTAINS SOUTH OF LITTROW CRATER. THE ALSEP EXPERIMENTS WERE POWERED BY A NUCLEAR POWER SOURCE AND INCLUDED STUDY OF THE ATMOSPHERIC AND IONIC ENVIRONMENT OF THE MOON, HEAT LOSS FROM THE LUNAR INTERIOR, LUNAR EJECTA AND METEORITES, LUNAR SEISMIC PROFILING, AND LUNAR SURFACE GRAVIMETER FINDINGS. THE LM WAS ON THE LUNAR SURFACE DECEMBER 11-13, 1972.

------- APOLLO 17 LM/ALSEP, BERG----------

INVESTIGATION NAME- LUNAR EJECTA AND METEORITES

NSSDC ID- 72-096C-05 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
DUST
INTERPLANETARY DUST

PERSONNEL
PI - O.E. BERG NASA-GSFC

BRIEF DESCRIPTION
THE APOLLO 17 LUNAR EJECTA AND METEORITE EXPERIMENT MEASURED THE FREQUENCY WITH WHICH THE MOON IS IMPACTED BY PRIMARY COSMIC DUST PARTICLES AND THE EFFECT OF THE LUNAR EJECTA EMANATING FROM THE SITES OF METEORITE IMPACTS ON THE LUNAR SURFACE. THE EXPERIMENT HAD THE FOLLOWING SPECIFIC OBJECTIVES -- (1) TO DETERMINE THE BACKGROUND AND LONG-TERM VARIATIONS OF COSMIC DUST INFLUX RATES IN CISLUNAR SPACE, (2) TO DETERMINE THE EXTENT AND NATURE OF LUNAR EJECTA PRODUCED BY METEORITE IMPACTS ON THE LUNAR SURFACE, (3) TO DETERMINE THE RELATIVE CONTRIBUTION OF COMETS AND ASTEROIDS TO THE EARTH'S METEOROID ENSEMBLE, (4) TO STUDY POSSIBLE CORRELATIONS BETWEEN THE ASSOCIATED EJECTA EVENTS AND THE TIMES OF THE EARTH'S CROSSING OF COMETARY ORBITAL PLANES AND METEOR STREAMS, (5) TO DETERMINE THE EXTENT OF THE CONTRIBUTION OF INTERSTELLAR PARTICLES TOWARD THE MAINTENANCE OF THE ZODIACAL CLOUD AS THE SOLAR SYSTEM PASSES THROUGH GALACTIC SPACE, AND (6) TO INVESTIGATE THE EXISTENCE OF AN EFFECT CALLED 'EARTH FOCUSING OF DUST PARTICLES.' THE EQUIPMENT FOR THIS EXPERIMENT, WHICH WAS PART OF THE APOLLO 17 ALSEP, INCLUDED ONE DEPLOYABLE UNIT WITH DETECTOR PLATES, ALSEP CENTRAL STATION ELECTRONICS, AND THE CABLE AND ASTRONAUT CONNECTOR FOR MATING THE EXTERNAL UNIT WITH THE CENTRAL STATION. THE EXTERNAL UNIT COMPONENTS OR SENSORS CONSISTED OF SUPPRESSOR AND COLLECTOR PLATES, IMPACT PLATES, FILM FRAMES, AND MICROPHONES. THE SENSOR HAD A FIELD OF VIEW OF PLUS OR MINUS 60 DEG AND AN ANGULAR RESOLUTION OF PLUS OR MINUS 26 DEG. IT MEASURED PARTICLE IMPACTS IN AN ENERGY RANGE OF 1 TO 1000 ERGS WITH A PRIMARY FREQUENCY OF MEASUREMENT OF 1.E-4 IMPACTS/SQ M/S. THE EXTERNAL UNIT WAS ERECTED AND DEPLOYED ON THE LUNAR SURFACE ABOUT 8 M SOUTH OF THE ALSEP CENTRAL STATION. THE UNIT WAS ALIGNED TO PLUS OR MINUS 5 DEG OF THE SCAN-SHADOW LINE AND LEVELED TO PLUS OR MINUS 5 DEG. A COVER PROVIDED TO SHIELD THE DETECTOR PLATES FROM DIRT PARTICLES PRODUCED DURING LUNAR MODULE ASCENT LIFTOFF WAS JETTISONED BY EARTH COMMAND AT A SUITABLE TIME AFTER LIFTOFF.

------- APOLLO 17 LM/ALSEP, KOVACH----------

INVESTIGATION NAME- LUNAR SEISMIC PROFILING EXPERIMENT

NSSDC ID- 72-096C-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - R.L. KOVACH — STANFORD U
OI - J.S. WATKINS — U OF TEXAS, GALVESTON

BRIEF DESCRIPTION
THE PURPOSE OF THE LUNAR SEISMIC PROFILING EXPERIMENT (S-203) WAS TO ACQUIRE DATA ON THE PHYSICAL PROPERTIES OF THE LUNAR NEAR-SURFACE MATERIALS. SPECIFIC OBJECTIVES INCLUDED MEASURING THE LUNAR SEISMIC SIGNALS PRODUCED BY DETONATION OF EXPLOSIVE CHARGES ON THE SURFACE, MONITORING NATURAL SEISMIC ACTIVITY RESULTING FROM MOONQUAKES OR METEORITE IMPACTS, RECORDING THE SEISMIC SIGNALS RESULTING FROM THE ASCENT OF THE LM, AND RECORDING THE SEISMIC SIGNALS RESULTING FROM THE IMPACT OF THE SPENT LM ASCENT STAGE. THIS EXPERIMENT YIELDED DETAILED INFORMATION ON LUNAR GEOLOGIC CHARACTERISTICS TO DEPTHS OF 3 KM. THE EQUIPMENT CONSISTED OF FOUR GEOPHONES, MARKER FLAGS, A GEOPHONE MODULE WITH A MARKER FLAG, AN ELECTRONICS PACKAGE IN THE ALSEP CENTRAL STATION, A TRANSMITTER, AN ANTENNA, AND EIGHT EXPLOSIVE PACKAGES. THE EXPLOSIVE PACKAGE MAJOR COMPONENTS WERE A RECEIVING ANTENNA, A RECEIVER, AN EXPLOSIVE TRAIN, A SIGNAL PROCESSOR, AND A FIRING PULSE GENERATOR. THE CREW DEPLOYED THE GEOPHONES AND THE GEOPHONE MODULE MARKED WITH FLAGS AND THEN PHOTOGRAPHED THEM DURING EVA 1. THE ANTENNAS AND ELECTRONICS PACKAGE WERE ALSO DEPLOYED AND CONNECTED TO THE ALSEP CENTRAL STATION. THE EXPLOSIVE PACKAGES WERE DEPLOYED AT DESIGNATED SITES DURING THE LUNAR TRAVERSES.

-------- APOLLO 17 LM/ALSEP, LANGSETH----------

INVESTIGATION NAME- HEAT FLOW

NSSDC ID- 72-096C-01
INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - M.G. LANGSETH — LAMONT-DOHERTY GEO OBS
OI - S.P. CLARK, JR. — YALE U
OI - J.L. CHUTE, JR. — LEHMAN COLLEGE

BRIEF DESCRIPTION
THE PURPOSE OF THE HEAT FLOW EXPERIMENT (S-037) WAS TO DETERMINE THE RATE OF HEAT LOSS FROM THE LUNAR INTERIOR. SPECIFIC OBJECTIVES WERE -- (1) MEASUREMENT OF THE SUBSURFACE VERTICAL TEMPERATURE GRADIENTS IN THE LUNAR SURFACE LAYER AS A FUNCTION OF TIME, (2) MEASUREMENT OF THE ABSOLUTE TEMPERATURE OF THE LUNAR SUBSURFACE AS A FUNCTION OF TIME, (3) DETERMINATION OF THE THERMAL CONDUCTIVITY OF THE LUNAR SUBSURFACE MATERIAL, AND (4) MEASUREMENT OF THE BRIGHTNESS TEMPERATURE OF THE LOCAL LUNAR SURFACE. MEASUREMENTS TAKEN OF THE HEAT FLUX THROUGH THE UPPER 2.4 M OF THE SURFACE PROVIDED DATA ON THE LUNAR SOIL THERMAL CONDUCTIVITY, CONTRIBUTED TO THE RESOLUTION OF ISSUES CONCERNING LUNAR INTERNAL HEATING PROCESSES, AND ESTABLISHED LIMITS OF CONSTRAINT ON THE INTERIOR TEMPERATURE AND COMPOSITION OF THE MOON. THE EXPERIMENT CONSISTED OF TWO PROBES (EACH ABOUT 1.2 M IN LENGTH), A SPECIAL TOOL FOR PROBE INSERTION, RADIATION SHIELDS FOR EACH PROBE, AND AN ELECTRONICS PACKAGE THAT WAS CABLE-CONNECTED TO THE PROBES AND THE ALSEP CONTROL STATION. TWO HOLES WERE DRILLED IN THE LUNAR SURFACE ABOUT 10 M APART. THE BORE SYSTEMS REMAINED IN THE HOLES TO PROVIDE A CASING TO PREVENT WALL COLLAPSE. ONE PROBE WAS INSERTED INTO EACH HOLE, AND THE DEPTH OF THE PROBE WAS RECORDED.

-------- APOLLO 17 LM/ALSEP, WEBER----------

INVESTIGATION NAME- LUNAR SURFACE GRAVIMETER

NSSDC ID- 72-096C-09
INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL
PI - J. WEBER — U OF MARYLAND
OI - J.V. LARSON — U OF MARYLAND

BRIEF DESCRIPTION
THE PURPOSE OF THE LUNAR SURFACE GRAVIMETER EXPERIMENT (S-207) WAS TO OBTAIN HIGHLY ACCURATE MEASUREMENTS OF THE LUNAR SURFACE GRAVITATIONAL ACCELERATION AND ITS TEMPORAL VARIATIONS AT A SELECTED POINT ON THE SURFACE. SPECIFIC OBJECTIVES WERE DETERMINATION OF THE VALUE OF LUNAR GRAVITY RELATIVE TO EARTH GRAVITY (WITH AN ACCURACY OF ABOUT 1 PART IN 1.E5), DETERMINATION OF THE MAGNITUDE OF LUNAR SURFACE DEFORMATION DUE TO TIDAL FORCES, MEASUREMENT OF VERTICAL COMPONENTS OF LUNAR NATURAL SEISMICITY, AND MONITORING OF FREE OSCILLATIONS OF THE MOON THAT MAY BE INDUCED BY GRAVITATIONAL RADIATION FROM COSMIC SOURCES. THE EQUIPMENT CONSISTED OF ELECTRONICS, SENSORS (SPRING MASS SUSPENSION CAPACITOR PLATES), A SUNSHIELD, AND A RIBBON CABLE TO THE CENTRAL STATION ELECTRONICS. THE CREW DEPLOYED THIS EXPERIMENT ABOUT 8 M FROM THE ALSEP CENTRAL STATION. THIS PROCEDURE CONSISTED OF LEVELING AND ALIGNMENT WITHIN PLUS OR MINUS 3 DEG, USING THE SUNSHIELD SHADOW, AND MATING THE CABLE TO THE CENTRAL STATION.

********** ARYABHATA**********

SPACECRAFT COMMON NAME- ARYABHATA
ALTERNATE NAMES- ARIABAT, INDIAN SCIENTIFIC SAT.
INDASAT

NSSDC ID- 75-033A

LAUNCH DATE- 04/19/75 — WEIGHT- 360. KG
LAUNCH SITE-
LAUNCH VEHICLE- INTRCOS II

SPONSORING COUNTRY/AGENCY
INDIA — ISRO

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC — EPOCH DATE- 04/20/75
ORBIT PERIOD- 96.5 MIN — INCLINATION- 50.7 DEG
PERIAPSIS- 568. KM — APOAPSIS- 611. KM

PERSONNEL
PD - U.R. RAO — ISSP, VSSC
MG - UNKNOWN — UNKNOWN
SC - UNKNOWN — UNKNOWN
PS - U.R. RAO — ISSP, VSSC

BRIEF DESCRIPTION
THIS SPACECRAFT, NAMED AFTER THE FAMOUS INDIAN ASTRONOMER, WAS INDIA'S FIRST SATELLITE AND WAS COMPLETELY DESIGNED AND FABRICATED IN INDIA. IT WAS LAUNCHED BY A SOVIET ROCKET FROM A SOVIET COSMODROME. THE SPACECRAFT WAS QUASISPHERICAL IN SHAPE CONTAINING 26 SIDES AND CONTAINED THREE EXPERIMENTS FOR THE MEASUREMENT OF COSMIC X-RAYS, SOLAR NEUTRONS, AND GAMMA RAYS, AND AN IONOSPHERIC ELECTRON TRAP ALONG WITH A UV SENSOR. THE SPACECRAFT WEIGHED 360 KG, USED SOLAR PANELS ON 24 SIDES TO PROVIDE 46 WATTS OF POWER, USED A PASSIVE THERMAL CONTROL SYSTEM, CONTAINED BATTERIES, AND A SPIN-UP GAS JET SYSTEM TO PROVIDE A SPIN RATE OF NOT MORE THAN 90 RPM. THERE WERE A SET OF ALTITUDE SENSORS COMPRISED OF A TRIAXIAL MAGNETOMETER, A DIGITAL ELEVATION SOLAR SENSOR, AND FOUR AZIMUTH SOLAR SENSORS. THE DATA SYSTEM INCLUDED A TAPE RECORDER AT 256 B/S WITH PLAYBACK AT 10 TIMES THAT RATE. THE PCM-FM-PM TELEMETRY SYSTEM OPERATED AT 137.44 MHZ. THE NECESSARY GROUND TELEMETRY AND TELECOMMAND STATIONS WERE ESTABLISHED AT SHAR CENTRE IN SRIHARIKOTA, ANDHRA PRADESH.

-------- ARYABHATA, DANIEL----------

INVESTIGATION NAME- SOLAR NEUTRON AND GAMMA RAYS

NSSDC ID- 75-033A-02
INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.R. DANIEL — TATA INST OF FUND RES
OI - P.J. LAVAKARE — TATA INST OF FUND RES
OI - S.V. DAMLE — TATA INST OF FUND RES

BRIEF DESCRIPTION
THIS INVESTIGATION WAS CONCERNED WITH THE STUDY OF ENERGETIC NEUTRONS FROM 20 TO 500 MEV AND GAMMA RAYS FROM 0.2 TO 24 MEV. ALTHOUGH IT WAS INTENDED TO MEASURE THOSE PARTICLES AND PHOTONS ASSOCIATED WITH VIOLENT OUTBURSTS FROM THE SUN, THE DATA WERE ONLY ACCUMULATED IN REAL TIME FROM 11 ORBITS. THIS PERMITTED A STUDY OF ATMOSPHERIC NEUTRONS AND GAMMA RAYS. DURING THIS TIME, SOME EVENTS SHOWING SUDDEN INCREASES IN GAMMA RAY COUNTING RATES WERE RECORDED. THE DETECTOR SYSTEM CONSISTED OF A 12.5-CM-DIAMETER, 1.27-CM-THICK CSI (TL) CRYSTAL COUPLED TO A 12.5-CM-DIAMETER PM TUBE THAT WAS COMPLETELY ENCLOSED IN A 1-CM THICK, PLASTIC, SCINTILLATOR ANTICOINCIDENCE SHIELD. THIS SHIELD WAS VIEWED BY FOUR 3.8-CM-DIAMETER PM TUBES. A PULSE SHAPE DISCRIMINATOR WAS USED FOR ENERGY DEPOSITION IN THE CSI CRYSTAL GREATER THAN 5 MEV TO DISTINGUISH NEUTRONS FROM GAMMA RAYS, AND PULSE HEIGHT ANALYSIS WAS ACCOMPLISHED BY A 64-CHANNEL ANALYZER. FOR PULSES BELOW 5 MEV, ATTRIBUTED TO LOW-ENERGY GAMMA RAYS, THREE ENERGY-LOSS WINDOWS OF 0.2 TO 0.4, 0.4 TO 1 AND 1 TO 4 MEV WERE MEASURED. THE CHARGED PARTICLE FLUX WAS MONITORED BY MEASURING THE COINCIDENCE RATES BETWEEN THE CENTRAL AND SHIELD CRYSTALS AS WELL AS THE SINGLES RATE OF THE SHIELD. THE DATA RATES WERE SCANNED EVERY SECOND AND TRANSMITTED THROUGH THE SPACECRAFT TELEMETRY. FURTHER DETAILS OF THE EXPERIMENT ARE PUBLISHED IN 'PRAMANA,' 7, 355, 1976.

-------- ARYABHATA, PRAKASH----------

INVESTIGATION NAME- IONOSPHERIC ELECTRON TRAP AND UV CHAMBERS

NSSDC ID- 75-033A-03
INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - S. PRAKASH PHYSICAL RESEARCH LAB
OI - B.H. SUBBARAYA PHYSICAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBJECTIVE WAS TO USE AN ELECTRON TRAP TO MEASURE ELECTRON ENERGIES UP TO 100 EV, AND TO USE UV CHAMBERS TO MONITOR THE SCATTERED LYMAN-ALPHA RADIATION AND OXYGEN EMISSIONS IN THE NIGHT SKY.

------- ARYABHATA, RAO----------

INVESTIGATION NAME- X-RAY ASTRONOMY

NSSDC ID- 75-033A-01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - U.R. RAO ISSP, VSSC
OI - K. KASTURIRANGAN ISSP, VSSC

BRIEF DESCRIPTION
THIS EXPERIMENT USED AN NAI (TL) SCINTILLATOR AND A PROPORTIONAL COUNTER TO MEASURE X RAYS IN THE ENERGY RANGE 2 TO 100 KEV FROM BOTH CELESTIAL SOURCES AND COSMIC BACKGROUND.

********** ASTP-APOLLO**********

SPACECRAFT COMMON NAME- ASTP-APOLLO
ALTERNATE NAMES- APOLLO SOYUZ TEST PROJ., SOYUZ APOLLO

NSSDC ID- 75-066A

LAUNCH DATE- 07/15/75 WEIGHT- 14856. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OMSF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/18/75
ORBIT PERIOD- 88.91 MIN INCLINATION- 51.75 DEG
PERIAPSIS- 217. KM APOAPSIS- 231. KM

PERSONNEL
TD - G.S. LUNNEY NASA-JSC
SC - R.T. GIULI NASA-JSC
PM - C.M. LEE NASA HEADQUARTERS

BRIEF DESCRIPTION
THE UNITED STATES AND THE U.S.S.R. LAUNCHED AN APOLLO SPACECRAFT AND A SOYUZ SPACECRAFT, RESPECTIVELY, AS A JOINT EFFORT CALLED THE APOLLO-SOYUZ TEST PROJECT (ASTP). THE SOYUZ SPACECRAFT WAS LAUNCHED FIRST, WITH A TWO-MAN CREW WHO MANEUVERED THEIR SPACECRAFT INTO A DOCKING ORBIT. THE APOLLO SPACECRAFT WAS LAUNCHED 7 1/2 HR LATER, WITH A THREE-MAN CREW WHO PLACED THEIR SPACECRAFT INTO A PROPER CONFIGURATION FOR DOCKING WITH THE SOYUZ SPACECRAFT. THE DOCKING OF THE TWO SPACECRAFT OCCURRED ON THE THIRD DAY. AFTER DOCKING, CREW TRANSFERS TOOK PLACE, WITH THE APOLLO CREW FIRST VISITING THE SOYUZ. THE COMBINED APOLLO-SOYUZ CREWS PERFORMED JOINT EXPERIMENTS AND PRESENTED RADIO AND TV REPORTS. AFTER JOINT EXPERIMENTS WERE COMPLETED, THE SPACECRAFT DISENGAGED AND EACH CONTINUED ITS SEPARATE MISSION.

------- ASTP-APOLLO, AKOEV----------

INVESTIGATION NAME- ZONE FORMING FUNGI

NSSDC ID- 75-066A-24 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - I.G. AKOEV UNKNOWN

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO INVESTIGATE THE EFFECT OF SPACE FLIGHT CONDITIONS ON THE RHYTHMS OF VEGETATIVE AND SPORE PHASE CHARACTERISTICS OF STREPTOMYCES LEVORIS. THIS SPECIES WAS ISOLATED, NAMED, AND PROVIDED BY THE U.S.S.R. AND WAS USED AS THE PRIMARY TEST SPECIMEN FOR THIS EXPERIMENT. THE CULTURAL CHARACTERISTICS OF THIS ORGANISM PERMIT IN SITU COMPARISON OF SPORE RING FEATURES AND DEVELOPMENT RATES IN PREFLIGHT, FLIGHT, AND POSTFLIGHT PERIODS OF THE APOLLO-SOYUZ TEST PROJECT, WITHIN A SINGLE CULTURE. ASPECTS OF THE EXPERIMENT THAT WERE STUDIED INCLUDED -- (1) CULTURES THAT HAD BEEN INITIATED WITHIN A 12-HR PHASE SHIFT WERE EXCHANGED DURING THE FLIGHT, (2) THE EFFECTS OF LOCAL RADIATION ON GENERIC CHANGES WERE STUDIED, (3) CHARACTERISTICS OF SECONDARY CULTURES THAT WERE DERIVED FROM DIFFERENT SECTORS OF THE PRIMARY CULTURES WERE STUDIED AND COMPARED, AND (4) MORPHOLOGICAL AND CULTURAL PROPERTIES OF DIFFERENT NUTRIENT MEDIA WERE RECORDED. EACH FLIGHT DEVICE HELD TWO PETRI DISHES THAT CONTAINED STREPTOMYCES CULTURES. RADIATION DETECTORS OF CELLULOSE TRIACETATE, CELLULOSE NITRATE, AND LEXAN WERE USED TO REGISTER PARTICLES THAT PASSED THROUGH THE BIOLOGICAL TEST SYSTEMS, AND THEY WERE PLACED BENEATH THE PETRI DISHES AS WELL AS IN A MOVABLE LID. ALL FLIGHT AND CONTROL SPECIMENS WERE PHOTOGRAPHED AT 12-H (PLUS OR MINUS 3 H) INTERVALS FROM THE TIME THE CULTURES WERE SELECTED FOR THE EXPERIMENT UNTIL TERMINATION. ADDITIONAL DETAILS OF THE EXPERIMENT AND ITS PERFORMANCE CAN BE FOUND IN, 'ZONE FORMING FUNGI - EXPERIMENT MA-147,' T. D. ROGERS ET AL., APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 15.1-15.17, 1976.

------- ASTP-APOLLO, ALLEN----------

INVESTIGATION NAME- ELECTROPHORESIS TECHNOLOGY

NSSDC ID- 75-066A-20 INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - R.E. ALLEN NASA-MSFC

BRIEF DESCRIPTION
THE ELECTROPHORESIS TECHNOLOGY EXPERIMENT WAS DESIGNED TO TEST ELECTROPHORESIS HARDWARE THAT WOULD CONTINUE THE DEVELOPMENT OF TECHNOLOGY FOR ELECTROPHORETIC SEPARATION OF MATERIALS IN SPACE. SPECIFICALLY, THE OBJECTIVES WERE -- (1) TO CONDUCT ENGINEERING AND OPERATIONAL TESTS OF A SPACE RATED STATIC ELECTROPHORESIS SEPARATION APPARATUS, (2) TO FURTHER CURRENT RESEARCH EFFORTS THROUGH THE SEPARATION OF SIMILAR CELLULAR SPECIES, (3) TO REDUCE OR ELIMINATE ELECTRO-OSMOSIS THROUGH SEPARATION OF SIMILAR CELLULAR SPECIES, (4) TO APPLY BIOLOGICAL SAMPLES PRECISELY WITHOUT PERTURBING THE SUBSEQUENT ELECTROPHORESIS, (5) TO MAINTAIN VIABLE BIOLOGICAL SAMPLES DURING ALL PHASES OF THE EXPERIMENT PROCEDURE, (6) TO DEMONSTRATE ISOTACHOPHORESIS OF RED BLOOD CELLS IN SPACE. THERE WERE FOUR MAJOR ELEMENTS IN THE EXPERIMENT EQUIPMENT -- (1) AN ELECTROPHORESIS UNIT (EU), (2) A CRYOGENIC FREEZER (CF), (3) EIGHT EXPERIMENT COLUMNS, AND (4) EIGHT SAMPLE INSERTION SLIDES. THE FOLLOWING BIOLOGICAL SUBSTANCES WERE CONTAINED IN THE SAMPLE SLIDES FOR THE EIGHT EXPERIMENT STAGES -- (1) COLUMNS 1 AND 5 - RABBIT, HUMAN, AND HORSE FIXED RED BLOOD CELLS, (2) COLUMNS 2 AND 6 - HUMAN PERIPHERAL BLOOD LYMPHOCYTES, (3) COLUMNS 3 AND 7 - HUMAN FETAL KIDNEY CELLS, (4) COLUMN 4 - FIXED RABBIT AND HUMAN RED BLOOD CELLS, (5) COLUMN 8 FRESH RABBIT AND HUMAN RED BLOOD CELLS. A CREW MEMBER REMOVED A COLUMN FROM STORAGE AND INSTALLED IT IN THE EU. THE SLIDE CONTAINING A SPECIFIC FROZEN SAMPLE WAS NEXT REMOVED FROM THE CF AND INSERTED IN THE COLUMN. THE CRITICAL CONTROL POSITIONS AND DIGITAL READOUTS DURING EACH COLUMN OPERATION WERE PHOTOGRAPHED BY A CAMERA MOUNTED ON THE EU COVER. AFTER EACH ELECTROPHOREDID SEPARATION, THE COLUMN WAS FROZEN BY A THERMOELECTRIC MODULE AND THEN REMOVED FROM THE CRADLE. MORE DETAILS CAN BE FOUND IN 'ELECTROPHORESIS TECHNOLOGY EXPERIMENT MA-011,' R. E. ALLEN ET AL., APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 20.1-20.23, 1976.

------- ASTP-APOLLO, ANG----------

INVESTIGATION NAME- INFLUENCE OF WEIGHTLESSNESS ON THE IMMISCIBILITY OF MONOTECTIC ALLOY SYSTEMS

NSSDC ID- 75-066A-06 INVESTIGATIVE PROGRAM
CODE ESS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - C.Y. ANG NASA-MSFC
OI - L.L. LACY NASA-MSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO STUDY THE EFFECTS OF WEIGHTLESSNESS ON THE MELTING AND SOLIDIFICATION OF TWO MATERIAL SYSTEMS -- LEAD ZINC (PBZN) AND ALUMINUM ANTIMONY (ALSB). SPECIFICALLY, THE OBJECTIVES WERE -- (A) TO STUDY PHASE SEGREGATION EFFECTS IN LOW 'G' FOR THE IMMISCIBLE BINARY PBZN, AND (B) TO DETERMINE THE INFLUENCE OF LOW-G SOLIDIFICATION ON THE MICROSTRUCTURAL HOMOGENEITY AND STOICHIOMETRY OF THE SEMICONDUCTING COMPOUND ALSB. TESTS WERE PERFORMED ON THE GROUND THAT WERE SIMILAR TO THOSE DONE IN SPACE SO THAT SAMPLE COMPARISONS COULD BE PERFORMED. FOR THE PBZN SYSTEM, THE COMPOSITION WAS 20 ATOMIC PERCENT PB AND 80 ATOMIC PERCENT ZN, AND FOR ALSB BOTH CONSTITUENTS WERE 50 ATOMIC PERCENT. ALL STARTING CONSTITUENTS WERE COMPOSED OF MATERIALS HAVING TOTAL IMPURITIES LESS THAN 10 PPM. THERE WERE TWO ALSB AND THREE PBZN FLIGHT SAMPLES. THE MATERIALS WERE LOADED IN GRAPHITE CRUCIBLES AND SEALED WITH GRAPHITE CEMENT. THE PBZN SYSTEM WAS HEATED IN A 30.5-CM, HOT-ZONE TUBE FURNACE, AND THE ALSB SAMPLES WERE HEATED BY A HIGH-FREQUENCY INDUCTION FURNACE. IN FLIGHT, THE ALSB TEMPERATURE SOAK WAS ESTIMATED TO OCCUR AT 1399 K AND THE PBZN SYSTEM WAS SOAKED FOR 1 H AT AN AVERAGE TEMPERATURE OF 1107 K. FURTHER DETAILS OF THE EXPERIMENT AND ITS PERFORMANCE CAN BE FOUND IN THE REPORT, 'MONOTECTIC AND SYNTECTIC ALLOYS EXPERIMENT MA-044,' C. Y. ANG AND L. L. LACY, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 24.1-24.25, 1976.

------- ASTP-APOLLO, BOWYER-------

INVESTIGATION NAME- EXTREME ULTRAVIOLET ASTRONOMY

NSSDC ID- 75-066A-01

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - C.S. BOWYER — U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS ASTP EXPERIMENT SEARCHED FOR SOURCES OF EXTREME ULTRAVIOLET (EUV) RADIATION IN THE NIGHT SKY. THE PRINCIPAL INSTRUMENT WAS A FLUX-COLLECTING GRAZING-INCIDENCE TELESCOPE WITH AN EUV DETECTOR AT ITS FOCAL POINT, MOUNTED OUTSIDE THE SPACECRAFT.

------- ASTP-APOLLO, BOWYER-------

INVESTIGATION NAME- HELIUM GLOW

NSSDC ID- 75-066A-02

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - C.S. BOWYER — U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS ASTP EXPERIMENT MEASURED THE INTENSITY AND SPATIAL DISTRIBUTION OF HELIUM-FLUORESCENT RADIATION IN SELECTED REGIONS OF THE NIGHT SKY. THE MEASUREMENTS COULD GIVE THE DISTRIBUTION OF HELIUM IN INTERPLANETARY SPACE, AND INDICATE THE PENETRATION OF INTERSTELLAR HELIUM INTO THE SOLAR SYSTEM. MEASUREMENTS WERE MADE WITH A NARROW-PASSBAND PHOTOMETER, SENSITIVE TO HELIUM RADIATION, AND POINTED TO AN ACCURACY OF 4 DEG.

------- ASTP-APOLLO, BUCKER-------

INVESTIGATION NAME- BIOSTACK

NSSDC ID- 75-066A-15

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - H. BUCKER — U OF FRANKFURT

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WERE -- TO STUDY THE BIOLOGICAL EFFECTS OF HIGH-ENERGY LOSS (HZE) HEAVY COSMIC PARTICLES NOT AVAILABLE ON EARTH, TO STUDY THE MECHANISM BY WHICH HZE PARTICLES DAMAGE BIOLOGICAL MATERIALS, AND TO ESTIMATE THE RADIATION HAZARDS TO MAN IN SPACE. THE EXPERIMENT PACKAGES CONTAINED BACTERIAL SPORES, PROTOZOA CYSTS, PLANT SEEDS, SHRIMP EGGS, AND INSECT EGGS, TOGETHER WITH DIFFERENT PHYSICAL RADIATION DETECTORS -- NUCLEAR EMULSIONS, PLASTICS, SILVER CLORIDE CRYSTALS, AND LITHIUM FLUORIDE THERMOLUMINESCENCE DOSIMETERS. EIGHT BIOLOGICAL SYSTEMS AND SEVEN DOSIMETRIC DETECTORS WERE FLOWN. THE BIOLOGICAL OBJECTS WERE ARRANGED IN MONOLAYERS THAT WERE STACKED BETWEEN THE TRACK DETECTOR SHEETS SO THAT -- (1) IN RELATION TO THE BIOLOGICAL OBJECTS THE PARTICLE TRACKS COULD BE LOCATED, AND (2) THE PHYSICAL PROPERTIES OF THESE PARTICLES COULD BE DETERMINED. MOST OF THE BIOLOGICAL OBJECTS WERE EMBEDDED IN POLYVINYL ALCOHOL. A SINGLE BACTERIAL SPORE FROM THE FLIGHT PLATES COULD BE TRANSFERRED TO THE NUTRIENT MEDIUM, TO OBSERVE CHANGES IN DEVELOPMENT, GROWTH KINETICS, AND CELL MORPHOLOGY. MORE DETAILS CAN BE FOUND IN 'BIOSTACK III - EXPERIMENT MA-107,' H. BUCKER, ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 14.1-14.28, 1976.

------- ASTP-APOLLO, BUDINGER-------

INVESTIGATION NAME- LIGHT FLASHES AND OTHER SENSATIONS FROM COSMIC PARTICLES

NSSDC ID- 75-066A-16

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY
COSMIC RAYS

PERSONNEL
PI - T.F. BUDINGER — U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO DETERMINE QUANTITATIVELY THE FREQUENCY, CHARACTER, LATITUDINAL DEPENDENCE, AND THE IDENTITY OF COSMIC PARTICLES THAT CAUSE THE LIGHTFLASH PHENOMENON. THE DATA OBTAINED SHOULD CONTRIBUTE TO MAKING AN ASSESSMENT OF THE RADIATION HAZARDS FOR LONG-TERM EARTH-ORBITING AND INTERPLANETARY MISSIONS. THE EXPERIMENT INVOLVED THE MEASUREMENT OF DARK ADAPTION AND THE MEASUREMENT OF THE CHARACERISTICS OF THE COSMIC PARTICLE ENVIRONMENT NEAR THE EYE, AND THE CONTINUOUS ONBOARD ACCUMULATION OF THE LIGHTFLASH OBSERVATIONS FROM ASTRONAUTS AND PARTICLE DETECTORS THROUGHOUT ONE CONTINUOUS ORBIT. DURING THE FIRST OF TWO ORBITS DEVOTED TO THIS EXPERIMENT, A SILICON TELESCOPE-SPECTROMETER WAS DEPLOYED FOR THE MEASUREMENT OF THE TRAJECTORY, ATOMIC CHARGE Z, AND THE VELOCITY OF COSMIC PARTICLES WITH STOPPING POWER OF 10 KEV PER MICROMETER OR GREATER. THE APOLLO COMMANDER AND THE COMMAND MODULE PILOT MADE CONTINUOUS OBSERVATIONS OF THE VISUAL SENSATIONS WHILE DARK-ADAPTED DURING THE SECOND ORBIT. THE DOCKING MODULE PILOT OPERATED THE EXPERIMENT CONTROL UNIT, WHICH RECEIVED DATA FROM SILICON DETECTORS AND FROM SILVER CHLORIDE CADMIUM-DOPED (AGCl (CD)) CRYSTALS THAT WERE USED TO REGISTER PARTICLE TRACKS IN FOUR SECTORS OF THE ORBIT CORRESPONDING TO NORTHERN LATITUDES, EQUATORIAL LATITUDES, THE SAA, AND SOUTHERN LATITUDES. AT EACH EVENT, A PUSH BUTTON SIGNAL FROM THE OBSERVING ASTRONAUT WAS RECORDED ON THE DIGITAL TAPE AND THE VERBAL DESCRIPTION WAS RECORDED ON THE ONBOARD TAPE RECORDER. FURTHER DETAILS CAN BE OBTAINED FROM 'QUANTITATIVE OBSERVATION OF LIGHT FLASH SENSATIONS - EXPERIMENT MA-106,' T. F. BUDINGER, ET AL., APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 13.1-13.16, 1976.

------- ASTP-APOLLO, CRISWELL-------

INVESTIGATION NAME- EFFECTS OF SPACE FLIGHT ON THE CELLULAR RESPONSE OF MAN

NSSDC ID- 75-066A-14

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - B.S. CRISWELL — BAYLOR U

BRIEF DESCRIPTION
THE OBJECTIVE OF THE CELLULAR IMMUNE REPONSE EXPERIMENT WAS TO CHARACTERIZE LYMPHOCYTES FOR THEIR PRE- AND POSTFLIGHT RESPONSIVENESS. SPECIFICALLY, THE CELLULAR IMMUNE RESPONSE OF THE THREE ASTRONAUTS OF THE ASTP SPACE FLIGHT WAS STUDIED BEFORE AND AFTER THE FLIGHT. RESULTS ARE TO BE CORRELATED WITH LYMPHOCYTIC CHANGES THAT WERE NOTED DURING THE SKYLAB SPACE FLIGHT. ALTHOUGH NO SIGNIFICANT QUANTITATIVE CHANGES WERE NOTED AMONG THE LYMPHOCYTIC POPULATION, SIGNIFICANT CHANGES IN PHA LYMPHOCYTIC RESPONSIVENESS OCCURRED IN THE RESPONSE OF THE THREE ASTRONAUTS DURING THE FLIGHT. PARAMETERS STUDIED WERE WHITE BLOOD CELL CONCENTRATIONS, LYMPHOCYTE NUMBERS, B- AND T-LYMPHOCYTE DISTRIBUTIONS IN PERIPHERAL BLOOD, AND LYMPHOCYTE RESPONSIVENESS TO PHA, POKEWEED NITOGEN, CONCANAVALIN A, AND INFLUENZA VIRUS ANTIGEN. SAMPLES OF HEPARINIZED PEREPHERAL VENUS BLOOD (10 CC) WERE OBTAINED AND WERE PROCESSED WITHIN 1 TO 24 H AFTER COLLECTION. BEFORE SEPARATION, THE TOTAL LEUKOCYTE (WHITE BLOOD CELL (WBC)) COUNTS WERE PERFORMED USING A HEMOCYTOMETER AND/OR A COULTER COUNTER, AND DIFFERENTIAL COUNTS WERE DETERMINED USING SLIDE PREPARATIONS STAINED WITH WRIGHT'S STAIN. LYMPHOCYTES WERE SEPARATED BY FICOLL-HYPAQUE GRADIENT CENTRIFUGATION ACCORDING TO BOYUM'S METHOD, OR BY USING A TECHNICON LYMPHOCYTE SEPARATOR. FOR ADDITIONAL EXPERIMENT DETAILS AND PERFORMANCE RESULTS, SEE 'CELLULAR IMMUNE RESPONSE EXPERIMENT MA-031,' B. S. CRISWELL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173,17-1 TO 17-7, 1960.

------- ASTP-APOLLO, DONAHUE-------

INVESTIGATION NAME- ULTRAVIOLET ATMOSPHERIC ABSORPTION

NSSDC ID- 75-066A-03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T.M. DONAHUE — U OF MICHIGAN

BRIEF DESCRIPTION
THIS ULTRAVIOLET ABSORPTION EXPERIMENT (UVA) WAS PERFORMED TO MEASURE THE CONCENTRATION OF ATOMIC OXYGEN AND NITROGEN IN THE ATMOSPHERE BY USE OF ULTRAVIOLET ABSORPTION AND RESONANCE-SCATTERING SPECTROSCOPY. A BEAM OF ATOMIC OXYGEN AND ATOMIC NITROGEN RESONANCE RADIATION (1304 AND 1200 A), STRONG UNABSORBABLE OXYGEN AND NITROGEN RADIATION (1356 AND 1493 A), AND VISIBLE RADIATION STRUCK THE RETROREFLECTOR ASSEMBLY ON THE SOYUZ AND WERE FOCUSED ON THE ENTRANCE SLIT OF A 0.75-M EBERT-FASTIE SCANNING SPECTROPHOTOMETER. THE DENSITY OF ATOMIC OXYGEN AND ATOMIC NITROGEN, BETWEEN THE TWO SPACECRAFT, WAS MEASURED WHEN THE LINE JOINING APOLLO AND SOYUZ WAS PERPENDICULAR TO THEIR VELOCITY RELATIVE TO THE ATMOSPHERE, BY OBSERVING THE AMOUNT OF RESONANCE RADIATION ABSORBED. BY ALLOWING THE APOLLO SPACECRAFT TO DRIFT AT FIXED RANGES OF 150, 500, AND 1400 M THROUGH AN ARC OF PLUS OR MINUS 15 DEG WITH RESPECT TO THE PERPENDICULAR TO THE VELOCITY VECTOR, THE TEMPERATURE OF THE GAS COULD BE OBTAINED FROM THE DOPPLER LINE PROFILE. THE SPECTRAL RANGE FROM 1200 TO 1493 A WAS SCANNED EVERY 12 S THROUGH 15-A RANGES CENTERED ON 1200, 1304, 1356, AND 1493 A. MORE DETAILS CAN BE FOUND IN 'ULTRAVIOLET ABSORPTION EXPERIMENT MA-059,' T. M. DONAHUE, ET AL, APOLLO-SOYUZ TEST PROJECT - PRELIMINARY SCIENCE REPORT, TMX-58173, 8.1-8.19, 1976.

------- ASTP-APOLLO, EL-BAZ-------

INVESTIGATION NAME- EARTH OBSERVATIONS AND PHOTOGRAPHY

NSSDC ID- 75-066A-21

INVESTIGATIVE PROGRAM
CODE ER

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - F. EL-BAZ — SMITHSONIAN INST

BRIEF DESCRIPTION
THE OBJECTIVE OF THE EARTH OBSERVATIONS AND PHOTOGRAPHY EXPERIMENT OF THE APOLLO-SOYUZ TEST PROJECT WAS TO PHOTOGRAPH VARIOUS TERRESTRIAL STRUCTURES USING MAN TO VISUALLY STUDY EARTH FEATURES AND PHENOMENA. A TOTAL OF 11 MAPPING SITES AND 12 VISUAL OBSERVING SITES WERE CHOSEN IN PART FROM INPUTS PROVIDED BY SPECIALISTS IN THE FOLLOWING DISCIPLINES -- GEOLOGY, OCEANOGRAPHY, DESERT STUDY, HYDROLOGY, AND ENVIRONMENTAL SCIENCE. THE PHOTOGRAPHS OF OBSERVATION AND MAPPING SITES WERE MADE WITH A VIDEO TAPE RECORDER (VTR), A 70-MM HASSELBLAD REFLEX CAMERA (HRC), A 70-MM HASSELBLAD DATA CAMERA (HDC), A 35-MM NIKON CAMERA, AND A 16-MM DATA ACQUISITION CAMERA (DAC). REAL-TIME TELEVISION TRANSMISSIONS WERE ALSO SCHEDULED. THE 'EARTH OBSERVATIONS BOOK' WAS THE PRINCIPAL ONBOARD AID, AND IT WAS DIVIDED INTO THREE MAJOR SECTIONS. SECTION TWO PERTAINED TO SPECIFIC VISUAL OBSERVATIONAL TARGETS AND WAS ARRANGED ACCORDING TO SITE NUMBER. FOR EACH SITE THERE WAS A SUMMARY PAGE WITH A MAP SHOWING REVOLUTION GROUND TRACKS FOLLOWED BY A PAGE (ONE FOR EACH TARGET) THAT INCLUDED SPECIFIC QUESTIONS, APPROPRIATE DIAGRAMS AND PHOTOGRAPHS, AND CAMERA SETTINGS. STUDIES PERFORMED INCLUDED OBSERVATIONS OF MAJOR ACTIVE FAULT ZONES, RIVER DELTAS, VOLCANOES, OCEAN EDDIES, CURRENTS, INTERNAL WAVES, EOLIAN LANDFORM, DESERT COLOR, SNOWCOVER, DRAINAGE PATTERNS, CLOUD FEATURES, TROPICAL STORMS, AND SOURCES OF ATMOSPHERIC AND WATER POLLUTION. FURTHER DETAILS AND SOME RESULTS ARE CONTAINED IN THE REPORT, 'EARTH OBSERVATIONS AND PHOTOGRAPHY - EXPERIMENT MA-136,' FAROUK EL-BAZ AND D. A. MITCHELL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 10.1-10.64, 1976.

------- ASTP-APOLLO, FRIEDMAN-------

INVESTIGATION NAME- SKY-EARTH X-RAY OBSERVATIONS

NSSDC ID- 75-066A-04

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - H.D. FRIEDMAN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS ASTP EXPERIMENT WAS INTENDED TO PRODUCE A DETAILED MAP OF CELESTIAL SOFT X-RAY EMISSIONS IN THE 0.1- TO 1.0-KEV RANGE. ROCKET OBSERVATIONS HAVE DETECTED A DIFFUSE BACKGROUND OF SOFT X-RAY RADIATION, BUT A SYSTEMATIC SKY SURVEY HAS NEVER BEEN MADE IN THE 0.1- TO 1.0-KEV ENERGY RANGE. SATELLITE OBSERVATIONS PROVIDED FINER ANGULAR RESOLUTION AND STATISTICS NEEDED TO DETERMINE THE VARIOUS SOURCES THAT CONTRIBUTE. THE THIN-WINDOW, SOFT X-RAY DETECTOR WAS MOUNTED IN A BAY OF THE APOLLO SERVICE MODULE.

------- ASTP-APOLLO, GATOS-------

INVESTIGATION NAME- DETERMINATION OF ZERO-GRAVITY EFFECTS ON ELECTRONIC MATERIALS PROCESSING

NSSDC ID- 75-066A-08

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE PROCESSING

PERSONNEL
PI - H.C. GATOS — MASS INST OF TECH
OI - A.F. WITT — MASS INST OF TECH

BRIEF DESCRIPTION
THE GERMANIUM (GE) CRYSTAL GROWTH EXPERIMENT HAD AS ITS OBJECTIVE THE QUANTITATIVE STUDY OF THE BASIC SOLIDIFICATION BEHAVIOR OF HIGH-TEMPERATURE MELTS IN NEAR ZERO-G CONDITIONS. SPECIFICALLY, IT WAS DESIGNED TO DETERMINE THE FOLLOWING -- (1) THE GROWTH-RATE BEHAVIOR ON THE MICROSCALE, (2) THE MORPHOLOGY OF THE CRYSTAL MELT INTERFACE AND ITS CHANGES DURING SOLIDIFICATION, (3) THE DOPANT SEGREGATION BEHAVIOR AND ITS FUNCTIONAL DEPENDENCE ON THE MICROSCOPIC GROWTH RATE, (4) THE ABSENCE OR PRESENCE OF CONVECTION PHENOMENA, AND (5) THE HEAT TRANSFER CHARACTERISTICS OF A SOLIDIFICATION SYSTEM IN THE ABSENCE OF FREE CONVECTION. THE EXPERIMENT INVOLVED THE GROWTH OF GALLIUM (GA) DOPED GE AND ANTIMONY (SB) DOPED GE OF (111) AND (100) ORIENTATION. THE GROWTH SYSTEM WAS EQUIPPED FOR INTERFACE DEMARCATION DURING SOLIDIFICATION THROUGH 20-AMP CURRENT PULSING (60 MS DURATION) AT 4-S INTERVALS. CURRENT PULSING WAS APPLIED TO THE GROWTH SYSTEM THROUGHOUT THE HEAT UP, THERMAL SOAKING, AND ENSUING COOLING CYCLE, WHILE IT WAS IN THE MULTIPURPOSE FURNACE. THE DIRECT COMPARISON OF SOLIDIFICATION BEHAVIOR ON EARTH WITH THAT IN NEAR ZERO-G CONDITIONS WAS MADE. ONE USE OF THE DATA OBTAINED HERE WOULD BE TO PROVIDE A BASIS FOR FEASIBILITY STUDIES OF ZERO-G PROCESSING EXPERIMENTS TO BE CONDUCTED IN THE SPACE SHUTTLE. MORE DETAILS CAN BE FOUND IN 'INTERFACE MARKINGS IN CRYSTALS - EXPERIMENT MA-060,' H. C. GATOS ET AL., APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 25.1-25.8, 1976.

------- ASTP-APOLLO, HANNIG-------

INVESTIGATION NAME- ELECTROPHORESIS

NSSDC ID- 75-066A-11

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE BIOLOGY

PERSONNEL
PI - K. HANNIG — MPI-EXTRATERR PHYS

BRIEF DESCRIPTION
IN THE ELECTROPHORESIS EXPERIMENT (EPE), A CONTINUOUS, FREE-FLOW ELECTROPHORESIS STUDY WAS CONDUCTED TO EVALUATE THE INCREASE IN SAMPLE FLOW RATE AND SAMPLE RESOLUTION ACHIEVABLE IN SPACE. THERMAL CONVECTION AND SEDIMENTATION LIMITED THE EFFECTIVENESS OF SEPARATION BY THIS TECHNIQUE. THIS EXPERIMENT WAS DESIGNED FOR THE SEPARATION OF FOUR MIXTURES OF BIOLOGICAL CELLS WITH VARIABLE SAMPLE FLOW RATES, BUFFER FLOW RATES, AND ELECTRIC FIELD GRADIENTS. THE SEPARATION SAMPLE CONTINUOUSLY ENTERED A SEPARATION CHAMBER IN WHICH A BUFFER SOLUTION FLOWED LAMINARLY. WHEN AN ELECTRIC FIELD WAS APPLIED PERPENDICULAR TO THE DIRECTION OF FLOW, PARTICLES HAVING DIFFERENT SURFACE CHARGE DENSITIES WERE DEFLECTED FROM THE FLOW DIRECTION OF THE BUFFER BY AN ANGLE DETERMINED BY THE ELECTROPHORETIC MOBILITY OF THE PARTICLE AND BY THE FLOW RATE, LEAVING THE LOWER END OF THE SEPARATION CHAMBER, THE SEPARATED ZONES WERE ANALYZED BY MEASURING THE DEFLECTION AND DENSITY DISTRIBUTION OF THE FRACTIONS. THE SEPARATION CHAMBER CONSISTED OF TWO COOLING PLATES THAT WERE ADJUSTED TO BE EXACTLY PARALLEL TO SUPPLY LAMINAR FLOW AND FORM A GAP OF ABOUT A 28- X 3.8-MM CROSS SECTION. ALONG THE SIDES, ELECTRODES (180-MM LONG) PROVIDED THE ELECTRIC FIELD PERPENDICULAR TO THE CELL BUFFER FLOW. THE SAMPLES PREPARED FOR THIS EXPERIMENT WERE -- (1) RAT BONE MARROW CELLS, (2) MIXTURE OF HUMAN AND RABBIT ERYTHROCYTES, (3) RAT SPLEEN CELLS, (4) RAT LYMPH NODE CELLS WITH THE ADDITION OF HUMAN ERYTHROCYTES AS MARKERS. IT WAS POSSIBLE TO DETERMINE THE APPLICABILITY OF THE METHOD AND TO STUDY THE SHARPNESS OF THE SEPARATION BY USING AN OPTICAL DETECTION SYSTEM. MORE DETAILS CAN BE OBTAINED FROM 'ELECTROPHORESIS EXPERIMENT - EXPERIMENT MA-014,' K. HANNING AND H. WIRTH, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 21.1-21.16, 1976.

------- ASTP-APOLLO, LARSON-------

INVESTIGATION NAME- ROLE OF CONVECTION IN SOLIDIFICATION PROCESS IN HIGH COERCIVE STRAIGHT MAGNET

NSSDC ID- 75-066A-07

INVESTIGATIVE PROGRAM
CODE ESS

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - D. LARSON — GRUMMAN AEROSPACE CORP
OI - T.Z. KATTAMIS — U OF CONNECTICUT

BRIEF DESCRIPTION
THE OBJECTIVES OF THE ZERO-G PROCESSING OF MAGNETS EXPERIMENT WERE -- (A) TO STUDY THE SOLIDIFICATION OF MAGNETIC MATERIALS IN THE LOW-GRAVITY ORBITAL ENVIRONMENT, AND (B) TO STUDY THE FLUID-STATIC CONFIGURATIONS IN LOW-G BY VARIATION OF FUNDAMENTAL PARAMETERS SUCH AS -- FILL FACTOR, DIAMETER-TO-LENGTH RATIO OF THE CYLINDRICAL CRUCIBLE, ETC. BOTH MAGNETIC COMPOUNDS STUDIED -- MANGANESE BISMUTH (MN BI) AND COPPER-COBALT-CERIUM -- HAVE POTENTIAL FOR THE DEVELOPMENT OF HIGH COERCIVE STRENGTH. FROM THE RESULTS OBTAINED, IT SHOULD BE POSSIBLE TO DETERMINE WHETHER, IN SPACE PROCESSING, THE CRITICAL MAGNETIC PROPERTIES CAN BE SIGNIFICANTLY IMPROVED BY IMPROVING CHEMICAL HOMOGENEITY, MORPHOLOGICAL PERFECTION, CRYSTALLINE PERFECTION, OR MAGNETIC SUBSTRUCTURE. THE EXPERIMENT OPERATED IN THE MULTIPURPOSE FURNACE FACILITY. OF THE THREE EXPERIMENT CARTRIDGES USED, AMPOULES 1 AND 2 WERE PYROLYTIC BORON NITRATE AND AMPOULE 3 WAS QUARTZ. AMPOULE 1 CONTAINED A 50-50 ATOMIC PERCENT ALLOY OF BISMUTH AND MANGANESE, AMPOULE 2 CONTAINED THE COPPER-COBALT-CERIUM EUTECTIC ALLOY, AND AMPOULE 3 CONTAINED A BISMUTH-MANGANESE-BISMUTH (BI-MN-BI) EUTECTIC ALLOY. THE FURNACE REQUIRED APPROXIMATELY 3.3 H TO REACH SOAK TEMPERATURE, IT THEN WAS HELD AT SOAK TEMPERATURE OF 1348 K OR 0.75 HR AND THEN COOLED PASSIVELY OVER A 10.5 H PERIOD. FURTHER DETAILS CAN BE FOUND IN 'ZERO-G PROCESSING OF MAGNETS - EXPERIMENT MA-070,' APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 26.1-26.6, 1976.

------- ASTP-APOLLO, LIND----------

INVESTIGATION NAME- CRYSTAL GROWTH

NSSDC ID- 75-066A-18

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE PROCESSING

PERSONNEL
PI - M.D. LIND — ROCKWELL INTL CORP

BRIEF DESCRIPTION
THE CRYSTAL GROWTH EXPERIMENT INVOLVED A NOVEL PROCESS FOR GROWING SINGLE CRYSTALS OF INSOLUBLE SUBSTANCES BY ALLOWING TWO OR MORE REACTANT SOLUTIONS TO DIFFUSE TOWARD EACH OTHER THROUGH A REGION OF PURE SOLVENT IN ZERO GRAVITY. THE APPROACH USED TOOK ADVANTAGE OF THE ABSENCE OF GRAVITY DRIVEN CONVECTION THAT, ON EARTH, PREDOMINATES OVER DIFFUSION AS A MECHANISM OF MATERIAL TRANSPORT. THE THREE CRYSTALS INVESTIGATED WERE -- CALCIUM TARTRATE, CALCIUM CARBONATE, AND LEAD SULFIDE. EXPERIMENT APPARATUS CONSISTED OF SIX SPECIALLY DESIGNED AND FABRICATED REACTORS, EACH ONE HAVING THREE COMPARTMENTS THAT WERE SEPARATED BY VALVES OPERATED BY THE KNOBS AT EACH END. EACH COMPARTMENT HAD A SEPARATE FILLING PORT. THE COMPARTMENTS VARIED IN LENGTH. THE REACTOR COVERS WERE FLAT AND TRANSPARENT TO PERMIT PHOTOGRAPHY OF THE PROCESS OF DIFFUSION AND CRYSTAL GROWTH. THE REACTANT SOLUTIONS WERE PLACED IN THE OUTER COMPARTMENTS OF EACH REACTOR, AND THE CENTRAL COMPARTMENT WAS FILLED WITH WATER. BEGINNING AT TIME OF ACTIVATION AND AT 12-H INTERVALS FOR 116 H OF FLIGHT, AN ASTRONAUT TOOK COLOR PHOTOGRAPHS OF THE 6 REACTORS. MORE DETAILS CAN BE FOUND IN 'CRYSTAL GROWTH EXPERIMENT MA-028,' M. D. LIND, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 30.1-30.5, 1976.

------- ASTP-APOLLO, MARTIN----------

INVESTIGATION NAME- POLYMORPHONUCLEAR LEUKOCYTE RESPONSE TO INFECTION

NSSDC ID- 75-066A-13

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - R.R. MARTIN — BAYLOR U

BRIEF DESCRIPTION
THE GOAL OF THIS 'ASTP POLYMORPHONUCLEAR LEUKOCYTE (PMN) RESPONSE' EXPERIMENT WAS TO IDENTIFY ANY MEASURABLE CHANGES IN PMN RESPONSE THAT MIGHT BE SIGNIFICANT IN PLANNING FUTURE, LONGER DURATION SPACE MISSIONS. NO PREVIOUS FORMAL EFFORT WAS MADE TO INVESTIGATE THE POSSIBLE EFFECTS OF SPACEFLIGHT AND WEIGHTLESSNESS ON THE PMN FUNCTION. BECAUSE THESE CELLS ARE IMPORTANT IN THE DEFENSE OF THE BLOOD AGAINST DISEASE, AND BECAUSE SITUATIONS IN WHICH THE FUNCTION OF THE LEUKOCYTES IS ABNORMAL ARE ASSOCIATED WITH INCREASED SUSCEPTIBILITY TO INFECTION, A VARIETY OF EXPERIMENTS WERE DESIGNED TO OBSERVE CHANGES IN THE PMN FUNCTION OF THE ASTRONAUTS IN RELATIONSHIP TO THE EVENTS OF THE ASTP. A SERIES OF STUDIES WAS PERFORMED AT INTERVALS FROM 30 DAYS BEFORE FLIGHT TO 30 DAYS AFTER RECOVERY. BLOOD SAMPLES WERE OBTAINED FROM THE THREE ASTRONAUTS AND FROM EIGHT CONTROL SUBJECTS. TESTS WERE PERFORMED ON BOARD THE RECOVERY SHIP U.S.S. NEW ORLEANS ON BLOOD SAMPLES OBTAINED AS QUICKLY AS POSSIBLE AFTER SPLASHDOWN AND ON THE DAY FOLLOWING RECOVERY. DATA WERE OBTAINED DURING EACH TIME PERIOD ON THE TOTAL LEUKOCYTE COUNT, DIFFERENTIAL COUNT, LEUKOCYTE ADHESION, LEUKOCYTE MIGRATION CHEMATOXIS, PHAGACYTASIS, AND HISTOCHEMICAL STAINING FOR LEUKOCYTE ACID AND ALKALINE PHOSPHATOSE. THE TECHNIQUES USED IN THIS STUDY WERE ADAPTED FROM METHODS IN WIDESPREAD USE AMONG INVESTIGATORS WORKING ON THE LEUKOCYTE FUNCTIONS. FURTHER DETAILS CAN BE FOUND IN 'THE EFFECTS OF SPACE FLIGHT ON POLYMORPHONUCLEAR LEUKOCYTE RESPONSE EXPERIMENT MA-032,' R. R. MARTIN, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 18.1-18.29, 1976.

------- ASTP-APOLLO, PEPIN----------

INVESTIGATION NAME- STRATOSPHERIC AEROSOL MEASUREMENT

NSSDC ID- 75-066A-19

INVESTIGATIVE PROGRAM
CODE SU

INVESTIGATION DISCIPLINE(S)
UPPER ATMOSPHERE RESEARCH

PERSONNEL
PI - T.J. PEPIN — U OF WYOMING

BRIEF DESCRIPTION
THE STRATOSPHERIC AEROSOL MEASUREMENT (SAM) EXPERIMENT WAS FLOWN TO DEMONSTRATE THAT SOLAR OCCULTATION MEASUREMENTS BY PHOTOMETER AND CAMERA CAN BE USED FOR DETERMINING THE VERTICAL DISTRIBUTION OF STRATOSPHERIC AEROSOLS. THE INSTRUMENT USED FOR MAKING THESE AEROSOL MEASUREMENTS CONSISTED OF A PHOTOMETER AND ASSOCIATED ELECTRONICS THAT PROVIDED A SIGNAL TO THE COMMAND MODULE (CM) TELEMETRY. SOLAR PHOTOGRAPHS, TAKEN WITH THE ACCOMPANYING CAMERA, CORROBORATED THE REFRACTION MODEL USED HERE AND FOR SIMILAR EXPERIMENTS ON FUTURE FLIGHTS. THE PHOTOMETER HAD A PIN DIODE DETECTOR WITH A 10-DEG FIELD OF VIEW. A HASSELBLAD DATA CAMERA EQUIPPED WITH A SPECIAL INFRARED FILM AND FILTER WAS USED TO PHOTOGRAPH A SERIES OF TIMED SPACECRAFT SUNSETS AND SUNRISES. SPECIFICALLY, IMMEDIATELY BEFORE SATELLITE NIGHT, AS THE SPACECRAFT APPROACHED THE SHADOW OF THE EARTH, THE LINE OF SIGHT TO THE SUN PASSED FIRST THROUGH THE UPPER LAYERS OF THE STRATOSPHERE AND THEN STEADILY DOWN TO THE LOWER LAYERS OF THE TROPOSPHERE. DURING THE 1.5 MIN REQUIRED FOR THE INSTRUMENT LINE OF SIGHT TO PASS THROUGH THE LOWER 150 KM OF THE ATMOSPHERE, THE SOLAR INTENSITY WAS RECORDED BY THE PHOTOMETER AND SOLAR DISK CHANGES RECORDED BY THE CAMERA. THE SAME MEASURING PROCEDURES WERE FOLLOWED WHEN THE SPACECRAFT EMERGED FROM THE DARKSIDE. FROM THE MEASURED VARIATION OF SOLAR INTENSITY AS A FUNCTION OF TOTAL AIR MASS DISTRIBUTED ALONG THE LINE-OF-SIGHT, THE TOTAL EXTINCTION COEFFICIENT WAS DETERMINED. AT THE EFFECTIVE WAVELENGTH OF THE PHOTOMETER AND PHOTOGRAPHIC SYSTEM, THE EXTINCTION WAS PRODUCED PRINCIPALLY BY ATMOSPHERIC AEROSOLS, AND THE MEASUREMENTS OBTAINED WERE USED TO DETERMINE AEROSOL CONCENTRATIONS. TO VERIFY THE OPERATION OF THE SAM EXPERIMENT, GROUND TRUTH DATA WERE OBTAINED BY A BALLOON-BORNE AEROSOL OPTICAL COUNTER (DUST-SONDE) AND A GROUND-BASED LASER RADAR (LIDAR) SYSTEM. FURTHER DETAILS CAN BE FOUND IN 'STRATOSPHERIC AEROSOL MEASUREMENT-EXPERIMENT MA-007' BY T. J. PEPIN AND M. P. MCCORMICK, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 9.1 TO 9.8, 1976.

------- ASTP-APOLLO, REED----------

INVESTIGATION NAME- SURFACE-TENSION-INDUCED CONVECTION IN ENCAPSULATED LIQUID METALS IN ZERO-G

NSSDC ID- 75-066A-05

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE PROCESSING

PERSONNEL
PI - R.E. REED — OAK RIDGE NATL LAB
CI - F.J. BRUNI — HOLIFIELD NATL LAB

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY POSSIBLE SURFACE-TENSION-INDUCED CONVECTION, CAUSED BY A STEPWISE COMPOSITIONAL VARIATION IN A LIQUID METAL CONTAINED IN BOTH WETTING AND NON-WETTING AMPOULES, WITH MINIMUM TEMPERATURE GRADIENTS. SPECIFICALLY, THE PLANS WERE TO SET UP, IN A MICROGRAVITY ENVIRONMENT, A LIQUID DIFFUSION COUPLE OF LEAD AND LEAD-0.05 ATOMIC PERCENT GOLD ALLOY. TWO TYPES OF AMPOULES WERE USED TO CONTAIN THE COUPLES -- A STEEL CONTAINER THAT THE LIQUID METAL WOULD WET AND A GRAPHITE CONTAINER THAT THE LIQUID METAL WOULD NOT WET. THE COUPLES WERE IN THE MOLTEN STATE FOR APPROXIMATELY 2 H TO ALLOW THE GOLD TO DIFFUSE APPROXIMATELY 2.5 CM. IF THERE WAS NO CONVECTIVE STIRRING DUE TO THE SURFACE TENSION DIFFERENCE BETWEEN THE LEAD AND LEAD-GOLD ALLOY, THEN A NORMAL CONCENTRATION-DISTANCE PROFILE FOR THE GOLD COULD BE FOUND IN THE DIFFUSION COUPLES. THE LIQUID DIFFUSION PARAMETERS FOR GOLD IN LEAD CAN BE ESTIMATED BECAUSE THERE WERE TWO DIFFERENT DIFFUSION TEMPERATURES USED, 923 K AND 743 K. IN DETERMINING THE EXTENT OF THESE STIRRING EFFECTS, THE ROLE OF THE TWO AMPOULES WAS EXAMINED. THE TOTAL SPECIMEN LENGTH WAS APPROXIMATELY 3 CM, AND THE DIAMETER WAS APPROXIMATELY 1 CM. THE 3-MM LEAD-GOLD ALLOY DISK WAS COLD-PRESSURE WELDED TO THE LEAD. ADDITIONAL DETAILS CAN BE FOUND IN 'SURFACE-TENSION-INDUCED CONVECTION EXPERIMENT MA-041,' R. E. REED, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 23.1-23.11, 1976.

------- ASTP-APOLLO, SCHELD----------

INVESTIGATION NAME- KILLIFISH HATCHING-ORIENTATION

NSSDC ID- 75-066A-23

INVESTIGATIVE PROGRAM
CODE SB

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - R.W. SCHELD — NASA-JSC

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE WAS TO MAKE IN-FLIGHT OBSERVATIONS OF ORIENTATION BEHAVIOR IN ZERO GRAVITY, AND TO EVALUATE THE GRAVITY DEPENDENCE OF SENSORY STRUCTURE AND FUNCTIONAL DEVELOPMENT DURING EMBRYOGENSIS OF THE KILLIFISH. THE EXPERIMENT CONSISTED OF TWO PARTS. FOR THE FIRST PART, IT WAS PLANNED TO HAVE SEVERAL SAMPLES, PRECONDITIONED IN VARIOUS PHYSICAL AND CHEMICAL ENVIRONMENTS, SUBJECTED TO PREDETERMINED VISUAL CUES AND DISTURBANCES. VIDEO OR CINE RECORDINGS WERE TO BE MADE OF THE ORIENTATION BEHAVIOR. SIMILAR RECORDINGS WERE TO BE MADE OF ORIENTATION BEHAVIOR OF HATCHLINGS FROM EMBRYONATED EGGS CARRIED INTO ORBIT. FOR THE SECOND PART OF THE EXPERIMENT, A GRADED SERIES OF EMBRYOS REPRESENTING KEY DEVELOPMENTAL STAGES WERE PLACED ON BOARD. AFTER RECOVERY, THESE FLIGHT TEST SPECIMENS AND SUITABLE GROUND CONTROLS WERE OBSERVED FOR -- (1) NORMALCY IN VESTIBULAR FUNCTIONING, AND (2) MICROSCOPIC AND PHYSIOLOGICAL CHANGES.

------- ASTP-APOLLO, TROMBKA----------

INVESTIGATION NAME- CRYSTAL ACTIVATION

NSSDC ID- 75-066A-22

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.I. TROMBKA NASA-GSFC

BRIEF DESCRIPTION
THE OBJECTIVE OF THE CRYSTAL ACTIVATION EXPERIMENT WAS TO DEFINE THE BACKGROUND CAUSED BY DETECTOR ACTIVATION THAT INTERFERES WHEN GAMMA RADIATION IS MEASURED IN THE 0.02- TO 10-MEV RANGE FROM EARTH ORBIT. THE RESULTS OBTAINED HERE, TOGETHER WITH ACCELERATION BEAM ACTIVATION MEASUREMENTS AND THEORETICAL CALCULATIONS, CAN BE USED TO ESTIMATE THIS BACKGROUND LEVEL FOR FUTURE FLIGHT EXPERIMENTS. THE EXPERIMENT CONSISTED OF TWO SAMPLE PACKAGES THAT WERE FLOWN IN THE COMMAND MODULE, AND WERE RETURNED TO EARTH TO BE ANALYZED FOR RADIOACTIVITY INDUCED IN THEM DURING FLIGHT. ONE PACKAGE CONTAINED THE APOLLO NAI(TL) CRYSTAL ASSEMBLY, AND THE OTHER PACKAGE CONTAINED AN INTRINSIC GERMANIUM DETECTOR, A 724-GM OF HIGH-PURITY GERMANIUM, AND 100-GM FOIL DISKS OF YTTRIUM, SCANDIUM, AND DEPLETED URANIUM. AFTER TESTS WERE PERFORMED ONBOARD THE RECOVERY CARRIER, THE TEST ITEMS WERE RETURNED TO LABORATORIES IN THE UNITED STATES FOR FURTHER COUNTING. PRIOR TO LAUNCH, BACKGROUND COUNTS WERE TAKEN ON ALL MATERIALS IN THE LABORATORIES WHERE POSTFLIGHT LOW-LEVEL COUNTING WAS ANTICIPATED. MORE DETAILS CAN BE FOUND IN 'CRYSTAL ACTIVATION - EXPERIMENT MA-051,' J. I. TROMBKA, ET AL., APOLLO-SOYUZ TEST PROJECT - PRELIMINARY SCIENCE REPORT, TM-X-58173, 7.1-7.10, 1976.

------- ASTP-APOLLO, VONBUN----------

INVESTIGATION NAME- GEODYNAMICS

NSSDC ID- 75-066A-17

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
GEODYNAMICS

PERSONNEL
PI - F.O. VONBUN NASA-GSFC

BRIEF DESCRIPTION
THE APOLLO-SOYUZ TEST PROJECT GEODYNAMICS EXPERIMENT WAS PERFORMED TO DETERMINE THE FEASIBILITY OF TRACKING AND RECOVERING HIGH-FREQUENCY COMPONENTS OF THE EARTH GRAVITY FIELD USING THE SYNCHRONOUS ORBITING APPLICATIONS TECHNOLOGY SATELLITE (ATS 6). THE SPECIFIC OBJECTIVES WERE -- (1) TO DEMONSTRATE THE DETECTABILITY OF SHORT WAVELENGTH (I.E., 300 KM AND LARGER) FEATURES OF THE EARTH'S GRAVITY FIELD, (2) TO EVALUATE THE 'HIGH/LOW' SATELLITE-TO-SATELLITE (SST) CONCEPT FOR GEODYNAMICS APPLICATIONS, (3) TO TEST THE RECOVERABILITY OF SHORT WAVELENGTH FEATURES OF THE EARTH'S GRAVITY FIELD. GRAVITY ANOMALIES OF 5 MILLIGALS OR LARGER HAVING WAVELENGTHS OF 300 TO 1000 KM ON THE SURFACE OF THE EARTH ARE IMPORTANT FOR GEOLOGIC STUDIES OF THE UPPER LAYERS OF THE EARTH'S CRUST. SMALL VELOCITY CHANGES (1 TO 10 MM/S) OF THE LOW ORBITING SPACECRAFT HAD TO BE MEASURED TO DETERMINE LOCAL GRAVITY VARIATIONS. AN ORBIT OF ONE TO ONE AND ONE-HALF REVOLUTIONS WAS COMPUTED FOR THE APOLLO SPACECRAFT. FROM THESE APOLLO ORBITS, TOGETHER WITH THE ATS 6 ORBIT, THE RANGE RATES BETWEEN ATS 6 AND THE APOLLO SPACECRAFT WERE COMPUTED. THESE COMPUTED RANGE RATES WERE SUBTRACTED FROM THE ACTUAL MEASURED ONES TO YIELD THE INPUT DATA NEEDED TO DETERMINE THE SURFACE GRAVITY. THE SST RANGE-RATE DATA TOGETHER WITH DIRECT ATS 6 TRACKING DATA AND UNIFIED S-BAND TRACKING DATA WERE USED IN THE ORBIT DETERMINATIONS. THE TWO PRIME AREAS OF DATA COLLECTION WERE THE CENTER OF THE AFRICAN CONTINENT, AND THE INDIAN OCEAN DEPRESSION CENTERED AT LATITUDE 5 DEG N AND LONGITUDE 75 DEG E. THE APOLLO SPACECRAFT WAS CONNECTED WITH MADRID BY TWO LINKS, THE ATS 6 LINK AND A DIRECT GROUND LINK. TO MINIMIZE ATMOSPHERICALLY DISTURBED DATA, THE DATA PASSES WERE LIMITED TO APPROXIMATELY 40 MIN. FURTHER DETAILS INCLUDING SOME MEASURED RESULTS CAN BE FOUND IN 'GEODYNAMICS-EXPERIMENT MA-128,' F.O. VONBUN ET AL., APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173, 12.1 TO 12.6, 1976.

------- ASTP-APOLLO, WEIFFENBACH----------

INVESTIGATION NAME- SPACECRAFT-TO-SPACECRAFT DOPPLER TRACKING

NSSDC ID- 75-066A-12

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - G.C. WEIFFENBACH SAO

BRIEF DESCRIPTION
THE DOPPLER TRACKING EXPERIMENT WAS DESIGNED TO DETERMINE GRAVITY FEATURES HAVING A HORIZONTAL SCALE OF 250 TO 1000 KM, BY USING THE LOW SATELLITE-TO-SATELLITE TRACKING METHOD. A SECONDARY GOAL WAS TO MEASURE SOME IONOSPHERIC PROPERTIES. THE ASTP MISSION WAS PARTICULARLY WELL SUITED FOR THIS EXPERIMENT, BECAUSE IT PROVIDED TWO PLATFORMS WITH A CONTROLLED SEPARATION WITHIN THE SAME ORBIT AT AN ALTITUDE OF 220 KM, WHICH IS LOW ENOUGH TO ENHANCE SENSITIVITY TO THESE SHORT WAVELENGTH GRAVITY ANOMALIES. THE RELATIVE VELOCITY OR DOPPLER SHIFT BETWEEN THE DOCKING MODULE (DM) AND THE COMMAND AND SERVICE MODULE (CSM) WAS MEASURED USING A PHASE-COHERENT DUAL FREQUENCY VHF LINK. INITIALLY, THE MODULES HAD A SEPARATION OF 317 KM, WHICH INCREASED TO 475 KM BY THE END OF THE EXPERIMENT. LOCALIZED ANOMALIES IN THE EARTH'S GRAVITATION FIELD CAN BE MEASURED WITH A THRESHOLD SENSITIVITY OF BETTER THAN -0.15 MM/S SG, FROM THE RELATIVE VELOCITY DATA. THE GEOMETRIC RANGE-RATE ERROR CAUSED BY THE IONOSPHERE CAN BE REMOVED BY APPLYING THE DUAL FREQUENCY (162 AND 324 MHZ) CORRECTION. THE ACCELERATION PRODUCED BY THE RADIATION PRESSURE WAS NEGLIGIBLE, AND THE ACCELERATION PRODUCED BY THE ATMOSPHERIC DRAG FORCE WAS TAKEN INTO ACCOUNT BY USING THE MEASURED ORBITAL AND ALTITUDE MOTIONS OF BOTH SPACECRAFT. THE TWO MAJOR EXPERIMENT COMPONENTS WERE THE TRANSMITTER LOCATED ON THE DM AND THE RECEIVER, WITH THE DOPPLER PROCESSOR LOCATED ON THE CSM. FURTHER EXPERIMENT AND PERFORMANCE DETAILS CAN BE FOUND IN 'DOPPLER TRACKING EXPERIMENT - MA-089,' G. C. WEIFFENBACH AND D. M. GROSSI, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 11.1-11.31, 1976.

------- ASTP-APOLLO, WIEDEMEIER----------

INVESTIGATION NAME- CRYSTAL GROWTH FROM THE VAPOR PHASE IN ZERO-GRAVITY ENVIRONMENT

NSSDC ID- 75-066A-09

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE PROCESSING

PERSONNEL
PI - H. WIEDEMEIER RENSSELAER POLYTECHNIC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE CRYSTAL GROWTH FROM THE VAPOR PHASE EXPERIMENT WERE TO STUDY THE EFFECTS OF MICROGRAVITY ON THE MORPHOLOGY OF SINGLE CRYSTALS OF MIXED SYSTEMS AND TO EVALUATE THE MASS TRANSPORT RATES OF THESE SYSTEMS, USING THE CHEMICAL TRANSPORT TECHNIQUE. THESE RESULTS SHOULD HELP TO PRODUCE CRYSTALS OF IMPROVED QUALITY AND TO YIELD FUNDAMENTAL DATA FOR THE VAPOR TRANSPORT PROCESS. THREE VAPOR TRANSPORT EXPERIMENTS WERE PERFORMED ON MULTICOMPONENT SYSTEMS CONTAINING DIFFERENT PARTS OF GERMANIUM SELINIDE, TELURIUM, GERMANIUM TETRAIODIDE, GERMANIUM MONOSULFIDE, GERMANIUM TETRACHLORIDE, AND ARGON. MATERIALS WERE ENCLOSED IN EVACUATED SEALED AMPOULES OF FUSED SILICA AND WERE TRANSPORTED IN A TEMPERATURE GRADIENT OF THE MULTIPURPOSE ELECTRIC FURNACE. AFTER A HEAT-UP PERIOD OF APPROXIMATELY 2 H, THE DESIRED TEMPERATURE GRADIENT OF 877-780 K WAS ACHIEVED, AND MAINTAINED FOR 16 H. MORE DETAILS CAN BE FOUND IN 'CRYSTAL GROWTH FROM THE VAPOR PHASE - EXPERIMENT MA-085,' H. WIEDEMEIR, ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 27.1-27.20, 1976.

------- ASTP-APOLLO, YUE----------

INVESTIGATION NAME- ZERO-GRAVITY SOLIDIFICATION OF NACL-LIF EUTECTIC

NSSDC ID- 75-066A-10

INVESTIGATIVE PROGRAM
CODE ES

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY
SPACE PROCESSING

PERSONNEL
PI - A.S. YUE U OF CALIF, LA
CI - C.W. YEH U OF CALIF, LA

BRIEF DESCRIPTION
THE HALIDE EUTECTIC GROWTH EXPERIMENT WAS FLOWN TO STUDY THE SOLIDIFICATION PROCESS IN THE SPACE ENVIRONMENT WHERE THERE ARE NO VIBRATION AND CONVECTION CURRENTS IN THE MELT. FIBER-LIKE SODIUM CHLORIDE-LITHIUM FLUORIDE EUTECTIC MIXTURES WERE PRODUCED IN SPACE BY THE DIRECTIONAL SOLIDIFICATION TECHNIQUE. WHEN A EUTECTIC LIQUID OF SODIUM CHLORIDE AND LITHIUM FLOURIDE SOLIDIFIED, LITHIUM FLOURIDE FORMED THE FIBER PHASE IN THE SODIUM CHLORIDE MATRIX. WHEN PRODUCED ON EARTH, FIBER-LIKE EUTECTICS SUFFER IMPERFECTIONS BY THE PRESENCE OF A BANDED STRUCTURE, AND BY DISCONTINUITY FAULTS, DUE IN PART TO VIBRATION AND CONVECTION CURRENTS IN THE MELT DURING SOLIDIFICATION. THESE DEFECTS CAUSE SOLID-STATE EUTECTIC DEVICES TO BE INEFFICIENT AND USELESS. THE SODIUM CHLORIDE AND 28.8 WEIGHT PERCENT LITHIUM FLUORIDE EUTECTIC MIXTURES, WERE MADE FROM 99.96 WEIGHT PERCENT SODIUM CHLORIDE AND 99.99 WEIGHT PERCENT LITHIUM FLUORIDE. THE MIXTURES WERE SOLIDIFIED IN AN INDUCTION HEATING UNIT UNDER A PROTECTIVE ATMOSPHERE. INGOTS OF SODIUM CHLORIDE-LITHIUM FLUORIDE EUTECTICS 0.79 CM IN DIAMETER AND 6.4-CM LONG WERE GROWN. ADDITIONAL DETAILS CAN BE FOUND IN 'HALIDE EUTECTIC GROWTH - EXPERIMENT MA-131,' A. S. YUE ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE

REPORT, TM-X-58173, 28.1-28.8, 1976.

********** ASTP-SOYUZ**********

SPACECRAFT COMMON NAME- ASTP-SOYUZ
ALTERNATE NAMES- APOLLO SOYUZ TEST PROJ., SOYUZ APOLLO

NSSDC ID- 75-065A

LAUNCH DATE- 07/15/75 WEIGHT- 6800. KG
LAUNCH SITE- TYURATAM (BAIKONUR COSMODROME), U.S.S.R.
LAUNCH VEHICLE- UNKNOWN

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/16/75
ORBIT PERIOD- 88.92 MIN INCLINATION- 51.76 DEG
PERIAPSIS- 218. KM APOAPSIS- 231. KM

PERSONNEL
TD - K.D. BUSHUYEV UNKNOWN
SC - Y.K. KHODAREV UNKNOWN

BRIEF DESCRIPTION
THE UNITED STATES AND THE U.S.S.R. LAUNCHED AN APOLLO SPACECRAFT AND A SOYUZ SPACECRAFT, RESPECTIVELY, AS A JOINT EFFORT CALLED THE APOLLO-SOYUZ TEST PROJECT (ASTP). THE SOYUZ SPACECRAFT WAS LAUNCHED FIRST, WITH A TWO-MAN CREW WHO MANEUVERED THEIR SPACECRAFT INTO A DOCKING ORBIT. THE APOLLO SPACECRAFT WAS LAUNCHED 7 1/2 HR LATER, WITH A THREE-MAN CREW WHO PLACED THEIR SPACECRAFT INTO A PROPER CONFIGURATION FOR DOCKING WITH THE SOYUZ SPACECRAFT. THE DOCKING OF THE TWO SPACECRAFT OCCURRED ON THE THIRD DAY. AFTER DOCKING, CREW TRANSFERS TOOK PLACE, WITH THE APOLLO CREW FIRST VISITING THE SOYUZ. THE COMBINED APOLLO-SOYUZ CREWS PERFORMED JOINT EXPERIMENTS AND PRESENTED RADIO AND TV REPORTS. AFTER JOINT EXPERIMENTS WERE COMPLETED, THE SPACECRAFT DISENGAGED AND EACH CONTINUED ITS SEPARATE MISSION.

-------- ASTP-SOYUZ, AKOEV----------

INVESTIGATION NAME- ZONE FORMING FUNGI

NSSDC ID- 75-065A-03 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - I.G. AKOEV UNKNOWN

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO INVESTIGATE THE EFFECT OF SPACE FLIGHT CONDITIONS ON THE RHYTHMS OF VEGETATIVE AND SPORE PHASE CHARACTERISTICS OF STREPTOMYCES LEVORIS. THIS SPECIES WAS ISOLATED, NAMED, AND PROVIDED BY THE U.S.S.R. AND WAS USED AS THE PRIMARY TEST SPECIMEN FOR THIS EXPERIMENT. THE CULTURAL CHARACTERISTICS OF THIS ORGANISM PERMIT IN SITU COMPARISON OF SPORE RING FEATURES AND DEVELOPMENT RATES IN PREFLIGHT, FLIGHT, AND POSTFLIGHT PERIODS OF THE APOLLO-SOYUZ TEST PROJECT, WITHIN A SINGLE CULTURE. ASPECTS OF THE EXPERIMENT THAT WERE STUDIED INCLUDED -- (1) CULTURES THAT HAD BEEN INITIATED WITHIN A 12-H PHASE SHIFT WERE EXCHANGED DURING FLIGHT, (2) THE EFFECTS OF LOCAL RADIATION ON GENERIC CHANGES WERE STUDIED, (3) CHARACTERISTICS OF SECONDARY CULTURES THAT WERE DERIVED FROM DIFFERENT SECTORS OF THE PRIMARY CULTURES WERE STUDIED AND COMPARED, AND (4) MORPHOLOGICAL AND CULTURAL PROPERTIES OF DIFFERENT NUTRIENT MEDIA WERE RECORDED. EACH FLIGHT DEVICE HELD TWO PETRI DISHES THAT CONTAINED STREPTOMYCES CULTURES. RADIATION DETECTORS OF CELLULOSE TRIACETATE, CELLULOSE NITRATE, AND LEXAN WERE USED TO REGISTER PARTICLES THAT PASSES THROUGH THE BIOLOLOGICAL TEST SYSTEMS, AND THEY WERE PLACED BENEATH THE PETRI DISHES AS WELL AS IN A MOVABLE LID. ALL FLIGHT AND CONTROL SPECIMENS WERE PHOTOGRAPHED AT 12-H (PLUS OR MINUS 3 H) INTERVALS FROM THE TIME THE CULTURES WERE SELECTED FOR THE EXPERIMENT UNTIL TERMINATION. ADDITIONAL DETAILS OF THE EXPERIMENT AND ITS PERFORMANCE CAN BE FOUND IN, 'ZONE FORMING FUNGI - EXPERIMENT MA-147,' T. D. ROGERS ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TMX-58173, 15.1-15.12, 1976.

-------- ASTP-SOYUZ, IVANOV----------

INVESTIGATION NAME- USSR MULTIPLE MATERIAL MELTING

NSSDC ID- 75-065A-02 INVESTIGATIVE PROGRAM
CODE ES/CO-OP

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - I. IVANOV SAS-IPA

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO DETERMINE THE DEGREE OF IMPROVEMENT OF MATERIALS PROCESSED IN ZERO-G. CONVECTIVE STIRRING DURING SOLIDIFICATION AND SEGREGATION IN THE MELT DUE TO GRAVITY CONTRIBUTE TO NON-HOMOGENEITIES, VOIDS AND STRUCTURAL IMPERFECTIONS IN MATERIALS WHEN PROCESSED ON EARTH. THE ONBOARD MULTIPURPOSE FURNACE SYSTEM WAS USED. THREE DIFFERENT MATERIAL SYSTEMS WERE USED. IN THE HOT ISOTHERMAL REGION, A SAMPLE OF ALUMINUM WITH TUNGSTEN SPHERES WAS MELTED AND SOLIDIFIED. A GERMANIUM ROD CONTAINING 2 ATOMIC PERCENT OF SILICON WAS PARTIALLY MELTED AND SOLIDIFIED IN THE GRADIENT REGION. AN ADDITIONAL ISOTHERMAL REGION WAS CREATED IN THE GRADIENT ZONE TO PROCESS AN AMPOULE OF POWDERED ALUMINUM.

-------- ASTP-SOYUZ, NIKOLSKY----------

INVESTIGATION NAME- ARTIFICIAL SOLAR ECLIPSE

NSSDC ID- 75-065A-04 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - G.M. NIKOLSKY SOVIET ACAD OF SCI

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS ARTIFICIAL SOLAR ECLIPSE EXPERIMENT WAS TO DETECT THE EXTENDED REGION OF THE CORONA BY PHOTOGRAPHING IT FROM THE SOYUZ SPACECRAFT AGAINST THE BLACK SPACE BACKGROUND WHILE THE DISK OF THE SUN WAS OCCULTED BY THE APOLLO SPACECRAFT. THE SOYUZ CREW WAS RESPONSIBLE FOR PHOTOGRAPHING THE CORONA, AND THE APOLLO CREW WAS RESPONSIBLE FOR PERFORMING THE REQUIRED SPACECRAFT MANEUVERS AND FOR PHOTOGRAPHING THE ECLIPSE SHADOW ON THE SOYUZ VEHICLE. SHORTLY AFTER ORBITAL SUNRISE, APOLLO BACKED AWAY FROM THE SOYUZ TOWARD THE SUN TO A SEPARATION DISTANCE AT WHICH THE APPARENT DIAMETER OF APOLLO WAS APPROXIMATELY 2 SOLAR DIAMETERS. APOLLO TOTALLY OCCULTED THE SUN DURING THE SEPARATION MANEUVER, AND THE SOYUZ PERFORMED AUTOMATIC SEQUENCE PHOTOGRAPHY IN THE SOLAR DIRECTION DURING THE ENTIRE SEPARATION MANEUVER. THE 50-MM CAMERA ON BOARD THE SOYUZ SPACECRAFT HAD A 90-MM FOCAL LENGTH LENS WITH NO FILTER. THE PHOTOGRAPHS WERE TAKEN IN 'WHITE LIGHT' OVER THE WAVELENGTH RANGE OF APPROXIMATELY 4000 TO 7500 A. A MECHANIZED MAGAZINE CONTAINING HIGHLY SENSITIZED KODAK 2485 FILM WAS MOUNTED TO THE BACK OF THE CAMERA. THE APOLLO CREW DEPLOYED A U.S.S.R. LIGHT BAFFLE ON THE OUTSIDE OF THE HATCH WINDOW TO MINIMIZE THE AMOUNT OF SCATTERED AND REFLECTED LIGHT THAT ENTERED THE OPTICAL PATH OF THE CAMERA. MORE EXPERIMENT DETAILS CAN BE FOUND IN -- 'ARTIFICIAL SOLAR ECLIPSE-EXPERIMENT MA-148,' R. T. GIULI ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, 6-1 TO 6-5, TM-X-58173.

-------- ASTP-SOYUZ, TAYLOR----------

INVESTIGATION NAME- MICROBIAL EXCHANGE TEST

NSSDC ID- 75-065A-01 INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL
PI - G.R. TAYLOR NASA-JSC

BRIEF DESCRIPTION
THE OBJECTIVE OF THE MICROBIAL EXCHANGE EXPERIMENT WAS TO DETERMINE THE COMPONENTS OF THE INFECTIOUS DISEASE PROCESS IN SPACE FLIGHT BY MEASURING CHANGES IN THREE FACTORS -- (1) THE COMPOSITION OF THE MICROBIAL POPULATIONS INHABITING THE CREW MEMBERS AND SPACECRAFT, (2) THE ABILITY OF EACH CREW MEMBER'S DEFENSE MECHANISM TO RESIST INFECTION, AND (3) THE ABILITY OF CERTAIN MICROORGANISMS TO ORIGINATE INFECTIONS. HENCE, THIS EXPERIMENT WAS DESIGNED TO MONITOR QUANTITATIVELY THE MICROBIAL LOAD OF ALL CREW MEMBERS AND OF SELECTED INNER SURFACES OF BOTH THE APOLLO AND SOYUZ SPACECRAFT. THE NORMAL AUTOFLORA AND IMMUNOCOMPETENCE LEVEL OF EACH CREW MEMBER WAS ESTABLISHED BEFORE FLIGHT THROUGH REPEATED SAMPLING AND ANALYSIS. SELECTED MICROORGANISMS RECOVERED FROM THE CREW AND SPACECRAFT WERE EXAMINED TO DETECT CHANGES IN THE ABILITY OF THE MICROORGANISM TO BECOME PATHOGENIC, INFECTIVE, OR TOXIC TO MAN. AT SOME TIME, CERTAIN IMMUNOLOGICAL PARAMETERS OF THE BLOOD AND SALIVA OF EACH CREW MEMBER WERE STUDIED TO DETECT CHANGES IN THE ABILITY OF THE INDIVIDUAL TO RESIST INFECTION. SPECIMENS WERE COLLECTED FROM THE 5 PRIME AND 5 BACKUP CREW MEMBERS AND FROM 15 AREAS ON THE INNER SURFACES OF EACH SPACECRAFT AT SPECIFIC TIMES BEFORE, DURING, AND AFTER THE FLIGHT. FOR INFLIGHT SAMPLES, A SPECIALLY DEVELOPED SAMPLE COLLECTION DEVICE WAS USED THAT CONSISTED OF A COTTON-TIPPED TEFLON SWAB ON A CAPILLARY TUBE CONTAINING CONSERVATION FLUID TO KEEP THE MICROORGANISM ALIVE. ALL FOUR SETS OF SWABS WERE LAUNCHED IN THE SOYUZ SPACECRAFT. TWO KITS TO BE USED IN THE APOLLO WERE TRANSFERRED FROM THE SOYUZ AT THE END OF THE FIRST JOINT ACTIVITY AND RETURNED TO THE SOYUZ NEAR THE END OF THE LAST JOINT ACTIVITY. ALL SAMPLES COLLECTED DURING FLIGHT WERE RETURNED TO MOSCOW FOR PRELIMINARY ANALYSIS AND DIVISION BETWEEN U.S. AND U.S.S.R. LABORATORIES. MORE EXPERIMENT DETAILS AND SOME FLIGHT RESULTS CAN BE FOUND IN 'MICROBIAL EXCHANGE EXPERIMENT AR-002,' G.R. TAYLOR ET AL, APOLLO-SOYUZ TEST PROJECT, PRELIMINARY SCIENCE REPORT, TM-X-58173,

16.1-16.31, 1976.

********** ATS 5**********

SPACECRAFT COMMON NAME- ATS 5
ALTERNATE NAMES- PL-692B, ATS-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-OA

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

PERSONNEL
MG - UNKNOWN
SC - UNKNOWN
PM - 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, MOZER----------

INVESTIGATION NAME- TRI-DIRECTIONAL, MEDIUM-ENERGY PARTICLE DETECTOR

NSSDC ID- 69-069A-04 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - F.S. MOZER U OF CALIF, BERKELEY

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE ESSENTIALLY IDENTICAL SCINTILLATION PHOTOMULTIPLIER DETECTORS, EACH INTENDED TO MEASURE (SEPARATELY) ELECTRONS AND PROTONS IN THREE ENERGY WINDOWS CENTERED RESPECTIVELY AT 40, 75, AND 120 KEV AND 60, 120, AND 165 KEV. TWO DETECTORS, LOOKING IN OPPOSITE DIRECTIONS, WERE TILTED BY 12 DEG FROM THE SATELLITE Z-AXIS AND ONE WAS ORIENTED PERPENDICULAR TO THIS CONFIGURATION. OVER MOST OF ITS DATA COLLECTING LIFETIME, THE SATELLITE WAS SPINNING ABOUT ITS Z-AXIS, WITH A SPIN PERIOD OF 0.78 S. DUE TO AN UNPLANNED SPACECRAFT SPIN SOON AFTER LAUNCH, A SHUTTER SYSTEM WAS ACTIVATED THAT RENDERED THE PERPENDICULAR DETECTOR INEFFECTIVE. THEREFORE, MEASUREMENTS WERE MADE ONLY IN DIRECTIONS APPROXIMATELY PARALLEL AND ANTIPARALLEL TO THE LOCAL MAGNETIC FIELD. THE SPECIES ANALYSIS WAS PERFORMED BY A THREE-CHANNEL, PULSE-HEIGHT ANALYZER, AND PARTICLE COUNTS WERE TELEMETERED IN BOTH ANALOG AND DIGITAL MODES. THE INTEGRATION TIME FOR EACH CHANNEL WAS 0.01 S, WHILE THE READOUT RATE FOR ANY ONE CHANNEL VARIED FROM 0.2 TO 5.12 S, DEPENDING ON A COMMANDABLE READOUT MODE. FOR INFORMATION REGARDING EXPERIMENT DESIGN AND CONSTRUCTION CONSULT, 'DEVELOPMENT OF A DOUBLE-LAYERED SCINTILLATOR FOR SEPARATING AND DETECTING LOW-ENERGY PROTONS AND ELECTRONS,' BY F. S. MOZER, F. H. BOGOTT, AND C. W. BATES, JR., IEEE TRANS. ON NUCL. SCI., NS-15, 144, 1968.

------- 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/31/74
ORBIT PERIOD- 1436.3 MIN INCLINATION- 1.5 DEG
PERIAPSIS- 35763.0 KM APOAPSIS- 35818.0 KM

PERSONNEL
PM - 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, 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.D. 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 WDC-A, SOLAR-TERR PHYS
OI - R.B. 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. KONRADI 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 5.3 S BY USE OF APPROPRIATE H-TELESCOPE DISCRIMINATION LEVELS. FOR FURTHER DETAILS, SEE FRITZ AND CESSNA, 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. GHAIS 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, HENRY----------

INVESTIGATION NAME- RADIO FREQUENCY INTERFERENCE

NSSDC ID- 74-039A-11 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL
PI - V.F. HENRY NASA-GSFC

BRIEF DESCRIPTION
THE RADIO FREQUENCY INTERFERENCE (RFI) EXPERIMENT PROVIDED REALISTIC DATA ON MUTUAL RF INTERFERENCE IN THE C-BAND SPECTRUM SHARED BETWEEN SATELLITE AND TERRESTRIAL TELECOMMUNICATIONS SYSTEMS. THE EXPERIMENT MEASURED AND EVALUATED THE EFFECTS OF RFI IN THE SHARED COMMON-CARRIER FREQUENCY BAND, 5925 TO 6425 MHZ. THE TECHNICAL OBJECTIVES OF THE C-BAND RFI EXPERIMENT WERE TO -- DETERMINE THE FLUX DENSITY OF THE 6-GHZ INTERFERENCE POWER AT THE SATELLITE, ESTABLISH PRACTICAL GAIN-TO-NOISE RATIO LIMITS FOR THE SATELLITE, ESTABLISH REALISTIC SATELLITE PROTECTION RATIOS, DETERMINE BOTH GEOGRAPHICAL AND FREQUENCY DISTRIBUTION OF TERRESTRIAL RF NOISE SOURCES, AND TO INVESTIGATE THE FEASIBILITY OF ESTABLISHING MATHEMATICAL MODELS FOR PREDICTING RFI.

------- ATS 6, HYDE----------

INVESTIGATION NAME- COMSAT PROPAGATION (13-AND 18-GHZ)

NSSDC ID- 74-039A-21 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL
PI - G. HYDE COMMUN SATELLITE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THE EXPERIMENT WAS TO COLLECT SUFFICIENT LONG-TERM DATA ON PROPAGATION ATTENUATION CAUSED BY PRECIPITATION FOR A LARGE NUMBER OF LOCATIONS IN THE U.S. THIS WILL PERMIT DETERMINATION OF MINIMUM-POWER MARGINS NEEDED IN SPACECRAFT COMMUNICATIONS SYSTEMS OPERATING AT FREQUENCIES ABOVE 10 GHZ. THE EXPERIMENT WILL INVOLVE ANALYSIS OF DATA GATHERED FROM 15 WIDELY SEPARATED DUAL-FREQUENCY SITES, AND PROVIDE THE UNIQUE CAPABILITY OF MAKING INSTANTANEOUS CORRELATIONS OF SIGNALS BETWEEN ANY NUMBER OF STATIONS. THE EXPERIMENTAL SYSTEM CONSISTED OF THREE MAIN PARTS -- (1) 15 SMALL, WIDELY SEPARATED (GREATER THAN 100 MILES APART) EARTH STATIONS, EACH TRANSMITTING AT APPROXIMATELY 13 AND 18 GHZ, AND 9 CLOSELY SPACED (LESS THAN 25 MILES APART) 18-GHZ TRANSMITTING TERMINALS, (2) A SPACECRAFT TRANSPONDER RECEIVING FROM THE SMALL EARTH TRANSMITTING TERMINALS AT APPROXIMATELY 13 AND 18 GHZ, AND RETRANSMITTING THESE SIGNALS AT ABOUT 4 GHZ, AND (3) ONE 4-GHZ EARTH STATION FOR RECEIVING AND RECORDING THE PROPAGATION DATA FROM THIS EXPERIMENT.

------- ATS 6, IPPOLITO----------

INVESTIGATION NAME- MILLIMETER WAVE PROPAGATION

NSSDC ID- 74-039A-13 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL
PI - L.J. IPPOLITO NASA-GSFC

BRIEF DESCRIPTION
THE ATS 6 MILLIMETER WAVE (MMW) PROPAGATION EXPERIMENT EVALUATED THE PROPAGATION CHARACTERISTICS OF SPACE-EARTH LINKS CENTERED AT 20 AND 30 GHZ DURING MEASURED METEOROLOGICAL CONDITIONS. THE OBJECTIVES OF THIS EXPERIMENT WERE TO -- PROVIDE ENGINEERING DATA ON SPACE-EARTH COMMUNICATIONS LINKS OPERATING AT 20 AND 30 GHZ, INVESTIGATE TECHNIQUES FOR PREDICTING MMW PROPAGATION EFFECTS FROM INDIRECT MEANS SUCH AS RADIOMETRIC SKY TEMPERATURE AND RADAR BACKSCATTER, AND ESTABLISH A MODEL FOR THE MMW CHANNEL UNDER DEFINED METEOROLOGICAL CONDITIONS.

------- ATS 6, ISLEY----------

INVESTIGATION NAME- SPACECRAFT ATTITUDE CONTROL

NSSDC ID- 74-039A-20 INVESTIGATIVE PROGRAM CODE EC

INVESTIGATION DISCIPLINE(S) COMMUNICATIONS

PERSONNEL
PI - W.C. ISLEY NASA-GSFC

BRIEF DESCRIPTION
THE SPACECRAFT ATTITUDE PRECISION POINTING AND SLEWING ADAPTIVE CONTROL EXPERIMENT (SAPPSAC) OBJECTIVES WERE TO DEMONSTRATE -- (1) THE ABILITY TO MAINTAIN PRECISE ATTITUDE STABILIZATION OF A GIVEN SPACECRAFT POINTING VECTOR (SUCH AS THE ANTENNA) IN A FIXED DIRECTION, FOR AN EXTENDED PERIOD OF TIME IN THE PRESENCE OF ALL DISTURBING INPUTS, WHEN USING THE GROUND ATTITUDE CONTROL COMMAND LINK WITH AUTOMATIC EXECUTION, (2) RELATIVE COMMAND AND TELEMETRY LINK RELIABILITIES FOR AN EXTENDED PERIOD OF TIME, (3) THE RELATIVE ATTITUDE MEASUREMENT CAPABILITIES FOR THE AVAILABLE SENSORS DURING EXTENDED TERM PRECISION ATTITUDE STABILIZATION OF THE SPACECRAFT, (4) THE ABILITY TO PERFORM A SINGLE-ATTITUDE SLEWING MANEUVER BETWEEN TWO REFERENCE GROUND LOCATIONS IN A MANNER PRESCRIBED (SUCH AS MANEUVER TIME, REACTION JET-PROPELLANT EXPENDITURE, MOMENTUM-WHEEL SPEED CHANGES, MAXIMUM ALLOWABLE ATTITUDE RATES, OR IN VARIOUS COMBINATIONS), (5) THE ABILITY TO GENERATE PRESCRIBED GROUND PATTERNS, SUCH AS ANTENNA MAPPING AT A GROUND STATION OR FIXED GROUND TRACK GENERATION, (6) THE ABILITY TO TRACK ANOTHER OBJECT IN FLIGHT IN A MANNER THAT MINIMIZES JET-PROPELLANT EXPENDITURE OR WHEEL-SPEED VARIATIONS, (7) THE USE OF SAPPSAC FOR POSTLAUNCH DIAGNOSTICS, SUCH AS VERIFICATION OF SOLAR-TORQUE PROFILES, REACTION-JET BEHAVIOR, MOMENTUM-WHEEL BEHAVIOR, LOW-FREQUENCY JITTER AND SENSOR BEHAVIOR, AND (8) THE ABILITY OF COMBINED TWO-STATION INTERFEROMETER AND EARTH SENSOR (OR THREE-STATION INTERFEROMETER) GROUND TELEMETRY TO DETERMINE REAL-TIME ORBIT STATE.

------- 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, KIRKPATRICK----------

INVESTIGATION NAME- ADVANCED THERMAL CONTROL FLIGHT

NSSDC ID- 74-039A-22

INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J. KIRKPATRICK NASA-ARC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE ADVANCED THERMAL CONTROL FLIGHT EXPERIMENT (ATFE) WERE -- (1) TO EVALUATE, IN SPACE, THE PERFORMANCE OF AN ACTIVE, FEEDBACK-CONTROLLED, VARIABLE-CONDUCTANCE HEAT PIPE, A THERMAL DIODE (ONE-WAY HEAT PIPE), AND A PHASE-CHANGE HEAT RESERVOIR OR THERMAL ACCUMULATOR, (2) TO DEMONSTRATE THE EFFECTIVENESS OF THESE RECENTLY DEVELOPED THERMAL CONTROL DEVICES IN STABILIZING THE TEMPERATURE OF SPACECRAFT COMPONENTS WHICH UNDERGO MARKED CHANGES IN POWER DISSIPATION AND/OR THERMAL ENVIRONMENT. TO AVOID THE USE OF SPACECRAFT POWER TO PROVIDE HEAT INPUT, THE EXPERIMENT INCLUDED A SOLAR ABSORBER PANEL AND A THERMAL DIODE. THE SOLAR ABSORBER WAS ORIENTED SO, IN SYNCHRONOUS ORBIT, IT WILL BE EXPOSED TO ONE FULL DAILY RANGE OF INSOLATION.

------- 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, MCILWAIN----------

INVESTIGATION NAME- AURORAL PARTICLES EXPERIMENT

NSSDC ID- 74-039A-05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - C.E. MCILWAIN U OF CALIF, SAN DIEGO
OI - R.W. FILLIUS U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO DETERMINE THE PROCESSES THAT ACCELERATE CHARGED PARTICLES NEAR THE EARTH, WITH PARTICULAR EMPHASIS ON PROCESSES ASSOCIATED WITH THE FORMATION OF AURORAS AND SUBSTORMS. FIVE ELECTROSTATIC ANALYZERS WERE CAPABLE OF MEASURING PARTICLES OF ENERGY LESS THAN 1 EV TO 81 KEV IN 64 CHANNELS WITH AN ENERGY RESOLUTON OF ABOUT 0.2E+2 EV. THE GEOMETRIC FACTOR IS APPROXIMATELY 2.4E-4 SQ CM STER FOR PROTONS AND 1.6E-4 SQ CM STER FOR ELECTRONS. THESE ARE DIFFERENT BECAUSE HALF OF EACH ELECTRON APERTURE AND ONE-FOURTH OF EACH ION APERTURE WERE COVERED IN ORDER TO AVOID INTERFERING EQUIPMENT WITHIN THE FIELD OF VIEW. FOUR OF THE ANALYZERS WERE MOUNTED IN TWO ROTATING HEADS IN SETS OF TWO EACH, ONE OF WHICH WAS SENSITIVE TO ELECTRONS AND ONE TO POSITIVE IONS. THE HEADS WERE MOUNTED MUTUALLY PERPENDICULAR TO EACH OTHER AND COULD BE ROTATED THROUGH 220 DEG EACH. THE EXPERIMENT HAD MANY MODES OF OPERATION. FOR MORE DETAIL SEE 'IEEE TRANS.,' AES-11, 6, P 1125.

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

INVESTIGATION NAME- SATELLITE INSTRUCTIONAL TV

NSSDC ID- 74-039A-17

INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - J.E. MILLER NASA-GSFC

BRIEF DESCRIPTION
THE GENERAL OBJECTIVES OF THE EXPERIMENT WERE -- (1) TO GAIN EXPERIENCE IN THE DEVELOPING, TESTING, AND MANAGING OF A SATELLITE-BASED INSTRUCTIONAL TV SYSTEM, PARTICULARLY IN RURAL AREAS AND TO DETERMINE OPTIMAL SYSTEM PARAMETERS, (2) TO DEMONSTRATE THE POTENTIAL VALUE OF SATELLITE TECHNOLOGY IN THE RAPID DEVELOPMENT OF EFFECTIVE MASS COMMUNICATIONS IN DEVELOPING COUNTRIES, (3) TO DEMONSTRATE THE POTENTIAL VALUE OF SATELLITE BROADCAST TV IN THE PRACTICAL INSTRUCTION OF VILLAGE INHABITANTS, AND (4) TO STIMULATE NATIONAL DEVELOPMENT IN INDIA, WITH IMPORTANT MANAGERIAL, ECONOMIC, TECHNOLOGICAL, AND SOCIAL IMPLICATIONS. THE SPACECRAFT WAS POSITIONED AT APPROXIMATELY 35 DEG E LONGITUDE. A FREQUENCY MODULATED TV CARRIER AT 6 GHZ WAS TRANSMITTED TO THE ATS 6 EARTH-COVERAGE ANTENNA FROM ONE OF TWO EARTH STATIONS -- AHMEDABAD OR DELHI. THE SIGNAL WAS PROCESSED AND RETRANSMITTED AT BOTH 4 GHZ AND 860 MHZ. THE 860-MHZ DOWNLINK TESTED THE CONCEPT OF A HYBRID SYSTEM INVOLVING BOTH DIRECT RECEPTION BY LOW-COST AUGMENTED TV RECEIVERS AS WELL AS HIGHER SENSITIVITY EARTH STATIONS FOR REBROADCAST AT VHF TO CONVENTIONAL TV RECEIVERS. ABOUT 2400 DIRECT RECEPTION AND 2600 CONVENTIONAL SETS WERE LOCATED IN 5000 VILLAGES. THE DIRECT RECEPTION TERMINALS WERE LOCATED IN CLUSTERS OF ABOUT 400 EACH IN 6 STATES OF INDIA, WHILE THE CONVENTIONAL SETS WERE LOCATED IN VILLAGES NEAR EXISTING OR PLANNED VHF TV TRANSMITTERS.

------- 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, PATTERSON----------

INVESTIGATION NAME- TELEVISION CAMERA

NSSDC ID- 74-039A-31

INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - G.C. PATTERSON NASA-GSFC

BRIEF DESCRIPTION
A SUBMINIATURE TV CAMERA WAS MOUNTED INSIDE THE EARTH-VIEWING MODULE WITH THE LENS ATTACHED THROUGH A HOLE IN THE PRIME-FOCUS FEED PLATE TO VIEW THE 30-FT PARABOLIC REFLECTOR. ITS PRIMARY PURPOSE WAS TO VERIFY PROPER REFLECTOR DEPLOYMENT AND TO INDICATE POSSIBLE ANOMALIES SUCH AS TEARS, HOLES, FOLDS, AND OTHER DISTORTIONS. ITS SECONDARY PURPOSE WAS TO PERIODICALLY DETERMINE ANY CHANGE IN THE STATUS OF THE REFLECTOR. THIS INFORMATION WAS USED IN OPERATING AND ANALYZING THE COMMUNICATIONS SYSTEM. THE TV CAMERA USED THE COMMUNICATIONS SUBSYSTEM WIDE-BAND DATA UNIT TO TRANSMIT PICTURES TO THE GROUND.

------- 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 BETWEEEN 140 AND 600 KEV, ELECTRONS ABOVE 0.7, 1.55, AND 3.9 MEV, PROTONS IN THE INTERVALS 2.12-26, 20-52, 40-90, 58-68, 85-96, 58-96, 86-109, 58-108, AND 86-13220-52, AND 40-90 MEV AND ALPHA PARTICLES IN THE INTERVALS 9.4-21232-265 AND 344-37021.2, AND 46-100 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, ROGERS----------

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCE

NSSDC ID- 74-039A-23 INVESTIGATIVE PROGRAM
CODE EC

INVESTIGATION DISCIPLINE(S)
TECHNOLOGY

PERSONNEL
PI - J.F. ROGERS NASA-GSFC

BRIEF DESCRIPTION
THE QUARTZ CRYSTAL MICROBALANCE CONTAMINATION MONITOR SEARCHED FOR POSSIBLE SPACECRAFT CONTAMINANTS. THE INSTRUMENT USED WAS A QUARTZ CRYSTAL MICROBALANCE THAT MEASURES EXTREMELY SMALL MASS ACCRETIONS. THE SENSOR WAS MOUNTED ON A FACE WHICH VIEWS SPACE, AND RAN AT TEMPERATURES NEAR 200 K. SOURCES OF POSSIBLE CONTAMINANTS ON THE SPACECRAFT, IN ADDITION TO GENERAL OUTGASSING, INCLUDED THE EJECTA FROM THE SPACECRAFT PROPULSION SUBSYSTEMS AND PROPULSION EXPERIMENT. THE EXPERIMENT FLIGHT HARDWARE CONSISTED OF TWO PARTS -- A SENSOR ASSEMBLY MOUNTED EXTERNALLY ON THE NORTH FACE OF THE EARTH-VIEWING MODULE, AND THE ELECTRONIC UNIT MOUNTED INTERNALLY ON THE SAME FACE. THE SENSOR ASSEMBLY CONTAINED THE SENSING AND REFERENCE OSCILLATING QUARTZ CRYSTALS, HEATERS, AND THE ELECTRONIC DRIVING CIRCUITRY FOR THE CRYSTALS. THE DESIGN GOAL TEMPERATURE OF 200 K FOR THE CRYSTALS WAS OBTAINED BY USING OPTICAL SOLAR REFLECTORS FOR EXTERNAL THERMAL CONTROL, AND THERMAL INSULATORS FOR MOUNTING STRUCTURES. THE ELECTRONIC UNIT CONTAINED THE SIGNAL PROCESSING, TEMPERATURE CONTROL, AND COMMAND CIRCUITRY.

------- 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.

------- ATS 6, WINCKLER----------

INVESTIGATION NAME- PARTICLE ACCELERATION MECHANISMS AND DYNAMICS OF THE OUTER TRAPPING REGION

NSSDC ID- 74-039A-04 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.R. WINCKLER U OF MINNESOTA
OI - G.K. PARKS U OF WASHINGTON

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF TWO, NEARLY IDENTICAL DETECTOR ASSEMBLIES TO INVESTIGATE THE ORIGIN AND DYNAMICS OF ENERGETIC ELECTRONS AND PROTONS IN THE OUTER RADIATION BELT AND THE NEAR-EARTH PLASMA SHEET. EACH OF THE DETECTOR ASSEMBLIES WAS A MAGNETIC SPECTROMETER CONTAINING FOUR GOLD-SILICON SURFACE BARRIER DETECTORS. ELECTRONS WERE DEFLECTED INTO TWO OF THESE DETECTORS DEPENDING ON THEIR MOMENTUM. MORE ENERGETIC ELECTRONS, AND PROTONS, MOVED DIRECTLY THROUGH THE 10 DEG ANGULAR APERTURE TO A TWO-DETECTOR TELESCOPE IN WHICH THE FRONT DETECTOR MEASURES PROTONS AND THE REAR DETECTOR SENSED HIGHER ENERGY PROTONS. USING PULSE HEIGHT ANALYSIS, THE FOLLOWING NOMINAL RANGES OF PARTICLES WERE MEASURED -- PROTONS, 30-50 KEV, 50-160 KEV, AND 120-514 KEV; ELECTRONS, 30-50 KEV, 150-214 KEV, AND .GT. 500 KEV. ONE DETECTOR ASSEMBLY WAS MOUNTED IN A FIXED POSITION AND THE OTHER WAS ROTATED THROUGH A 180 DEG RANGE. DATA WERE TRANSMITTED FROM THE EXPERIMENT AS HIGH AS EIGHT MEASUREMENTS PER S. THE 150-214 KEV ELECTRON CHANNEL PROVIDED NO DATA FOR THE WHOLE MISSION. HIGHER THAN ANTICIPATED TEMPERATURES CAUSED THE PROTON DETECTOR IN THE FIXED SPECTROMETER TO FAIL ABOUT 9 MONTHS AFTER LAUNCH. IN ADDITION, THE LOWER THRESHOLD CHANNELS COULD ONLY BE OPERATED DURING COOLER PERIODS AS THE MISSION PROGRESSED. THE EXPERIMENT FAILED IN JANUARY 1977, AND NO FURTHER DATA WERE OBTAINED. ADDITIONAL DETAILS ON THIS EXPERIMENT MAY BE FOUND ON PP 1131-1137 IN 'IEEE TRANS. AEROSPACE AND ELECTRONIC SYSTEMS,' AES 11, 6, NOVEMBER 1975.

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

SPACECRAFT COMMON NAME- BE-C
ALTERNATE NAMES- EXPLORER 27, S 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 APOAPSIS- 1320. KM

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

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 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 ESE

INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - J.M. BERBERT 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 40 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

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

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, 350-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 9480 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.

------- 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 T2 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 (B1) 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 (B2) 10 MM THICK. THE PRIMARY OBJECTIVES OF THE TT WERE TO DEFINE THE FIELD OF VIEW, TO DETECT THE DOWNWARD-MOVING ELECTRONS, AND TO PROVIDE THE FAST TRIGGER TO DISCHARGE THE SC. IT WAS POSSIBLE TO RESTRICT THE FIELD OF VIEW OF THE INSTRUMENT BY THE DIVISION OF THE C AND B2 COUNTERS INTO QUADRANTS, WHICH WERE VIEWED BY PMT OUTSIDE THE FIELD OF VIEW. THE PMT OUTPUTS WERE PULSE-HEIGHT ANALYSED TO PROVIDE INFORMATION ON THE NUMBERS OF PARTICLES LEAVING THE SC AND ENTERING THE CALORIMETER, E. THE E UNIT WAS A SINGLE CRYSTAL OF CESIUM IODIDE, 4.5 RADIATION LENGTHS THICK, IN WHICH THE E-P PAIR INITIATED AN ELECTRON-PHOTON CASCADE THAT WAS COMPLETELY ABSORBED AT LOW ENERGIES. AT HIGHER ENERGIES THE CASCADE PENETRATED TO THE FINAL PLASTIC SCINTILLATOR COUNTER, 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.

********** D2B**********

SPACECRAFT COMMON NAME- D2B
ALTERNATE NAMES- ASTRONOMY SATELLITE D2B

NSSDC ID- 75-092A

LAUNCH DATE- 09/27/75
LAUNCH SITE- KOUROU (CENTRE SPATIAL GUYANAIS), FRANCE
LAUNCH VEHICLE- DIAMANT
WEIGHT- 115. KG

SPONSORING COUNTRY/AGENCY
FRANCE CNRS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.5 MIN
PERIAPSIS- 477. KM
EPOCH DATE- 09/28/75
INCLINATION- 37.1 DEG
APOAPSIS- 707. KM

PERSONNEL
MG - UNKNOWN UNKNOWN
SC - UNKNOWN UNKNOWN
PM - D. SACOTTE CNES
PS - UNKNOWN UNKNOWN

BRIEF DESCRIPTION
THIS SPACECRAFT CARRIED AN EUV EXPERIMENT FOR SOLAR AND ATMOSPHERIC INVESTIGATIONS AND A SET OF UV EXPERIMENTS FOR MAKING STELLAR, ZODIACAL LIGHT, AND INTEGRATED SKY BACKGROUND AND STELLAR OBSERVATIONS. THE SPACECRAFT WAS SPINNING AT ABOUT 0.25 RPM ABOUT AN AXIS THAT WAS DIRECTED TOWARD THE SUN. THE DATA TRANSMISSION RATE WAS 256 B/S FOR REAL-TIME DATA AND 11 KB/S FOR STORED DATA AT A TELEMETRY FREQUENCY OF 136.740 MHZ. THE MEMORY CAPACITY WAS 1.6 MB. THE CYLINDRICALLY SHAPED SATELLITE HAD A DIA. OF 0.8 M AND A HEIGHT OF 0.7 M AND WEIGHED 106.6 KG. FOUR SOLAR PANELS SITUATED PERPENDICULAR TO THE CYLINDRICAL AXIS PROVIDED POWER FOR THE MISSION. THE STABILIZATION SYSTEM FAILED ON DECEMBER 28, 1976, THEREBY TERMINATING OPERATION OF THE SPACECRAFT.

------- D2B, CRUVELIER----------

INVESTIGATION NAME- SOLAR FLUX MONITOR, FLARE EVOLUTION (174 TO 1315 A)

NSSDC ID- 75-092A-02
INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - P. CRUVELIER CNRS-LAS

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTED OF A SPECTROHELIOMETER COVERING THE WAVELENGTH RANGE FROM 1216 TO 3100 A WITH A RESOLUTION OF 2.75 A. THE TIME RESOLUTION FOR DATA COLLECTION WAS 1 S. THE INSTRUMENT MEASURED THE INTEGRATED LIGHT DUE TO THE SKY BACKGROUND AT 90 DEG TO THE SATELLITE-SUN DIRECTION. THE FIELD OF VIEW WAS 1.3 DEG.

------- D2B, CRUVELIER----------

INVESTIGATION NAME- ATMOSPHERIC COMPOSITION BY SOLAR ABSORBTION (177 TO 1216 A)

NSSDC ID- 75-092A-03
INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - P. CRUVELIER CNRS-LAS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE STELLAR UV RADIATION IN THE ANTISOLAR DIRECTION WITH A LOW SPECTRAL RESOLUTION (ABOUT 400 A) BETWEEN 792 AND 3075 A. THE SENSITIVITY OF THE INSTRUMENT ALLOWED DETECTION OF BO TYPE STARS DOWN TO 8TH MAGNITUDE. IN ADDITION, A UBV PHOTOMETER MEASURED THE RADIATION FROM THE STARS AND THE SKY BACKGROUND.

------- D2B, DE LABOUDINIERE----------

INVESTIGATION NAME- SOLAR ACTIVITY STUDY (174 TO 1315 A)

NSSDC ID- 75-092A-01

INVESTIGATIVE PROGRAM
PHYSICS AND ASTRONOMY

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - J.P. DE LABOUDINIERE CNRS-LPSP

BRIEF DESCRIPTION
THIS EXPERIMENT USED TWO SPECTROMETERS TO OBSERVE THE SOLAR DISK AT 17 DIFFERENT, DISCRETE WAVELENGTHS BETWEEN 174 AND 1315 A (SPECTRAL RESOLUTION WAS 10 A) AND DETERMINED ATMOSPHERIC ABSORPTION AT SUNRISE AND SUNSET FOR 11 DISCRETE WAVELENGTHS BETWEEN 177 AND 1216 A. THE ABSORPTION MEASUREMENTS YIELDED INFORMATION ON THE COMPOSITION OF THE UPPER ATMOSPHERE AS A FUNCTION OF SOLAR EUV OUTPUT. THE SPATIAL RESOLUTION WAS OF THE ORDER OF 1 MIN OF ARC.

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

SPACECRAFT COMMON NAME- D5-B
ALTERNATE NAMES- CASTOR, D7802

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

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. THE EXPECTED LIFETIME IS 8 MONTHS.

------- 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 SC 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- GRAVITY FIELD PERTURBATIONS STUDY

NSSDC ID- 75-039B-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - F.E. BARLIER CERGA
OI - G. BALMINO CNES

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO STUDY GRAVITY FIELD PERTURBATIONS USING ACCURATE LASER TRACKING AND ELIMINATING THE ATMOSPHERIC DRAG PERTURBATION FROM THE ORBIT CALCULATIONS.

------- 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(74-063A)**********

SPACECRAFT COMMON NAME- DMSP(74-063A)
ALTERNATE NAMES- DAPP(74-063A), DSAP(74-063A)
DMSP 9532, D7411

NSSDC ID- 74-063A

LAUNCH DATE- 08/09/74 WEIGHT- 195. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- THOR

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.7 MIN EPOCH DATE- 08/10/74
PERIAPSIS- 803.0 KM INCLINATION- 98.9 DEG
APOAPSIS- 872.0 KM

PERSONNEL
PM - UNKNOWN US AIR FORCE

BRIEF DESCRIPTION
DMSP (74-063A), ALSO KNOWN AS DMSP 9532, WAS ONE OF A SERIES OF METEOROLOGICAL SATELLITES DEVELOPED AND OPERATED BY THE AIR FORCE UNDER THE DEFENSE METEOROLOGICAL SATELLITE PROGRAM. THIS PROGRAM, PREVIOUSLY KNOWN AS DATA ACQUISITION AND PROCESSING PROGRAM (DAPP), WAS CLASSIFIED UNTIL MARCH 1973. THE OBJECTIVE OF THIS PROGRAM WAS TO PROVIDE GLOBAL VISUAL AND INFRARED (IR) CLOUDCOVER DATA AND SPECIALIZED ENVIRONMENTAL DATA TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS. OPERATIONALLY, THE PROGRAM CONSISTED OF TWO SATELLITES IN 830 KM SUN-SYNCHRONOUS POLAR ORBITS, WITH THE ASCENDING NODE OF ONE SATELLITE NEAR THE SUNRISE TERMINATOR AND THE OTHER NEAR LOCAL NOON. THE SATELLITE, SHAPED LIKE THE FRUSTUM OF A POLYHEDRON, CONSISTED OF FOUR SUBASSEMBLIES -- (1) A SOLAR ARRAY HAT, (2) A BASE-PLATE ASSEMBLY, (3) A SENSOR AEROSPACE VEHICLE ELECTRONICS (AVE) PACKAGE (SAP), AND (4) A DATA PROCESSING SYSTEM. THE PRIMARY SENSOR (SAP) WAS A FOUR CHANNEL SCANNING RADIOMETER. SECONDARY SENSORS INCLUDED A VERTICAL TEMPERATURE PROFILE RADIOMETER (SUPPLEMENTARY SENSOR E - SSE) AND AN ELECTRON SPECTROGRAPH (SUPPLEMENTARY SENSOR J/2 - SSJ/2), WHICH WERE MOUNTED, ALONG WITH THE PRIMARY SENSOR, ON THE BASE-PLATE ASSEMBLY. SPACECRAFT STABILIZATION WAS CONTROLLED BY A COMBINATION FLYWHEEL AND MAGNETIC CONTROL COIL SYSTEM SO THAT THE SENSORS WERE MAINTAINED IN THE DESIRED EARTH-LOOKING MODE. THE DATA PROCESSING SYSTEM INCLUDED THREE TAPE RECORDERS CAPABLE OF STORING A TOTAL OF 440 MIN OF DATA, WHICH ALLOWED FULL GLOBAL COVERAGE TWICE DAILY. EITHER RECORDED OR REAL-TIME DATA WERE TRANSMITTED TO GROUND RECEIVING SITES VIA AN S-BAND TRANSMITTER. RECORDED DATA WERE READ OUT TO TRACKING SITES LOCATED AT FAIRCHILD AFB, WA, AND LORING AFB, ME, AND RELAYED TO AIR FORCE GLOBAL WEATHER CENTRAL, OFFUTT AFB, NE. REAL-TIME DATA WERE READ OUT AT MOBILE TACTICAL SITES LOCATED AROUND THE WORLD.

------- DMSP(74-063A), AFGWC STAFF----------

INVESTIGATION NAME- SCANNING RADIOMETER

NSSDC ID- 74-063A-01

INVESTIGATIVE PROGRAM
OPERATIONAL MET SYSTEM

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
THE FOUR-CHANNEL SCANNING RADIOMETER, DESIGNATED THE SENSOR AVE (AEROSPACE VEHICLE ELECTRONICS) PACKAGE (SAP), WAS THE PRIMARY EXPERIMENT ON THE DMSP SPACECRAFT. THE PURPOSE OF THIS EXPERIMENT WAS TO PROVIDE GLOBAL, DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND CLOUD TEMPERATURE MEASUREMENTS TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS FOR OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE RADIOMETER OPERATED IN TWO SPECTRAL INTERVALS -- (1) VISIBLE AND NEAR INFRARED (0.4 TO 1.1

MICROMETERS) AND (2) INFRARED (8 TO 13 MICROMETERS). THE FOUR-CHANNEL RADIOMETER WAS ESSENTIALLY TWO SCANNING RADIOMETERS DRIVEN BY A COMMON MOTOR. ONE RADIOMETER PRODUCED HIGH RESOLUTION (HR) VISUAL AND INFRARED (IR) DATA WITH NADIR RESOLUTIONS OF 3.7 AND 4.4 KM, RESPECTIVELY. THE OTHER RADIOMETER PRODUCED VERY HIGH RESOLUTION (VHR) VISUAL AND INFRARED (WHR) DATA WITH NADIR RESOLUTIONS OF .63 AND .67 KM, RESPECTIVELY. ONBOARD RECORDERS HAD A STORAGE CAPACITY OF 210 MIN OF BOTH HR AND IR DATA AND A TOTAL OF 20 MIN OF VHR AND WHR DATA. FOR DIRECT READOUT TO TACTICAL SITES, THE EXPERIMENT WAS PROGRAMMED SO THAT VHR AND IR DATA WERE OBTAINED DURING THE DAYTIME AND HR AND WHR DATA WERE OBTAINED AT NIGHT. THE INFRARED CHANNELS (WHR AND IR) COVERED A TEMPERATURE RANGE OF 210 TO 310 K WITH AN ACCURACY OF 1 DEG C. ELECTRONIC CIRCUITRY IN THE SENSOR CONVERTED THE SENSED INFRARED ENERGY DIRECTLY INTO EQUIVALENT BLACK BODY TEMPERATURE (AS OPPOSED TO RADIANCE) PRIOR TO TRANSMISSION TO GROUND SITES. THE HR CHANNEL INCLUDED A ZERO RESOLUTION SENSOR WHICH MEASURED SOLAR INPUT AND WAS USED TO CONTROL CHANNEL GAIN, THEREBY PRODUCING AN OUTPUT SIGNAL THAT REPRESENTS SCENE ALBEDO. THIS FEATURE ALSO MADE IT POSSIBLE TO OBTAIN USEFUL VISUAL DATA AT NIGHT. THE SENSOR INCORPORATED SUNSHADES AND GLARE SUPPRESSION DEVICES IN CONJUNCTION WITH A LONG-SCAN AUTOMATIC GAIN CONTROL WHICH ALLOWED THE HR CHANNEL TO PROVIDE USABLE DATA THROUGH THE DAY/NIGHT TERMINATOR. IDENTICAL EXPERIMENTS WERE FLOWN ON ALL DMSP BLOCK 5 SPACECRAFT.

-------- DMSP(74-063A), AFGWC STAFF----------

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER

NSSDC ID- 74-063A-02

INVESTIGATIVE PROGRAM
EARTH OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SUPPLEMENTARY SENSOR E (SSE) WAS A VERTICAL TEMPERATURE PROFILE RADIOMETER. THE OBJECTIVE OF THIS EXPERIMENT WAS TO OBTAIN VERTICAL TEMPERATURE AND WATER VAPOR PROFILES OF THE ATMOSPHERE TO SUPPORT DEPARTMENT OF DEFENSE REQUIREMENTS IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE SSE WAS AN EIGHT-CHANNEL SENSOR WITH SIX CHANNELS (668.5, 677, 695, 708, 725, AND 747 CM-1) IN THE CO2 15-MICROMETER ABSORPTION BAND, ONE CHANNEL (535 CM-1) IN A WATER VAPOR ABSORPTION BAND, AND ONE CHANNEL (835 CM-1) IN THE 11-MICROMETER ATMOSPHERIC WINDOW.
THE EXPERIMENT CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE SCANNING MIRROR STEPPED ACROSS THE SATELLITE SUBTRACK, ALLOWING THE SSE TO VIEW 25 SEPARATE COLUMNS OF THE ATMOSPHERE EVERY 32 S OVER A CROSS TRACK GROUND SWATH OF 185 KM. WHILE THE SCANNING MIRROR WAS STOPPED AT A SCENE STATION, THE CHANNEL FILTERS WERE TOTALED THROUGH THE FIELD OF VIEW. THE SURFACE RESOLUTION OF THE SSE WAS APPROXIMATELY 37 KM AT NADIR. THE CO2 BAND RADIATION DATA WERE TRANSFORMED TO A TEMPERATURE PROFILE BY A MATHEMATICAL INVERSION TECHNIQUE. BY A SIMILAR TECHNIQUE, THIS INFORMATION COULD BE COMBINED WITH WATER VAPOR BAND DATA TO OBTAIN A WATER VAPOR PROFILE. IDENTICAL EXPERIMENTS HAVE BEEN FLOWN ON ALL DMSP SPACECRAFT LAUNCHED SINCE 1972.

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

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

NSSDC ID- 76-091A

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

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

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

PERSONNEL
PM - W.D. MYER USAF-SAMSO

BRIEF DESCRIPTION
DMSP5D1, ALSO KNOWN AS DMSP BLOCK 5D, IS ONE OF A SERIES OF METEOROLOGICAL SATELLITE 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. A NEW 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 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 BLOCK 5D SATELLITE CAN BE FOUND IN 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 MET SYSTEM

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
SUPPLEMENTARY SENSOR H (SSH)

NSSDC ID- 76-091A-02

INVESTIGATIVE PROGRAM
OPERATIONAL MET SYSTEM

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SUPPLEMENTARY 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 NADIR. 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
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.B.	BLAKE	AEROSPACE CORP
OI - S.J.	IMAMOTO	AEROSPACE CORP
OI - N.	KATZ	AEROSPACE CORP
OI - W.A.	KOLASINSKI	AEROSPACE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THE GFE-3R DOSIMETER WAS TO MEASURE THE RADIATION DOSE IN SILICON UNDER ALUMINUM SHIELDING OF FOUR THICKNESSES REPRESENTATIVE OF BLOCK 5D 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 5.5E5 RADS. ADDITIONAL INFORMATION CAN BE OBTAINED FROM AEROSPACE CORPORATION PUBLICATION NUMBER TOR-0077(2630)-1, JUNE 1977.

********** DMSP-F2**********

SPACECRAFT COMMON NAME- DMSP-F2
ALTERNATE NAMES-

NSSDC ID- 77-044A

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

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

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

PERSONNEL
PM - W.D. MYER USAF-SAMSO

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-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. A NEW 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 MET SYSTEM

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-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
SUPPLEMENTARY SENSOR H (SSH)

NSSDC ID- 77-044A-02

INVESTIGATIVE PROGRAM
OPERATIONAL MET SYSTEM

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - AFGWC STAFF GLOBAL WEATHER CTR

BRIEF DESCRIPTION
SUPPLEMENTARY 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.

********** ESA GEOS **********

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

NSSDC ID- 77-029A

LAUNCH DATE- 04/20/77 WEIGHT- 260. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

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

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, COMMENSURATE, 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 ANTARTICA. 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 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. 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, BEGHIN-------

INVESTIGATION NAME- WAVE FIELD IMPEDANCE

NSSDC ID- 77-029A-11

INVESTIGATIVE PROGRAM
SCIENCE

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 SWEPT-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, GEISS-------

INVESTIGATION NAME- LOW-ENERGY ION COMPOSITION

NSSDC ID- 77-029A-03

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J. GEISS U OF BERNE
PI - H.R. ROSENBAUER MPI-EXTRATERR PHYS
OI - P.W. EBERHARDT U OF BERNE
OI - H. BALSIGER U OF BERNE
OI - P. HIRT U OF BERNE
OI - A. GHIELMETTI U OF BERNE
OI - H. LOIDL 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 MODE 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 ESAGEOS 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, GENDRIN-------

INVESTIGATION NAME- MAGNETIC WAVE FIELDS

NSSDC ID- 77-029A-06

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - R.E. GENDRIN CNET
OI - J.M. ETCHETO IONOSPHERIC RES GROUP
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 E 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 SWEPT-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 77-0..A-07 (PEDERSEN) AND -10 (LUNGSTRUP), 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, HULTQVIST----------

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

NSSDC ID- 77-029A-04

INVESTIGATIVE PROGRAM
SCIENCE

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 COMPLIMENTARY 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 GROUND STATION ANTENNA AT MICHELSTADT, FEDERAL REPUBLIC OF GERMANY, BUT NOT FOR THE OTHER DAILY APOGEE OVER THE PACIFIC OCEAN.

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

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 77-029A-09

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - F.	MARIANI	CNR, SPACE PLASMA LAB
OI - M.	CANDIDI	NATL RES COUNC ITALY
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, MELZNER----------

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

NSSDC ID- 77-029A-08

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

THE PRIME OBJECTIVE OF THIS EXPERIMENT (ESA EXPERIMENT NO. S-329) WAS THE MEASUREMENT OF THE DC ELECTRIC FIELD IN THE PLANE PERPENDICULAR TO THE LOCAL MAGNETIC FIELD (B). THE EXPERIMENT ALSO MEASURED 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 MAGNETICALLS TO THE AURORAL ZONES COULD BE ACHIEVED, AS WELL AS DETERMINING PLASMA CONVECTION AND PARTICLE FLOW WITHIN THE PLASMA SHEET. THE INSTRUMENT CONSISTED OF FOUR ELECTRON GUNS SPACED LOGARITHMICALLY FROM THE ELECTRON DETECTOR. TWO OF THE GUNS WERE MOUNTED ON ONE OF THE 3-M RADIAL BOOMS. THE GUNS WERE USED ONE A. A TIME TO GENERATE AN ELECTRON BEAM OF ABOUT 1.E-8 AMPS AND ENERGY ABOUT 1 KEV. BOTH PARAMETERS WERE VARIED BY TELECOMMAND. DEFLECTION PLATES ASSOCIATED WITH EACH GUN RECEIVED A SINUSOIDAL SIGNAL FROM THE MAGNETOMETER EXPERIMENT TO INSURE THAT THE BEAM WAS ALWAYS AT RIGHT ANGLES TO B, IN SPITE OF THE ANGLE OF THE SPIN VECTOR TO B. THE ELECTRON DETECTOR CONSISTED OF DEFLECTION PLATES THAT REMOVED THE ELEVATION CORRECTION GIVEN TO THE BEAM BY THE MAGNETOMETER SIGNAL, A CURVED PLATE ENERGY FILTER, AND A PHOTOMULTIPLIER TUBE. SINCE THE MAXIMUM DISPLACEMENT WOULD OCCUR WHEN THE BEAM MADE AN ANGLE OF 0 OR 180 DEG TO THE ELECTRIC FIELD, ALL POSSIBLE DISPLACEMENTS LESS THAN THIS WOULD OCCUR TWICE DURING A SPIN PERIOD. CONSEQUENTLY, THE BEAM WOULD SWEEP ACROSS THE DETECTOR TWICE PER SPIN PERIOD PROVIDED THE MAXIMUM DISPLACEMENT WAS LESS THAN THE DISTANCE BETWEEN THE GUN AND THE DETECTOR. THE VALUES OF THE SPIN ANGLE AT WHICH THE BEAM WAS DETECTED AFTER ONE GYRATION, AND THE DISTANCE BETWEEN THE GUN AND RECEIVER, ALLOWED THE DETERMINATION OF THE ELECTRIC FIELD. A POSSIBLE CONTRIBUTION FROM THE GRADIENT OF B COULD BE DETERMINED BY VARYING THE ENERGY OF THE BEAM. THE EXPERIMENT RELIED ENTIRELY ON REAL-TIME CONTROL BY A GROUND-BASED COMPUTER. IT HAD FOUR BASIC MODES OF OPERATION: A SEARCH MODE, AN ADJUSTMENT MODE, AN OPTIMIZATION MODE, AND A NORMAL MODE. THE SEARCH MODE WAS DESIGNED TO FIND THE SIGNAL AT NOMINAL BEAM PARAMETERS. IF THIS WAS NOT ACHIEVED, THE ADJUSTMENT MODE WAS USED TO VARY THESE PARAMETERS SYSTEMATICALLY. ONCE THE BEAM WAS DETECTED, THE OPTIMIZATION MODE DETERMINED THE BEST COMPROMISE BETWEEN BEAM CURRENT AND RECEIVED SIGNAL QUALITY. THEN THE NORMAL MODE STARTED, WHICH CONSISTED OF A CONTINUOUS MEASUREMENT OF THE ELECTRIC FIELD AND THE GRADIENT OF B, USING THE MOST APPROPRIATE OF THE 4 GUNS. UNFORTUNATELY, THE THREE INNERMOST GUNS CEASED OPERATION EARLY IN THE LIFE OF THE EXPERIMENT, SO ONLY THE MORE INTENSE ELECTRIC FIELDS COULD BE STUDIED.

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

INVESTIGATION NAME- DC FIELDS BY DOUBLE PROBE

NSSDC ID- 77-029A-07

INVESTIGATIVE PROGRAM
SCIENCE

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 - [illegible]	GHARD	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 EXPRESSED 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 AS A DIFFERENTIAL OUTPUT FROM THE TWO SPHERES WAS COMPRESSED LOGARITHMICALLY. IN ADDITION, THE TWO OUTPUTS WERE PASSED THROUGH 45 HZ TO 77 KHZ

FILTERS. THESE FILTERED SIGNALS WERE DIFFERENCED AND ALL THREE SIGNALS MADE AVAILABLE FOR ANALYSIS BY THE SWEPT-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, PETIT----------

INVESTIGATION NAME- VLF PLASMA RESONANCES

NSSDC ID- 77-029A-05

INVESTIGATIVE PROGRAM
SCIENCE

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 SWEPT-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, UNGSTRUP----------

INVESTIGATION NAME- ELECTRIC WAVE FIELDS

NSSDC ID- 77-029A-10

INVESTIGATIVE PROGRAM
SCIENCE

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 SWEPT-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, WILKEN----------

INVESTIGATION NAME- ELECTRON AND PROTON PITCH ANGLE DISTRIBUTION

NSSDC ID- 77-029A-01

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - B. WILKEN MPI-AERONOMY
CI - G. PFOTZER(RETIRED) MPI-AERONOMY
CI - E. KEPPLER MPI-AERONOMY
CI - A. KORTH MPI-AERONOMY
CI - 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 COMPLIMENTARY 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, WRENN----------

INVESTIGATION NAME- THERMAL PLASMA FLOW

NSSDC ID- 77-029A-02

INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

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

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 100 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.

********** ESSA 8**********

SPACECRAFT COMMON NAME- ESSA 8
ALTERNATE NAMES- PL-691A, TOS-F
03615

NSSDC ID- 68-114A

LAUNCH DATE- 12/15/68 WEIGHT- 297. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES ESSA

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/28/77
ORBIT PERIOD- 114.6 MIN INCLINATION- 101.4 DEG
PERIAPSIS- 1416. KM APOAPSIS- 1465. KM

PERSONNEL
PM - W.W. JONES NASA-GSFC

BRIEF DESCRIPTION
ESSA 8 WAS A SUN-SYNCHRONOUS OPERATIONAL METEOROLOGICAL SATELLITE DESIGNED TO PROVIDE REAL-TIME EARTH CLOUDCOVER TV PICTURES TO PROPERLY EQUIP GROUND RECEIVING STATIONS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE SATELLITE HAD ESSENTIALLY THE SAME CONFIGURATION AS THAT OF A TIROS SPACECRAFT, I.E., AN 18-SIDED RIGHT PRISM, 107 CM ACROSS OPPOSITE CORNERS AND 56 CM HIGH, WITH A REINFORCED BASEPLATE CARRYING MOST OF THE SUBSYSTEMS AND A COVER ASSEMBLY (HAT). ELECTRICAL POWER WAS PROVIDED BY APPROXIMATELY 10,000 1- BY 2-CM SOLAR CELLS THAT WERE MOUNTED ON THE COVER ASSEMBLY AND BY 21 NICKEL-CADMIUM BATTERIES. TWO REDUNDANT WIDE-ANGLE AUTOMATIC PICTURE TRANSMISSION (APT) CAMERAS WERE MOUNTED ON OPPOSITE SIDES OF THE SPACECRAFT WITH THEIR OPTICAL AXES PERPENDICULAR TO THE SPIN AXIS. PROJECTING DOWNWARD FROM THE BASEPLATE WERE A PAIR OF CROSSED-DIPOLE COMMAND RECEPTION ANTENNAS. A MONOPOLE TELEMETRY (136.500 MHZ) AND TRACKING (.36.770 MHZ) ANTENNA EXTENDED OUTWARD FROM THE TOP OF THE COVER ASSEMBLY. THE SATELLITE SPIN RATE WAS CONTROLLED BY MEANS OF A MAGNETIC ATTITUDE SPIN COIL (MASC), WITH THE SPIN AXIS MAINTAINED NORMAL TO THE ORBITAL PLANE (CARTWHEEL ORBIT MODE) TO WITHIN PLUS OR MINUS 1 DEG. THE MASC WAS A CURRENT-CARRYING COIL MOUNTED IN THE COVER ASSEMBLY. THE MAGNETIC FIELD INDUCED BY THE CURRENT INTERACTED WITH THE EARTH'S MAGNETIC FIELD TO PROVIDE THE TORQUE NECESSARY TO MAINTAIN A DESIRED SPIN RATE OF 10.9 RPM.

------- ESSA 8, NESS STAFF-------

INVESTIGATION NAME- AUTOMATIC PICTURE TRANSMISSION (APT) SYSTEM

NSSDC ID- 68-114A-01

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE ESSA 8 AUTOMATIC PICTURE TRANSMISSION (APT) SUBSYSTEM WAS A CAMERA AND TRANSMITTER COMBINATION DESIGNED TO TRANSMIT REAL-TIME, DAYLIGHT, SLOW-SCAN TELEVISION PICTURES OF CLOUDCOVER TO ANY PROPERLY EQUIPPED GROUND RECEIVING STATIONS. THE CAMERA SYSTEM CONSISTED OF TWO REDUNDANT APT CAMERAS WITH 2.54-CM-DIAM VIDICONS. EACH CAMERA HAD A 108-DEG WIDE-ANGLE F/1.8 OBJECTIVE LENS WITH A FOCAL LENGTH OF 5.7 MM. THE CAMERAS WERE MOUNTED 180 DEG APART ON THE SIDE OF THE SPACECRAFT, WITH THEIR OPTICAL AXES PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. THE CAMERAS WERE PROGRAMMED TO TAKE FOUR OR EIGHT APT PICTURES PER ORBIT. THE ACTUAL PICTURE TAKING REQUIRED 8 S AND THE TRANSMISSION 200 S. EARTH-CLOUD IMAGES WERE RETAINED ON THE PHOTOSENSITIVE SURFACE OF THE VIDICON AND WERE READ OUT AT FOUR LINES PER S TO PRODUCE AN 800-LINE PICTURE. TWO 5-W TV TRANSMITTERS (137.5 MHZ) RELAYED THE PICTURES TO LOCAL APT STATIONS WITHIN COMMUNICATION RANGE. THE FACEPLATE OF THE VIDICON HAD RETICLE MARKS THAT APPEARED ON THE PICTURE FORMAT TO AID IN RELATING THE PICTURE TO ITS GEOGRAPHICAL POSITION ON THE EARTH'S SURFACE. AT NOMINAL SATELLITE ATTITUDE AND ALTITUDE (APPROXIMATELY 1450 KM), A PICTURE COVERED A 3100- BY 3100-KM SQUARE WITH A HORIZONTAL RESOLUTION OF ABOUT 4 KM AT NADIR. THERE WAS A 30 PERCENT OVERLAP BETWEEN PICTURES ALONG THE TRACK TO INSURE COMPLETE COVERAGE. IDENTICAL EXPERIMENTS WERE FLOWN ON ESSA 2, 4, 6. APT DATA ARE PRIMARILY INTENDED FOR OPERATIONAL USE WITHIN THE LOCAL APT ACQUISITION STATION. HOWEVER, COPIES OF PICTURES TAKEN OVER THE UNITED STATES ARE MAINTAINED ON FILE AT NOAA-NESS, SUITLAND, MARYLAND.

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

SPACECRAFT COMMON NAME- GEOS 2
ALTERNATE NAMES- GEOS-B, EXPLORER 36
03093

NSSDC ID- 68-002A

LAUNCH DATE- 01/11/68 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- 1083. KM APOAPSIS- 1577. KM

PERSONNEL
PM - J.D. ROSENBERG NASA HEADQUARTERS
PS - N.G. ROMAN NASA HEADQUARTERS

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 ESE

INVESTIGATION DISCIPLINE(S)
GEODESY

PERSONNEL
PI - H.H. PLOTKIN 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 AFCRL, 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/10/75
ORBIT PERIOD- 101.82 MIN INCLINATION- 114.96 DEG
PERIAPSIS- 839. KM APOAPSIS- 853. KM

PERSONNEL
MG - C.J. FINLEY NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PM - NONE ASSIGNED
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. [illegible]SIVE 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 ESE/CO-OP

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

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

INVESTIGATION NAME- RADAR ALTIMETER SYSTEM

NSSDC ID- 75-027A-01

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
NAVIGATION
GEODESY

PERSONNEL
PI - C.L. PURDY NASA-WFC

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

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

INVESTIGATION NAME- S-BAND TRACKING SYSTEM

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 WAS TO OPERATE IN THE FOLLOWING THREE MODES -- (1) SATELLITE-TO-SATELLITE TRACKING (SST) FROM THE ROSMAN OR EUROPEAN ATS GROUND STATIONS THROUGH ATS 6 TO GEOS 3 AND BACK, (2) DIRECT USB (DOPPLER ONLY) GROUND STATION TRACKING OF GEOS 3, AFTER THE USB GROUND STATIONS ARE MODIFIED, AND (3) DIRECT GRARR GROUND STATION TRACKING OF GEOS 3. THE TRANSPONDER SUBSYSTEM CONSISTED OF A SINGLE-CHANNEL TRANSPONDER, A POWER AMPLIFIER, A DIPLEXER, AND AN EARTH-VIEWING AND ATS-VIEWING ANTENNA SYSTEM. THE ANTENNAS WERE SELECTABLE BY GROUND COMMAND. THE EARTH-VIEWING ANTENNA FOR DIRECT TRACKING WITH THE USB AND GRARR GROUND STATIONS HAD 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 1-DB GAIN IN THE DIRECTION OF ATS FOR GEOS ASCENDING AND DESCENDING NODE PASSES, WHICH CROSSED THE EQUATOR WITHIN PLUS OR MINUS 26 DEGREES OF THE ATS SUBSATELLITE POINT. IN THE SST OPERATION MODE, THE INTERROGATION SIGNAL WAS FIRST TRANSMITTED AT C-BAND BY THE ATS GROUND STATION TO THE ATS 6 SPACECRAFT. ATS SPACECRAFT INSTRUMENTATION COHERENTLY ALTERED THE SIGNAL, MAKING IT COMPATIBLE WITH THE INPUT FREQUENCY (2069.1125 MHZ) OF THE S-BAND TRANSPONDER ON GEOS 3, AND TRANSMITTED THE SIGNAL TO GEOS 3. GEOS 3 THEN, AFTER TRANSLATING THE RECEIVED SIGNAL, RETRANSMITTED IT TO ATS 6 AS IF ATS 6 WERE ANOTHER GROUND STATION. ATS 6 THEN RETRANSMITTED THE SIGNAL TO THE ATS GROUND STATION AT C-BAND. RANGE SUM AND RANGE-RATE SUM WERE OBTAINED BY COMPARING THE INTERROGATION AND RESPONSE SIGNALS. THE S-BAND ON GEOS 3 WAS ALSO TRACKED BY THE USB AND GRARR STDN STATIONS. CARRIER FREQUENCIES (2069.1125 MHZ UP AND 2247 MHZ DOWN) WERE IDENTICAL TO THOSE OF THE SST MODE. COHERENT GRARR TRACKING WAS ACCOMPLISHED VIA STANDARD GRARR RANGING SIDE TONES. USB TRACKING CONSISTED ONLY OF COHERENT-CARRIER DOPPLER TRACKING. THE S-BAND TRANSPONDER WAS A SINGLE-CHANNEL TRANSPONDER, THEREFORE, SIMULTANEOUS OPERATION WAS NOT POSSIBLE.

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

INVESTIGATION NAME- LASER CUBE SYSTEM

NSSDC ID- 75-027A-04

INVESTIGATIVE PROGRAM
CODE ESE

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. THE CUBES WERE CONFIGURED ON THE LATERAL SURFACE OF A CONIC FRUSTUM, WITH THE LATERAL SURFACE OF THE FRUSTUM ADJOINING THE BOTTOM, EARTH-ORIENTED SURFACE OF THE SPACECRAFT AT A 45-DEG ANGLE. THE BASE OF THE FRUSTUM MEASURED APPROXIMATELY 0.9 METERS IN DIAM. WHEN ILLUMINATED BY A LASER LIGHT PULSE FROM THE GROUND, EACH RETROREFLECTOR CUBE IN THE ARRAY REFLECTED THE LIGHT RAY BACK TO A SPECIAL TELESCOPE RECEIVER ON THE GROUND. THE REFLECTED LIGHT WAS PICKED UP BY THE TELESCOPE AND THE OPTICAL IMPULSES CONVERTED TO AN ELECTRICAL SIGNAL. A DIGITAL COUNTER RECORDED THE TIME WHEN THE LIGHT BEAM WAS RETURNED TO THE GROUND. THE TOTAL TRAVEL TIME OF THE LIGHT PULSES, FROM GROUND TO SATELLITE AND BACK TO THE GROUND, MEASURED THE DISTANCE TO THE SATELLITE, THUS FORMING THE BASIS OF THE SATELLITE OPTICAL LASER SYSTEM. THE FOLLOWING OBSERVATIONAL SYSTEMS SHOULD ACQUIRE THE NECESSARY DATA -- NASA/WALLOPS LASER RANGING SYSTEMS, SAO LASER RANGING SYSTEMS, GSFC LASER RANGING SYSTEMS, AND OTHER NATIONAL AND INTERNATIONAL LASER STATIONS AS DETERMINED.

********** GMS **********

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

NSSDC ID- 77-065A

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

SPONSORING COUNTRY/AGENCY
JAPAN NASDA
JAPAN JMA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/15/77
ORBIT PERIOD- 649.7 MIN INCLINATION- 27.4 DEG
PERIAPSIS- 187. KM APOAPSIS- 36745. KM

PERSONNEL
PM - R.J. GOSS NASA-GSFC
PM - K. WATANABE NATL SATELL DEV AGCY
PS - UNKNOWN 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 PROVIDE GEOSTATIONARY SATELLITES FOR THIS PROGRAM, AND THE USA AND USSR PROVIDE POLAR, SUN-SYNCHRONOUS SATELLITES. THE MAJOR OBJECTIVE OF GARP IS TO OBTAIN SYNOPTIC GLOBAL METEOROLOGICAL DATA SETS OF OVER A MONTH'S DURATION. THESE SETS SERVE AS RAW MATERIAL TO OPTIMIZE COMPUTER MODELS FOR METEOROLOGICAL PREDICTION. IT IS HOPED THAT DETERMINATION CAN BE MADE OF THE TIME LIMITATION FOR SHORT-TERM MODELING. THIS SPACECRAFT IS ROUGHLY CYLINDRICAL WITH A HEIGHT OF 345 CM AND DIAMETER OF 216 CM. THE CYLINDRICAL SURFACE IS COVERED WITH SOLAR CELLS WHICH CAN PROVIDE 225 W. THE SATELLITE IS SPIN-STABILIZED WITH A DESPUN EARTH-POINTING ANTENNA. THE SATELLITE IS POSITIONED NEAR 140 DEG E AND IS DESIGNED TO OPERATE FOR 5 YEARS.

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

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

NSSDC ID- 77-065A-01
INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITES
INVESTIGATIOI DISCIPLINE(S)
METEOROLOG.

PERSONNEL
PI - JMA STAFF METEOROL AGCY

BRIEF DESCRIPTION
THE VISIBLE IR SPIN-SCAN RADIOMETER (VISSR) IS SIMILAR TO VISSR EXPERIMENTS ON OTHER GARP (GLOBAL ATMOSPHERIC RESEARCH PROGRAM) SATELLITES SUCH AS GOES 1. IT CAN MAKE BOTH NIGHT (IR 10.5 TO 12.5 MICROMETERS) AND DAY IR PLUS VISIBLE (.5 TO .75 MICROMETERS) PHOTOMETRIC OBSERVATIONS OF THE SUBSATELLITE AREA AT 30 MIN INTERVALS. REAL-TIME TRANSMISSION IS AVAILABLE TO THE DATA ACQUISITION STATION IN JAPAN, WITH FURTHER DATA TRANSMISSION TO OTHER METEOROLOGICAL USERS AS NEEDED.

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

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR (SEM)

NSSDC ID- 77-065A-02
INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITES
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

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

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

INVESTIGATION NAME- WEATHER COMMUNICATIONS FACILITY

NSSDC ID- 77-065A-03
INVESTIGATIVE PROGRAM
APPLICATIONS SATELLITES
INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
METEOROLOGY

PERSONNEL
PI - JMA STAFF JAPANESE METEOROL AGCY

BRIEF DESCRIPTION
THE GMS INCLUDES A COMMUNICATIONS FACILITY (OR EXPERIMENT). 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.

********** 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-OA

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

PERSONNEL
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 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMBED EQUIPMENT SHELF AND THRUST TUBE. THE VISSR TELESCOPE WAS MOUNTED ON THE EQUIPMENT SHELF AND VIEWED THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDED RADIALLY 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 ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) FLOWN ON GOES 1 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO

COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEPT 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.

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

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-100A-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 WAS AN EXPERIMENTAL COMMUNICATIONS AND DATA HANDLING SYSTEM DESIGNED TO RECEIVE AND PROCESS METEOROLOGICAL DATA COLLECTED FROM REMOTELY LOCATED EARTH-BASED DATA COLLECTION (OBSERVATION) PLATFORMS (DCP). THE COLLECTED DATA WERE RETRANSMITTED FROM THE SATELLITE TO SMALL, GROUND-BASED, REGIONAL DATA UTILIZATION CENTERS. DATA FROM UP TO 10,000 DCP STATIONS WERE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWED FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL, GROUND-BASED APT RECEIVER STATIONS. THIS COMMUNICATIONS SYSTEM OPERATED ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTED OF APPROXIMATELY 3500 DCP STATIONS FOR CONTACT IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD WAS BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUES. DATA RECEIVED FROM INDIVIDUAL STATIONS VARIED FROM 50 TO 3000 BITS, DEPENDING ON THE TYPES AND VARIETIES OF SENSORS USED AT AN INDIVIDUAL DCP STATION.

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

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-100A-02

INVESTIGATIVE PROGRAM
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 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 0.5 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

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

BRIEF DESCRIPTION
A SHORT BOOM DEPLOYED (2 FT) 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-OA

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

PERSONNEL
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 STRUTURE EXTENDS RADIALLY OUT FROM THE THRUST RUBE 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 ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

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 EVENTALLY 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 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 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 TECHNIQUEES. 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 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 0.5 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

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

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 (APPROXIMATELY 2 FT) 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
EXPLORER 52

NSSDC ID- 74-040A

LAUNCH DATE- 06/03/74 WEIGHT- 26.1 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

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

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. DATA WERE COLLECTED UNTIL 8/1/77 WHEN OPERATIONS WERE TERMINATED. RE-ENTRY WAS EXPECTED IN 4/78.

-------- 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 (LEPEDEA) EMPLOYED TWO ELECTROSTATIC ANALYZERS TO MEASURE PROTRONS 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 SWEPT 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 1.58 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-6V/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- 74-040A-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.A. VAN ALLEN U OF IOWA
OI - M.N. OLIVEN(DECEASED) 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.

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

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

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

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

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 OVER THE SOUTH ATLANTIC ANOMALY (SAA), HIGH VOLTAGE SUPPLIES WERE TURNED OFF OR REDUCED TO PREVENT DAMAGE DUE TO SATURATION EFFECTS. THE SPACECRAFT HAD A DESIGN LIFETIME OF 6 MONTHS WITH AN ORBIT AND THRUSTER PROPELLANT CAPABILITY OF FUNCTIONING NOMINALLY FOR 1 YR. THE SIX-SIDED HEAO 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.

------- HEAO 1, BOLDT----------

INVESTIGATION NAME- COSMIC X-RAY EXPERIMENT

NSSDC ID- 77-075A-02 INVESTIGATIVE PROGRAM
ASTROPHYSICS

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - E.A. BOLDT NASA-GSFC
OI - G.P. GARMIRE CALIF INST OF TECH
OI - C.S. BOWYER U OF CALIF, BERKELEY
OI - R. CRUDDANCE U OF CALIF, BERKELEY
OI - G.B. FIELD SAO
OI - M.L. LAMPTON U OF CALIF, BERKELEY
OI - J I. SILK U OF CALIF, BERKELEY
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 0.28 KEV BAND AND FOR THE 0.5 TO 3.0 KEV BAND.

------- HEAO 1, FRIEDMAN-------

INVESTIGATION NAME- LARGE AREA COSMIC X-RAY SURVEY

NSSDC ID- 77-075A-01

INVESTIGATIVE PROGRAM
ASTROPHYSICS

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.T.	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 8 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.

------- HEAO 1, GURSKY-------

INVESTIGATION NAME- X-RAY SCANNING MODULATION COLLIMATOR

NSSDC ID- 77-075A-03

INVESTIGATIVE PROGRAM
ASTROPHYSICS

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - H.	GURSKY	HARVARD COLLEGE OBS
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.	DOXSEY	MASS INST OF TECH
OI - R.	GIACCONI	HARVARD COLLEGE OBS
OI - P.	GORENSTEIN	HARVARD COLLEGE OBS
OI - E.M.	KELLOGG	HARVARD COLLEGE OBS
OI - H.	TANANBAUM	HARVARD COLLEGE OBS
OI - D.	SCHWARTZ	HARVARD COLLEGE OBS

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.

------- HEAO 1, PETERSON-------

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

NSSDC ID- 77-075A-04

INVESTIGATIVE PROGRAM
ASTROPHYSICS

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.	SCHEEPMAKER	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(T1)/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 0.1 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 (RPHA) 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 MPHA 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 CSI(NA) SHIELDS THAT HAVE A TOTAL OMNIDIRECTIONAL COLLECTION AREA OF ABOUT 2400 SQ CM, AND DISCRIMINATING THE SUMMED SIGNAL IN A SYSTEM WITH THRESHOLDS OF 0.1, 0.2, 0.4, 0.8, 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

MG - F.B.	KOCHENDORFER	NASA HEADQUARTERS
SC - A.G.	OPP	NASA HEADQUARTERS
PM - A.	KUTZER	GES FUR WELTRAUMFORSCH
PM - G.M.	OUSLEY	NASA-GSFC
PS - H.	PORSCHE	ORG FOR SPACE RES
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 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 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 PERIHELION, IT WAS GENERALLY OPERATED FROM 64 TO 256 BPS; AND NEAR 0.3 AU, IT WAS OPERATED AT THE HIGHEST BIT RATE. BECAUSE OF A DEPLOYMENT FAILURE OF ONE AXIS OF THE 32-M, TIP-TO-TIP, DIPOLE ANTENNA, ONE AXIS WAS SHORTED, CAUSING THE ANTENNA TO FUNCTION AS A MONOPOLE. THE MAJOR EFFECT OF THIS ANOMALY WAS TO INCREASE THE EFFECTIVE INSTRUMENT THRESHOLDS, AND TO INTRODUCE ADDITIONAL UNCERTAINTIES IN THE EFFECTIVE ANTENNA LENGTH.

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

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- 74-097A-12

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
INTERPLANETARY DUST

PERSONNEL

PI - H. FECHTIG		MPI-NUCLEAR PHYS
OI - J. WEINBRAUCH		MPI-NUCLEAR PHYS

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 ST/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 50 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 TELEMETERED 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 INITATED IN WHICH THE ELECTRIC FIELD SPECTRUM, MAGNETIC FIELD, AND PLASMA DATA WERE RECORDED INTO SPACECRAFT MEMORY FOR A PERIOD STARING 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 DETREMENTAL 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 ST/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 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 ST/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

B M. THIS SHORTER CONFIGURATION RESULTED IN INCREASED RADIO FREQUENCY INTERFERENCE (RFI) OF FROM 3 TO 30 DB, ABOVE EXPECTED LEVELS, AND A LOSS OF 6 DB IN GAIN. 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 ST/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 ST/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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.	KUNOW	U OF KIEL
OI - G.	WIBBERENZ	U OF KIEL
OI - G.	GREEN	U OF KIEL
OI - M.	MUELLER-MELLIN	U OF KIEL
OI - R.	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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
ZODIACAL LIGHT

PERSONNEL

PI - C.	LEINERT	MPI-AERONOMY
OI - E.	PITZ	MPI-AERONOMY

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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F.	NESS	NASA-GSFC
OI - F.	MARIANI	CNR, 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 0.03, 0.09, 0.28, AND 0.84 GAMMAS. A SENSOR FLIPPER IS ACTUATED 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 ST/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-A, NEUBAUER----------

INVESTIGATION NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- 74-097A-03

INVESTIGATIVE PROGRAM
CODE ST/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-A, ROSENBAUER----------

INVESTIGATION NAME- PLASMA DETECTORS

NSSDC ID- 74-097A-09 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - H.R. ROSENBAUER MPI-EXTRATERR PHYS
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 TIWASUTION 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 PHENOMEN 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 ST/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 I .GT. 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. PORSCHE ORG FOR SPACE RES
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 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.

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

INVESTIGATION NAME- MICROMETEOROID DETECTOR AND ANALYZER

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

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
INTERPLANETARY PHYSICS

PERSONNEL
PI - H. FECHTIG MPI-NUCLEAR PHYS
OI - J. WEIHRAUCH MPI-NUCLEAR PHYS

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 IMPULSE 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 ST/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 DEPENDED IN DETAIL ON THE SPACECRAFT BIT RATE AND TELEMETRY FORMAT. THE FASTEST REAL TIME TELEMETERED 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 INITATED 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 6 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- 76-003A-05

INVESTIGATIVE PROGRAM
CODE ST/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 208 HZ TO 6.07 KHZ. THE LOW-FREQUENCY RECEIVER HAD 24 SETTINGS WITH 15 PERCENT SEPARATION AND COVERED THE RANGE 11 HZ TO 309 HZ. THE RESPONSE TIME OF THE LOW-FREQUENCY RECEIVER WAS APPROXIMATELY 1 S, NECESSITATING THE INCLUSION OF THE WIDEBAND RECEIVER TO OBTAIN INFORMATION ABOUT THE ANGULAR DISTRIBUTION OF WAVES APPEARING IN THE LOW-FREQUENCY BAND. THIS RECEIVER COVERED THE FREQUENCY RANGE 1 HZ TO 200 HZ. THE TIME RESOLUTION DEPENDED IN DETAIL ON THE SPACECRAFT TELEMETRY FORMAT, BIT RATE, AND EXPERIMENT OPERATIONAL MODE. WHEN THE SHOCK ALARM MODE BECAME ACTIVATED, DATA FROM THE WAVE FORM SAMPLER WERE READ INTO SPACECRAFT MEMORY FOR A PERIOD STARTING BEFORE AND ENDING AFTER THE TRIGGERING EVENT. IN THIS MODE, THE INSTANTANEOUS VOLTAGE ACROSS THE ANTENNA WAS PASSED THROUGH A LOW PASS FILTER WITH CORNER FREQUENCY DEPENDENT ON THE SAMPLING RATE, AND MEASURED AT DISCRETE INTERVALS. THE MOST RAPID BEING 2.2 MS. FOR A MORE DETAILED DISCUSSION SEE P 248 OF "RAUMFAHRTFORSCHUNG," 19, 1975.

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

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

NSSDC ID- 76-003A-06

INVESTIGATIVE PROGRAM
CODE ST/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 (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. 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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL		
PI - E.	KEPPLER	MPI-AERONOMY
OI - G.	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 1800 KEV.
THE PROTON MEASUREMENTS WERE MADE WITH A TWO-DETECTOR TELESCOPE EMPLOYING COINCIDENCE AND ANTICOINCIDENCE LOGICS. BOTH PARTICLE SPECIES WERE MEASURED IN 16 ENERGY CHANNELS THROUGH PULSE HEIGHT ANALYSIS. FOR FURTHER INFORMATION SEE PP 261-263 OF 'RAUMFAHRTFORSCHUNG,' 19, 5, SEPTEMBER/OCTOBER 1975.

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

INVESTIGATION NAME- CELESTIAL MECHANICS

NSSDC ID- 76-003A-14

INVESTIGATIVE PROGRAM
CODE ST/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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL		
PI - H.	KUNOW	U OF KIEL
OI - G.H.	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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
ZODIACAL LIGHT

PERSONNEL

PI - C.	LEINERT	MPI-AERONOMY
OI - E.	PITZ	MPI-AERONOMY

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, SELECTED VISUAL BANDS, AND WHITE LIGHT. THE PURPOSE OF THI 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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F.	NESS	NASA-GSFC
OI - F.	MARIANI	CNR, 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 RANGE 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 ST/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 ST/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 ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.R.	ROSENBAUER	MPI-EXTRATERR PHYS
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 IN? 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 ST/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 2 .GT. 1 PARTICLES IN THREE RANGES BETWEEN 3 AND 21 MEV/N. THE SECOND LOW-ENERGY TELESCOPE (GEOMETRIC FACTOR WAS 0.015 SQ CM 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.

********** HEOS 1**********

SPACECRAFT COMMON NAME- HEOS 1
ALTERNATE NAMES- HEOS-A1, HEOS-A
03595

NSSDC ID- 68-109A

LAUNCH DATE- 12/05/68 WEIGHT- 105. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/24/69
ORBIT PERIOD- 6690. MIN INCLINATION- 23.1 DEG
PERIAPSIS- 6804. KM APOAPSIS- 227?99. KM

PERSONNEL
MG - NONE ASSIGNED
SC - NONE ASSIGNED
PM - J. VANDENKERCKHOVE ESA-ESTEC
PS - B.G. TAYLOR ESA-ESTEC

BRIEF DESCRIPTION
HEOS 1 WAS AN EARTH ORBITING, SPIN-STABILIZED SATELLITE THAT WAS LAUNCHED BY ESA (FORMERLY ESRO). IT WAS BASICALLY CYLINDRICAL WITH AN AXIAL BOOM SUPPORTING THE ANTENNA AND THE MAGNETOMETERS. THE SPIN AXIS ATTITUDE AND SPIN RATE WERE CHANGED BY ONBOARD GAS JETS. THE SPACECRAFT OBJECTIVES WERE TO STUDY THE INTERPLANETARY MAGNETIC FIELDS, COSMIC RAYS, SOLAR WIND, AND THE MAGNETOSHEATH. THE SPACECRAFT OPERATION WAS FULLY SATISFACTORY FOR 16 MONTHS, AFTER WHICH INTERMITTENT LOSS OF SOME SOLAR GATE (ATTITUDE REFERENCE) PULSES OCCURRED. BY 1974, SPACECRAFT TELEMETRY COVERAGE WAS 50 PERCENT, AND ONLY THE MAGNETIC FIELD EXPERIMENT WAS OPERATIONAL. THE SPACECRAFT REENTERED THE EARTH'S ATMOSPHERE ON OCTOBER 28, 1975.

------- HEOS 1, ELLIOT----------

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- 68-109A-02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - H. ELLIOT IMPERIAL COLLEGE
OI - P.C. HEDGECOCK IMPERIAL COLLEGE

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE MAGNETIC FIELDS IN THE RANGE PLUS TO MINUS 64 GAMMAS WITH AN ACCURACY OF 0.25 GAMMA USING A BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER. THE HEOS-A1 SPACECRAFT WAS LAUNCHED INTO A HIGHLY ECCENTRIC ORBIT SO THAT THE MAGNETOMETER MEASURED MAGNETIC FIELDS WITHIN THE MAGNETOSPHERE AND THE TRANSITION AND INTERPLANETARY REGIONS. THE MAGNETOMETER OPERATED CONTINUOUSLY IN TWO MODES. ONE GAVE A CONTINUOUS SERIES OF VECTORS SAMPLED AT 48-S INTERVALS. THE OTHER OPERATED VIA A 16-KILOBIT DATA STORE WITH A VARIETY OF MEASUREMENT PROGRAMS WITH OPTIONS INCLUDING COMMAND OR AUTOMATIC REPLAY, SHOCK TYPE EVENT DETECTION, ETC. THE EXPERIMENT OPERATION WAS NORMAL UNTIL SPACECRAFT REENTRY (OCTOBER 28, 1975). HOWEVER, DATA ACQUISITION BECAME INTERMITTENT LATE IN THE SPACECRAFT LIFE, AND DATA ACCURACY DECREASED SOMEWHAT. FOR FURTHER DETAILS, SEE HEDGECOCK, SP. SCI. INSTRUM., VOL 1, P53, 1975.

********** HERMES**********

SPACECRAFT COMMON NAME- HERMES
ALTERNATE NAMES- CAS-C, COMMUN. TECHNOL. SAT.
COOPERATIVE APPLICA SAT., CTS

NSSDC ID- 76-004A

LAUNCH DATE- 01/17/76 WEIGHT- 680. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA
CANADA CRC

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/18/76
ORBIT PERIOD- 1392. MIN INCLINATION- 0.7 DEG
PERIAPSIS- 33814. KM APOAPSIS- 36022. KM

PERSONNEL
MG - I. PAGHIS COMMUN RESEARCH CENTRE
MG - A.J. CERVENKA NASA HEADQUARTERS
PM - J.N. BARRY COMMUN RESEARCH CENTRE
PS - A.S. BROWN COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS THREE-AXIS STABILIZED SATELLITE WAS DESIGNED AS A TEST VEHICLE TO CARRY COMMUNICATIONS-RELATED EQUIPMENT. THE PURPOSE OF ITS LAUNCH INTO AN EQUATORIAL, EARTH-SYNCHRONOUS ORBIT WAS -- (1) TO DEMONSTRATE NEW TECHNOLOGY, (2) TO CONDUCT COMMUNICATIONS TECHNOLOGICAL EXPERIMENTS, AND (3) TO DEVELOP NEW COMMUNICATIONS METHODOLOGY IN CONJUNCTION WITH GROUND-BASED COMPONENTS. THE SPACECRAFT WAS A SHORT (1.17-M) RIGHT CYLINDER (1.8-M DIAMETER) WITH TWO PARALLEL (1.72-M APART) PLANE SURFACES SYMMETRICALLY TRUNCATING THE CURVED SURFACE. THESE PLANE SURFACES WERE ALSO PARALLEL TO THE CYLINDER AXIS. RELATIVELY LONG, NARROW (1.3- BY 6.5-M) SOLAR ARRAYS WERE EXTENDABLE FROM MECHANISMS MOUNTED ON THE PARALLEL PLANE SIDES.
A MORE COMPLETE DESCRIPTION MAY BE FOUND IN THE 'NASA-GSFC MISSION OPERATION PLAN, SECTION 1,' AND IN THE MISSION OPERATION REPORT.

------- HERMES, DAY----------

INVESTIGATION NAME- SUPER-HIGH-FREQUENCY (12 AND 14 GHZ) - TRANSMITTER EXPERIMENT PACKAGE (TEP)

NSSDC ID- 76-004A-01 INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - J.W.B.DAY COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS COMMUNICATIONS EXPERIMENT CONSISTED OF A 20-W LOW-POWER SUPER-HIGH-FREQUENCY (SHF) COMMUNICATIONS TRANSPONDER, A 200-W HIGH-POWER SHF TRANSMITTER PACKAGE, AN SHF BEACON, AND ANTENNA SUBSYSTEMS. THE PURPOSE OF THIS EXPERIMENT WAS -- (1) TO EVALUATE TECHNICAL PERFORMANCE OF THE COMPONENTS AND (2) TO EVALUATE OVERALL TECHNICAL OPERATION OF THE SYSTEM. BOTH TYPES OF TESTS WERE DONE OVER A 2-YR PERIOD. REFERENCE WAS SOMETIMES MADE TO THE TWO DIFFERENT TYPES OF EVALUATION AS TWO DIFFERENT EXPERIMENTS. EVALUATION OF THE OVERALL OPERATION WAS THEN REFERRED TO AS A 'COMMUNICATION SYSTEM' EXPERIMENT.

------- HERMES, DONOUGHE----------

INVESTIGATION NAME- UNITED STATES USER EXPERIMENTS

NSSDC ID- 76-004A-05 INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - DONOUGHE UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT INVOLVED EXPLANATION OF FUTURE POSSIBLE USES OF HIGH-POWERED COMMUNICATIONS SATELLITES. EXPERIMENTATION BY 13 DIFFERENT EXPERIMENTERS INVOLVED MEDICINE, EDUCATION, COMMUNITY SERVICES, SPECIAL SERVICES, AND COMMUNICATIONS TECHNOLOGY.

------- HERMES, KERR----------

INVESTIGATION NAME- CANADIAN COMMUNICATIONS EXPERIMENTS

NSSDC ID- 76-004A-04 INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - KERR UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT INVOLVED INVESTIGATION OF PRACTICAL TECHNIQUES FOR USE OF THE SATELLITE COMMUNICATIONS SYSTEMS BEING TESTED. IT INCLUDED COMMUNICATION TECHNIQUES FOR USE IN MEDICINE, EDUCATION, COMMUNITY DEVELOPMENT AND INTERACTION, AND DATA TRANSMISSION. IT ALSO INCLUDED DEVELOPMENT OF COMPATIBLE GROUND FACILITIES. ABOUT 30 DIFFERENT EXPERIMENTS BY OVER 20 DIFFERENT ORGANIZATIONS HAVE BEEN APPROVED BY A JOINT WORKING GROUP, WHICH APPROVED AND COORDINATED CANADIAN AND U.S. EXPERIMENTS FOR THIS SATELLITE EQUIPMENT.

------- HERMES, VIGNERON----------

INVESTIGATION NAME- SOLAR ARRAY TECHNOLOGY EXPERIMENT (SATE)

NSSDC ID- 76-004A-02 INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - F.R. VIGNERON COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS EXPERIMENT WAS TO STUDY THE MECHANICAL, DYNAMIC, AND ELECTRICAL PROPERTIES OF A NEW TYPE OF EXTENDABLE SOLAR ARRAY OVER AN EXTENDED TIME PERIOD. THE TWO 1.3- X 6.5-M ARRAYS WERE UNFOLDED FROM THEIR PACKS BY UNFURLING A SUPPORTING TUBE THAT WAS ATTACHED TO THE EXTREMITY OF THE ARRAY.

------- HERMES, VIGNERON----------

INVESTIGATION NAME- ATTITUDE CONTROL SYSTEM EXPERIMENT(ACS?)

NSSDC ID- 76-004A-03 INVESTIGATIVE PROGRAM
CODE EC/CO-OP

INVESTIGATION DISCIPLINE(S)
NAVIGATION

PERSONNEL
PI - F.R. VIGNERON COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS WAS A TECHNOLOGY EXPERIMENT TO EVALUATE THE DYNAMICS OF SPACECRAFT MECHANICAL FLEXIBILITY ON ACS (ATTITUDE CONTROL SYSTEM) OPERATION AND TO DEMONSTRATE THAT ATTITUDE CONTROL FLIGHT PERFORMANCE IS IN ACCORDANCE WITH STABILITY AND CONTROL THEORY.

********** 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- 09/23/72
ORBIT PERIOD- 17702. MIN INCLINATION- 17.2 DEG
PERIAPSIS- 201599. KM APOAPSIS- 235639. KM

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- MEASUREMENT OF SOLAR PLASMA

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 (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 30 EV TO 2 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-H, BRIDGE----------

INVESTIGATION NAME- MEASUREMENT OF SOLAR PLASMA

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 S'

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
COSMIC RAYS

PERSONNEL
PI - T.L. CLINE NASA-GSFC

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- 72-073A-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 PEMPORAL 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- 72-073A-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 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 28). 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
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 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 MAGNETOTAIL 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	NASA-GSFC
OI -	D.E.	HAGGE	UNKNOWN
OI -	B.J.	TEEGARDEN	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	TRW SYSTEMS GROUP
OI -	G.M.	CROOK	GAINES M. CROOK ASSOC
OI -	I.M.	GREEN	TRW SYSTEMS GROUP
OI -	R.W.	FREDERICKS	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 10 TO 100 HZ, WAS USED IN CONJUNCTION WITH THE SPECIAL PURPOSE ANALOG TELEMETRY TEST TO BE CONDUCTED. UNFORTUNATELY THIS NEW 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-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 H 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-H, STONE----------

INVESTIGATION NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES

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 ISOTOPES 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 ANNUALAR 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 8 DIFFERENT COINCIDENCE/ ANTICOINCIDENCE MODES AND 2 PARAMETER PULSE HEIGHT ANALYSES FOR 32 PARTICLES EVERY 20.48 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 EXPERIMENT 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 PATCHES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR AND THROUGH THE FLANKS OF THE MAGNETOPAUSE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE GEOMAGNETIC FIELD. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE CONFIGURATION EMPLOYING SOLID-STATE DETECTORS AND A MAGNET TO DEFLECT ELECTRONS. TWO SIDE-MOUNTED DETECTORS WERE USED TO DETECT THE ELECTRONS DEFLECTED BY THE MAGNET. TWO ADDITIONAL SOLID-STATE DETECTORS WERE USED TO DETECT VERY LOW-ENERGY (GREATER THAN 15 KEV) PARTICLES, ALPHA PARTICLES, AND CHARGED PARTICLES OF Z GREATER THAN 2. THE EXPERIMENT WAS DESIGNED TO MEASURE (1) PROTON FLUXES FROM 30 KEV TO GREATER THAN 8.6 MEV IN SIX RANGES, (2) ELECTRON FLUXES FROM 30 KEV TO GREATER THAN 450 KEV IN THREE RANGES, (3) CHARGED PARTICLES GREATER THAN 15 KEV, (4) ALPHA PARTICLES GREATER THAN 0.5 MEV, GREATER THAN 1.6 MEV, 2.2 TO 8.8 MEV, AND 8.8 TO 35 MEV, AND (5) CHARGED PARTICLES OF Z GREATER THAN 2 AT E GREATER THAN 5 MEV.

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

SPACECRAFT COMMON NAME- IMP-J
ALTERNATE NAMES- PL-723A, IMP 8
EXPLORER 50, 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
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/27/73
ORBIT PERIOD- 17286. MIN INCLINATION- 28.7 DEG
PERIAPSIS- 141224. KM APOAPSIS- 288940. KM

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

BRIEF DESCRIPTION
IMP 8 (EXPLORER 50), 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 DECEASED 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 DC UP 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- MEASUREMENT OF SOLAR PLASMA

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- MEASUREMENT OF SOLAR PLASMA

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 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 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 R(E) 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 INCLUDES (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 100D-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 - D.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 400 FT, NORMAL TO THE SPACECRAFT SPIN AXIS AND THE OTHER ANTENNA, EXTENDABLE TO 20 FT, ALONG THE SPIN AXIS). THE SECOND SYSTEM CONTAINED A BOOM-MOUNTED TRIAD OF ORTHOGONAL LOOP ANTENNAS. THE THIRD SYSTEM CONSISTED OF A BOOM-MOUNTED 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.

------- 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 BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO STUDY THE INTERPLANETARY AND GEOMAGNETIC TAIL MAGNETIC FIELDS. EACH SENSOR HAD THREE DYNAMIC RANGES, PLUS OR MINUS 12, PLUS OR MINUS 36, AND PLUS OR MINUS 108 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.

------- 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 H 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 EXPERIMENT 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 PATCHES THROUGHOUT THE GEOMAGNETIC TAIL AND NEAR AND THROUGH THE FLANKS OF THE MAGNETOPAUSE, AND (3) TO STUDY THE ENTRY OF SOLAR COSMIC RAYS INTO THE GEOMAGNETIC FIELD. THE INSTRUMENTATION CONSISTED OF A THREE-ELEMENT TELESCOPE CONFIGURATION EMPLOYING SOLID-STATE DETECTORS AND A MAGNETIC FIELD TO DEFLECT ELECTRONS. TWO SIDE-MOUNTED DETECTORS WERE USED TO DETECT THE ELECTRONS DEFLECTED BY THE MAGNET. TWO ADDITIONAL SOLID-STATE DETECTORS WERE USED TO DETECT VERY LOW-ENERGY (GREATER THAN 15 KEV) PROTONS, ALPHA PARTICLES, AND CHARGED PARTICLES OF Z GREATER THAN 2. THE EXPERIMENT WAS DESIGNED TO MEASURE (1) PROTON FLUXES FROM 30 KEV TO GREATER THAN 8.6 MEV IN SIX RANGES, (2) ELECTRON FLUXES FROM 30 KEV TO GREATER THAN 450 KEV IN THREE RANGES, (3) CHARGED PARTICLES GREATER THAN 15 KEV, (4) ALPHA PARTICLES IN FOUR RANGES, GREATER THAN 0.5 MEV, GREATER THAN 1.6 MEV, 2.2 TO 8.8 MEV, AND 8.8 TO 35 MEV, AND (5) CHARGED PARTICLES OF Z GREATER THAN 2 AT E GREATER THAN 5 MEV.

********** INTASAT**********

SPACECRAFT COMMON NAME- INTASAT
ALTERNATE NAMES- INTA SATELLITE

NSSDC ID- 74-089C

LAUNCH DATE- 11/15/74
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA
WEIGHT- 20. KG

SPONSORING COUNTRY/AGENCY

SPAIN	CNIE-INTA
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 114.9 MIN
PERIAPSIS- 1440.0 KM
EPOCH DATE- 11/16/74
INCLINATION- 101.7 DEG
APOAPSIS- 1457.0 KM

PERSONNEL

MG - J.R.	HOLTZ	NASA HEADQUARTERS
SC - E.R.	SCHMERLING	NASA HEADQUARTERS
PM - J.M.	DORADO	CONIE-INTA
PM - W.R.	WITT, JR.	NASA-GSFC
PS - G.	SAGREDO	CONIE-INTA
PS - L.H.	BRACE	NASA-GSFC

BRIEF DESCRIPTION
INTASAT, THE FIRST SPANISH SATELLITE WAS A SMALL, MAGNETICALLY ORIENTED, SPIN STABILIZED SPACECRAFT CARRYING A BEACON EXPERIMENT TO STUDY THE IONSPHERE. INTASAT WAS LAUNCHED PIGGYBACK WITH ITOS-G. THE SPACECRAFT WAS A 12-SIDED RIGHT PRISM, 44.2 CM ACROSS OPPOSITE CORNERS, AND 41 CM HIGH. THE BEACON ANTENNAS EXTENDED ALONG THE SPIN AXIS FOR ABOUT 175 CM FROM THE CENTER OF BOTH ENDS OF THE SATELLITE. FOUR 49-CM TELEMETRY ANTENNAS EXTENDED DIAGONALLY OUTWARD FROM ONE END. THE ATTITUDE CONTROL MAGNET WITH DAMPING BARS PROVIDED ALIGNMENT TO THE LOCAL MAGNETIC FIELD VECTOR WITHIN 2 WEEKS OF LAUNCH. THE 16-V POWER SYSTEM WAS OPERATED BY 12 NICKEL-CADMIUM BATTERIES CHARGED BY SOLAR CELLS ON THE SIDES OF THE SATELLITE. THE ORBIT WAS SUN-SYNCHRONOUS, WITH EQUATOR CROSSING INITIALLY OCCURING AT NOON AND MIDNIGHT LOCAL TIME. ABOUT 40 GROUND OBSERVERS USED THE EXPERIMENT FOR IONOSPHERIC STUDY. NASA-GSFC OBTAINED TELEMETRY AND SATELLITE POSITION DATA TO MONITOR AND CONTROL SPACECRAFT CONDITION AND TO PROVIDE INFORMATION TO INCLUDE 'M' FACTORS. TELEMETRY ALSO CONTAINED DATA FROM A TECHNOLOGY EXPERIMENT. INTA WAS RESPONSIBLE FOR COORDINATING ALL BEACON DATA ACQUISITION AND PROCESSING. BEACON POWER WAS TURNED ON BY A TIMER SHORTLY AFTER SPACECRAFT SEPARATION FROM THE LAUNCH VEHICLE. A KILLER-TIMER SYSTEM TURNED OFF THE SPACECRAFT AT THE END OF 2 YEARS.

------- INTASAT, SAGREDO----------

INVESTIGATION NAME- IONOSPHERIC BEACON

NSSDC ID- 74-089C-01

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - J.L. SAGREDO CONIE-INTA

BRIEF DESCRIPTION
THIS BEACON EXPERIMENT CONSISTED OF A TWO-FREQUENCY (40.0100 AND 40.01025 MHZ) TRANSMITTER, THAT CONTINUOUSLY RADIATED LINEARLY POLARIZED, STABLE AND UNMODULATED SIGNALS AT A MINIMUM POWER LEVEL OF 200 MW. THE TWO-BEACON MONOPOLE ANTENNA, ONE BEACON FOR EACH FREQUENCY, EXTENDED FROM THE TOP AND BOTTOM OF THE SPACECRAFT ALONG THE SPACECRAFT AXIS. OVER 40 EXPERIMENTERS IN 21 DIFFERENT COUNTRIES PARTICIPATED. THE EXPERIMENTERS CALCULATED TOTAL ELECTRON CONTENT ALONG THE PROPAGATION PATH FROM SATELLITE TO GROUND AND OBSERVED IONOSPHERIC IRREGULARITIES AND SCINTILLATIONS.

********** INTERCOSMOS 14**********

SPACECRAFT COMMON NAME- INTERCOSMOS 14
ALTERNATE NAMES- IK-14

NSSDC ID- 75-115A

LAUNCH DATE- 12/11/75 WEIGHT- KG
LAUNCH SITE-
LAUNCH VEHICLE-

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/12/75
ORBIT PERIOD- 105.3 MIN INCLINATION- 74. DEG
PERIAPSIS- 345. KM APOAPSIS- 1707. KM

PERSONNEL
PM - UNKNOWN
PS - J.I. LIKHTER IZMIRAN

BRIEF DESCRIPTION
THE SPACECRAFT WAS A CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) PROGRAM INVOLVING THE SCIENTIFIC COMMUNITY OF SOCIALIST COUNTRIES. THE SPACECRAFT CONTAINED FIVE EXPERIMENTS WHICH PROVIDE MEASUREMENTS OF EXTREMELY LOW-FREQUENCY (ELF) AND VERY LOW-FREQUENCY (VLF) EMISSIONS IN THE MAGNETOSPHERE, OF THE VARIATION OF IONOSPHERIC PLASMA DENSITY AND ELECTRON TEMPERATURE ALONG THE ORBIT, OF VARIATIONS OF TOTAL ELECTRON CONTENT IN THE IONOSPHERE, AND OF ENERGY AND PENETRATION CHARACTERISTICS OF METEOR SHOWERS. THE SPACECRAFT WAS MAGNETICALLY ORIENTED AND CONTAINED BOTH A STANDARD TELEMETRY SYSTEM AND A WIDEBAND SYSTEM WHICH TRANSMITS REAL-TIME DATA FROM A FOUR-COMPONENT ELF/VLF RECEIVER AND AN ELECTRON TEMPERATURE INSTRUMENT. THE DATA SYSTEM INCLUDES A WIDEBAND TAPE RECORDER (0.05-15 KHZ). A LARGE NUMBER OF GROUND-BASED OBSERVATORIES IN THE SOCIALIST COUNTRIES WERE INVOLVED IN MEASURING IONOSPHERIC CONDITIONS, GEOMAGNETIC FIELD VARIATIONS, AND VLF EMISSIONS IN CONJUNCTION WITH THE SATELLITE. OPERATIONS TERMINATED ON 6/28/76.

------- INTERCOSMOS 14, GDALEVICH----------

INVESTIGATION NAME- SPHERICAL ION TRAPS

NSSDC ID- 75-115A-01 INVESTIGATIVE PROGRAM
INTERCOSMOS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - G.L. GDALEVICH IKI
PI - K.B. SERAFIMOV BULGARIAN ACAD OF SCI

BRIEF DESCRIPTION
THE EXPERIMENT CONSISTS OF TWO SPHERICAL ION TRAPS LOCATED ON BOOMS THAT EXTEND FROM OPPOSITE POINTS ON THE SPACECRAFT BODY TO REMOVE SPACECRAFT VELOCITY EFFECTS ON THE MEASUREMENT OF POSITIVE ION DENSITY. THE SPATIAL RESOLUTION OF THE MEASUREMENT IS ABOUT 10 M IN THE REAL-TIME MODE AND 500 M IN THE STORAGE MODE.

------- INTERCOSMOS 14, GRINGAUZ----------

INVESTIGATION NAME- PERPENDICULAR AND PARALLEL ELECTRON TEMPERATURE

NSSDC ID- 75-115A-02 INVESTIGATIVE PROGRAM
INTERCOSMOS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - K.I. GRINGAUZ IKI
PI - J.I. SCHMILAUER CZECH ACAD OF SCI

BRIEF DESCRIPTION
THE INSTRUMENT HAS TWO FLAT MUTUALLY PERPENDICULAR SENSORS FOR MEASURING ELECTRON TEMPERATURES ALONG AND PERPENDICULAR TO THE GEOMAGNETIC FIELD. THE DYNAMIC RANGE OF THE DEVICE IS 400 TO 10,000 K. THE RATIO OF THE TWO TEMPERATURES IS ALSO MEASURED.

------- INTERCOSMOS 14, LIKHTER----------

INVESTIGATION NAME- ELF/VLF RECEIVER

NSSDC ID- 75-115A-03 INVESTIGATIVE PROGRAM
INTERCOSMOS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.I. LIKHTER IZMIRAN
PI - P. TRISKA CZECH ACAD OF SCI

BRIEF DESCRIPTION
THE RECEIVER DETECTS THE SIGNALS ON ANTENNAS THAT ALLOW THE MEASUREMENT OF THE ELECTRIC AND MAGNETIC FIELDS PARALLEL AND PERPENDICULAR TO THE DIRECTION OF THE GEOMAGNETIC FIELD. THE RECEIVER COVERS THE RANGE 0.05-20 KHZ. THE PERPENDICULAR MAGNETIC FIELD CHANNEL CONTAINS A 10-FREQUENCY SPECTRUM ANALYZER FOR ELF/VLF EMISSIONS. BOTH ELECTRIC-FIELD RECEIVER CHANNELS HAVE TWO NARROW-BAND FILTERS AT 0.72 AND 4.0 KHZ. SELF AND MUTUAL IMPEDANCE OF THE SPHERICAL PROBE ELECTRIC ANTENNAS ARE MEASURED.

------- INTERCOSMOS 14, NAZAROVA----------

INVESTIGATION NAME- MICROMETEORITE DETECTOR

NSSDC ID- 75-115A-04 INVESTIGATIVE PROGRAM
INTERCOSMOS

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST
DUST

PERSONNEL
PI - T.N. NAZAROVA SOVIET ACAD OF SCI
PI - I. ZAKHAROV CZECH ACAD OF SCI
PI - I. APATHY HUNGARIAN ACAD OF SCI

BRIEF DESCRIPTION
THE MICROMETEORITE DETECTOR GIVES STATISTICAL INFORMATION, PARTICULARLY DURING THE OCCURENCE OF INTENSIVE METEOR SHOWERS.

------- INTERCOSMOS 14, SCHMILAUER----------

INVESTIGATION NAME- FOUR FREQUENCY BEACON

NSSDC ID- 75-115A-05 INVESTIGATIVE PROGRAM
INTERCOSMOS

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

PERSONNEL
PI - J.I. SCHMILAUER CZECH ACAD OF SCI

BRIEF DESCRIPTION
THE INSTRUMENT CONSISTS OF A BEACON TRANSMITTER THAT RADIATES AT THE FOUR COHERENT FREQUENCIES -- 20.004 MHZ, 40.008 MHZ, 180.036 MHZ, AND 360.072 MHZ -- AND IS USED TO MEASURE TOTAL ELECTRON CONTENT BETWEEN THE SPACECRAFT AND A GROUND-RECEIVING STATION.

********** ISIS 1**********

SPACECRAFT COMMON NAME- ISIS 1
ALTERNATE NAMES- ISIS-A, 03669

NSSDC ID- 69-009A

LAUNCH DATE- 01/30/69 WEIGHT- 532. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

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
PERIAPSIS- 578. KM APOAPSIS- 3526. KM

PERSONNEL
MG - F.W. GAETANO NASA HEADQUARTERS
MG - C.D. FLORIDA COMMUN RESEARCH CENTRE
PM - C.A. FRANKLIN COMMUN RESEARCH CENTRE
PM - E.D. NELSEN NASA-GSFC
PS - J.E. JACKSON 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 (78.4 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 MERIDAN 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-03

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 IONOSONDE. 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 OPERATEED. 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-07

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 450 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.B.	NORTON	NOAA-ERL
OI - J.M.	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 EXPERMENT 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 FRUCTION OF GEOGRAPHICAL POSITION). THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF THE TELEMETRY STATION.

------- ISIS 1, FORSYTH----------

INVESTIGATION NAME- RADIO BEACON

NSSDC ID- 69-009A-09

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - P.A.	FORSYTH	WESTERN ONTARIO U
OI - G.F.	LYON	WESTERN ONTARIO U
OI - E.H.	TULL	WESTERN ONTARIO U

BRIEF DESCRIPTION

THIS EXPERIMENT WAS DEVISED TO STUDY THE IONOSPHERIC IRREGULARITIES GIVING SPECIAL ATTENTION TO THE DISTURBED IONOSPHERIC CONDITIONS. BEACON TRANSMITTERS ABOARD THE SATELLITE RADIATED POLARIZED RADIO EMISSIONS ON COMMAND, AT 136.41 AND 137.95 MHZ. THE SIGNAL POLARIZATION, THE AMPLITUDE OF THE SIGNAL, THE RELATIVE PHASE OF THE SIGNAL, AND THE INCIDENT DIRECTION OF THE SIGNAL WERE OBSERVED FROM GROUND STATIONS. COINCIDENT OBSERVATIONS WERE MADE AT STATIONS ABOUT 100 WAVELENGTHS APART. FROM KNOWN SPACECRAFT POSITION INFORMATION AND THESE OBSERVATIONS, IONOSPHERIC IRREGULARITIES COULD BE ALMOST COMPLETELY DESCRIBED IN TERMS OF HEIGHT, HORIZONTAL SIZE AND SHAPE, ELECTRON PEAK CONCENTRATION, AND RADIAL DISTRIBUTION OF ELECTRONS. AN IMPORTANT PART OF THESE DESCRIPTIONS WAS TO ORIGINATE FROM THE COMPUTED VALUES OF TOTAL ELECTRON CONTENT (TEC) OBTAINED PRIMARILY FROM THE POLARIZATION AND PHASE OBSERVATIONS. REFERENCE 'ISIS TECHNICAL PLAN,' PP. 84, 85 FOR FURTHER DETAILS.

------- 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 SWEPT FROM 0.1 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 CESIUM IODIDE SCINTILLATION-PHOTOMULTIPLIER SYSTEMS. EACH SYSTEM OPERATED IN TWO MODES AND RESPONDED TO ELECTRONS GREATER THAN 8, 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.C. SAGALYN		USAF GEOPHYS LAB
OI - M. SMIDDY		USAF GEOPHYS 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 ELECTRONICS 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- SWEEP-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 PRED SERV
OI - M. SYLVAIN		LGE
OI - D. 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. CHAN		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 SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS POSSIBLE WHERE THE TRANSMITTER FREQUENCY WAS FIXED AT 0.82 MHZ WHILE THE RECEIVER SWEPT. SEVERAL VIRTUAL HEIGHT (DELAY TIME) TRACES WERE NORMALLY OBSERVED DUE TO GROUND REFLECTIONS, PLASMA RESONANCES, BIREFRINGENCE OF THE IONOSHPERE, 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
05104

NSSDC ID- 71-024A

LAUNCH DATE- 04/01/71 WEIGHT- 570. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

CANADA	CRC
UNITED STATES	NASA-OSS

INITIAL ORBIT PARAMETERS

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

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 - E.D. NELSEN		NASA-GSFC
PS - J.E. JACKSON		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-M CAPACITY. FOR NONRECORDED OBSERVATIONS, DATA FROM SATELLITE AND SUBSATELLITE LOCATIONS WERE TELEMETERED WHEN THE SPACECRAFT WAS IN LINE OF SIGHT OF A TELEMETRY STATION. TELEMETRY STATIONS WERE LOCATED SO THAT PRIMARY DATA COVERAGE WAS NEAR THE 80 DEG W MERIDIAN AND NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, FRANCE, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA.

------- 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 A OVER THE PORTION OF THE DARK EARTH VISIBLE TO THE SPACECRAFT. A COMBINATION OF INTERNAL ELECTRONIC SCANNING PERFORMED BY AN IMAGE DISSECTOR AND OF THE NATURAL ORBITAL AND ROTATIONAL MOTIONS OF THE SPACECRAFT PERMITTED THE SENSOR TO SYSTEMATICALLY SCAN ACROSS THE EARTH. THE DETECTOR SYSTEM WAS CONSTRUCTED TO ALLOW INCIDENT RADIATION TO BE ACCEPTED FROM TWO DIRECTIONS 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 5581 PLUS OR MINUS 9 A (AT THE HALF-MAXIMUM POINTS), AND THE OTHER FILTER OPERATED AT 3915 PLUS OR MINUS 13 A. ONLY ONE OF THE TWO OPTICAL SYSTEMS POINTED AT THE EARTH AT ANY ONE TIME, WHILE THE OTHER FACED INTO SPACE. WHEN THE SPACECRAFT SPIN AXIS WAS ORIENTED TO LIE IN THE ORBITAL PLANE, EACH ROTATION OF THE SPACECRAFT RESULTED IN AN EARTH SCAN 5 DEG WIDE. THIS WIDTH SIZE WAS CHOSEN TO INSURE OVERLAP WITH THE PREVIOUS SCAN. THE IMAGE DISSECTOR 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. FANCOTT, 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-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

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

BRIEF DESCRIPTION
THE 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 IONOSONDE. 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 SWEPT 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-OP

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 DRIVEN 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-OP

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, FORSYTH----------

INVESTIGATION NAME- RADIO BEACON

NSSDC ID- 71-024A-09
INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - P.A. FORSYTH WESTERN ONTARIO U
OI - G.F. LYON WESTERN ONTARIO U
OI - E.H. TULL WESTERN ONTARIO U

BRIEF DESCRIPTION
A CW TRANSMITTER (137 TO 138 MHZ BAND) RADIATING ABOUT 100 MW AND OPERATING IN CONJUNCTION WITH TRACKING BEACON (136 TO 137 MHZ BAND) PROVIDED FACILITIES FOR OBSERVING SCINTILLATIONS FROM IRREGULARITIES, DETERMINING MAGNITUDES AND POSITIONS, AND EVALUATING ELECTRON CONTENT BETWEEN GROUND OBSERVER AND SATELLITE

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

INVESTIGATION NAME- COSMIC RADIO NOISE

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

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - T.R. HARTZ COMMUN RESEARCH CENTRE

BRIEF DESCRIPTION
THIS EXPERIMENT USED THE SWEEP FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL (AGC) VOLTAGES TO MEASURE GALACTIC AND SOLAR RADIO NOISE LEVELS. THE RECEIVER SWEPT 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, HEIKKILA----------

INVESTIGATION NAME- SOFT-PARTICLE SPECTROMETER

NSSDC ID- 71-024A-05
INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - W.J. HEIKKILA U OF TEXAS, DALLAS

BRIEF DESCRIPTION
THE SOFT-PARTICLE SPECTROMETER (BASICALLY AN ELECTROSTATIC ANALYZER) WAS USED TO STUDY THE DIRECTIONAL INTENSITY AND DIFFERENTIAL ENERGY SPECTRA OF PROTONS AND ELECTRONS TO OBTAIN A GREATER UNDERSTANDING OF AURORAS, GEOMAGNETIC DISTURBANCES, AND VARIOUS IONOSPHERIC FEATURES. DIFFERENTIAL ENERGY SPECTRA WERE OBTAINED IN THE ENERGY RANGE 10 EV TO 10 KEV WITH A 20 PERCENT ENERGY RESOLUTION. THE VOLTAGE SWEEP PROGRAM OF THE ANALYZER WAS FLEXIBLE.

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

INVESTIGATION NAME- ION MASS SPECTROMETER

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

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES
ATMOSPHERIC PHYSICS

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

BRIEF DESCRIPTION
THIS MAGNETIC ION MASS SPECTROMETER EXPERIMENT WAS FLOWN TO MEASURE THE DISTRIBUTION OF THE CONCENTRATIONS OF THE 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 - R. SMIDDY USAF GEOPHYS 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 APERATURE 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.B. 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 THAT 20 AND 40 KEV PERPENDICULAR AND PARALLEL TO THE SPIN AXIS. THESE GEIGER COUNTERS WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN [illegible] 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 FERFORM 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 1973.

------- ISIS 2, WHITTEKER----------

INVESTIGATION NAME- SWEEP-FREQUENCY SOUNDER

NSSDC ID- 71-024A-01 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - J.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 - D.	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 IONOSONDE WAS A RADIO TRANSMITTER THAT RECORDED THE TIME DELAY BETWEEN A TRANSMITTED AND RETURNED RADIO FREQUENCY PULSE. A CONTINUUM OF FREQUENCIES BETWEEN 0.1 AND 20 MHZ WAS SAMPLED EVERY 14 OR 21 S, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO USED FOR SOUNDING FOR A FEW SECONDS DURING EACH 14- OR 21-S PERIOD. IN ADDITION TO THE SWEEP- AND FIXED-FREQUENCY MODES OF OPERATION, A MIXED MODE WAS AVAILABLE IN WHICH THE TRANSMITTER FREQUENCY WAS FIXED AT ONE OF SIX POSSIBLE FREQUENCIES WHILE THE RECEIVER SWEPT. 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 1**********

SPACECRAFT COMMON NAME- ISS 1
ALTERNATE NAMES- IONOSPHERE SOUNDING SAT., JISS

NSSDC ID- 76-019A

LAUNCH DATE- 02/29/76 WEIGHT- 135. KG
LAUNCH SITE- TANEGASHIMA, JAPAN
LAUNCH VEHICLE- NU

SPONSORING COUNTRY/AGENCY

JAPAN	NASDA
JAPAN	RRL

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/01/76
ORBIT PERIOD- 105. MIN INCLINATION- 69.7 DEG
PERIAPSIS- 984. KM APOAPSIS- 1017. KM

PERSONNEL

PM - Y.	OGATA	RADIO RESEARCH LAB
PS - K.	TAO	RADIO RESEARCH LAB

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

------- ISS 1, FUGONO----------

INVESTIGATION NAME- POSITIVE ION MASS SPECTROMETER (PIC)

NSSDC ID- 76-019A-04 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL

PI - N.	FUGONO	RADIO RESEARCH LAB
OI - I.	IWAMOTO	RADIO RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO MEASURE THE POSITIVE ION COMPOSITION OVER THE SPACECRAFT ORBIT. TWO BENNETT-TYPE ION MASS SPECTROMETERS WERE FLUSH MOUNTED ON OPPOSITE ENDS OF THE SPACECRAFT TO LOOK IN OPPOSITE DIRECTIONS ALONG THE SPIN AXIS. THE INSIDE DIAMETER OF THESE CYLINDRICAL SENSORS WAS 26 MM. THE MASS RANGE COVERED WAS 1 TO 20 U, AND THE ION CONCENTRATIONS WERE MEASURED OVER THE RANGE FROM 100 TO 1.E7 IONS PER CC.

------- ISS 1, MIYAZAKI----------

INVESTIGATION NAME- RETARDING POTENTIAL PROBE

NSSDC ID- 76-019A-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL

PI - S.	MIYAZAKI	RADIO RESEARCH LAB

BRIEF DESCRIPTION
THIS PROBE WAS A SPHERICAL RETARDING POTENTIAL TRAP DESIGNED TO OBSERVE AMBIENT ION AND ELECTRON DENSITIES RANGING FROM 1.E3 TO 1.E6 PER CC. AMBIENT ION AND ELECTRON TEMPERATURES IN THE RANGE 1000 TO 5000 K WERE DETERMINED. AS WITH ALL RETARDING POTENTIAL INSTRUMENTS, THESE PARAMETERS WERE DERIVED FROM INTERPRETATION OF THE CURRENT FLOW MEASUREMENT WITH A GIVEN VOLTAGE SEQUENCE APPLIED TO THE COLLECTOR AND SCREEN GRIDS. THE SENSOR WAS MOUNTED ON A BOOM EXTENDING PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. IT CONSISTED OF A 2-CM DIAMETER COLLECTOR, CONCENTRICALLY ENVELOPED BY 6- AND 10-CM DIAMETER SPHERICAL WIRE GRIDS. THE CURRENT VOLTAGE ANALOG DATA WERE TELEMETERED AND SUBSEQUENTLY ANALYZED BY THE EXPERIMENTER.

------- ISS 1, MURANAGA----------

INVESTIGATION NAME- RADIO NOISE NEAR 2.5,5,10+25 MHZ (RAN)

NSSDC ID- 76-019A-02 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PLANETARY PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - K.	MURANAGA	RADIO RESEARCH LAB

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WERE TO OBSERVE AND STUDY --(1) THE GLOBAL DISTRIBUTION OF SPHERICS AND (2) THE TIME VARIATION OF SPHERICS AND COSMIC NOISE. RADIO NOISE IN FOUR FREQUENCY CHANNELS -- 2.497, 4.997, 9.997, (OR 10.003), AND 24.994 (OR 25.006) MHZ -- WAS OBSERVED. CHARACTERISTICS OBSERVED AT EACH FREQUENCY WERE NOISE INTENSITY (RESOLUTION OF 1/12.8 S) AND OCCURENCE FREQUENCY OF IMPULSIVE NOISE (G.T. 15 DB ABOVE RESOLVED INTENSITY). DETAILS ON ISS PERFORMANCE MAY BE FOUND IN MATUURA'S 'REPORT ON DATA FROM SHORT-LIVED ISS.'

********** 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/05/76
ORBIT PERIOD- 225.41 MIN INCLINATION- 109.86 DEG
PERIAPSIS- 5837. KM APOAPSIS- 5945. KM

PERSONNEL
MG - J.P. MURPHY NASA-HEADQUARTERS
PM - C.W. JOHNSON NASA-MSFC
PM - C.C. STEPHANIDES 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 (ALTITUDE-INDEPENDENT) GEOMETRY OF THE SPACECRAFT, TOGETHER WITH THE ORBIT, MAKES THIS SATELLITE THE MOST PRECISE POSITION REFERENCE AVAILIABLE. 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 RETROFLECTORS

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

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 ACCOMODATE THE RETROREFLECTORS. THE SATELLITE WAS PLACED AT A MID-TO-HIGH ORBITAL INCLINATION AT AN ALTITUDE OF ABOUT 3700 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, 06126

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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/24/72
ORBIT PERIOD- 103.1 MIN INCLINATION- 99.1 DEG
PERIAPSIS- 897. KM APOAPSIS- 917. KM

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - J.R. MORRISON NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - S.C. FREDEN 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.

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

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 72-058A-02 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - J. ARLUSKAS NASA-GSFC

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 VIDEO 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.

------- LANDSAT 1, PAINTER----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- 72-058A-03 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - J.E. PAINTER NASA-GSFC

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**********

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

NSSDC ID- 75-004A

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

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

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

PERSONNEL

MG - H.	MANNHEIMER	NASA HEADQUARTERS
SC - J.R.	MORRISON	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 2, ARLUSKAS----------

INVESTIGATION NAME- MULTISPECTRAL SCANNER (MSS)

NSSDC ID- 75-004A-02 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

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 ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS

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 2, WEINSTEIN----------

INVESTIGATION NAME- RETURN BEAM VIDICON (RBV) CAMERA SYSTEM

NSSDC ID- 75-004A-01 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

PI - O.	WEINSTEIN	NASA-GSFC
DI - T.M.	RAGLAND	NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT 2 RETURN BEAM VIDICON (RBV) CAMERA SYSTEM CONTAINED THREE INDEPENDENT CAMERAS COVERING THE THREE SPECTRAL BANDS FROM BLUE-GREEN (0.47 TO 0.575 MICROMETERS) THROUGH YELLOW-RED (0.58 TO 0.68 MICROMETER) TO NEAR IR (0.69 TO 0.83 MICROMETER). WHILE DESIGNED PRIMARILY TO OBTAIN INFORMATION FOR EARTH RESOURCE TYPE STUDIES, THE RBV CAMERA SYSTEM WAS ALSO USED TO CONDUCT METEOROLOGICAL STUDIES, I.E., TO INVESTIGATE ATMOSPHERIC ATTENUATION AND TO OBSERVE MESOSCALE PHENOMENA, WINTER MONSOON CLOUDS (JAPAN), SNOW COVER, ETC. THE THREE EARTH-ORIENTED CAMERAS WERE MOUNTED ON A COMMON BASE, STRUCTURALLY ISOLATED FROM THE SPACECRAFT TO MAINTAIN ACCURATE ALIGNMENT. EACH CAMERA CONTAINED AN OPTICAL LENS, A 5.08-CM RBV, A THERMOELECTRIC COOLER, DEFLECTION AND FOCUS COILS, A MECHANICAL SHUTTER, ERASE LAMPS, AND SENSOR ELECTRONICS. THE CAMERAS WERE SIMILAR EXCEPT FOR THE SPECTRAL FILTERS CONTAINED IN THE LENS ASSEMBLIES THAT PROVIDED SEPARATE SPECTRAL VIEWING REGIONS. THE VIEWED GROUND SCENE, 185 BY 185 KM IN AREA, WAS

TEMPORARILY STORED ON THE PHOTOSENSITIVE SURFACE OF THE CAMERA TUBE. THE STORED IMAGE WAS THEN SCANNED BY AN ELECTRON BEAM TO PRODUCE A VIDEO SIGNAL OUTPUT. EACH CAMERA WAS READ OUT SEQUENTIALLY, REQUIRING ABOUT 3.5 S FOR EACH OF THE SPECTRAL IMAGES. THE CAMERAS WERE OPERATED EVERY 25 S TO PRODUCE OVERLAPPING IMAGES ALONG THE DIRECTION OF SPACECRAFT MOTION. VIDEO DATA FROM THE RBV WERE TRANSMITTED (AT 2265.5 MHZ) IN BOTH REAL-TIME AND TAPE-RECORDER MODES. FROM A NOMINAL SPACECRAFT ALTITUDE OF 912 KM, THE RBV HAD A HORIZONTAL RESOLUTION OF ABOUT 0.7 KM. 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 MAY OBTAIN DATA THROUGH THE EARTH RESOURCES DATA CENTER, DEPARTMENT OF THE INTERIOR, SIOUX FALLS, SD.

********** MARINER 10**********

SPACECRAFT COMMON NAME- MARINER 10
ALTERNATE NAMES- MARINER 73, PL-732A
MARINER-J VENUS/MERCURY
6919

NSSDC ID- 73-085A

LAUNCH DATE- 11/03/73 WEIGHT- 504. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MERCURY FLYBY

PERSONNEL

MG - N.W.	CUNNINGHAM	NASA HEADQUARTERS
SC - S.E.	DWORNIK	NASA HEADQUARTERS
PM - W.E.	GIBERSON	NASA-JPL
PS - J.A.	DUNNE	NASA-JPL

BRIEF DESCRIPTION
THIS SPACECRAFT WAS THE FIRST TO USE THE GRAVITATIONAL PULL OF ONE PLANET (VENUS) TO REACH ANOTHER (MERCURY). THE SPACECRAFT STRUCTURE WAS AN 18.15-KG (40 LB), EIGHT-SIDED FRAMEWORK WITH EIGHT ELECTRONICS COMPARTMENTS. IT MEASURED 1.39 M DIAGONALLY AND 0.457 M IN DEPTH. TWO SOLAR PANELS, EACH 2.7 M LONG AND 0.97 M WIDE, WERE ATTACHED AT THE TOP, SUPPORTING 5.1 SQ M OF SOLAR CELL AREA. THE ROCKET ENGINE WAS LIQUID-FUELED, WITH TWO SETS OF REACTION JETS USED TO STABILIZE THE SPACECRAFT ON THREE AXES. IT CARRIED A LOW-GAIN OMNIDIRECTIONAL ANTENNA, COMPOSED OF A HONEYCOMB-DISC PARABOLIC REFLECTOR, 1.37 M IN DIAMETER, WITH FOCAL LENGTH 55 CM. FEEDS ENABLED THE SPACECRAFT TO TRANSMIT AT S-BAND AND X-BAND FREQUENCIES. THE SPACECRAFT CARRIED A CANOPUS STAR TRACKER, LOCATED ON THE UPPER RING STRUCTURE OF THE OCTAGONAL SATELLITE, AND ACQUISITION SUN SENSORS ON THE TIPS OF THE SOLAR PANELS. THE INTERIOR OF THE SPACECRAFT WAS INSULATED WITH MULTILAYER THERMAL BLANKETS AT TOP AND BOTTOM. A SUNSHADE WAS DEPLOYED AFTER LAUNCH TO PROTECT THE SPACECRAFT ON THE SOLAR-ORIENTED SIDE. INSTRUMENTS ABOARD THE SPACECRAFT MEASURED THE ATMOSPHERIC, SURFACE, AND PHYSICAL CHARACTERISTICS OF MERCURY AND VENUS. EXPERIMENTS INCLUDED TELEVISION PHOTOGRAPHY, MAGNETIC FIELD, PLASMA, INFRARED RADIOMETRY, ULTRAVIOLET SPECTROSCOPY, AND RADIO SCIENCE DETECTORS. AN EXPERIMENTAL X-BAND, HIGH-FREQUENCY TRANSMITTER WAS FLOWN FOR THE FIRST TIME ON THIS SPACECRAFT. MARINER 10 WAS PLACED IN A PARKING ORBIT AFTER LAUNCH FOR APPROXIMATELY 25 MIN, THEN PLACED IN ORBIT AROUND THE SUN ENROUTE TO VENUS. THE ORBIT DIRECTION WAS OPPOSITE TO THE MOTION OF THE EARTH AROUND THE SUN. MID-COURSE CORRECTIONS WERE MADE. THE SPACECRAFT PASSED VENUS ON FEBRUARY 5, 1974, AT A DISTANCE OF 4200 KM. IT CROSSED THE ORBIT OF MERCURY ON MARCH 29, 1974, AT 2046UT, AT A DISTANCE OF ABOUT 704 KM FROM THE SURFACE. THE TV AND UV EXPERIMENTS WERE TURNED ON THE COMET KOHOUTEK WHILE THE SPACECRAFT WAS ON THE WAY TO VENUS. A SECOND ENCOUNTER WITH MERCURY, WHEN MORE PHOTOGRAPHS WERE TAKEN, OCCURRED ON SEPTEMBER 21, 1974, AT AN ALTITUDE OF ABOUT 47,000 KM. A THIRD AND LAST MERCURY ENCOUNTER AT AN ALTITUDE OF 327 KM, WITH ADDITIONAL PHOTOGRAPHY OF ABOUT 300 PHOTOGRAPHS AND MAGNETIC FIELD MEASUREMENTS OCCURRED ON MARCH 16, 1975. ENGINEERING TESTS WERE CONTINUED UNTIL MARCH 24, 1975, WHEN THE SUPPLY OF ATTITUDE CONTROL GAS WAS DEPLETED AND THE MISSION WAS TERMINATED.

------- MARINER 10, BRIDGE-------

INVESTIGATION NAME- MEASUREMENT OF PLASMA ENVIRONMENT

NSSDC ID- 73-085A-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - H.S.	BRIDGE	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 - S.J.	BAME	LOS ALAMOS SCI LAB
OI - M.B.	MONTGOMERY	LOS ALAMOS SCI LAB
OI - A.J.	HUNDHAUSEN	NATL CTR FOR ATMOS RES
OI - J.R.	ASBRIDGE	LOS ALAMOS SCI LAB
OI - K.W.	OGILVIE	NASA-GSFC
OI - L.F.	BURLAGA	NASA-GSFC
OI - R.E.	HARTLE	NASA-GSFC
OI - C.W.	SNYDER	NASA-JPL
OI - G.L.	SISCOE	U OF CALIF, LA

BRIEF DESCRIPTION
THE EXPERIMENT WAS DESIGNED TO DETERMINE THE MODE OF INTERACTION BETWEEN THE PLANET MERCURY AND THE SOLAR WIND, TO MAKE A COMPREHENSIVE STUDY OF THE PLASMA REGIME AT MERCURY, TO VERIFY AND EXTEND PREVIOUS OBSERVATIONS OF THE SOLAR WIND INTERACTION WITH VENUS, TO CLARIFY THE ROLE OF ELECTRONS IN THE INTERACTIONS, AND TO STUDY THE SOLAR WIND FORM 1 TO 0.4 AU. INSTRUMENTATION FOR THE EXPERIMENT CONSISTED OF TWO SUNWARD FACING ELECTROSTATIC ANALYZERS (SESA) AND ONE BACKWARD FACING ELECTRON SPECTROMETER (BESA). THESE THREE DETECTORS WERE MOUNTED ON A SCANNING PLATFORM, WHICH COULD BE SWEPT AT 1 DEG PER SEC THROUGH AN ARC OF 120 DEG CENTERED ON A DIRECTION IN THE ECLIPTIC PLANE 6 DEG EAST OF THE SPACECRAFT-SUN LINE. BOTH SESAS FAILED TO RETURN DATA. THEY WERE TO MEASURE POSITIVE IONS FROM 0.08 TO 8 KEV AND ELECTRONS FROM 4 TO 400 EV. THE BESA HAD A FAN-SHAPED FIELD OF VIEW OF PLUS OR MINUS 3.5 DEG BY PLUS OR MINUS 13.5 DEG. THE LARGER ANGLE WAS NORMAL TO, AND SYMMETRIC ABOUT, THE SCAN ARC. AN ELECTRON SPECTRUM WAS OBTAINED EVERY 6 S, AND CONSISTED OF FLUX MEASUREMENTS IN 15 LOGARITHMICALLY-SPACED ENERGY CHANNELS (WITH CHANNEL WIDTH DELTA E/E = 6.6 PERCENT) WITHIN THE ENERGY RANGE 13.4 TO 690 EV. BECAUSE SOLAR WIND FLOW PAST THE SPACECRAFT INTRODUCES ANGULAR DISTORTION OF THE ELECTRON DISTRIBUTION FUNCTION COMPARED TO WHAT WOULD BE OBSERVED IN THE SOLAR WIND REST FRAME, IT WAS POSSIBLE, BY TAKING INTO ACCOUNT THIS DISTORTION AND THE SPACECRAFT SHEATH CHARACTERISTICS, TO DERIVE SOME OF THE SOLAR WIND PLASMA PARAMETERS SUCH AS ION BULK SPEED, ELECTRON TEMPERATURE, AND ELECTRON DENSITY. THE RELIABILITY OF THESE PARAMETERS IS NECESSARILY DEPENDENT ON THE VALIDITY OF THE SPACECRAFT SHEATH MODEL EMPLOYED IN THE ANALYSIS, AND IS THUS AFFECTED BY TIME CHANGES IN THE AMBIENT SOLAR WIND.

------- MARINER 10, CHASE, JR.-------

INVESTIGATION NAME- TWO-CHANNEL IR RADIOMETER

NSSDC ID- 73-085A-06 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - S.C.	CHASE, JR.	SANTA BARBARA RES CTR
OI - E.D.	MINER	NASA-JPL
OI - D.	MORRISON	U OF HAWAII
OI - G.	MUNCH	CALIF INST OF TECH
OI - G.	NEUGEBAUER	CALIF INST OF TECH
OI - J.M.	SAARI	BOEING SCI RES LAB

BRIEF DESCRIPTION
AN INFRARED RADIOMETER HAVING TWO CHANNELS, 22 TO 39 MICROMETERS (80 K TO 500 K) AND 10 TO 17 MICROMETERS (200 K TO 650 K), WAS USED TO OBSERVE THE THERMAL EMISSION FROM VENUS AND MERCURY IN TWO BROAD SPECTRAL BANDS. THE IR THERMAL EMISSION FROM THE SURFACE OF MERCURY BETWEEN LATE AFTERNOON AND EARLY MORNING (LOCAL TIME) AND DEVIATIONS FROM THE AVERAGE THERMAL BEHAVIOR OF THE SURFACE WAS MEASURED. MEASUREMENTS WERE ALSO MADE OF THE BRIGHTNESS TEMPERATURES OF VENUSIAN CLOUD TOPS AND LIMB DARKENING PHENOMENA. ATTEMPTS WERE MADE TO CORRELATE UNUSUAL TEMPERATURE VARIATIONS WITH PHOTOGRAPHS AND MEASUREMENTS BY OTHER INSTRUMENTS TO IDENTIFY MOUNTAINS/VALLEYS, VOLCANOES, AND UNUSUAL SURFACE MATERIALS.

------- MARINER 10, HOWARD-------

INVESTIGATION NAME- S- AND X-BAND RADIO PROPAGATION

NSSDC ID- 73-085A-02 INVESTIGATIVE PROGRAM
CODE SL

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

PERSONNEL

PI - H.T.	HOWARD	STANFORD U
OI - G.S.	LEVY	NASA-JPL
OI - I.I.	SHAPIRO	MASS INST OF TECH
OI - G.	FJELDBO	NASA-JPL
OI - A.J.	KLIORE	NASA-JPL
OI - J.D.	ANDERSON	NASA-JPL

BRIEF DESCRIPTION
THIS EXPERIMENT USED X- (8400 MHZ) AND S- (2113 MHZ) BAND, ON-BOARD RADIO SYSTEMS FOR WHATEVER SCIENTIFIC PURPOSES COULD BE DEVISED. TWO PRIMARY APPROACHES WERE MADE, ONE UTILIZING TRACKING INFORMATION, THE OTHER TAKING ADVANTAGE OF RADIO TRAJECTORY VARIATIONS ASSOCIATED WITH OCCULTATION OF THE EARTH-SPACECRAFT SIGNAL. TRACKING INFORMATION WAS ANALYZED TO DETERMINE MASS AND GRAVITATIONAL CHARACTERISTICS (INCLUDING PLANETARY INTERNAL COMPOSITION AND DENSITY ESTIMATES) OF BOTH VENUS AND MERCURY. FROM ANOMALOUS CHARACTERISTICS OBSERVED IN THE X- AND S-BAND SIGNALS DURING SPACECRAFT PASSAGE THROUGH THE PLANETARY ATMOSPHERES JUST PRIOR TO, AND SUBSQUENT TO,

OCCULTATION, TEMPERATURE AND PRESSURE PROFILES WERE CALCULATED. THESE PROFILES WERE USEFUL TO ADJUST ATMOSPHERIC COMPOSITION MODELS. SIGNAL CUT-OFF PROVIDED USEFUL INFORMATION FOR DETERMINATION OF PLANETARY RADIUS.

------- MARINER 10, MURRAY----------

INVESTIGATION NAME- TELEVISION PHOTOGRAPHY

NSSDC ID- 73-085A-01 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI - B.C.	MURRAY	CALIF INST OF TECH
OI - M.J.S.	BELTON	KITT PEAK NATL OBS
OI - G.P.	KUIPER(DECEASED)	
OI - V.E.	SUOMI	U OF WISCONSIN
OI - N.J.	TRASK, JR.	US GEOLOGICAL SURVEY
OI - D.E.	GAULT	NASA-ARC
OI - B.W.	HAPKE	U OF PITTSBURGH
OI - M.E.	DAVIES	RAND CORP
OI - B.T.	O'LEARY	PRINCETON U

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WERE TO PHOTOGRAPH THE SURFACES (UPPER ATMOSPHERE IN THE CASE OF VENUS) OF THE PLANETS VENUS AND MERCURY. FOR VENUS, THE OBJECTIVES WERE TO INVESTIGATE THE TIME-DEPENDENT PROPERTIES OF THE UV CLOUDS, AND TO OBTAIN HIGH-RESOLUTION IMAGERY OF THE MAIN CLOUDS. FOR MERCURY, THE OBJECTIVES WERE TO MAP ITS MAJOR PHYSIOGRAPHIC PROVINCES, DETERMINE ITS SPIN AXIS ORIENTATION, ESTABLISH A CARTOGRAPHIC COORDINATE SYSTEM, AND SEARCH FOR MERCURIAN SATELLITES. THE EQUIPMENT CONSISTED OF TWO SPHERICAL (150 MM DIAMETER) CASSEGRAIN TELESCOPES WITH EIGHT FILTERS, ATTACHED TO GEC 1-INCH VIDICON TUBE CAMERAS (1500 MM FOCAL LENGTH AND 0.5 DEG FIELD OF VIEW) FOR NARROW-ANGLE PHOTOGRAPHY. AN AUXILIARY OPTICAL SYSTEM MOUNTED ON EACH CAMERA PROVIDED WIDE-ANGLE (62 MM FOCAL LENGTH AND 11 X 14 DEG FIELD OF VIEW) PHOTOGRAPHY BY MOVING A MIRROR ON A FILTER WHEEL TO A POSITION IN THE OPTICAL PATH. EXPOSURE TIME RANGED FROM 3 MS TO 12 SECS, AND EACH CAMERA TOOK A PICTURE EVERY 42 SECS. THE TV PICTURE CONSISTED OF 700 SCAN LINES WITH 832 PICTURE ELEMENTS/LINE, WHICH WERE DIGITALLY CODED INTO 8-BIT WORDS FOR TRANSMISSION. THERE WERE EIGHT FILTER WHEEL POSITIONS: (1) WIDE-ANGLE IMAGE RELAY MIRROR, (2) BLUE BANDPASS, (3) UV POLARIZING, (4) MINUS UV HIGH PASS, (5) CLEAR, (6) UV BANDPASS, (7) DEFOCUSSING LENS (FOR CALIBRATION), AND (8) YELLOW BANDPASS. ABOUT 7000 PHOTOGRAPHS WERE OBTAINED OF VENUS AND MERCURY, WITH A MAXIMUM RESOLUTION OF 100 M FOR MERCURY. THREE PHOTOGRAPHIC PASSES, SEPARATED BY SIX-MONTH INTERVALS WERE MADE FOR MERCURY. FURTHER DETAILS OF THE EXPERIMENT CAN BE OBTAINED FROM NSSDC 75-18, AND 'ICARUS,' 25, 2, OCTOBER 1971. SCIENCE RESULTS ON MERCURY MAY BE OBTAINED FROM 'J. GEOPHYS. RESEARCH,' 80, 17, JUNE 1975, AND ON VENUS IN 'SCIENCE,' 183, 4131, MARCH 1974.

------- MARINER 10, NESS----------

INVESTIGATION NAME- FLUXGATE MAGNETOMETERS

NSSDC ID- 73-085A-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETOLOGY

PERSONNEL

PI - N.F.	NESS	NASA-GSFC
OI - K.W.	BEHANNON	NASA-GSFC
OI - R.P.	LEPPING	NASA-GSFC
OI - Y.C.	WHANG	CATHOLIC U OF AMERICA

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF TWO TRIAXIAL FLUXGATE MAGNETOMETERS MOUNTED ON A COMMON BOOM 2.3 M AND 5.8 M FROM THE SPACECRAFT AND DESIGNED TO MEASURE THE VECTOR MAGNETIC FIELD IN THE VICINITY OF MERCURY AND VENUS AND IN THE INTERPLANETARY MEDIUM. OUTPUTS FROM THE TWO MAGNETOMETERS WERE SIMULTANEOUSLY ANALYZED TO SEPARATE AMBIENT FIELDS FROM SPACECRAFT FIELDS. EACH SENSOR HAD DUAL OPERATING RANGES OF MINUS TO PLUS 16 GAMMAS AND 128 GAMMAS, WITH DIGITIZATION ACCURACIES OF 0.03 GAMMAS AND 0.26 GAMMAS, RESPECTIVELY. BIAS OFFSET CAPABILITY EXTENDED THE OPERATING RANGE TO MINUS OR PLUS 3188 GAMMAS. DURING THE PRIMARY PHASE OF THE MISSION (NOVEMBER 3, 1973 TO MARCH 29, 1974) AND DURING THE SECOND AND THIRD MERCURY ENCOUNTERS, 25 VECTORS PER SECOND WERE SAMPLED BY THE PRIMARY OUTBOARD MAGNETOMETER AND TRANSMITTED TO EARTH. AT OTHER TIMES, A LOWER DATA RATE MODE WAS USED DURING WHICH FIVE VECTORS PER SECOND WERE TRANSMITTED. THE EXPERIMENT FUNCTIONED NORMALLY THROUGHOUT THE LIFE OF THE SPACECRAFT. FOR FURTHER DETAILS, SEE NESS, N.F. ET AL, SCIENCE, 183, 1301.

------- MARINER 10, SIMPSON----------

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- 73-085A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.A.	SIMPSON	U OF CHICAGO
OI - J.E.	LAMPORT	U OF CHICAGO

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE ENERGETIC ELECTRONS, PROTONS, AND ALPHA PARTICLES IN THE INTERPLANETARY MEDIUM AND IN THE VICINITIES OF VENUS AND MERCURY. THE INSTRUMENTATION CONSISTED OF A MAIN TELESCOPE AND A LOW-ENERGY TELESCOPE. THE MAIN TELESCOPE CONSISTED OF SIX COLINEAR SENSORS (FIVE SILICON DETECTORS AND ONE CSI SCINTILLATOR) SURROUNDED BY A PLASTIC SCINTILLATOR ANTICOINCIDENCE CUP. ONE INCIDENT PARTICLE WAS PULSE HEIGHT ANALYZED EVERY 0.33 S, AND COUNTS ACCUMULATED IN EACH COINCIDENCE/ANTICOINCIDENCE MODE WERE MEASURED EVERY 0.6 S. PARTICLES STOPPING IN THE FIRST SENSOR WERE PROTONS AND ALPHA PARTICLES IN THE RANGE 0.62-10.3 MEV/NUCLEON AND ELECTRONS ABOVE APPROXIMATELY 170 KEV. THE APERTURE HALF ANGLE FOR THIS MODE WAS 47 DEG, AND THE GEOMETRIC FACTORS WERE 14 SQ CM STER FOR ELECTRONS AND 7.4 SQ CM STER FOR PROTONS AND ALPHA PARTICLES. THE TELESCOPE APERTURE HALF ANGLE DECREASED TO 32 DEG FOR COINCIDENT COUNTS IN THE FIRST AND THIRD SENSORS. THE LOW ENERGY TELESCOPE, A TWO ELEMENT (PLUS AN COINCIDENCE) DETECTOR WITH A 38 DEG HALF ANGLE APERTURE AND A 0.49 SQ CM STER GEOMETRICAL FACTOR, WAS DESIGNED TO MEASURE 0.53-1.9 AND 1.9-8.9 MEV PROTONS WITHOUT RESPONDING TO ELECTRONS OVER A WIDE RANGE OF ELECTRON ENERGIES AND INTENSITIES. SEE 'JGR,' 80, 4018 AND REFERENCES THEREIN FOR FURTHER DETAILS.

********** METEOROID TECHNOLOGY SAT**********

SPACECRAFT COMMON NAME- METEOROID TECHNOLOGY SAT
ALTERNATE NAMES- METEC, MTS
06142, EXPLORER 46

NSSDC ID- 72-061A

LAUNCH DATE- 08/13/72 WEIGHT- 90. KG
LAUNCH SITE- WALLOPS FLIGHT CENTER, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OAST

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/13/72
ORBIT PERIOD- 97.8 MIN INCLINATION- 37.7 DEG
PERIAPSIS- 496. KM APOAPSIS- 814. KM

PERSONNEL

PM - C.V.	WOERNER	NASA-LARC
PS - W.H.	KINARD	NASA-LARC

BRIEF DESCRIPTION
THE OBJECTIVES OF THE METEOROID TECHNOLOGY SATELLITE WERE TO MEASURE THE METEOROID PENETRATION RATES IN A BUMPER-PROTECTED TARGET, AND TO OBTAIN DATA ON METEOROID VELOCITY AND FLUX DISTRIBUTION. THE CENTRAL HUB OF THE SATELLITE WAS 320 CM LONG AND CARRIED THE VELOCITY AND IMPACT EXPERIMENTS. BUMPER TARGETS EXTENDED FROM THE SATELLITE, GIVING IT AN OVERALL WIDTH OF 701.5 CM.

------- METEOROID TECHNOLOGY SAT, HUMES----------

INVESTIGATION NAME- METEOROID PENETRATION

NSSDC ID- 72-061A-01 INVESTIGATIVE PROGRAM
CODE R

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY DUST

PERSONNEL

PI - D.H.	HUMES	NASA-LARC
OI - W.H.	KINARD	NASA-LARC

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WAS TO MEASURE THE METEOROID PENETRATION RATES OF A BUMPER-PROTECTED TARGET. PENETRATIONS WERE MEASURED, USING 12 2-MIL STAINLESS-STEEL PRESSURE CELLS LOCATED BEHIND 1-MIL STAINLESS-STEEL BUMPERS. THESE 12 CELLS WERE MOUNTED ON 4 BUMPER PANELS WHICH EXTENDED OUT FROM THE CYLINDRICAL SPACECRAFT BODY. DUE TO A MALFUNCTION, ONLY TWO OF THE FOUR BUMPER PANELS, DEPLOYED.

********** 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/09/70
ORBIT PERIOD- 107.2 MIN INCLINATION- 80.114 DEG
PERIAPSIS- 1092. KM APOAPSIS- 1108. KM

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - M. TEPPER 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 STABOLIZED, 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, COTE----------

INVESTIGATION NAME- INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS)

NSSDC ID- 70-025A-07 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - C.E. COTE NASA-GSFC

BRIEF DESCRIPTION
THE NIMBUS 4 INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS) EXPERIMENT WAS DESIGNED TO COLLECT AND RETRANSMIT METEOROLOGICAL, GEOPHYSICAL, AND OTHER EXPERIMENTAL DATA FROM REMOTE UNMANNED DATA COLLECTION STATIONS (PLATFORMS) DEPLOYED ON A GLOBAL SCALE. THE IRLS COULD ALSO DETERMINE THE LOCATION AND TRACK THE MOVEMENT OF SUCH PLATFORMS AS BALLOONS, OCEAN BUOYS, AND SHIPS TO WITHIN AN ACCURACY OF 2 KM. THE IRLS CONSISTED OF (1) A 466-MHZ RECEIVER, (2) A 401.5-MHZ TRANSMITTER, (3) DECODING AND CODING CIRCUITS, (4) A RANGE DETECTOR, AND (5) A 100-KB SATELLITE DATA MEMORY CAPABLE OF STORING DATA OBTAINED DURING EACH ORBIT FOR UP TO 370 DIFFERENT INTERROGATIONS. ON EACH ORBIT PASS, WHEN THE SATELLITE WAS WITHIN RANGE OF AN ACQUISITION AND COMMAND STATION, THE SATELLITE COMMAND MEMORY WAS PROGRAMMED TO COMMUNICATE WITH SELECTED PLATFORMS DURING THE COMING ORBIT. THE SATELLITE STORED BOTH THE ADDRESS (NUMBER) OF EACH PLATFORM AND THE DESIRED TIME THAT EACH SHOULD BE CONTACTED. AT THE APPROPRIATE TIME IN ORBIT, THE SATELLITE INTERROGATED EACH PLATFORM, MEASURED THE SATELLITE TO PLATFORM DISTANCE BY DETERMINING THE ROUND TRIP PROPAGATION TIME OF THE RF SIGNAL, RECEIVED THE ANALOG DATA FROM THE PLATFORM, CONVERTED IT TO DIGITAL FORM, AND STORED IT. UPON RETURN TO THE LOCALE OF THE GROUND STATION, THE STATION COMMANDED THE SATELLITE TO TRANSMIT THE STORED DATA AND TO ACCEPT NEW COMMANDS FOR THE NEXT ORBIT. A LISTING OF IRLS TRACKING DATA FROM CONSTANT-LEVEL BALLOONS (30 AND 50 MB) APPEARS IN THE 'NIMBUS 4 DATA CATALOG,' VOLUME 4. COPIES OF COMPUTER OUTPUTS FROM INDIVIDUAL PLATFORM EXPERIMENTS ARE RETAINED AT THE NIMBUS/ATS DATA UTILIZATION CENTER, NASA-GSFC, GREENBELT, MD.

------- NIMBUS 4, HEATH----------

INVESTIGATION NAME- BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER

NSSDC ID- 70-025A-05 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - D.F. HEATH NASA-GSFC
OI - J.V. DAVE UNKNOWN
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-EBERT 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/11/72
ORBIT PERIOD- 107.2 MIN INCLINATION- 99.9 DEG
PERIAPSIS- 1089. KM APOAPSIS- 1101. KM

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - M. TEPPER 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 ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T.	HOUGHTON	OXFORD U
OI - S.D.	SMITH	READING U

BRIEF DESCRIPTION

THE NIMBUS 5 SELECTIVE CHOPPER RADIOMETER (SCR) WAS DESIGNED TO (1) OBSERVE THE GLOBAL TEMPERATURE STRUCTURE OF THE ATMOSPHERE UP TO 50 KM IN ALTITUDE, (2) MAKE SUPPORTING OBSERVATIONS OF WATER VAPOR DISTRIBUTION, AND (3) DETERMINE THE DENSITY OF ICE PARTICLES IN CIRRUS CLOUDS. TO ACCOMPLISH THESE OBJECTIVES, THE SCR MEASURED EMITTED RADIATION IN 16 SPECTRAL INTERVALS SEPARATED INTO THE FOLLOWING FOUR GROUPS -- (1) FOUR CO2 CHANNELS BETWEEN 13.8 AND 14.8 MICROMETERS (2) AN IR WINDOW CHANNEL AT 11.1 MICROMETERS AND A WATER VAPOR CHANNEL AT 18.6 MICROMETERS, (3) TWO CHANNELS AT 49.5 AND 133.3 MICROMETERS, AND (4) 2.08, 2.59, 2.65, AND 3.5 MICROMETERS. FROM AN AVERAGE SATELLITE ALTITUDE OF 1100 KM, THE RADIOMETER VIEWED A 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, MCCULLOCH----------

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- 72-097A-08

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - A.W.	MCCULLOCH	NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 5 TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) WAS DESIGNED TO DETECT EMITTED THERMAL RADIATION IN BOTH THE 10.5- TO 12.5-MICROMETER REGION (IR WINDOW) AND THE 6.5- TO 7.0-MICROMETER REGION (WATER VAPOR). THE WINDOW CHANNEL MEASURED CLOUDTOP TEMPERATURES AND WAS CAPABLE OF PRODUCING CLOUDCOVER AND THERMAL GRADIENTS ON LAND AND WATER SURFACES IN CLOUD-FREE AREAS DURING BOTH THE DAY AND NIGHT PORTIONS OF THE ORBIT. THE OTHER CHANNEL OPERATED PRIMARILY AT NIGHT TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND STRATOSPHERE. SENSOR DATA FROM THESE TWO CHANNELS WERE PRIMARILY USED TO SUPPORT THE OTHER, MORE SOPHISTICATED METEOROLOGICAL EXPERIMENTS ON BOARD NIMBUS 5. THE INSTRUMENT CONSISTED OF A 12.7-CM CASSEGRAIN SYSTEM, A SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BOLOMETERS. IN CONTRAST TO TV, NO IMAGE WAS FORMED WITHIN THE RADIOMETER. INCOMING RADIANT ENERGY WAS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATED AT 48 RPM AND SCANNED IN A PLANE PERPENDICULAR TO THE SPACECRAFT VELOCITY. THE ENERGY WAS FOCUSED ON A DICHROMATIC BEAM SPLITTER, WHICH DIVIDED THE ENERGY SPECTRALLY AND SPATIALLY INTO THE TWO CHANNELS. BOTH CHANNELS OF THE THIR SENSOR TRANSFORMED THE RECEIVED RADIATION INTO AN ELECTRIC OUTPUT (VOLTAGES), WHICH WAS RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

------- NIMBUS 5, SMITH----------

INVESTIGATION NAME- INFRARED TEMPERATURE PROFILE RADIOMETER (ITPR)

NSSDC ID- 72-097A-01

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - W.L.	SMITH	NOAA-NESS
OI - D.Q.	WARK	NOAA-NESS

BRIEF DESCRIPTION

THE NIMBUS 5 INFRARED TEMPERATURE PROFILE RADIOMETER (ITPR) EXPERIMENT WAS DESIGNED TO TEST THE FEASIBILITY AND OPERATIONAL APPLICATIONS OF A REMOTE SOUNDING TECHNIQUE USING SIMULTANEOUS MEDIUM-RESOLUTION (32 KM) MEASUREMENTS IN NINE SPECTRAL INTERVALS. THE RADIOMETER SENSED SIX INTERVALS IN THE 15-MICROMETER CO2 BAND, ONE INTERVAL IN THE WATER VAPOR ROTATIONAL BAND NEAR 20 MICROMETERS AND TWO SPECTRAL INTERVALS IN THE ATMOSPHERIC WINDOW REGIONS NEAR 5.8 AND 11 MICROMETERS. THE ITPR VIEWED THE EARTH SUCCESSIVELY AT VARIOUS ANGLES DISTRIBUTED SYMMETRICALLY ABOUT NADIR IN A PLANE NORMAL TO THE ORBITAL TRACK. FORTY-TWO GEOGRAPHICALLY INDEPENDENT SCAN SPOTS WERE TAKEN ALONG A SINGLE STRIP. AS THE SATELLITE PROGRESSED ALONG ITS ORBITAL PATH, THE RADIOMETER OBSERVED 10 SUCH '42-SPOT' STRIPS TO FORM A MATRIX OF INDEPENDENT SCAN SPOTS. EACH MATRIX WAS PRODUCED IN 222 S WITH THE WHOLE SCANNING SEQUENCE REPEATED EVERY 240 S. THE MATRIX DATA WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION. MATRIX MEASUREMENTS TAKEN IN THE CO2 AND WATER VAPOR ABSORPTION BANDS WERE USED TO CALCULATE TEMPERATURE PROFILES AND TOTAL WATER VAPOR CONTENT IN THE TROPOSPHERE AND LOWER STRATOSPHERE. THE TWO WINDOW MEASUREMENTS HELPED TO DETECT AND ELIMINATE CLOUD CONTAMINATION OF THE RADIANCES, THUS PERMITTING ACTUAL DETERMINATION OF PROFILES DOWN TO THE EARTH'S SURFACE IN ALL BUT COMPLETELY OVERCAST AREAS.

------- NIMBUS 5, STAELIN----------

INVESTIGATION NAME- NIMBUS 5 MICROWAVE SPECTROMETER (NEMS)

NSSDC ID- 72-097A-03

INVESTIGATIVE PROGRAM
CODE ERN

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 - N.E.	GAUT	UNKNOWN
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 ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - T.T. WILHEIT, JR.		NASA-GSFC
OI - P. GLOERSEN		NASA-GSFC

BRIEF DESCRIPTION

THE PRIMARY OBJECTIVES OF THE NIMBUS 5 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) WERE (1) TO DERIVE THE LIQUID WATER CONTENT OF CLOUDS FROM BRIGHTNESS TEMPERATURES OVER OCEANS, (2) TO OBSERVE DIFFERENCES BETWEEN SEA ICE AND THE OPEN SEA OVER THE POLAR CAPS, AND (3) TO TEST THE FEASIBILITY OF INFERRING SURFACE COMPOSITION AND SOIL MOISTURE. TO ACCOMPLISH THESE OBJECTIVES, THE ESMR WAS CAPABLE OF CONTINUOUS GLOBAL MAPPING OF THE 1.55-CM (19.36 GHZ) RADIO THERMAL (MICROWAVE) RADIATION EMITTED BY THE EARTH/ATMOSPHERE SYSTEM AND COULD FUNCTION EVEN IN THE PRESENCE OF CLOUD CONDITIONS THAT BLOCK CONVENTIONAL SATELLITE INFRARED SENSORS. A 90- BY 90-CM RADIOMETER ANTENNA SYSTEM, DEPLOYED AFTER LAUNCH, SCANNED THE EARTH SUCCESSIVELY AT VARIOUS ANGLES IN A PLANE PERPENDICULAR TO THE SPACECRAFT ORBITAL TRACK, PRODUCING A BRIGHTNESS TEMPERATURE MAP OF THE SURFACE OF THE EARTH AND ITS ATMOSPHERE. THE SCANNING PROCESS WAS CONTROLLED BY A COMPUTER ON BOARD AND CONSISTED OF 78 SYMMETRICALLY DISTRIBUTED INDEPENDENT SCAN SPOTS EXTENDING 50 DEG TO EITHER SIDE OF NADIR. ANGULAR SEPARATION OF THE SCAN SPOTS ALLOWED FOR AN 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-731B, 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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/12/75
ORBIT PERIOD- 107.3 MIN INCLINATION- 100. DEG
PERIAPSIS- 1093.00 KM APOAPSIS- 1101.00 KM

PERSONNEL

MG - H. MANNHEIMER		NASA HEADQUARTERS
SC - M. TEPPER		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 CC ECTING 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, GILLE-------

INVESTIGATION NAME- LIMB RADIANCE INVERSION RADIOMETER (LRIR)

NSSDC ID- 75-052A-04 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.C. GILLE		NATL CTR FOR ATMOS RES
OI - F.B. HOUSE		DREXEL U
OI - R.A. CRAIG		FLORIDA STATE U
OI - J.C. BATES		UNKNOWN

BRIEF DESCRIPTION

THE NIMBUS 6 LIMB RADIANCE INVERSION RADIOMETER (LRIR) PROVIDED CALIBRATED RADIANCE VERSUS ALTITUDE PROFILES BY INTERCEPTING RADIATION EMANATING FROM AN ATMOSPHERIC PATH WHICH IS TANGENTIAL TO A PARTICULAR GEOCENTRIC HEIGHT. THE LRIR SENSED RADIATION IN FOUR SPECTRAL INTERVALS -- (1) THE 14.6- TO 15.9-MICROMETER CO2 BAND, (2) THE 14.2- TO 17.3-MICROMETER CO2 BAND, (3) THE 8.8- TO 10.1-MICROMETER OZONE BAND, AND (4) THE 20- TO 25-MICROMETER WATER VAPOR ROTATIONAL BAND. MEASUREMENTS TAKEN IN THE TWO CO2 CHANNELS AND THE WATER VAPOR CHANNEL WERE USED TO CALCULATE GLOBAL TEMPERATURE AND WATER VAPOR PROFILES IN THE STRATOSPHERE AND LOWER MESOSPHERE. IN ADDITION, VALUES OF THE GEOSTROPHIC WIND UP TO 1 MB (APPROXIMATELY 48 KM) WERE DERIVED ANALYTICALLY FROM THE DEDUCED TEMPERATURE PROFILES. THE RADIOMETER INCLUDED AN OPTICAL SYSTEM, A SCANNING MIRROR, CHOPPERS, AND ASSOCIATED ELECTRONICS AND EMPLOYED AN AMMONIA-METHANE COOLER SYSTEM FOR THREE OF THE FOUR DETECTOR CHANNELS. WHILE THE DEDUCED TEMPERATURE PROFILES HAD AN RMS ACCURACY OF PLUS OR MINUS 3 DEG AT HEIGHTS ABOVE 15 KM, THE VALUES FOR OZONE WERE ACCURATE TO WITHIN PLUS OR MINUS 20 PERCENT AT 1 MB. WATER VAPOR VALUES AT THE SAME HEIGHT WERE WITHIN 50 PERCENT.

------- NIMBUS 6, HOUGHTON-------

INVESTIGATION NAME- PRESSURE-MODULATED RADIOMETER (PMR)

NSSDC ID- 75-052A-09 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T. HOUGHTON		OXFORD U
OI - C.D. 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 100K 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 INFLIGHT RANGE AND ZERO CALIBRATION. THE MOTOR WAS MOUNTED ON A PAIR OF FLEXIBLE PIVOTS SO THAT THE MIRROR CAN BE ROTATED THROUGH PLUS OR MINUS 7-1/2 DEG FROM ITS REST POSITION TO GIVE THE REQUIRED DOPPLER SCAN. MAJOR COMPONENTS IN THE PRESSURE MODULATOR CELL WERE A MOVABLE PISTON, A DIAPHRAGM, AND A MAGNETIC DRIVE COIL. THE DETECTOR ASSEMBLY CONSISTED OF A FIELD LENS, A CONDENSING LIGHT PIPE, AND A PYROELECTRIC FLAKE BOLOMETER. EACH RADIOMETER HAD A FIELD OF VIEW THAT WAS 20-DEG WHOLE ANGLE ACROSS THE SPACECRAFT'S LINE OF FLIGHT AND 40-DEG WHOLE ANGLE PARALLEL TO THE LINE OF FLIGHT. THE REDUCED TEMPERATURE VALUES WERE WITHIN PLUS OR MINUS 2 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 ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY
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 CUTDOWN 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, MCCULLOCH----------

INVESTIGATION NAME- TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)

NSSDC ID- 75-052A-12

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
OCEANOGRAPHY

PERSONNEL

PI - A.W.	MCCULLOCH	NASA-GSFC

BRIEF DESCRIPTION

THE NIMBUS 6 TEMPERATURE-HUMIDITY INFRARED RADIOMETER (THIR) DETECTED EMITTED THERMAL RADIATION IN BOTH THE 10.5- TO 12.5-MICROMETER REGION (IR WINDOW) AND THE 6.5 TO 7.0-MICROMETER REGION (WATER VAPOR). THE WINDOW CHANNEL MEASURED CLOUDTOP TEMPERATURES AND WAS CAPABLE OF PRODUCING HIGH-RESOLUTION PICTURES OF CLOUDCOVER AND THERMAL GRADIENTS ON LAND AND WATER SURFACES IN CLOUD-FREE AREAS DURING BOTH THE DAY AND NIGHT PORTIONS OF THE ORBIT. THE OTHER CHANNEL OPERATED PRIMARILY AT NIGHT TO MAP THE WATER VAPOR DISTRIBUTION IN THE UPPER TROPOSPHERE AND THE STRATOSPHERE. SENSORY DATA FROM THESE TWO CHANNELS WERE USED PRIMARILY TO SUPPORT MORE SOPHISTICATED METEOROLOGICAL EXPERIMENTS ON BOARD NIMBUS 6. THE INSTRUMENT CONSISTED OF A 12.7-CM CASSEGRAIN SYSTEM AND SCANNING MIRROR COMMON TO BOTH CHANNELS, A BEAM SPLITTER, FILTERS, AND TWO GERMANIUM-IMMERSED THERMISTOR BOLOMETERS. IN CONTRAST TO TV, NO IMAGE WAS FORMED WITHIN THE RADIOMETER. INCOMING RADIANT ENERGY WAS COLLECTED BY A FLAT SCANNING MIRROR INCLINED AT 45 DEG TO THE OPTICAL AXIS. THE MIRROR ROTATED THROUGH 360 DEG AT 48 RPM AND SCANNED IN A PLANE NORMAL TO THE SPACECRAFT VELOCITY. THE ENERGY WAS THEN FOCUSED ON A DICHROMATIC BEAM SPLITTER WHICH DIVIDED THE ENERGY SPECTRALLY AND SPATIALLY INTO THE TWO CHANNELS. BOTH CHANNELS OF THE THIR SENSOR TRANSFORMED THE RECEIVED RADIATION INTO ELECTRIC OUTPUT (VOLTAGES), WHICH WERE RECORDED ON MAGNETIC TAPE FOR SUBSEQUENT PLAYBACK TO A GROUND ACQUISITION STATION.

-------- NIMBUS 6, SMITH----------

INVESTIGATION NAME- HIGH RESOLUTION INFRARED RADIATION SOUNDER (HIRS)

NSSDC ID- 75-052A-02

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - W.L.	SMITH	NOAA-NESS
OI - A.W.	MCCULLOCH	NASA-GSFC
OI - H.	JACOBOWITZ	NOAA-NESS
OI - I.	RUFF	NOAA-NESS

BRIEF DESCRIPTION

THE NIMBUS 6 HIGH-RESOLUTION INFRARED RADIATION SOUNDER (HIRS) SUPPORTED THE GARP DATA TEST SET BY PROVIDING VERTICAL TEMPERATURE PROFILES TWICE DAILY ON A GLOBAL BASIS, EXTENDING UP TO APPROXIMATELY 40 KM, AND INFORMATION ON THE WATER VAPOR DISTRIBUTION IN THE TROPOSPHERE. THE HIRS MEASURED RADIANCES PRIMARILY IN FIVE SPECTRAL REGIONS -- (1) SEVEN CHANNELS NEAR THE 15-MICROMETER CO2 ABSORPTION BAND, (2) TWO CHANNELS IN THE IR WINDOW, 11.1 AND 3.7 MICROMETERS, (3) TWO CHANNELS IN THE WATER VAPOR ABSORPTION BAND, 8.2 AND 6.7 MICROMETERS, (4) FIVE CHANNELS IN THE 4.3-MICROMETER BAND, AND (5) ONE CHANNEL IN THE VISIBLE 0.69-MICROMETER REGION. THE SOUNDER CONSISTED OF A CASSEGRAIN TELESCOPE, SCANNING MIRROR, DICHROMATIC BEAM SPLITTER, FILTER WHEEL, CHOPPER, AND ASSOCIATED ELECTRONICS. THE HIRS SCANNED THE EARTH'S SURFACE IN A PLANE NORMAL TO THE SPACECRAFT'S ORBITAL PATH WITH A MAXIMUM SCAN ANGLE OF 30 DEG TO EITHER SIDE OF NADIR.

-------- NIMBUS 6, SMITH----------

INVESTIGATION NAME- EARTH RADIATION BUDGET (ERB)

NSSDC ID- 75-052A-05

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS
METEOROLOGY
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.	SCHOLES	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-DEG FIELD OF VIEW. THE CHANNELS WERE ORIENTED IN A DIRECTIONAL FAN TO COVER 20 DEG TO EACH SIDE OF THE ORBITAL PLANE. THE 64-S SCAN PERIOD ALLOWED AN AREA TO BE MEASURED FROM UP TO 17 DIFFERENT ANGLES AS THE SPACECRAFT PASSED OVERHEAD.

-------- NIMBUS 6, STAELIN----------

INVESTIGATION NAME- SCANNING MICROWAVE SPECTROMETER (SCAMS)

NSSDC ID- 75-052A-10

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL

PI - D.H.	STAELIN	MASS INST OF TECH
OI - F.T.	BARATH	NASA-JPL
OI - A.H.	BARRETT	MASS INST OF TECH
OI - W.B.	LENOIR	NASA-JSC
OI - W.	PHILLIPS	MASS INST OF TECH

BRIEF DESCRIPTION

THE NIMBUS 6 SCANNING MICROWAVE SPECTROMETER (SCAMS) WAS DESIGNED TO MAP TROPOSPHERIC TEMPERATURE PROFILES, WATER VAPOR ABUNDANCE, AND CLOUD WATER CONTENT AND TO OBTAIN SUCH DATA FOR WEATHER PREDICTION PURPOSES EVEN IN THE PRESENCE OF CLOUDS, WHICH BLOCK CONVENTIONAL SATELLITE INFRARED SENSORS. THE SCAMS CONTINUOUSLY MONITORED EMITTED THERMAL RADIATION AT WAVELENGTHS OF 13.5, 9.5, 5.7, 4.9, AND 4.6 MM. THE THREE CHANNELS NEAR THE 5.0-MM OXYGEN ABSORPTION BAND WERE USED PRIMARILY TO DEDUCE ATMOSPHERIC TEMPERATURE PROFILES. THE TWO CHANNELS NEAR 10 MM PERMITTED WATER VAPOR AND CLOUD WATER CONTENT OVER CALM OCEANS TO BE ESTIMATED SEPARATELY. THE INSTRUMENT, A DICKE-SUPERHETERODYNE TYPE, SCANNED PLUS OR MINUS 45 DEG NORMAL TO THE ORBITAL PLANE WITH A 10-DEG FIELD OF VIEW. THE THREE OXYGEN CHANNELS SHARED COMMON SIGNAL AND REFERENCE ANTENNAS. BOTH WATER VAPOR CHANNELS HAD THEIR OWN SIGNALS AND REFERENCE

ANTENNAS. THE ABSOLUTE RMS ACCURACY OF THE OXYGEN CHANNELS WAS BETTER THAN 2 K AND THAT OF THE WATER VAPOR CHANNELS BETTER THAN 1 K. THE DYNAMIC RANGE FOR ALL CHANNELS WAS 0-400 K.

------- NIMBUS 6, VONBUN----------

INVESTIGATION NAME- TRACKING AND DATA RELAY

NSSDC ID- 75-052A-13

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS
GEODESY

PERSONNEL
PI - F.O. VONBUN NASA-GSFC
OI - P.E. SCHMID NASA-GSFC
OI - J.P. BROWN NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WILL PROVIDE THE NIMBUS PORTION OF A COMMUNICATION LINK FROM NIMBUS TO ATS TO A GROUND STATION. THE PURPOSE OF THE EXPERIMENT WAS TO GAIN INFORMATION ON THE USE OF SUCH A LINK FOR RANGE AND RATE COMMUNICATIONS (FOR SATELLITE GEODETIC PURPOSES) AND FOR DATA COMMUNICATION FROM A LOW-ORBITING SPACECRAFT THROUGH A SYNCHRONOUS SPACECRAFT TO A GROUND TELEMETRY STATION. THE INSTRUMENTATION INCLUDES AN S-BAND TRANSPONDER, A COMMAND DETECTOR/DECODER, AN ANTENNA PROGRAMMER, A DIGITAL EVALUATION MODULE, AN S-BAND ANTENNA, AND AN ANTENNA GIMBAL ASSEMBLY. INITIAL EXPERIMENT OPERATION WAS NOMINAL.

------- NIMBUS 6, WILHEIT, JR.----------

INVESTIGATION NAME- ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)

NSSDC ID- 75-052A-03

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T.T. WILHEIT, JR. NASA-GSFC
OI - A.T. EDGERTON AEROJET ELECTROSYSTEMS

BRIEF DESCRIPTION
THE NIMBUS 6 ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR) MEASURED THE EARTH'S MICROWAVE EMISSION AT 37 GHZ. THE LIQUID WATER CONTENT OF CLOUDS, THE DISTRIBUTION AND VARIATION OF SEA ICE COVER, AND GROSS CHARACTERISTICS OF LAND SURFACES (VEGETATION, SOIL MOISTURE, AND SNOW COVER) WERE OBTAINED FROM THESE MEASUREMENTS. THE DICKE-TYPE RADIOMETER CONSISTED OF A SINGLE TIME-SHARING RECEIVER AND AN ELECTRICALLY SCANNING PHASED ARRAY ANTENNA OPERATING AT 0.8 CM (37 GHZ). THE ANTENNA BEAM ARRAY, A 90-BY 20- BY 12-CM BOX-LIKE STRUCTURE, WAS MOUNTED ON TOP OF THE SPACECRAFT SENSORY RING AND WAS POINTED IN THE DIRECTION OF THE SPACECRAFT'S FORWARD MOTION AND TILTED DOWN 40 DEG FROM THE SATELLITE VELOCITY VECTOR. THE ANTENNA BEAM SCANNED THE EARTH IN 100 DISCRETE STEPS FOR VARIOUS ANGLES EXTENDING UP TO 35 DEG ON EITHER SIDE OF THE ORBITAL PLANE. THE DEDUCED BRIGHTNESS TEMPERATURES WERE EXPECTED TO BE ACCURATE TO WITHIN 2 K.

********** NOAA 3**********

SPACECRAFT COMMON NAME- NOAA 3
ALTERNATE NAMES- ITOS-F, 6920

NSSDC ID- 73-086A

LAUNCH DATE- 11/06/73 WEIGHT- 746. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/07/73
ORBIT PERIOD- 116.1 MIN INCLINATION- 102.1 DEG
PERIAPSIS- 1500.0 KM APOAPSIS- 1509.0 KM

PERSONNEL
SC - UNKNOWN UNKNOWN
PM - S. WEILAND NASA-GSFC
PS - I.L. GOLDBERG NASA-GSFC

BRIEF DESCRIPTION
THE NOAA 3 WAS ONE IN A SERIES OF IMPROVED TIROS-M TYPE SATELLITES WITH NEW METEOROLOGICAL SENSORS ONBOARD TO EXPAND THE OPERATIONAL CAPABILITY OF THE ITOS SYSTEM. THE PRIMARY OBJECTIVE OF NOAA 3 WAS TO PROVIDE GLOBAL DAYTIME AND NIGHTTIME DIRECT READOUT CLOUDCOVER DATA ON A DAILY BASIS. THE SUN-SYNCHRONOUS SPACECRAFT WAS ALSO 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 FLUX 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 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 4.2 M 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 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 SPACECRAFT BECAME THE OPERATIONAL ITOS SPACECRAFT ON MARCH 19, 1974. OPERATIONS TERMINATED IN AUGUST 1976.

------- NOAA 3, WILLIAMS----------

INVESTIGATION NAME- SOLAR PROTON MONITOR

NSSDC ID- 73-086A-01

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THREE SOLID-STATE DETECTORS MONITORED THE OMNIDIRECTIONAL FLUXES OF SOLAR PROTONS WITH ENERGIES ABOVE 10, 30, AND 60 MEV, RESPECTIVELY. TWO TELESCOPES CONSISTING OF SOLID-STATE DETECTORS EACH MEASURED DIRECTIONAL FLUXES OF PROTONS BETWEEN 0.27 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 VIEWED PARALLEL TO, AND PERPENDICULAR TO, THE LOCAL MAGNETIC FIELD DIRECTION. AN ADDITIONAL SOLID-STATE DETECTOR MEASURED DIRECTIONAL FLUXES OF ELECTRONS OF ENERGIES GREATER THAN 140 KEV. THIS DETECTOR LOOKED IN A DIRECTION PERPENDICULAR TO THE ORBIT PLANE.

********** 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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/16/74
ORBIT PERIOD- 114.9 MIN INCLINATION- 101.7 DEG
PERIAPSIS- 1443.0 KM APOAPSIS- 14570.0 KM

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 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 4.2, 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 MHZ) TO AN ACQUISTION STATION. THE DATA WERE ALSO TRANSMITTED IN REAL TIME TO LOCAL APT STATIONS. ONCE THE SIGNAL IS RECEIVED BY THE GROUND STATION, A CONTINUOUS PICTURE WILL BE 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 OR +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, NESS STAFF----------

INVESTIGATION NAME- VERY HIGH RESOLUTION RADIOMETER (VHRR)

NSSDC ID- 74-089A-03

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE VERY HIGH RESOLUTION (VHRR) EXPERIMENT IS DESIGNED TO CONTINUOUSLY MEASURE SURFACE TEMPERATURES OF THE EARTH, SEA, AND CLOUD TOPS IN DAYLIGHT AS WELL AS NIGHT AND TO TRANSMIT THE TEMPERATURE DATA IN REAL TIME TO COMMAND AND DATA ACQUISITION (CDA) STATIONS THROUGHOUT THE WORLD FOR USE IN LOCAL WEATHER FORECASTING. THE SPACECRAFT CAN BE PROGRAMMED TO RECORD UP TO 9 MIN OF DATA FOR REMOTE AREAS WHERE NO CDA STATION IS WITHIN RANGE OF THE SPACECRAFT, WITH THE RECORDED DATA FOR BEING PLAYED BACK TO THE NEXT CDA STATION THAT THE SPACECRAFT PASSES.
THE EXPERIMENT INCLUDED TWO SCANNING RADIOMETERS, A MAGNETIC TAPE RECORDER, AND ASSOCIATED ELECTRONICS. THE TWO-CHANNEL VHRR WILL OPERATE SIMILARLY TO THE SCANNING RADIOMETER (SR) BUT WITH MUCH GREATER RESOLUTION (0.9 KM COMPARED TO 4 KM FOR THE SR AT NADIR). ONE CHANNEL MEASURED REFLECTED VISUAL RADIATION FROM CLOUD TOPS IN THE LIMITED SPECTRAL RANGE BETWEEN 0.6 AND 0.7 MICROMETERS. THIS PROVIDED MORE CONTRAST THAN THE SR BETWEEN THE EARTH AND CLOUDS BY REDUCING THE EFFECT OF HAZE. THE SECOND CHANNEL MEASURED INFRARED RADIATION EMITTED FROM THE EARTH, SEA, AND CLOUD TOPS ON THE 10.5- TO 12.5-MICROMETER REGION. THIS SPECTRAL REGION PERMITTED BOTH DAYTIME AND NIGHTTIME RADIANCE MEASUREMENTS. THE VHRR FORMED AN IMAGE BY USING A SCANNING MIRROR TECHNIQUE SIMILAR TO THE SR, EXCEPT THAT BOTH RADIOMETERS OPERATED SIMULTANEOUSLY. AS THE SATELLITE PROCEEDED IN ITS ORBIT, TWO 400-RPM REVOLVING MIRRORS SCANNED THE EARTH'S SURFACE 180 DEG OUT OF PHASE (ONE MIRROR AT A TIME) IN A LINE PERPENDICULAR TO THE ORBIT PATH. THE VISIBLE AND INFRARED DATA WILL BE TIME-MULTIPLEXED SO THAT THE SCAN OF THE INFRARED CHANNEL WAS TRANSMITTED FIRST, FOLLOWED BY THE EARTH SCAN PORTION OF THE VISIBLE CHANNEL. THIS PROCESS WAS REPEATED 400 TIMES PER MINUTE (EQUIVALENT TO THE SCAN RATE). IF ONE OF THE RADIOMETERS FAILED, THE SYSTEM WAS STILL CAPABLE OF MEASURING BOTH VISIBLE AND INFRARED RADIATION USING ONLY THE REMAINING RADIOMETER. ALL OPERATIONAL DATA FROM THIS EXPERIMENT WERE HANDLED BY NOAA AND EVENTUALLY ARCHIVED AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, NORTH CAROLINA. IDENTICAL EXPERIMENTS WERE FLOWN ON ITOS-E, -F, AND -G.

------- NOAA 4, NESS STAFF----------

INVESTIGATION NAME- VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)

NSSDC ID- 74-089A-04

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE ITOS-G VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR) SENSED THE RADIANT ENERGY FROM ATMOSPHERIC CO2 IN SIX NARROW SPECTRAL REGIONS CENTERED AT 15.0, 14.8, 14.4, 14.1, 13.8, AND 13.4 MICHOMETERS. THE GROSS ATMOSPHERIC WATER VAPOR CONTENT WAS DETERMINED FROM MEASUREMENTS CENTERED AT 18.7 MICROMETERS. MEASUREMENTS WERE TAKEN IN THE 12.0-MICROMETER SPECTRAL REGION TO DETERMINE SURFACE/CLOUDTOP TEMPERATURES. THE VTPR CONSISTED OF AN OPTICAL SYSTEM, DETECTOR AND ASSOCIATED ELECTRONICS, AND A SCANNING MIRROR. THE MIRROR SCANNED THE EARTH'S SURFACE PERPENDICULAR TO THE SATELLITE'S ORBITAL PATH. AS EACH AREA IS SCANNED, THE OPTICAL SYSTEM COLLECTED, FILTERED, AND DETECTED THE RADIATION FROM THE EARTH AND SEPARATED IT INTO THE EIGHT SPECTRAL INTERVALS. THE GROUND AREA COVERED BY ONE SAMPLE OF DATA WAS APPROXIMATELY 50 BY 50 KM. THE RADIOMETER OPERATED CONTINUOUSLY, TAKING MEASUREMENTS OVER EVERY PART OF THE EARTH'S SURFACE TWICE A DAY. THE DATA WERE RECORDED THROUGHOUT THE ORBIT AND WERE PLAYED BACK UPON COMMAND WHEN THE SATELLITE WAS WITHIN COMMUNICATION RANGE OF A COMMAND AND DATA ACQUISITION STATION. GROUND PERSONNEL USED THE DATA TO COMPUTE TEMPERATURE-PRESSURE PROFILES TO ALTITUDES AS HIGH AS 30 KM. ALL OPERATIONAL DATA FROM THIS EXPERIMENT WERE HANDLED BY NOAA AND EVENTUALLY ARCHIVED AT THE NATIONAL CLIMATIC CENTER, ASHEVILLE, 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 WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THIS EXPERIMENT CONTINUES THE ITOS SERIES OF JHU/APL EXPERIMENTS, WHICH ARE ALL TO BE 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 0.27 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, 09057

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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/30/76
ORBIT PERIOD- 116.2 MIN INCLINATION- 102.1 DEG
PERIAPSIS- 1502. KM APOAPSIS- 1520. KM

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 0830 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 MU- LTISPECTRAL 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

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- 76-077A-04 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS 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 6.6 MEV), (2) PROTONS IN THE RANGES 400 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-7010, OAO-C
COPERNICUS, 06153

NSSDC ID- 72-065A

LAUNCH DATE- 08/21/72 WEIGHT- 2150. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/21/72
ORBIT PERIOD- 99.7 MIN INCLINATION- 35.0 DEG
PERIAPSIS- 739. KM APOAPSIS- 751. KM

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 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 138 FT. A SUN BAFFLE PROTECTED THE EXPERIMENTS AND INCREASED THE LENGTH OF THE

SPACECRAFT TO 193 IN. TWO INERTIAL BALANCE BOOMS, ONE FORWARD AND ONE AFT, EXTENDED APPROXIMATELY 300 IN. 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 SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - R.L.F.BOY 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 ANTICOINCIDENCE 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 SA

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-S. 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 5**********

SPACECRAFT COMMON NAME- OSO 5
ALTERNATE NAMES- OSO-F, PL-6844
03663

NSSDC ID- 69-006A

LAUNCH DATE- 01/22/69 WEIGHT- 645. 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- 01/22/69
ORBIT PERIOD- 95.48 MIN INCLINATION- 32.95 DEG
PERIAPSIS- 536. KM APOAPSIS- 561. KM

PERSONNEL
MG - M.E. MCDONALD NASA HEADQUARTERS
SC - G.K. OERTEL NASA HEADQUARTERS
PM - R.H. PICKARD NASA-GSFC
PS - S.P. MARAN 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, X-RAY AND GAMMA RADIATION. THE OSO 5 PLATFORM CONSISTED OF A SAIL SECTION THAT POINTED TWO EXPERIMENTS CONTINUALLY TOWARD THE SUN AND A WHEEL SECTION THAT SPUN ABOUT AN AXIS PERPENDICULAR TO THE POINTING DIRECTION OF THE SAIL AND CARRIED SIX EXPERIMENTS. ATTITUDE ADJUSTMENTS WERE PERFORMED BY GAS JETS AND A MAGNETIC TORQUING COIL. POINTING CONTROL PERMITTED THE POINTED EXPERIMENTS TO SCAN THE REGION OF THE SOLAR DISK IN A 40- BY 40-ARC-MIN RASTER PATTERN.
IN ADDITION, THE POINTED SECTION COULD BE COMMANDED TO SELECT AND SCAN A 7.5- BY 7-ARC-MIN REGION NEAR THE SOLAR DISK. DATA WERE SIMULTANEOUSLY RECORDED ON TAPE AND TRANSMITTED BY PCM/PM TELEMETRY. A COMMAND SYSTEM PROVIDED FOR 155 GROUND-BASED COMMANDS.

------- OSO 5, BLAMONT----------

INVESTIGATION NAME- MEASUREMENT OF THE SELF-REVERSAL OF THE SOLAR LYMAN-ALPHA LINE

NSSDC ID- 69-006A-06 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - J.E. BLAMONT CNRS-LPSP
OI - P. COUFLEAU PARIS OBSERVATORY

BRIEF DESCRIPTION
THIS FLIGHT INSTRUMENT WAS DESIGNED FOR STUDYING THE LINE SHAPE OF THE SOLAR LYMAN-ALPHA LINE SUMMED OVER THE ENTIRE SOLAR DISK. IT MADE USE OF THE OPTICAL RESONANCE OF HYDROGEN AND DEUTERIUM GASES. A GRATING AND MIRROR SYSTEM CONVERTED THE INCIDENT SOLAR RADIATION INTO A BEAM OF LYMAN-ALPHA LIGHT (1216 A) WITH A BANDWIDTH OF 100 A, WHICH ENTERED TWO RESONANCE CELLS. ONE CELL WAS FILLED WITH MOLECULAR HYDROGEN AND THE OTHER CELL WAS FILLED WITH MOLECULAR DEUTERIUM GAS. EACH CELL HAD A PHOTOMULTIPLIER MOUNTED AT ITS EXIT WINDOW TO MEASURE THE TOTAL INTENSITY OF THE SOLAR SPECTRUM IN THE 100-A BANDWIDTH. IN ADDITION, EACH CELL HAD A PHOTOMULTIPLIER MOUNTED AT RIGHT ANGLES TO THE CELL (I. E., AT RIGHT ANGLES TO THE INCIDENT BEAM) THAT MEASURED THE INTENSITY OF THE LIGHT SCATTERED BY THE CELL. HEATED FILAMENTS IN THESE CELLS DISSOCIATED SOME OF THE GAS, AND DIFFERENT CONCENTRATIONS OF ATOMIC SPECIES IN THE CELLS WERE OBTAINED BY VARYING FILAMENT VOLTAGE. THE SIGNAL ON THE RIGHT ANGLE DETECTORS WAS PROPORTIONAL TO THE INTENSITY OF THE INCIDENT LIGHT AT 1215.664 A FOR THE HYDROGEN CELL (0.015 A BANDWIDTH) AND AT 1215.334 A FOR THE DEUTERIUM CELL (0.011 A). SCANNING WAS ACCOMPLISHED BY A DOPPLER SHIFT DUE TO APPROACHING AND RECEDING VELOCITY OF THE SPACECRAFT WITH RELATION TO THE SUN AT ORBIT MORNING AND EVENING. AN INTERNAL CALIBRATION LAMP WAS INCLUDED IN THE EXPERIMENT. THE EXPERIMENT OPERATED 1 H EVERY 2 CALENDAR DAYS. MORE EXPERIMENT DETAILS AND SOME MEASURED DATA ARE CONTAINED IN THE PAPER, 'SOLAR LYMAN ALPHA CHANGES AND RELATED HYDROGEN DENSITY DISTRIBUTION AT THE EARTH'S EXOBASE (1969-1970)," A. VIDAL-MADJAR, ET AL., J. GEOPHYS. RES., 78, 7, 1115-1144, MARCH 1973.

------- OSO 5, BOYD----------

INVESTIGATION NAME- X-RAY SPECTROHELIOGRAPH

NSSDC ID- 69-006A-01 INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
IONOSPHERES

PERSONNEL
PI - R.L.F.BOYD U COLLEGE LONDON
OI - E.A. STEWARDSON(DECEASED)
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - K.A. POUNDS U OF LEICESTER

BRIEF DESCRIPTION
PROPORTIONAL COUNTERS ATTACHED TO COLLIMATORS PROVIDED EIGHT-CHANNEL SPECTRAL INFORMATION AS WELL AS THE SPATIAL DISTRIBUTION OF SOLAR X-RAY SOURCES. IN THE 8- TO 18-A REGION, THE COLLIMATOR WAS A GRAZING INCIDENCE PARABOLIC REFLECTOR THAT YIELDED AN ANGULAR RESOLUTION OF PLUS OR MINUS 1 ARC-MIN. IN THE 3- TO 9-A REGION, TWO PARALLEL SLITS COLLIMATED THE RADIATION IN ONE DIMENSION ONLY (3.3 ARC-MIN).

------- OSO 5, NEY----------

INVESTIGATION NAME- ZODIACAL LIGHT MONITOR

NSSDC ID- 69-006A-07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
SOLAR PHYSICS

PERSONNEL
PI - E.P. NEY U OF MINNESOTA

BRIEF DESCRIPTION
THIS EXPERIMENT, A MODIFIED VERSION OF AN OSO 2 EXPERIMENT (65-007A-04), WAS DESIGNED TO MEASURE THE INTENSITY AND DEGREE OF POLARIZATION OF ZODIACAL LIGHT AS A FUNCTION OF ECLIPTIC LATITUDE AND TO SEARCH FOR CHANGES IN ZODIACAL LIGHT RESULTING FROM SOLAR DISTURBANCES. IT WAS ALSO INTENDED TO STUDY THE INTENSITY OF THE AIRGLOW CONTINUUM LAYER AND TO STUDY THE DISTRIBUTION OF NIGHTTIME LIGHTNING STORMS. SIX PHOTOMULTIPLIER/FILTER PHOTOMETERS WERE USED WITH VARIOUS APERTURES AND ORIENTATIONS. THESE PHOTOMETERS WERE PM-1, PM-2, PM-3, PM-4, PM-5, AND PM-6. PM-1 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH A 9.25- BY 57-DEG FOV AND A RED/VISUAL PASSBAND. PM-2 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS WITH A 9.25- BY 57-DEG FIELD OF VIEW (FOV) AND A BLUE (3500 TO 5000 A) PASSBAND. PM-3 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH AN 11-DEG-DIAMETER CONICAL FOV AND A BLUE (3500 TO 5000 A) PASSBAND. PM-4 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH A 10.5-DEG OFFSET, A 9.5-DEG-DIAMETER CONICAL FOV, AND A BLUE (3500 TO 5000 A) PASSBAND. PM-5 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS WITH A 9-DEG-DIAMETER CONICAL FOV AND A RED (6000 TO 8500 A) PASSBAND. PM-6 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS WITH A 9-DEG OFFSET, A 9.5-DEG-DIAMETER FOV AND A VISUAL/RED PASSBAND. PM-1, PM-2, AND PM-3 WERE READ OUT THREE TIMES DURING EACH SPACECRAFT MAIN FRAME (TELEMETRY), AND PM-4, PM-5, AND PM-6 WERE READ OUT TWICE DURING EACH SPACECRAFT MAIN FRAME. THESE PHOTOMETERS MEASURED LIGHT INTENSITY UP TO ABOUT 1000 TIMES THAT OF A TENTH MAGNITUDE STAR, ON A SCALE FROM 0 TO 4096. PM-3, PM-4, AND PM-5 WERE EQUIPPED WITH FIXED POLARIZING FILTERS. IN ADDITION, TWO PHOTODIODES, EACH WITH A SENSITIVITY ABOUT ONE-SIXTEENTH THAT OF THE PHOTOMETERS, FUNCTIONED AS MONITOR EYES AND WERE SAMPLED ONCE EVERY 5 S. EYE-1 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH A 10.5-DEG OFFSET AND HAD A 21-DEG-DIAMETER CONICAL FOV. EYE-2 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS, OFFSET BY 5 DEG, AND HAD A 17.5-DEG-DIAMETER FOV.

********** OSO 8**********

SPACECRAFT COMMON NAME- OSO 8
ALTERNATE NAMES- OSO-I, 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
ORBIT PERIOD- 95.7 MIN EPOCH DATE- 06/22/75
PERIAPSIS- 544. KM INCLINATION- 32.9 DEG
APOAPSIS- 559. KM

PERSONNEL
MG - 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- 75-057A-04

INVESTIGATIVE PROGRAM
CODE ST

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 HAVE 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 60 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 NATL CTR FOR ATMOS RES

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- 75-057A-02

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - R.M. BONNET CNRS-LPSP
OI - P. LEMAIRE CNRS-LPSP
OI - A. VIDAL-MADJAR CNRS-LPSP
OI - J.C. VIAL CNRS-LPSP

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 SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - R. NOVICK COLUMBIA U
OI - J.R.P.ANGEL COLUMBIA U
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 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 SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - P.J. SERLEMITSOS NASA-GSFC
OI - E.A. BOLDT NASA-GSFC
OI - S.S. HOLT NASA-GSFC
OI - D. SCHWARTZ HARVARD COLLEGE OBS

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 (MULTIANODE PROPORTIONAL COUNTERS) ARE USED AS DETECTORS. ONE DETECTOR COMPLEMENT, 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

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 1050 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.

********** OV5-6**********

SPACECRAFT COMMON NAME- OV5-6
ALTERNATE NAMES- ERS 26, 03951

NSSDC ID- 69-046B

LAUNCH DATE- 05/23/69 WEIGHT- 23. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/24/69
ORBIT PERIOD- 3115.2 MIN INCLINATION- 32.86 DEG
PERIAPSIS- 16923. KM APOAPSIS- 111636. KM

PERSONNEL
PM - C.H. REYNOLDS USAF GEOPHYS LAB
PS - K. YATES USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE SATELLITE HAS AN OCTAGONAL CONFIGURATION, IS SPIN-STABILIZED, AND WAS PLACED IN A MODERATELY ELIPTICAL EARTH ORBIT (ECCENTRICITY = 0.670) BY A TITAN 3C ON MAY 25, 1969. THE PURPOSE OF THE SATELLITE IS TO MONITOR X-RAY, ELECTRON, AND PROTON RADIATION ASSOCIATED WITH SOLAR ACTIVITY IN ORDER TO DEVELOP DATA HANDLING TECHNIQUES IN NEAR REAL-TIME FOR USE BY THE AIR WEATHER SERVICE FORECAST CENTER IN FORECASTING SOLAR FLARES.

------- OV5-6, YATES----------

INVESTIGATION NAME- GEIGER-MUELLER TUBE, SOLAR X-RAY DETECTOR, 2 TO 12 A

NSSDC ID- 69-046B-01

INVESTIGATIVE PROGRAM
SPACE RADIATION ENVIRONMENT

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES LAB

BRIEF DESCRIPTION
TWO IDENTICAL GEIGER-MUELLER TUBES (EON 6213) WERE MOUNTED IN MUTUALLY ORTHOGONAL POSITIONS AT 45 DEG AND 135 DEG WITH RESPECT TO THE SPACECRAFT SPIN AXIS. THESE DETECTORS, WHICH HAVE MICA WINDOWS, MEASURED THE SOLAR X-RAY FLUX IN THE 2- TO 12-A BAND.

------- OV5-6, YATES----------

INVESTIGATION NAME- SODIUM IODIDE SCINTILLATOR, GAMMA-RAY DETECTOR, 19 TO 1175 KEV

NSSDC ID- 69-046B-02

INVESTIGATIVE PROGRAM
SPACE RADIATION ENVIRONMENT

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

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES LAB

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO MONITOR SOLAR RADIATION FLUX IN FOUR BANDS RANGING FROM HARD X RAYS TO HARD GAMMA RAYS. A DETECTOR CONSISTING OF A SODIUM IODIDE CRYSTAL PHOTOMULITPLIER (DOPED WITH THALLIUM) WAS USED TO MEASUPE SOLAR ELECTROMAGNETIC RADIATION IN THE 19- TO 76-KEV, 76- TO 232-KEV, 232- TO 1175-KEV, AND GREATER THAN 1175 KEV BANDS. THE SODIUM IODIDE CRYSTAL IS 0.5 IN. IN DIAMETER AND 0.5 IN. LONG, AND WAS CONTAINED IN A HERMETICALLY SEALED ALUMINUM CAN WITH WALLS 0.010 IN. THICK. THE THICKNESS OF THE WALLS DETERMINED THE LOWER LIMIT OF THE DETECTOR'S SENSITIVITY.

------- OV5-6, YATES----------

INVESTIGATION NAME- PROTON ALPHA PARTICLE TELESCOPE

NSSDC ID- 69-046B-03

INVESTIGATIVE PROGRAM
SPACE RADIATION ENVIRONMENT

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES LAB

BRIEF DESCRIPTION
THIS TELESCOPE CONSISTS OF TWO TOTALLY DEPLETED SILICON SURFACE BARRIER DETECTORS. THE INSTRUMENT LOOKS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. PROTONS IN THE ENERGY RANGES 5.3 TO 8, 8 TO 17, 17 TO 40, AND 40 TO 100 MEV AND ALPHA PARTICLES IN THE ENERGY RANGES 20 TO 32, 32 TO 68, AND 68 TO 100 MEV ARE MEASURED SEPARATELY. THE SATELLITE ROTATES A SIGNIFICANT AMOUNT DURING EACH COUNTING INTERVAL.

------- OV5-6, YATES----------

INVESTIGATION NAME- LOW-ENERGY ELECTRON DETECTOR

NSSDC ID- 69-046B-05

INVESTIGATIVE PROGRAM
SPACE RADIATION ENVIRONMENT

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES LAB

BRIEF DESCRIPTION
A PLASTIC SCINTILLATOR DETECTOR MEASURES THE OMNIDIRECTIONAL FLUXES OF ELECTRONS WITH ENERGIES GREATER THAN 40 KEV.

********** 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-OSS

ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 311.1 DAYS EPOCH DATE- 07/15/75
PERIAPSIS- 0.813 AU RAD INCLINATION- 0.168 DEG
APOAPSIS- 0.983 AU RAD

PERSONNEL
MG - F.D. KUCHENDORFER 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, 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 MASS INST OF TECH
CI - A.J. LAZARUS MASS INST OF TECH
CI - F. SCHERB U OF WISCONSIN

BRIEF DESCRIPTION
A MULTIGRID FARADAY CUP WITH TWO SEMICIRCULAR, COPLANAR COLLECTORS WAS USED TO STUDY SOLAR WIND IONS AND ELECTRONS. THE INSTRUMENT HAD 14 CONTIGUOUS, ENERGY-PER-CHARGE (E/Q) CHANNELS BETWEEN 75 AND 9485 V FOR POSITIVE IONS AND FOUR ENERGY-PER-CHARGE CHANNELS BETWEEN 90 AND 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 (-5.5 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 U OF ARIZONA
CI - J.A. SIMPSON U OF CHICAGO
OI - J.E. LAMPOPT 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.GT. 175 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.4 TO 55.6 MEV, 55.6 TO 293 MEV, AND E.GT. 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 ELIPTIC PLANE ABOUT ONCE PER SECOND. PULSE HEIGHT ANALYSIS OF DETECTOR D1 OUTPUT (128 CHANNEL) AND D3 OUTPUT (32 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. FOR FURTHER DETAILS, SEE FA· IT AL, JGR, 73, 1555, 1968.

------- PIONEER 6, MCCRACKEN----------

INVESTIGATION NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 65-105A-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 - R.U.	RAO	INDIAN SCI SAT PROJ

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 303.8 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 E 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 64 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
SC - A.G.	OPP	NASA HEADQUARTERS
PM - 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, 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 - R.U.	RAO	INDIAN SCI SAT PROJ

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 OMNIDIRECTIONAL 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. LAMPORT 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.GT. 165 MEV. THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.5 TO 52 MEV, 52 TO 280 MEV, AND E.GT. 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 UNKNOWN

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 THE 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 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, 03066

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- 0.057 DEG
PERIAPSIS- 0.992 AU RAD APOAPSIS- 1.088 AU RAD

PERSONNEL
MG - F.O. 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 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 WERE USED PRIMARILY FOR SCIENTIFIC DATA AND CONSISTED OF 32 SEVEN 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, 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 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	STANFORD U
OI - H.T.	HOWARD	STANFORD U
OI - R.L.	LEADABRAND	STANFORD RES INST
OI - R.A.	LONG	STANFORD RES INST
OI - A.R.	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 TELEMETERED 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 SIMILAR 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

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G.	MCCRACKEN	CSIRO
OI - R.U.	RAO	INDIAN SCI SAT PROJ
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 8, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV AND ALPHA PARTICLES IN THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 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

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - N.F.	NESS	NASA-GSFC
OI - S.C.	CANTARANO	U OF ROME
OI - F.	MARIANI	CNR, 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, 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

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
DI - 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 PUSSIBLE 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 STEPS) AND ONE SET OF ELECTRON MEASUREMENTS (AT EACH E/Q STEPS). 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 9**********

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-D, PL-684K
03533

NSSDC ID- 68-100A

LAUNCH DATE- 11/08/68 WEIGHT- 147. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

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.B.	KOCHENDORFER	NASA HEADQUARTERS
SC - A.G.	OPP	NASA HEADQUARTERS
PM - 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, 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	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
DI - T.A.	CROFT	STANFORD U
DI - H.T.	HOWARD	STANFORD U
DI - R.L.	LEADABRAND	STANFORD RES INST
DI - R.A.	LONG	STANFORD RES INST
DI - 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 APPRECIABLEY 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. DIFFERNTIAL 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-04, 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

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - K.G.	MCCRACKEN	CSIRO
OI - R.U.	RAO	INDIAN SCI SAT PROJ
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 8, 1 TO 5, 1 TO 3, AND 4 TO 6 MEV AND ALPHA PARTICLES IN THE ENERGY RANGE 4 TO 8 MEV. DURING EACH 224-BIT MAIN TELEMETRY FRAME, TWO FIRST-MODE 9-BIT ACCUMULATORS AND ONE SECOND-MODE 9-BIT ACCUMULATOR WERE READ OUT. IN-FLIGHT CALIBRATION OF THE SCINTILLATOR AND OF SOME OF THE ELECTRONICS WAS PERFORMED DAILY. SEE 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 SL

INVESTIGATION 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 SL

INVESTIGATION 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 SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - W.R.	WEBBER	U OF NEW HAMPSHIRE

BRIEF DESCRIPTION

THIS EXPERIMENT UTILIZED A TELESCOPE COMPRISED OF FIVE SOLID-STATE SENSORS, A CERENKOV DETECTOR, AND AN ANTICOINCIDENCE SHIELD. THE TELESCOPE AXIS WAS PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. AS DETERMINED BY TWO COINCIDENCE MODES AND ELECTRONIC DISCRIMINATION OF SENSOR OUTPUT PULSES, PARTICLES MEASURED WERE ELECTRONS IN THREE CONTIGUOUS ENERGY INTERVALS BETWEEN 0.31 AND 5.1 MEV, PROTONS IN FIVE CONTIGUOUS ENERGY INTERVALS BETWEEN 2.2 AND 42 MEV, AND ALPHA PARTICLES IN 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 SL

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL

PI - J.H.	WOLFE	NASA-ARC
OI - E.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 50 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 STEPS) AND ONE SET OF ELECTRON MEASUREMENTS (AT EACH E/Q STEPS). 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 26 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
35860

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
PM - 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. TH. SPACECRAFT STRUCTURE WAS A 36-CM DEEP, FLAT EQUIPMENT COMPARIMENT, 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 ANG 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. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTIONS TO THE EARTH AND THE SUN WITH THE KNOWN DIRECTION TO CANOPUS AS A BACKUP. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN RATE CONTROL (MAINTAINED AT 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 METEOROIDS, SEALED PRESSURIZED CELLS OF ARGON AND NITROGEN GAS FOR MEASURING THE PENETRATION OF METEOROIDS, UV PHOTOMETER, IR RADIOMETER, AND AN IMAGING PHOTOPOLARIMETER, WHICH PRODUCED PHOTOGRAPHS AND MEASURED POLARIZATION. FURTHER SCIENTIFIC INFORMATION WAS OBTAINED FROM THE TRACKING AND OCCULTATION DATA. THE SPACECRAFT ACHIEVED ITS CLOSEST APPROACH ON DECEMBER 3, 1973, WHEN IT REACHED APPROXIMATELY 3 JOVIAN RADII. 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 90 MEV. A CERENKOV COUNTER (C) HAD FOUR OUTPUT CHANNELS (C1, C2, C3, AND CDC) SENSITIVE TO ELECTRONS HAVING ENERGIES ABOVE 6, 9, 13, AND 1 MEV, RESPECTIVELY. AN ELECTRON SCATTER COUNTER (E) HAD THREE OUTPUT CHANNELS (E1, E2, AND E3) SENSITIVE TO ELECTRONS ABOVE .16, .26, AND .46 MEV. A 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 SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THREE OF THE CHANNELS (CDC, SPDC, AND SEDC) WERE READ OUT THROUGH A COMMON ELECTROMETER, DUE TO A MALFUNCTION THAT OCCURRED BETWEEN LAUNCH AND JOVIAN ENCOUNTER. THESE THREE CHANNELS PRODUCED NO 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 ENLOUNTER 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 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- X 8- MRAD FIELD-STOP APERTURE, WHILE THE SPIN-SCAN IMAGING USED A 0.5- BY 0.5-MRAD APERTURE SYOP. 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 ELSMENT 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 BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUTOV 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, KINARD----------

INVESTIGATION NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
INTERPLANETARY DUST

PERSONNEL

PI - W.H.	KINARD	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 NANOGRAM OR MORE. SOME 300 TO 400 HITS WERE EXPECTED BY THE TIME THE SPACECRAFT COMPLETED ITS 200-DAY JOURNEY THROUGH THE ASTEROID BELT.

-------- PIONEER 10, MCDONALD----------

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 72-012A-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.J.	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 - S.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 MODES. SOME OF THE RATES FROM EACH TELESCOPE WERE SECTORED INTO EIGHT OCTANTS IN THE SPACECRAFT SPIN PLANE. IN ADDITION, THREE-SENSOR PULSE HEIGHT ANALYSIS, WITH PRIORITY SCHEMES FAVORING THE ANALYSIS OF HEAVIER PARTICLES, WAS ASSOCIATED WITH EACH TELESCOPE.

-------- PIONEER 10, SIMPSON----------

INVESTIGATION NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 72-012A-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - J.A.	SIMPSON	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 68 MEV FOR PROTONS AND 10 TO 150 MEV/NUCL. 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, SMITH----------

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- 72-012A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
PLANETARY MAGNETIC FIELD
MAGNETOSPHERIC PHYSICS

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
THIS TRIAXIAL VECTOR HELIUM MAGNETOMETER, DESIGNED TO MEASURE JOVIAN AND INTERPLANETARY MAGNETIC FIELDS, MEASURED THE THREE FIELD COMPONENTS OVER THE FREQUENCY RANGE 0-10 HZ. AT ENCOUNTER THE DATA RATE WAS 1024 BITS/S AND THE MAGNETOMETER SAMPLING RATE WAS 5.33 SAMPLES/S. TO AVOID POSSIBLE ALIASING, THE MAGNETOMETER PASSBAND WAS LIMITED TO FREQUENCIES BELOW THE NYQUIST FREQUENCY (2.7 HZ). BEFORE BEING DIGITIZED, THE THREE ANALOG WAVE FORMS WERE PASSED THROUGH A BUTTERWORTH FILTER HAVING A - DB POINT AT 3 HZ AND AN 18 DB/OCTAVE ROLL-OFF AT HIGHER FREQUENCIES. THE BROADBAND (10 HZ) ANALOG WAVE FORMS FROM ONE AXIS (PARALLEL TO THE SPACECRAFT SPIN AXIS) WERE ALSO FED TO AN ANALOG SPECTRUM ANALYZER, WHICH RESOLVED THE FIELD FLUCTUATIONS INTO THREE PASSBANDS OF 0.1-1, 1-3, AND 3-10 HZ. THE MAGNETOMETER NOISE SPECTRUM WAS INDEPENDENT OF FREQUENCY WITH A FIELD EQUIVALENT POWER SPECTRAL DENSITY OF 10 TO THE MINUS 4 POWER GAMMA SQ/HZ. THE MAGNETOMETER AUTOMATICALLY SELECTED ONE OF EIGHT RANGES BETWEEN FULL SCALE VALUES OF MINUS TO PLUS 4 GAMMAS AND 1.4 GAUSS (PER AXIS). DIGITIZATION RESOLUTION WAS ABOUT 0.2 PERCENT. THE EXPERIMENT WORKED AS

PLANNED UNTIL NOVEMBER 1975, WHEN THE SPACECRAFT WAS NEAR 8 AU. NO FURTHER USEFUL DATA WERE OBTAINED. FOR FURTHER DETAILS, SEE SMITH ET AL., 'IEEE TRANS. ON MAGNETICS,' 11, 962, 1975.

------- 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 METEOROIDS 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 .000000010 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	SPACE ASTRONOMY LAB
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 A) AND RED (5800 TO 7000 A). 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 SWEPT 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 144 DEG IN CONE ANGLE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MAKSUTOV 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.

------- PIONEER 10, WOLFE----------

INVESTIGATION NAME- PLASMA

NSSDC ID- 72-012A-13

INVESTIGATIVE PROGRAM
CODE SL

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-EXTRATERR PHYS
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	UNKNOWN

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 SWEPT 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 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- JUPITER 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 100 W AT SATURN. THERE WERE THREE REFERENCE SENSORS -- A STAR (CANOPUS) SENSOR, AND TWO SUN SENSORS. ATTITUDE POSITION COULD BE CALCULATED FROM THE REFERENCE DIRECTION TO EARTH AND THE SUN, WITH THE KNOWN DIRECTION TO CANOPUS AS BACKUP. PIONEER 11'S STAR SENSOR GAIN AND THRESHOLD SETTINGS WERE MODIFIED BASED ON EXPERIENCE FROM THAT OF PIONEER 10. THREE PAIRS OF ROCKET THRUSTERS PROVIDED SPIN AXIS CONTROL (AT 4.8 RPM) AND CHANGE OF THE SPACECRAFT VELOCITY. 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. 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 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, S/N 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 COC) 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 SEDC CHANNEL EFFECTIVELY MEASURED THE ELECTRON FLUX, WHICH COULD THEN BE SUBTRACTED FROM THE SPDC CHANNEL RESPONSE TO OBTAIN THE PROTON FLUX. SEVERAL OTHER CHANNELS LISTED ABOVE REQUIRED CORRECTIONS TO OBTAIN THE FLUXES OF THE SPECIES INDICATED. THE DETECTOR CHANNELS COULD BE PROGRAMMED FOR READ-OUT IN ANY ONE OF FOUR PATTERNS AT EACH OF THE EIGHT SPACECRAFT BIT RATE MODES. DURING ENCOUNTER WHEN THE SPACECRAFT WAS OPERATING IN THE HIGHEST BIT RATE MODE, THE MINIMUM TIME TO SAMPLE ONE CHANNEL WAS 1.5 S AND THE TIME TO OBTAIN A COMPLETE SCAN THROUGH ALL CHANNELS WAS 108 S. SINCE THE DIRECTIONAL DETECTORS POINTED PERPENDICULAR TO THE SPIN AXIS AND THE SPIN RATE WAS 5 RPS, 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

NSSDC ID- 73-019A-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL
PI - T. GEHRELS U OF ARIZONA
OI - D.L. COFFEEN NASA-GISS
OI - J. HAMEEN-ANTTILA U OF ARIZONA
OI - C.E. 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

6- BY 6-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 BACKLIGHTED (SUNLIGHT) SOURCE. THE EXPERIMENTAL TRAIN FOR THE IPP PACKAGE CONSISTED OF THE FOLLOWING ELEMENTS -- (1) A NEAR-DIFFRACTION-LIMITED 2.54-CM MATSUTOV 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, KLIORE----------

INVESTIGATION NAME- S-BAND OCCULTATION

NSSDC ID- 73-019A-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.J.	KLIORE	NASA-JPL
OI - G.	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 11, MCDONALD----------

INVESTIGATION NAME- COSMIC-RAY SPECTRA

NSSDC ID- 73-019A-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - F.B.	MCDONALD	NASA-GSFC
OI - K.G.	MCCRACKEN	CSIRO
OI - W.R.	WEBBER	U OF NEW HAMPSHIRE
OI - E.C.	ROELOF	APPLIED PHYSICS LAB
OI - B.J.	TEEGARDEN	NASA-GSFC
OI - J.H.	TRAINOR	NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE 3-ELEMENT TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. A BIDIRECTIONAL TELESCOPE MEASURED 20- TO 800-MEV/NUCLEON PARTICLES WITH 5 TO 10 PERCENT ENERGY RESOLUTION. ANOTHER TELESCOPE MEASURED 3- TO 22-MEV/NUCLEON PARTICLES WITH 5 PERCENT RESOLUTION. THESE TWO TELESCOPES MEASURED PARTICLES WITH Z VALUES BETWEEN 1 AND 8. THE THIRD TELESCOPE MEASURED 50-KEV TO 3-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	CALIF INST OF TECH
OI - R.W.	BOESE	NASA-ARC
OI - S.C.	CHASE, JR.	SANTA BARBARA RES CTR
OI - A.P.	INGERSOL	CALIF INST OF TECH
OI - G.	NEUGEBAUER	CALIF INST OF TECH
OI - L.M.	TRAFTON	U OF TEXAS, AUSTIN

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 88-CHANNEL, THIN-FILM BIMETALLIC THERMOPILES IN TWO BANDS OF THE IR SPECTRUM (14 TO 25 MICROMETERS AND 19 TO 56 MICROMETERS) TO MEASURE THE IRRADIANCE. THE TWO-CHANNEL RADIOMETER WAS SIMILAR TO THOSE FLOWN ON MARINER 6 AND 7, BUT WAS MORE ACCURATE AND HAD BETTER SPATIAL RESOLUTION.

------- PIONEER 11, 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 H 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.

-------- 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
THIS TRIAXIAL VECTOR HELIUM MAGNETOMETER, DESIGNED TO MEASURE JOVIAN AND INTERPLANETARY MAGNETIC FIELDS, MEASURED THE THREE FIELD COMPONENTS OVER THE FREQUENCY RANGE 0-10 HZ. AT ENCOUNTER THE DATA RATE WAS 1024 BITS/S AND THE MAGNETOMETER SAMPLING RATE WAS 5.33 SAMPLES/S. TO AVOID POSSIBLE ALIASING, THE MAGNETOMETER PASSBAND WAS LIMITED TO FREQUENCIES BELOW THE NYQUIST FREQUENCY (2.7 HZ). BEFORE BEING DIGITIZED, THE THREE ANALOG WAVEFORMS WERE PASSED THROUGH A BUTTERWORTH FILTER HAVING A -3 DB POINT AT 3 HZ AND AN 18 DB/OCTAVE ROLL-OFF AT HIGHER FREQUENCIES. THE BROADBAND (10 HZ) ANALOG WAVEFORMS FROM ONE AXIS (PARALLEL TO THE SPACECRAFT SPIN AXIS) WERE ALSO FED TO AN ANALOG SPECTRUM ANALYZER, WHICH RESOLVED THE FIELD FLUCTUATIONS INTO THREE PASSBANDS OF 0.1-1, 1-3, AND 3-10 HZ. THE MAGNETOMETER NOISE SPECTRUM WAS INDEPENDENT OF FREQUENCY WITH A FIELD EQUIVALENT POWER SPECTRAL DENSITY OF 10 TO THE MINUS 4 POWER GAMMA SQ/HZ. THE MAGNETOMETER AUTOMATICALLY SELECTED ONE OF EIGHT RANGES BETWEEN FULL SCALE VALUES OF MINUS TO PLUS 4 GAMMAS AND 1.4 GAUSS (PER AXIS). DIGITIZATION RESOLUTION WAS ABOUT 0.2 PERCENT. FOR FURTHER DETAILS, SEE SMITH ET AL., "IEEE TRANS. ON MAGNETICS," 11, 962, 1975.

-------- PIONEER 11, SOBERMAN----------

INVESTIGATION NAME- ASTEROID/METEOROID ASTRONOMY

NSSDC ID- [illegible].19A-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
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 METEOROIDS 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-CRETIEN TELESCOPES WITH PRIMARY MIRRORS OF 20-CM (8 IN) DIAMETER, 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 TELESCOPES. AN EVENT WAS RECORDED WHEN 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. SINCE THE CELLS ON PIONEER 11 WERE SLIGHTLY THICKER THAN PIONEER 10, THE MINIMUM MASS PARTICLES DETECTED WERE OF SLIGHTLY GREATER MASS.

-------- PIONEER 11, VAN ALLEN----------

INVESTIGATION NAME- JOVIAN CHARGED PARTICLES

NSSDC ID- 73-019A-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - J.A.	VAN ALLEN	U OF IOWA

BRIEF DESCRIPTION
THIS EXPERIMENT USES SEVEN MINIATURE GEIGER TUBES IN THREE ARRAUS 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, WEINBERG----------

INVESTIGATION NAME- ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY

NSSDC ID- 73-019A-15

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ZODIACAL LIGHT
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL

PI - J.L.	WEINBERG	SPACE ASTRONOMY LAB
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 A) AND RED (5800 TO 7000 A). 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. IN DETAIL, SIMULTANEOUS RADIOMETRIC AND POLARIMETRIC MAPS OF THE SKY IN BOTH 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 POLARIZANCE 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 MAKSUTOV 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 THE 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 10.)

-------- PIONEER 11, WOLFE----------

INVESTIGATION NAME- PLASMA

NSSDC ID- 73-019A-13

INVESTIGATIVE PROGRAM
CODE SL

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-EXTRATERR PHYS
OI - D.S.	INTRILIGATOR	U OF SOUTHERN CALIF
OI - V.T.	ZAVIENTSEFF	NASA-ARC
OI - E.A.	SMITH	UNKNOWN
OI - F.L.	SCARF	TRW SYSTEMS GROUP
OI - H.R.	COLLARD	NASA-ARC
OI - W.C.	FELDMAN	LOS ALAMOS SCI LAB
OI - D.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 SWEPT 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.

********** PROGNOZ 4**********

SPACECRAFT COMMON NAME- PROGNOZ 4
ALTERNATE NAMES-

NSSDC ID- 75-122A

LAUNCH DATE- 12/22/75 WEIGHT- KG
LAUNCH SITE-
LAUNCH VEHICLE-

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/23/75
ORBIT PERIOD- 5740. MIN INCLINATION- 65. DEG
PERIAPSIS- 634. KM APOAPSIS- 199000. KM

PERSONNEL
PM - UNKNOWN
PS - A.A. GALEEV IKI

BRIEF DESCRIPTION

THE SPACECRAFT IS A CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY (IMS) PROGRAM, WHICH CARRIES EXPERIMENTS TO INVESTIGATE SOLAR CORPUSCULAR, X-RAY, AND RADIO EMISSIONS, AS WELL AS TO MEASURE ENERGETIC PARTICLES, PLASMA, AND MAGNETIC FIELDS IN THE MAGNETOSPHERE AND THE INTERPLANETARY MEDIUM. IN A COOPERATIVE PROGRAM WITH SCIENTISTS OF THE SOCIALIST COUNTRIES, SOUNDING ROCKETS ARE LAUNCHED TO ALTITUDES GREATER THAN 500 KM TO STUDY THE INTERACTION OF SHORTWAVE SOLAR RADIATION WITH THE ATMOSPHERE AND IONOSPHERE AND TO MAKE IN SITU MEASUREMENTS OF VARIOUS PARAMETERS IN THESE REGIONS OF SPACE.

------- PROGNOZ 4, GRIGORYEVA----------

INVESTIGATION NAME- KILOMETRIC/HECTOMETRIC RECEIVER

NSSDC ID- 75-122A-05

INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - V.P. GRIGORYEVA STERNBERG ASTRON INST

BRIEF DESCRIPTION

THE INSTRUMENT IS A RECEIVER-ANTENNA SYSTEM THAT MEASURES RADIO MISSION IN THE 50 - 1000 KHZ BAND IN 10-FREQUENCY INTERVALS.

------- PROGNOZ 4, GRINGAUZ----------

INVESTIGATION NAME- PLASMA DETECTOR

NSSDC ID- 75-122A-02

INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - K.I. GRINGAUZ IKI

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF A DIFFERENTIAL ION PROBE THAT MEASURES THE SPECTRUM BETWEEN 0.1 AND 4.4 KEV AND AN ELECTRON PROBE THAT MEASURES THE DENSITY AND TEMPERATURE FOR ENERGIES LESS THAN 300 EV. BECAUSE OF THE NATURE OF THE ORBIT, SOLAR WIND, MAGNETOSPHERE, AND PLASMASPHERE, PLASMA PARAMETERS ARE OBTAINED.

------- PROGNOZ 4, KACHAROV----------

INVESTIGATION NAME- SOLAR X-RAYS

NSSDC ID- 75-122A-03

INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - G.YE. KACHAROV LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

THE INSTRUMENT MEASURES X-RAYS IN THE ENERGY RANGE 2-511 KEV.

------- PROGNOZ 4, LOGACHEV----------

INVESTIGATION NAME- ENERGETIC PARTICLES AND CHARGE COMPOSITION

NSSDC ID- 75-122A-04

INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - YU.I. LOGACHEV INST NUCLEAR PHYS
PI - I.A. SANENKO MOSCOW STATE U

BRIEF DESCRIPTION

THE INSTRUMENT CONSISTS OF VARIOUS DETECTORS FOR MEASURING THE SPECTRA, ANISOTROPY AND CHARGE COMPOSITION OF SOLAR AND GALACTIC COSMIC RAYS, AS WELL AS ENERGETIC PARTICLES IN THE MAGNETOSPHERE AND RADIATION BELTS. ELECTRON ENERGIES ABOVE 10 KEV AND PROTON ENERGIES ABOVE 50 KEV ARE COVERED IN SUFFICIENTLY WIDE INTERVALS. THE CHARGE COMPOSITION AT ENERGIES ABOVE 500 MEV PER NUCLEON IS OBTAINED AT CHARGE VALUES BETWEEN Z = 2, 6, 15, 35, AND 50.

------- PROGNOZ 4, SKREBTSOV----------

INVESTIGATION NAME- ENERGETIC PARTICLE TELESCOPE

NSSDC ID- 75-122A-06

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - G.P. SKREBTSOV LENGRAD INST PHYS TECH

BRIEF DESCRIPTION

AN ENERGETIC PARTICLE TELESCOPE WAS FLOWN TO MEASURE CHARGE COMPOSITION OF ENERGETIC PARTICLES WITHIN 0.9 TO 15 MEV/NUCLEON FOR Z .GE. 3, AND 0.2 TO 7.2 MEV/NUCLEON FOR Z EQUALS 1, 2.

------- PROGNOZ 4, YEROSHENKO----------

INVESTIGATION NAME- THREE AXIS FLUXGATE MAGNETOMETER

NSSDC ID- 75-122A-01 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - YE.G. YEROSHENKO IZMIRAN

BRIEF DESCRIPTION
THE INSTRUMENT IS A TRIAXIAL FLUXGATE MAGNETOMETER FLOWN TO MEASURE VECTOR MAGNETIC FIELDS FROM 1 TO 60 GAMMAS.

********** PROGNOZ 5**********

SPACECRAFT COMMON NAME- PROGNOZ 5
ALTERNATE NAMES- 09557

NSSDC ID- 76-112A

LAUNCH DATE- 11/25/76 WEIGHT- KG
LAUNCH SITE-
LAUNCH VEHICLE-

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/26/76
ORBIT PERIOD- 5713. MIN INCLINATION- 65. DEG
PERIAPSIS- 510. KM APOAPSIS- 199000. KM

PERSONNEL
PM - UNKNOWN
PS - A.A. GALEEV IKI

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, GRIGORYEVA----------

INVESTIGATION NAME- KILOMETRIC/HECTOMETRIC RECEIVER

NSSDC ID- 76-112A-05 INVESTIGATIVE PROGRAM
SPACE 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

NSSDC ID- 76-112A-02 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K.I. GRINGAUZ IKI

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- SOLAR X-RAYS

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- ULTRAVIOLET PHOTOMETERS - HYDROGEN AND HELIUM

NSSDC ID- 76-112A-08 INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
INTERPLANETARY PHYSICS
ASTRONOMY

PERSONNEL
PI - V.G. KURT SPACE RES INST
PI - J.L. BERTAUX CNRS-LAS

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 GEOCORONA. 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- SOFT X-RAYS

NSSDC ID- 76-112A-07 INVESTIGATIVE PROGRAM
ASTROPHYSICS

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - O.B. LICKIN IKI
PI - B. VALNICEK ASTRON OBS (KHARKOV)

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
SPACE 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 Z 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
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - V.N. LUTSENKO SPACE RES INST

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, YEROSHENKO----------

INVESTIGATION NAME- THREE-AXIS FLUXGATE MAGNETOMETER

NSSDC ID- 76-112A-01 INVESTIGATIVE PROGRAM
SPACE PHYSICS

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - YE.G. YEROSHENKO IZMIRAN

BRIEF DESCRIPTION
A THREE-AXIS FLUXGATE MAGNETOMETER WAS FLOWN TO MEASURE VECTOR FIELDS FROM 1 TO 60 GAMMAS.

------- 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	SPACE RES INST
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.

********** RAE-B**********

SPACECRAFT COMMON NAME- RAE-B
ALTERNATE NAMES- RADIO ASTRONOMY EXPLORER, PL-693B
EXPLORER 49, 06686
6686

NSSDC ID- 73-039A

LAUNCH DATE- 06/10/73
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA
WEIGHT- 328. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES
NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 221.17 MIN
PERIAPSIS- 1052.98 KM
EPOCH DATE- 06/21/73
INCLINATION- 55.7 DEG
APOAPSIS- 1063.84 KM

PERSONNEL

MG - J.R.	HOLTZ	NASA HEADQUARTERS
SC - N.G.	ROMAN	NASA HEADQUARTERS
PM - J.T.	SHEA	NASA-GSFC
PS - R.G.	STONE	NASA-GSFC

BRIEF DESCRIPTION
THIS MISSION WAS THE SECOND OF A PAIR OF RADIO ASTRONOMY EXPLORER SATELLITES TO BE PLACED INTO ORBIT. IT WAS PLACED INTO LUNAR ORBIT ON JUNE 15, 1973, TO PROVIDE RADIO ASTRONOMICAL MEASUREMENTS OF THE PLANETS, THE SUN, AND THE MILKY WAY OVER THE FREQUENCY RANGE OF 25 KHZ TO 13.1 MHZ. THE EXPERIMENT COMPLEMENT CONSISTED OF TWO RYLE-VONBERG RADIOMETERS (9 CHANNELS EACH), THREE SWEPT-FREQUENCY BURST RECEIVERS (32 CHANNELS EACH), AND AN IMPEDANCE PROBE FOR CALIBRATION. THE EXPERIMENT ANTENNAS CONSISTED OF A 229-M, UPPER V-ANTENNA POINTED AWAY FROM THE MOON; A 183-M, LOWER V-ANTENNA POINTED TOWARDS THE MOON; AND A 37-M, DIPOLE ANTENNA PARALLEL TO THE LUNAR SURFACE. THE LOWER V-ANTENNA WAS EXTENDED TO ITS FULL 229-M LENGTH IN NOVEMBER 1974. THE SPACECRAFT BODY WAS A TRUNCATED CYLINDER 36.25 IN. IN DIAMETER APPROXIMATELY 31 IN. HIGH, WITH FOUR FIXED SOLAR PADDLES. THE MANEUVERING SYSTEM CONSISTED OF A HYDRAZINE VELOCITY CORRECTION PACKAGE, A COLD GAS ATTITUDE CONTROL SYSTEM, AND A SOLID FUEL LUNAR INSERTION MOTOR. DATA WERE RETURNED TO THE EARTH VIA EITHER A LOW POWER, UHF (400 MHZ) TRANSMITTER, IN REAL TIME, OR STORED IN AN ON-BOARD TAPE RECORDER AND TRANSMITTED TO EARTH VIA A HIGH POWER UHF TRANSMITTER (400 MHZ). TWO TAPE RECORDERS PROVIDED BACKUP STORAGE. A VHF TRANSMITTER SERVED PRIMARILY FOR RANGE AND RANGE-RATE MEASUREMENTS AND SERVED AS A BACKUP. COMMANDS WERE RECEIVED ON A VHF (148 MHZ) RECEIVER, WHICH ALSO WAS A PART OF THE RANGE AND RANGE-RATE SYSTEM. SPACECRAFT ATTITUDE WAS DETERMINED BY (1) A SOLAR ASPECT SYSTEM, (2) A HORIZON SENSOR SYSTEM, AND (3) A PANORAMIC ATTITUDE SENSOR SYSTEM, AND WAS ACCURATE TO ONE DEG. THE SPACECRAFT WAS GRAVITY GRADIENT ORIENTED (Z AXIS PARALLEL TO LOCAL VERTICAL) AND WAS EQUIPPED WITH LIBRATION DAMPERS TO DAMP OUT OSCILLATIONS.

------- RAE-B, STONE----------

INVESTIGATION NAME- STEP FREQUENCY RADIOMETERS

NSSDC ID- 73-039A-01

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

PI - R.G.	STONE	NASA-GSFC
OI - R.R.	WEBER	NASA-GSFC
OI - L.W.	BROWN	NASA-GSFC
OI - J.F.	CLARK	NASA-GSFC

BRIEF DESCRIPTION
THE RYLE-VONBERG RECEIVERS WERE DESIGNED TO PROVIDE MEASUREMENTS THAT WERE RELATIVELY INSENSITIVE TO GAIN AND BANDWIDTH CHANGES. THERE WERE TWO RECEIVERS -- RV-1 CONNECTED TO THE UPPER V-ANTENNA AND RV-2 CONNECTED TO THE LOWER V-ANTENNA. THE RADIOMETERS HAD AN EFFECTIVE BANDWIDTH OF 40 KHZ AND A POST-DETECTION TIME CONSTANT OF 0.1 S. A COARSE OUTPUT CHANNEL WAS OBTAINED FROM THE INTEGRATED SERVO-LOOP ERROR SIGNAL, AND A FINE OUTPUT CHANNEL WAS OBTAINED FROM THE NOISE SOURCE OUTPUT REQUIRED TO MATCH THE ANTENNA SIGNAL. THE TIME CONSTANT FOR THE FINE CHANNEL WAS 0.5 S. A THERMISTOR LOCATED IN THE RECEIVER MEASURED THE AMBIENT TEMPERATURE, WHICH WAS TELEMETERED EVERY 19.7 MIN IN THE HOUSEKEEPING DATA. THE RECEIVERS OPERATED AT NINE FREQUENCIES FROM 0.45 TO 9.18 MHZ. EACH FREQUENCY WAS SELECTED FOR 15.4 S BEFORE STEPPING TO THE NEXT. DURING THIS TIME, EIGHT COARSE AND TWO FINE SAMPLES WERE TAKEN. OF THE EIGHT COARSE SAMPLES, THE FIRST WAS NOT RELIABLE SINCE NOT ENOUGH TIME HAD ELAPSED FOR THE RECEIVER TO STABILIZE AFTER THE FREQUENCY SWITCH WAS MADE.

------- RAE-B, STONE----------

INVESTIGATION NAME- RAPID-BURST RECEIVERS

NSSDC ID- 73-039A-02

INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
MAGNETOSPHERIC PHYSICS
SOLAR PHYSICS

PERSONNEL

PI - R.G.	STONE	NASA-GSFC
OI - J.K.	ALEXANDER, JR.	NASA-GSFC
OI - J.	FAINBERG	NASA-GSFC
OI - J.F.	CLARK	NASA-GSFC
OI - H.	MALITSON	NASA-GSFC

BRIEF DESCRIPTION
THE BURST RECEIVERS WERE 32-CHANNEL, STEPPED-FREQUENCY (25 KHZ TO 13.1 MHZ) RECEIVERS, WHICH OBTAINED ONE SAMPLE AT EACH FREQUENCY EVERY 7.68 S. ONE RECEIVER (BR-1) WAS CONNECTED TO THE UPPER V-ANTENNA AND ONE RECEIVER (BR-2) WAS CONNECTED TO THE LOWER V-ANTENNA. A THIRD BURST RECEIVER WAS CONNECTED TO THE DIPOLE ANTENNA, BUT IT FAILED ONE WEEK INTO THE FLIGHT AND NO SIGNIFICANT DATA RESULTED. THE RF VOLTAGE AT THE FEED POINT OF EACH HALF OF THE V-ANTENNA WAS SAMPLED BY A WIDEBAND, HIGH-IMPEDANCE PREAMPLIFIER, AND THE PREAMPLIFIER OUTPUTS WERE COMBINED IN A BALUN TRANSFORMER AND FED TO THE BURST RECEIVER. EACH BURST RECEIVER WAS COMPRISED OF A PAIR OF REDUNDANT IF AMPLIFIERS AND DETECTORS, WHICH SHARED A COMMON SET OF CRYSTAL-CONTROLLED LOCAL OSCILLATORS AND MIXERS. ONLY ONE IF STRIP WAS POWERED ON AT A GIVEN TIME; THE OTHER WAS USED AS A BACK-UP SYSTEM. LOW-PASS FILTERS AT THE INPUT OF THE BURST RECEIVER PREVENTED STRONG SIGNALS AT THE 21.4 MHZ INTERMEDIATE FREQUENCY FROM ENTERING THE IF STRIP. EACH RECEIVER HAD A CRYSTAL-CONTROLLED IF BANDWIDTH OF 20 KHZ AND A POST-DETECTION INTEGRATION TIME CONSTANT OF 6 MS. A THERMISTOR LOCATED IN EACH BURST RECEIVER PROVIDED A MEASUREMENT OF THE AMBIENT TEMPERATURE OF THE RECEIVER, AND THIS INFORMATION WAS INCLUDED IN THE HOUSEKEEPING DATA TELEMETERED EVERY 19.7 MIN. ALSO, THE NORMAL ANTENNA SIGNAL MEASUREMENT SEQUENCE WAS INTERRUPTED FOR 1.28 MIN EVERY 19.7 MIN, AND CALIBRATION NOISE SOURCE SIGNALS WERE INJECTED INTO EACH BURST RECEIVER TO PROVIDE A CHECK OF THEIR LONG-TERM GAIN STABILITY. THE TOTAL DYNAMIC RANGE OF THE BURST RECEIVERS WAS APPROXIMATELY 60 DB AND WAS DIVIDED INTO TWO 30-DB RANGES BY LOGIC CIRCUITRY IN THE DETECTOR ELECTRONICS. THE LIMIT OF THE INPUT SIGNAL LEVEL RESOLUTION DUE TO TELEMETRY QUANTIZATION STEP SIZE WAS ABOUT 0.3 DB. SATURATION LEVEL SIGNALS AT THE PREAMPLIFIER INPUT OFTEN RESULTED IN THE GENERATION OF INTERMODULATION PRODUCTS IN THE RF AMPLIFIERS, WHICH THEN APPEARED AS WIDEBAND SIGNALS IN THE TELEMETERED DATA. THIS PROBLEM WAS MOST ACUTE WHEN INTENSE KILOMETER WAVELENGTH EMISSIONS FROM THE TERRESTRIAL MAGNETOSPHERE WERE OBSERVED AT FREQUENCIES IN THE 200 TO 300 KHZ RANGE. BR-1 WAS LESS SUSCEPTIBLE TO INTERMODULATION PROBLEMS THAN BR-2 BY 6 TO 10 DB, DUE TO A FAILURE IN THE LOCAL OSCILLATOR CIRCUITRY IN BR-1, CHANNELS 4 (55 KHZ) AND 12 (210 KHZ) DID NOT PROVIDE USEABLE DATA. DURING PERIODS WHEN A PORTION OF EACH ORBIT WAS IN THE LUNAR SHADOW, CYCLIC VARIATIONS IN THERMAL GRADIENTS ACROSS THE V-ANTENNA BOOMS RESULTED IN SCISSOR-MODE OSCILLATIONS OF THE BOOMS, WHICH DID NOT OCCUR WHEN THE SPACECRAFT WAS IN 100 PERCENT SUNLIGHT. ONE CONSEQUENCE OF THIS BOOM MOTION WAS A VARIATION IN ANTENNA IMPEDANCE THAT SOMETIMES RESULTED IN SIGNIFICANT FLUCTUATIONS IN THE APPARENT SIGNAL LEVEL - ESPECIALLY AT FREQUENCIES NEAR HALF- AND FULLWAVE RESONANCE (I.E., APPROXIMATELY 737 AND 1310 KHZ). THIS EFFECT HAD A PERIOD OF APPROXIMATELY 50 MIN (THE SCISSOR-MODE PERIOD) AND WAS MOST PRONOUNCED ON THE UPPER V-ANTENNA DURING THE FIRST AND FIFTH LUNAR SHADOW PERIOD AND ON THE LOWER V-ANTENNA DURING THE SECOND AND THIRD LUNAR SHADOW PERIODS.

------- RAE-B, STONE----------

INVESTIGATION NAME- IMPEDANCE PROBE

NSSDC ID- 73-039A-03 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - R.G. STONE NASA-GSFC
OI - J.L. DONLEY NASA-GSFC
OI - J.E. GUTHRIE NASA-GSFC
OI - J.A. KANE NASA-GSFC
OI - R.C. SOMERLOCK NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS AN ENGINEERING EXPERIMENT TO CHECK THE UPPER V-ANTENNA. IT WAS USED ONLY FOR ROUTINE CONFIRMATION OF ANTENNA CHARACTERISTICS EARLY IN THE FLIGHT.

********** S3-1**********

SPACECRAFT COMMON NAME- S3-1
ALTERNATE NAMES- SESP P73-5, ST73-5A

NSSDC ID- 74-085C

LAUNCH DATE- 10/29/74 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/31/74
ORBIT PERIOD- 126.6 MIN INCLINATION- 97.0 DEG
PERIAPSIS- 152.0 KM APOAPSIS- 3795.0 KM

PERSONNEL
PM - UNKNOWN
PS - J.R. STEVENS AEROSPACE CORP

BRIEF DESCRIPTION
THIS SATELLITE CARRIED EIGHT COMPLEMENTARY TYPES OF EXPERIMENTS, DESIGNED TO STUDY ATMOSPHERIC DENSITY AND ITS CHANGES AT LOW ALTITUDES. THE SATELLITE WAS SPIN STABILIZED, WITH THE SPIN AXIS PERPENDICULAR TO ITS POLAR ORBIT. ORBIT PRECESSION, WHEN THE ORBIT IS INCLINED MORE THAN 70 DEG, WAS LIMITED TO LESS THAN 0.5 DEG PER DAY. THIS LIMITED OBSERVATIONS FOR SAMPLING TO LESS THAN ONE-FOURTH OF THE POSSIBLE 24 H OF LOCAL TIME OVER THE 7-MONTH SATELLITE LIFETIME.

------- S3-1, KOONS----------

INVESTIGATION NAME- ELF-VLF RECEIVER

NSSDC ID- 74-085C-07 INVESTIGATIVE PROGRAM
SESP

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

PERSONNEL
PI - H.C. KOONS AEROSPACE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO OBSERVE THE AC ELECTRIC AND MAGNETIC FIELDS IN THE ATMOSPHERE ABOVE 120 KM. CORRELATIVE STUDIES OF THESE OBSERVATIONS WITH DENSITY (AND OTHER DENSITY-RELATED PHENOMENA) HELPED TO DETERMINE CAUSES FOR DENSITY VARIATIONS IN THE UPPER ATMOSPHERE.

--- --- S3-1, MARCOS----------

INVESTIGATION NAME- ACCELEROMETER DENSITY OBSERVATIONS

NSSDC ID- 74-085C-01 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - F.A. MARCOS USAF GEOPHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED NEUTRAL DENSITY AND ITS VARIATIONS BETWEEN 135 AND 485 KM. THE EQUIPMENT CONSISTED TO TWO DIFFERENT ACCELEROMETERS. DENSITY PROFILES NEAR PERIGEE WERE COMPUTED FROM SPACECRAFT ACCELERATION DATA AND KNOWLEDGE OF THE SPACECRAFT SHAPE, MASS, AND ALTITUDE. WITH DATA LIMITED TO THE PERIGEE REGION OF THE OUTPUT, THE 7-MONTH EXPERIMENT LIFETIME PROVIDED DATA COVERAGE OVER AN APPRECIABLE SPAN OF SOLAR TIME (DUE TO THE ORBIT PRECESSION) AND OVER ALL LATITUDES (DUE TO PERIGEE MOTION).

------- S3-1, MCISSAC----------

INVESTIGATION NAME- ION DENSITY GAUGES

NSSDC ID- 74-085C-02 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.R. MCISSAC USAF GEOPHYS LAB

BRIEF DESCRIPTION
TWO IONIZATION DENSITY SENSORS AND A COLD CATHODE ION GAUGE WERE USED TO OBSERVE ATMOSPHERIC NEUTRAL DENSITIES. THE NEUTRAL PARTICLES WERE IONIZED BY THE DETECTOR, AND THE ION CURRENT TO A CHARGED COLLECTOR PROVIDED THE DATA FROM WHICH THE NEUTRAL DENSITY PROFILES WERE DETERMINED. IT WAS INTENDED TO OBTAIN NEUTRAL DENSITIES BETWEEN 175 AND 485 KM. WITH DATA LIMITED TO THE PERIGEE REGION OF THE ORBIT, THE 7-MONTH EXPERIMENT LIFETIME PROVIDED DATA COVERAGE OVER AN APPRECIABLE SPAN OF SOLAR TIME (DUE TO THE ORBIT PRECESSION) AND OVER ALL ALTITUDES (DUE TO PERIGEE MOTION).

------- S3-1, PHILBRICK----------

INVESTIGATION NAME- MASS SPECTROMETER

NSSDC ID- 74-085C-03 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - C.R. PHILBRICK USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE THE COMPOSITION AND CONSTITUENT DENSITIES OF THE ATMOSPHERE BETWEEN 140 AND 500 KM. OF PARTICULAR INTEREST WERE CONSTITUENT AND CONSTITUENT-DENSITY CHANGES CAUSED BY SOLAR AND GEOMAGNETIC VARIATIONS.

------- S3-1, PRAG----------

INVESTIGATION NAME- SOLAR UV EXPERIMENT

NSSDC ID- 74-085C-04 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - A.B. PRAG AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE ABSOLUTE INTENSITY OF THE SOLAR UV FLUX (BETWEEN 300 AND 1800 A) IN IDENTIFYING THE EARTH'S ATMOSPHERE. THE WAVELENGTH BANDS OF PARTICULAR INTEREST (300 TO 1000 A AND 1400 TO 1600 A) WERE THOSE MOST CLOSELY RELATED TO NEUTRAL DENSITY VARIATIONS AND VARIATION IN COMPOSITION ABOVE 120 KM.

------- S3-1, RICE----------

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 74-085C-05 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL
PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO OBSERVE THE ELECTRON AND ION FLUXES IN THE 120- TO 500-KM REGION OF THE ATMOSPHERE. CORRELATIVE STUDIES OF THESE OBSERVATIONS WITH DENSITY (OR OTHER DENSITY-RELATED PHENOMENA) HELPED DETERMINE CAUSES FOR DENSITY VARIATIONS IN THIS REGION.

------- S3-1, RICE----------

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 74-085C-06 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL
PI - C.J. RICE AEROSPACE CORP

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WAS TO OBSERVE THE PLASMA TEMPERATURES IN THE 120- TO 500-KM REGION OF THE ATMOSPHERE. CORRELATIVE STUDIES OF THESE OBSERVATIONS WITH DENSITY (OR OTHER DENSITY-RELATED PHENOMENA) HELPED TO DETERMINE CAUSES FOR DENSITY VARIATIONS IN THIS REGION.

********** 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

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- NOMINAL
ORBIT PERIOD- 96. MIN INCLINATION- 97. DEG
PERIAPSIS- 230. KM APOAPSIS- 900. KM

PERSONNEL
PM - SAMSO 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- ENERGETIC ELECTRON (0.1- 1.0 MEV) SENSOR

NSSDC ID- 75-114B-06 INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - J.F. FENNELL AEROSPACE CORP
OI - W. MOOMEY LOS ALAMOS SCI LAB
OI - W.A. KOLASINSKI AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIMENT EMPLOYED AN ELECTROMAGNETIC ANALYZER TO OBSERVE FLUX, ENERGY SPECTRA, AND DIRECTION OF ELECTRONS IN THE 0. 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, 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, MCISSAC----------

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. MCISSAC 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 BE 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- RETARDING POTENTIAL ANALYZER

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 GEOPHYS LAB
OI - M. SMIDDY — USAF GEOPHYS 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- 75-114B-07

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - M. SMIDDY — USAF GEOPHYS 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, VANCOUR----------

INVESTIGATION NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 75-114B-09

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
ATMOSPHERIC PHYSICS

PERSONNEL
PI - R.P. VANCOUR — USAF GEOPHYS LAB
OI - M. SMIDDY — USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED PROTON AND ELECTRON FLUX FROM 1 TO 20 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- LOW ENERGY ELECTRONS AND PROTONS

NSSDC ID- 75-114B-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 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.

------- S3-2, YATES----------

INVESTIGATION NAME- LOW ENERGY PROTON SPECTROMETER

NSSDC ID- 75-114B-04

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES — USAF CAMBRIDGE RES 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- 75-114B-05

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES — USAF GEOPHYS LAB
OI - W. MOONEY — 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 S74-2A, S74-2
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 — DOD-USAF

ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC — EPOCH DATE- NOMINAL
ORBIT PERIOD- 176.6 MIN — INCLINATION- 97.5 DEG
PERIAPSIS- 246. KM — APOAPSIS- 7856. KM

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, KOONS----------

INVESTIGATION NAME- ELF/VLF RECEIVER

NSSDC ID- 76-065B-06
INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SPACE PLASMAS
PARTICLES AND FIELDS

PERSONNEL
PI - H.C. KOONS AEROSPACE CORP
OI - D.P. CAUFFMAN NASA HEADQUARTERS

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE LINEAR AND NON-LINEAR EFFECTS OF THE ENVIRONMENT ON THE NEAR-EARTH MAGNETIC FIELD. IT PROVIDED ANTENNA IMPEDANCE MEASUREMENTS ON AN ELECTRIC-FIELD ANTENNA FOR FREQUENCIES FROM 0.1 TO 20 KHZ. THE EXPERIMENT WAS ALSO USED TO OBSERVE AMBIENT ELECTRIC FIELDS IN THE MAGNETOSPHERE TO DETERMINE THE EFFECTIVENESS OF WAVE-PARTICLE INTERACTIONS AS A LOSS MECHANISM FOR ENERGETIC ELECTRONS FROM THE OUTER RADIATION ZONE. THE SENSING EQUIPMENT CONSISTED OF THE ANTENNA, AND THE ASSOCIATED RECEIVER ELECTRONICS PACKAGE.

------- S3-3, MOZER----------

INVESTIGATION NAME- DC ELECTRIC FIELDS

NSSDC ID- 76-065B-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- 76-065B-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- 76-065B-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- 76-065B-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 GEOPHYS LAB
OI - M. SMIDDY 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 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- 76-065B-03
INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES 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- 76-065B-04
INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF CAMBRIDGE RES 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.

********** SAN MARCO 4**********

SPACECRAFT COMMON NAME- SAN MARCO 4
ALTERNATE NAMES- SAN MARCO-C-2, 07154
SM-C2

NSSDC ID- 74-009A

LAUNCH DATE- 02/18/74 WEIGHT- 164. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
ITALY CRA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 02/19/74
ORBIT PERIOD- 96.3 MIN INCLINATION- 2.9 DEG
PERIAPSIS- 232.0 KM APOAPSIS- 905.0 KM

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - E.R. SCHMERLING NASA HEADQUARTERS
PM - A.J. CAPORALE NASA-GSFC
PS - G.P. NEWTON NASA-GSFC

BRIEF DESCRIPTION
THE ITALIAN-BUILT SAN MARCO C-2 SPACECRAFT WAS PART OF A COOPERATIVE SPACE EFFORT BETWEEN THE ITALIAN SPACE COMMISSION (CRA) AND NASA. THE SCIENTIFIC OBJECTIVE OF SAN MARCO C-2 WAS TO PROVIDE MEASUREMENTS OF THE DIURNAL VARIATIONS OF EQUATORIAL NEUTRAL THERMOSPHERE DENSITY, COMPOSITION, AND TEMPERATURE FOR CORRELATION WITH SIMULTANEOUS ATMOSPHERIC EXPLORER C (AE-C) DATA, TO BE USED IN STUDIES OF THE PHYSICS AND DYNAMICS OF THE LOWER THERMOSPHERE. THE SPACECRAFT CARRIED (1) A NEUTRAL

ATMOSPHERE COMPOSITION EXPERIMENT (NACE) TO DETERMINE UPPER ATMOSPHERIC (160 KM AND ABOVE) CONCENTRATIONS OF ARGON, HELIUM, ATOMIC OXYGEN AND MOLECULAR OXYGEN AND NITROGEN, (2) A NEUTRAL ATMOSPHERIC TEMPERATURE EXPERIMENT TO DETERMINE THE TEMPERATURE OF AMBIENT MOLECULAR NITROGEN AND (3) AN ACCELEROMETER TO MEASURE ATMOSPHERIC DENSITY NEAR SATELLITE PERIGEE.

------- SAN MARCO 4, NEWTON----------

INVESTIGATION NAME- NEUTRAL ATMOSPHERE COMPOSITION

NSSDC ID- 74-009A-02 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - G.P. NEWTON NASA-GSFC
OI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN AT EQUATORIAL LATITUDES TO DETERMINE THE CONCENTRATIONS AND TEMPORAL (INCLUDING DIURNAL) FLUCTUATIONS OF THE FOLLOWING NEUTRAL UPPER ATMOSPHERE CONSTITUENTS -- ARGON, MOLECULAR AND ATOMIC OXYGEN, MOLECULAR NITROGEN, AND HELIUM. THE MEASUREMENTS OBTAINED WERE CORRELATED WITH APPROPRIATE ATMOSPHERIC EXPLORER-C DATA. A MAGNETIC MASS SPECTROMETER WAS USED.

------- SAN MARCO 4, SPENCER----------

INVESTIGATION NAME- NEUTRAL ATMOSPHERE TEMPERATURE

NSSDC ID- 74-009A-03 INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - N.W. SPENCER NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO DETERMINE BY DIRECT MEASUREMENT THE TEMPERATURE AND DENSITY OF MOLECULAR NITROGEN AT SEVERAL ALTITUDES IN THE UPPER ATMOSPHERE. THE DATA OBTAINED WERE USED TO STUDY TEMPORAL FLUCTUATIONS, AND THEY WERE ALSO CORRELATED WITH ATMOSPHERIC EXPLORER-C MEASUREMENTS. THE SENSOR WAS A SMALL OMEGATRON TUNED TO MEASURE MOLECULAR NITROGEN, AND HAD A SPECIALLY SHAPED APERTURE. TEMPERATURE WAS MEASURED DURING A SPIN-SCAN BY OBSERVING THE RESPONSE AS A FUNCTION OF ANGLE WITH THE SATELLITE VELOCITY VECTOR.

********** SAS-A**********

SPACECRAFT COMMON NAME- SAS-A
ALTERNATE NAMES- SAS 1, EXPLORER 42
UHURU 1, PL-7010
04797

NSSDC ID- 70-107A

LAUNCH DATE- 12/12/70 WEIGHT- 143. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSSA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/13/70
ORBIT PERIOD- 95.7 MIN INCLINATION- 3.0 DEG
PERIAPSIS- 531. KM APOAPSIS- 572. KM

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - M.R. TOWNSEND NASA-GSFC
PS - C.E. FICHTEL NASA-GSFC

BRIEF DESCRIPTION
SAS-A WAS THE FIRST OF A SERIES OF SMALL SPACECRAFT WHOSE OBJECTIVES WERE TO SURVEY THE CELESTIAL SPHERE AND SEARCH FOR SOURCES RADIATING IN THE X-RAY, GAMMA-RAY, UV, AND OTHER SPECTRAL REGIONS. THE PRIMARY MISSION OF SAS-A WAS TO DEVELOP A CATALOG OF CELESTIAL X-RAY SOURCES BY SYSTEMATIC SCANNING OF THE CELESTIAL SPHERE IN THE ENERGY RANGE FROM 2 TO 20 KEV. THE SPACECRAFT WAS LAUNCHED DECEMBER 12, 1970, FROM THE SAN MARCO PLATFORM OFF THE COAST OF KENYA, AFRICA, INTO A NEAR-CIRCULAR EQUATORIAL ORBIT. THE ORBITING SPACECRAFT WAS IN THE SHAPE OF A CYLINDER APPROXIMATELY 56 CM IN DIAMETER AND 116 CM IN LENGTH. FOUR SOLAR PADDLES WERE USED TO RECHARGE A 6-AMP-HR, EIGHT-CELL, NICKEL-CADMIUM BATTERY AND TO PROVIDE POWER TO THE SPACECRAFT AND EXPERIMENT. THE SPACECRAFT WAS STABILIZED BY AN INTERNAL WHEEL, AND A MAGNETICALLY TORQUED COMMANDABLE CONTROL SYSTEM WAS USED TO POINT THE SPIN AXIS OF THE SPACECRAFT TO ANY POINT OF THE SKY. THE ASPECT SYSTEM CONSISTED OF BOTH A STAR AND SUN SENSOR THAT SHARED THE SAME PROCESSING ELECTRONICS. DATA WERE STORED ON A ONE-ORBIT STORAGE TAPE RECORDER AND TELEMETERED DURING A 3.4-MIN PLAYBACK CYCLE. A 1000-BPS PCM/PM SYSTEM WAS USED.

------- SAS-A, GIACCONI----------

INVESTIGATION NAME- ALL-SKY X-RAY SURVEY

NSSDC ID- 70-107A-01 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI HARVARD COLLEGE OBS
OI - E.M. KELLOGG HARVARD COLLEGE OBS
OI - H. GURSKY HARVARD COLLEGE OBS
OI - H. TANANBAUM HARVARD COLLEGE OBS

BRIEF DESCRIPTION
THE X-RAY INSTRUMENT ABOARD SAS-A (EXPLORER 42) CONSISTED OF TWO NEARLY IDENTICAL SIDES BOTH PHYSICALLY AND ELECTRONICALLY. EACH SIDE CONTAINED AN X-RAY DETECTION SYSTEM COMPOSED OF A COLLIMATOR, PROPORTIONAL COUNTERS, ASSOCIATED PROCESSING ELECTRONICS, AND AN ASPECT SENSING SYSTEM. THE HIGH-RESOLUTION (SPATIAL) SIDE HAD A VIEWING ANGLE OF 0.5 DEG BY 5 DEG FWHM AND A DETECTION RANGE FROM 1 TO 20 KEV. THE OTHER SIDE HAD A HIGH-SENSITIVITY (INTENSITY) COLLIMATOR WITH A VIEWING ANGLE OF 5 DEG BY 5 DEG FWHM. THIS SILE HAD A DETECTION RANGE FROM 1 TO 10 KEV. THE CENTERS OF THE FIELDS OF VIEW OF THE TWO BANKS WERE DISPLACED FROM THE EQUATORIAL PLANE OF THE SATELLITE, SUCH THAT THE FULL BANDWIDTH COVERED BY THE TWO DETECTORS DURING EACH SPIN WAS APPROXIMATELY 127 DEG. SIX PROPORTIONAL COUNTERS COMPOSED OF A BERYLLIUM SHELL WITH 2.5-MIL BERYLLIUM FOIL WINDOWS WERE BEHIND EACH COLLIMATOR. THE INTERIOR CONTAINED A 2-MIL TUNGSTEN ANODE WIRE AND A GAS COMPOSITION OF 90 PERCENT ARGON, 9.5 PERCENT COZON DIOXIDE FOR QUENCHING, AND 0.5 PERCENT HELIUM AT A PRESSURE OF 940 MM OF MERCURY. LOW-INTENSITY RADIOACTIVE SOURCES WERE USED FOR IN-FLIGHT CALIBRATION OF THE INSTRUMENT. THE SPIN AXIS OF THE SPACECRAFT WAS HELD FIXED IN THE SKY FOR ABOUT A DAY AT A TIME. DURING THIS PERIOD A BAND OF APPROXIMATELY 10 DEG ABOUT THE EQUATOR OF THE SPIN AXIS WAS SCANNED. THE PRIMARY DATA REDUCTION OBJECTIVE WAS TO SUPERIMPOSE THE X-RAY DATA RECORDED AS 'COUNT RATE VS TIME' TO 'COUNT RATE VS AZIMUTH' SO THAT THE SUPERIMPOSITION DATA WOULD BE EQUIVALENT TO A SINGLE SWEEP THROUGH THE OBSERVING 10-DEG BAND WITH A TOTAL OBSERVING TIME OF 1 DAY. AN ARRAY WAS CREATED OF X-RAY SUPERPOSITION (REPRESENTING THE 360-DEG CIRCLE SCANNED) BROKEN INTO 4320 ELEMENTS OF AZIMUTH OF 5 MIN EACH FOR THE 0.5-DEG DETECTOR AND 1080 ELEMENTS OF AZIMUTH OF 20 MIN EACH FOR THE 5-DEG DETECTOR.

********** SAS-C**********

SPACECRAFT COMMON NAME- SAS-C
ALTERNATE NAMES- PL-7430, 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- 05/08/75
ORBIT PERIOD- 94.9 MIN INCLINATION- 3.0 DEG
PERIAPSIS- 509. KM APOAPSIS- 516. KM

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - M.R. TOWNSEND 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 SA

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- 75-037A-02

INVESTIGATIVE PROGRAM
CODE SA

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
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- 75-037A-03

INVESTIGATIVE PROGRAM
CODE SA

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
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 CM SQ.

------- SAS-C, CLARK----------

INVESTIGATION NAME- X-RAY ABSORPTION CONTOURS OF THE GALAXY

NSSDC ID- 75-037A-04

INVESTIGATIVE PROGRAM
CODE SA

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
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 BE 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.

********** SMS 1**********

SPACECRAFT COMMON NAME- SMS 1
ALTERNATE NAMES- SMS-A, SYNCH METEOROL SATELL A
AEROS, MEO1

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-OA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/23/74
ORBIT PERIOD- 1340.4 MIN INCLINATION- 1.9 DEG
PERIAPSIS- 32345.0 KM APOAPSIS- 35439.0 KM

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
ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

PI -	NESS STAFF	NOAA-NESS

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-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT WAS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN WAS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR NORTH TO SOUTH AT THE COMPLETION OF EACH SPIN. A FULL PICTURE TOOK 18.2 MIN TO COMPLETE AND ABOUT 2 MIN TO RETRACE. DURING EACH SCAN, THE FIELD OF VIEW ON THE EARTH WAS SWEPT 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
ENVIRON. MONITORING DEVELOPMENT

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 (WEFAX 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 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

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

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

BRIEF DESCRIPTION
A BIAXIAL, SHORT BOOM-MOUNTED (2 FT) CLOSED-LOOP, FLUXGATE MAGNETOMETER WAS ORIENTED WITH ONE AXIS ALONG THE S/C SPIN AXIS, AND ONE IN THE SPIN PLANE. EACH SENSOR HAD A SELECTABLE RANGE (+50, 100, 200, OR 400 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, ME02

NSSDC ID- 75-011A

LAUNCH DATE- 02/06/75 WEIGHT- 243. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

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

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/01/75
ORBIT PERIOD- 1436.2 MIN INCLINATION- 1.0 DEG
PERIAPSIS- 35778. KM APOAPSIS- 35799. KM

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-INFRARED SPIN-SCAN RADIOMETER (VISSR) TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM TO RELAY PROCESSED DATA FROM CENTRAL WEATHER FACILITIES TO SMALL APT-EQUIPPED REGIONAL STATIONS AND TO COLLECT AND RETRANSMIT DATA FROM REMOTE EARTH-BASED PLATFORMS, AND (3) A SPACE ENVIRONMENT MONITOR (SEM) SYSTEM TO MEASURE PROTON, ELECTRON, AND SOLAR X-RAY FLUXES AND MAGNETIC FIELDS. THE SPIN-STABILIZED, EARTH-SYNCHRONOUS, AND CYLINDRICALLY SHAPED SPACECRAFT MEASURED 190.5 CM IN DIAM AND 230 CM IN LENGTH, EXCLUSIVE OF A MAGNETOMETER THAT EXTENDED AN ADDITIONAL 83 CM BEYOND THE CYLINDER SHELL. THE PRIMARY STRUCTURAL MEMBERS WERE A HONEYCOMB EQUIPMENT 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-INFRARED SPIN-SCAN RADIOMETER (VISSR)

NSSDC ID- 75-011A-04

INVESTIGATIVE PROGRAM
ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR) FLOWN ON SMS 2 PROVIDED DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED, GEOSTATIONARY SATELLITE FOR USE IN OPERATIONAL WEATHER ANALYSIS AND FORECASTING. THE TWO-CHANNEL INSTRUMENT WAS ABLE TO TAKE BOTH FULL AND PARTIAL PICTURES OF THE EARTH'S DISK. THE INFRARED CHANNEL (10.5 TO 12.6 MICROMETERS) AND THE VISIBLE CHANNEL (0.55 TO 0.70 MICROMETER) USED A COMMON OPTICS SYSTEM. INCOMING RADIATION WAS RECEIVED BY AN ELLIPTICALLY-SHAPED SCAN MIRROR AND COLLECTED BY A RITCHEY-CHRETIEN OPTICAL SYSTEM. THE SCAN MIRROR WAS SET AT A NOMINAL ANGLE OF 45 DEG TO THE VISSR OPTICAL AXIS, WHICH WAS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDED A WEST-TO-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT 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 SWEPT 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 2, NESS STAFF----------

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- 75-011A-05

INVESTIGATIVE PROGRAM
ENVIRON. MONITORING DEVELOPMENT

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - NESS STAFF NOAA-NESS

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

------- SMS 2, WILLIAMS----------

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- 75-011A-01

INVESTIGATIVE PROGRAM
ENVIRON. MONITORING DEVELOPMENT

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 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

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 RAYS 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

BRIEF DESCRIPTION
A SHORT BOOM DEPLOYED (2 FT) 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 INFLIGHT CALIBRATION CAPABILITY.

********** SOLRAD 10**********

SPACECRAFT COMMON NAME- SOLRAD 10
ALTERNATE NAMES- EXPLORER 44, SOLAR EXPLORER-C
SE-C, SOLRAD-C
PL-703A

NSSDC ID- 71-058A

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 APOAPSIS- 630. KM

PERSONNEL
MG - J.R. KOLTZ NASA HEADQUARTERS
SC - G.K. OERTEL 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 TELEMETERED 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- 71-058A-01 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.	MCCLINTON, 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 0.08 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 0.08- 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 0.08- 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 700 A, 1080 TO 1350 A, 1225 TO 1350 A, AND 1450 TO 1600 A. THE TWO SHORTER WAVELENGTH BANDS HAD LITHIUM FLUORIDE, PHOTOSENSITIVE 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 OXIDE OR TRIETHYLAMINE 8). 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 250 MW. TM 2 TRANSMITTED STORED DATA (UP TO ONE DATA SAMPLE PER MIN- FOR 14.25 H) ON COMMAND.

********** SOLRAD 11A**********

SPACECRAFT COMMON NAME- SOLRAD 11A
ALTERNATE NAMES- SRD-11A, SOLRAD HI-TRIP
SESP NO. NRL-111-0264, NRL-111
SESP P74-1C

NSSDC ID- 76-023C

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- 7344.3 MIN INCLINATION- 25.7 DEG
PERIAPSIS- 118383. KM APOAPSIS- 119180. KM

PERSONNEL

PM - E.W.	PETERKIN	US NAVAL RESEARCH LAB
PS - R.W.	KREPLIN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
SOLRAD 11A 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 11A, BLAKE----------

INVESTIGATION NAME- SOLAR PROTONS

NSSDC ID- 76-023C-14 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - J.B.	BLAKE	AEROSPACE CORP
OI - R.W.	KREPLIN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A PAIR OF IDENTICAL SENSORS WAS MOUNTED ON THE SPACECRAFT, WITH ONE ON THE SOLAR-ORIENTED SURFACE (THIS EXPERIMENT) AND ONE ON THE ANTISOLAR SURFACE (EXPERIMENT 76-023C-23). EACH SENSOR WAS A TWO-ELEMENT COUNTER USING DISK-SHAPED SEMICONDUCTORS AS DETECTOR ELEMENTS, WITH SHIELDING MATERIAL IN FRONT OF AND BETWEEN THE TWO DETECTOR ELEMENTS. THE DETECTOR ELEMENTS WERE CONNECTED TO CHARGE-SENSITIVE AMPLIFIERS. COINCIDENCE AND PULSE HEIGHT ANALYSIS WERE USED TO SEPARATE PULSES PRODUCED BY 2-MEV PROTONS, 10-MEV PROTONS, 4.5-MEV ALPHA PARTICLES, 7.5-MEV ALPHA PARTICLES, AND HEAVY NUCLEI (Z GREATER THAN 2, E GREATER THAN 3 MEV PER NUCLEON). A COMPLETE SET OF DATA POINTS WAS OBTAINED EVERY 2 MIN.

------- SOLRAD 11A, BLAKE----------

INVESTIGATION NAME- OMNIDIRECTIONAL PROTONS

NSSDC ID- 76-023C-17 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.B.	BLAKE	AEROSPACE CORP
OI - R.W.	KREPLIN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE SOLAR PROTONS AND ALPHA PARTICLES. A SET OF FIVE SMALL SILICON CUBICAL SEMICONDUCTOR DETECTORS WAS USED TO SEPARATELY MEASURE THE OMNIDIRECTIONAL PROTON AND ALPHA PARTICLE FLUXES IN THE ENERGY/NUCLEON RANGES 5 TO 20, 10 TO 25, 20 TO 40, 50 TO 90, AND 100 TO 160 MEV. A TWO-ELEMENT SEMICONDUCTOR TELESCOPE USED COINCIDENCE REQUIREMENTS AND PULSE-HEIGHT ANALYSIS TO DETERMINE PROTON FLUXES IN FIVE DIFFERENTIAL ENERGY CHANNELS FROM 20 TO 500 KEV AND IN THREE INTEGRAL CHANNELS AT 0.5, 1, AND 1.5 MEV. THE 36- TO 74-KEV DATA AND THE 1-MEV DATA WERE SECTORED INTO QUADRANTS, WHILE THE REMAINING CHANNELS YIELDED SPIN-INTEGRATED DATA. THE INSTRUMENT CONSISTED OF A PHOTOMULTIPLIER TUBE VIEWING A THIN PLASTIC SCINTILLATOR FOIL. PULSE-HEIGHT ANALYSIS WAS USED TO SEPARATE IONS INTO FIVE GROUPS (Z = 1, 2, 6 TO 10, 12 TO 18, AND GREATER THAN 18). THE IONS HAD ENERGY THRESHOLDS OF 0.5 MEV/NUCLEON (Z = 1 OR 2) THROUGH 0.8 MEV/NUCLEON (Z GREATER THAN 18). THE Z=2 AND Z=6 THROUGH 10 DATA WERE SECTORED INTO FOUR QUADRANTS. THE REMAINING DATA WERE SPIN-INTEGRATED. A COMPLETE SET OF MEASUREMENTS WAS MADE ONCE EVERY 2 MIN.

------- SOLRAD 11A, BLAKE----------

INVESTIGATION NAME- ANTISOLAR PROTONS

NSSDC ID- 76-023C-23 INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL

PI - J.B.	BLAKE	AEROSPACE CORP
OI - R.W.	KREPLIN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A PAIR OF IDENTICAL SENSORS WAS MOUNTED ON THE SPACECRAFT, WITH ONE ON THE ANTISOLAR SURFACE (THIS EXPERIMENT) AND ONE ON THE SOLAR-ORIENTED SURFACE (EXPERIMENT 76-023C-14). EACH SENSOR WAS A TWO-ELEMENT COUNTER TELESCOPE USING DISK-SHAPED SEMICONDUCTORS AS DETECTOR ELEMENTS, WITH SHIELDING MATERIAL IN FRONT OF AND BETWEEN THE TWO DETECTOR ELEMENTS. THE DETECTOR ELEMENTS WERE CONNECTED TO CHARGE-SENSITIVE AMPLIFIERS. COINCIDENCE AND PULSE-HEIGHT ANALYSIS WERE USED TO SEPARATE PULSES PRODUCED BY 2-MEV PROTONS, 10-MEV PROTONS, 4.5-MEV ALPHA PARTICLES, 7.5-MEV ALPHA PARTICLES, AND HEAVY NUCLEI (Z GREATER THAN 2, E GREATER THAN 3 MEV PER NUCLEON). A COMPLETE SET OF DATA POINTS WERE OBTAINED EVERY 2 MIN.

------- SOLRAD 11A, BYRAM----------

INVESTIGATION NAME- STELLAR/AURORAL X-RAYS

NSSDC ID- 76-023C-16

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL

PI - E.T.	BYRAM	US NAVAL RESEARCH LAB
OI - D.M.	HORAN	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE PROPORTIONAL COUNTERS SENSITIVE TO X RAYS BETWEEN 1 AND 8 A. THESE PROPORTIONAL COUNTERS WERE MOUNTED ON THE SIDE OF THE SATELLITE AND ORIENTED 45 DEG, 90 DEG, AND 135 DEG OFF THE SPIN AXIS. THE COUNTING CIRCUITS WERE CONTROLLED BY THE ROLL PERIOD AND SYNCHRONIZED TO THE STAR AND/OR EARTH PULSES SO THAT DATA SAMPLES COULD BE ASSOCIATED WITH PORTIONS OF THE SKY. THE STELLAR PORTION OF THIS EXPERIMENT HAS ABLE TO MAP COSMIC X-RAY SOURCES AND TO SWEEP THE ENTIRE CELESTIAL SPHERE IN ABOUT 6 MONTHS. THE AURORAL PORTION OF THE EXPERIMENT WAS DESIGNED TO MONITOR AURORAL X-RAY EMISSIONS FROM THE EARTH. THE STELLAR PORTION SAMPLING CYCLE TOOK 16 MIN, WHILE THE AURORAL PORTION REQUIRED 2 MIN FOR A SAMPLING CYCLE.

------- SOLRAD 11A, DOSCHEK----------

INVESTIGATION NAME- THOMSON X-RAY POLARIMETER

NSSDC ID- 76-023C-10

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - G.A.	DOSCHEK	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
INCIDENT SOLAR X RAYS WERE SCATTERED BY A BLOCK OF LOW-DENSITY MATERIAL SUCH AS LITHIUM, LITHIUM HYDRIDE, OR BERYLLIUM. POLARIZED X RAYS WERE PREFERENTIALLY SCATTERED WHILE NON-POLARIZED X RAYS WERE SCATTERED ISOTROPICALLY. TWO PROPORTIONAL COUNTERS, EACH WITH A TWO-CHANNEL PULSE HEIGHT ANALYZER TO PROVIDE ENERGY RESOLUTION IN 2- TO 10-KEV AND 10- TO 50-KEV BANDS, WERE MOUNTED ON OPPOSITE SIDES OF THE SCATTERING BLOCK. AS THE SATELLITE ROLLED, THE SCATTERING BLOCK AND THE DETECTORS WERE ROTATED WITH RESPECT TO THE PLANE OF POLARIZATION OF THE INCIDENT X RAYS. THE DATA WERE GATED ELECTRONICALLY INTO ACCUMULATORS ASSOCIATED WITH 45-DEG SECTORS IN THE ROLL DIRECTION. CYCLIC PULSE-COUNT VARIATIONS FROM SECTOR TO SECTOR REVEALED POLARIZATION IF PRESENT. THE DATA FROM THE 45-DEG SECTORS WERE ACCUMULATED FOR AN INTEGRAL NUMBER OF SPINS DURING EACH 30-S SAMPLING CYCLE AND THEN READ OUT ON COMMAND. A RADIOACTIVE SOURCE SWUNG OUT BETWEEN EACH DETECTOR AND THE SCATTERING BLOCK FOR CALIBRATION IN FLIGHT.

------- SOLRAD 11A, EVANS----------

INVESTIGATION NAME- COSMIC GAMMA-RAY BURST AND BACKGROUND DETECTOR (0.2 TO 2.0 MEV)

NSSDC ID- 76-023C-25

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL

PI - W.D.	EVANS	LOS ALAMOS SCI LAB
PI - R.W.	KLEBESADEL	LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED FOR THE STUDY OF THE GAMMA-RAY BACKGROUND AND THE DETECTION OF GAMMA-RAY BURSTS. THE EXPERIMENTAL CONFIGURATION CONSISTS OF TWO IDENTICAL DETECTORS MOUNTED 180 DEG APART AND LOOKING OUTWARD RADIALLY. THE FOV FOR EACH DETECTOR APPROACHES 4 PI, WITH SOME REDUCTION RESULTING FROM SHADOWING BY THE SPACECRAFT MASS. THE BASIC COMPONENTS OF EACH UNIT ARE -- (1) A CESIUM IODIDE CRYSTAL, (2) PHOTOMULTIPLIER WITH ASSOCIATED POWER SUPPLY AND AMPLIFIERS, AND (3) PULSE HEIGHT ANALYZERS. THE ENERGY COVERAGE IS FROM 0.2 TO 2.0 MEV, AND IS RESOLVED INTO PASSBANDS OF 0.2 TO 0.3, 0.3 TO 0.4, 0.4 TO 0.6, 0.2 TO 2.0, 0.3 TO 2.0, AND 0.6 TO 2.0 MEV. BACKGROUND MONITORING IS AFFECTED BY ACCUMULATION OF 20-S AVERAGES BUILT UP OF 14.6-MS SAMPLINGS OF EITHER THE 0.2- TO 2.0- OR 0.3- TO 2.0-MEV PASSBAND. THE SIGNATURE OF A BURST IS THE OBSERVATION OF A 7-SIGMA INCREASE IN THE BACKGROUND OVER ONE 628-MS PERIOD. DURING A BURST, 12 BLOCKS OF DATA ARE RECORDED. EACH BLOCK REPRESENTS EIGHT READOUTS OF THE 0.2- TO 2.0- OR 0.3- TO 0.6-MEV PASSBAND, PLUS ONE READING OF EACH OF THE 0.2- TO 0.3-, 0.3- TO 0.4-, 0.4- TO 0.6-, AND 0.6- TO 2.0-MEV PASSBANDS. IF THE BURST LASTS LONGER THAN ONE STORAGE CYCLE, UP TO SEVEN ADDITIONAL STORAGE CYCLES MAY BE USED. THE READOUT OF THE DATA FOR A FULL SET OF STORAGE CYCLES TAKES 64 MIN.

------- SOLRAD 11A, FELDMAN----------

INVESTIGATION NAME- 1175- TO 1800-A SOLAR UV SPECTROMETER

NSSDC ID- 76-023C-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 11A, FRITZ----------

INVESTIGATION NAME- 15- TO 150-KEV SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-01

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL

PI - G.G.	FRITZ	US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT USED A CESIUM IODIDE SCINTILLATOR SURROUNDED BY A PLASTIC SCINTILLATOR OPERATED IN ANTICOINCIDENCE TO SCREEN OUT BACKGROUND COUNTS. PULSE HEIGHT ANALYSIS PROVIDED SOLAR SPECTRA IN THE RANGES FROM 15 TO 20, 20 TO 30, 30 TO 60, AND 60 TO 150 KEV. NORMALLY, DATA WERE TELEMETERED FROM EACH CHANNEL EVERY 7.5 S, ALTHOUGH AN OPTIONAL MODE SELECTED THE 20- TO 30-KEV CHANNEL FOR TRANSMISSION EVERY 1.875 S. INFLIGHT CALIBRATION WAS MADE USING A RADIOACTIVE SOURCE THAT SWUNG IN FRONT OF THE DETECTOR UPON COMMAND AND REMAINED THERE FOR A 2-MIN TELEMETRY CYCLE. THE OVERALL DETECTOR DESIGN WAS THE SAME AS THAT USED ON SOLRAD 10 WITH IMPROVED ELECTRONICS.

------- SOLRAD 11A, FRITZ----------

INVESTIGATION NAME- X-RAY BACKGROUND

NSSDC ID- 76-023C-24

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
ASTRONOMY

PERSONNEL

PI - G.G.	FRITZ	US NAVAL RESEARCH LAB
OI - R.	LUCKE	US NAVAL RESEARCH LAB
OI - R.C.	HENRY	JOHNS HOPKINS U

BRIEF DESCRIPTION
A SOLID-STATE DETECTOR (GERMANIUM OR LITHIUM-DRIFTED SILICON) WAS USED TO MEASURE THE GALACTIC X-RAY BACKGROUND IN THE 0.5- TO 20-KEV RANGE WITH AN ENERGY RESOLUTION OF BETTER THAN 0.3 KEV. TO REACH THE DESIRED 0.3-KEV ENERGY RESOLUTION, THE DETECTOR HAD TO BE PASSIVELY COOLED TO 70 TO 100 KELVIN. THE INSTRUMENT WAS MOUNTED ON THE ANTISOLAR SIDE OF THE SPACECRAFT AND SWEPT OUT A BAND NEARLY 20-DEG WIDE, CENTERED NEAR THE ECLIPTIC PLANE AS THE SATELLITE MOVED AROUND THE SUN. THE DETECTOR OUTPUT UNDERWENT A 256-CHANNEL ANALYSIS TO PRODUCE THE ENERGY SPECTRUM. ALL 256 CHANNELS WERE READ OUT IN 16 MIN. A RADIOACTIVE SOURCE MOUNTED ON A SHUTTER WAS USED TO PROVIDE INFLIGHT CALIBRATION OF THE DETECTOR.

------- SOLRAD 11A, KREPLIN----------

INVESTIGATION NAME- 1- TO 8-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-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 11A, KREPLIN----------

INVESTIGATION NAME- 8- TO 16-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-05

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
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 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 11A, KREPLIN----------

INVESTIGATION NAME- 44- TO 60-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-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 11A, KREPLIN----------

INVESTIGATION NAME- 170- TO 1050-A SOLAR EUV MONITOR

NSSDC ID- 76-023C-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 PHOTOSENSITIVE SURFACE DETECTORS COUPLED TO FOUR-RANGE ELECTROMETER-AMPLIFIERS. THE THREE SETS WERE NOT REDUNDANT DUE TO THE DIFFERENT FILTERS BEING USED. A BERYLLIUM FILTER LIMITED ONE DETECTOR'S RESPONSE TO WAVELENGTHS FROM 170 TO 500 A. A TIN FILTER LIMITED A SECOND DETECTOR'S RESPONSE TO WAVELENGTHS FROM 450 TO 850 A. AN INDIUM FILTER LIMITED THE THIRD DETECTOR'S RESPONSE TO WAVELENGTHS FROM 725 TO 1050 A. THE DETECTOR-ELECTROMETER SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES. EACH DETECTOR WAS READ EVERY 7.5 S. THE ELECTROMETERS COULD BE CALIBRATED DURING FLIGHT WITHOUT DETACHING THE DETECTOR, ALTHOUGH THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT.

------- SOLRAD 11A, KREPLIN----------

INVESTIGATION NAME- 1080- TO 1350-A SOLAR UV MONITOR

NSSDC ID- 76-023C-08

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 ONE 4-RANGE ELECTROMETER-AMPLIFIER AND THREE IONIZATION CHAMBERS. TWO OF THE IONIZATION CHAMBERS WERE THE STANDARD GAS-FILLED CHAMBERS FLOWN ON PREVIOUS SOLRAD SATELLITES. THESE DETECTORS, ELECTRONICALLY AND MECHANICALLY PAIRED, WERE DESIGNATED AS DETECTOR 'A.' THE THIRD IONIZATION CHAMBER WAS AN EVACUATED CHAMBER WITH A LITHIUM FLUORIDE PHOTOSENSITIVE SURFACE, AND WAS DESIGNATED AS DETECTOR 'B.' NORMALLY, DETECTOR B WAS CONTINUOUSLY SELECTED FOR TELEMETRY TRANSMISSION AND WAS REPLACED ONLY OCCASIONALLY BY DETECTOR A FOR CALIBRATING B AND EXPERIMENT 9. A MECHANICAL SHUTTER, MOVABLE BY COMMAND, SHIELDED THE WINDOW OF 8A FROM THE SUN. THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED WITHOUT DETACHING THE DETECTOR FROM THE DETECTOR SYSTEM. DATA WERE SAMPLED AT 15-S INTERVALS.

------- SOLRAD 11A, KREPLIN----------

INVESTIGATION NAME- 0.5- TO 3-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-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 11A, KREPLIN----------

INVESTIGATION NAME- 2- TO 20-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023C-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 11A, LAZARUS----------

INVESTIGATION NAME- SOLAR WIND SPECTROMETER

NSSDC ID- 76-023C-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 6.798-S CYCLE WERE TELEMETERED, -- 1-HOUS KEEPING 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 6.798-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 1.030 S FOR 6 TIMES (6.180 S), WAITS 11 S, AND REPEATS THE 6 SEQUENCES.

------- SOLRAD 11A, MEEKINS----------

INVESTIGATION NAME- CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR

NSSDC ID- 76-023C-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 11A, MEEKINS----------

INVESTIGATION NAME- BRAGG X-RAY POLARIMETER

NSSDC ID- 76-023C-11
INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - J.F. MEEKINS — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED A LITHIUM FLUORIDE CRYSTAL, FIXED AT AN ANGLE TO ALLOW SOLAR X RAYS OF ABOUT 2.8 A TO UNDERGO FIRST-ORDER BRAGG REFLECTION INTO A PROPORTIONAL COUNTER. SINCE THE REFLECTION OF POLARIZED RADIATION DEPENDED UPON THE ANGLE BETWEEN THE ELECTRIC VECTOR OF THE RADIATION AND THE REFLECTING ANGLE OF THE CRYSTAL, THE SPIN OF THE SATELLITE MODULATED THE INTENSITY OF REFLECTED POLARIZED RADIATION. DATA PULSES ASSOCIATED WITH 45-DEG SECTORS IN THE ROLL DIRECTION WERE ELECTRONICALLY GATED INTO CORRESPONDING ACCUMULATORS. SIGNAL VARIATIONS FROM SECTOR TO SECTOR INDICATED THE PRESENCE OF POLARIZED RADIATION. DATA FOR EACH 45-DEG SECTOR ACCUMULATED FOR AN INTEGRAL NUMBER OF SPINS AND READ OUT ONCE IN EACH 2-MIN TELEMETRY CYCLE.

------- SOLRAD 11A, SMATHERS----------

INVESTIGATION NAME- X-RAY MONITOR (0.1-1.6 A, 0.5-3 A, 1-4 A)

NSSDC ID- 76-023C-02
INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
X-RAY ASTRONOMY

PERSONNEL
PI - H.W. SMATHERS — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
FOUR ELECTRONICALLY PAIRED, GAS-FILLED, PROPORTIONAL COUNTERS WERE USED TO MEASURE X-RAY EMISSION BETWEEN 4 AND 100 KEV IN FOUR CHANNELS. ALL FOUR DETECTORS HAD 10-MIL BERYLLIUM WINDOWS PLUS ADDITIONAL ALUMINUM OR BERYLLIUM MATERIAL MOUNTED IN FRONT OF THE DETECTORS. EACH DETECTOR WAS SAMPLED ONCE EVERY 7.5 S, ALTHOUGH AN OPTIONAL MODE TRANSMITTED DATA FROM ONLY ONE OR TWO DETECTORS, EFFECTIVELY QUADRUPLING OR DOUBLING THE SAMPLING RATE OF THAT DETECTOR. IN-FLIGHT CALIBRATION WAS PERFORMED USING A RADIOACTIVE SOURCE THAT WAS MOVED IN FRONT OF THE DETECTORS UPON COMMAND.

------- SOLRAD 11A, VAMPOLA----------

INVESTIGATION NAME- SOLAR FLARE ELECTRONS

NSSDC ID- 76-023C-22
INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - A.L. VAMPOLA — AEROSPACE CORP
CI - J.B. BLAKE — AEROSPACE CORP
CI - R.W. KREPLIN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED SOLAR ELECTRONS. TWO PERMANENT MAGNETS WERE USED TO MOMENTUM-ANALYZE INCIDENT ELECTRONS. ARRAYS OF SILICON DETECTORS COUNTED INCIDENT ELECTRONS IN 12 ENERGY CHANNELS FROM 11 KEV TO 1.5 MEV. SPIN-INTEGRATED DATA WERE OBTAINED ONCE EVERY 2 MIN, EXCEPT THAT 11-KEV AND 405-KEV DATA WERE SECTORED INTO QUADRANTS, AND 60-KEV AND 610-KEV DATA WERE OBTAINED WITH 15-S RESOLUTION.

------- SOLRAD 11A, WELLER, JR.----------

INVESTIGATION NAME- GEOCORONAL-EXTRATERRESTRIAL EUV - DETECTOR 1

NSSDC ID- 76-023C-18
INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL
PI - C.S. WELLER, JR. — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A COLLIMATED CHANNELTRON PHOTOMULTIPLIER MOUNTED BEHIND A FILTER WHEEL WAS USED TO MEASURE EUV RADIATION FROM NON SOLAR SOURCES. THE FILTER WHEEL ALLOWED VARIOUS EMISSION LINES BETWEEN 200 AND 1400 A TO BE ISOLATED, AS WELL AS ALLOWING IN-FLIGHT CALIBRATION THROUGH THE USE OF A RADIOACTIVE SOURCE. THE DETECTOR WAS MOUNTED TO LOOK 90 DEG OFF THE SPIN AXIS OF THE SPACECRAFT AND SWEPT THE CELESTIAL SPHERE IN ABOUT 6 MONTHS. EACH DATA SAMPLE WAS ACCUMULATED OVER INCREMENTS OF 1/64 OF THE SPACECRAFT'S SPIN, WITH THE SAMPLE SOURCE REFERENCED TO EITHER A STAR PULSE OR THE EARTH PULSE. THE DATA WERE READ OUT IN 2-MIN INTERVALS. THIS EXPERIMENT OPERATED NO MORE THAN 1 H PER DAY.

------- SOLRAD 11A, WELLER, JR.----------

INVESTIGATION NAME- GEOCORONAL-EXTRATERRESTRIAL EUV - DETECTOR 2

NSSDC ID- 76-023C-19
INVESTIGATIVE PROGRAM
SESP
INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL
PI - C.S. WELLER, JR. — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A COLLIMATED CHANNELTRON PHOTOMULTIPLIER MOUNTED BEHIND A FILTER WHEEL WAS USED TO MEASURE EUV RADIATION FROM NON SOLAR SOURCES. THE FILTER WHEEL ALLOWED VARIOUS EMISSION LINES BETWEEN 200 AND 1400 A TO BE ISOLATED, AS WELL AS ALLOWING IN-FLIGHT CALIBRATION THROUGH THE USE OF A RADIOACTIVE SOURCE. THE DETECTOR WAS MOUNTED TO LOOK 90 DEG OFF THE SPIN AXIS OF THE SPACECRAFT AND SWEPT THE CELESTIAL SPHERE IN ABOUT 6 MONTHS. EACH DATA SAMPLE WAS ACCUMULATED OVER INCREMENTS OF 1/64 OF THE SPACECRAFT'S SPIN, WITH THE SAMPLE SOURCE REFERENCED TO EITHER A STAR PULSE OR THE EARTH PULSE. THE DATA WERE READ OUT IN 2-MIN INTERVALS. THIS EXPERIMENT OPERATED NOT MORE THAN 1 H PER DAY.

------- SOLRAD 11A, YATES----------

INVESTIGATION NAME- PROTON-ALPHA TELESCOPE

NSSDC ID- 76-023C-20

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES — USAF CAMBRIDGE RES LAB
OI - R.W. KREPLIN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
TWO TOTALLY DEPLETED SILICON SURFACE BARRIER DETECTORS IN A COINCIDENCE TELESCOPE ARRANGEMENT WERE USED TO DETECT 1- TO 100-MEV PROTONS AND 10- TO 100-MEV ALPHA PARTICLES. PULSE HEIGHT ANALYSIS AND SUITABLE LOGIC ELEMENTS WERE USED TO PROVIDE 11 PROTON CHANNELS AND 4 ALPHA PARTICLE CHANNELS. THE TELESCOPE WAS INSENSITIVE TO LIGHT AND TO ELECTRONS. VERY LITTLE FLUX DIRECTIONALITY INFORMATION WAS OBTAINED.

------- SOLRAD 11A, YATES----------

INVESTIGATION NAME- LOW-ENERGY PROTON SPECTROMETER

NSSDC ID- 76-023C-21

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. 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.

********** 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- 76-023D

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 — APOAPSIS- 116645. KM

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, BLAKE----------

INVESTIGATION NAME- SOLAR PROTONS

NSSDC ID- 76-023D-14

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - J.B. BLAKE — AEROSPACE CORP
OI - R.W. KREPLIN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A PAIR OF IDENTICAL SENSORS WAS MOUNTED ON THE SPACECRAFT, WITH ONE ON THE SOLAR-ORIENTED SURFACE (THIS EXPERIMENT) AND ONE ON THE ANTISOLAR SURFACE (EXPERIMENT 76-023D-23). EACH SENSOR WAS A TWO-ELEMENT COUNTER USING DISK-SHAPED SEMICONDUCTORS AS DETECTOR ELEMENTS, WITH SHIELDING MATERIAL IN FRONT OF AND BETWEEN THE TWO DETECTOR ELEMENTS. THE DETECTOR ELEMENTS WERE CONNECTED TO CHARGE-SENSITIVE AMPLIFIERS. COINCIDENCE AND PULSE HEIGHT ANALYSIS WERE USED TO SEPARATE PULSES PRODUCED BY 2-MEV PROTONS, 10-MEV PROTONS, 4.5-MEV ALPHA PARTICLES, 7.5-MEV ALPHA PARTICLES, AND HEAVY NUCLEI (Z GREATER THAN 2, E GREATER THAN 3 MEV PER NUCLEON). A COMPLETE SET OF DATA POINTS WAS OBTAINED EVERY 2 MIN.

------- SOLRAD 11B, BLAKE----------

INVESTIGATION NAME- OMNIDIRECTIONAL PROTONS

NSSDC ID- 76-023D-17

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - J.B. BLAKE — AEROSPACE CORP
OI - R.W. KREPLIN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE SOLAR PROTONS AND ALPHA PARTICLES. A SET OF FIVE SMALL SILICON CUBICAL SEMICONDUCTOR DETECTORS WAS USED TO SEPARATELY MEASURE THE OMNIDIRECTIONAL PROTON AND ALPHA PARTICLE FLUXES IN THE ENERGY/NUCLEON RANGES 5 TO 20, 10 TO 25, 20 TO 40, 50 TO 90, AND 100 TO 160 MEV. A TWO-ELEMENT SEMICONDUCTOR TELESCOPE USED COINCIDENCE REQUIREMENTS AND PULSE-HEIGHT ANALYSIS TO DETERMINE PROTON FLUXES IN FIVE DIFFERENTIAL ENERGY CHANNELS FROM 20 TO 500 KEV AND IN THREE INTEGRAL CHANNELS AT 0.5, 1, AND 1.5 MEV. THE 36- TO 74-KEV DATA AND THE 1-MEV DATA WERE SECTORED INTO QUADRANTS, WHILE THE REMAINING CHANNELS YIELDED SPIN-INTEGRATED DATA. THE INSTRUMENT CONSISTED OF A PHOTOMULITIPLIER TUBE VIEWING A THIN PLASTIC SCINTILLATOR FOIL. PULSE-HEIGHT ANALYSIS WAS USED TO SEPARATE IONS INTO FIVE GROUPS (Z = 1, 2, 6 TO 10, 12 TO 18, AND GREATER THAN 18). THE IONS HAD ENERGY THRESHOLDS OF 0.5 MEV/NUCLEON (Z = 1 OR 2) THROUGH 0.8 MEV/NUCLEON (Z GREATER THAN 18). THE Z=2 AND Z=6 THROUGH 10 DATA WERE SECTORED INTO FOUR QUADRANTS. THE REMAINING DATA WERE SPIN-INTEGRATED. A COMPLETE SET OF MEASUREMENTS WAS MADE ONCE EVERY 2 MIN.

------- SOLRAD 11B, BLAKE----------

INVESTIGATION NAME- ANTISOLAR PROTONS

NSSDC ID- 76-023D-23

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.B. BLAKE — AEROSPACE CORP
OI - R.W. KREPLIN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A PAIR OF IDENTICAL SENSORS WERE MOUNTED ON THE SPACECRAFT, WITH ONE ON THE ANTISOLAR SURFACE (THIS EXPERIMENT) AND ONE ON THE SOLAR-ORIENTED SURFACE (EXPERIMENT 76-023D-14). EACH SENSOR WAS A TWO-ELEMENT COUNTER TELECOPE USING DISK-SHAPED SEMICONDUCTORS AS DETECTOR ELEMENTS, WITH SHIELDING MATERIAL IN FRONT OF AND BETWEEN THE TWO DETECTOR ELEMENTS. THE DETECTOR ELEMENTS WERE CONNECTED TO CHARGE-SENSITIVE AMPLIFIERS. COINCIDENCE AND PULSE-HEIGHT ANALYSIS WERE USED TO SEPARATE PULSES PRODUCED BY 2-MEV PROTONS, 10-MEV PROTONS, 4.5-MEV ALPHA PARTICLES, 7.5-MEV ALPHA PARTICLES, AND HEAVY NUCLEI (Z GREATER THAN 2, E GREATER THAN 3 MEV PER NUCLEON). A COMPLETE SET OF DATA POINTS WAS OBTAINED EVERY 2 MIN.

------- SOLRAD 11B, BYRAM----------

INVESTIGATION NAME- STELLAR/AURORAL X RAYS

NSSDC ID- 76-023D-16

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL
PI - E.T. BYRAM — US NAVAL RESEARCH LAB
OI - D.M. HORAN — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE PROPORTIONAL COUNTERS SENSITIVE TO X RAYS BETWEEN 1 AND 8 A. THESE PROPORTIONAL COUNTERS WERE MOUNTED ON THE SIDE OF THE SATELLITE AND ORIENTED 45 DEG, 90 DEG, AND 135 DEG OFF THE SPIN AXIS. THE COUNTING CIRCUITS WERE CONTROLLED BY THE ROLL PERIOD AND SYNCHRONIZED TO THE STAR AND/OR EARTH PULSES SO THAT DATA SAMPLES COULD BE ASSOCIATED WITH PORTIONS OF THE SKY. THE STELLAR PORTION OF THIS EXPERIMENT WAS ABLE TO MAP COSMIC X-RAY SOURCES AND TO SWEEP THE ENTIRE CELESTIAL SPHERE IN ABOUT 6 MONTHS. THE AURORAL PORTION OF THE EXPERIMENT WAS DESIGNED TO MONITOR AURORAL X-RAY EMISSIONS FROM THE EARTH. THE STELLAR PORTION SAMPLING CYCLE TOOK 16 MIN, WHILE THE AURORAL PORTION REQUIRED 2 MIN FOR A SAMPLING CYCLE.

------- SOLRAD 11B, DOSCHEK----------

INVESTIGATION NAME- THOMSON X-RAY POLARIMETER

NSSDC ID- 76-023D-10

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - G.A. DOSCHEK — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
INCIDENT SOLAR X RAYS WERE SCATTERED BY A BLOCK OF LOW-DENSITY MATERIAL SUCH AS LITHIUM, LITHIUM HYDRIDE, OR BERYLLIUM. POLARIZED X RAYS WERE PREFERENTIALLY SCATTERED WHILE NON POLARIZED X RAYS WERE SCATTERED ISOTROPICALLY. TWO PROPORTIONAL COUNTERS, EACH WITH A TWO-CHANNEL PULSE HEIGHT ANALYZER TO PROVIDE ENERGY RESOLUTION IN 2- TO 10-KEV AND 10- TO 50-KEV BANDS, WERE MOUNTED ON OPPOSITE SIDES OF THE SCATTERING BLOCK. AS THE SATELLITE ROLLED, THE SCATTERING BLOCK AND THE DETECTORS WERE ROTATED WITH RESPECT TO THE PLANE OF POLARIZATION OF THE INCIDENT X RAYS. THE DATA WERE GATED ELECTRONICALLY INTO ACCUMULATORS ASSOCIATED WITH 45-DEG SECTORS IN THE ROLL DIRECTION. CYCLIC PULSE-COUNT VARIATIONS FROM SECTOR TO SECTOR REVEALED POLARIZATION IF PRESENT. THE DATA FROM THE 45-DEG SECTORS WERE ACCUMULATED FOR AN INTEGRAL NUMBER OF SPINS DURING EACH 30-S SAMPLING CYCLE AND THEN READ OUT ON COMMAND. A RADIOACTIVE SOURCE SWUNG OUT BETWEEN EACH DETECTOR AND THE SCATTERING BLOCK FOR CALIBRATION IN FLIGHT.

------- SOLRAD 11B, EVANS----------

INVESTIGATION NAME- COSMIC GAMMA-RAY BURST AND BACKGROUND DETECTOR (0.2 TO 2.0 MEV)

NSSDC ID- 76-023D-25

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
GAMMA-RAY ASTRONOMY

PERSONNEL
PI - W.D. EVANS — LOS ALAMOS SCI LAB
PI - R.W. KLEBESADEL — LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED FOR THE STUDY OF THE GAMMA-RAY BACKGROUND AND THE DETECTION OF GAMMA-RAY BURSTS. THE EXPERIMENTAL CONFIGURATION CONSISTS OF TWO IDENTICAL DETECTORS MOUNTED 180 DEG APART AND LOOKING OUTWARD RADIALLY. THE FOV FOR EACH DETECTOR APPROACHES 4 PI, WITH SOME REDUCTION RESULTING FROM SHADOWING BY THE SPACECRAFT MASS. THE BASIC COMPONENTS OF EACH UNIT ARE -- (1) A CESIUM IODIDE CRYSTAL, (2) PHOTOMULTIPLIER WITH ASSOCIATED POWER SUPPLY AND AMPLIFIERS, AND (3) PULSE HEIGHT ANALYZERS. THE ENERGY COVERAGE IS FROM 0.2 TO 2.0 MEV, AND IS RESOLVED INTO PASSBANDS OF 0.2 TO 0.3, 0.3 TO 0.4, 0.4 TO 0.6, 0.2 TO 2.0, 0.3 TO 2.0, AND 0.6 TO 2.0 MEV. BACKGROUND MONITORING IS AFFECTED BY ACCUMULATION OF 20-S AVERAGES BUILT UP OF 14.6 MS SAMPLINGS OF EITHER THE 0.2- TO 2.0- OR 0.3- TO 2.0-MEV PASSBAND. THE SIGNATURE OF A BURST IS THE OBSERVATION OF A 7-SIGMA INCREASE IN THE BACKGROUND OVER ONE 628-MS PERIOD. DURING A BURST, 12 BLOCKS OF DATA ARE RECORDED. EACH BLOCK REPRESENTS EIGHT READOUTS OF THE 0.2- TO 2.0- OR 0.3- TO 0.6- MEV PASSBAND, PLUS ONE READING OF EACH OF THE 0.2- TO 0.3-, 0.3- TO 0.4-, 0.4- TO 0.6-, AND 0.6- TO 2.0- MEV PASSBANDS. IF THE BURST LASTS LONGER THAN ONE STORAGE CYCLE, UP TO SEVEN ADDITIONAL STORAGE CYCLES MAY BE USED. THE READOUT OF THE DATA FOR A FULL SET OF STORAGE CYCLES TAKES 64 MIN.

------- SOLRAD 11B, FELDMAN----------

INVESTIGATION NAME- 1175- TO 1800-A SOLAR UV SPECTROMETER

NSSDC ID- 76-023D-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, FRITZ----------

INVESTIGATION NAME- 15- TO 150-KEV SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-01

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - G.G. FRITZ — US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT USED A CESIUM IODIDE SCINTILLATOR SURROUNDED BY A PLASTIC SCINTILLATOR OPERATED IN ANTICOINCIDENCE TO SCREEN OUT BACKGROUND COUNTS. PULSE HEIGHT ANALYSIS PROVIDED SOLAR SPECTRA IN THE RANGES FROM 15 TO 20, 20 TO 30, 30 TO 60, AND 60 TO 150 KEV. NORMALLY, DATA WERE TELEMETERED FROM EACH CHANNEL EVERY 7.5 S, ALTHOUGH AN OPTIONAL MODE SELECTED THE 20- TO 30-KEV CHANNEL FOR TRANSMISSION EVERY 1.875 S. IN-FLIGHT CALIBRATION WAS MADE USING A RADIOACTIVE SOURCE, WHICH SWUNG IN FRONT OF THE DETECTOR UPON COMMAND AND REMAINED THERE FOR A 2-MIN TELEMETRY CYCLE. THE OVERALL DETECTOR DESIGN WAS THE SAME AS THAT USED ON SOLRAD 10 WITH IMPROVED ELECTRONICS.

------- SOLRAD 11B, FRITZ----------

INVESTIGATION NAME- X-RAY BACKGROUND

NSSDC ID- 76-023D-24

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
ASTRONOMY

PERSONNEL
PI - G.G. FRITZ — US NAVAL RESEARCH LAB
OI - R. LUCKE — US NAVAL RESEARCH LAB
OI - R.C. HENRY — JOHNS HOPKINS U

BRIEF DESCRIPTION
A SOLID-STATE DETECTOR (GERMANIUM OR LITHIUM-DRIFTED SILICON) WAS USED TO MEASURE THE GALACTIC X-RAY BACKGROUND IN THE 0.5- TO 20-KEV RANGE WITH AN ENERGY RESOLUTION OF BETTER THAN 0.3 KEV. TO REACH THE DESIRED 0.3-KEV ENERGY RESOLUTION, THE DETECTOR HAD TO BE PASSIVELY COOLED TO 70 TO 100 KELVIN. THE INSTRUMENT WAS MOUNTED ON THE ANTISOLAR SIDE OF THE SPACECRAFT AND SWEPT OUT A BAND NEARLY 20-DEG WIDE, CENTERED NEAR THE ECLIPTIC PLANE AS THE SATELLITE MOVED AROUND THE SUN. THE DETECTOR OUTPUT UNDERWENT A 256-CHANNEL ANALYSIS TO PRODUCE THE ENERGY SPECTRUM. ALL 256 CHANNELS WERE READ OUT IN 16 MIN.
A RADIOACTIVE SOURCE MOUNTED ON A SHUTTER WAS USED TO PROVIDE IN FLIGHT CALIBRATION OF THE DETECTOR.

------- SOLRAD 11B, KREPLIN----------

INVESTIGATION NAME- 1- TO 8-A SOLAR X-RAY MONITOR

NSSDC ID- 76-023D-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- 76-023D-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 PHOTOSENSITIVE SURFACE DETECTORS COUPLED TO FOUR-RANGE ELECTROMETER-AMPLIFIERS. THE THREE SETS WERE NOT REDUNDANT DUE TO THE DIFFERENT FILTERS BEING USED. A BERYLLIUM FILTER LIMITED ONE DETECTOR'S RESPONSE TO WAVELENGTHS FROM 170 TO 500 A. A TIN FILTER LIMITED A SECOND DETECTOR'S RESPONSE TO WAVELENGTHS FROM 450 TO 850 A. AN INDIUM FILTER LIMITED THE THIRD DETECTOR'S RESPONSE TO WAVELENGTHS FROM 725 TO 1050 A. THE DETECTOR-ELECTROMETER SETS WERE DRIVEN BY SEPARATE POWER SUPPLIES. EACH DETECTOR WAS READ EVERY 7.5 S. THE ELECTROMETERS COULD BE CALIBRATED DURING FLIGHT WITHOUT DETACHING THE DETECTOR, ALTHOUGH THE DETECTORS COULD NOT BE CALIBRATED IN FLIGHT.

------- SOLRAD 11B, KREPLIN----------

INVESTIGATION NAME- 1080- TO 1350-A SOLAR UV MONITOR

NSSDC ID- 76-023D-08

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 ONE 4-RANGE ELECTROMETER-AMPLIFIER AND THREE IONIZATION CHAMBERS. TWO OF THE IONIZATION CHAMBERS WERE THE STANDARD GAS-FILLED CHAMBERS FLOWN ON PREVIOUS SOLRAD SATELLITES. THESE DETECTORS, ELECTRONICALLY AND MECHANICALLY PAIRED, WERE DESIGNATED AS DETECTOR 'A.' THE THIRD IONIZATION CHAMBER WAS AN EVACUATED CHAMBER WITH A LITHIUM FLUORIDE PHOTOSENSITIVE SURFACE, AND WAS DESIGNATED AS DETECTOR 'B.' NORMALLY, DETECTOR B WAS CONTINUOUSLY SELECTED FOR TELEMETRY TRANSMISSION AND WAS REPLACED ONLY OCCASIONALLY BY DETECTOR A FOR CALIBRATING B AND EXPERIMENT 9. A MECHANICAL SHUTTER, MOVABLE BY COMMAND, SHIELDED THE WINDOW OF B A FROM THE SUN. THE ELECTROMETER-AMPLIFIER COULD BE CALIBRATED WITHOUT DETACHING THE DETECTOR FROM THE DETECTOR SYSTEM. DATA WERE SAMPLED AT 15-S INTERVALS.

------- 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 6.798-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 6.798-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 1.030 S FOR 6 TIMES (6.180 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, MEEKINS----------

INVESTIGATION NAME- BRAGG X-RAY POLARIMETER

NSSDC ID- 76-023D-11

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - J.F. MEEKINS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED A LITHIUM FLUORIDE CRYSTAL, FIXED AT AN ANGLE TO ALLOW SOLAR X RAYS OF ABOUT 2.8 A TO UNDERGO FIRST-ORDER BRAGG REFLECTION INTO A PROPORTIONAL COUNTER. SINCE THE REFLECTION OF POLARIZED RADIATION DEPENDED UPON THE ANGLE BETWEEN THE ELECTRIC VECTOR OF THE RADIATION AND THE REFLECTING ANGLE OF THE CRYSTAL, THE SPIN OF THE SATELLITE MODULATED THE INTENSITY OF REFLECTED POLARIZED RADIATION. DATA PULSES ASSOCIATED WITH 45-DEG SECTORS IN THE ROLL DIRECTION WERE ELECTRONICALLY GATED INTO CORRESPONDING ACCUMULATORS. SIGNAL VARIATIONS FROM SECTOR TO SECTOR INDICATED THE PRESENCE OF POLARIZED RADIATION. DATA FOR EACH 45-DEG SECTOR ACCUMULATED FOR AN INTEGRAL NUMBER OF SPINS AND READ OUT ONCE IN EACH 2-MIN TELEMETRY CYCLE.

------- SOLRAD 11B, SMATHERS----------

INVESTIGATION NAME- X-RAY MONITOR (0.1-1.6 A, 0.5-3 A, 1-4A)

NSSDC ID- 76-023D-02

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY
SOLAR PHYSICS

PERSONNEL
PI - H.W. SMATHERS US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
FOUR ELECTRONICALLY PAIRED GAS-FILLED PROPORTIONAL COUNTERS WERE USED TO MEASURE X-RAY EMISSION BETWEEN 4 AND 100 KEV IN FOUR CHANNELS. ALL FOUR DETECTORS HAD 10-MIL BERYLLIUM WINDOWS PLUS ADDITIONAL ALUMINUM OR BERYLLIUM MATERIAL MOUNTED IN FRONT OF THE DETECTORS. EACH DETECTOR WAS SAMPLED ONCE EVERY 7.5 S, ALTHOUGH AN OPTIONAL MODE TRANSMITTED DATA FROM ONLY ONE OR TWO DETECTORS, EFFECTIVELY QUADRUPLING OR DOUBLING THE SAMPLING RATE OF THAT DETECTOR. IN-FLIGHT CALIBRATION WAS PERFORMED USING A RADIOACTIVE SOURCE, WHICH WAS MOVED IN FRONT OF THE DETECTORS UPON COMMAND.

------- SOLRAD 11B, VAMPOLA----------

INVESTIGATION NAME- SOLAR FLARE ELECTRONS

NSSDC ID- 76-023D-22

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - A.L. VAMPOLA AEROSPACE CORP
OI - J.B. BLAKE AEROSPACE CORP
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED SOLAR ELECTRONS. TWO PERMANENT MAGNETS WERE USED TO MOMENTUM-ANALYZE INCIDENT ELECTRONS. ARRAYS OF SILICON DETECTORS COUNTED INCIDENT ELECTRONS IN 12 ENERGY CHANNELS FROM 11 KEV TO 1.5 MEV. SPIN-INTEGRATED DATA WERE OBTAINED ONCE EVERY 2 MIN, EXCEPT THAT 11-KEV AND 405-KEV DATA WERE SECTORED INTO QUADRANTS, AND 60-KEV AND 610-KEV DATA WERE OBTAINED WITH 15-S RESOLUTION.

------- SOLRAD 11B, WELLER, JR.----------

INVESTIGATION NAME- GEOCORONAL-EXTRATERRESTRIAL EUV DETECTOR 1

NSSDC ID- 76-023D-18

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL
PI - C.S. WELLER, JR. US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A COLLIMATED CHANNELTRON PHOTOMULTIPLIER MOUNTED BEHIND A FILTER WHEEL WAS USED TO MEASURE EUV RADIATION FROM NONSOLAR SOURCES. THE FILTER WHEEL ALLOWED VARIOUS EMISSION LINES BETWEEN 200 AND 1400 A TO BE ISOLATED, AS WELL AS ALLOWING IN-FLIGHT CALIBRATION THROUGH THE USE OF A RADIOACTIVE SOURCE. THE DETECTOR WAS MOUNTED TO LOOK 90 DEG OFF THE SPIN AXIS OF THE SPACECRAFT AND SWEPT THE CELESTIAL SPHERE IN ABOUT 6 MONTHS. EACH DATA SAMPLE WAS ACCUMULATED OVER INCREMENTS OF 1/64 OF THE SPACECRAFT'S SPIN, WITH THE SAMPLE SOURCE REFERENCED TO EITHER A STAR PULSE OR THE EARTH PULSE. THE DATA WERE READ OUT IN 2-MIN INTERVALS. THIS EXPERIMENT OPERATED NO MORE THAN 1 H PER DAY.

------- SOLRAD 11B, WELLER, JR.----------

INVESTIGATION NAME- GEOCORONAL-EXTRATERRESTRIAL EUV DETECTOR 2

NSSDC ID- 76-023D-19

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
ASTRONOMY

PERSONNEL
PI - C.S. WELLER, JR. US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
A COLLIMATED CHANNELTRON PHOTOMULTIPLIER MOUNTED BEHIND A FILTER WHEEL WAS USED TO MEASURE EUV RADIATION FROM NONSOLAR SOURCES. THE FILTER WHEEL ALLOWED VARIOUS EMISSION LINES BETWEEN 200 AND 1400 A TO BE ISOLATED, AS WELL AS ALLOWING IN-FLIGHT CALIBRATION THROUGH THE USE OF A RADIOACTIVE SOURCE. THE DETECTOR WAS MOUNTED TO LOOK 90 DEG OFF THE SPIN AXIS OF THE SPACECRAFT AND SWEPT THE CELESTIAL SPHERE IN ABOUT 6 MONTHS. EACH DATA SAMPLE WAS ACCUMULATED OVER INCREMENTS OF 1/64 OF THE SPACECRAFT'S SPIN, WITH THE SAMPLE SOURCE REFERENCED TO EITHER A STAR PULSE OR THE EARTH PULSE. THE DATA WERE READ OUT IN 2-MIN INTERVALS. THIS EXPERIMENT OPERATED NOT MORE THAN 1 H PER DAY.

------- SOLRAD 11B, YATES----------

INVESTIGATION NAME- PROTON-ALPHA TELESCOPE

NSSDC ID- 76-023D-20

INVESTIGATIVE PROGRAM
SESP

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - K. YATES USAF GEOPHYS LAB
OI - R.W. KREPLIN US NAVAL RESEARCH LAB

BRIEF DESCRIPTION
TWO TOTALLY DEPLETED SILICON SURFACE BARRIER DETECTORS IN A COINCIDENCE TELESCOPE ARRANGEMENT WERE USED TO DETECT 1- TO 100-MEV PROTONS AND 10- TO 100-MEV ALPHA PARTICLES. PULSE HEIGHT ANALYSIS AND SUITABLE LOGIC ELEMENTS WERE USED TO PROVIDE 11 PROTON CHANNELS AND FOUR ALPHA PARTICLE CHANNELS. THE TELESCOPE WAS INSENSITIVE TO LIGHT AND TO ELECTRONS. VERY LITTLE FLUX DIRECTIONALITY INFORMATION WAS OBTAINED.

------- 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 - K. 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.

********** SRATS**********

SPACECRAFT COMMON NAME- SRATS
ALTERNATE NAMES- TAIYO

NSSDC ID- 75-014A

LAUNCH DATE- 02/24/75 — WEIGHT- 86. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- MU

SPONSORING COUNTRY/AGENCY
JAPAN — ISAS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC — EPOCH DATE- 02/25/75
ORBIT PERIOD- 120.06 MIN — INCLINATION- 31.54 DEG
PERIAPSIS- 249. KM — APOAPSIS- 3129. KM

PERSONNEL
PM - K. HIRAO — U OF TOKYO

BRIEF DESCRIPTION
SRATS/TAIYO (SOLAR RADIATION AND THERMOSPHERIC SATELLITE) WAS AN AERONOMY RESEARCH SATELLITE. IT HAD AN OCTAGONAL COLUMN FORM (75 CM IN DIAM AND 65 CM IN HEIGHT), IN WHICH THE EXPERIMENT INSTRUMENTS WERE MOUNTED. THE SATELLITE WAS SPIN STABILIZED IN A ROLLING WHEEL MODE BY A GEOMAGNETIC ATTITUDE CONTROL SYSTEM. FOUR PLASMA PROBES WERE EXTENDED PERPENDICULAR TO THE SPIN AXIS BY 0.5-M METALLIC BOOMS. POWER AT AN AVERAGE RATE OF 15 W WAS PROVIDED BY 6000 SILICON N-P SOLAR CELLS. THE OBJECTIVES OF THE SATELLITE WERE TO STUDY THE IONOSPHERE SYSTEMATICALLY BY SIMULTANEOUSLY OBSERVING SOLAR IONIZING RADIATIONS (HYDROGEN LYMAN-ALPHA AND X RAYS), THE ULTRAVIOLET ALBEDO OF THE EARTH, POSITIVE ION COMPOSITION, AND PLASMA PARAMETERS SUCH AS ELECTRON AND ION DENSITIES AND TEMPERATURES IN THE IONSPHERE.

------- SRATS, FUGONO-------

INVESTIGATION NAME- IONIC COMPOSITION

NSSDC ID- 75-014A-07

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - N. FUGONO — RADIO RESEARCH LAB
OI - I. IWAMOTO — RADIO RESEARCH LAB
OI - T. SUITZ — RADIO RESEARCH LAB

BRIEF DESCRIPTION
THE PRIMARY OBJECTIVE OF THIS ION COMPOSITION EXPERIMENT WAS TO MEASURE THE CONCENTRATION OF DIFFERENT ION SPECIES AND THEIR HEIGHT DISTRIBUTIONS AS A FUNCTION OF LOCATION, TIME, AND SOLAR AND GEOMAGNETIC ACTIVITY. THE 'COMPOSITION OF POSITIVE IONS' (CPI) INSTRUMENT WAS DESIGNED TO MEASURE THE COMPOSITION OF POSITIVE IONS IN THE RANGE OF 250 TO 3000 KM. IT CONSISTED OF A THREE-STAGE 5-3 CYCLE BENNETT TYPE MASS SPECTROMETER AS SENSOR, A 15-STAGE SECONDARY ELECTRON MULTIPLIER AND CONTROL ELECTRONICS. THE SENSOR MEASURED IN SEQUENCE THE CONCENTRATION OF THE FOLLOWING ION SPECIES -- ATOMIC OXYGEN, HELIUM, AND HYDROGEN. THESE MEASUREMENTS WERE MADE EVERY 4 SECONDS. MASS RESOLUTION AND INSTRUMENT SENSITIVITY WERE CHANGED BY A COMMAND. THE CPI INSTRUMENT WAS MOUNTED WITH ITS AXIS PERPENDICULAR TO THE SPIN AXIS, AND WITH ITS APERTURE ON THE SIDE WALL OF THE SATELLITE. MORE EXPERIMENT DETAILS CAN BE FOUND IN J. GEOMAG. GEOELECTR., 27, 303-310, 1975.

------- SRATS, HIRAO-------

INVESTIGATION NAME- ELECTRON TEMPERATURE

NSSDC ID- 75-014A-05

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - K. HIRAO — U OF TOKYO
OI - K. OYAMA — U OF TOKYO

BRIEF DESCRIPTION
ELECTRON TEMPERATURES WERE DIRECTLY MEASURED WITH AN IMPROVED TYPE OF ELECTRON TEMPERATURE PROBE FOR STRUCTURAL STUDY OF THE IONOSPHERE. THE INSTRUMENT OPERATION WAS TERMINATED ON 11/03/76.

------- SRATS, MATSUOKA-------

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- 75-014A-01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - M. MATSUOKA — U OF TOKYO

BRIEF DESCRIPTION
CONTINUOUS MEASUREMENT OF THE TOTAL DISK INTENSITY OF SOLAR X RAYS OF SPECTRAL RANGE 6 TO 12 KEV WERE MADE WITH PROPORTIONAL COUNTERS.

------- SRATS, MIYAZAKI-------

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 75-014A-06

INVESTIGATIVE PROGRAM
SOLAR-TERRESTRIAL PHYSICS

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS

PERSONNEL
PI - S. MIYAZAKI — RADIO RESEARCH LAB

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO STUDY ION AND ELECTRON TEMPERATURES AND CONCENTRATIONS. OF INTEREST WERE VARIATIONS OF THESE PARAMETERS IN SPACE AND TIME, AS WELL AS VARIATIONS OF TRANSITION LEVELS. THE INSTRUMENT IS OF PLANAR GEOMETRY, MOUNTED ON A BOOM EXTENDING 50 CM ABOVE THE SATELLITE AND ALONG ITS GEOMETRIC AXIS. THE PLANE OF THE SENSING ORIFICE WAS PREPENDICULAR TO THE SATELLITE GEOMETRIC AXIS, AND OBSERVATIONS WERE TAKEN ONLY WHEN THE ORIFICE FACES WITHIN ABOUT 30 DEG OF THE FORWARD VELOCITY VECTOR OF THE SPACECRAFT. THE SPACECRAFT DID NOT SPIN ABOUT ITS GEOMETRIC AXIS, BUT RATHER ROTATED IN A CARTWHEEL MANNER AT ABOUT 10 RPM. THE RETARDING POTENTIAL ANALYZER (RPA) CONSISTED OF A SENSOR, A CURRENT DETECTOR, AND AN ELECTRONIC MEMORY. THE 100-MM DIAMETER SENSOR CONSISTED OF 3 GRIDS AND A COLLECTOR, ENCIRCLED BY A GUARD RING. A TRIANGULAR VOLTAGE SWEEP OPERATED FROM -2 TO +12.7 V WAS APPLIED TO GRIDS 1 AND 2, WHILE GRID 3 AND THE COLLECTOR WERE KEPT AT -8 V. AN ADDITIONAL 100-MV 1520 MHZ AC COMPONENT WAS APPLIED TO GRID 1. INTERPRETATION OF THE RESULTING VOLTAGE-CURRENT PROFILES PROVIDED THE DESIRED TEMPERATURES AND DENSITIES AND ALSO IDENTIFIED THE IONS PRESENT. MEASUREMENT TIME DEPENDS UPON THE SATELLLITE ROTATION RATE, BUT WAS ABOUT 1 S AND OCCURED ONCE PER SATELLITE SPIN PERIOD. A MORE COMPLETE DESCRIPTION CAN BE FOUND IN THE 1975 J. GEOMAG. AND GEOELECTR., 311-320, 1975.

------- SRATS, OSHIO-------

INVESTIGATION NAME- HYDROGEN LYMAN-ALPHA

NSSDC ID- 75-014A-02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - T. OSHIO — OSAKA CITY U

BRIEF DESCRIPTION
CONTINUOUS MEASUREMENT OF SOLAR HYDROGEN LYMAN-ALPHA EMISSION WAS MADE WITH A LITHIUM FLOURIDE OXIDE IONIZATION CHAMBER.

------- SRATS, OYA-------

INVESTIGATION NAME- ELECTRON DENSITY MEASUREMENT

NSSDC ID- 75-014A-04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - H. OYA — U OF TOHOKU
OI - A. MORIOKA — U OF TOHOKU

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO STUDY THE ELECTRON TEMPERATURE STRUCTURE OF THE IONOSPHERE BY MEANS OF A GYRO-PLASMA PROBE. THIS PROBE USED A RADIO-FREQUENCY IMPEDANCE TECHNIQUE TO DETERMINE THE CAPACITANCE OF A SPHERICAL ELECTRODE THAT IS SEPARATED FROM THE SATELLITE BY A SUPPORTING BOOM. CAPACITANCE MEASUREMENTS WERE MADE AS FREQUENCIES FROM .3 TO 13 MHZ AND WERE SWEPT OVER A PERIOD OF 1 S, TO THE ELECTRODE. INTERPRETATION OF THIS FREQUENCY-CAPACITANCE RELATIONSHIP WAS USED TO DETERMINE ELECTRON TEMPERATURES, ELECTRON DENSITIES, AND ION/ELECTRON FLUX. MORE DETAILED DESCRIPTIVE INFORMATION IS CONTAINED IN J. GEOMAG. AND GEOELECTR., 331-361, 1975.

------- SRATS, TOHMATSU----------

INVESTIGATION NAME- GEOCORONAL UV GLOW AND EARTH UV ALBEDO

NSSDC ID- 75-014A-03
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - T. TOHMATSU U OF TOKYO
OI - K. SUZUKI U OF TOKYO
OI - T. OGAWA U OF TOKYO

BRIEF DESCRIPTION
THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTED OF TWO MIDDLE UV RADIOMETERS AND FOUR VACUUM UV PHOTON COUNTERS. THE RADIOMETERS WERE DESIGNED TO MEASURE THE SOLAR RADIATION AT 2550 AND 2900 A FOR STUDY OF THE OZONE DISTRIBUTION IN THE MESOSPHERE AND UPPER STRATOSPHERE. EACH SENSOR CONSISTED OF A MECHANICAL COLLIMATOR, AN INTERFERENCE FILTER, AND A PHOTOMULTIPLIER TUBE. THE RADIOMETER HAD A 3-DEG DIAMETER FOV.
THE PHOTON COUNTERS WERE DESIGNED TO MEASURE RADIATION AT THE FOLLOWING WAVELENGTHS (IN ANGSTROMS) -- 304, 584, 833, 1300, AND 1216, TO STUDY AIRGLOW, GEOCORONA, AND INTERPLANETARY GLOW.
EACH OF THE FOUR PHOTON COUNTERS CONSISTED OF A MECHANICAL COLLIMATOR, AN EUV TRANSMITTING FILTER, AND A CHANNEL MULTIPLIER, AND HAD A CIRCULAR FOV OF ABOUT 3 DEG IN DIAMETER. IN THE NORMAL OPERATIONAL MODE, AS THE SATELLITE SPUN, THE SENSORS MEASURED RADIATION AT 32 DIRECTIONS IN A GREAT CIRCLE CONTAINING LOCAL NADIR AND ZENITH OF THE SATELLITE. MORE EXPERIMENT DETAILS CAN BE FOUND IN J. GEOMAG. GEOELECTR., 27, 295-301, 1975.

********** TIP 1**********

SPACECRAFT COMMON NAME- TIP 1
ALTERNATE NAMES- TRIAD 1, TRIAD OI 1X
01172, 06173

NSSDC ID- 72-069A

LAUNCH DATE- 09/02/72 WEIGHT- 94. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-NAVY

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/04/72
ORBIT PERIOD- 100.7 MIN INCLINATION- 90.1 DEG
PERIAPSIS- 716.0 KM APOAPSIS- 863.0 KM

PERSONNEL
MG - NONE ASSIGNED
SC - NONE ASSIGNED
PM - J. DASSOULAS APPLIED PHYSICS LAB
PS - R.E. FISCHELL APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS THREE BODY SPACECRAFT IS CONNECTED BY BOOMS WHICH SERVE AS GRAVITY GRADIENT STABILIZERS IN THE RADIAL DIRECTION. A MOMENTUM WHEEL WAS USED FOR STABILIZATION IN ROLL AND YAW. THE PRIMARY FUNCTION OF THE SPACECRAFT WAS TO TEST VARIOUS CONCEPTS FOR IMPROVING THE USN TRANSIT NAVIGATION SYSTEM. THE POWER WAS SUPPLIED BY A RADIO ISOTOPE THERMAL ELECTRIC GENERATOR (RTG).

------- TIP 1, POTEMRA----------

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 72-069A-01
INVESTIGATIVE PROGRAM
NAVIGATION TECHNOLOGY

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T. POTEMRA APPLIED PHYSICS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER DESIGNED TO MEASURE VECTOR FIELDS WITH MAGNITUDES UP TO 50,000 GAMMAS. MEASUREMENTS WERE MADE BY SAMPLING EACH AXIS SEQUENTIALLY AT A RATE OF 2.25 SAMPLES/S. DIGITIZATION RESOLUTION WAS ABOUT 10 GAMMAS AS GIVEN BY A 13-BIT ANALOG TO DIGITAL CONVERTER, BUT ZERO LEVEL DRIFTS WERE NOT READILY CHECKED. AS SUCH, THE EXPERIMENT WAS MOST USEFUL IN STUDIES OF MAGNETIC FLUCTUATIONS. DUE TO THE REAL-TIME DATA TRANSMISSION AND THE LOCATIONS OF THE TRACKING STATIONS, MOST OF THE DATA OBTAINED RELATED TO NORTHERN AND SOUTHERN HEMISPHERE HIGH LATITUDES.

********** UK 5**********

SPACECRAFT COMMON NAME- UK 5
ALTERNATE NAMES- UNITED KINGDOM 5, PL-732B
ARIEL 5

NSSDC ID- 74-077A

LAUNCH DATE- 10/15/74 WEIGHT- 135. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED KINGDOM SRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/16/74
ORBIT PERIOD- 95.3 MIN INCLINATION- 2.9 DEG
PERIAPSIS- 512.0 KM APOAPSIS- 557.0 KM

PERSONNEL
MG - J.R. HOLTZ NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - H.L. EAKER UNKNOWN
PS - S.S. HOLT NASA-GSFC

BRIEF DESCRIPTION
THE UK 5 SPACECRAFT WAS DESIGNED TO CARRY SIX EXPERIMENTS THAT MEASURE THE SPECTRUM, POLARIZATION, AND PULSAR FEATURES OF NONSOLAR X-RAY SOURCES. THE SPACECRAFT WAS SPIN STABILIZED, AND TWO EXPERIMENTS SCANNED THE SKY PERPENDICULAR TO THE SPIN AXIS, WHILE FOUR EXPERIMENTS POINTED PARALLEL TO THE SPIN AXIS.
DATA WAS STORED ON BOARD THE SPACECRAFT IN A CORE STORAGE AND DUMPED TO GROUND STATIONS ONCE PER ORBIT.

------- UK 5, BOYD----------

INVESTIGATION NAME- 0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR

NSSDC ID- 74-077A-01
INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.L.F.BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION
THIS EXPERIMENT COMBINED THE FUNCTION OF OBSERVING X RAYS IN DIFFERENT ENERGY RANGES WITH THAT OF STAR TRACKING. THE EXPERIMENT CONTAINED A ROTATION COLLIMATOR, UTILIZING THE SATELLITE SPIN, BEHIND WHICH THERE ARE THREE DETECTORS. THE FIELD OF VIEW WAS A CONE WITH A SEMI-ANGLE OF 10 DEG TO 20 DEG, DEPENDING ON THE TYPE OF RADIATION VIEWED BY THE DIFFERENT DETECTORS. THE FIRST DETECTOR WAS A VISIBLE LIGHT PHOTOMULTIPLIER THAT ENABLED THE SPIN AXIS TO BE ACCURATELY DETERMINED BY VIEWING THE BACKGROUND OF OPTICAL STARS. SECONDLY, THERE WAS AN ARRAY OF CHANNEL ELECTRON MULTIPLIERS, WITH SELECTABLE FILTERS, COVERING THE WAVELENGTH RANGE 0.3 TO 6 KEV. THIRD, THERE WAS A GROUP OF PROPORTIONAL COUNTERS COVERING THE RANGE 2.5 TO 30 KEV. IT WAS ESTIMATED THAT SOURCE POSITIONS COULD BE DETERMINED TO WITHIN 2 ARC-MIN FOR BRIGHT SOURCES.

------- UK 5, BOYD----------

INVESTIGATION NAME- HIGH-RESOLUTION SOURCE SPECTRA

NSSDC ID- 74-077A-03
INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.L.F.BOYD U COLLEGE LONDON
OI - A.P. WILLMORE U OF BIRMINGHAM
OI - P.W. SANFORD U COLLEGE LONDON

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A HIGH-RESOLUTION PROPORTIONAL COUNTER SPECTROMETER WITH A 128-CHANNEL PULSE HEIGHT ANALYZER AND RESPONDED TO PHOTONS IN THE 2- TO 30-KEV ENERGY RANGE. THE SPECTRA OF SOURCES WERE EXAMINED IN GREATER DETAIL THAN HAD BEEN PREVIOUSLY POSSIBLE. LINE EMISSION FOR CERTAIN ELEMENTS (E.G., IRON) COULD ALSO BE IDENTIFIED. THE DETECTOR VIEWED IN A DIRECTION PARALLEL TO THE SPIN AXIS AND, THEREFORE, CONTINUED TO OBSERVE THE SAME PIECE OF SKY FOR AS LONG AS THE POSITION OF THE SATELLITE SPIN AXIS REMAINED UNALTERED. THE EXPERIMENT AXIS POINTED APPROXIMATELY 2 DEG OFF THE SPIN AXIS, SO THAT WHEN OBSERVING A SOURCE ALSO 2 DEG OFF THE SPIN AXIS THE SOURCE PASSED IN AND OUT OF THE FIELD OF VIEW DURING EACH ROTATION. THIS PERMITTED THE BACKGROUND FLUX TO BE SAMPLED EVERY SPIN PERIOD BY RECORDING THE SPECTRAL INFORMATION IN FOUR SETS OF LOCATIONS, EACH CORRESPONDING TO A QUADRANT OF THE SPIN CYCLE. THIS SHOULD HAVE OVERCOME THE LACK OF INFORMATION ON POSSIBLE FLUCTUATIONS IN THE BACKGROUND FLUX DURING AN ORBIT'S INTEGRATION. THE EXPERIMENT COULD ALSO HAVE BEEN OPERATED IN A MODE IN WHICH PERIODICITIES IN THE RANGE TYPICAL OF PULSAR FREQUENCIES WERE DETECTED.

------- UK 5, ELLIOT----------

INVESTIGATION NAME- HIGH-ENERGY COSMIC X-RAY SPECTRA

NSSDC ID- 74-077A-05
INVESTIGATIVE PROGRAM
CODE SA/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 SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - S.S.	HOLT	NASA-GSFC
OI - E.A.	BOLDT	NASA-GSFC
OI - P.J.	SERLEMITSOS	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 SA/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 SA/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 6-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), 03954
VELA 5A (USAF)

NSSDC ID- 69-046D

LAUNCH DATE- 05/23/69 WEIGHT- 259. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/24/69
ORBIT PERIOD- 6703. MIN INCLINATION- 32.8 DEG
PERIAPSIS- 110900. KM APOAPSIS- 112210. KM

PERSONNEL

MG -	ARPA STAFF	ARPA/WASH, DC
PM -	SAMSO	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, GAME----------

INVESTIGATION NAME- SOLAR WIND

NSSDC ID- 69-046D-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI - S.J.	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 5A, BAME----------

INVESTIGATION NAME- NEUTRON DETECTOR

NSSDC ID- 69-046D-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 8 LB) 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

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(T1)) 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 44 TO 60 A. THIS COMBINATION OF ION CHAMBERS ALLOWED SOLAR X-RAY FLUX MEASUREMENTS IN THE BANDS 1 TO 8 A, 1 TO 16 A, 8 TO 16 A, AND 44 TO 60 A TO BE OBTAINED UPON SUITABLE ANALYSIS OF THE DATA. THE SCINTILLATION DETECTOR USED FOR THE .3- TO 3-A WAVELENGTH REGION CONSISTED OF A THALLIUM-ACTIVATED NAI CRYSTAL OPTICALLY COUPLED TO A PMT, THE OUTPUT OF WHICH FED A FIVE-LEVEL, INTEGRAL, PULSE-HEIGHT ANALYZER. UNLIKE THE ION CHAMBERS, THE TWO SCINTILLATION DETECTORS IN THE TWO SENSOR UNITS WERE NOT IDENTICAL. THE MORE SENSITIVE DETECTOR HAD A 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 0.08-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 SCILTILLATION 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 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

********** VELA 5B**********

SPACECRAFT COMMON NAME- VELA 5B
ALTERNATE NAMES- VELA 10 (TRW), 03955
VELA 5B (USAF)

NSSDC ID- 69-046E

LAUNCH DATE- 05/23/69 WEIGHT- 259. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TITAN 3C

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 05/25/69
ORBIT PERIOD- 6709. MIN INCLINATION- 32.8 DEG
PERIAPSIS- 110920. KM APOAPSIS- 112283. KM

PERSONNEL

MG -	ARPA-STAFF	ARPA/WASH,DC
PM -	SAMSO	USAF-LAS
PS - MR.	R.W.	KLEBESADEL

BRIEF DESCRIPTION
VELA 5B 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 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 16.5 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

BRIEF DESCRIPTION
THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 8 LB) POLYETHYLENE MODERATOR SURROUNDING TWO HELIUM-3 FILLED PROPORTIONAL COUNTERS. NEUTRONS BETWEEN 1 AND 100 MEV WERE THERMALIZED BY THE MODERATOR AND DETECTED BY THE COUNTERS. THE INSTRUMENT WAS ALSO SENSITIVE TO PROTONS ABOVE 25 MEV.

------- VELA 5B, BELIAN----------

INVESTIGATION NAME- COSMIC X RAYS

NSSDC ID- 69-046E-06
INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R.D. BELIAN — LOS ALAMOS SCI LAB
OI - W.D. EVANS — LOS ALAMOS SCI LAB
OI - J.P. CONNER — LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE COSMIC X-RAY DETECTOR WAS A LARGE-AREA 26 CM SQ SODIUM IODIDE SCINTILLATOR WITH A 5-MIL BERYLLIUM WINDOW. THE EXPERIMENT WAS DESIGNED TO PROVIDE MEASUREMENTS OF THE LOCATION, INTENSITY, AND INTENSITY VARIATIONS OF NONSOLAR X-RAY SOURCES OVER A LONG PERIOD OF TIME. THE DETECTOR WAS SENSITIVE TO X-RAY PHOTONS IN TWO ENERGY INTERVALS - (3 TO 6 KEV AND 3 TO 12 KEV), AND WAS SUFFICIENTLY SENSITIVE TO MONITOR FROM 6 TO 12 GALACTIC X-RAY SOURCES. ANY ONE SOURCE WAS VIEWED FOR APPROXIMATELY 1 H, AND EVERY 2 DAYS EACH SOURCE WAS BACK IN VIEW. THREE MODES OF READOUT WERE AVAILABLE - (1) THE REAL TIME NORMAL MODE, IN WHICH COUNTS FROM EACH ENERGY CHANNEL WERE TRANSMITTED EVERY 5, (2) THE HIGH RESOLUTION MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS TRANSMITTED EIGHT TIMES PER S, AND (3) THE STORE MODE, IN WHICH ONLY THE 3- TO 12-KEV CHANNEL WAS STORED.

------- VELA 5B, HIGBIE----------

INVESTIGATION NAME- SOLAR PARTICLE TELESCOPES

NSSDC ID- 69-046E-03
INVESTIGATIVE PROGRAM
NUCLEAR 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 5B, HIGBIE----------

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 69-046E-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 ABILITY TO OBSERVE ELECTRONS IN THE PRESENCE OF MUCH LARGER FLUXES OF PROTONS. EACH OF THE THREE DIRECT VIEW DETECTORS AND EACH OF THE THREE SCATTER GEOMETRY DETECTORS LAY IN A SINGLE PLANE AND MADE ANGLES OF 45 DEG, 90 DEG, AND 135 DEG WITH THE SPACECRAFT SPIN AXIS.

------- VELA 5B, KLEBESADEL----------

INVESTIGATION NAME- GAMMA RAY ASTRONOMY

NSSDC ID- 69-046E-08
INVESTIGATIVE PROGRAM
NUCLEAR 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 1.0 MEV WITH A DETECTION EFFICIENCY RANGING FROM 17 TO 50 PERCENT. THE SCINTILLATORS WERE SHIELDED AGAINST DIRECT PENETRATION BY ELECTRONS BELOW 0.75 MEV AND PROTONS BELOW 20 MEV. NO ACTIVE ANTICOINCIDENCE SHIELDING WAS PROVIDED. NORMALIZED OUTPUT PULSES FROM THE SIX DETECTORS WERE SUMMED INTO COUNTING AND LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, IS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 150 COUNTS/S.

********** VELA 6A**********

SPACECRAFT COMMON NAME- VELA 6A
ALTERNATE NAMES- PL-7028, VELA 11 (TRW)
04366, VELA 6A (USAF)

NSSDC ID- 70-027A

LAUNCH DATE- 04/08/70 — WEIGHT- 261. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES — DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC — EPOCH DATE- 04/09/70
ORBIT PERIOD- 6729. MIN — INCLINATION- 32.41 DEG
PERIAPSIS- 111210. KM — APOAPSIS- 112160. KM

PERSONNEL
MG - ARPA-STAFF — ARPA/WASH,DC
PM - SAMSO — USAF-LAS
PS - R.W. KLEBESADEL — LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
VELA 6A WAS ONE OF TWO SPIN-STABILIZED, 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 6A WAS AN IMPROVED VERSION OF THE EARLIER VELA SERIES SATELLITES HAVING BETTER COMMAND CAPABILITIES, INCREASED DATA STORAGE, IMPROVED POWER REQUIREMENTS, BETTER THERMAL CONTROL OF OPTICAL SENSORS, AND GREATER EXPERIMENTATION WEIGHT.

POWER SUPPLIES OF 120 W WERE PROVIDED BY 22,500 SOLAR CELLS MOUNTED ON 24 OF THE SPACECRAFT'S 26 FACES. ROTATION RATES OF 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND 5B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

------- VELA 6A, BAME----------

INVESTIGATION NAME- SOLAR WIND EXPERIMENT

NSSDC ID- 70-027A-05

INVESTIGATIVE PROGRAM
NUCLEAR DETECTION

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL

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

BRIEF DESCRIPTION

TWO ELECTROSTATIC ANALYZER-ELECTRON MULTIPLIER UNITS WERE USED TO STUDY THE INTERPLANETARY SOLAR WIND (INCLUDING HEAVY IONS) AND PROTONS AND ELECTRONS IN THE MAGNETOTAIL. ENERGY ANALYSIS WAS ACCOMPLISHED BY CHARGING THE PLATES TO KNOWN VOLTAGE LEVELS ALLOWING THEM TO DISCHARGE WITH KNOWN RESISTANCE CAPACITOR (RC) TIME CONSTANTS. PARTICLES IN A 6-DEG BY 100-DEG FAN-SHAPED ANGULAR RANGE WERE ACCEPTED FOR ANALYSIS DURING A DECAYING VOLTAGE CYCLE. THE 100-DEG DIMENSION WAS PARALLEL TO THE SPACECRAFT SPIN AXIS FOR BOTH DETECTORS. ONE ANALYZER-MULTIPLIER UNIT STUDIED SOLAR WIND ELECTRONS IN THE ENERGY RANGE FROM 7.5 EV TO 18.5 KEV AND SOLAR WIND POSITIVE IONS (MAINLY PROTONS AND ALPHA PARTICLES) IN AN ENERGY PER CHARGE RANGE FROM 120 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 8 LB) 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

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(T1)) 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 4N 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 0.3- 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-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 SCILTILLATION 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 LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, WAS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 20 COUNTS/S.

********** VELA 6B **********

SPACECRAFT COMMON NAME- VELA 6B
ALTERNATE NAMES- PL-702C, VELA 12 (TRW)
04368, VELA 6B (USAF)

NSSDC ID- 70-027B

LAUNCH DATE- 04/08/70 WEIGHT- 261. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 04/11/70
ORBIT PERIOD- 6745. MIN INCLINATION- 32.52 DEG
PERIAPSIS- 111500. KM APOAPSIS- 112210. KM

PERSONNEL
MG - ERDA-STAFF ERDA/WASH,DC
PM - SAMSO USAF-LAS
PS - R.W. KLEBESADEL 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 78 RPM DURING TRANSFER ORBITS AND 1 RPM AFTER FINAL ORBIT INSERTION MAINTAINED NOMINAL ATTITUDE CONTROL. EIGHT WHIP ANTENNAS AND FOUR STUB ANTENNA ARRAYS AT OPPOSITE ENDS OF THE SPACECRAFT STRUCTURE WERE USED FOR GROUND COMMANDS AND TELEMETRY. THE LAUNCH OF VELA 6A AND 6B, PLUS THE TWO ACTIVE VELAS STILL IN ORBIT (VELA 5A AND B), COMPLETED THE OBJECTIVES OF THE VELA PROGRAM.

------- VELA 6B, 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 LOS ALAMOS SCI LAB
OI - J.R. ASBRIDGE LOS ALAMOS SCI LAB

BRIEF DESCRIPTION
THE NEUTRON DETECTOR CONSISTED OF A LARGE (ABOUT 8 LB) 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 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 6B, HIGBIE----------

INVESTIGATION NAME- ELECTRON DETECTORS

NSSDC ID- 70-027B-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 6B, KLEBESADEL----------

INVESTIGATION NAME- GAMMA-RAY ASTRONOMY

NSSDC ID- 70-027B-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 LOGICS CIRCUITRY. LOGICAL SENSING OF RAPID, STATISTICALLY SIGNIFICANT COUNT RATE INCREASES INITIATED THE RECORDING OF DISCRETE COUNTS IN A SERIES OF LOGARITHMICALLY INCREASING TIME INTERVALS. THIS CAPABILITY PROVIDED CONTINUOUS TEMPORAL COVERAGE, WHICH, COUPLED WITH THE ISOTROPIC RESPONSE, WAS UNIQUE IN ASTRONOMY. A TIME MEASUREMENT WAS ALSO ASSOCIATED WITH EACH RECORD. THE DATA ACCUMULATIONS INCLUDED A BACKGROUND COMPONENT, DUE TO COSMIC PARTICLES AND THEIR SECONDARY EFFECTS. THE OBSERVED BACKGROUND RATE, WHICH WAS A FUNCTION OF THRESHOLD ENERGY, WAS ABOUT 20 COUNTS/S.

********** VIKING 1 LANDER **********

SPACECRAFT COMMON NAME- VIKING 1 LANDER
ALTERNATE NAMES- VIKING-B LANDER, VIKING-B

NSSDC ID- 75-075C

LAUNCH DATE- 08/20/75 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 - L.G. GOFF NASA HEADQUARTERS
PM - G.C. BROOME NASA-LARC
PS - G.A. SOFFEN NASA-LARC

BRIEF DESCRIPTION
THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED AT 22.48 DEG N LATITUDE, 47.94 DEG W LONGITUDE ON THE MARTIAN SURFACE. THE ORBITER HAD THE CAPABILITY OF BEING MADE SYNCHRONOUS WITH THE LANDER TO PROVIDE FOR DAILY RELAY AND LANDING SITE OBSERVATION. IT ALSO WAS CAPABLE OF OBTAINING DATA FOR THE SELECTION OF LANDING SITES FOR FUTURE MISSIONS. THE LANDER VEHICLE 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. THE SCIENTIFIC PAYLOAD FOR THE LANDER WEIGHS APPROXIMATELY 91 KG (200 LB). THIS SPACECRAFT WAS ORIGINALLY SCHEDULED TO BE THE SECOND VIKING MISSION, BUT BECAUSE OF A MALFUNCTION IN VIKING-A, IT WAS LAUNCHED FIRST.

------- VIKING 1 LANDER, ANDERSON----------

INVESTIGATION NAME- SEISMOLOGY

NSSDC ID- 75-075C-08 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY PHYSICS

PERSONNEL

TL - D.L.	ANDERSON	CALIF INST OF TECH
TM - M.N.	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

BRIEF DESCRIPTION
THE SEISMOLOGY EXPERIMENT WAS DESIGNED TO DETERMINE THE LEVEL OF SEISMIC ACTIVITY ON MARS AND ITS INTERNAL STRUCTURE. THE SEISMOLOGY INSTRUMENT CONSISTED OF A 15-CM CUBICAL PACKAGE THAT WEIGHED APPROXIMATELY 2.3 KG. IN THE PACKAGE WERE THREE MUTUALLY PERPENDICULAR SEISMOMETERS. THEY CONSIS TED OF A 20-GM MASS WITH AN ATTACHED COIL, ELASTI CALLY PIVOTED FROM THE INSTRUMENT FRAME ON A SHORT BOOM, SO THE COIL PROJECTS INTO A MAGNET MOUNTED ON THE FRAME. RELATIVE MOTION OF THE COIL AND MAGNET, INDUCED BY THE MASS'S REACTION TO GROUND MOTION, WAS DESIGNED TO GENERATE A VARYING VOLTAGE THAT WAS THEN INPUT TO AN AMPLIFIER. MODES WERE -- (1) SELECTION OF VARIOUS FILTERS FOR FRE QUENCY CONTENT OR TO ADJUST TO BEST RECEPTION OF SPECIFIC TYPES OF DATA, (2) A LOW SAMPLING RATE FOR GENERAL ACTIVITY, (3) A HIGH DATA RATE FOR DETAILED EXAMINATION OF EVENTS, AND (4) A COMPRES SED MEDIUM RATE FOR CONTINOUS MONITORING OF MARSQUAKES THAT WERE DORMANT UNTIL ACTIVATED BY AN EVENT. THE DATA WERE TO BE COMPRESSED FOR TRANS MISSION TO EARTH BY AVERAGING THE AMPLITUDE OF NORMAL GROUND NOISE OVER A 15-S PERIOD. WHEN AN EVENT OCCURED, A TRIGGER WOULD ACTIVATE A HIGHER DATA RATE MODE THAT SAMPLED THE AMPLITUDE OF THE OVERALL EVENT ENVELOPE THAT REQUIRED ONLY ONE AMPLITUDE SAMPLE PER S 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 A S. THE SHAPE OF THE ENVELOPE AND ITS INCREMENTAL FREQUENCY CONTENT WOULD THEN BE TRANSMITTED TO EARTH AND RECONSTRUCTED TO APPROXIMATE THE ORIGINAL EVENT. THE INSTRUMENT FAILED TO FUNCTION ON THE MARTIAN SURFACE.

------- VIKING 1 LANDER, BIEMANN----------

INVESTIGATION NAME- MOLECULAR ANALYSIS

NSSDC ID- 75-075C-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - K.	BIEMANN	MASS INST OF TECH
TM - H.C.	UREY	U OF CALIF, SAN DIEGO
TM - D.M.	ANDERSON	USA-CRREL
TM - T.	OWEN	STATE U OF NEW YORK
TM - J.	ORO	U OF HOUSTON
TM - L.E.	ORGEL	SALK INST BIOL STUDIES
TM - A.O.C.	NIER	U OF MINNESOTA
TM - P.	TOULMIN, 3RD	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION
THE MOLECULAR ANALYSIS EXPERIMENT WAS DESIGNED TO SEARCH FOR AND IDENTIFY ORGANIC (AND SOME INORGANIC) COMPOUNDS IN THE UPPER SURFACE LAYER OF MARS, DETERMINE THE ATMOSPHERIC COMPOSITION NEAR THE SURFACE, AND MONITOR COMPOSITION CHANGES. THE ANALYSES WERE PERFORMED BY A GAS CHROMATOGRAPH MASS SPECTROMETER (GCMS), WHICH HAD HIGH SENSITIVITY, HIGH STRUCTURAL SPECIFICITY, AND BROAD APPLICABILITY TO A WIDE RANGE OF COMPOUNDS. ORGANIC SUBSTANCES WERE VAPORIZED FROM THE SURFACE MATERIAL BY HEATING TO 200 DEG C WHILE CARBON DIOXIDE (LABELED WITH C-13) SWEPT THROUGH. THE MATERIAL WAS THEN CARRIED INTO A TENEX GAS-CHROMATOGRAPHIC COLUMN THAT WAS SWEPT WITH HYDROGEN AS A CARRIER GAS. WHILE PASSING THROUGH THE COLUMN, SUBSTANCES WERE SEPARATED FROM EACH OTHER BY THEIR DIFFERENT DEGREES OF RETENTION BY THE TENEX. THE RESIDUAL STREAM MOVED INTO THE MASS SPECTROMETER (AFTER HYDROGEN WAS REMOVED BY HYDROGEN-ONLY PERMEABLE PALLADIUM) AND A MASS SPECTRUM (FROM MASS 12 TO 200) WAS OBTAINED EVERY 10 S FOR THE 84 MIN OF THE GAS CHROMATOGRAM. THE DATA WERE STORED AND THEN TRANSMITTED TO EARTH. AFTER THE INITIAL ANALYSIS THE SAME SAMPLE WAS HEATED TO 500 DEG C TO OBTAIN LESS VOLATILE MATERIALS AND TO PYROLYZE SUBSTANCES THAT WERE NOT VOLATILE ENOUGH TO EVAPORATE. THIS MATERIAL WAS THEN ALSO ANALYZED BY THE GCMS.

------- 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 WAS DESIGNED TO DETECT THE PRESENCE OF MAGNETIC PARTICLES IN MARTIAN SURFACE MATERIAL AND TO DETERMINE THE IDENTITY AND QUANTITY OF THESE PARTICLES. IT USED A SET OF TWO PERMANENT, SAMARIUM-COBALT MAGNETIC PAIRS MOUNTED ON THE BACKHOE OF THE SURFACE-SAMPLER COLLECTOR HEAD. EACH PAIR CONSISTED OF AN OUTER RING MAGNET ABOUT 2.5 CM IN DIAMETER WITH AN INNER CORE MAGNET OF OPPOSITE POLARITY. THE MAGNETIC FIELD OF THE MAGNETS WAS APPROXIMATELY 2500 G AND THE MAGNETS WERE MOUNTED ON THE OUTER SURFACE OF THE BACKHOE AT DIFFERENT DEPTHS TO INSURE A GRADIENT IN MAGNETIC FIELD STRENGTH. ADDITIONALLY, A SIMILAR MAGNETIC PAIR WAS MOUNTED ON THE PHOTOMETRIC TARGET ATOP THE LANDER TO ATTRACT MAGNETIC PARTICLES PRESENT IN WINDBLOWN DUST. THE MAGNETS WERE DIRECTLY IMAGED BY THE CAMERA SYSTEM IN BLACK AND WHITE AND IN COLOR. A 5-POWER GNIFYING MIRROR WAS USED FOR MAXIMUM RESOLUTION.

------- VIKING 1 LANDER, HESS----------

INVESTIGATION NAME- METEOROLOGY EXPERIMENT

NSSDC ID- 75-075C-07 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY BIOLOGY

PERSONNEL

TL - S.L.	HESS	FLORIDA STATE U
TM - C.B.	LEOVY	U OF WASHINGTON
TM - R.M.	HENRY	NASA-LARC
TM - J.A.	RYAN	MCDONNELL-DOUGLAS CORP
TM - J.E.	TILLMAN	U OF WASHINGTON

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ELEMENTS THAT WERE DETERMINED ARE PRESSURE, TEMPERATURE, AND WIND SPEED AND DIRECTION OF THE MARTIAN ATMOSPHERE. DIURNAL AND TEMPORAL VARIATIONS OF THE PARAMETERS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY WERE SELECTABLE BY GROUND COMMAND. ALL MEASUREMENTS WERE CONTINUED FOR THE LANDER LIFETIME. THE SENSORS WERE MOUNTED ON AN ERECTABLE BOOM.

------- VIKING 1 LANDER, KLEIN----------

INVESTIGATION NAME- BIOLOGY INVESTIGATION

NSSDC ID- 75-075C-03 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY BIOLOGY

PERSONNEL

TL - H.P.	KLEIN	NASA-ARC
TM - J.	LEDERBERG	STANFORD U
TM - A.	RICH	MASS INST OF TECH
TM - N.H.	HOROWITZ	CALIF INST OF TECH
TM - V.I.	OYAMA	NASA-ARC
TM - G.V.	LEVIN	BIOSPHERICS, INC

BRIEF DESCRIPTION
THE BIOLOGY EXPERIMENT WAS DESIGNED TO SEARCH FOR THE PRESENCE OF MARTIAN ORGANISMS BY LOOKING FOR PRODUCTS OF THEIR METABOLISM. THREE DISTINCT INSTRUMENTS -- (1) PYROLYTIC RELEASE (PR), (2) LABELED RELEASE (LR), AND (3) GAS EXCHANGE (GEX) -- INCUBATED SAMPLES OF THE MARTIAN SURFACE UNDER A NUMBER OF DIFFERENT ENVIRONMENTAL CONDITIONS. SOIL SAMPLES ACQUIRED BY THE SURFACE SAMPLER WERE DELIVERED TO THE VIKING BIOLOGY INSTRUMENT (VBI). THESE SAMPLES WERE THEN DISTRIBUTED, IN MEASURED AMOUNTS, TO THE THREE INSTRUMENTS FOR INCUBATION AND PROCESSING. THE VBI MAINTAINED INCUBATION TEMPERATURES BETWEEN 8 AND 17 DEG C. AFTER AN EXPERIMENT, THE SAMPLE WAS STERILIZED AND REPROCESSED AS A CONTROL. THE PR CONTAINED THREE INCUBATION CHAMBERS EACH OF WHICH MEASURED ONE SAMPLE FOR PHOTOSYNTHETIC OR CHEMICAL FIXATION OF CO2 OR CCO CONTAINING C-14. LABELED CO2/CO MIXTURE WAS ADDED AND A XENON ARC LAMP SIMULATING THE SUN'S ENERGY WAS TURNED ON FOR A 5-DAY INCUBATION. THE SAMPLE WAS THEN HEATED TO 120 DEG C TO REMOVE RESIDUAL INCUBATION GASES. AT ANOTHER 'STATION,' THE SAMPLE WAS HEATED TO 625 DEG C WHILE PURGING IT WITH HELIUM. THE PURGED GASES PASSED THROUGH AN ORGANIC VAPOR TRAP (OVT) THAT RETAINED ORGANIC COMPOUNDS AND FRAGMENTS WHILE PASSING THE CO2 AND CO. A RADIOACTIVITY DETECTOR THEN DETECTED 'PEAKS' CONSISTING OF UNREACTED CO2/CO. THE SAMPLE WAS THEN HEATED AND PURGED WITH HELIUM TO VERIFY THAT THE LEVEL WAS DOWN TO PRE-PYROLYSIS BACKGROUND COUNT. THE TRAPPED ORGANIC MATERIALS IN THE OVT WERE THEN HEATED TO 750 DEG C, WHICH OXIDIZED THEM TO CO2 AND WHICH WAS THEN COUNTED TO DETECT ABSORPTION OF THE LABELED CARBON. THE LR INCUBATED A SAMPLE WITH RADIOACTIVELY

LABELED NUTRIENTS. THE ATMOSPHERE ABOVE THE SAMPLE WAS CONTINUOUSLY MONITORED FOR 12 DAYS. THE DETECTION OF RADIOACTIVE CO2 PRODUCED A METABOLIC CURVE AS A FUNCTION OF TIME, THE SHAPE OF WHICH WAS USED TO DETERMINE IF GROWTH TOOK PLACE. THE GEX MEASURED THE PRODUCTION OR UPTAKE OF CO2, NITROGEN, CH4, HYDROGEN, AND OXYGEN DURING INCUBATION OF A SOIL SAMPLE. THE SAMPLE WAS SEALED AND PURGED BY HELIUM, THEN A MIXTURE OF HELIUM, KRYPTON, AND CO2 WAS INTRODUCED AS AN INITIAL INCUBATION ATMOSPHERE. AFTER THE ADDITION OF A SELECTED QUANTITY OF A NUTRIENT SOLUTION THE SAMPLE WAS INCUBATED FOR 12 DAYS. AT DAY 0, 1, 2, 4, 8, AND 12, SAMPLES OF THE ATMOSPHERE WERE REMOVED AND ANALYZED BY A GAS CHROMATOGRAPH WITH A THERMAL CONDUCTIVITY DETECTOR. THE FIRST SERIES OF TESTS HAS BEEN PERFORMED AND THE EXPERIMENT FUNCTIONED NOMINALLY AS OF AUGUST 19, 1976.

------- VIKING 1 LANDER, MICHAEL, JR.----------

INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- 75-075C-11

INVESTIGATIVE PROGRAM
CODE SL

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 - R.D.	GROSSI	RAYTHEON CORP
TM - G.L.	TYLER	STANFORD U
TM - J.	BRENKLE	NASA-JPL
TM - R.H.	TOLSON	NASA-LARC
TM - C.T.	STELZRIED	NASA-JPL

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED THE LANDER-TO-EARTH AND ORBITER-TO-EARTH S-BAND COMMUNICATIONS LINK (INCLUDING RANGE AND RANGE-RATE CAPABILITIES), THE LANDER-TO-ORBITER UHF RELAY LINK, AND THE ORBITER-TO-EARTH X-BAND DOWNLINK. THE RESULTING DATA WILL BE USED TO DETERMINE THE MARTIAN GRAVITATIONAL FIELD, AXIS OF ROTATION, EPHEMERIS, FIGURE, ATMOSPHERE, STRUCTURE, IONOSPHERE, AND SURFACE PROPERTIES. IN ADDITION, THE DATA WILL BE USED TO DETERMINE THE LANDER LOCATION, TO STUDY RELATIVITY, TO STUDY THE INTERPLANETARY MEDIUM, AND, IF CONDITIONS PERMIT, TO STUDY THE SOLAR CORONA.

------- VIKING 1 LANDER, MUTCH----------

INVESTIGATION NAME- FACSIMILE CAMERA

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.O.	HUCK	NASA-LARC
TM - E.C.	LEVINTHAL	STANFORD U
TM - S.	LIEBES, JR.	STANFORD U

BRIEF DESCRIPTION
THE PURPOSE OF THE IMAGING INVESTIGATION FROM THE LANDER WAS TO CHARACTERIZE VISUALLY THE LANDING SITE, PROVIDING DATA WITH BIOLOGICAL, GEOLOGICAL, AND METEOROLOGICAL RELEVANCE. TWO CAMERAS WITH A 0.04-DEG SCANNING RESOLUTION WERE REQUIRED. THE VERTICAL FIELD OF VIEW FOR EACH CAMERA WAS 20 DEG WITH A CAPABILITY OF OBTAINING A COMPLETE 0- TO 360-DEG HORIZONTAL PANORAMA. VERTICAL POINTING BY COMMAND FOR ANGULAR COVERAGE FROM 40 DEG ABOVE TO 60 DEG BELOW (OUTER EDGE OF FIELD-OF-VIEW) THE HORIZONTAL PLANE OF THE LANDER IN 10-DEG INCREMENTS WAS REQUIRED. AZIMUTH POINTING BY COMMAND WAS IN 2.5-DEG INCREMENTS. THE CAMERAS WERE MOUNTED AT LEAST 1.3 M ABOVE THE MARTIAN SURFACE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND AT LEAST 90 PERCENT OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. EACH CAMERA WAS CAPABLE OF OBTAINING VISUAL COLOR IMAGERY. PROVISION WAS MADE TO OPERATE IN IR SPECTRAL BANDS BETWEEN 0.8 AND 1.1 MICROMETERS. HORIZONTAL STEREO WITH A MINIMUM BASE OF 0.8 M WAS REQUIRED.

------- VIKING 1 LANDER, NIER----------

INVESTIGATION NAME- ENTRY-ATMOSPHERIC STRUCTURE

NSSDC ID- 75-075C-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

TL - A.O.C.NIER		U OF MINNESOTA
TM - M.B.	MCELROY	HARVARD U
TM - W.B.	HANSON	U OF TEXAS, DALLAS
TM - N.W.	SPENCER	NASA-GSFC
TM - A.	SEIFF	NASA-ARC

BRIEF DESCRIPTION
THE PARTICULAR ELEMENTS OF MARTIAN ATMOSPHERIC STRUCTURE DETERMINED WERE PRESSURE, TEMPERATURE, AND DENSITY VARIATIONS AT DIFFERENT ALTITUDES IN THE LOWER MARTIAN ATMOSPHERE. THE MEASUREMENTS MADE TO DETERMINE THESE ATMOSPHERIC PARAMETERS WERE SPACECRAFT ACCELERATION, PRESSURE, AND TEMPERATURE. THE ACCELEROMETER OF THE GUIDANCE AND CONTROL SYSTEM WERE USED FOR THE ATMOSPHERIC STRUCTURE INVESTIGATION.

------- VIKING 1 LANDER, NIER----------

INVESTIGATION NAME- ENTRY-ATMOSPHERIC COMPOSITION

NSSDC ID- 75-075C-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

TL - A.O.C.NIER		U OF MINNESOTA
TM - N.W.	SPENCER	NASA-GSFC
TM - M.B.	MCELROY	HARVARD U
TM - W.B.	HANSON	U OF TEXAS, DALLAS
TM - A.	SEIFF	NASA-ARC

BRIEF DESCRIPTION
THE VIKING ENTRY-ATMOSPHERIC COMPOSITION EXPERIMENT WAS DESIGNED TO PROVIDE THE COMPOSITION DATA (FOR BOTH NEUTRAL AND CHARGED SPECIES) NEEDED TO DEFINE THE PRESENT PHYSICAL AND CHEMICAL STATE OF THE MARTIAN ATMOSPHERE. MOUNTED IN AN OPENING IN THE AEROSHELL WITH ITS ELECTRON-IMPACT OPEN ION SOURCE RECESSED BELOW THE SURFACE OF THE AEROSHELL, A DOUBLE-FOCUSING (ELECTROSTATIC AND MAGNETIC) MASS SPECTROMETER WAS USED TO MEASURE THE CONCENTRATIONS OF THE ATMOSPHERIC SPECIES THAT HAVE MASS-TO-CHARGE RATIOS FROM 1 TO 49. TWO COLLECTORS WERE USED, ONE FOR THE MASS RANGE FROM 1 TO 7 U, AND THE OTHER SIMULTANEOUSLY MEASURING IN THE MASS RANGE FROM 7 TO 49 U. MASS SPECTRA WAS OBTAINED BY SWEEPING THE ION ACCELERATION VOLTAGE AND THE DEFLECTION VOLTAGE ACROSS THE ELECTROSTATIC PLATES. THE SWEEP PERIOD WAS APPROXIMATELY FIVE S, AND A DYNAMIC RANGE OF 1.E5 WAS PROVIDED WITHIN EACH SPECTRUM. A RETARDING POTENTIAL ANALYZER (RPA) MEASURED THE IONOSPHERIC PROPERTIES OVER APPROXIMATELY THE SAME ALTITUDE RANGE AS THE MASS SPECTROMETER. ITS FRONT END MATED TO THE AEROSHELL SO THAT THE ENTRANCE GRID WAS NEARLY FLUSH TO THE SURFACE, WHICH WAS MADE CONDUCTING IN THE REGION OF THE RPA TO PROVIDE A GROUND PLANE. THE SPACE BETWEEN THE ENTRANCE GRID AND COLLECTOR WAS ELECTRICALLY SEGMENTED BY FIVE GRIDS WHOSE POTENTIALS DETERMINED THE ENERGY AND SIGN OF THE CHARGED PARTICLES THAT REACHED THE COLLECTOR. THREE DIFFERENT LINEAR VOLTAGE RAMPS WERE APPLIED IN SUCCESSION TO THE RETARDING GRID. ONE RAMP WAS USED TO MEASURE SOLAR WIND ELECTRONS AND IONOSPHERIC PHOTOELECTRONS COVERED THE VOLTAGE RANGE FROM -75 V TO 0 V (IN ABOUT 1 S). ANOTHER RAMP MEASURED ELECTRON TEMPATURES IN THE IONOSPHERE COVERED FROM -1.5 V TO 0 V (IN ABOUT 1 S). THE LAST RAMP WAS USED TO PROVIDE ION TEMPERATURE AND ION CONCENTRATION DATA COVERED FROM +15 V TO 0 V (IN ABOUT 2 S). MORE EXPERIMENT DETAILS CAN BE FOUND IN, 'ENTRY SCIENCE EXPERIMENT FOR VIKING 1975,'A. O. NIER, ET AL, ICARUS, 16, 74-91, 1972.

------- VIKING 1 LANDER, SHORTHILL----------

INVESTIGATION NAME- PHYSICAL PROPERTIES INVESTIGATION

NSSDC ID- 75-075C-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 EXPERIMENT 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- X-RAY FLUORESCENCE SPECTROMETER

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 ULILIZED AN ENERGY-DISPERSIVE, X-RAY FLUORESCENCE SPECTROMETER IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS DETECTED X RAYS EMITTED FROM SAMPLES OF THE 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 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 WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS, DEPENDING UPON THE ELEMENT IN QUESTION.

********** VIKING 1 ORBITER**********

SPACECRAFT COMMON NAME- VIKING 1 ORBITER
ALTERNATE NAMES- PL-7338, VIKING-B ORBITER
VIKNG-B

NSSDC ID- 75-075A

LAUNCH DATE- 08/20/75
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN
WEIGHT- 1170. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- MARSCENTRIC
ORBIT PERIOD- 1476. MIN
PERIAPSIS- 1500. KM
EPOCH DATE- 06/20/76
INCLINATION- 37.74 DEG
APOAPSIS- 33000. KM

PERSONNEL

MG - W.	JAKOBOWSKI	NASA HEADQUARTERS
SC - L.G.	GOFF	NASA HEADQUARTERS
PM - G.C.	BROOME	NASA-LARC
PS - G.A.	SOFFEN	NASA-LARC

BRIEF DESCRIPTION
THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. A LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED ON THE SURFACE ON JULY 20,1976. ORBITAL, ENTRY, AND SCIENTIFIC DATA FROM THE LANDER WERE COLLECTED AND TRANSMITTED TO EARTH. THE SPACECRAFT 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 AND A 70-W CAPACITY FOR THE LANDER. SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS WEIGHED APPROXIMATELY 72 KG (158 LB).

------- VIKING 1 ORBITER, CARR----------

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-075A-01

INVESTIGATIVE PROGRAM
CODE SL

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

BRIEF DESCRIPTION
THE PURPOSES OF THE VIKING ORBITER TV IMAGING EXPERIMENT INVESTIGATION WERE TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS AND FUTURE MISSIONS, TO MONITOR THE REGION SURROUNDING THE LANDER, AND TO STUDY THE GEOLOGIC AND DYNAMIC CHARACTERISTICS OF MARS. THE GEOMETRIC RESOLUTION OF THE ORBITING IMAGING SYSTEM WAS 40 M PER LINE AT A REFERENCE ALTITUDE OF 1500 KM, WITH IMAGE SMEARING FROM ORBITER MOTION TO BE LESS THAN 50 PERCENT OF THIS RESOLUTION. THE DYNAMIC RANGE WAS 80 TO 1, AND THE SENSITIVITY WAS SUFFICIENT TO OBTAIN PICTURES AS CLOSE TO THE TERMINATOR AS 30 DEG WITH OPTIMUM IMAGE QUALITY AND AS CLOSE AS 5 DEG TO THE TERMINATOR WITH DEGRADED IMAGE QUALITY. PRIOR TO LANDER SEPARATION THE ORBITER WAS REQUIRED TO PHOTOGRAPH WITH CONTIGUOUS PICTURES A SWATH AT LEAST 40-KM CROSS-TRACK BY 500-KM DOWN-TRACK ON A SINGLE ORBITAL PASS FROM THE NEAR-APOAPSIS PORTION OF THE ORBIT. AFTER LANDER SEPARATION, COMPLETE COVERAGE OBTAINED WITH CONTIGUOUS PICTURES OF AN AREA AT LEAST 50 KM IN RADIUS CENTERED ON THE LANDER.

------- VIKING 1 ORBITER, FARMER----------

INVESTIGATION NAME- IR SPECTROMETER -- WATER VAPOR MAPPING

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

BRIEF DESCRIPTION
THE OBJECTIVES OF THE IR SPECTROMETRY EXPERIMENT WERE TO DETERMINE THE SPATIAL AND TEMPORAL DISTRIBUTION OF WATER VAPOR, TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS, AND (FOR FUTURE MISSIONS) TO MONITOR THE REGION SURROUNDING THE LANDER AND STUDY THE DYNAMIC CHARACTERISTICS OF MARS. THE INFRARED SPECTROMETER WAS HORESIGHTED WITH THE IMAGINE SYSTEM. IT WAS OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. THE WATER VAPOR MEASUREMENT RANGE WAS FROM 1 TO 1000 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 1 MICROMETER BETWEEN 1 AND 20 MICROMETERS AND 5 PERCENT BETWEEN 20 AND 1000 MICROMETERS. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT WAS 2 BY 16 MILLIRADIANS.

------- VIKING 1 ORBITER, KIEFFER----------

INVESTIGATION NAME- IR RADIOMETRY -- THERMAL MAPPING

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.	NEUGEBAUER	CALIF INST OF TECH
TM - S.C.	CHASE, JR.	SANTA BARBARA RES CTR

BRIEF DESCRIPTION
THE PURPOSE OF THE THERMAL MAPPING EXPERIMENT WAS TO OBTAIN TEMPERATURES OF AREAS ON THE SURFACE AND OF THE ATMOSPHERE OF MARS WITH AN INFRARED THERMAL MAPPER (IRTM) INSTRUMENT. IT ALSO MEASURED THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET. THE IRTM WAS A MULTI-CHANNEL RADIOMETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN SENSITIVE INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 DEG C THROUGHOUT A TEMPERATURE RANGE OF MINUS 130 DEG C TO PLUS 57 DEG C. THE INSTRUMENT WAS 20 X 25 X 30 CM AND HAD A MINIMUM SPATIAL RESOLUTION OF 8 KM ON THE SURFACE.

********** VIKING 2 LANDER**********

SPACECRAFT COMMON NAME- VIKING 2 LANDER
ALTERNATE NAMES- VIKING-A LANDER, VIKING-A

NSSDC ID- 75-083C

LAUNCH DATE- 09/09/75
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN
WEIGHT- 598. KG

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- MARS LANDER

PERSONNEL

MG - W.	JAKOBOWSKI	NASA HEADQUARTERS
SC - L.G.	GOFF	NASA HEADQUARTERS
PM - G.C.	BROOME	NASA-LARC
PS - G.A.	SOFFEN	NASA-LARC

BRIEF DESCRIPTION
THIS SPACECRAFT WAS THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT SOFT-LANDED AT 47.97 DEG N LATITUDE, 225.71 DEG W LONGITUDE ON THE MARTIAN SURFACE. THIS SECOND MARS LANDER WAS CAPABLE OF ACCOMPLISHING THE FIRST LANDER MISSION AS A BACKUP. 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. IT HAD A 70-W POWER CAPACITY AND A SCIENTIFIC

PAYLOAD OF APPROXIMATELY 91 KG (200LB). THIS SPACECRAFT WAS ORIGINALLY SCHEDULED TO BE THE FIRST MISSION, BUT BECAUSE OF A MALFUNCTION, IT WAS LAUNCHED SECOND.

------- VIKING 2 LANDER, ANDERSON----------

INVESTIGATION NAME- SEISMOLOGY

NSSDC ID- 75-083C-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY
PLANETARY PHYSICS

PERSONNEL

TL - D.L.	ANDERSON	CALIF INST OF TECH
TM - M.N.	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

BRIEF DESCRIPTION
THE SEISMOLOGY EXPERIMENT WAS DESIGNED TO DETERMINE THE LEVEL OF SEISMIC ACTIVITY ON MARS AND ITS INTERNAL STRUCTURE. THE SEISMOLOGY INSTRUMENT CONSISTED OF A 1- CM CUBICAL PACKAGE THAT WEIGHED APPROXIMATELY 2.3 KG (5 LB). IN THE PACKAGE WERE THREE MUTUALLY PERPENDICULAR SEISMOMETERS. THEY CONSISTED OF A 20-GM MASS WITH AN ATTACHED COIL, ELASTICALLY PIVOTED FROM THE INSTRUMENT FRAME ON A SHORT BOOM, SO THE COIL PROJECTS INTO A MAGNET MOUNTED ON THE FRAME. RELATIVE MOTION OF THE COIL AND MAGNET, INDUCED BY THE MASS'S REACTION TO GROUND MOTION, WAS AN AMPLIFIER. MODES WERE -- (1) SELECTION OF VARIOUS FILTERS FOR FREQUENCY CONTENT OR TO ADJUST TO BEST RECEPTION OF SPECIFIC TYPES OF DATA, (2) A LOW SAMPLING RATE FOR GENERAL ACTIVITY, (3) A HIGH DATA RATE FOR DETAILED EXAMINATION OF EVENTS, AND (4) A COMPRESSED MEDIUM RATE FOR CONTINUOUS MONITORING OF MARSQUAKES THAT WAS 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 S 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 A S. 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 BECOME UNCAGED AND CANNOT BE USED IN A SEISMIC NETWORK WITH THE VIKING 2 INSTRUMENT.

------- VIKING 2 LANDER, BIEMANN----------

INVESTIGATION NAME- MOLECULAR ANALYSIS

NSSDC ID- 75-083C-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY BIOLOGY
PLANETOLOGY

PERSONNEL

TL - K.	BIEMANN	MASS INST OF TECH
TM - H.C.	UREY	U OF CALIF, SAN DIEGO
TM - D.M.	ANDERSON	USA-CRREL
TM - T.	OWEN	STATE U OF NEW YORK
TM - J.	ORO	U OF HOUSTON
TM - L.E.	ORGEL	SALK INST BIOL STUDIES
TM - A.O.C.	NIER	U OF MINNESOTA
TM - P.	TOULMIN, 3RD	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION
THE MOLECULAR ANALYSIS EXPERIMENT WAS DESIGNED TO SEARCH FOR AND IDENTIFY ORGANIC (AND SOME INORGANIC) COMPOUNDS IN THE UPPER SURFACE LAYER OF MARS, DETERMINE THE ATMOSPHERIC COMPOSITION NEAR THE SURFACE AND MONITOR COMPOSITION CHANGES. THE ANALYSES WERE PERFORMED BY A GAS CHROMATOGRAPH MASS SPECTROMETER (GCMS), WHICH HAD HIGH SENSITIVITY, HIGH STRUCTURAL SPECIFICITY, AND BROAD APPLICABILITY TO A WIDE RANGE OF COMPOUNDS. ORGANIC SUBSTANCES WERE VAPORIZED FROM THE SURFACE MATERIAL BY HEATING TO 200 DEG C WHILE CARBON DIOXIDE (LABELED WITH C-13) SWEPT THROUGH. THE MATERIAL WAS THEN CARRIED INTO A TENEX GAS-CHROMATOGRAPHIC COLUMN THAT WAS SWEPT WITH HYDROGEN AS A CARRIER GAS. WHILE PASSING THROUGH THE COLUMN, SUBSTANCES WERE SEPARATED FROM EACH OTHER BY THEIR DIFFERENT DEGREES OF RETENTION BY THE TENEX. THE RESIDUAL STREAM MOVED INTO THE MASS SPECTROMETER (AFTER HYDROGEN WAS REMOVED BY HYDROGEN-ONLY PERMEABLE PALLADIUM), AND A MASS SPECTRUM (FROM MASS 12 TO 200) WAS OBTAINED EVERY 10 S FOR THE 84 MIN OF THE GAS CHROMATOGRAM. THE DATA WERE STORED AND THEN TRANSMITTED TO EARTH. AFTER THE INITIAL ANALYSIS THE SAME SAMPLE WAS HEATED TO 500 DEG C TO OBTAIN LESS VOLATILE MATERIALS AND TO PYROLYZE SUBSTANCES THAT WERE NOT VOLATILE ENOUGH TO EVAPORATE. THIS MATERIAL WAS THEN ALSO ANALYZED BY THE GCMS.

------- VIKING 2 LANDER, HARGRAVES----------

INVESTIGATION NAME- MAGNETIC PROPERTIES

NSSDC ID- 75-083C-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETOLOGY

PERSONNEL

TL - R.B.	HARGRAVES	PRINCETON U

BRIEF DESCRIPTION
THE MAGNETIC PROPERTIES EXPERIMENT WAS DESIGNED TO DETECT THE PRESENCE OF MAGNETIC PARTICLES IN MARTIAN SURFACE MATERIAL AND TO DETERMINE THE IDENTITY AND QUANTITY OF THESE PARTICLES. IT USED A SET OF TWO PERMANENT, SAMARIUM-COBALT MAGNETIC PAIRS MOUNTED ON THE BACKHOE OF THE SURFACE SAMPLER COLLECTOR HEAD. THEY CONSISTED OF AN OUTER RING MAGNET ABOUT 2.5 CM IN DIAMETER WITH AN INNER CORE MAGNET OF OPPOSITE POLARITY. THE MAGNETIC FIELD OF THE MAGNETS WAS APPROXIMATELY 2500 G, AND THEY WERE MOUNTED ON THE OUTER SURFACE OF THE BACKHOE AT DIFFERENT DEPTHS TO ENSURE A GRADIENT IN MAGNETIC FIELD STRENGTH. ADDITIONALLY, A SIMILAR MAGNETIC PAIR WAS ON THE PHOTOMETRIC TARGET ON TOP OF THE LANDER TO ATTRACT MAGNETIC PARTICLES PRESENT IN WINDBLOWN DUST. THE MAGNETS WERE DIRECTLY IMAGED BY THE CAMERA SYSTEM IN BLACK AND WHITE AND IN COLOR. A 5-POWER MAGNIFYING MIRROR WAS USED FOR MAXIMUM RESOLUTION.

------- VIKING 2 LANDER, HESS----------

INVESTIGATION NAME- METEOROLOGY EXPERIMENT

NSSDC ID- 75-083C-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

TL - S.L.	HESS	FLORIDA STATE U
TM - C.B.	LEOVY	U OF WASHINGTON
TM - R.M.	HENRY	NASA-LARC
TM - J.A.	RYAN	MCDONNELL-DOUGLAS CORP
TM - J.E.	TILLMAN	U OF WASHINGTON

BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAINED INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ELEMENTS OF PRESSURE, TEMPERATURE, AND WIND SPEED AND DIRECTION OF THE MARTIAN ATMOSPHERE WERE DETERMINED. DIURNAL AND TEMPORAL VARIATIONS OF THE PARAMETERS WERE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY WERE SELECTABLE BY GROUND COMMAND. ALL MEASUREMENTS WERE CONTINUED FOR THE LANDER LIFETIME. THE SENSORS WERE MOUNTED ON AN ERECTABLE BOOM.

------- VIKING 2 LANDER, KLEIN----------

INVESTIGATION NAME- BIOLOGY INVESTIGATION

NSSDC ID- 75-083C-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY BIOLOGY

PERSONNEL

TL - H.P.	KLEIN	NASA-ARC
TM - J.	LEDERBERG	STANFORD U
TM - A.	RICH	MASS INST OF TECH
TM - N.H.	HOROWITZ	CALIF INST OF TECH
TM - V.I.	OYAMA	NASA-ARC
TM - G.V.	LEVIN	BIOSPHERICS, INC

BRIEF DESCRIPTION
THE BIOLOGY EXPERIMENT WAS DESIGNED TO SEARCH FOR THE PRESENCE OF MARTIAN ORGANISMS BY LOOKING FOR PRODUCTS OF THEIR METABOLISM. THREE DISTINCT INSTRUMENTS -- (1) PYROLYTIC RELEASE (PR), (2) LABELED RELEASE (LR), AND (3) GAS EXCHANGE (GEX) -- INCUBATED SAMPLES OF THE MARTIAN SURFACE UNDER A NUMBER OF DIFFERENT ENVIRONMENTAL CONDITIONS. SOIL SAMPLES ACQUIRED BY THE SURFACE SAMPLER WERE DELIVERED TO THE VIKING BIOLOGY INSTRUMENT (VBI). THESE SAMPLES WERE THEN DISTRIBUTED, IN MEASURED AMOUNTS, TO THE THREE INSTRUMENTS FOR INCUBATION AND PROCESSING. THE VBI MAINTAINED INCUBATION TEMPERATURES BETWEEN 8 AND 17 DEG C. AFTER AN EXPERIMENT, THE SAMPLE WAS STERILIZED AND REPROCESSED AS A CONTROL. THE PR CONTAINED THREE INCUBATION CHAMBERS EACH OF WHICH MEASURED ONE SAMPLE FOR PHOTOSYNTHETIC OR CHEMICAL FIXATION OF CO2 OR CO CONTAINING C-14. LABELED CO2/CO MIXTURE WAS ADDED AND A XENON ARC LAMP SIMULATING THE SUN'S ENERGY WAS TURNED ON FOR A 5-D INCUBATION. THE SAMPLE WAS THEN HEATED TO 120 DEG C TO REMOVE RESIDUAL INCUBATION GASES. AT ANOTHER 'STATION,' THE SAMPLE WAS HEATED TO 625 DEG C WHILE PURGING IT WITH HELIUM. THE PURGED GASES PASSED THROUGH AN ORGANIC VAPOR TRAP (OVT), WHICH RETAINED ORGANIC COMPOUNDS AND FRAGMENTS WHILE PASSING THE CO2 AND CO. A RADIOACTIVITY DETECTOR THEN DETECTED 'PEAKS' CONSISTING OF UNREACTED CO2/CO. THE SAMPLE WAS THEN HEATED AND PURGED WITH HELIUM TO VERIFY THAT THE LEVEL WAS DOWN TO PRE-PYROLYSIS BACKGROUND COUNT. THE TRAPPED ORGANIC MATERIALS IN THE OVT WERE THEN HEATED TO 700 DEG C OXIDIZING THEM TO CO2, WHICH WAS THEN COUNTED TO DETECT ABSORPTION OF THE LABELED CARBON. THE

LR INCUBATED A SAMPLE WITH RADIOACTIVELY LABELED NUTRIENTS. THE ATMOSPHERE ABOVE THE SAMPLE WAS CONTINUOUSLY MONITORED FOR 12 DAYS. THE DETECTION OF RADIOACTIVE CO2 PRODUCED A METABOLIC CURVE AS A FUNCTION OF TIME, THE SHAPE OF WHICH WAS USED TO DETERMINE IF GROWTH TOOK PLACE. THE GEX MEASURED THE PRODUCTION OR UPTAKE OF CO2, NITROGEN, CH4, HYDROGEN, AND OXYGEN DURING INCUBATION OF A SOIL SAMPLE. THE SAMPLE WAS SEALED AND PURGED BY HELIUM, THEN A MIXTURE OF HELIUM, KRYPTON, AND CO2 WAS INTRODUCED AS AN INITIAL INCUBATION ATMOSPHERE. AFTER THE ADDITION OF A SELECTED QUANTITY OF A NUTRIENT SOLUTION THE SAMPLE WAS INCUBATED FOR 12 DAYS. SAMPLES OF THE ATMOSPHERE WERE REMOVED AND ANALYZED BY A GAS CHROMATOGRAPH WITH A THERMAL CONDUCTIVITY DETECTOR.

------- VIKING 2 LANDER, MICHAEL, JR.----------

INVESTIGATION NAME- RADIO SCIENCE

NSSDC ID- 75-083C-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
IONOSPHERES AND RADIO PHYSICS
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.	BRENKLE	NASA-JPL
TM - R.H.	TOLSON	NASA-LARC
TM - C.T.	STELZRIED	NASA-JPL

BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED THE LANDER-TO-EARTH AND ORBITER-TO-EARTH S-BAND COMMUNICATIONS LINK (INCLUDING RANGE AND RANGE-RATE CAPABILITIES), THE LANDER-TO-ORBITER UHF RELAY LINK, AND THE ORBITER-TO-EARTH X-BAND DOWNLINK. THE RESULTING DATA WAS USED TO DETERMINE THE MARTIAN GRAVITATIONAL FIELD, AXIS OF ROTATION, EPHEMERIS, FIGURE, ATMOSPHERE, STRUCTURE, IONOSPHERE, AND SURFACE PROPERTIES. IN ADDITION, THE DATA WERE USED TO DETERMINE THE LANDER LOCATION, TO STUDY RELATIVITY, TO STUDY THE INTERPLANETARY MEDIUM, AND, IF CONDITIONS PERMITED, TO STUDY THE SOLAR CORONA.

------- VIKING 2 LANDER, MUTCH----------

INVESTIGATION NAME- FACSIMILE CAMERA

NSSDC ID- 75-083C-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.O.	HUCK	NASA-LARC
TM - E.C.	LEVINTHAL	STANFORD U
TM - S.	LIEBES, JR.	STANFORD U

BRIEF DESCRIPTION
THE PURPOSE OF THE IMAGING INVESTIGATION FROM THE LANDER WAS TO CHARACTERIZE VISUALLY THE LANDING SITE, PROVIDING DATA WITH BIOLOGICAL, GEOLOGICAL, AND METEROLOGICAL RELEVANCE. TWO CAMERAS WITH A 0.04-DEG SCANNING RESOLUTION WERE REQUIRED. THE VERTICAL FIELD OF VIEW FOR EACH CAMERA WAS 20 DEG, WITH A CAPABILITY OF OBTAINING A COMPLETE 0- TO 360-DEG HORIZONTAL PANORAMA. VERTICAL POINTING BY COMMAND FOR ANGULAR COVERAGE FROM 40 DEG ABOVE TO 60 DEG BELOW THE HORIZONTAL PLANE OF THE LANDER IN 10-DEG INCREMENTS WAS REQUIRED. AZIMUTH POINTING BY COMMAND WAS IN 2.5-DEG INCREMENTS. THE CAMERAS WERE MOUNTED AT LEAST 1.3 M ABOVE THE MARTIAN SURFACE AND WERE CAPABLE OF VIEWING TWO FOOTPADS AND AT LEAST 90 PERCENT OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. EACH CAMERA WAS CAPABLE OF OBTAINING VISUAL COLOR IMAGERY. PROVISION WAS MADE TO OPERATE IN IR SPECTRAL BANDS BETWEEN 0.8 AND 1.1 MICROMETERS. HORIZONTAL STEREO WITH A MINIMUM BASE OF 0.8 M WAS REQUIRED.

------- VIKING 2 LANDER, NIER----------

INVESTIGATION NAME- ENTRY-ATMOSPHERIC STRUCTURE

NSSDC ID- 75-083C-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

TL - A.O.C.	NIER	U OF MINNESOTA
TM - M.B.	MCELROY	HARVARD U
TM - W.B.	HANSON	U OF TEXAS, DALLAS
TM - N.W.	SPENCER	NASA-GSFC
TM - A.	SEIFF	NASA-ARC

BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE PRESSURE, TEMPERATURE, AND DENSITY VARIATIONS AT DIFFERENT ALTITUDES IN THE LOWER MARTIAN ATMOSPHERE THROUGH MEASUREMENT OF ACCELERATION, PRESSURE, AND TEMPERATURE. THE ACCELEROMETER OF THE GUIDANCE AND CONTROL SYSTEM WERE USED FOR THE ATMOSPHERIC STRUCTURE INVESTIGATION.

------- VIKING 2 LANDER, NIER----------

INVESTIGATION NAME- ENTRY-ATMOSPHERIC COMPOSITION

NSSDC ID- 75-083C-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
PLANETARY ATMOSPHERES

PERSONNEL

TL - A.O.C.	NIER	U OF MINNESOTA
TM - N.W.	SPENCER	NASA-GSFC
TM - M.B.	MCELROY	HARVARD U
TM - W.B.	HANSON	U OF TEXAS, DALLAS
TM - A.	SEIFF	NASA-ARC

BRIEF DESCRIPTION
THE VIKING ENTRY-ATMOSPHERIC COMPOSITION EXPERIMENT WAS DESIGNED TO PROVIDE THE COMPOSITION DATA (FOR BOTH NEUTRAL AND CHARGED SPECIES) NEEDED TO DEFINE THE PRESENT PHYSICAL AND CHEMICAL STATE OF THE MARTIAN ATMOSPHERE. MOUNTED IN AN OPENING IN THE AEROSHELL WITH ITS ELECTRON-IMPACT OPEN ION SOURCE RECESSED BELOW THE SURFACE OF THE AEROSHELL, A DOUBLE-FOCUSING (ELECTROSTATIC AND MAGNETIC) MASS SPECTROMETER WAS USED TO MEASURE THE CONCENTRATIONS OF THE ATMOSPHERIC SPECIES THAT HAVE MASS-TO-CHARGE RATIOS FROM 1 TO 49. TWO COLLECTORS WERE USED -- ONE COVERING THE MASS RANGE FROM 1 TO 7 U AND THE OTHER SIMULTANEOUSLY COVERING THE RANGE FROM 7 TO 49 U. MASS SPECTRA WERE OBTAINED BY SWEEPING THE ION ACCELERATION VOLTAGE AND THE DEFLECTION VOLTAGE ACROSS THE ELECTROSTATIC PLATES. THE SWEEP PERIOD WAS APPROXIMATELY FIVE S, AND A DYNAMIC RANGE OF 1.E5 WAS PROVIDED WITHIN EACH SPECTRUM. A RETARDING POTENTIAL ANALYZER (RPA) MEASURED THE IONOSPHERIC PROPERTIES OVER APPROXIMATELY THE SAME ALTITUDE RANGE AS THE MASS SPECTROMETER. ITS FRONT END MATED TO THE AEROSHELL SO THAT THE ENTRANCE GRID WAS NEARLY FLUSH TO THE SURFACE, WHICH WAS MADE CONDUCTING IN THE REGION OF THE RPA TO PROVIDE A GROUND PLANE. THE SPACE BETWEEN THE ENTRANCE AND COLLECTOR WAS ELECTRICALLY SEGMENTED BY FIVE GRIDS WHOSE POTENTIALS DETERMINED THE ENERGY AND SIGN OF THE CHARGED PARTICLES THAT CAN REACH THE COLLECTOR. THREE DIFFERENT LINEAR VOLTAGE RAMPS WERE APPLIED IN SUCCESSION TO THE RETARDING GRID. ONE RAMP COVERED THE VOLTAGE RANGE FROM -75 TO 0 V (IN ABOUT 1 S) AND MEASURED SOLAR WIND ELECTRONS AND IONOSPHERIC PHOTOELECTRONS. ANOTHER COVERED FROM -1.5 TO 0 V (IN ABOUT 1 S), AND MEASURED ELECTRON TEMPERATURES IN THE IONOSPHERE. THE LAST RAMP COVERED FROM +15 TO 0 V (IN ABOUT 2 S), AND PROVIDED ION TEMPERATURES AND ION CONCENTRATION DATA. MORE EXPERIMENT DETAIL CAN BE FOUND IN 'ENTRY SCIENCE EXPERIMENT FOR VIKING 1975,' A. O. C. NIER, ET AL, ICARUS, 16, 74, 1972.

------- VIKING 2 LANDER, SHORTHILL----------

INVESTIGATION NAME- PHYSICAL PROPERTIES INVESTIGATION

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 EXPERIMENT 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 GAGES, WERE ADDED FOR THIS EXPERIMENT.

------- VIKING 2 LANDER, TOULMIN, 3RD----------

INVESTIGATION NAME- X-RAY FLUORESCENCE SPECTROMETER

NSSDC ID- 75-083C-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 IN WHICH FOUR SEALED, GAS-FILLED PROPORTIONAL COUNTERS DETECTED X RAYS EMITTED FROM SAMPLES OF THE 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 WITH ACCURACIES RANGING FROM A FEW TENS OF PARTS PER MILLION FOR TRACE ELEMENTS TO A FEW PERCENT FOR MAJOR ELEMENTS, DEPENDING UPON THE ELEMENT IN QUESTION.

********** VIKING 2 ORBITER**********

SPACECRAFT COMMON NAME- VIKING 2 ORBITER
ALTERNATE NAMES- PL-733A, VIKNG-A
VIKING-A ORBITER

NSSDC ID- 75-083A

LAUNCH DATE- 09/09/75 WEIGHT- 1092. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

ORBIT PARAMETERS
ORBIT TYPE- MARSCENTRIC
ORBIT PERIOD- 1476. MIN
PERIAPSIS- 1500. KM
EPOCH DATE- 08/07/76
INCLINATION- 55. DEG
APOAPSIS- 35000. KM

PERSONNEL

MG - W.	JAKOBOWSKI	NASA HEADQUARTERS
SC - L.G.	GOFF	NASA HEADQUARTERS
PM - G.C.	BROOME	NASA-LARC
PS - G.A.	SOFFEN	NASA-LARC

BRIEF DESCRIPTION
THE VIKING SPACECRAFT CONSISTED OF AN ORBITER AND A LANDER. A LANDER SEPARATED FROM THE ORBITER, ENTERED THE MARTIAN ATMOSPHERE, AND SOFT-LANDED ON THE SURFACE ON SEPTEMBER 3, 1976. ORBITAL, ENTRY, AND SCIENTIFIC DATA FROM THE LANDER WAS COLLECTED AND TRANSMITTED TO EARTH. THE SPACECRAFT 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 AND A 70-W CAPACITY FOR THE LANDER. SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS WEIGHED APPROXIMATELY 72 KG (158 LB).

------- VIKING 2 ORBITER, CARR----------

INVESTIGATION NAME- ORBITER IMAGING

NSSDC ID- 75-083A-01

INVESTIGATIVE PROGRAM
CODE SL

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

BRIEF DESCRIPTION
THE PURPOSES OF THE VIKING ORBITER TV IMAGING EXPERIMENT INVESTIGATION WWERE TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS AND FUTURE MISSIONS, TO MONITOR THE REGION SURROUNDING THE LANDER, AND TO STUDY THE GEOLOGIC AND DYNAMIC CHARACTERISTICS OF MARS. THE GEOMETRIC RESOLUTION OF THE ORBITING IMAGING SYSTEM WAS 40 M PER LINE AT A REFERENCE ALTITUDE OF 1500 KM, WITH IMAGE SMEARING FROM ORBITER MOTION LESS THAN 50 PERCENT OF THIS RESOLUTION. THE DYNAMIC RANGE WAS 80 TO 1, AND THE SENSITIVITY WAS SUFFICIENT TO OBTAIN PICTURES AS CLOSE TO THE TERMINATOR AS 30 DEG WITH OPTIMUM IMAGE QUALITY AND AS CLOSE AS 5 DEG TO THE TERMINATOR WITH DEGRADED IMAGE QUALITY. PRIOR TO LANDER SEPARATION THE ORBITER WAS REQUIRED TO PHOTOGRAPH WITH CONTIGUOUS PICTURES A SWATH AT LEAST 40-KM CROSS-TRACK BY 500-KM DOWN-TRACK ON A SINGLE ORBITAL PASS FROM THE NEAR-APOAPSIS PORTION OF THE ORBIT. AFTER LANDER SEPARATION COMPLETE COVERAGE WITH CONTIGUOUS PICTURES OF AN AREA AT LEAST 50 KM IN RADIUS CENTERED ON THE LANDER WAS OBTAINED.

------- VIKING 2 ORBITER, FARMER----------

INVESTIGATION NAME- IR SPECTROMETER -- WATER VAPOR MAPPING

NSSDC ID- 75-083A-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

BRIEF DESCRIPTION
THE OBJECTIVES OF THE IR SPECTROMETRY EXPERIMENT WERE TO DETERMINE THE SPATIAL AND TEMPORAL DISTRIBUTION OF WATER VAPOR, TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS, AND (FOR FUTURE MISSIONS) TO MONITOR THE REGION SURROUNDING THE LANDER AND STUDY THE DYNAMIC CHARACTERISTICS OF MARS. THE IR SPECTROMETER WAS BORESIGHTED WITH THE IMAGING SYSTEM. IT WAS OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. THE WATER VAPOR MEASUREMENT RANGE WAS FROM 1 TO 1000 MICROMETERS OF PRECIPITABLE WATER WITH AN ACCURACY OF 1 MICROMETER BETWEEN 1 AND 20 MICROMETERS AND 5 PERCENT BETWEEN 20 AND 1000 MICROMETERS. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT IS 2 BY 16 MILLIRADIANS.

------- VIKING 2 ORBITER, KIEFFER----------

INVESTIGATION NAME- IR RADIOMETRY -- THERMAL MAPPING

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 THERMAL MAPPING EXPERIMENT WAS TO OBTAIN TEMPERATURES OF AREAS ON THE SURFACE AND OF THE ATMOSPHERE OF MARS WITH AN INFRARED THERMAL MAPPER (IRTM) INSTRUMENT. IT ALSO MEASURED THE AMOUNT OF SUNLIGHT REFLECTED BY THE PLANET. THE IRTM WAS A MULTI-CHANNEL RADIOMETER MOUNTED ON THE ORBITER'S SCAN PLATFORM. FOUR SMALL TELESCOPES, EACH WITH SEVEN SENSITIVE INFRARED DETECTORS, WERE AIMED PARALLEL TO THE VISUAL IMAGING OPTICAL AXIS. THE INSTRUMENT WAS CAPABLE OF MEASURING DIFFERENCES OF 1 DEG C THROUGHOUT AN EXPECTED TEMPERATURE RANGE OF MINUS 130 DEG C TO PLUS 57 DEG C. THE INSTRUMENT WAS 20 X 25 X 30 CM AND HAD A MINIMUM SPATIAL RESOLUTION OF 8 KM ON THE SURFACE.

********** VOYAGER 1**********

SPACECRAFT COMMON NAME- VOYAGER 1
ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A, MJS 77A

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 - J.R.	CASANI	NASA HEADQUARTERS
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	MPI-AERONOMY
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 O 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

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-LPSP
OI -	J.L.	BERTAUX	CNES

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	STANFORD U
TM -	G.L.	TYLER	STANFORD U
TM -	G.	FJELDBO	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 IONSPHERES 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.	PIRRAGLIA	NASA-GSFC
OI -	R.E.	SAMUELSON	NASA-GSFC
OI -	T.E.	BURKE	NASA-JPL
OI -	P.	GIERASH	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 CH2 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

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 TELEPHONE LAB
OI -	T.P.	ARMSTRONG	U OF KANSAS
OI -	W.I.	AXFORD	MPI-AERONOMY
OI -	C.O.	BOSTROM	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 0.05 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.W.	HANSEN	U OF ARIZONA
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 PHOTOMULTIPLER 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 -	N.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 PHOTOGRAPHY

NSSDC ID- 77-084A-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL

PI -	B.A.	SMITH	NEW MEXICO STATE U
OI -	G.A.	BRIGGS	NASA-JPL
OI -	A.F.	COOK	SMITHSONIAN INST
OI -	G.	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 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 OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULATION - 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

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	MEUDON OBS
OI - C.C.	HARVEY	PARIS OBSERVATORY
OI - Y.	LEBLANC	MEUDON OBS
OI - W.E.	BROWN, JR.	NASA-JPL
OI - S.	GULKIS	NASA-JPL
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. 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 77B, MJS 77B

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 - J.R.	CASANI	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 MAGNETTOMETERS, 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

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 1.8 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

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.L.	BROADFOOT	KITT PEAK NATL OBS
OI - A.	DALGARNO	HARVARD U
OI - J.C.	MCCONNELL	HARVARD U
OI - R.M.	GOODY	HARVARD U
OI - T.M.	DONAHUE	U OF MICHIGAN
OI - M.B.	MCELROY	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-LPSP
OI - J.L.	BERTAUX	CNES

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 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 A) OR HELIUM (584 A). 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 SL

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
CELESTIAL MECHANICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL

TL - V.R.	ESHLEMAN	STANFORD U
TM - G.	FJELDBO	NASA-JPL
TM - G.S.	LEVY	NASA-JPL
TM - T.A.	CROFT	STANFORD U
TM - G.L.	TYLER	STANFORD U
TM - J.D.	ANDERSON	NASA-JPL

BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM USES THE TELECOMUNICATIONS 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 SL

INVESTIGATION 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.	GIERASH	CORNELL U
OI - J.	PIRRAGLIA	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 CH2 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 2, KRIMIGIS----------

INVESTIGATION NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- 77-076A-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION 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.	LANZEROTTI	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 A

NSSDC ID- 77-076A-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.W.	HANSEN	U OF ARIZONA
OI - D.L.	COFFEEN	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-A SPECTRAL REGION, THEN ON TO A PHOTOMULTIPLER 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

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
CI - F.M.	NEUBAUER	BRAUNSCHWEIG TECH U
OI - K.W.	BEHANNON	NASA-GSFC
OI - L.F.	BURLAGA	NASA-GSFC
OI - M.H.	ACUNA	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	NEW MEXICO STATE U
OI - G.A.	BRIGGS	NASA-JPL
OI - A.F.	COOK	SMITHSONIAN INST
OI - G.	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 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 VISABLE 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) OCCULATION - 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 I"ST 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

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		MEUDON OBS
OI - D.H. STAELIN		MASS INST OF TECH
OI - A. BOISCHOT		MEUDON OBS
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 NONTHERMAL 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, 1977, 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. 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.

3.1 Contents of Spacecraft Entries

The heading for each spacecraft description in this section includes a set of initial or 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 and flyby 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), technical director (TD), and program director (PD). 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.

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.

********** ASTRO-A**********

SPACECRAFT COMMON NAME- ASTRO-A
ALTERNATE NAMES-

NSSDC ID- ASTRO-A

LAUNCH DATE- 04/00/81 WEIGHT- 120. 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 APOAPSIS- 600. KM

PERSONNEL
PM - Y. TANAKA U OF TOKYO
PS - I. SUEMOTO U OF TOKYO

BRIEF DESCRIPTION
THE MISSION OF ASTRO-A IS TO MAKE OBSERVATIONS OF SOLAR-FLARE RADIATIONS DURING THE NEXT SOLAR MAXIMUM PERIOD.

------- 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

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

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-03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - M. MATSUOKA 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

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

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, TAKECUHI-------

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. TAKECUHI INST PHYS + CHEM RES

BRIEF DESCRIPTION
THIS EXPERIMENT USES A PARTICLE DETECTOR TO MONITOR SOLAR ELECTRON FLUX ABOVE 100 KEV.

********** EXOS-A**********

SPACECRAFT COMMON NAME- EXOS-A
ALTERNATE NAMES- EXOSPHERIC SAT. A

NSSDC ID- EXOS-A

LAUNCH DATE- 01/00/78 WEIGHT- 95. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3H

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 137. MIN INCLINATION- 65. DEG
PERIAPSIS- 350. KM APOAPSIS- 4500. KM

PERSONNEL
PM - K. HIRAO U OF TOKYO

BRIEF DESCRIPTION
THIS SATELLITE IS PART OF JAPAN'S CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE OBJECTIVES ARE TO STUDY THE POLAR AURORA AND IONOSPHERE. THE PAYLOAD CONSISTS OF AN AURORAL EUV TELEVISION CAMERA AND PLASMA PROBES DESIGNED TO STUDY THE ELECTRON AND ION DENSITY/TEMPERATURE AND ION COMPOSITION. THERE ARE ALSO ENERGETIC PARTICLE DETECTORS DESIGNED TO STUDY THE FLUX OF ELECTRONS IN THE IONOSPHERE. ELECTROSTATIC WAVES, VLF EMISSIONS, GEOCORONA EMISSIONS, AND UV ALBEDO EMISSIONS ARE ALSO OBSERVED.

------- EXOS-A, KANEDA-------

INVESTIGATION NAME- UV AURORAL TV IMAGING

NSSDC ID- EXOS-A -03 INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - E. KANEDA U OF TOKYO
OI - N. NIWA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVES UV AURORAL EMISSIONS OF THE POLAR IONOSPHERE BY USING TELEVISION.

------- EXOS-A, MUKAI----------

INVESTIGATION NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- EXOS-A -02
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - T. MUKAI U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO MEASURE THE FLUX OF ELECTRONS AND PROTONS IN THE MAGNETOSPHERE, USING ENERGETIC PARTICLE DETECTORS, ESPECIALLY IN THE POLAR REGIONS.

------- EXOS-A, NAKAMURA----------

INVESTIGATION NAME- UV GLOW SPECTROPHOTOMETER

NSSDC ID- EXOS-A -05
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY
PLANETARY ATMOSPHERES

PERSONNEL
PI - M. NAKAMURA U OF TOKYO
OI - T. TOHMATSU U OF TOKYO

BRIEF DESCRIPTION
ULTRAVIOLET GLOW FROM THE THERMOSPHERE, MAGNETOSPHERE, AND INTERPLANETARY SPACE ARE OBSERVED WITH A SPECTROPHOTOMETER.

------- EXOS-A, OYAMA----------

INVESTIGATION NAME- IONOSPHERIC PROBES

NSSDC ID- EXOS-A -01
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - K. OYAMA U OF TOKYO
OI - I. IWAMOTO RADIO RESEARCH LAB

BRIEF DESCRIPTION
IONOSPHERIC PROBES OBSERVE ELECTRON DENSITY AND TEMPERATURE IN ADDITION TO ION DENSITY, COMPOSITION, AND TEMPERATURE.

------- EXOS-A, YOSHINO----------

INVESTIGATION NAME- PLASMA WAVE DETECTOR

NSSDC ID- EXOS-A -04
INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - T. YOSHINO U OF ELECTRO-COMMUN
OI - Y. NAKAMURA U OF TOKYO

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO MEASURE ELECTROSTATIC WAVES AND VLF EMISSIONS EXCITED IN THE POLAR REGIONS.

********** EXOS-B**********

SPACECRAFT COMMON NAME- EXOS-B
ALTERNATE NAMES- EXOSPHERIC SAT. B

NSSDC ID- EXOS-B

LAUNCH DATE- 01/00/79 WEIGHT- 85. KG
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-3S

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 517. MIN INCLINATION- 30. DEG
PERIAPSIS- 300. KM APOAPSIS- 30000. KM

PERSONNEL
PM - T. OBAYASHI U OF TOKYO
PS - N. KAWASHIMA U OF TOKYO
PS - H. OYA U OF TOHOKU

BRIEF DESCRIPTION
THIS SATELLITE IS PART OF THE JAPANESE CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE SATELLITE STUDIES THE PLASMASPHERE UP TO GEOCENTRIC DISTANCES OF 30,000 KM. ITS PLASMA EXPERIMENTS STUDY THE ELECTRON/ION DENSITY AND WAVE PARTICLE INTERACTIONS. THE SPACECRAFT CARRIES ENERGETIC PARTICLE DETECTORS TO STUDY THE ELECTRON AND PROTON FLUX IN THE ENERGY RANGE 50 TO 20,000 EV. IT ALSO CARRIES ELECTROMAGNETIC FIELD FLUCTUATION DETECTORS.

------- EXOS-B, AOYAMA----------

INVESTIGATION NAME- FLUXGATE MAGNETOMETER

NSSDC ID- EXOS-B -05
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 SPEC.OF ELEC.-PROT.(.05-20KEV)

NSSDC ID- EXOS-B -06
INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

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
THE ELECTRON AND PROTON ENERGY SPECTRUM IS MEASURED IN AN ENERGY RANGE FROM 50 EV TO 20 KEV. THE RESOLUTION IS CONTROLLABLE. THE FINE STRUCTURE OF TIME VARIATION OF THE ENERGY SPECTRUM IS DETECTED AS A COOPERATING OPERATION WITH THE SIMULATED PLASMA-WAVE EXPERIMENT.

------- EXOS-B, KAWASHIMA----------

INVESTIGATION NAME- WAVE-PARTICLE INTERACTIONS

NSSDC ID- EXOS-B -07
INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - N. KAWASHIMA U OF TOKYO
OI - M. EJIRI U OF TOKYO

BRIEF DESCRIPTION
EJECTION OF THE ELECTRON BEAM IN AN ENERGY RANGE FROM 3 TO 200 EV INTO THE SPACE PLASMA IS DESIGNED FOR THE CONTROLLED GENERATION OF THE WAVE-PARTICLE INTERACTION.

------- EXOS-B, KIMURA----------

INVESTIGATION NAME- ELECTROMAGNETIC FIELD FLUCTUATION DETECTORS

NSSDC ID- EXOS-B -03
INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - I. KIMURA KYOTO U
OI - K. HASHIMOTO KYOTO U

BRIEF DESCRIPTION
THE PHASE SHIFT OF THE VLF WAVES TRANSMITTED FROM THE EARTH'S STATIONS IS DETECTED FOR MEASUREMENT OF THE PLASMA DENSITY AND TEMPERATURE. DUCT FORMATION AND MOVEMENT IN THE PLASMASPHERE IS ALSO MONITORED BY THIS EXPERIMENT.

------- EXOS-B, OBAYASHI----------

INVESTIGATION NAME- IMPEDANCE AND ELECTRIC FIELD

NSSDC ID- EXOS-B -04

INVESTIGATIVE PROGRAM
BIOSCIENCE

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.	TSURUDA	U OF TOKYO
OI - T.	OGAWA -	KYOTO U

BRIEF DESCRIPTION
IMPEDANCE OF A DIPOLE ANTENNA IS MEASURED IN A WIDE FREQUENCY RANGE FROM 3 KHZ TO 10 MHZ TO OBTAIN AN ACCURATE DETERMINATION OF PLASMA DENSITY. THE ELECTRIC FIELD IS MEASURED BY A LONG DIPOLE ANTENNA (120 M TIP TO TIP) IN A FREQUENCY RANGE FROM DC TO 200 HZ.

------- EXOS-B, OYA----------

INVESTIGATION NAME- MAGNETOSPHERIC PLASMA PROBE

NSSDC ID- EXOS-B -01

INVESTIGATIVE PROGRAM
BIOSCIENCE

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	RRL,POSTS + TELECOMM

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
BIOSCIENCE

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	RRL,POSTS + TELECOMM

BRIEF DESCRIPTION
THE NATURAL PLASMA WAVES ARE MEASURED IN THREE FREQUENCY BANDS -- 3 TO 30 KHZ, 30 TO 300 KHZ, AND 300 KHZ TO 10 MHZ, RESPECTIVELY, USING A 120 M (TIP TO TIP) DIPOLE AND LOOP ANTENNAS. THIS SYSTEM IS ALSO USED FOR RADIO ASTRONOMICAL PURPOSES.

********** EXOS-C**********

SPACECRAFT COMMON NAME- EXOS-C
ALTERNATE NAMES- EXOSPHERIC SAT. C

NSSDC ID- EXOS-C

LAUNCH DATE- 01/00/78
LAUNCH SITE- KAGOSHIMA, JAPAN
LAUNCH VEHICLE- M-4S
WEIGHT- 100. KG

SPONSORING COUNTRY/AGENCY
JAPAN ISAS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN
PERIAPSIS- 500. KM
INCLINATION- DEG
APOAPSIS- 500. KM

PERSONNEL
PM - PROF. 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.

------- EXOS-C, UNKNOWN----------

INVESTIGATION NAME- X-RAY AND GAMMA-RAY ASTRONOMICAL TELESCOPES

NSSDC ID- EXOS-C -01

INVESTIGATIVE PROGRAM
BIOSCIENCE

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

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVES ASTRONOMICAL SOURCES WITH X-RAY AND GAMMA-RAY TELESCOPES.

------- EXOS-C, UNKNOWN----------

INVESTIGATION NAME- ULTRAVIOLET TELESCOPE

NSSDC ID- EXOS-C -02

INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE UV REGION OF THE SPECTRUM.

------- EXOS-C, UNKNOWN----------

INVESTIGATION NAME- INFRARED TELESCOPE

NSSDC ID- EXOS-C -03

INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT IS USED TO OBSERVE ASTRONOMICAL OBJECTS IN THE INFRARED REGION OF THE SPECTRUM.

------- EXOS-C, UNKNOWN----------

INVESTIGATION NAME- ENERGETIC PARTICLES

NSSDC ID- EXOS-C -04

INVESTIGATIVE PROGRAM
BIOSCIENCE

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT IS TO MEASURE ENERGETIC CHARGED PARTICLES OF BOTH SOLAR AND GALACTIC ORIGIN.

********** GOES-C**********

SPACECRAFT COMMON NAME- GOES-C
ALTERNATE NAMES-

NSSDC ID- GOES-C

LAUNCH DATE- 07/00/78
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA
WEIGHT- 294. KG

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN
INCLINATION- 1. DEG
PERIAPSIS- 35786. KM
APOAPSIS- 35786. KM

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

BRIEF DESCRIPTION
GOES-C 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 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 TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED ORBIT.

------- GOES-C, NESS STAFF----------

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

NSSDC ID- GOES-C -01
INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE VISIBLE INFRARED SPIN SCAN RADIOMETER (VISSR) FLOWN ON GOES-C 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-C, NESS STAFF----------

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-C -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 FORM 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 BETWEEN 350K AND 600K BITS, DEPENDING ON THE CODING TECHNIQUEES. 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-C, WILLIAMS----------

INVESTIGATION NAME- ENERGETIC PARTICLE MONITOR

NSSDC ID- GOES-C -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 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 0.5 MEV.

------- GOES-C, WILLIAMS----------

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-C -03
INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS NOAA-ERL

BRIEF DESCRIPTION
THE X-RAY COUNTER WAS COMPOSED OF A COLLIMATOR, TWO IONIZATION CHAMBERS, AND TWO ELECTROMETERS. A SMALL ANGULAR APERTURE WAS CHOSEN FOR THE TELESCOPE COLLIMATOR, WHICH WAS MOUNTED SO THAT THE DECLINATION OF ITS AXIS 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-C, WILLIAMS----------

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-C -04
INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS 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 (APPROXIMATELY 2 FT) 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), AN IN-FLIGHT CALIBRATION CAPABILITY.

********** GOES-D**********

SPACECRAFT COMMON NAME- GOES-D
ALTERNATE NAMES-

NSSDC ID- GOES-D

LAUNCH DATE- 03/01/79 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 1. DEG
PERIAPSIS- 35786. KM APOAPSIS- 35786. KM

PERSONNEL
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 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-D, NESS STAFF----------

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

NSSDC ID- GOES-D -01 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

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 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-D, NESS STAFF----------

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-D -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 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 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

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE RANGE .GE. 500 KEV.

-------- GOES-D, WILLIAMS----------

INVESTIGATION NAME- SOLAR X-RAY MONITOR

NSSDC ID- GOES-D -03 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS 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

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- 06/01/79 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1436. MIN INCLINATION- 1. DEG
PERIAPSIS- 35786. KM APOAPSIS- 35786. KM

PERSONNEL
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) (O 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 ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

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 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-E, NESS STAFF----------

INVESTIGATION NAME- METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM

NSSDC ID- GOES-E -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 10,000 DCP STATINS 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 TECHNIQUEES. 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

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .GE. 500 KEV RANGE.

------- GOES-E, WILLIAMS----------

INVESTIGATION NAME- SOLAR X-RAY MONITER

NSSDC ID- GOES-E -03
INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING
INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL
PI - D.J. WILLIAMS 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

BRIEF DESCRIPTION
THE MAGNETOMETER WILL HAVE A RANGE OF PLUS OR MINUS 4?0 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- 07/00/80 WEIGHT- 660. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 1. DEG
PERIAPSIS- 35786. KM APOAPSIS- 35786. KM

PERSONNEL
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 ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

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 0.7; 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 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 10,000 DCP STATIONS CAN BE HANDLED BY THE SYSTEM. THE SYSTEM ALSO ALLOWS FOR THE RETRANSMISSION OF NARROW-BAND (WEFAX TYPE) DATA FROM CENTRALIZED WEATHER FACILITIES TO SMALL GROUND-BASED APT RECEIVING STATIONS. THIS COMMUNICATIONS SYSTEM OPERATES ON S-BAND FREQUENCIES. THE MINIMUM DATA COLLECTION SYSTEM FOR ONE SMALL METEOROLOGICAL SATELLITE CONSISTS OF APPROXIMATELY 3500 DCP STATIONS TO BE CONTACTED IN A 6-H PERIOD. THE TOTAL AMOUNT OF DATA COLLECTED DURING THE 6-H PERIOD 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.

------- 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

BRIEF DESCRIPTION
THE ENERGETIC PARTICLE MONITOR CONSISTS OF THREE DETECTOR ASSEMBLIES, EACH COVERING LIMITED REGIONS OF THE OVERALL ENERGY SPECTRUM. THE FIRST TWO DETECTOR ASSEMBLIES MONITOR PROTONS IN SEVEN ENERGY RANGES BETWEEN 0.8 AND 500 MEV, AND ALPHA PARTICLES IN SIX RANGES BETWEEN 4 AND .GT. 400 MEV. THERE IS ALSO ONE CHANNEL FOR THE MEASUREMENT OF ELECTRONS IN THE .GE. 500 KEV RANGE.

------- 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

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 ERGS PER SQ CM PER S WITH A DYNAMIC RANGE OF 1.E4.

------- GOES-F, WILLIAMS----------

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- GOES-F -04 INVESTIGATIVE PROGRAM
OPERATIONAL ENVIRON. MONITORING

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL
PI - D.J. WILLIAMS 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.

********** HCMM **********

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

NSSDC ID- AEM-A

LAUNCH DATE- 04/00/78 WEIGHT- 117. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-UA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.8 MIN INCLINATION- 97.8 DEG
PERIAPSIS- 620. KM APOAPSIS- 620. KM

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) SPACECRAFT 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 NODE WITH NOMINAL EQUATORIAL CROSSING TIME OF 2 PM, AND PROVIDES A ONE-THIRTY PM TO TWO-THIRTY AM CROSSING TIME OVER MIDDLE NORTHERN LATITUDES. THE ORBIT ALSO ALLOWS FOR REFLECTANCE MEASUREMENTS DURING DAYLIGHT PASSES.

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

INVESTIGATION NAME- HEAT CAPACITY MISSION RADIOMETER

NSSDC ID- AEM-A -01 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. IT IS PLANNED TO MAKE THE DATA GENERALLY 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-B **********

SPACECRAFT COMMON NAME- HEAO-B
ALTERNATE NAMES- HIGH ENERGY ASTRON OBS-B

NSSDC ID- HEAO-B

LAUNCH DATE- 06/15/78 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. THE TELESCOPE COLLECTS X-RAYS OVER AN ANGULAR RANGE OF APPROXIMATELY 1 DEG X 1 DEG WITH THE FOCAL PLANE INSTRUMENTS DETERMINING THE LIMITING RESOLUTION FOR EACH MEASUREMENT. THESE INSTRUMENTS ARE THE OTHER EXPERIMENTS LISTED AS THE PAYLOAD, NAMELY A SOLID-STATE X-RAY DETECTOR, A CURVED CRYSTAL BRAGG SPECTROMETER AND AN IMAGING PROPORTIONAL COUNTER. IN ADDITION, A MONITOR PROPORTIONAL COUNTER VIEWS THE SKY ALONG THE TELESCOPE AXIS. THE SCIENTIFIC OBJECTIVES ARE TO -- (1) ACCURATELY LOCATE AND EXAMINE X-RAY SOURCES IN THE ENERGY RANGE 0.2 TO 4.0 KEV WITH HIGH RESOLUTION; (2) PERFORM HIGH SPECTRAL SENSITIVITY MEASUREMENTS WITH BOTH HIGH- AND LOW-DISPERSION SPECTROGRAPHS; (3) PERFORM HIGH SENSITIVITY MEASUREMENTS OF TRANSIENT X-RAY BEHAVIOR. THE SAME TYPE OF SPACECRAFT USED FOR HEAO 1 IS EMPLOYED; I.E., A SIX-SIDED STRUCTURE 5.68-M HIGH AND 2.67-M IN DIAMETER. DOWNLINK TELEMETRY IS AT A DATA RATE OF 6.5 KB/S FOR REAL-TIME DATA AND 128 KB/S FOR EITHER OF TWO TAPE RECORDER SYSTEMS. AN ALTITUDE CONTROL AND DETERMINATION SUBSYSTEM IS USED TO POINT AND MANEUVER THE SPACECRAFT. GYROS, SUN SENSORS, AND STAR TRACKERS ARE EMPLOYED AS SENSING DEVICES.

------- HEAO-B, BOLDT-------

INVESTIGATION NAME- SOLID-STATE X-RAY DETECTOR

NSSDC ID- HEAO-B -05 INVESTIGATIVE PROGRAM
CODE SA

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. A LITHIUM-DRIFTED SOLID-STATE DETECTOR IS OPERATED AT A TEMPERATURE OF 120 K. THE PRIMARY DETECTOR IS 6 MM IN DIAMETER AND IS SURROUNDED BY TWO VETO GUARD COUNTERS. A TWO-STAGE SOLID CRYOGEN REFRIGERATOR IS USED TO COOL THE DETECTOR. SPECTRAL MEASUREMENTS ARE MADE BETWEEN 0.5 AND 4 KEV, WITH A RESOLUTION FROM 120 TO 150 EV, FWHM AND AN EFFICIENCY GREATER THAN 0.9.

------- HEAO-B, CLARK-------

INVESTIGATION NAME- A CURVED-CRYSTAL BRAGG X-RAY SPECTROMETER

NSSDC ID- HEAO-B -03 INVESTIGATIVE PROGRAM
CODE SA

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. THE INSTRUMENT IS A CURVED-CRYSTAL BRAGG SPECTROMETER USING SIX CRYSTALS. THE SELECTION OF SPECIFIC CRYSTALS IS MADE FROM AMONG PET, ADP, BERYL RAP, LEAD LAURATE, AND LEAD STEARATE. THE SPECTROGRAPH RESOLUTION DEPENDS ON THE FINAL SELECTION OF CRYSTALS. RAP AND ADP GIVE RESOLUTIONS IN LAMBDA/DELTA-LAMBDA OF GREATER THAN 2500. LEAD STEARATE AND LAURATE GIVE RESOLUTIONS OF APPROXIMATELY 100. THE X-RAY LINES ARE DETECTED BY A THIN-WINDOW POSITION-SENSITIVE PROPORTIONAL COUNTER.

------- HEAO-B, GIACCONI-------

INVESTIGATION NAME- MONITOR PROPORTIONAL COUNTER

NSSDC ID- HEAO-B -01 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI HARVARD COLLEGE OBS

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

------- HEAO-B, GIACCONI----------

INVESTIGATION NAME- HIGH-RESOLUTION IMAGER

NSSDC ID- HEAO-B -02 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - R. GIACCONI HARVARD COLLEGE OBS

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. THIS INSTRUMENT IS A LARGE GRAZING INCIDENCE X-RAY TELESCOPE THAT PROVIDES IMAGES OF SOURCES THAT ARE THEN ANALYZED BY THE OTHER INTERCHANGEABLE EXPERIMENTS AT THIS FOCAL PLANE OF THE TELESCOPE.

------- HEAO-B, GURSKY----------

INVESTIGATION NAME- IMAGING PROPORTIONAL COUNTER

NSSDC ID- HEAO-B -04 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - H. GURSKY HARVARD COLLEGE OBS

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- 07/15/79 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- 93.7 MIN INCLINATION- 45. DEG
PERIAPSIS- 480. KM APOAPSIS- 480. KM

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 COSMICRAY 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 = 50; (2) SEARCH FOR SUPER-HEAVY NUCLEI UP TO Z = 120, AND MEASURE THE COMPOSITION OF THE NUCLEI WITH Z .GT. 20; (3) STUDY INTENSITY, SPECTRUM, AND TIME BEHAVIOR OF X-RAY AND GAMMARAY 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 GAMMARAY 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 NUCLEII

NSSDC ID- HEAO-C -03 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - M.H. ISRAEL WASHINGTON U
PI - E.C. STONE CALIF INST OF TECH
PI - C.J. WADDINGTON U OF MINNESOTA
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 SA

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. METZGER 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 SA

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-PETERSEN 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 TIN (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.

********** HELOS**********

SPACECRAFT COMMON NAME- HELOS
ALTERNATE NAMES- HI.ECCEN LUN OCCULT.SAT., EXOSAT
EUROPEAN X-RAY OBS SAT.

NSSDC ID- HELOS

LAUNCH DATE- 12/00/80 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM APOAPSIS- KM

PERSONNEL
MG - NONE ASSIGNED
SC - NONE ASSIGNED
PM - UNKNOWN ESA-ESTEC
PS - UNKNOWN ESA-ESTEC

BRIEF DESCRIPTION
THE OBJECTIVES OF THIS MISSION ARE THE MEASUREMENT OF THE POSITION, STRUCTURAL FEATURES, SPECTRAL, AND TEMPORAL CHARACTERISTICS OF COSMIC X-RAY SOURCES. THE POSITION AND DIAMETER OF COSMIC X-RAY SOURCES ARE DETERMINED BY THE OBSERVATION OF THE TIME AND SPEED WITH WHICH THE SOURCES DISAPPEAR BEHIND THE MOON DURING LUNAR OCCULTATIONS. THE ABILITY TO CORRECT BOTH THE ORBIT AND THE ORIENTATION OF THE SPACECRAFT, COUPLED WITH THE HIGHLY ECCENTRIC ORBIT, ENABLES THE SPACECRAFT TO OBSERVE ANY PORTION OF THE SKY FOR LONG PERIODS OF TIME. TEMPORAL VARIATIONS ON SCALES RANGING FROM TENS OF MICROSECONDS TO TENS OF HOURS ARE OBSERVABLE, AS WELL AS ENERGY SPECTRUM OBSERVATIONS AND ABSOLUTE FLUX MEASUREMENTS OF OBJECTS WITH AN INTENSITY GREATER THAN 5.E-5 THAT OF THE CRAB NEBULA. BRIGHT SOURCES ARE LOCATABLE TO WITHIN ARC-S IN POSITION.

-------- HELOS, UNKNOWN----------

INVESTIGATION NAME- MEDIUM-ENERGY COSMIC X-RAY PACKAGE

NSSDC ID- HELOS -01 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVES COSMIC X-RAY SOURCES IN THE ENERGY RANGE OF 1.5 TO 20 KEV AND CONSISTS OF PROPORTIONAL COUNTERS LOCATED BEHIND MODIFIED HONEYCOMB COLLIMATORS.

-------- HELOS, UNKNOWN----------

INVESTIGATION NAME- LOW-ENERGY COSMIC X-RAY PACKAGE

NSSDC ID- HELOS -02 INVESTIGATIVE PROGRAM
SCIENCE

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVES COSMIC X-RAY SOURCES IN THE 0.1- TO 2-KEV RANGE AND UTILIZES THIN-WINDOW, POSITION-SENSITIVE, PROPORTIONAL COUNTERS LOCATED BEHIND GRAZING-INCIDENCE MIRRORS.

********** IONOSONDE-IK**********

SPACECRAFT COMMON NAME- IONOSONDE-IK
ALTERNATE NAMES-

NSSDC ID- IONO-IK

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- 150. MIN INCLINATION- 75. DEG
PERIAPSIS- 350. KM APOAPSIS- 1700. KM

PERSONNEL
PS - V.V. MIGULIN IZMIRAN

BRIEF DESCRIPTION
DURING INTERNATIONAL MAGNETOSPHERE STUDY PERIOD AN INTERCOSMOS SPACECRAFT, IONOSONDE-IK WILL BE LAUNCHED INTO A HIGH INCLINATION ELLIPTICAL ORBIT WITH A LOW APOGEE. THE MAIN SCIENTIFIC OBJECTIVES OF IONOSONDE-IK 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 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.

********** 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- 950. 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. DEG
PERIAPSIS- 900. KM APOAPSIS- 900. KM

PERSONNEL
MG - L. DONDEY NASA HEADQUARTERS
SC - N. BOGGESS NASA HEADQUARTERS
PM - E. K. CASANI JPL
PS - H. H. AUMANN JPL

BRIEF DESCRIPTION
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 6-METER RITCHEY-CHRETIEN TELESCOPE COOLED BY HELIUM TO A TEMPERATURE OF NEAR 10 K. AN ARRAY OF ABOUT 100 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. FOR JOINT IRAS SCIENCE WORKING GROUP MEMBERS, SEE APPENDIX B2.

********** ISEE-A**********

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

NSSDC ID- MOTHER

LAUNCH DATE- 10/13/77 WEIGHT- 340.2 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3522. MIN INCLINATION- 28.8 DEG
PERIAPSIS- 280. KM APOAPSIS- 140344. KM

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.

------- ISEE-A, ANDERSON----------

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- MOTHER -10

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - K.A. ANDERSON		U OF CALIF, BERKELEY
OI - C.I. MENG		U OF CALIF, BERKELEY
OI - F.V. CORONITI		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 FROM 12 TO 200 KEV, AND PROTONS ARE MEASURED AT 2 AND 6 KEV AND FROM 20 TO 380 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. THESE ANALYZERS ARE USED TO MEASURE ELECTRONS AND PROTONS SEPARATELY AT 2 AND 6 KEV.

------- ISEE-A, BAME----------

INVESTIGATION NAME- 50-EV TO 40-KEV PROTON AND 5-EV TO 20-KEV ELECTRON PLASMA PROBE

NSSDC ID- MOTHER -01

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - S.J. BAME		LOS ALAMOS SCI LAB
OI - H. MIGGENRIEDER		MPI-EXTRATERR PHYS
OI - K. SCHINDLER		RUHR-U BOCHUM
OI - J.R. ASBRIDGE		LOS ALAMOS SCI LAB
OI - H.R. ROSENBAUER		MPI-EXTRATERR PHYS
OI - H. VOLK		MPI-EXTRATERR 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 40 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-A, FRANK----------

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- MOTHER -03

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - L.A. FRANK		U OF IOWA
OI - V.M. VASYLIUNAS		MASS INST OF TECH
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 50 KEV ARE MEASURED IN 63 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION (DELTA E/E) OF 0.17. 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 THE MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR-PI STER SOLID ANGLE FOR PARTICLE VELOCITY VECTORS ARE COVERED.

------- ISEE-A, GURNETT----------

INVESTIGATION NAME- 10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD TRIAXIAL PROBES

NSSDC ID- MOTHER -07

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

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

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE ISEE-B SPACECRAFT, IS DESIGNED TO MEASURE WAVE PHENOMENA OCCURRING WITHIN THE MAGNETOSPHERE AND SOLAR WIND. TRIAXIAL SEARCH COILS WITH HIGH-PERMEABILITY CORES AND TRIAXIAL ELECTRIC DIPOLES ARE USED. THE SEARCH COILS HAVE A FREQUENCY RESPONSE OF 10 HZ TO 10 KHZ. THE TIME REQUIRED FOR ONE 16-CHANNEL TRIAXIAL SPECTRUM ANALYSIS IS 100 MS. BROADBAND DATA ARE ALSO AVAILABLE WITH A 10-KHZ BANDWIDTH ABOUT EVERY 1 MS. ELECTRIC FIELDS ARE MEASURED BY TWO ORTHOGONAL 123-M TIP-TO-TIP DIPOLES IN THE SPACECRAFT SPIN PLANE AND ONE 0.5-M DIPOLE ALONG THE SPIN AXIS. THE TIME REQUIRED FOR TRIAXIAL 12-CHANNEL SPECTRUM ANALYSIS FROM 10 HZ TO 200 KHZ IS 100 MS. BROADBAND DATA ARE AVAILABLE WITH A 10-KHZ BANDWIDTH AND 1-MS TIME RESOLUTION.

------- ISEE-A, HARVEY----------

INVESTIGATION NAME- ACTIVE PLASMA EXPERIMENT

NSSDC ID- MOTHER -08

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - C.C. HARVEY		PARIS OBSERVATORY
OI - M. PETIT		CNET
OI - J.R. MCAFEE		NOAA-ERL
OI - D. JONES		ESA-ESTEC
OI - J.M. 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 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 IMMERSED, 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 A NUMBER OF SUB-BANDS, COVERING THE CHARACTERISTIC RESONANCE FREQUENCIES OF THE PLASMA, AND (2) THE INTEGRATED DENSITY BETWEEN THE MOTHER AND THE DAUGHTER IS OBTAINED FROM A SECOND EXPERIMENT THAT MEASURES THE PHASE DELAY INTRODUCED BY THE

AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 1 MHZ 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.

-------- ISEE-A, HELLIWELL----------

INVESTIGATION NAME- VLF WAVE INJECTION

NSSDC ID- MOTHER -13

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - R.A.	HELLIWELL	STANFORD U
OI - T.	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 20-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS ARE INTENSITY OF RECEIVED RADIO FREQUENCY AS A FUNCTION OF TIME.

-------- ISEE-A, HEPPNER----------

INVESTIGATION NAME- DC ELECTRIC FIELDS

NSSDC ID- MOTHER -11

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - J.P.	HEPPNER	NASA-GSFC
OI - T.L.	AGGSON	NASA-GSFC
OI - N.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. AN ORTHOGONAL PAIR OF 123-M TIP-TO-TIP DIPOLE ANTENNAE ARE USED TO MAKE DC AND AC ELECTRIC FIELD MEASUREMENTS IN THE FOLLOWING NINE FREQUENCY WINDOWS -- 0.1 TO 0.32 HZ, 0.32 TO 1 HZ, 1 TO 3.2 HZ, 3.2 TO 10 HZ, 10 TO 32 HZ, 32 TO 100 HZ, 100 TO 320 HZ, 320 TO 1000 HZ, AND 1000 TO 3200 HZ. DC MEASUREMENTS ARE MADE IN ANY OF 256 ANGULAR SECTIONS THREE TIMES OR 24 TIMES PER S, DEPENDING ON THE BIT RATE. DC MODE MEASUREMENTS HAVE A TWO-STEP VARIABLE GAIN AMPLIFIER CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE IS 0.12 MV/M WITH A DYNAMIC RANGE OF PLUS OR MINUS 0.983 V/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 0.6 MICROVOLTS/M RMS. THE EXPERIMENT CAN BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR A FREE STATE AS CONTROLLED FROM THE 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 READOUT SEQUENCE.

-------- ISEE-A, HOVESTADT----------

INVESTIGATION NAME- LOW-ENERGY COSMIC-RAY COMPOSITION

NSSDC ID- MOTHER -05

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS
PARTICLES AND FIELDS

PERSONNEL

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

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE HELIOCENTRIC AND MOTHER SPACECRAFT, THE NUCLEAR AND IONIC CHARGE AS WELL AS ISOTOPIC COMPOSITION OF INTERPLANETARY AND MAGNETOSPHERIC HEAVY PARTICLES. THE MEASUREMENTS ARE MADE OF THE FOLLOWING SPECIES IN THE DESIGNATED RANGES -- (1) SOLAR WIND IONS (Z TO 10 KEV/CHARGE), (2) SUPRATHERMAL MULTIPLE-CHARGED IONS (Z, Q LESS THAN OR EQUAL TO 26 IN THE ENERGY RANGE FROM 0.02 TO 13 MEV (HYDROGEN), 0.01 TO 30 MEV/NUCLEON (OXYGEN) AND 0.005 TO 50 MEV/NUCLEON (IRON)), AND (3) TRAPPED PARTICLES (0.01 TO 6 MEV/NUCLEON). THE INSTRUMENTATION CONSISTS OF TWO SENSORS ON EACH SPACECRAFT WHICH USE ELECTROSTATIC DEFLECTION TECHNIQUES, THIN WINDOW PROPORTIONAL COUNTERS, AND POSITION-SENSITIVE SOLID-STATE DETECTORS. THE SENSORS HAVE LARGE GEOMETRICAL FACTORS OVER THE ENTIRE ENERGY RANGE, I.E., 0.04 CM SQ STER FOR THERMAL AND SUPRATHERMAL SOLAR WIND MEASUREMENTS, AND 3 CM SQ STER FOR LOW ENERGY COSMIC RAY MEASUREMENTS.

-------- ISEE-A, MOZER----------

INVESTIGATION NAME- DC TO 12-HZ ELECTRIC FIELD PROBE

NSSDC ID- MOTHER -06

INVESTIGATIVE PROGRAM
CODE SA/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 4-IN-DIAM SPHERES MOUNTED AT THE END OF A 30-M BOOM 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 A THRESHOLD TO 1 MV/M IN THE FREQUENCY BAND OF 0 TO 12 HZ.

-------- ISEE-A, OGILVIE----------

INVESTIGATION NAME- THREE-DIMENSIONAL (SIX AXES), 6-EV TO 10-KEV ELECTRON SPECTROMETER

NSSDC ID- MOTHER -02

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI - K.W.	OGILVIE	NASA-GSFC
OI - J.D.	SCUDDER	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 FROM 6 EV TO 10 KEV. MEASUREMENTS ARE MADE IN TWO ENERGY RANGES WITH AN ENERGY RESOLUTION (DELTA E/E) OF 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 A CHANNELTRON DETECTOR.

-------- ISEE-A, RUSSELL----------

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- MOTHER -04

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T.	RUSSELL	U OF CALIF, LA
OI - R.L.	MCPHERRON	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 512 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 1/32 GAMMA IN THE LOW AND HIGH SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 8 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-A, SHARP----------

INVESTIGATION NAME- PLASMA COMPOSITION

NSSDC ID- MOTHER -12

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

PI -	R.D.	SHARP	LOCKHEED PALO ALTO
OI -	G.	HAERENDEL	MPI-EXTRATERR PHYS
OI -	H.R.	ROSENBAUER	MPI-EXTRATERR PHYS
OI -	R.G.	JOHNSON	LOCKHEED PALO ALTO
OI -	E.G.	SHELLEY	LOCKHEED PALO ALTO
OI -	J.	GEISS	U OF BERNE
OI -	P.X.	EBERHARDT	U OF BERNE
OI -	H.	BALSIGER	U OF BERNE
OI -	C.R.	CHAPPELL	NASA-MSFC

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. THE MASS-PER-UNIT-CHARGE RANGE MEASURED EXTENDS FROM 1 TO 138 U.

------- ISEE-A, WILLIAMS----------

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- MOTHER -09

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI -	D.J.	WILLIAMS	NOAA-ERL
OI -	C.O.	BOSTROM	APPLIED PHYSICS LAB
OI -	B.	WILKEN	MPI-AERONOMY
OI -	T.A.	FRITZ	NOAA-ERL
OI -	G.	WIBBERENZ	U OF KIEL
OI -	E.	KEPPLER	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 DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 8 CHANNELS BETWEEN 20 KEV AND 2 MEV, AND ELECTRONS IN 8 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 150 KEV PER NUCLEON.

********** ISEE-B**********

SPACECRAFT COMMON NAME- ISEE-B
ALTERNATE NAMES- IMP-K PRIME, IME-D
DAUGHTER, INTNL SUN EARTH EXPL-B

NSSDC ID- DAUGHTR

LAUNCH DATE- 10/13/77 WEIGHT- 165.78 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OSS
INTERNATIONAL	ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 3522. MIN INCLINATION- 28.8 DEG
PERIAPSIS- 280. KM APOAPSIS- 140344. KM

PERSONNEL

MG -	J.R.	HOLTZ	NASA HEADQUARTERS
SC -	E.R.	SCHMERLING	NASA HEADQUARTERS
PM -	A.	HAWKYARD	ESA-ESTEC
PS -	A.C.	DURNEY	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-TERRESTRIAL 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.

------- ISEE-B, ANDERSON----------

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- DAUGHTR-08

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL

PI -	K.A.	ANDERSON	U OF CALIF, BERKELEY
OI -	C.I.	MENG	U OF CALIF, BERKELEY
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.K.	PARKS	U OF WASHINGTON

BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT IS 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 IN TWO INTERVALS OVER THE ENERGY RANGE FROM 8 TO 200 KEV, AND PROTONS ARE MEASURED IN THREE INTERVALS OVER THE ENERGY RANGE FROM 10 TO 380 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 CHARGED PARTICLE ANALYZERS. THESE ANALYZERS ARE USED TO MEASURE ELECTRONS AND PROTONS SEPARATELY AT 2 AND 6 KEV.

------- ISEE-B, EGIDI----------

INVESTIGATION NAME- SOLAR WIND IONS

NSSDC ID- DAUGHTR-02

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

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

BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT IS TO GAIN A BETTER UNDERSTANDING OF THE INTERACTION OF THE SOLAR WIND WITH THE EARTH'S MAGNETIC FIELD BY MEASURING ION FLUXES AS FUNCTIONS OF DIRECTION AND ENERGY. AN ELECTROSTATIC ANALYZER IS USED TO MEASURE THE ION DISTRIBUTION FUNCTION FROM 50 EV TO 10 KEV PER UNIT CHARGE. THE ELECTROSTATIC ANALYZER HAS SEVERAL NARROW ENERGY WINDOWS TO MAP THE ION DISTRIBUTION FUNCTION IN DETAIL.

------- ISEE-B, FRANK----------

INVESTIGATION NAME- HOT PLASMA

NSSDC ID- DAUGHTR-03

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
SPACE PLASMAS

PERSONNEL

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

BRIEF DESCRIPTION
THIS EXPERIMENT 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 50 KEV ARE MEASURED IN 63 CONTIGUOUS ENERGY BANDS WITH AN ENERGY RESOLUTION (DELTA E/E) OF 0.17. 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 ARE FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR PI STER SOLID-ANGLE IS COVERED FOR PARTICLE VELOCITY VECTORS.

------- ISEE-B, GURNETT----------

INVESTIGATION NAME- 10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD MONOAXIAL PROBES

NSSDC ID- DAUGHTR-05
INVESTIGATIVE PROGRAM CODE SA/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 A SINGLE ELECTRIC FIELD DIPOLE (RELATIVELY SHORT) MEASURES WAVE PHENOMENON OCCURING WITHIN THE MAGNETOSPHERE AND SOLAR WIND IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE MOTHER SPACECRAFT. THE TIME REQUIRED FOR A 16-CHANNEL SPECTRUM ANALYSIS IN A RANGE OF 10 HZ TO 10 KHZ FROM THE SEARCH COIL IS 100 MS. THE TIME REQUIRED FOR A 16-CHANNEL SPECTRUM ANALYSIS IN A RANGE OF 10 HZ TO 200 KHZ FROM THE ELECTRIC DIPOLE IS ALSO 100 MS. THE DIPOLE IS MOUNTED PERPENDICULAR TO THE SPIN AXIS.

------- ISEE-B, HARVEY----------

INVESTIGATION NAME- RADIO PROPAGATION RECEIVER

NSSDC ID- DAUGHTR-06
INVESTIGATIVE PROGRAM CODE SA/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.	GRARD	ESA-ESTEC

IEF DESCRIPTION
THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER WILL BE OBTAINED BY MEASURING THE PHASE DELAY INTRODUCED BY THE AMBIENT PLASMA ONTO A WAVE OF FREQUENCY ABOUT 1 MHZ, TRANSMITTED FROM THE MOTHER (EXPERIMENT 8) AND RECEIVED ON THE DAUGHTER. THE PHASE WILL BE 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.

------- ISEE-B, KEPPLER----------

INVESTIGATION NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- DAUGHTR-07
INVESTIGATIVE PROGRAM CODE SA/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.	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 25 KEV AND 2 MEV AND ELECTRONS IN 5 DIRECTIONS AND 12 ENERGY CHANNELS BETWEEN 20 KEV AND 1 MEV ARE MEASURED.

------- ISEE-B, PASCHMANN----------

INVESTIGATION NAME- 50-EV TO 40-KEV PROTON AND 5-EV TO 20-KEV ELECTRON PLASMA PROBE

NSSDC ID- DAUGHTR-01
INVESTIGATIVE PROGRAM CODE SA/CO-OP
INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS

PERSONNEL

PI -	G.	PASCHMANN	MPI-EXTRATERR PHYS
OI -	W.C.	FELDMAN	LOS ALAMOS SCI LAB
OI -	E.W.	HONES, JR.	LOS ALAMOS SCI LAB
OI -	K.	SCHINDLER	INST FOR THEOR PHYS
OI -	H.	MIGGENRIEDER	MPI-EXTRATERR PHYS
OI -	S.J.	BAME	LOS ALAMOS SCI LAB
OI -	H.	VOLK	MPI-EXTRATERR PHYS
OI -	H.R.	ROSENBAUER	MPI-EXTRATERR PHYS
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, MAGNETSHEATH, 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-B, RUSSELL----------

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- DAUGHTR-04
INVESTIGATIVE PROGRAM CODE SA/CO-OP
INVESTIGATION DISCIPLINE(S) MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

PERSONNEL

PI -	C.T.	RUSSELL	U OF CALIF, LA
OI -	R.L.	MCPHERRON	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 512 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 1/32 GAMMA IN THE LOW- AND HIGH-SENSITIVITY RANGES. IN THE SINGLE-PRECISION MODE, ANY 8 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-C**********

SPACECRAFT COMMON NAME- ISEE-C
ALTERNATE NAMES- STP PROBE, IME-H
HELIOCENTRIC, INTNL SUN EARTH EXPL-C

NSSDC ID- HELOCTR

LAUNCH DATE- 07/00/78 WEIGHT- 469. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OSS
INTERNATIONAL	ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 365. DAYS INCLINATION- 0. DEG
PERIAPSIS- 0.99 AU RAD APOAPSIS- 0.99 AU RAD

PERSONNEL

MG - F.W.	GAETANO	NASA HEADQUARTERS
SC - E.R.	SCHMERLING	NASA HEADQUARTERS
PM - J.J.	MADDEN	NASA-GSFC
PS - T.T.	VON ROSENVINGE	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/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, 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 20 RPM. IT IS PLACED INTO AN ELLIPTICAL HALO ORBIT ABOUT THE LIBRATION POINT 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 SPACECRAFTALSO PROVIDES A NEAR-EARTH BASE FOR MAKING COSMIC RAY AND OTHER PLANETARY MEASUREMENTS FOR COMPARISON WITH COINCIDENT MEASUREMENTS FROM DEEP-SPACE PROBES.

------- ISEE-C, ANDERSON----------

INVESTIGATION NAME- X RAYS AND ELECTRONS

NSSDC ID- HELOCTR-09

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

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 800 KEV) IN THE TRANSITION ENERGY RANGE BETWEEN SOLAR WIND AND LOW-ENERGY COSMIC RAYS, AND TO STUDY WITH 1-S RESOLUTION THE SPECTRA OF SOLAR X RAYS (6 TO 228 KEV). THE ELECTRONS ARE MEASURED BY A PAIR OF PASSIVELY COOLED, SURFACE BARRIER SEMICONDUCTOR DETECTOR TELESCOPES (10-800 KEV) AND BY A HEMISPHERICAL PLATE ELECTROSTATIC ANALYZER WITH CHANNEL-MULTIPLIER DETECTORS (2-18 KEV). THE X RAYS ARE MEASURED BY A PROPORTIONAL COUNTER (6-20 KEV) AND A SODIUM IODIDE SCINTILLATOR (12 TO 228 KEV).

------- ISEE-C, BAME----------

INVESTIGATION NAME- 150-EV TO 7-KEV PROTON AND 5-EV TO 2.5-KEV ELECTRON PLASMA PROBE

NSSDC ID- HELOCTR-01

INVESTIGATIVE PROGRAM
CODE SA/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. IN THE EXPERIMENT, PROTON AND ELECTRON SOLAR PLASMA ARE MEASURED FROM 150 EV TO 7 KEV AND 5 EV TO 2.5 KEV IN 12 AND 16 ENERGY STEPS, RESPECTIVELY. PROTONS 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. ELECTRONS 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.

------- ISEE-C, HECKMAN----------

INVESTIGATION NAME- HIGH-ENERGY COSMIC RAYS

NSSDC ID- HELOCTR-05

INVESTIGATIVE PROGRAM
CODE SA/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 IRON. THE INSTRUMENT USES A 10-ELEMENT, SOLID-STATE, PARTICLE TELESCOPE CONSISTING OF LITHIUM-DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED RUN FROM 31 TO 110 MEV FOR Z=1, AND 125 TO 445 MEV FOR Z=26. ISOTOPIC RESOLUTION IS LESS THAN 0.15 U FOR Z=1 THROUGH 26. DIRECTION OF INCIDENT NUCLEI IS OBTAINED FROM A PAIR OF MULTI-WIRE PROPORTIONAL COUNTERS WITH 2-DEG RESOLUTION.

------- ISEE-C, HOVESTADT----------

INVESTIGATION NAME- LOW-ENERGY COSMIC-RAY COMPOSITION

NSSDC ID- HELOCTR-03

INVESTIGATIVE PROGRAM
CODE SA/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	NASA-GSFC

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO STUDY, BY MEANS OF IDENTICAL INSTRUMENTATION ON THE HELIOCENTRIC AND MOTHER SPACECRAFT, THE NUCLEAR AND IONIC CHARGE AS WELL AS ISOTOPIC COMPOSITION OF INTERPLANETARY AND MAGNETOSPHERIC HEAVY PARTICLES. MEASUREMENTS INCLUDE THE FOLLOWING SPECIES IN THE DESIGNATED RANGES -- (1) SOLAR WIND IONS (5 KEV/CHARGE TO 20 MEV/CHARGE), (2) SUPRATHERMAL MULTIPLE-CHARGED IONS (Z .LE. 26 IN THE ENERGY RANGE 5 TO 50 KEV/ NUCLEON), (3) LOW-ENERGY COSMIC RAYS (0.05 TO 20 MEV/NUCLEON), AND (4) TRAPPED PARTICLES (0.05 TO 6 MEV/NUCLEON). THE INSTRUMENTATION CONSISTS OF TWO SENSORS ON EACH SPACECRAFT THAT USE ELECTROSTATIC DEFLECTION TECHNIQUES, THIN WINDOW PROPORTIONAL COUNTERS, AND POSITION SENSITIVE SOLID-STATE DETECTORS. THE SENSORS HAVE LARGE GEOMETRICAL FACTORS OVER THE ENTIRE ENERGY RANGE, I.E., 0.04 SQ CM STER FOR THERMAL AND SUPRATHERMAL SOLAR WIND MEASUREMENTS AND 3 SQ CM STER FOR LOW-ENERGY COSMIC RAY MEASUREMENTS.

------- ISEE-C, HYNDS----------

INVESTIGATION NAME- ENERGETIC PROTONS

NSSDC ID- HELOCTR-08

INVESTIGATIVE PROGRAM
CODE SA/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	WENZEL	ESA-ESTEC
OI - R.V.D.	NIEUWENHOF	U OF UTRECHT
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	SPACE RESEARCH LAB
OI - H.	ELLIOT	IMPERIAL COLLEGE

BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO STUDY PARTICLE ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. MEASUREMENTS ARE MADE OF PROTONS FROM 0.03 TO 1.40 MEV USING THREE TWO-ELEMENT TELESCOPES. THE TELESCOPES ARE MOUNTED AT 30, 60, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EIGHT-SECTOR DATA ARE OBTAINED FOR SELECTED ENERGY CHANNELS.

------- ISEE-C, MEYER----------

INVESTIGATION NAME- COSMIC-RAY ELECTRONS AND NUCLEI

NSSDC ID- HELOCTR-06

INVESTIGATIVE PROGRAM
CODE SA/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) PROTONS (DIFFERENTIAL SPECTRUM FROM 36 TO 13,000 MEV AND INTEGRAL SPECTRUM ABOVE 13 GEV), (3) HELIUM THROUGH SULFUR (Z FROM 2 THROUGH 16, DIFFERENTIAL SPECTRUM FROM 60 TO 13,000 MEV/NUCLEON AND INTEGRAL SPECTRUM ABOVE 13 GEV/NUCLEON), AND (4) THE IRON GROUP (Z FROM 26 THROUGH 28, DIFFERENTIAL SPECTRUM FROM 150 TO 13,000 MEV/NUCLEON, AND INTEGRAL SPECTRUM ABOVE 13 GEV/NUCLEON). A CHARGED-PARTICLE TELESCOPE IS USED TO MAKE THESE MEASUREMENTS. IT CONSISTS OF A CURVED SOLID-STATE DETECTOR, A GAS CERENKOV COUNTER, A SOLID-STATE DETECTOR, A CESIUM IODIDE SCINTILLATION DETECTOR, A PLASTIC SCINTILLATION COUNTER, AND A QUARTZ CERENKOV COUNTER. THE DESIGN OF THE TELESCOPE IS BASED ON THAT USED IN EXPERIMENT 68-014A-09 FOR OGO 5.

------- ISEE-C, OGILVIE----------

INVESTIGATION NAME- MASS SPECTROMETER

NSSDC ID- HELOCTR-11

INVESTIGATIVE PROGRAM
CODE SA/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 AN ELECTROSTATIC ENERGY ANALYZER AND A WIEN 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 0.47 TO 10.5 KEV PER CHARGE AND A MASS PER UNIT CHARGE RANGE OF 1 TO 5.6 U PER CHARGE.

------- ISEE-C, SCARF----------

INVESTIGATION NAME- 20-HZ TO 1-KHZ MAGNETIC AND 20-HZ TO 100-KHZ ELECTRIC FIELD DETECTORS

NSSDC ID- HELOCTR-07

INVESTIGATIVE PROGRAM
CODE SA/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. AN ELECTRIC DIPOLE AND MAGNETIC SEARCH COIL, BOOM-MOUNTED AND ALIGNED ALONG THE SPACECRAFT SPIN AXIS, ARE USED TO MEASURE MAGNETIC FIELD WAVE LEVELS FROM 20 HZ TO 1 KHZ IN EIGHT CHANNELS AND ELECTRIC FIELD LEVELS FROM 20 HZ TO 100 KHZ I. 16 CHANNELS.

------- ISEE-C, SMITH----------

INVESTIGATION NAME- MAGNETIC FIELDS

NSSDC ID- HELOCTR-02

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY MAGNETIC FIELDS
PARTICLES AND FIELDS

PERSONNEL

PI - E.J.	SMITH	NASA-JPL
OI - L.	DAVIS, JR.	CALIF INST OF TECH
OI - G.L.	SISCOE	U OF CALIF, LA
OI - D.E.	JONES	BRIGHAM YOUNG U
OI - B.T.	TSURUTANI	NASA-JPL

BRIEF DESCRIPTION
THE INSTRUMENTATION FOR THIS EXPERIMENT CONSISTS OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS ARE MADE OF THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. FOUR FIELD AMPLITUDE RANGES (MINUS TO PLUS 4, 14, 42, AND 146 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 OF 0.1 TO 1, 1 TO 3, AND 3 TO 10 HZ.

------- ISEE-C, STEINBERG----------

INVESTIGATION NAME- 20-KHZ TO 3-MHZ RADIO MAPPING

NSSDC ID- HELOCTR-10

INVESTIGATIVE PROGRAM
CODE SA/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.	FAINBERG	NASA-GSFC
OI - R.G.	STONE	NASA-GSFC
OI - S.R.	MOSIER	NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTS OF FOUR SELF-CALIBRATING RADIOMETERS THAT STEP THROUGH 16 FREQUENCIES BETWEEN 20 KHZ AND 3 MHZ. THESE RADIOMETERS ARE CONNECTED TO DIPOLE ANTENNAS. TYPE 3 SOLAR RADIO BURSTS ARE USED TO MAP MAGNETIC LINES OF FORCE IN AND OUT OF THE ECLIPTIC BETWEEN 0.05 AND 1 AU, THEREBY PRODUCING A THREE-DIMENSIONAL DESCRIPTION OF THE SOLAR WIND.

------- ISEE-C, STONE----------

INVESTIGATION NAME- COSMIC-RAY COMPOSITION

NSSDC ID- HELOCTR-12

INVESTIGATIVE PROGRAM
CODE SA/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 ISOTROPIC 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 PROCESSES. 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 2 TO 200 MEV/NUCLEON. THE CORRESPONDING MASS RESOLUTION IS 0.065 TO 0.083 PROTON MASS FOR LITHIUM, AND 0.18 TO 0.22 PROTON MASS FOR IRON. THE ISOTROPIC ABUNDANCES AND ENERGY SPECTRA ARE MEASURED BY A HEAVY ISOTROPE SPECTROMETER TELESCOPE THAT USES SOLID-STATE CHARGED PARTICLE DETECTORS. ANTICOINCIDENCE GUARD RINGS AND SOLID-STATE MATRIX HODOSCOPE DETECTORS ARE EMPLOYED TO IMPROVE MASS AND ENERGY RESOLUTION.

------- ISEE-C, VON ROSENVINGE----------

INVESTIGATION NAME- SOLAR AND GALACTIC ENERGETIC PARTICLES

NSSDC ID- HELOCTR-04

INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
COSMIC RAYS

PERSONNEL

PI - T.T.	VON ROSENVINGE	NASA-GSFC
OI - L.A.	FISK	NASA-GSFC
OI - F.B.	MCDONALD	NASA-GSFC
OI - J.H.	TRAINOR	NASA-GSFC
OI - M.A.	VAN HOLLEBEKE	NASA-GSFC

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 PARTICLE TELESCOPES PLUS A PROPORTIONAL COUNTER, FOR MEASUREMENT OF ELECTRONS AND X RAYS, COMPRISE THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 26 ARE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 0.5 TO 500 MEV PER NUCLEON. ISOTOPES IN THE Z RANGES 1 TO 2, 3 TO 7, AND 8 TO 16 ARE MEASURED IN THE ENERGY RANGES 4 TO 80, 8 TO 120, AND 10 TO 200 MEV PER NUCLEON, RESPECTIVELY. ELECTRONS ARE MEASURED IN THE ENERGY RANGES 0.07 TO 0.2 MEV AND 0.3 TO 12 MEV. ANISOTROPY INFORMATION IS OBTAINED FOR THE ELECTRONS AND

FOR 0.5 TO 150 MEV PER NUCLEON NUCLEI.

-------- ISEE-C, WILCOX----------

INVESTIGATION NAME- SOLAR AND INTERPLANETARY MAGNETIC FIELDS (CORRELATIVE STUDY)

NSSDC ID- HELOCTR-13

INVESTIGATIVE PROGRAM
CODE SA/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.

********** ISS 2**********

SPACECRAFT COMMON NAME- ISS 2
ALTERNATE NAMES- IONOSP SOUNDING SAT 2

NSSDC ID- ISS-2

LAUNCH DATE- 02/00/78 WEIGHT- 135. KG
LAUNCH SITE- TANEGASHIMA, JAPAN
LAUNCH VEHICLE- NU

SPONSORING COUNTRY/AGENCY
JAPAN RRL

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 105. MIN INCLINATION- 70.0 DEG
PERIAPSIS- 980. KM APOAPSIS- 1015. KM

PERSONNEL
PM - Y. OGATA RADIO RESEARCH LAB
PS - K. TAO RADIO RESEARCH LAB

BRIEF DESCRIPTION
THE IONOSPHERE SOUNDING SATELLITE (ISS) IS BEING DEVELOPED AS 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 2, FUGONO----------

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- ISS-2 -04

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - N. FUGONO RADIO RESEARCH LAB
CI - N. NIWA U OF TOKYO

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 INLET 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 100 TO 1.E7 IONS PER CC.

------- ISS 2, MATUURA----------

INVESTIGATION NAME- SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)

NSSDC ID- ISS-2 -01

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES

PERSONNEL
PI - N. MATUURA RADIO RESEARCH LAB

BRIEF DESCRIPTION
THE IONOSPHERE SOUNDING SATELLITE (ISS) IONOSONDE 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 FORM 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 2, MIYAZAKI----------

INVESTIGATION NAME- RETARDING POTENTIAL TRAP

NSSDC ID- ISS-2 -03

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
PARTICLES AND FIELDS

PERSONNEL
PI - S. MIYAZAKI 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 1000- 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.

------- ISS 2, MURANAGA----------

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

NSSDC ID- ISS-2 -02

INVESTIGATIVE PROGRAM
SCIENTIFIC SATELLITE

INVESTIGATION DISCIPLINE(S)
IONOSPHERES AND RADIO PHYSICS

PERSONNEL
PI - K. MURANAGA 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 FOUR FREQUENCY CHANNELS -- 2.497, 4.997, 9.997 (OR 10.003), AND 24.996 (OR 25.006) MHZ -- WILL BE 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).

********** IUE**********

SPACECRAFT COMMON NAME- IUE
ALTERNATE NAMES- IN ULTRAVIOLET EXPL, SAS-D

NSSDC ID- SAS-D

LAUNCH DATE- 11/15/77 WEIGHT- 669. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 26.50 DEG
PERIAPSIS- 24308. KM APOAPSIS- 47263. KM

PERSONNEL
MG - L. OONDEY NASA HEADQUARTERS
SC - N.G. ROMAN NASA HEADQUARTERS
PM - G.W. LONGANECKER NASA-GSFC
PS - A. BOGGESS NASA-GSFC

BRIEF DESCRIPTION
THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-D) SATELLITE IS AN APPROVED MISSION FOR THE CONSTRUCTION OF 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) IS SUPPLYING 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 WILL BE LAUNCHED INTO A SYNCHRONOUS ORBIT. THE 45-CM RITCHERY-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 A. IT OPERATES IN EITHER A HIGH-RESOLUTION OR A LOW-RESOLUTION MODE, WITH RESOLUTIONS OF APPROXIMATELY 0.2 AND 6 A, 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-S-ANGSTROM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. GUEST INVESTIGATORS AND THEIR INVESTIGATIONS ARE LISTED IN APPENDIX B.

------- IUE, NONE ASSIGNED----------

INVESTIGATION NAME- LOW-/HIGH-RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE

NSSDC ID- SAS-D -01 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - NONE ASSIGNED 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 A) OR LOW-RESOLUTION (6A) 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 BO 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 A IN THE HIGH-RESOLUTION MODE, AND 1135 TO 2085 A IN THE LOW-RESOLUTION MODE. FOR THE OTHER UNIT, THE RANGES ARE FROM 1893 TO 3031 A AND 1800 TO 3255 A 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.

********** LANDSAT-C**********

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

NSSDC ID- ERTS-C

LAUNCH DATE- 09/29/77 WEIGHT- 960. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 99.1 MIN INCLINATION- 98.20 DEG
PERIAPSIS- 705. KM APOAPSIS- 705. KM

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - J.R. MORRISON NASA HEADQUARTERS
PM - R.K. BROWNING NASA-GSFC
PS - S.C. FREDEN NASA-GSFC

BRIEF DESCRIPTION
LANDSAT-C 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 FORESTY RESOURCES, GEOLOGY AND MINERAL RESOURCES, HYDROLOGY AND WATER RESOURCES, HYDEOLOGY 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 RADIOMETRIC IMAGES OF THE EARTH, AND (2) A DATA COLLECTION SYSTEM TO COLLECT INFORMATION FROM REMOTE INDIVIDUALLY EQUIPPED GROUND STATIONS AND TO RELAY THE DATA TO CENTRAL ACQUISITION STATIONS. LANDSAT-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-C, ARLUSKAS----------

INVESTIGATION NAME- MULTISPECTRAL SCANNER

NSSDC ID- ERTS-C -02 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL
PI - J. ARLUSKAS NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT-C 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-C 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-C, PAINTER----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- ERTS-C -03 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
EARTH RESOURCES SURVEY

PERSONNEL
PI - J.E. PAINTER NASA-GSFC

BRIEF DESCRIPTION
THE LANDSAT-C 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 FORESTY 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-C, WEINSTEIN----------

INVESTIGATION NAME- RETURN BEAM VIDICON CAMERA (RBV)

NSSDC ID- ERTS-C -01 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

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

BRIEF DESCRIPTION
THE LANDSAT-C 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.

********** LANDSAT-D**********

SPACECRAFT COMMON NAME- LANDSAT-D
ALTERNATE NAMES- LAND SATELLITE-D1, LFO-A
LANDSAT-D1

NSSDC ID- LAND-D

LAUNCH DATE- 03/00/81 WEIGHT- 1407. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 98.8 MIN INCLINATION- 98.2 DEG
PERIAPSIS- 705. KM APOAPSIS- 705. KM

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 MULTIMISSION MODULAR SPACECRAFT (MMS) THAT CONTAINS THE MODULARIZED AND STANDARDIZED POWER, PROPULSION, ATTITUDE CONTROL, AND COMMUNICATIONS AND DATA HANDLING SUBSYSTEMS. WHEN THE LANDSAT-D SATELLITE IS LAUNCHED, IT IS DEPLOYED AT AN ORBITAL ALTITUDE OF 705.3 KM, INCLINATION OF 98.2 DEG, AND A SUN ANGLE OF 9:30 A.M. AT THE DESCENDING NODE. THIS ORBIT HAS A FREQUENCY OF 19-9/16 ORBITS PER DAY AND COVERS THE EARTH IN 16 DAYS. THE DISTANCE BETWEEN GROUND TRACKS IS 172 KM, WHICH WHEN USED IN CONJUNCTION WITH THE 185 KM 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 ERN

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.

********** MAGIC**********

SPACECRAFT COMMON NAME- MAGIC
ALTERNATE NAMES-

NSSDC ID- MAGIC

LAUNCH DATE- 00/00/77 WEIGHT- KG
LAUNCH SITE-
LAUNCH VEHICLE-

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 105. MIN INCLINATION- 75. DEG
PERIAPSIS- 350. KM APOAPSIS- 1700. KM

PERSONNEL
PM - UNKNOWN UNKNOWN

BRIEF DESCRIPTION
TO BE LAUNCHED DURING THE DMS 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 50 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.

********** MAG **********

SPACECRAFT COMMON NAME- MAGSAT
ALTERNATE NAMES- AEM-C, GLOBAL MAGNETIC SURV MSN

NSSDC ID- AEM-C

LAUNCH DATE- 02/00/80 WEIGHT- 158. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- 97.79 DEG
PERIAPSIS- 500. KM APOAPSIS- 500. KM

PERSONNEL
MG - D.S. DILLER NASA HEADQUARTERS
SC - J.P. MURPHY NASA HEADQUARTERS
PM - 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 ERF

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, L ANGEL -------

INVESTIGATION NAME- VECTOR MAGNETOMETER

NSSDC ID- AEM-C -02 INVESTIGATIVE PROGRAM
CODE ERF

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.

********** METEOSAT-A **********

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

NSSDC ID- METOS-A

LAUNCH DATE- 11/03/77 WEIGHT- 625.8 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 0. DEG
PERIAPSIS- 35600. KM APOAPSIS- 35600. KM

PERSONNEL
MG - M. DELAHAIS ESA-ESTEC
PM - D. LENNERTZ ESA-ESTEC

BRIEF DESCRIPTION
METOSAT-A 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 HAS ATTAINED SYNCHRONOUS ORBIT.

------- METEOSAT-A, ESA STAFF -------

INVESTIGATION NAME- IMAGING RADIOMETER

NSSDC ID- METOS-A-01 INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE VISIBLE-IR RADIOMETER FLOWN ON METOSAT-A 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. INCOMMING 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-A, ESA STAFF----------

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- METOS-A-02 INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE DATA COLLECTION PLATFORM IS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FORM 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.

********** METEOSAT-B**********

SPACECRAFT COMMON NAME- METEOSAT-B
ALTERNATE NAMES- METEOROLOGICAL SAT-B

NSSDC ID- METOS-B

LAUNCH DATE- 11/00/78 WEIGHT- 625.8 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 0. DEG
PERIAPSIS- 35600. KM APOAPSIS- 35600. KM

PERSONNEL
MG - M. DELAHAIS ESA-ESTEC
PM - D. LENNERTZ ESA-ESTEC

BRIEF DESCRIPTION
METOSAT-B IS GEOSTATIONARY SPACECRAFT AND SERVES AS PART OF EUROPEAN SPACE AGENCY'S (ESA) CONTRIBUTION TO GARP. AS PART OF GARP, THE SATELLITE HELPS TO SUPPLY DATA REQUIRED FOR GLOBAL DATA SETS USED IN IMPROVEMENT OF MACHINE WEATHER FORECASTS. IN GENERAL, THE SPACECRAFT DESIGN, INSTRUMENTATION, AND OPEATION ARE SIMILAR TO SMS/GOES. THE SPIN-STABILIZED SPACECRAFT CARRIES (1) A VISIBLE-IR RADIOMETER TO PROVIDE HIGH-QUALITY DAY/NIGHT CLOUDCOVER DATA AND TO TAKE RADIANCE TEMPERATURES OF THE EARTH/ATMOSPHERE SYSTEM, (2) A METEOROLOGICAL DATA COLLECTION SYSTEM TO DISSEMINATE IMAGE DATA TO USER STATIONS, TO COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND TO RELAY DATA FROM POLAR-ORBITING SATELLITES. THE CYLINDRICALLY-SHAPED SPACECRAFT MEASURES 210 CM IN DIAMETER AND 430 CM IN LENGTH, INCLUDING THE APOGEE BOOST MOTOR. THE PRIMARY STRUCTURAL MEMBERS ARE AN EQUIPMENT PLATFORM AND A CENTRAL TUBE. THE RADIOMETER TELESCOPE IS MOUNTED ON THE EQUIPMENT PLATFORM AND VIEWS THE EARTH THROUGH A SPECIAL APERTURE IN THE SPACECRAFT'S SIDE. A SUPPORT STRUCTURE EXTENDS RADIALLY OUT FROM THE CENTRAL TUBE AND IS AFFIXED TO THE SOLAR PANELS, WHICH FORM THE OUTER WALLS OF THE SPACECRAFT AND PROVIDE THE PRIMARY SOURCE OF ELECTRICAL POWER. LOCATED IN THE ANNULUS-SHAPED SPACE BETWEEN THE CENTRAL TUBE AND THE SOLAR PANELS ARE STATIONKEEPING AND DYNAMICS CONTROL EQUIPMENT AND BATTERIES. PROPER SPACECRAFT ATTITUDE AND SPIN RATE (APPROXIMATELY 100 RPM) ARE MAINTAINED BY JET THRUSTERS MOUNTED ON THE SPACECRAFT AND ACTIVATED BY GROUND COMMAND. THE SPACECRAFT USES BOTH UHF-BAND AND S-BAND FREQUENCIES IN ITS TELEMETRY AND COMMAND SUBSYSTEMS. A LOW-POWER VHF TRANSPONDER PROVIDES TELEMETRY AND COMMAND DURING LAUNCH AND THEN SERVES AS A BACKUP FOR THE PRIMARY SUBSYSTEM ONCE THE SPACECRAFT HAS ATTAINED SYNCHRONOUS ORBIT.

-------- METEOSAT-B, ESA STAFF----------

INVESTIGATION NAME- IMAGING RADIOMETER

NSSDC ID- METOS-B-01 INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE VISIBLE-IR RADIOMETER FLOWN ON METEOSAT-B IS CAPABLE OF PROVIDING DAY/NIGHT OBSERVATIONS OF CLOUDCOVER AND EARTH/CLOUD RADIANCE TEMPERATURE MEASUREMENTS FROM A SYNCHRONOUS, SPIN-STABILIZED SATELLITE FOR USE IN (1) OPERATIONAL WEATHER ANALYSIS AND FORECASTING AND, (2) FOR SUPPORT TO GARP. THE FIVE-CHANNEL INSTRUMENT IS ABLE TO TAKE FULL PICTURES OF THE EARTH'S DISK. THE THREE IR CHANNELS (TWO IN THE 10.5- TO 12.5-MICROMETER REGION AND ONE IN THE 5.7- TO 7.1-MICROMETER REGION), AND THE TWO VISIBLE CHANNELS (0.5- TO 0.9-MICROMETER) USE A COMMON OPTICS SYSTEM. INCOMING RADIATION IS RECEIVED BY A SCAN MIRROR AND COLLECTED BY AN OPTICAL SYSTEM. THE SCAN MIRROR IS SET AT A NOMINAL ANGLE OF 45 DEG TO THE RADIOMETER OPTICAL AXIS, WHICH IS ALIGNED PARALLEL TO THE SPIN AXIS OF THE SPACECRAFT. THE SPINNING MOTION OF THE SPACECRAFT (APPROXIMATELY 100 RPM) PROVIDES A WEST-EAST SCAN MOTION WHEN THE SPIN AXIS OF THE SPACECRAFT IS ORIENTED PARALLEL WITH THE EARTH'S AXIS. THE LATITUDINAL SCAN IS ACCOMPLISHED BY SEQUENTIALLY TILTING THE SCANNING MIRROR AT THE COMPLETION OF EACH SPIN.

-------- METEOSAT-B, ESA STAFF----------

INVESTIGATION NAME- DATA COLLECTION PLATFORM (DCP)

NSSDC ID- METOS-B-02 INVESTIGATIVE PROGRAM
COMMUNICATIONS

INVESTIGATION DISCIPLINE(S)
COMMUNICATIONS

PERSONNEL
PI - ESA STAFF ESA-ESTEC

BRIEF DESCRIPTION
THE DATA COLLECTION PLATFORM IS DESIGNED TO (1) DISSEMINATE IMAGE DATA TO USER STATIONS, (2) COLLECT DATA FROM VARIOUS EARTH-BASED PLATFORMS, AND (3) PROVIDE FOR A SPACE-TO-SPACE RELAY FOR DATA FROM POLAR ORBITING SATELLITES. THIS EXPERIMENT IS SIMILAR TO THE METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM (WEFAX) FLOWN ON SMS 1, SMS 2, AND GOES SERIES SPACECRAFT. THIS EXPERIMENT OPERATES ON S-BAND FREQUENCIES FOR WEFAX TYPE TRANSMISSIONS AND UHF FOR DATA COLLECTION PLATFORM REPORT AND INTERROGATION.

********** NIMBUS-G**********

SPACECRAFT COMMON NAME- NIMBUS-G
ALTERNATE NAMES-

NSSDC ID- NIMBS-G

LAUNCH DATE- 10/00/78 WEIGHT- 832. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 104.01 MIN INCLINATION- 99. DEG
PERIAPSIS- 955. KM APOAPSIS- 955. KM

PERSONNEL
MG - H. MANNHEIMER NASA HEADQUARTERS
SC - M. TEPPER 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 SMMR, (7) - SOLAR BACKSCATTER UV AND TOTAL OZONE MAPPING SPECTROMETER SBUV/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 ERN

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 OTHE' 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, METEOLOGICAL 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 BOLOMETERS. 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 DICHROIC 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 ERN

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS
OCEANOGRAPHY

PERSONNEL

TL - P.	GLOERSEN	NASA-GSFC
TM - R.O.	RAMSEIR	ENVIRONMENT CANADA
TM - D.H.	STAELIN	MASS INST OF TECH
TM - W.J.	CAMPBELL	US GEOLOGICAL SURVEY
TM - D.B.	ROSS	NOAA-ERL
TM - P.	GUDMANSEN	TECH U OF DENMARK

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 ERN

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.	CUNNOLD	MASS INST OF TECH
TM - W.L.	IMHOF	LOCKHEED PALO ALTO

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 0.20 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 0.052 RAD. AT EACH SCAN POSITION THE EARTH RADIANCE IS MONITORED AT SIX WAVELENGTHS BETWEEN 3100 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 5E3. THE TOMS SIGNAL-TO-NOISE RATIO IS GREATER THAN 1.E5.

------- NIMBUS-G, HOUGHTON----------

INVESTIGATION NAME- STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)

NSSDC ID- NIMBS-G-02

INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS
METEOROLOGY

PERSONNEL

PI - J.T.	HOUGHTON	OXFORD U
OI - W.L.	BARNES	NASA-GSFC
OI - K.	DAVIES	WDC-A, SOLAR-TERR PHYS

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 DICHROIC 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 OCEAN COLOR SCANNER

NSSDC ID- NIMBS-G-03 INVESTIGATIVE PROGRAM
CODE ERN

INVESTIGATION DISCIPLINE(S)
EARTH RESOURCES SURVEY

PERSONNEL

TL - W.A.	HOVIS	NOAA-NESS
TM - H.L.	RICHARD	NASA-GSFC
TM - C.S.	YENTSCH	BIGELOW LAB OCEAN SCI
TM - D.	CLARK	NOAA-NESS
TM - J.R.	APEL	NOAA-ERL
TM - S.Z.	EL-SAYED	TEXAS A&M U
TM - H.R.	GORDON	U OF MIAMI
TM - R.C.	WRIGLEY	NASA-ARC

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 670 NANOMETERS CENTER ON THE MOST INTENSE ABSORPTION BANDS OF CHLOROPHYLL, WHILE THE BAND AT 550 NANOMETERS CENTERS ON THE 'HINGE POINT,' THE WAVELENGTH OF MINIMUM ABSORPTION. RATIOS OF MEASURED ENERGIES IN THESE CHANNELS 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 520 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 ERN

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.	STOWE	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 SYNOPTIC 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 ERN

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	STANFORD RES INST

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 1.12 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 ERN

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.	LOEVY	U OF WASHINGTON
TM - S.R.	DRAYSON	U OF MICHIGAN
TM - H.	FISCHER	U OF MUNICH
TM - W.G.	PLANET	NOAA-NESS

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-CD-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-

NSSDC ID- NOAA-A

LAUNCH DATE- 1978
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F
WEIGHT- 588.9 KG

SPONSORING COUNTRY/AGENCY
UNITED STATES
NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 101.5 MIN
PERIAPSIS- 833. KM
INCLINATION- 98.7 DEG
APOAPSIS- 833. KM

PERSONNEL
MG - M.L. GARBACZ
PM - G.A. BRANCHFLOWER
PS - A. ARKING
NASA HEADQUARTERS
NASA-GSFC
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 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-A, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-A -04
INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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-A, NESS STAFF----------

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-A -01
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 -02
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, 14.5, 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-A, NESS STAFF----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM

NSSDC ID- NOAA-A -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-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-B**********

SPACECRAFT COMMON NAME- NOAA-B
ALTERNATE NAMES-

NSSDC ID- NOAA-B

LAUNCH DATE- 1979
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F
WEIGHT- 588.9 KG

SPONSORING COUNTRY/AGENCY
UNITED STATES
NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN
PERIAPSIS- 500. KM
INCLINATION- 98.7 DEG
APOAPSIS- 500. KM

PERSONNEL
MG - M.L. GARBACZ — NASA HEADQUARTERS
PM - G.A. BRANCHFLOWER — NASA-GSFC
PS - A. ARKING — NASA-GSFC

BRIEF DESCRIPTION
NOAA-B IS THE SECOND IN A SERIES OF THIRD-GENERATION, OPERATIONAL 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 0.035 DEG/S.

------- NOAA-B, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-B -04
INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS
INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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-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 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-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 (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**********

SPACECRAFT COMMON NAME- NOAA-C
ALTERNATE NAMES-

NSSDC ID- NOAA-C

LAUNCH DATE- 1980 — WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES — NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN — INCLINATION- 98.7 DEG
PERIAPSIS- 500. KM — APOAPSIS- 500. KM

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, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-C -04

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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-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
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-C ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR) WILL BE A FOUR CHANNEL SCANNING RADIOMETER CAPABLE OF PROVIDING GLOBAL DAYTIME AND NIGHTTIME SEA SURFACE TEMPERATURE, ICE, SNOW, AND CLOUD INFORMATION. THESE DATA WILL BE OBTAINED ON A DAILY BASIS FOR USE IN WEATHER ANALYSIS AND FORECASTING. THE MULTISPECTRAL RADIOMETER WILL OPERATE IN THE SCANNING MODE AND WILL MEASURE EMITTED AND REFLECTED RADIATION IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 (VISIBLE), 0.55 TO 0.9 MICROMETER, CHANNEL 2 (NEAR IR), 0.725 MICROMETER TO DETECTOR CUT OFF AROUND 1.3 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-C, NESS STAFF----------

INVESTIGATION NAME-

NSSDC ID- NOAA-C -02

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)

PERSONNEL
PI - NESS STAFF NOAA-NESS

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
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS) ON NOAA-C IS DESIGNED TO MEET THE METEOROLOGICAL DATA NEEDS OF THE UNITED STATES AND TO SUPPORT THE GLOBAL ATMOSPHERIC RESEARCH PROGRAM (GARP). THE SYSTEM RECEIVES LOW DUTY CYCLE TRANSMISSIONS OF METEOROLOGICAL OBSERVATIONS FROM FREE-FLOATING BALLOONS, OCEAN BUOYS, OTHER SATELLITES, AND FIXED GROUND-BASED SENSOR PLATFORMS DISTRIBUTED AROUND THE GLOBE. THESE OBSERVATIONS ARE ORGANIZED ON BOARD THE SPACECRAFT AND RETRANSMITTED WHEN THE SPACECRAFT COMES IN RANGE OF A COMMAND AND DATA ACQUISITION (CDA) STATION. FOR FREE-MOVING BALLOONS, THE DOPPLER FREQUENCY SHIFT OF THE TRANSMITTED SIGNAL IS OBSERVED TO CALCULATE THE LOCATION OF THE BALLOONS. THE DCS IS EXPECTED, FOR A MOVING SENSOR PLATFORM, TO HAVE A LOCATION ACCURACY OF 5 TO 8 KM RMS, AND A VELOCITY ACCURACY OF 1 TO 1.6 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**********

SPACECRAFT COMMON NAME- NOAA-D
ALTERNATE NAMES-

NSSDC ID- NOAA-D

LAUNCH DATE- 1981 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 500. KM APOAPSIS- 500. KM

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 0.035 DEG/S.

------- NOAA-D, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-D -04

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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-D, NESS STAFF----------

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-D -01

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 1.1 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-D, NESS STAFF----------

INVESTIGATION NAME- OPERATIONAL VERTICAL SOUNDER

NSSDC ID- NOAA-D -02

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - NESS STAFF NOAA-NESS

BRIEF DESCRIPTION
THE NOAA-D OPERATIONAL SOUNDER CONSISTS OF THREE INSTRUMENTS DESIGNED TO DETERMINE RADIANCES NEEDED TO CALCULATE TEMPERATURE AND HUMIDITY PROFILES OF THE ATMOSPHERE FROM THE SURFACE TO THE STRATOSPHERE (APPROXIMATELY 1 MB). THE FIRST INSTRUMENT, THE BASIC SOUNDING UNIT (BSU), HAS 14 CHANNELS AND MAKES MEASUREMENTS IN THE FOLLOWING SPECTRAL INTERVALS -- CHANNEL 1 - THE 3.7-MICROMETER WINDOW REGION, CHANNEL 2 - THE 4.3-MICROMETER CO2 BAND, CHANNEL 3 - THE 9.7-MICROMETER OZONE BAND, CHANNEL 4 - THE 11.1-MICROMETER WINDOW REGION, CHANNELS 5 THROUGH 11 - THE 15-MICROMETER CO2 BAND (13.3, 13.6, 14.0, 14.3, 14.5, 14.75, AND 15.0), AND CHANNELS 12 THROUGH 14 - THE 18-MICROMETER ROTATIONAL WATER VAPOR BANDS (18.8, 23.15, AND 29.4). THE SECOND INSTRUMENT, THE STRATOSPHERIC SOUNDING UNIT, HAS THREE CHANNELS OPERATING AT 14.97 MICROMETERS USING SELECTIVE ABSORPTION BY PASSING THE INCOMING RADIATION THROUGH THREE PRESSURE MODULATED CELLS CONTAINING CO2. THE THIRD INSTRUMENT, THE MICROWAVE SOUNDING UNIT, HAS FOUR CHANNELS OPERATING IN THE 50 TO 60 GHZ OXYGEN (50.3, 53.7, 55.0, AND 57.9) TO OBTAIN TEMPERATURE PROFILES WHICH ARE FREE OF CLOUD INTERFERENCE. THE INSTRUMENTS ARE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE A TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

------- NOAA-D, NESS STAFF----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-D -03

INVESTIGATIVE PROGRAM
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-E**********

SPACECRAFT COMMON NAME- NOAA-E
ALTERNATE NAMES-

NSSDC ID- NOAA-E

LAUNCH DATE- 1982 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 500. KM APOAPSIS- 500. KM

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 BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE IS BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND IS CAPABLE OF MAINTAINING AN EARTH-POINTING ACCURACY OF BETTER THAN PLUS OR MINUS 0.1 DEG WITH A MOTION RATE OF LESS THAN 0.035 DEG/S.

------- NOAA-E, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-E -04

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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, 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 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-F**********

SPACECRAFT COMMON NAME- NOAA-F
ALTERNATE NAMES-

NSSDC ID- NOAA-F

LAUNCH DATE- 1983 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 500. KM APOAPSIS- 500. KM

PERSONNEL
MG - M.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 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-F, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-F -04 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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-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. 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-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). 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 USE CROSS-COURSE SCANNING DEVICES UTILIZING A STEP TO PROVIDE TRAVERSE SCAN WHILE THE ORBITAL MOTION OF THE SATELLITE PROVIDES SCANNING IN THE ORTHOGONAL DIRECTION. SIMILAR EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

-------- NOAA-F, NESS STAFF----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- NOAA-F -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). 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-G**********

SPACECRAFT COMMON NAME- NOAA-G
ALTERNATE NAMES-

NSSDC ID- NOAA-G

LAUNCH DATE- 1984 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS F

SPONSORING COUNTRY/AGENCY
UNITED STATES NOAA-NESS

PERSONNEL
MG - M.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. THE SATELLITE DESIGN WILL PROVIDE 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 WILL 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 WILL CONSISTS OF A SPACE ENVIRONMENT MONITOR (SEM), WHICH WILL MEASURE THE PROTON AND ELECTRON FLUX NEAR THE EARTH, AND A DATA COLLECTION AND PLATFORM LOCATION SYSTEM (DCS), WHICH WILL PROCESS AND RELAY TO CENTRAL DATA ACQUISITION STATIONS, VARIOUS METEOROLOGICAL DATA RECEIVED FROM FREE-FLOATING BALLOONS AND OCEAN BUOYS DISTRIBUTED AROUND THE GLOBE. THE SATELLITE WILL BE BASED UPON THE BLOCK 5D SPACECRAFT BUS DEVELOPED FOR THE US AIR FORCE, AND WILL BE 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/SEC.

-------- NOAA-G, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- NOAA-G -04

INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - 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-G, NESS STAFF----------

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- NOAA-G -01 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)

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), 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 0.12 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-

NSSDC ID- NOAA-G -02 INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)

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-G, 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.

********** ONE METER UV TELESCOPE**********

SPACECRAFT COMMON NAME- ONE METER UV TELESCOPE
ALTERNATE NAMES- SPACELAB ASTRONOMY MISS, SPACELAB IN UV TELESC

NSSDC ID- OMUVTEL

LAUNCH DATE- 1982 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- MIN INCLINATION- DEG
PERIAPSIS- KM APOAPSIS- KM

PERSONNEL
MG - UNKNOWN UNKNOWN
SC - J.D. ROSENDHAL NASA HEADQUARTERS
PM - D.S. LECKRONE NASA-GSFC
PS - UNKNOWN UNKNOWN

BRIEF DESCRIPTION
DURING THE 1980'S, NASA WILL USE THE SPACE SHUTTLE AS ITS PRIMARY TRANSPORTATION SYSTEM FOR CARRYING INSTRUMENTATION INTO NEAR-EARTH ORBIT. UNDER THE SPACELAB PROGRAM THE SHUTTLE'S PAYLOAD BAY IS BEING CONFIGURED AND EQUIPPED TO ACT AS A GENERALIZED IN-ORBIT LABORATORY. ONE PROPOSED SPACECRAFT MISSION IS TO FLY A 1-METER GENERAL PURPOSE TELESCOPE CAPABLE OF PERFORMING NON-SOLAR ASTRONOMICAL OBSERVATIONS FROM THE VACUUM-UV THROUGH THE VISIBLE-WAVELENGTH RANGE. THE INITIAL DEFINITION OF THE REQUIREMENTS FOR THIS 1-M UV-OPTICAL SPACELAB TELESCOPE AND RELATED SUPPORT SYSTEMS BEGAN IN DECEMBER 1974. THE ORGANIZATION AND IMPLEMENTATION OF THE UV-OPTICAL TELESCOPE STUDY WILL BE CARRIED OUT BY AN INSTRUMENT DEFINITION TEAM (IDT) WHOSE MEMBERS HAVE BEEN CHOSEN FROM SCIENTISTS THROUGHOUT THE WORLD ON THE BASIS OF SUBMITTED PROPOSALS. THIS IDT WILL INTERACT WITH NASA THROUGH A NASA STUDY SCIENTIST APPOINTED BY GSFC.

------- ONE METER UV TELESCOPE, HENIZE----------

INVESTIGATION NAME- INSTRUMENT DEFINITION TEAM

NSSDC ID- OMUVTEL-01 INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
TL - K.G. HENIZE NASA-JSC
TM - A.M. SMITH NASA-GSFC
TM - C.M. ANDERSON U OF WISCONSIN
TM - R.W. O'CONNELL U OF VIRGINIA
TM - E.B. JENKINS PRINCETON U

BRIEF DESCRIPTION
THE SPECIFIC GOAL OF THE INSTRUMENT DEFINITION TEAM (IDT) IS TO ESTABLISH THE SCIENTIFIC MERIT AND APPROVE PRELIMINARY CONCEPTUAL DESIGN OF A FLEXIBLE, GENERAL PURPOSE, 1-M CLASS UV-OPTICAL FACILITY TELESCOPE FOR SPACELAB ASTRONOMY MISSIONS. THE END PRODUCTS OF THE DEFINITION STUDY INCLUDE -- (1) A DELINEATION OF BROAD SCIENTIFIC GOALS AND THE DEFINITION OF REPRESENTATIVE OBSERVING PROGRAMS, (2) A THOROUGH STATEMENT OF REQUIREMENTS FOR TELESCOPE AND SUPPORT SYSTEMS PERFORMANCE NECESSARY TO THE FACILITY SCIENTIFIC OBJECTIVES, (3) PRELIMINARY DESCRIPTIONS OF SEVERAL ILLUSTRATIVE FOCAL PLANE INSTRUMENTS, AND (4) A WELL-DEVELOPED CONCEPT OF THE TOTAL OPERATING TELESCOPE FACILITY, INCLUDING COMMAND AND CONTROL MECHANISMS, DATA HANDLING, GROUND OPERATIONS, USER INVOLVEMENT, ETC.

********** PIONEER VENUS ORBITER**********

SPACECRAFT COMMON NAME- PIONEER VENUS ORBITER
ALTERNATE NAMES- PIONEER VENUS 1978 ORBIT

NSSDC ID- P10780R

LAUNCH DATE- 05/22/78 WEIGHT- 517. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- VENUSCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 105. DEG
PERIAPSIS- 200. KM APOAPSIS- 66614. KM

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

THE PIONEER VENUS ORBITER IS PLANNED TO BE A SINGLE, SPIN-STABILIZED SPACECRAFT IN A HIGHLY ELLIPTICAL ORBIT ABOUT VENUS. THE NOMINAL OPERATIONAL LIFETIME IS 1 VENUS SIDEREAL YEAR (225 DAYS), WHICH PERMITS INTENSIVE STUDIES OF THE PLANET'S ATMOSPHERE AND ITS RESPONSES TO THE SUN. THE PAYLOAD HAS BEEN SELECTED TO OPTIMIZE CORRELATIVE STUDIES BETWEEN THE LONG-LIVED ORBITER AND THE ENTRY PROBES. THE ORBITAL INVESTIGATIONS INCLUDE STUDIES OF THE UPPER ATMOSPHERE, IONOSPHERE, AND THE INTERACTIONS OF THE SOLAR WIND WITH THE VENUSIAN ATMOSPHERE. REMOTE SENSING TECHNIQUES EXAMINE THE LOWER ATMOSPHERE AND SURFACE FOR GLOBAL CHARACTERISTICS AND TEMPORAL PHENOMENA OF BOTH SHORT- AND LONG-TERM DURATION. THE LONGEVITY OF THE ORBITER AND THE COMPLETION OF A LARGE NUMBER OF MONITORED ORBITS SHOULD PERMIT A DETERMINATION OF THE GRAVITATIONAL FIELD HARMONICS. IN AN EFFORT TO MINIMIZE COST AND OPTIMIZE DESIGN CAPABILITY, THE ORBITER SPACECRAFT AND THE PROBE BUS FOR THE MULTIPROBE MISSION ARE OF COMMON ORIGIN.

------- PIONEER VENUS ORBITER, BRACE----------

INVESTIGATION NAME- LANGMUIR PROBE

NSSDC ID- PI0780R-01

INVESTIGATIVE PROGRAM
CODE SL

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.	NAGY	U OF MICHIGAN
OI -	T.M.	DONAHUE	U OF MICHIGAN

BRIEF DESCRIPTION

THIS EXPERIMENT CONSISTS OF A PAIR OF CYCLINDRICAL 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 ORBITER, COVERING A LARGE RANGE OF SOLAR ASPECT ANGLES, TO YIELD A MORE COMPLETE CONFIGURATION OF THE PHYSICAL PROPERTIES OF THE IONOPAUSE REGION.

------- PIONEER VENUS ORBITER, BROWN----------

INVESTIGATION NAME- RADAR ALTIMETER

NSSDC ID- PI0780R-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL

PI -	W.E.	BROWN	NASA-JPL
OI -	G.	PETTENGILL	MASS INST OF TECH
OI -	W.M.	KAULA	U OF CALIF, LA
OI -	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 ORBITER, CROFT----------

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- PI0780R-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

TL -	T.A.	CROFT	STANFORD U
TM -	G.M.	KEATING	NASA-LARC
TM -	A.J.	KLIORE	NASA-JPL
TM -	R.	PHILLIPS	NASA-JPL
TM -	I.I.	SHAPIRO	MASS INST OF TECH
TM -	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 ORBITER, DONAHUE----------

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- PI0780R-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 OCCURING IN THE ATMOSPHERE OF VENUS.

------- PIONEER VENUS ORBITER, EVANS----------

INVESTIGATION NAME- TRANSIENT GAMMA-RAY SOURCES

NSSDC ID- PI0780R-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.	KLEBESADEL	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 ORBITER, HANSEN----------

INVESTIGATION NAME- CLOUD PHOTOPOLARIMETER

NSSDC ID- PI0780R-06

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI -	J.W.	HANSEN	U OF ARIZONA
OI -	P.	STONE	NASA-GISS
OI -	A.A.	LACIS	COMPUTER SCIENCES CORP
OI -	D.L.	COFFEEN	NASA-GISS
OI -	L.	TRAVIS	COMPUTER SCIENCES CORP

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 ORBITER, KNUDSEN----------

INVESTIGATION NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- PI0780R-07

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
PLANETARY IONOSPHERES

PERSONNEL

PI - W.C.	KNUDSEN	LOCKHEED PALO ALTO
OI - K.	SPENNER	INST FUR PHYS WELTRAUM
OI - R.C.	WHITTEN	NASA-ARC

BRIEF DESCRIPTION

THE INSTRUMENT PROPOSED FOR THIS EXPERIMENT IS 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 ORBITER, MASURSKY----------

INVESTIGATION NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- PI078OR-08

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
GEODESY AND CARTOGRAPHY
PLANETOLOGY

PERSONNEL

PI - H.	MASURSKY	US GEOLOGICAL SURVEY

BRIEF DESCRIPTION

SURFACE PROFILE, ROUGHNESS, AND ELECTRICAL PROPERTIES DATA FROM THE PIONEER VENUS RADAR ALTIMETER 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 ORBITER, MCGILL----------

INVESTIGATION NAME- PARTICIPATING THEORIST MCGILL

NSSDC ID- PI078OR-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION 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 ORBITER, NAGY----------

INVESTIGATION NAME- PARTICIPATING THEORIST NAGY

NSSDC ID- PI078OR-10

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.F.	NAGY	U OF MICHIGAN

BRIEF DESCRIPTION

INVESTIGATIONS OF THE IONOSPHERE OF VENUS 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 ORBITER, NIEMANN----------

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- PI078OR-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
AERONOMY
PLANETARY ATMOSPHERES

PERSONNEL

PI - H.B.	NIEMANN	NASA-GSFC
OI - G.R.	CARIGNAN	U OF MICHIGAN
OI - R.E.	HARTLE	NASA-GSFC
OI - 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 ORBITER, RUSSELL----------

INVESTIGATION NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- PI078OR-12

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS
PARTICLES AND FIELDS

PERSONNEL

PI - C.T.	RUSSELL	U OF CALIF, LA
OI - P.J.	COLEMAN, JR.	U OF CALIF, LA
OI - F.V.	CORONITI	U OF CALIF, LA
OI - C.F.	KENNEL	U OF CALIF, LA
OI - R.L.	MCPHERRON	U OF CALIF, LA
OI - G.L.	SISCOE	U OF CALIF, LA

BRIEF DESCRIPTION

THIS EXPERIMENT 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 ORBITER, SCARF----------

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- PI078OR-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL

PI - F.L.	SCARF	TRW SYSTEMS GROUP
PI - I.M.	GREEN	TRW 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 ORBITER, SCHUBERT----------

INVESTIGATION NAME- PARTICIPATING THEORIST SCHUBERT

NSSDC ID- P10780R-14

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
IONOSPHERES
MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES
PLANETOLOGY

PERSONNEL

PI -	G.	SCHUBERT	U OF CALIF, LA

BRIEF DESCRIPTION
MEASUREMENTS OF PLASMA TEMPERATURES, MAGNETIC FIELDS, COMPOSITION, AND OTHER DATA ARE USED TO DEVELOP AND TEST THEORIES OF ATMOSPHERIC CIRCULATION AND SOLAR WIND-IONOSPHERE INTERACTIONS. IN THE CASE OF THE TOPOGRAPHY AND GRAVITY, THE DATA (ALTIMETRY AND TRACKING) ARE USED BOTH IN DESCRIPTIVE FASHION, TO SIMPLY CHARACTERIZE THE SURFACE OF VENUS AND ITS GRAVITATIONAL FIELD, AND IN A MORE QUANTITATIVE WAY TO MODEL THE INTERNAL STRUCTURE OF THE PLANET.

------- PIONEER VENUS ORBITER, STEWART----------

INVESTIGATION NAME- PROGRAMMABLE ULTRAVIOLET SPECTROMETER

NSSDC ID- P10780R-15

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
IONOSPHERES

PERSONNEL

PI -	A.I.	STEWART	U OF COLORADO
OI -	C.A.	BARTH	U OF COLORADO
OI -	C.W.	HORD	U OF COLORADO
OI -	G.E.	THOMAS	U OF COLORADO
OI -	D.	ANDERSON	U OF COLORADO

BRIEF DESCRIPTION
THIS INVESTIGATION USES A 125-MM CASSEGRAIN TELESCOPE ON A 125-MM EBERT-FASTIE SPECTROMETER WITH A PROGRAMMABLE GRATING DRIVE. AIRGLOW, SCATTERED SUNLIGHT, AND HYDROGEN LYMAN ALPHA EMISSIONS ARE DETECTED IN THE THERMOSPHERE, MESOSPHERE, AND EXOSPHERE OF VENUS. THESE MEASUREMENTS ARE USED TO ESTABLISH AND MAP THE COMPOSITION, TEMPERATURE, AND PHOTOCHEMISTRY OF THE THERMOSPHERE AND IONOSPHERE, TO DETERMINE THE PRESSURE AT AND ABOVE THE VISIBLE CLOUD TOPS, AND TO ESTABLISH THE DISTRIBUTION AND ESCAPE RATE OF ATOMIC HYDROGEN. THE INSTRUMENT OPERATES IN THE 1100-3400 A REGION.

------- PIONEER VENUS ORBITER, TAYLOR----------

INVESTIGATION NAME- RADIOMETRIC TEMPERATURE-SOUNDING EXPERIMENT

NSSDC ID- P10780R-16

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI -	F.W.	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
OI -	C.D.	RODGERS	OXFORD U
OI -	F.J.	WILLIAMSON	CLARENDON LAB
OI -	R.	DICKINSON	NATL CTR FOR ATMOS RES
OI -	J.C.	GILLE	NATL CTR FOR ATMOS RES

BRIEF DESCRIPTION
THIS INVESTIGATION USES AN 8-CHANNEL RADIOMETER FOR VERTICAL TEMPERATURE SOUNDING OF THE ATMOSPHERE FROM THE CLOUD TOPS (60 KM) TO 150 KM AND FOR INVESTIGATIONS OF CLOUD MORPHOLOGY, INCLUDING THE IDENTIFICATION OF POSSIBLE MULTIPLE LAYERS AND WATER VAPOR MAPPING. THE INSTRUMENT IS BASED ON THE SELECTIVE CHOPPER RADIOMETER AND THE PRESSURE MODULATOR RADIOMETER DESIGNS FLOWN ON NIMBUS SATELLITES.

------- PIONEER VENUS ORBITER, TAYLOR, JR.----------

INVESTIGATION NAME- ION MASS SPECTROMETER

NSSDC ID- P10780R-17

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY IONOSPHERES
PLANETARY ATMOSPHERES

PERSONNEL

PI -	H.A.	TAYLOR, JR.	NASA-GSFC
OI -	S.J.	BAUER	NASA-GSFC
OI -	R.E.	HARTLE	NASA-GSFC
OI -	H.C.	BRINTON	NASA-GSFC
OI -	J.R.	HERMAN	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 ORBITER, WOLFE----------

INVESTIGATION NAME- SOLAR WIND PLASMA DETECTOR

NSSDC ID- P10780R-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 PROBE BUS**********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE BUS
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- P1078PA

LAUNCH DATE- 08/00/78 WEIGHT- 380. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED 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 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 FOURPROBES 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, IS SCHEDULED TO PLACE 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 BUS, BAUER----------

INVESTIGATION NAME- PARTICIPATING THEORIST BAUER

NSSDC ID- P1078PA-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 PROBE BUS, COUNSELMAN----------

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- P1078PA-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.H.	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 BUS, DONAHUE----------

INVESTIGATION NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- P1078PA-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

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 PROBE BUS, GOODY----------

INVESTIGATION NAME- PARTICIPATING THEORIST GOODY

NSSDC ID- P1078PA-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 PROBE BUS, HUNTEN----------

INVESTIGATION NAME- PARTICIPATING THEORIST HUNTEN

NSSDC ID- P1078PA-11

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL
PI - D.M. HUNTEN KITT PEAK NATL OBS

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 PROBE BUS, PETTENGILL----------

INVESTIGATION NAME- RADIO SCIENCE TEAM

NSSDC ID- P1078PA-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	STANFORD U
TM - A.J.	KLIORE	NASA-JPL
TM - 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 PROBE BUS, POLLACK----------

INVESTIGATION NAME- PARTICIPATING THEORIST POLLACK

NSSDC ID- P1078PA-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. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES THE DETERMINATION OF IMPORTANT SOURCES OF THERMAL OPACITY, THE SCATTERING CHARACTERISTICS OF THE CLOUDS, AND SOLAR ENERGY DEPOSITION PROFILE, AND THE THEORY AND EVOLUTION OF THE ATMOSPHERE AND LITHOSPHERE OF VENUS.

------- PIONEER VENUS PROBE BUS, SPENCER----------

INVESTIGATION NAME- PARTICIPATING THEORIST SPENCER

NSSDC ID- PI078PA-13

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL
PI - N.F. 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. EACH THEORIST HAS AN AREA OF MAJOR RESPONSIBILITY THAT INCLUDES THE INTERDISCIPLINARY ASPECTS OF THE NATURE OF THE COMPOSITION OF THE ATMOSPHERE OF VENUS, THE NATURE AND COMPOSITION OF THE CLOUDS IN THE ATMOSPHERE, AND THE DRIVING FORCES OR ENERGY INPUTS AFFECTING THE BEHAVIOR OF THE ATMOSPHERE AND CLOUDS AND CHANGES THAT TAKE PLACE.

------- PIONEER VENUS PROBE BUS, TAYLOR, JR.----------

INVESTIGATION NAME- ION-MASS SPECTROMETER

NSSDC ID- PI078PA-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.	HARTLE	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. A BENNETT ION SPECTROMETER, SIMILAR TO UNITS FLOWN ON MANY EARTH SATELLITES AND ROCKETS, MEASURES VENUS' UPPER ATMOSPHERE ION CONCENTRATIONS IN THE MASS RANGE FROM 1 TO 60 ATOMIC MASS UNITS (U) FROM THE TIME OF CROSSING VENUS' BOWSHOCK TO BUS BURNUP.

------- PIONEER VENUS PROBE BUS, VON ZAHN----------

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- PI078PA-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - U.	VON ZAHN	U OF BONN
OI - A.O.C.	NIER	U OF MINNESOTA
OI - D.M.	HUNTEN	KITT PEAK NATL OBS

BRIEF DESCRIPTION
THIS NEUTRAL PARTICLE MASS SPECTROMETER EXPERIMENT WILL OBTAINS 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. A MAGNETIC DEFLECTION, DOUBLE-FOCUSING, MASS SPECTROMETER WILL BE FLOWN TO MEASURE THE UPPER ATMOSPHERE NEUTRAL MOLECULES IN THE MASS RANGE 1 TO 46 ATOMIC MASS UNITS.

********** PIONEER VENUS PROBE LRG**********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE LRG
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- PI078PB

LAUNCH DATE- 08/00/78 WEIGHT- 300. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED 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. TWO SMALL PROBES ENTER ON THE NIGHTSIDE AND A SMALL PROBE AND THIS 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 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, IS SCHEDULED TO PLACE 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 LRG, BOESE----------

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- PI078PB-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. THIS EXPERIMENT USES A 4-CHANNEL INFRARED RADIOMETER LOOKING DOWN FROM THE PROBE. TWO INTERNAL BLACKBODIES ARE USED TO ALLOW ABSOLUTE MEASUREMENTS OF THE FLUX IN EACH CHANNEL. THE INSTRUMENT WEIGHS ABOUT 2 KG AND USES ABOUT 3 W OF POWER.

------- PIONEER VENUS PROBE LRG, COUNSELMAN----------

INVESTIGATION NAME- DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- PI078PB-09

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
METEOROLOGY
PLANETOLOGY

PERSONNEL

PI - C.C.	COUNSELMAN	MASS INST OF TECH
OI - G.H.	PETTENGILL	MASS INST OF TECH
OI - J.	CHARNEY	MASS INST OF TECH
TM - I.I.	SHAPIRO	MASS INST OF TECH
TM - R.	PRINN	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 LRG, HOFFMAN----------

INVESTIGATION NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- PI078PB-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 DECENT. 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- PI078PB-03

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI -	R.	KNOLLENBERG	U OF CHICAGO
OI -	D.M.	HUNTEN	KITT PEAK NATL OBS

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- PI078PB-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI -	V.I.	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- PI078PB-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI -	B.	RAGENT	NASA-ARC
PI -	J.E.	BLAMONT	CNRS-LPSP

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 0.5 KG AND USES ABOUT 1.3 W OF POWER.

------- PIONEER VENUS PROBE LRG, SEIFF----------

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PB-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI -	A.	SEIFF	NASA-ARC
OI -	S.	SOMMER	NASA-ARC
OI -	R.C.	BLANCHARD	NASA-LARC
OI -	D.B.	KIRK	NASA-ARC
OI -	R.	YOUNG	U OF CALIF, LA
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 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- PI078PB-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 SM**********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- PI078PC

LAUNCH DATE- 08/00/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- VENUS PROBE

PERSONNEL

MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS
SC -	R.F.	FELLOWS	NASA HEADQUARTERS
PM -	C.F.	HALL	NASA-ARC
PS -	L.	COLIN	NASA-ARC

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, IS SCHEDULED TO PLACE 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, COUNSELMAN----------

INVESTIGATION NAME- DIFFERENTIAL VERY LONG BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- PI078PC-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.H.	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, RAGENT----------

INVESTIGATION NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- PI078PC-02

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - B.	RAGENT	NASA-ARC
PI - J.E.	BLAMONT	CNRS-LPSP

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.

------- PIONEER VENUS PROBE SM, SEIFF----------

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PC-01

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.	SEIFF	NASA-ARC
OI - S.	SOMMER	NASA-ARC
OI - D.B.	KIRK	NASA-ARC
OI - R.C.	BLANCHARD	NASA-LARC
OI - R.	YOUNG	U OF CALIF, LA
OI - J.	DERR	US GEOLOGICAL SURVEY

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 PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST A7106-2001). 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, SUOMI----------

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- PI078PC-04

INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - V.E.	SUOMI	U OF WISCONSIN
OI - J.	LENOBLE	U OF LILLE
OI - L.A.	SROMOVSKY	U OF WISCONSIN
OI - A.	FYMAT	NASA-JPL
OI - G.	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 SM2**********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM2
ALTERNATE NAMES- PIONEER VENUS 1978

NSSDC ID- PI078PD

LAUNCH DATE- 08/00/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED 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, IS SCHEDULED TO PLACE 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 SM2, COUNSELMAN----------

INVESTIGATION NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- PI078PD-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.H.	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- PI078PD-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - B.	RAGENT	NASA-ARC
PI - J.E.	BLAMONT	CNRS-LPSP

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 1.2 W OF POWER.

------- PIONEER VENUS PROBE SM2, SEIFF----------

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PD-01 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.	SEIFF	NASA-ARC
OI - S.	SOMMER	NASA-ARC
OI - D.B.	KIRK	NASA-ARC
OI - R.C.	BLANCHARD	NASA-LARC
OI - R.	YOUNG	U OF CALIF, LA
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- PI078PD-04 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - V.E.	SUOMI	U OF WISCONSIN
OI - J.	LENOBLE	U OF LILLE
OI - L.A.	SROMOVSKY	U OF WISCONSIN
OI - A.	FYMAT	NASA-JPL
OI - G.	DANIELSON	NASA-JPL
OI - M.	HERMAN	U OF LILLE

BRIEF DESCRIPTION
THE OBJECTIVES ARE TO LOCATE REGIONS OF RADIATIVE COVERGENCE 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- PI078PE

LAUNCH DATE- 08/00/78 WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED 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 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, IS SCHEDULED TO PLACE 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- DIFFERTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- PI078PE-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.H.	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- PI078PE-02 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY
METEOROLOGY

PERSONNEL

PI - B.	RAGENT	NASA-ARC
PI - J.E.	BLAMONT	CNRS-LPSP

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.

------- PIONEER VENUS PROBE SM3, SEIFF----------

INVESTIGATION NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PE-01 INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES

PERSONNEL

PI - A.	SEIFF	NASA-ARC
OI - S.	SOMMER	NASA-ARC
OI - R.C.	BLANCHARD	NASA-LARC
OI - D.B.	KIRK	NASA-ARC
OI - R.	YOUNG	U OF CALIF, LA
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 SM3, SUOMI----------

INVESTIGATION NAME- INFRARED RADIOMETER

NSSDC ID- P1078PE-04
INVESTIGATIVE PROGRAM
CODE SL

INVESTIGATION DISCIPLINE(S)
PLANETARY ATMOSPHERES
AERONOMY

PERSONNEL

PI - V.E.	SUOMI	U OF WISCONSIN
OI - J.	LENOBLE	U OF LILLE
OI - A.	FYMAT	NASA-JPL
OI - L.A.	SROMOVSKY	U OF WISCONSIN
OI - G.	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.

********** SAGE**********

SPACECRAFT COMMON NAME- SAGE
ALTERNATE NAMES- AEM-B, STRAT AERO AND GAS EXP
APPL EXPL MISSION B, SAGM

NSSDC ID- AEM-B

LAUNCH DATE- 07/01.79 WEIGHT- 122. KG
LAUNCH SITE- WALLOPS FLIGHT CENTER, UNITED STATES
LAUNCH VEHICLE- SCOUT-F

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96.6 MIN INCLINATION- 50. DEG
PERIAPSIS- 600. KM APOAPSIS- 600. KM

PERSONNEL

MG - D.S.	DILLER	NASA HEADQUARTERS
SC - M.	TEPPER	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 IS 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 ERF

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 THAT 1 KM.

********** SAN MARCO-D/L**********

SPACECRAFT COMMON NAME- SAN MARCO-D/L
ALTERNATE NAMES-

NSSDC ID- SM-DL

LAUNCH DATE- 02/00/80 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 APOAPSIS- 800. KM

PERSONNEL

MG - W.	LOGAN	NASA HEADQUARTERS
SC - E.	SCHMERLING	NASA HEADQUARTERS
PM - A.J.	CAPORALE	NASA-GSFC
PS - J.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 50-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 -01
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- IVI-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. HEPPNER 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 - M. MASCHEK INST FUR PHYS WELTRAUM
OI - C. MUNTHER 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- 09/00/79 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 APOAPSIS- 27000. KM

PERSONNEL
PM - A.J. CAPORALE 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 40 CM, WITH THE SECOND CYLINDER EXTENDING FROM THE END OF THE FIRST FOR AN ADDITIONAL 42-CM AND WITH A DIAMETER OF ABOUT 32 CM. THE SURFACE OF THE LARGER CYLINDER IS COVERED WITH 1296 SOLAR CELLS THAT FEED 2 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
EARTH OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
ATMOSPHERIC PHYSICS

PERSONNEL
PI - BUONGIORNO 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, TE 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 MARIO-D.'

********** SCATHA **********

SPACECRAFT COMMON NAME- SCATHA
ALTERNATE NAMES- SESP P78-2A, P78-2
STP P78-2

NSSDC ID- SCATHA

LAUNCH DATE- 01/00/79 WEIGHT- 343. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES DOD-USAF
UNITED STATES NASA-OSS
UNITED STATES DOD-NAVY

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 2.50 DEG
PERIAPSIS- 27850. KM APOAPSIS- 42780. KM

PERSONNEL
MG - NONE ASSIGNED
SC - NONE ASSIGNED
PM - J. DURRETT USAF-SAMSO
PS - NONE ASSIGNED

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 ONE YEAR EXTENSIONS.

------- SCATHA, AGGSON -------

INVESTIGATION NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- SCATHA -05
INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
IONOSPHERES

PERSONNEL
PI - T.L. AGGSON NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC 10 USAF NO.) 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/M.

------- SCATHA, BLAKE -------

INVESTIGATION NAME- ENERGETIC PROTON DETECTOR

NSSDC ID- SCATHA -14
INVESTIGATIVE PROGRAM
CODE ST
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.B. BLAKE AEROSPACE CORP

BRIEF DESCRIPTION
THIS EXPERIEMNT (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. THE EXPERIMENT IS FUNDED BY SAMSO.

------- SCATHA, CHAPPELL -------

INVESTIGATION NAME- LIGHT ION MASS SPECTROMETER

NSSDC ID- SCATHA -09
INVESTIGATIVE PROGRAM
CODE ST/CO-OP
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - C.R. CHAPPELL NASA-MSFC
CO - D.L. REASONER NASA-MSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC 7) 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.

------- SCATHA, COHEN -------

INVESTIGATION NAME- ELECTRON GUN-ION GUN

NSSDC ID- SCATHA -07
INVESTIGATIVE PROGRAM
CODE ST
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 GROUNDED 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 13). 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.

------- SCATHA, DEFOREST -------

INVESTIGATION NAME- SAN DIEGO PARTICLE DETECTOR

NSSDC ID- SCATHA -11
INVESTIGATIVE PROGRAM
CODE ST/ONR
INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - S.E. DEFOREST U OF CALIF, SAN DIEGO

BRIEF DESCRIPTION
THIS EXPERIMENT (SC 9) MEASURES THE ELECTRON AND ION DIFFERENTIAL FLUX, ENERGY, AND ANGLE RESOLUTION. THIS PARTICLE DETECTOR MEASURES ENERGY SPECTRA IN 64 STEPS BETWEEN 1 AND 20,000 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. THE EXPERIMENT IS FUNDED BY ONR.

-------- SCATHA, FENNELL----------

INVESTIGATION NAME- SPACECRAFT SHEATH FIELDS DETECTOR

NSSDC ID- SCATHA -06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - J.F. FENNELL 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.

-------- SCATHA, JOHNSON----------

INVESTIGATION NAME- ENERGETIC ION SPECTROMETER

NSSDC ID- SCATHA -13

INVESTIGATIVE PROGRAM
CODE ST/ONR

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
SPACE PLASMAS

PERSONNEL
PI - R.L. JOHNSON LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS EXPERIMENT 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.

-------- SCATHA, KOONS----------

INVESTIGATION NAME- SPACECRAFT SURFACE POTENTIAL MONITOR

NSSDC ID- SCATHA -01

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
MAGNETOSPHERIC PHYSICS

PERSONNEL
PI - H.C. KOONS AEROSPACE CORP

BRIEF DESCRIPTION
THE FLIGHT INSTRUMENT (PART OF SC1) MEASURES THE SURFACE POTENTIAL OF 20 DIFFERENT TYPES OF MATERIALS RELATIVE TO SOME 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 CAPACITANCE OF THIS CONFIGURATION IS ABOUT 250 MICRO-MICRO-FARADS. THE CONDUCTING PLATE IS ATTACHED TO THE REFERENCE POINT THROUGH A 0.25-MICRO-FARAD CAPACITOR. THE TWO CAPACITORS CONSTITUTE A 1000 TO 1 VOLTAGE DIVIDER BETWEEN THE SENSOR SURFACE AND THE REFERENCE POINT. SOME OF THE MATERIALS USED ARE -- SILICON AND CARBON CLOTH FABRIC WITH AND WITHOUT INTERWOVEN CONDUCTING WIRES OVER MULTILAYER INSULATION, SOLAR CELL COVER GLASSES, TWO BLACK PAINTS WITH DIFFERENT CONDUCTIVITY, ONE STANDARD WHITE PAINT AND ONE CONDUCTING WHITE PAINT, GOLD (REFERENCE), QUARTZ, ALUMINUM-TWO SURFACE FINISHES, AND MYLAR MULTILAYER INSULATION. SIXTEEN OF THE SAMPLES ARE PLACED ON THE SIDES OF THE SATELLITE AND ROTATED IN AND OUT OF SUNLIGHT. TWO SAMPLES EACH ARE LOCATED AT THE ENDS IN THE SHADOWS. THIS EXPERIMENT IS FUNDED BY SAMSO.

-------- SCATHA, KOONS----------

INVESTIGATION NAME- CHARGING ELECTRICAL EFFECTS ANALYZER

NSSDC ID- SCATHA -02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - H.C. KOONS AEROSPACE CORP

BRIEF DESCRIPTION
THE FLIGHT 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 0.1 TO 10 MHZ 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.

-------- SCATHA, LEDLEY----------

INVESTIGATION NAME- MAGNETIC FIELD MONITOR

NSSDC ID- SCATHA -08

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - B.G. LEDLEY NASA-GSFC

BRIEF DESCRIPTION
THIS EXPERIMENT (SC 11) OBTAINS TRIAXIAL MEASUREMENTS OF THE GEOMAGNETIC FIELD. A BOOM-MOUNTED (ON A 7-M BOOM) FLUXGATE MAGNETOMETER IS USED. TIME RESOLUTION IS FOUR VECTOR PER S. FIELD RESOLUTION IS 0.4 NANOTESSLA FOR A DYNAMIC RANGE OF +500 NANOTESSLA PER AXIS. SENSOR RESPONSE IS FROM DC TO 70 HZ.

-------- SCATHA, LEHN----------

INVESTIGATION NAME- QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS

NSSDC ID- SCATHA -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - W.L. LEHN USAF MATERIALS LAB
CI - D.F. HALL AEROSPACE CORP

BRIEF DESCRIPTION
IN THIS EXPERIMENT (ML12) TWO QUARTZ CRYSTAL MICROBALANCES ARE PLACED IN RETARDING POTENTIAL ANALYZERS, WITH ONE MICROBALANCE-ANALYZER SET MOUNTED ON THE SATELLITE 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 100 DEG C.

-------- SCATHA, LEHN----------

INVESTIGATION NAME- THERMAL CONTROL SAMPLE MONITOR

NSSDC ID- SCATHA -04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PLANETARY PHYSICS

PERSONNEL
PI - W.L. LEHN US AIR FORCE

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.

-------- SCATHA, PAVEL----------

INVESTIGATION NAME- RAPID SCAN PARTICLE DETECTOR

NSSDC ID- SCATHA -12

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - A. PAVEL USAF GEOPHYS LAB

BRIEF DESCRIPTION
THIS EXPERIMENT (SC5) EMPLOYS ELECTROSTATIC ANALYZERS AND SOLID STATE SPECTROMETERS TO MEASURE THE ELECTRON AND ION DIFFERENTIAL FLUX. FOR ELECTRON AND PROTON FLUXES, THIS RAPID SCAN PARTICLE DETECTOR PROVIDES FAST TIME RESOLUTION, POSSIBLY WITHIN 1 MS. TO OBTAIN SUFFICIENT COUNTING RATES. THE INSTRUMENT HAS A 15-DEG HALF-CONE ANGLE ACCEPTANCE, AND THE ENERGY SPECTRUM IS MEASURED IN ONLY FOUR STEPS.

------- SCATHA, REAGAN----------

INVESTIGATION NAME- HIGH-ENERGY PARTICLE DETECTOR

NSSDC ID- SCATHA -15

INVESTIGATIVE PROGRAM
CODE ST/ONR

INVESTIGATION DISCIPLINE(S)
HIGH ENERGY ASTROPHYSICS

PERSONNEL
PI - J.B. REAGAN LOCKHEED PALO ALTO

BRIEF DESCRIPTION
THIS EXPERIMENT (SC 3) 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.

------- SCATHA, SAGALYN----------

INVESTIGATION NAME - PLASMA PROBE

NSSDC ID- SCATHA -10

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS

PERSONNEL
PI - R.C. SAGALYN USAF GEOPHYS LAB

BRIEF DESCRIPTION
THE PLASMA PROBE EXPERIMENT (SC6) MEASURES THE ELECTRON DENSITY IN THE RANGE 1.0E-1 TO 1.0E+4 PER CM CUBED AND TEMPERATURE FOR ELECTRONS IN THE RANGE 0 TO 100 EV. THE SENSOR INCLUDES TWO GRIDDED PROBES, ONE MOUNTED ON A 3-M INSULATED BOOM AND THE OTHER BODY MOUNTED ON A CONDUCTING SURFACE.

********** SEASAT-A**********

SPACECRAFT COMMON NAME- SEASAT-A
ALTERNATE NAMES- OCEAN DYNAMICS SAT-A, SEA SATELLITE-A

NSSDC ID- SEAST-A

LAUNCH DATE- 05/17/78 WEIGHT- 1800. Kg
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100.2 MIN INCLINATION- 108. DEG
PERIAPSIS- 775. KM APOAPSIS- 775. KM

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-A) 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 BEING CONSIDERED 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-A, MCLAIN----------

INVESTIGATION NAME- SCANNING VISUAL/INFRARED RADIOMETER

NSSDC ID- SEAST-A-04

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL

TL - E.P.	MCLAIN	NOAA-NESS
TM -	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.

------- SEASAT-A, PIERSON----------

INVESTIGATION NAME- MICROWAVE WIND SCATTEROMETER

NSSDC ID- SEAST-A-03

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

TL - W.J.	PIERSON	CUNY INST MAR+ATMOS SC
TM - W.L.	GRANTHAM	NASA-LARC
TM -	FLITTNER	NOAA-NWS
TM -	BAER	NOAA
TM -	HALBERSTAM	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 20 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-A, ROSS----------

INVESTIGATION NAME- SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR)

NSSDC ID- SEAST-A-05

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
OCEANOGRAPHY

PERSONNEL

TL - D.B.	ROSS	NOAA-ERL
TM -	REINHARDT	NOAA
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.T.	WILHEIT, JR.	NASA-GSFC
TM - N.	HUANG	NASA-WFC
TM - C.T.	SWIFT	NASA-LARC
TM - W.J.	CAMPBELL	US GEOLOGICAL SURVEY
TM -	CARDONE	CUNY INST MAR+ATMOS SC

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-A, SMITH, III----------

INVESTIGATION NAME- COMPRESSED PULSE RADAR ALTIMETER (RA)

NSSDC ID- SEAST-A-01

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
NAVIGATION
METEOROLOGY

PERSONNEL

TL - S.L.	SMITH, III	USN SURF WEAPONS CNTR
TM - B.H.	CHOVITZ	NOAA-NOS
TM -	TOWNSEND	NASA-WFC
TM - J.T.	MCGOOGAN	NASA-WFC
TM -	BYRNE	NOAA
TM - E.M.	GAPOSCHKIN	SAO
TM -	LEONIBUS	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-A, TELEKI----------

INVESTIGATION NAME- COHERENT SYNTHETIC APERTURE IMAGING RADAR (SAR)

NSSDC ID- SEAST-A-02

INVESTIGATIVE PROGRAM
EARTH OBSERVATIONS

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 -	RODGERS	NASA-JPL
TM - C.L.	RIFENACH	NOAA-ERL
TM - J.W.	SHERMAN, III	NOAA-NESS
TM - R.	STEWART	SCRIPPS INST OCEANOGR
TM - J.	ZELENKA	ENVIRON RES INST OF MI
TM -	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 50 TO 1000 METERS AND CAN DETERMINE WAVE DIRECTION WITHIN 20 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.

********** SEASAT-B**********

SPACECRAFT COMMON NAME- SEASAT-B
ALTERNATE NAMES- OCEAN DYNAMICS SAT-B, SEA SATELLITE-B

NSSDC ID- SEAST-B

LAUNCH DATE- 1981 WEIGHT- KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OA

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 100.3 MIN INCLINATION- 108. DEG
PERIAPSIS- 775. KM APOAPSIS- 775. KM

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 IS DESIGNED TO PROVIDE MEASUREMENTS OF WAVE HEIGHTS AND DIRECTION SPECTRUM, 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. ACCURACIES ARE EXPECTED FOR THE SPACECRAFT TO OCEAN SURFACE DISTANCES TO 10 CM, WIND SPEEDS TO 6.6 FPS, AND SURFACE TEMPERATURES TO 1 DEG C.

------- SEASAT-B, MCLAIN----------

INVESTIGATION NAME- SCANNING VISUAL/INFRARED RADIOMETER

NSSDC ID- SEAST-B-04

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL

TL - E.P.	MCLAIN	NOAA-NESS
TM -	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 FOR OCEAN, COASTAL, AND ATMOSPHERIC FEATURES IS 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.

------- SEASAT-B, PIERSON----------

INVESTIGATION NAME- MICROWAVE WIND SCATTEROMETER

NSSDC ID- SEAST-B-03

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL

TL - W.J.	PIERSON	CUNY INST MAR+ATMOS SC
TM - W.L.	GRANTHAM	NASA-LARC
TM -	FLITTNER	NOAA-NWS
TM -	BAER	NOAA
TM -	HALBERSTAM	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 20 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-B, ROSS----------

INVESTIGATION NAME- SCANNING MULTI-CHANNEL MICROWAVE RADIOMETER (SMMR)

NSSDC ID- SEAST-B-05

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
OCEANOGRAPHY

PERSONNEL

TL - D...	ROSS	NOAA-ERL
TM -	REINHARDT	NOAA
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.T.	WILHEIT, JR.	NASA-GSFC
TM - N.	HUANG	NASA-WFC
TM - C.T.	SWIFT	NASA-LARC
TM - W.J.	CAMPBELL	US GEOLOGICAL SURVEY
TM -	CARDONE	CUNY INST MAR+ATMOS SC

BRIEF DESCRIPTION

THE OCEAN DYNAMICS SATELLITE (SEASTA1-B) 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 BEING CONSIDERED 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 SPEED TO 6.6 BPS, AND SURFACE TEMPERATURES TO 1 DEG C.

------- SEASAT-B, SMITH, III----------

INVESTIGATION NAME- COMPRESSED PULSE RADAR ALTIMETER (RA)

NSSDC ID- SEAST-B-01

INVESTIGATIVE PROGRAM
EARTH OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
OCEANOGRAPHY
GEODESY

PERSONNEL

TL -	S.L.	SMITH, III	USN SURF WEAPONS CNTR
TM -	B.W.	CHOVITZ	NOAA-NOS
TM -	J.T.	MCGOOGAN	NASA-WFC
TM -	B.	YAPLEE	US NAVAL RESEARCH LAB
TM -	E.M.	GAPOSCHKIN	SAO

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 ALLOW 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 MEASUREME , 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-B, TELEKI----------

INVESTIGATION NAME- COHERENT SYNETHIC APERTURE IMAGING RADAR (SAR)

NSSDC ID- SEAST-B-02

INVESTIGATIVE PROGRAM
CODE ESE

INVESTIGATION DISCIPLINE(S)
OCEANOGRAPHY

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 -		RODGERS	NASA-JPL
TM -	C.L.	RUFENACH	NOAA-ERL
TM -	J.W.	SHERMAN, III	NOAA-NESS
TM -	R.	STEWART	SCRIPPS INST OCEANOGR
TM -	J.	ZELENKA	ENVIRON RES INST OF MI
TM -		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 LENGTH IS IN THE RANGE OF 50 TO 1000 METERS AND CAN DETERMINE WAVE DIRECTION WITHIN 20 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.

********** SOLAR MAXIMUM MISSION**********

SPACECRAFT COMMON NAME- SOLAR MAXIMUM MISSION
ALTERNATE NAMES- SMM

NSSDC ID- SMM

LAUNCH DATE- 10/00/79 WEIGHT- 1610. 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- 96.2 MIN INCLINATION- 33. DEG
PERIAPSIS- 575. KM APOAPSIS- 575. KM

PERSONNEL

MG -	M.E.	MCDONALD	NASA HEADQUARTERS
SC -	J.D.	BOHLIN	NASA-GSFC
PM -	P.T.	BURR	NASA-GSFC
PS -	K.J.	FROST	NASA-GSFC

BRIEF DESCRIPTION
THE SOLAR MAXIMUM MISSION (SMM) IS DEDICATED TO COORDINATED OBSERVATIONS OF SPECIFIC SOLAR ACTIVITY AND SOLAR FLARE PROBLEMS. THE SPACECRAFT IS ORIENTED TOWARD THE SUN DURING THE DAYLIGHT PORTION OF THE ORBIT. THE SPACECRAFT ITSELF DOES NOT RASTER OVER THE SOLAR DISK, ALTHOUGH INDIVIDUAL INSTRUMENTS HAVE THIS CAPABILITY. THE SMM SPACECRAFT IS DESIGNED SO THAT IT CAN BE RETRIEVED BY AN EARLY SHUTTLE FLIGHT, RETURNED TO EARTH, REFURBISHED AND FITTED WITH AN UPDATE PAYLOAD, AND RETURNED TO ORBIT FOR ANOTHER SOLAR-ORIENTED MISSION.

------- SOLAR MAXIMUM MISSION, ACTON----------

INVESTIGATION NAME- SOFT X-RAY POLYCHROMATOR

NSSDC ID- SMM -04

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI -	L.W.	ACTON	LOCKHEED PALO ALTO
PI -	A.H.	GABRIEL	APPLETON LAB
PI -	J.L.	CULHANE	U COLLEGE LONDON
OI -	R.C.	CATURA	LOCKHEED PALO ALTO
OI -	J.H.	PARKINSON	U COLLEGE LONDON
OI -	C.G.	RAPLEY	U COLLEGE LONDON
OI -	B.B.	JONES	APPLETON LAB.
OI -	C.	JORDAN	OXFORD U
OI -	C.J.	WOLFSON	LOCKHEED PALO ALTO
OI -	B.C.	FAWCETT	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 A 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 A) AND THE CALCIUM XIX LINE BETWEEN 3.165 TO 3.231 A. 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.

------- SOLAR MAXIMUM MISSION, CHUPP----------

INVESTIGATION NAME- GAMMA RAY EXPERIMENT

NSSDC ID- SMM -07

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI -	E.L.	CHUPP	U OF NEW HAMPSHIRE
OI -	D.J.	FORREST	U OF NEW HAMPSHIRE
OI -	K.	PINKAU	MPI-EXTRATERR PHYS
OI -	C.	REPPIN	MPI-EXTRATERR PHYS
OI -	E.	RIEGER	MPI-EXTRATERR PHYS
OI -	W.N.	JOHNSON	US NAVAL RESEARCH LAB
OI -	R.L.	KINZER	US NAVAL RESEARCH LAB
OI -	J.D.	KURFESS	US NAVAL RESEARCH LAB
OI -	G.H.	SHARE	US NAVAL RESEARCH LAB
OI -	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 15 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.

------- SOLAR MAXIMUM MISSION, DE JAGER----------

INVESTIGATION NAME- HARD X-RAY IMAGING SPECTROMETER

NSSDC ID- SMM -05

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - C.	DE JAGER	U OF UTRECHT
OI - H.F.	VAN BEEK	U OF UTRECHT
OI - 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 NONTHERMAL SOURCES IN ACTIVE REGIONS AND FLARES. THIS INSTRUMENT PRODUCES TWO-DIMENSIONAL IMAGES WITH 8-ARC S RESOLUTION OVER A CIRCULAR AREA 3 MIN 44 S IN DIAMETER, OR 32 ARC S RESOLUTION OVER AN 8 MIN 32 S BY 7 MIN 28 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.

------- SOLAR MAXIMUM MISSION, FROST----------

INVESTIGATION NAME- X-RAY SPECTROMETER

NSSDC ID- SMM -06

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - K.J.	FROST	NASA-GSFC
OI - L.E.	ORWIG	NASA-GSFC
OI - B.R.	DENNIS	NASA-GSFC
OI - T.L.	CLINE	NASA-GSFC
OI - U.D.	DESAI	NASA-GSFC

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.

------- SOLAR MAXIMUM MISSION, MACQUEEN--------

INVESTIGATION NAME- CORONAGRAPH/POLARIMETER

NSSDC ID- SMM -01

INVESTIGATIVE PROGRAM
CODE ST

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-EXTRATERR PHYS
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 NUTATING 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 POLAROIDS 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.

------- SOLAR MAXIMUM MISSION, REEVES----------

INVESTIGATION NAME- XUV SPECTROHELIOMETER

NSSDC ID- SMM -03

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - E.M.	REEVES	HARVARD COLLEGE OBS
OI - R.W.	NOYES	HARVARD COLLEGE OBS
OI - G.L.	WITHBROE	HARVARD COLLEGE OBS
OI - J.G.	TIMOTHY	HARVARD COLLEGE OBS
OI - M.V.	ZOMBECK	HARVARD COLLEGE OBS

BRIEF DESCRIPTION

THE SCIENTIFIC OBJECTIVES OF THIS EXPERIMENT INCLUDE THE DETERMINATION OF THE THREE-DIMENSIONAL STRUCTURE OF THE SOLAR PLASMA IN ACTIVE REGIONS ASSOCIATED WITH SOLAR FLARES, THE STRUCTURE AND EVOLUTION OF ACTIVE REGION LOOPS AND CORONAL HOLES, AND MICROSCOPIC AND MACROSCOPIC VELOCITIES FOR ACTIVE REGIONS AND FLARES. TO ACHIEVE THESE OBJECTIVES, THIS EXPERIMENT WILL MEASURE ELECTRON TEMPERATURES FROM INTENSITY RATIOS OF A PAIR OF LINES OF BERYLLIUM- AND LITHIUM-LIKE IONS, ELECTRON DENSITIES FROM EMISSION LINE INTENSITY RATIOS AND FROM ABSOLUTE INTENSITIES OF OPTICALLY THIN EMISSION LINES, AND FLARE PLASMA MORPHOLOGY AND MAGNETIC FIELD CONFIGURATIONS FROM EMISSION LINES CHARACTERISTIC OF A WIDE RANGE OF TEMPERATURES. THE TELESCOPE SECTION OF THE INSTRUMENT CONSISTS OF A SINGLE OFF-AXIS PARABOLOID MIRROR SEGMENT, SERVO-CONTROLLED TO MAINTAIN FOCUS ON THE ENTRANCE SLIT. THE SPECTROMETER SECTION CONSISTS OF A GRAZING-INCIDENCE ROWLAND MOUNTING WITH A FIXED ARRAY OF DETECTORS ON A CARRIAGE THAT CAN BE DRIVEN ALONG THE FOCAL CURVE TO ACHIEVE VARIOUS POLYCHROMATIC POSITIONS OR PERFORM PARTIAL OR COMPLETE WAVELENGTH SCANS. SPATIAL RESOLUTION IS 4 BY 4 ARC S OVER A RASTER SIZE VARIABLE FROM 2 ARC S TO 46 BY 46 ARC MIN. THE SPECTRAL RANGE COVERED IS 20 TO 716 A AND 929 TO 1332 A WITH A RESOLUTION OF 0.1 A FWHM.

------- SOLAR MAXIMUM MISSION, TANDBERG-HANSSEN----------

INVESTIGATION NAME- ULTRAVIOLET SPECTROMETER AND POLARIMETER

NSSDC ID- SMM -02

INVESTIGATIVE PROGRAM
CODE ST

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS

PERSONNEL

PI - E.	TANDBERG-HANSSEN	NASA-MSFC
OI - R.G.	ATHAY	HIGH ALTITUDE OBS
OI - J.M.	BECKERS	SACREMENTO PEAK OBS
OI - J.C.	BRANDT	NASA-GSFC
OI - E.C.	BRUNER, JR.	LOCKHEED PALO ALTO
OI - R.D.	CHAPMAN	NASA-GSFC
OI - C.L.	HYDER	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 8). THE INSTRUMENT COVERS THE 1100 TO 3000 A REGION WITH A SPECTRAL RESOLUTION OF ABOUT 0.010 A, FWHM, AND OBSERVES AN AREA OF TO 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.

------- SOLAR MAXIMUM MISSION, WILLSON----------

INVESTIGATION NAME- ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR

NSSDC ID- SMM -08

INVESTIGATIVE PROGRAM
PHYSICS AND ASTRONOMY

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.

********** SPACELAB 1**********

SPACECRAFT COMMON NAME- SPACELAB 1
ALTERNATE NAMES-

NSSDC ID- SPALAB1

LAUNCH DATE- 11/00/80 WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESA
UNITED STATES NASA-OMSF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM APOAPSIS- KM

PERSONNEL
MG - R. NOBLITT NASA HEADQUARTERS
SC - W. TAYLOR NASA HEADQUARTERS
PS - C.R. CHAPPELL 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 ACCOMODATE 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 SPECTROMERIC OBSERVATORY, SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS, STUDIES OF THE IONOZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI, ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING, FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT, HZE PARTICLE DOSIMETRY, NUTATION OF HELIANTHUS ANNUUS, VESTIBULAR EXPERIMENTS, INFLUENCE OF SPACE FLIGHT ON ERYTHROKINETICS IN MAN, CHARACTERIZATION OF PERSISTING CIRCADIAN RHYTHMS, VESTIBULO-SPINAL REFLEX MECHANISMS, EFFECTS ON PROLONGED WEIGHTLESSNESS, GEOPHYSICAL FLUID FLOW, WETTING-SPREADING AND OPERATING CHARACTERISTICS OF BEARING LUBRICANTS IN A ZERO GRAVITY ENVIRONMENT, TRIBOLOGICAL STUDIES OF FLUID LUBRICATED JOURNAL BEARINGS, ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR, 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 1900 A TO 4 MICROMETERS, LOW-ENERGY ELECTRONS, MAGNETIC FIELD MEASUREMENT, PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS, SOLAR CONSTANT, VERY WIDE FIELD CAMERA, X-RAY SPECTROSCOPY, HEAVY COSMIC RAY ISOTOPES, VESTIBULAR SLED, SLED EXPERIMENTS, LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS, MASS DISCRIMINATION, MEASUREMENT OF INTRATHORXIC 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
OI - M. HAMELIN CNRS
OI - D. HENRY CNRS
OI - M. PIRRE CNRS
OI - J.J. BERTHELIER CNRS
OI - J. LAUERENAT CNRS
OI - B.N. MAEHLUM NDRE
OI - J. TROIM NDRE
OI - R. BOSWELL ESA-ESTEC
OI - A. GONFALONE ESA-ESTEC
OI - T. 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), ELECTRON TEMPERATURE PROBE, AND THREE PARTICLE DETECTORS TO -- (1) STUDY IONOSPHERIC NEUTRALIZATION PROCESSES BY STUDYING THE STABILITY OF THE ELECTRONIC POTENTIAL OF THE GUN WITH RESPECT TO THE PLASMA, (2) STUDY PLASMA INSTABILITIES BY MEASURING ELECTRICAL (UP TO 100 MHZ) AND MAGNETIC (200 HZ UP TO 20 MHZ) WAVE COMPONENTS, (3) USE THE SHUTTLE MOTION TO PERFORM ION BOUNCE EXPERIMENTS, (4) STUDY THE O+ 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 GN (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 DOSIMETERY

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 200 LEXAN POLYCARBONATE PLASTIC FILMS.

------- SPACELAB 1, BERTAUX-------

INVESTIGATION NAME- INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA

NSSDC ID- SPALAB1-22
INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION DISCIPLINE(S)
PARTICLES AND FIELDS
ATMOSPHERIC PHYSICS

PERSONNEL
PI - J.L. BERTAUX CNRS-SA
OI - G. KOCKARTS IASB

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVES ARE -- TO USE A LYMAN-ALPHA PHOTOMETER EQUIPPED WITH H AND D ABSORPTION CELLS TO MEASURE DEUTERIUM EMISSION, TO OBSERVE 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 INTERACTIO WITH THE STS/SPACELAB ENVIRONMENT, AND TO ATTEMPT TO M SURE 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 SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL

PI - G. BOELLA		U COLLEGE LONDON
OI - R.L.F. BOYD		U COLLEGE LONDON
OI - G. BROWLIE		MULLARD SPACE SCI LAB
OI - J.L. CULHANE		MULLARD SPACE SCI LAB
OI - J. IVES		MULLARD SPACE SCI LAB
OI - P. SANFORD		MULLARD SPACE SCI LAB
OI - R.D. ANDRESEN		ESA-ESTEC
OI - A. PEACOCK		ESA-ESTEC
OI - B.G. TAYLOR		ESA-ESTEC
OI - S. SALENI		CNR,COSMIC PHYSICS LAB
OI - L. SCARSI		CNR,COSMIC PHYSICS LAB
OI - G. VILLA		CNR,COSMIC PHYSICS LAB

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 SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - C.S. BOWYER		U OF CALIF, BERKELEY
OI - G.C. COURTES		CNRS-LAS
OI - J.M. DEHARVENG		LAS
OI - R. MALINA		U OF CALIF, BERKELEY

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO PERFORM UV (1100-3500 A) BROADBAND IMAGING BEARING AND LOW RESOLUTION (20-200 A) SPECTROSCOPY OF -- GLOBULAR CLUSTERS, GALACTIC CLUSTERS, QUASI-STELLAR OBJECTS, NEARBY GALAXIES, UV STARS, EXTENDED SOURCES, GEOCORONA, 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 SB

INVESTIGATION 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

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - H. BUCKER		U OF FRANKFURT

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 WEIGHTLESSNESS

NSSDC ID- SPALAB1-36

INVESTIGATIVE PROGRAM
CODE SB/CO-OP

INVESTIGATION DISCIPLINE(S)
SPACE BIOLOGY

PERSONNEL

PI - A. COGOLI		U OF ZURICH

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO GAIN FURTHER INFORMATION ON THE TRIGGERING OF THE IMMUNORESPONSE AND ON THE MECHANISM OF EUCARYOTIC 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 SA/CO-OP

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL

PI - GC COURTES		CNRS-LAS
OI - M. VITON		CNRS-LAS
OI - J.P. SIVAN		CNRS-LAS
OI - H.L. ATKINS		NASA-MSFC

BRIEF DESCRIPTION

THE EXPERIMENT OBJECTIVE IS TO STUDY ZODIACAL LIGHT AND GEGENSCHEIN, 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 300 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 CONSTANT

NSSDC ID- SPALAB1-26

INVESTIGATIVE PROGRAM
CODE ST/CO-OP

INVESTIGATION 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 DEGREDATION OF OPTICAL SURFACES DUE TO CONDITIONS ON THE SPACELAB PALLET. THE EQUIPMENT CONSISTS OF AN ABSOLUTE RADIOMETER WITH AN INBUILT STABILITY CHECK.

-------- SPACELAB 1, DEMOREUIL----------

INVESTIGATION NAME- TRIBIOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL

NSSDC ID- SPALAB1-10

INVESTIGATIVE PROGRAM
APPLICATIONS

INVESTIGATION DISCIPLINE(S)
INTERPLANETARY PHYSICS
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 SA

INVESTIGATION 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/COOP

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 ER/COOP

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 APERATURE RADAR BEHAVIOR. THE EQUIPMENT CONSISTS OF (1) AN ANTENNA-PARABOLIC DISK WITH DIRECT HORN FEEDING, ACTUAL APERATURE TDB, EFFECTIVE APERATURE 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 8.50 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 ES

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
EARTH OBSERVATIONS

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.	RUSSELL	NASA-LARC

BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT IS TO USE HIGH-RESOLUTION, BOARDBAND (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 SB/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 -	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

NSSDC ID- SPALAB1-18

INVESTIGATIVE PROGRAM
EARTH OBSERVATIONS

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
BIOSCIENCE

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), ELECTROCEPHALOGRAM (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 SA

INVESTIGATION DISCIPLINE(S)
SOLAR PHYSICS
ASTRONOMY

PERSONNEL

PI - J.E.	HART	U OF COLORADO
OI - J.	TOOMRE	U OF COLORADO
OI - P.	GILMAN	HIGH ALTITUDE OBS
OI - G.	FICHTL	NASA-MSFC

BRIEF DESCRIPTION
THERE ARE TWO EXPERIMENT OBJECTIVES. ONE OBJECTIVE OF THIS EXPERIMENT IS TO UNDERSTAND THE CONVECTION OF STARS AND THE SUN BY -- (1) STUDYING THE ONSET OF CONVECTION BETWEEN CONCENTRIC SPHERES AS A FUNCTION OF IMPOSED TEMPERATURE DIFFERENCES AND ROTATION, (2) STUDYING THE SHAPES OF THE CONVECTION CELLS AT THE ONSET OF CONVECTION AND ITS EVOLUTION, (3) STUDYING THE INTERACTIVE MOTIONS SUCH AS MEAN AZIMUTHAL FLOWS OBSERVED ON THE SOLAR EQUATORIAL REGION. THE OTHER OBJECTIVE IS TO ACT AS THE FORERUNNER OF A SERIES OF PROPOSED EXPERIMENTS TO STUDY THE BAROCLINIC PROPERTIES OF THE EARTH'S ATMOSPHERE AND THE GENERAL CIRCULATION OF THE EARTH'S OCEAN BASINS. THE EQUIPMENT CONSISTS OF AN ELECTROCONVECTION CELL, CONTROLLERS, AND A CAMERA.

-------- SPACELAB 1, HERSE----------

INVESTIGATION NAME- WAVES IN THE OH EMISSIVE LAYER

NSSDC ID- SPALAB1-19

INVESTIGATIVE PROGRAM
CODE ER/COOP

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 0.95 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 - MEHDI	TAVASSOLI	SCRIPPS C+R FOUNDATION
OI - P.C.	JOHNSON	BAYLOR U
OI - J.P.	CHEN	U OF TENNESSEE
OI - C.D.R.	DUNN	U OF TENNESSEE
OI - R.D.	LANGE	U OF TENNESSEE
OI - E.C.	LARKIN	VETERANS ADMIN HOSP

BRIEF DESCRIPTION
THE EXPERIMENT OBJECTIVE IS TO OBTAIN NEW AND SPECIFIC INFORMATION PERTAINING TO THE MECHANISM AND SITE OF ACTION RELATIVE TO THE RED BLOOD CELL MASS AND PLASMA VOLUME CHANGES OBSERVED DURING SPACE FLIGHT. THE EQUIPMENT CONSISTS OF AN IN-FLIGHT BLOOD COLLECTION SYSTEM AND A REFRIGERATOR.

-------- SPACELAB 1, MENDE----------

INVESTIGATION NAME- ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING

NSSDC ID- SPALAB1-03

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.	NAUMANN	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) CDMS AND ONBOARD RECORDERS UTILIZED FOR DATA DISPLAY AND RECORDING.

------- SPACELAB 1, OBAYASHI----------

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 RESTIVITY, 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 O-G

NSSDC ID- SPALAB1-09

INVESTIGATIVE PROGRAM
APPLICATIONS

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 ENDOGENUS, 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 ER/COOP

INVESTIGATION DISCIPLINE(S)
METEOROLOGY
PLANETARY ATMOSPHERES

PERSONNEL
PI - G. THUILLIER CNRS-SA
OI - J.E. BLAMONT 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-COMPENSATE MICHELSON INTERFEROMETERS, A HIGH-RESOLUTION INSTRUMENT, AND A CASSEGRAIN TELESCOPE.

------- SPACELAB 1, THUILLIER----------

INVESTIGATION NAME- MEASUREMENT OF THE SOLAR SPECTRUM FROM 190NM TO 4000NM

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. BLAMONT CNRS-SA
OI - R. PASTIELS IASP
OI - D. LABS LANDESSTERNWARTE

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

INVESTIGATION DISCIPLINE(S)
ATMOSPHERIC PHYSICS

PERSONNEL
PI - M.R. TORR U OF MICHIGAN
OI - A.L. BROADFOOT KITT PEAK NATL OBS
OI - D.E. SHEMANSKY 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

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 WEIGTLESSNESS ON THE HUMORAL IMMUNE RESPONSE IN HUMANS

NSSDC ID- SPALAB1-17
INVESTIGATIVE PROGRAM
CODE SB

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. STUDEMENN 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 (SEPAC) 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

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 MAGNETUDE 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 (SELFCALIBRATING 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

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. MONEY		D+C INST OF ENVIRN MED
OI - C.M. OMAN		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.

********** ST**********

SPACECRAFT COMMON NAME- ST
ALTERNATE NAMES- LARGE SPACE TELESCOPE, SPACE TELESCOPE

NSSDC ID- LST

LAUNCH DATE- 11/00/83 WEIGHT- 9525. 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 APOAPSIS- 500. KM

PERSONNEL

MG - M.J. AUCREMANNE		NASA HEADQUARTERS
SC - N.G. ROMAN		NASA HEADQUARTERS
PS - C.R. O'DELL		NASA-MSFC

BRIEF DESCRIPTION
THE PROPOSED LARGE SPACE TELESCOPE (LST) IS A SPACEBORNE, DIFFRACTION-LIMITED TELESCOPE WITH A PLANNED EFFECTIVE APERTURE OF APPROXIMATELY 3 M. THE INITIAL LAUNCH OF THE LST INTO EARTH ORBIT IS EXPECTED IN LATE 1980. THE SPACE SHUTTLE IS USED FOR INITIAL LAUNCH, IN-ORBIT SERVICING, AND FOR RETURN OF THE LST TO THE GROUND FOR MAINTENANCE. THE ANTICIPATED MINIMUM OPERATIONAL LIFETIME, EXCLUDING DOWNTIME FOR PERIODIC MAINTENANCE AND UPDATING, IS 15 YR. THE LST SYSTEM SERVES AS A NATIONAL ASTRONOMICAL SPACE OBSERVATORY FACILITY. THE USE OF THE ONBOARD INSTRUMENTATION IS OPEN TO SCIENTISTS OF ALL COUNTRIES. THUS, ITS DESIGN IS MOST 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 ARE ACCOMPLISHED BY EITHER RETURN OF THE LST TO THE GROUND, OR BY UTILIZING SUITED ASTRONAUTS FOR IN-ORBIT WORK. PRESENT PHASE B DEFINITION STUDIES INDICATE A DESIRABLE COMPLEMENT OF INSTRUMENTS AS FOLLOWS -- (1) A HIGH-RESOLUTION CAMERA TO COVER THE SPECTRAL RANGE FROM 120 TO 1100 NM, (2) A HIGH-RESOLUTION SPECTROGRAPH, OF RESOLUTION APPROXIMATELY 1.E5, FOR THE 120-TO-310 NM REGION, (3) A FAINT OBJECT SPECTROGRAPH FOR WORK IN THE 90- TO 1100-NM REGION, (4) AN ASTROMETRIC PACKAGE FOR DOING WORK ON DOUBLE STARS, PROPER MOTIONS, PARALLAXES, ETC., (5) AN INFRARED PHOTOMETER AND/OR SPECTROMETER TO COVER THE WAVELENGTH INTERVAL FROM 1 TO 1000 MICROMETERS.

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 1 - HIGH-RESOLUTION CAMERA

NSSDC ID- LST -01 INVESTIGATIVE PROGRAM CODE SA

INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL

PI - UNKNOWN		UNKNOWN

BRIEF DESCRIPTION
THE HIGH-RESOLUTION CAMERA UNIT IS BEING DESIGNED TO A PHASE B LEVEL. THE UNIT IS COMPOSED OF TWO DISTINCT CAMERAS. ONE IS A F/24 FILLD CAMERA WITH A 3 ARC-MIN FIELD OF VIEW, AND USING A 50-MM SEC ORTHICON DETECTOR. THE OTHER CAMERA IS A BIFOCAL-LENGTH INSTRUMENT, F/48 OR F/96, WITH LIMITED FIELDS OF VIEW AS [illegible] DETECTOR USED IN THE DESIGN STUDY IS A 400 BY 400 CCD ARRAY.

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 2 - HIGH-RESOLUTION SPECTROGRAPH

NSSDC ID- LST -02 INVESTIGATIVE PROGRAM CODE SA

INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL

PI - UNKNOWN		UNKNOWN

BRIEF DESCRIPTION
THE HIGH-RESOLUTION SPECTROGRAPH UNIT IS BEING DESIGNED TO A PHASE B LEVEL. THE PRINCIPAL OPERATING MODE IS AS AN ECHELLE SPECTROGRAPH WITH SPECTRAL RESOLUTIONS OF 3.E4 TO 1.2E5 OVER THE WAVELENGTH INTERVAL FROM 115 TO 410 NM. TWO LARGE SEC ORTHICON CAMERAS ARE USED AS THE DETECTORS.

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 3 - FAINT-OBJECT SPECTROGRAPH

NSSDC ID- LST -03 INVESTIGATIVE PROGRAM CODE SA

INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL

PI - UNKNOWN		UNKNOWN

BRIEF DESCRIPTION
THE FAINT-OBJECT SPECTROGRAPH UNIT IS BEING DESIGNED TO A PHASE B LEVEL. THE DESIGN IS OF THE WADSWORTH TYPE ALLOWING RESOLUTIONS OF 1.E2 TO 1.E4 OVER THE WAVELENGTH INTERVAL FROM 90 TO 800 NM. THE DETECTORS USED IN THE DESIGN ARE PHOTONCOUNTERS, THEREBY ALLOWING OBSERVATIONS TO THE FAINTEST POSSIBLE MAGNITUDE.

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 4 - INFRARED PHOTOMETER

NSSDC ID- LST -04 INVESTIGATIVE PROGRAM CODE SA

INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL

PI - UNKNOWN		UNKNOWN

BRIEF DESCRIPTION
THE INFRARED PHOTOMETER UNIT IS BEING DESIGNED TO A PHASE B LEVEL. THE BASIC COMPONENT IN THE DESIGN IS A LARGE, SUPERFLUID-HELIUM DEWAR THAT WILL HOLD TWO DETECTORS (ONE PHOTOCONDUCTOR, ONE BOLOMETER) AT 2 DEG KELVIN, OR LESS, FOR 1 YEAR. THE COOLED DETECTORS ALLOW NEAR BACKGROUND LIMITED PERFORMANCE TO BE OBTAINED OVER THE WAVELENGTH INTERVAL FROM 1 MICROMETER TO 1 MILLIMETER.

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 5 - ASTROMETRIC INSTRUMENT

NSSDC ID- LST -05 INVESTIGATIVE PROGRAM CODE SA

INVESTIGATION DISCIPLINE(S) ASTRONOMY

PERSONNEL

PI - UNKNOWN		UNKNOWN

BRIEF DESCRIPTION
THE ASTROMETRIC INSTRUMENT UNIT IS BEING DESIGNED TO A PHASE B LEVEL. TWO DIFFERENT CONCEPTS HAVE BEEN ADVANCED. ONE IS TO USE A ROTATING CODED WHEEL TO MODULATE THE LIGHT INTENSITY AT THE FOCAL PLANE OVER A 5 ARC-MIN FIELD, AND SAMPLE THE RESULTANT SIGNAL FROM A PHOTOMULTIPLIER AT A VERY HIGH RATE. SUBSEQUENT ANALYSIS OF THE SIGNAL ALLOWS DETERMINATION OF THE POSITIONS AND COLORS OF ALL STARS PRESENT IN THE FIELD OF VIEW. THE SECOND CONCEPT IS TO MODIFY THE ST'S FINE GUIDANCE SYSTEM SO THAT IT CAN SPECIFY THE LOCATION OF INDIVIDUAL STARS TO THE NEEDED ASTROMETRIC PRECISION (ORDER OF 0.008 ARC-S).

-------- ST, UNKNOWN----------

INVESTIGATION NAME- SCIENTIFIC PACKAGE UNIT NO. 6 - HIGH SPEED POINT/AREA PHOTOMETER

NSSDC ID- LST -06
INVESTIGATIVE PROGRAM
CODE SA

INVESTIGATION DISCIPLINE(S)
ASTRONOMY

PERSONNEL
PI - UNKNOWN UNKNOWN

BRIEF DESCRIPTION
THE HIGH-SPEED POINT/AREA PHOTOMETER UNIT IS BEING DESIGNED TO A PHASE B LEVEL. THROUGH USE OF BOTH POINT AND AREA PHOTON-COUNTING DETECTORS, HIGH-SPEED FILTER PHOTOMETRY CAN BE PERFORMED OVER THE WAVELENGTH INTERVAL FROM 115 TO 650 NM. THE FIELDS OF VIEW ARE VARIABLE FROM NEAR-DIFFRACTION LIMITED SIZE, ORDER OF 0.2 ARC-S, TO A FEW ARC-S.

********** TIROS-N**********

SPACECRAFT COMMON NAME- TIROS-N
ALTERNATE NAMES-

NSSDC ID- TIROS-N

LAUNCH DATE- 05/00/78 WEIGHT- 588.9 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- ATLAS

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 94.5 MIN INCLINATION- 98.7 DEG
PERIAPSIS- 500. KM APOAPSIS- 500. KM

PERSONNEL
MG - H.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 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.

-------- TIROS-N, BOSTROM----------

INVESTIGATION NAME- SPACE ENVIRONMENT MONITOR

NSSDC ID- TIROS-N-04
INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

INVESTIGATION DISCIPLINE(S)
METEOROLOGY

PERSONNEL
PI - 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 SYSTEM, 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.

-------- TIROS-N, NESS STAFF----------

INVESTIGATION NAME- ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)

NSSDC ID- TIROS-N-01
INVESTIGATIVE PROGRAM
OPERATIONAL WEATHER OBSERVATIONS

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
OPERATIONAL WEATHER OBSERVATIONS

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 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 CONTAING 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.

-------- TIROS-N, NESS STAFF----------

INVESTIGATION NAME- DATA COLLECTION SYSTEM (DCS)

NSSDC ID- TIROS-N-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 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 2000 PLATFORMS PER DAY. IDENTICAL EXPERIMENTS ARE FLOWN ON OTHER SPACECRAFT IN THE TIROS-N/NOAA SERIES.

********** UK 6**********

SPACECRAFT COMMON NAME- UK 6
ALTERNATE NAMES- UNITED KINGDOM-6

NSSDC ID- UK-6

LAUNCH DATE- 07/27/78 WEIGHT- 133.8 KG
LAUNCH SITE- WALLOPS FLIGHT CENTER, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED KINGDOM SRC

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 95.6 MIN INCLINATION- 55. DEG
PERIAPSIS- 550. KM APOAPSIS- 550. KM

PERSONNEL
MG - NONE ASSIGNED
SC - NONE ASSIGNED
PM - J.E. FOSTER APPLETON LAB
PS - J.L. CULHANE IMPERIAL COLLEGE

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 ACCOMODATE THE X-RAY EXPERIMENTS REQUIREMENTS. THE INTENDED ORBIT IS CIRCULAR, 550 KM IN ALTITUDE, AND 55 DEG IN INCLINATION.

------- UK 6, UNKNOWN----------

INVESTIGATION NAME- COSMIC RAY

NSSDC ID- UK-6 -01 INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
COSMIC RAYS

PERSONNEL
PI - UNKNOWN

BRIEF DESCRIPTION
THIS EXPERIMENT IS INTENDED TO MEASURE THE CHARGE AND ENERGY SPECTRA OF THE ULTRA-HEAVY COMPONENT OF THE COSMIC RADIATION WITH PARTICULAR EMPHASIS ON THE CHARGE REGION Z .GT. 30.

------- UK 6, UNKNOWN----------

INVESTIGATION NAME- LEICESTER X-RAY

NSSDC ID- UK-6 -02 INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - UNKNOWN U OF LEICESTER

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO INVESTIGATE THE PERIODIC AND APERIODIC FLUCTUATIONS IN EMISSIONS FROM A WIDE RANGE OF X-RAY SOURCES DOWN TO SUBMILLISECOND TIME SCALES.

------- UK 6, UNKNOWN----------

INVESTIGATION NAME- MSSL/B X-RAY

NSSDC ID- UK-6 -03 INVESTIGATIVE PROGRAM
CODE SA/CO-OP

INVESTIGATION DISCIPLINE(S)
X-RAY ASTRONOMY

PERSONNEL
PI - UNKNOWN U COLLEGE LONDON
PI - UNKNOWN U OF BIRMINGHAM

BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO STUDY DISCRETE SOURCES AND EXTENDED FEATURES OF THE LOW-ENERGY, X-RAY SKY IN THE RANGE 0.1 TO 2.0 KEV. IN ADDITION, BOTH LONG- AND SHORT-TERM VARIABILITY OF INDIVIDUAL SOURCES ARE STUDIED IN CONJUNCTION WITH THE LEICESTER EXPERIMENT. THIS EXPERIMENT IS PROVIDED JOINTLY BY THE UNIVERSITY COLLEGE, LONDON/MULLARD SPACE LABORATORY, AND BIRMINGHAM UNIVERSITY.

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INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

4. INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS

This index contains the names of all spacecraft and experiments that were either active sometime between January 1, 1975, and June 30, 1977, or planned as of June 30, 1977. 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 state. 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, 1977, 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.

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATUS: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
AD-A	UNITED STATES / NASA-OSS	12/19/63	GEOCENTRIC	63-053A	12/19/63	PARTIAL	SUBS	11
JACCHIA	NONSYSTEMATIC CHANGES OF AIR DENSITY			63-053A-01	12/19/63	NORMAL	SUBS	11
KEATING	SYSTEMATIC CHANGES OF AIR DENSITY			63-053A-02	12/19/63	NORMAL	SUBS	11
AD-C	UNITED STATES / NASA-OSS	08/01/68	GEOCENTRIC	68-066A	6/00/71	PARTIAL	SUBS	11
JACCHIA	NONSYSTEMATIC CHANGES OF AIR DENSITY			68-066A-01	3/05/76	NORMAL	SUBS	11
KEATING	SYSTEMATIC CHANGES OF AIR DENSITY			68-066A-02	3/05/76	NORMAL	SUBS	11
AE 5	SEE AE-E							
AE-C	UNITED STATES / NASA-OSS	12/16/73	GEOCENTRIC	73-101A	2/28/76	NORMAL	STND	11
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	12
BRINTON	BENNETT ION-MASS SPECTROMETER (BIMS)			73-101A-11	2/28/76	NORMAL	STND	12
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	13
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)			73-101A-14	2/28/76	NORMAL	STND	13
HEATH	EXTREME SOLAR UV MONITOR (ESUM)			73-101A-05	5/28/75	INOPERABLE	ZERO	14
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)			73-101A-06	3/10/75	PARTIAL	STND	14
HOFFMAN	MAGNETIC ION-MASS SPECTROMETER (MIMS)			73-101A-10	1 HLF 77	PARTIAL	STND	14
HOFFMAN	LOW-ENERGY ELECTRONS (LEE)			73-101A-12	2/28/76	NORMAL	STND	14
NIER	OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)			73-101A-07	4/04/77	INOPERABLE	ZERO	14
RICE	COLD CATHODE ION GAUGE			73-101A-15	12/16/73	NORMAL	STND	15
RICE	CAPACITANCE MANOMETER			73-101A-16	12/16/73	NORMAL	STND	15
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)			73-101A-09	2/28/76	PARTIAL	STND	15
AE-D	UNITED STATES / NASA-OSS	10/06/75	GEOCENTRIC	75-096A	1/29/76	INOPERABLE	ZERO	15
BARTH	ULTRAVIOLET NITRIC-OXIDE EXPERIMENT			75-096A-11	1/29/76	INOPERABLE	ZERO	16
BRACE	CYLINDRICAL ELECTROSTATIC PROBE (CEP)			75-096A-01	1/29/76	INOPERABLE	ZERO	16
CHAMPION	ATMOSPHERIC DENSITY ACCELEROMETER (MESA)			75-096A-02	1/29/76	INOPERABLE	ZERO	16
DOERING	PHOTOELECTRON SPECTROMETER (PES)			75-096A-03	1/29/76	INOPERABLE	ZERO	16
HANSON	RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)			75-096A-04	1/29/76	INOPERABLE	ZERO	17
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)			75-096A-13	1/29/76	INOPERABLE	ZERO	17
HEDIN	NEUTRAL ATMOSPHERE COMPOSITION (NACE)			75-096A-08	1/29/76	INOPERABLE	ZERO	17
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)			75-096A-06	1/29/76	INOPERABLE	ZERO	17
HOFFMAN	MAGNETIC ION-MASS SPECTROMETER (MIMS)			75-096A-10	1/29/76	INOPERABLE	ZERO	18
HOFFMAN	LOW-ENERGY ELECTRONS (LEE)			75-096A-12	1/29/76	INOPERABLE	ZERO	18
NIER	OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)			75-096A-07	1/29/76	INOPERABLE	ZERO	18
RICE	CAPACITANCE MANOMETER			75-096A-14	1/29/76	INOPERABLE	ZERO	18
RICE	COLD CATHODE ION GAUGE			75-096A-15	1/29/76	INOPERABLE	ZERO	19
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)			75-096A-09	1/29/76	INOPERABLE	ZERO	19
AE-E	UNITED STATES / NASA-OSS	11/20/75	GEOCENTRIC	75-107A	11/20/75	NORMAL	STND	19
BRACE	CYLINDRICAL ELECTROSTATIC PROBE (CEP)			75-107A-01	12/00/75	NORMAL	STND	19
BRINTON	ION COMPOSITION AND CONCENTRATION			75-107A-10	12/11/75	NORMAL	STND	19
CHAMPION	ATMOSPHERIC DENSITY ACCELEROMETER (MESA)			75-107A-02	12/04/75	NORMAL	STND	20
DOERING	PHOTOELECTRON SPECTROMETER			75-107A-03	12/00/75	NORMAL	STND	20
HANSON	RETARDING POTENTIAL ANALYZER/DRIFT METER (RPA)			75-107A-04	12/00/75	NORMAL	STND	20
HAYS	VISIBLE AIRGLOW PHOTOMETER (VAE)			75-107A-11	12/11/75	NORMAL	STND	20
HEATH	EXTREME SOLAR UV MONITOR (ESUM)			75-107A-05	5/20/77	INOPERABLE	ZERO	21
HEATH	BACKSCATTER UV SPECTROMETER (BUV)			75-107A-16	3/18/77	INOPERABLE	ZERO	21
HEDIN	NEUTRAL ATMOSPHERE COMPOSITION (NACE)			75-107A-08	12/11/75	NORMAL	STND	21
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER (EUVS)			75-107A-06	12/00/75	NORMAL	STND	21
NIER	OPEN-SOURCE NEUTRAL MASS SPECTROMETER (OSS)			75-107A-07	12/11/75	NORMAL	STND	21
RICE	CAPACITANCE MANOMETER			75-107A-12	12/04/75	NORMAL	STND	22
RICE	COLD CATHODE ION GAUGE			75-107A-13	12/04/75	NORMAL	STND	22
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE (NATE)			75-107A-09	12/11/75	NORMAL	STND	22
AEM-A	SEE HCMM							
AEM-B	SEE SAGE							
AEM-C	SEE MAGSAT							
AEROS	SEE SMS 1							
AEROS 2	FEDERAL REPUBLIC OF GE GFW / UNITED STATES / NASA-OSS	07/16/74	GEOCENTRIC	74-055A	9/25/75	INOPERABLE	ZERO	22
KRANKOWSKY	MASS SPECTROMETER (MS)			74-055A-01	9/25/75	INOPERABLE	ZERO	22
NESKE	ELECTRON CONCENTRATION IN THE IONOSPHERE			74-055A-03	9/25/75	INOPERABLE	ZERO	23
ROEMER	ATMOSPHERIC DRAG ANALYSIS			74-055A-06	9/25/75	INOPERABLE	ZERO	23
SCHMIDTKE	SOLAR EUV RADIATION			74-055A-04	9/25/75	INOPERABLE	ZERO	23
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE			74-055A-05	9/25/75	INOPERABLE	ZERO	23
SPENNER	ENERGY DISTRIBUTION OF IONS AND			74-055A-02	9/25/75	INOPERABLE	ZERO	23

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATUS: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
	ELECTRONS							
AEROS-B	SEE AEROS 2							
ALOUETTE 2	CANADA	NASA-OSS	11/29/65 GEOCENTRIC	65-098A	11/29/75	PARTIAL	ZERO	23
	UNITED STATES	NASA-OSS						
BELROSE	VLF RECEIVER			65-098A-02	11/29/75	NORMAL	ZERO	24
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			65-098A-05	11/29/75	NORMAL	ZERO	24
HARTZ	COSMIC RADIO NOISE			65-098A-03	11/29/75	PARTIAL	ZERO	24
MCDIARMID	ENERGETIC PARTICLE DETECTORS			65-098A-04	11/29/75	NORMAL	ZERO	24
WHITTEKER	SWEEP FREQUENCY SOUNDER			65-098A-01	11/29/75	NORMAL	ZERO	24
ALOUETTE-B	SEE ALOUETTE 2							
ALSEP 12	SEE APOLLO 12 LM/ALSEP							
ALSEP 14	SEE APOLLO 14 LM/ALSEP							
ALSEP 15	SEE APOLLO 15 LM/ALSEP							
ALSEP 16	SEE APOLLO 16 LM/ALSEP							
ALSEP 17	SEE APOLLO 17 LM/ALSEP							
ANS	NETHERLANDS	NIVR	08/30/74 GEOCENTRIC	74-070A	7/30/76	NORMAL	ZERO	24
	UNITED STATES	NASA-OSS						
BRINKMAN	LOW-ENERGY X-RAY EXPERIMENT			74-070A-02	7/30/76	NORMAL	ZERO	24
GURSKY	HIGH ANGULAR AND SPECTRAL RESOLUTION OBSERVATIONS OF COSMIC X-RAY SOURCES			74-070A-03	7/30/76	NORMAL	ZERO	25
VANDUINEN	UV TELESCOPE			74-070A-01	7/30/76	NORMAL	ZERO	25
APOLLO 11 LM	SEE APOLLO 11 LM/EASEP							
APOLLO 11 LM/EASEP	UNITED STATES	NASA-OMSF	07/16/69 LUNAR LANDER	69-059C	12/14/69	INOPERABLE	ZERO	25
ALLEY	LASER RANGING RETROREFLECTOR			69-059C-04	7/20/69	NORMAL	STND	25
APOLLO 12 LM/ALSEP	UNITED STATES	NASA-OMSF	11/14/69 LUNAR LANDER	69-099C	10/01/77	INOPERABLE	ZERO	25
	UNITED STATES	NASA-OSS						
FREEMAN	SUPRATHERMAL ION DETECTOR			69-099C-05	5/03/76	INOPERABLE	ZERO	26
LATHAM	PASSIVE SEISMIC (PSE)			69-099C-03	10/01/77	INOPERABLE	ZERO	26
SNYDER	SOLAR WIND SPECTROMETER			69-099C-02	1/15/77	INOPERABLE	ZERO	26
APOLLO 12C	SEE APOLLO 12 LM/ALSEP							
APOLLO 14 LM/ALSEP	UNITED STATES	NASA-OMSF	01/31/71 LUNAR LANDER	71-008C	10/01/77	PARTIAL	ZERO	26
	UNITED STATES	NASA-OSS						
FALLER	LASER RANGING RETROREFLECTOR			71-008C-09	2/05/71	NORMAL	STND	26
KOVACH	ACTIVE SEISMIC			71-008C-05	10/01/77	PARTIAL	ZERO	26
LATHAM	PASSIVE SEISMIC (PSE)			71-008C-04	10/01/77	NORMAL	ZERO	27
O'BRIEN	CHARGED PARTICLE LUNAR ENVIRONMENT			71-008C-08	10/01/77	PARTIAL	ZERO	27
APOLLO 14C	SEE APOLLO 14 LM/ALSEP							
APOLLO 15 LM/ALSEP	UNITED STATES	NASA-OMSF	07/26/71 LUNAR LANDER	71-063C	10/01/77	PARTIAL	ZERO	27
	UNITED STATES	NASA-OSS						
BATES	LUNAR DUST DETECTOR			71-063C-09	10/01/77	NORMAL	ZERO	27
FALLER	LASER RANGING RETROREFLECTOR			71-063C-08	7/30/71	NORMAL	STND	27
FREEMAN	SUPRATHERMAL ION DETECTOR			71-063C-05	3/12/77	INOPERABLE	ZERO	27
JOHNSON	COLD CATHODE ION GAUGE			71-063C-07	7/18/75	INOPERABLE	ZERO	28
LANGSETH	HEAT FLOW			71-063C-06	1/13/77	INOPERABLE	ZERO	28
LATHAM	PASSIVE SEISMIC			71-063C-01	10/01/77	NORMAL	ZERO	28
APOLLO 15C	SEE APOLLO 15 LM/ALSEP							
APOLLO 16 LM/ALSEP	UNITED STATES	NASA-OSS	04/16/72 LUNAR LANDER	72-031C	10/01/77	PARTIAL	ZERO	28
	UNITED STATES	NASA-OMSF						
DYAL	LUNAR SURFACE MAGNETOMETER			72-031C-03	10/01/77	PARTIAL	ZERO	28
KOVACH	ACTIVE SEISMIC			72-031C-02	12/07/73	NORMAL	ZERO	29
LATHAM	PASSIVE SEISMIC (PSE)			72-031C-01	10/01/77	NORMAL	ZERO	29
APOLLO 16C	SEE APOLLO 16 LM/ALSEP							
APOLLO 17 LM/ALSEP	UNITED STATES	NASA-OMSF	12/07/72 LUNAR LANDER	72-096C	10/01/77	PARTIAL	ZERO	29
	UNITED STATES	NASA-OSS						
BERG	LUNAR EJECTA AND METEORITES			72-096C-05	8/15/76	PARTIAL	ZERO	29
KOVACH	LUNAR SEISMIC PROFILING EXPERIMENT			72-096C-06	10/01/77	NORMAL	ZERO	29
LANGSETH	HEAT FLOW			72-096C-01	10/01/77	NORMAL	ZERO	30
WEBER	LUNAR SURFACE GRAVIMETER			72-096C-09	10/01/77	PARTIAL	ZERO	30
APOLLO 17C	SEE APOLLO 17 LM/ALSEP							
APOLLO SOYUZ TEST PROJ.	SEE ASTP-SOYUZ							

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APPL EXPL MISSION B	SEE HCMM							
ARIABAT	SEE ARYABHATA							
ARIEL 5	SEE UK 5							
ARYABHATA	INDIA / ISRO	04/19/75	GEOCENTRIC	75-033A	9/23/76	INOPERABLE	ZERO	30
				75-033A-02	9/23/76	INOPERABLE	ZERO	30
				75-033A-03	4/19/75	INOPERABLE	ZERO	30
DANIEL	SOLAR NEUTRON AND GAMMA RAYS							
PRAKASH	IONOSPHERIC ELECTRON TRAP AND UV CHAMBERS			75-033A-01	9/23/76	INOPERABLE	ZERO	31
RAO	X-RAY ASTRONOMY							
ASTP-APOLLO	UNITED STATES / NASA-OMSF	07/15/75	GEOCENTRIC	75-066A	7/24/75	INOPERABLE	ZERO	31
				75-066A-24	7/24/75	INOPERABLE	ZERO	31
				75-066A-20	7/24/75	INOPERABLE	ZERO	31
				75-066A-06	7/24/75	INOPERABLE	ZERO	31
AKOEV	ZONE FORMING FUNGI							
ALLEN	ELECTROPHORESIS TECHNOLOGY			75-066A-01	7/24/75	INOPERABLE	ZERO	32
ANG	INFLUENCE OF WEIGHTLESSNESS ON THE IMMISCIBILITY OF MONOTECTIC ALLOY SYSTEMS			75-066A-02	7/24/75	INOPERABLE	ZERO	32
	EXTREME ULTRAVIOLET ASTRONOMY			75-066A-15	7/24/75	INOPERABLE	ZERO	32
BOWYER	HELIUM GLOW			75-066A-16	7/24/75	INOPERABLE	ZERO	32
BOWYER	BIOSTACK							
BUCKER	LIGHT FLASHES AND OTHER SENSATIONS FROM COSMIC PARTICLES			75-066A-14	7/24/75	INOPERABLE	ZERO	32
BUDINGER	EFFECTS OF SPACE FLIGHT ON THE CELLULAR RESPONSE OF MAN							
CRISWELL	ULTRAVIOLET ATMOSPHERIC ABSORPTION			75-066A-03	7/24/75	INOPERABLE	ZERO	32
				75-066A-21	7/24/75	INOPERABLE	ZERO	33
DONAHUE	EARTH OBSERVATIONS AND PHOTOGRAPHY			75-066A-04	7/24/75	INOPERABLE	ZERO	33
EL-BAZ	SKY-EARTH X-RAY OBSERVATIONS			75-066A-08	7/24/75	INOPERABLE	ZERO	33
FRIEDMAN	DETERMINATION OF ZERO-GRAVITY EFFECTS ON ELECTRONIC MATERIALS PROCESSING							
GATOS	ELECTROPHORESIS			75-066A-11	7/24/75	INOPERABLE	ZERO	33
				75-066A-07	7/24/75	INOPERABLE	ZERO	33
HANNIG	ROLE OF CONVECTION IN SOLIDIFICATION PROCESS IN HIGH COERCIVE STRAIGHT MAGNET							
LARSON	CRYSTAL GROWTH			75-066A-18	7/24/75	INOPERABLE	ZERO	34
				75-066A-13	7/24/75	INOPERABLE	ZERO	34
LIND	POLYMORPHONUCLEAR LEUKOCYTE RESPONSE TO INFECTION							
MARTIN	STRATOSPHERIC AEROSOL MEASUREMENT			75-066A-19	7/24/75	INOPERABLE	ZERO	34
				75-066A-05	7/24/75	INOPERABLE	ZERO	34
PEPIN	SURFACE-TENSION-INDUCED CONVECTION IN ENCAPSULATED LIQUID METALS IN ZERO-G							
REED	KILLIFISH HATCHING-ORIENTATION			75-066A-23	7/24/75	INOPERABLE	ZERO	34
				75-066A-22	7/24/75	INOPERABLE	ZERO	35
SCHELD	CRYSTAL ACTIVATION							
TROMBKA				75-066A-17	7/24/75	INOPERABLE	ZERO	35
				75-066A-12	7/24/75	INOPERABLE	ZERO	35
VONBUN	GEODYNAMICS							
WEIFFENBACH	SPACECRAFT-TO-SPACECRAFT DOPPLER TRACKING			75-066A-09	7/24/75	INOPERABLE	ZERO	35
WIEDEMEIER	CRYSTAL GROWTH FROM THE VAPOR PHASE IN ZERO-GRAVITY ENVIRONMENT							
YUE	ZERO-GRAVITY SOLIDIFICATION OF NACL-LIF EUTECTIC			75-066A-10	7/24/75	INOPERABLE	ZERO	35
ASTP-SOYUZ	U.S.S.R. / SAS	07/15/75	GEOCENTRIC	75-065A	7/24/75	INOPERABLE	ZERO	36
				75-065A-03	7/14/77	NORMAL	STND	36
				75-065A-02	7/14/77	NORMAL	STND	36
				75-065A-04	7/24/75	INOPERABLE	ZERO	36
				75-065A-01	7/14/77	NORMAL	STND	36
AKOEV	ZONE FORMING FUNGI							
IVANOV	USSR MULTIPLE MATERIAL MELTING							
NIKOLSKY	ARTIFICIAL SOLAR ECLIPSE							
TAYLOR	MICROBIAL EXCHANGE TEST							
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HIRAO	ELECTRON DENSITY AND TEMPERATURE PLASMA PROBES							
KONDO	SOLAR FLARE GAMMA-RAY DETECTOR IN 0.4-7 MEV RANGE							
MATSUOKA	TIME PROFILE AND SPECTRA OF X-RAY FLARES IN THE 2-60 KEV RANGE							
NISHI	SOLAR FLARE X-RAY BRAGG SPECTROSCOPY IN 1.5-2.0 A RANGE							
TAKAKURA	SOLAR FLARE X-RAYS IN RANGE OF 10-60 KEV USING ROTATING COLLIMATOR IMAGING							
TAKECUHI	ELECTRON FLUX ABOVE 100 KEV PARTICLE DETECTOR MONITOR							
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ATMOSPHERE EXPLORER-C	SEE AE-C							
ATMOSPHERE EXPLORER-D	SEE AE-D							
ATMOSPHERE EXPLORER-E	SEE AE-E							
ATS 5	UNITED STATES / NASA-OA	08/12/69	GEOCENTRIC	69-069A	6/01/73	PARTIAL	SUBS	37
				69-069A-12	3/10/75	NORMAL	SUBS	37
				69-069A-03	8/00/72	NORMAL	SUBS	37
DAROSA	RADIO BEACON							
MCILWAIN	OMNIDIRECTIONAL HIGH-ENERGY PARTICLE							

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	DETECTOR							
MOZER	TRI-DIRECTIONAL, MEDIUM-ENERGY PARTICLE DETECTOR			69-069A-04	3/10/75	NORMAL	SUBS	37
SUGIURA	MAGNETIC FIELD MONITOR			69-069A-13	11/15/75	PARTIAL	ZERO	37
ATS 6	UNITED STATES	NASA-OA	05/30/74 GEOCENTRIC	74-039A	5/30/74	NORMAL	STND	37
COLEMAN, JR.	MAGNETOMETER EXPERIMENT			74-039A-02	9/08/75	PARTIAL	STND	38
DAVIES	RADIO BEACON			74-039A-09	12/03/76	NORMAL	STND	38
DUNKERLY	SOLAR CELL RADIATION DAMAGE			74-039A-16	9/30/74	PARTIAL	STND	38
FRITZ	MEASUREMENT OF LOW-ENERGY PROTONS			74-039A-01	6/10/74	NORMAL	STND	38
GALICINAO	TRACKING AND DATA RELAY			74-039A-18	5/30/74	NORMAL	STND	38
GALICINAO	POSITION, LOCATION AND AIRCRAFT COMMUNICATION			74-039A-19	5/30/74	NORMAL	STND	39
HENRY	RADIO FREQUENCY INTERFERENCE			74-039A-11	2/01/77	NORMAL	ZERO	39
HYDE	COMSAT PROPAGATION (13-AND 18-GHZ)			74-039A-21	9/15/76	NORMAL	ZERO	39
IPPOLITO	MILLIMETER WAVE PROPAGATION			74-039A-13	9/30/74	PARTIAL	STND	39
ISLEY	SPACECRAFT ATTITUDE CONTROL			74-039A-20	5/20/75	NORMAL	ZERO	39
KAMENSKY	R.F.INTERFEROMETER SUBSYSTEM			74-039A-29	7/30/74	PARTIAL	STND	39
KIRKPATRICK	ADVANCED THERMAL CONTROL FLIGHT			74-039A-22	1/01/77	INOPERABLE	ZERO	40
MAYLEY	SOLAR COSMIC RAYS AND GEOMAGNETICALLY TRAPPED RADIATION			74-039A-06	6/14/74	NORMAL	STND	40
MCILWAIN	AURORAL PARTICLES EXPERIMENT			74-039A-05	5/15/77	INOPERABLE	ZERO	40
MILLER	SATELLITE INSTRUCTIONAL TV			74-039A-17	8/01/76	NORMAL	ZERO	40
MILLER	TELEVISION RELAY USING SMALL TERMINALS			74-039A-28	5/30/74	NORMAL	STND	40
PATTERSON	TELEVISION CAMERA			74-039A-31	5/30/74	NORMAL	STND	40
PAULIKAS	OMNIDIRECTIONAL SPECTROMETER			74-039A-07	6/14/74	NORMAL	STND	40
ROGERS	QUARTZ CRYSTAL MICROBALANCE			74-039A-23	1/01/76	INOPERABLE	ZERO	41
WHALEN	HEALTH AND EDUCATION TELECOMMUNICATIONS			74-039A-24	9/20/76	NORMAL	STND	41
WINCKLER	PARTICLE ACCELERATION MECHANISMS AND DYNAMICS OF THE OUTER TRAPPING REGION			74-039A-04	1/15/77	INOPERABLE	ZERO	41
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ATS-F	SEE ATS 6							
BE-C	UNITED STATES	NASA-OSS	04/29/65 GEOCENTRIC	65-032A	2/13/70	PARTIAL	SUBS	41
BERBERT	LASER TRACKING REFLECTOR			65-032A-03	2/13/70	PARTIAL	SUBS	41
CAS-C	SEE HERMES							
CASTOR	SEE D5-B							
COMMUN. TECHNOL. SAT.	SEE HERMES							
COOPERATIVE APPLICA SAT.	SEE HERMES							
COPERNICUS	SEE OAO 3							
COS-B	INTERNATIONAL	ESA	08/09/75 GEOCENTRIC	75-072A	8/09/75	NORMAL	STND	41
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CTS	SEE HERMES							
D2B	FRANCE	CNRS	09/27/75 GEOCENTRIC	75-092A	12/28/76	INOPERABLE	ZERO	42
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CRUVELIER	ATMOSPHERIC COMPOSITION BY SOLAR ABSORBTION (177 TO 1216 A)			75-092A-03	12/28/76	INOPERABLE	ZERO	42
DE LABOUDINIERE	SOLAR ACTIVITY STUDY (174 TO 1315 A)			75-092A-01	12/28/76	INOPERABLE	ZERO	43
D5-B	FRANCE	CNES	05/17/75 GEOCENTRIC	75-039B	7/01/76	NORMAL	SUBS	43
BARLIER	UPPER ATMOSPHERE DENSITY STUDY USING ON-BOARD ACCELEROMETER			75-039B-01	7/01/76	NORMAL	SUBS	43
BARLIER	GRAVITY FIELD PERTURBATIONS STUDY			75-039B-02	7/01/76	NORMAL	ZERO	43
BARLIER	MICROMETEORITE STUDY			75-039B-03	7/01/76	NORMAL	SUBS	43
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DMSP(74-063A)	UNITED STATES	DOD-USAF	08/09/74 GEOCENTRIC	74-063A	11/27/74	PARTIAL	STND	43
AFGWC STAFF	SCANNING RADIOMETER			74-063A-01	11/27/74	INOPERABLE	ZERO	43
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER			74-063A-02	8/09/74	NORMAL	STND	44

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DMSP-F1	UNITED STATES DOD-USAF	09/11/76	GEOCENTRIC	76-091A	7/05/77	NORMAL	STND	44
				76-091A-01	7/05/77	NORMAL	STND	44
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			76-091A-02	7/05/77	NORMAL	STND	44
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER SUPPLEMENTARY SENSOR H (SSH)							
BLAKE	RADIATION DOSIMETER			76-091A-03	7/05/77	NORMAL	STND	45
DMSP-F2	UNITED STATES DOD-USAF	06/05/77	GEOCENTRIC	77-044A	7/19/77	NORMAL	STND	45
				77-044A-01	7/19/77	NORMAL	STND	45
AFGWC STAFF	OPERATIONAL LINESCAN SYSTEM (OLS)			77-044A-02	7/19/77	NORMAL	STND	45
AFGWC STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER SUPPLEMENTARY SENSOR H (SSH)							
DSAP(74-063A)	SEE DMSP(74-063A)							
EARTH RES TECH SAT.-A	SEE LANDSAT 1							
EARTH RES TECH SAT.-B	SEE LANDSAT 2							
EARTH RES TECH SAT.-C	SEE LANDSAT-C							
ERS 26	SEE OV5-6							
ERTS-A	SEE LANDSAT 1							
ERTS-B	SEE LANDSAT 2							
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ESA GEOS	INTERNATIONAL ESA	04/20/77	GEOCENTRIC	77-029A	5/04/77	NORMAL	STND	46
				77-029A-11	5/04/77	NORMAL	STND	46
BEGHIN	WAVE FIELD IMPEDANCE			77-029A-03	5/04/77	NORMAL	STND	46
GEISS	LOW-ENERGY ION COMPOSITION			77-029A-06	5/04/77	NORMAL	STND	46
GENDRIN	MAGNETIC WAVE FIELDS			77-029A-04	5/04/77	NORMAL	STND	47
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MARIANI	TRIAXIAL FLUXGATE MAGNETOMETER			77-029A-08	5/00/77	PARTIAL	SUBS	47
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				77-029A-07	5/04/77	NORMAL	STND	47
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UNGSTRUP	ELECTRIC WAVE FIELDS			77-029A-01	5/04/77	NORMAL	STND	48
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WRENN	THERMAL PLASMA FLOW			77-029A-02	5/04/77	NORMAL	STND	48
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ESSA 8	UNITED STATES ESSA	12/15/68	GEOCENTRIC	68-114A	3/06/76	INOPERABLE	ZERO	48
				68-114A-01	3/06/76	INOPERABLE	ZERO	49
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GEOS 2	UNITED STATES	NASA-OSS	01/11/68 GEOCENTRIC	68-002A	12/30/68	INOPERABLE	ZERO	49
PLOTKIN	LASER TRACKING REFLECTOR			68-002A-02	5/16/77	NORMAL	STND	49
GEOS 3	UNITED STATES	NASA-OA	04/09/75 GEOCENTRIC	75-027A	4/09/75	NORMAL	STND	49
ANDERLE	US NAVY DOPPLER SYSTEM			75-027A-05	4/09/75	NORMAL	STND	49
GALICINAO	SATELLITE-TO-SATELLITE TRACKING			75-027A-06	4/09/75	NORMAL	STND	50
JACKSON	C-BAND SYSTEM			75-027A-03	4/09/75	NORMAL	STND	50
PURDY	RADAR ALTIMETER SYSTEM			75-027A-01	4/09/75	NORMAL	STND	50
SALZBERG	S-BAND TRACKING SYSTEM			75-027A-02	4/09/75	NORMAL	STND	50
STEPHANIDES	LASER CUBE SYSTEM			75-027A-04	4/09/75	NORMAL	STND	50
GEOS-B	SEE GEOS 2							
GEOSTATION.METEOROL SAT.	SEE GMS							
GLOBAL MAGNETIC SURV MSN	SEE MAGSAT							
GMS	JAPAN	NASDA	07/14/77 GEOCENTRIC	77-065A	8/15/77	NORMAL	STND	51
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JMA STAFF	VISIBLE AND INFRARED SPIN-SCAN RADIOMETER (VISSR)			77-065A-01	8/15/77	NORMAL	STND	51
JMA STAFF	SPACE ENVIRONMENT MONITOR (SEM)			77-065A-02	8/15/77	NORMAL	STND	51
JMA STAFF	WEATHER COMMUNICATIONS FACILITY			77-065A-03	8/15/77	NORMAL	STND	51
GOES 1	UNITED STATES	NOAA-NESS	10/16/75 GEOCENTRIC	75-100A	8/13/77	NORMAL	ZERO	51
	UNITED STATES	NASA-OA						
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-100A-01	8/13/77	NORMAL	ZERO	51
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-100A-05	8/13/77	PARTIAL	ZERO	52
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WILLIAMS	SOLAR X-RAY MONITOR			75-100A-03	8/13/77	NORMAL	ZERO	52
WILLIAMS	MAGNETIC FIELD MONITOR			75-100A-04	8/13/77	PARTIAL	ZERO	52
GOES 2	UNITED STATES	NOAA-NESS	06/16/77 GEOCENTRIC	77-048A	6/16/77	NORMAL	STND	52
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NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			77-048A-05	6/16/77	NORMAL	STND	53
WILLIAMS	ENERGETIC PARTICLE MONITOR			77-048A-02	7/20/77	NORMAL	STND	53
WILLIAMS	SOLAR X-RAY MONITOR			77-048A-03	7/20/77	NORMAL	STND	53
WILLIAMS	MAGNETIC FIELD MONITOR			77-048A-04	8/17/77	NORMAL	STND	53

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GOES 2								
GOES-A	SEE GOES 1							
GOES-B	SEE GOES 2							
GOES-C	UNITED STATES UNITED STATES	NOAA-NESS NASA-OA	07/00/78	GEOCENTRIC	GOES-C		APPROVED MISSION		143
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)				GOES-C -01				144
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				GOES-C -05				144
WILLIAMS	ENERGETIC PARTICLE MONITOR				GOES-C -02				144
WILLIAMS	SOLAR X-RAY MONITOR				GOES-C -03				144
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-C -04				144
GOES-D	UNITED STATES	NOAA-NESS	03/01/79	GEOCENTRIC	GOES-D		APPROVED MISSION		145
NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)				GOES-D -01				145
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				GOES-D -05				145
WILLIAMS	ENERGETIC PARTICLE MONITOR				GOES-D -02				145
WILLIAMS	SOLAR X-RAY MONITOR				GOES-D -03				145
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-D -04				145
GOES-E	UNITED STATES	NOAA-NESS	04/01/79	GEOCENTRIC	GOES-E		APPROVED MISSION		146
NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)				GOES-E -01				146
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM				GOES-E -05				146
WILLIAMS	ENERGETIC PARTICLE MONITOR				GOES-E -02				146
WILLIAMS	SOLAR X-RAY MONITER				GOES-E -03				146
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-E -04				146
GOES-F	UNITED STATES	NOAA-NESS	07/00/80	GEOCENTRIC	GOES-F		APPROVED MISSION		147
NESS STAFF	VISIBLE-INFRARED SPIN SCAN RADIOMETER (VISSR)				GOES-F -01				147
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSIONS SYSTEM				GOES-F -05				147
WILLIAMS	ENERGETIC PARTICLE MONITOR				GOES-F -02				147
WILLIAMS	SOLAR X-RAY MONITOR				GOES-F -03				147
WILLIAMS	MAGNETIC FIELD MONITOR				GOES-F -04				147
HAWKEYE 1	UNITED STATES	NASA-OSS	06/03/74	GEOCENTRIC	74-040A	7/20/75	NORMAL	SUBS	53
FRANK	LOW-ENERGY PROTONS AND ELECTRONS				74-040A-02	7/20/75	NORMAL	SUBS	54
GURNETT	ELF/VLF RECEIVERS				74-040A-03	4/05/75	NORMAL	SUBS	54
VAN ALLEN	TRIAXIAL FLUXGATE MAGNETOMETER				74-040A-01	7/20/75	NORMAL	SUBS	54
HCMM	UNITED STATES	NASA-OA	04/00/78	GEOCENTRIC	AEM-A		APPROVED MISSION		148
BARNES	HEAT CAPACITY MISSION RADIOMETER				AEM-A -01				148
HEAO 1	UNITED STATES	NASA-OSS	08/12/77	GEOCENTRIC	77-075A	8/12/77	NORMAL	STND	54
BOLDT	COSMIC X-RAY EXPERIMENT				77-075A-02	8/12/77	NORMAL	STND	54
FRIEDMAN	LARGE AREA COSMIC X-RAY SURVEY				77-075A-01	8/12/77	NORMAL	STND	55
GURSKY	X-RAY SCANNING MODULATION COLLIMATOR				77-075A-03	8/12/77	NORMAL	STND	55
PETERSON	LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY				77-075A-04	8/12/77	NORMAL	STND	55
HEAO-A	SEE HEAO 1								
HEAO-B	UNITED STATES	NASA-OSS	06/15/78	GEOCENTRIC	HEAO-B		APPROVED MISSION		148
BOLDT	SOLID-STATE X-RAY DETECTOR				HEAO-B -05				148
CLARK	A CURVED-CRYSTAL BRAGG X-RAY SPECTROMETER				HEAO-B -03				148
GIACCONI	MONITOR PROPORTIONAL COUNTER				HEAO-B -01				148
GIACCONI	HIGH-RESOLUTION IMAGER				HEAO-B -02				149
GURSKY	IMAGING PROPORTIONAL COUNTER				HEAO-B -04				149
HEAO-C	UNITED STATES	NASA-OSS	07/15/79	GEOCENTRIC	HEAO-C		APPROVED MISSION		149
ISRAEL	HEAVY NUCLEII				HEAO-C -03				149
JACOBSON	GAMMA-RAY LINE SPECTROMETER				HEAO-C -01				149
KOCH	ISOTOPIC COMPOSITION OF COSMIC RAYS				HEAO-C -04				149
HEAT CAPACITY MAP MSN	SEE HCMM								
HELIOCENTRIC	SEE ISEE-C								
HELIOS 1	SEE HELIOS-A								
HELIOS 2	SEE HELIOS-B								
HELIOS-A	FEDERAL REPUBLIC OF GE BMWF UNITED STATES	12/10/74 NASA-OSS		HELIOCENTRIC	74-097A	12/10/74	NORMAL	STND	55
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER				74-097A-12	12/10/74	NORMAL	STND	56

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GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			74-097A-04	3/10/75	PARTIAL	STND	56
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			74-097A-05	3/10/75	PARTIAL	STND	56
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			74-097A-06	3/10/75	PARTIAL	STND	56
KEPPLER	ENERGETIC ELECTRON DETECTOR			74-097A-10	12/10/74	NORMAL	STND	57
KUNDT	CELESTIAL MECHANICS			74-097A-14	12/10/74	NORMAL	STND	57
KUNOW	COSMIC-RAY PARTICLES			74-097A-07	12/10/74	NORMAL	STND	57
LEINERT	ZODIACAL LIGHT PHOTOMETER			74-097A-11	12/10/74	NORMAL	STND	57
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS			74-097A-02	12/10/74	NORMAL	STND	57
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			74-097A-01	12/10/74	NORMAL	STND	57
NEUBAUER	SEARCH COIL MAGNETOMETER			74-097A-03	12/10/74	NORMAL	STND	57
ROSENBAUER	PLASMA DETECTORS			74-097A-09	12/10/74	NORMAL	STND	58
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			74-097A-08	12/10/74	NORMAL	STND	58
HELIOS-B	FEDERAL REPUBLIC OF GE BMWF		01/15/76 HELIOCENTRIC	76-003A	1/15/76	NORMAL	STND	58
	UNITED STATES NASA-OSS							
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER			76-003A-12	1/23/76	NORMAL	STND	58
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			76-003A-04	1/16/76	NORMAL	STND	59
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			76-003A-05	1/16/76	NORMAL	STND	59
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			76-003A-06	1/16/76	NORMAL	STND	59
KEPPLER	ENERGETIC ELECTRON DETECTOR			76-003A-10	1/16/76	NORMAL	STND	59
KUNDT	CELESTIAL MECHANICS			76-003A-14	1/23/76	NORMAL	STND	59
KUNOW	COSMIC-RAY PARTICLES			76-003A-07	1/16/76	NORMAL	STND	59
LEINERT	ZODIACAL LIGHT PHOTOMETER			76-003A-11	1/23/76	NORMAL	STND	60
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS			76-003A-02	1/16/76	NORMAL	STND	60
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			76-003A-01	1/16/76	NORMAL	STND	60
NEUBAUER	SEARCH COIL MAGNETOMETER			76-003A-03	1/16/76	NORMAL	STND	60
ROSENBAUER	PLASMA DETECTORS			76-003A-09	1/16/76	NORMAL	STND	60
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			76-003A-08	1/16/76	NORMAL	STND	60
HELOS	INTERNATIONAL ESA		12/00/80 GEOCENTRIC	HELOS	PROPOSED MISSION			150
UNKNOWN	MEDIUM-ENERGY COSMIC X-RAY PACKAGE			HELOS -01				150
UNKNOWN	LOW-ENERGY COSMIC X-RAY PACKAGE			HELOS -02				150
HEOS 1	INTERNATIONAL ESA		12/05/68 GEOCENTRIC	68-109A	10/18/75	INOPERABLE	ZERO	61
ELLIOT	FLUXGATE MAGNETOMETER			68-109A-02	10/28/75	INOPERABLE	ZERO	61
HEOS-A	SEE HEOS 1							
HEOS-A1	SEE HEOS 1							
HERMES	UNITED STATES NASA-OA		01/17/76 GEOCENTRIC	76-004A	1/20/76	NORMAL	STND	61
	CANADA CRC							
DAY	SUPER-HIGH-FREQUENCY (12 AND 14 GHZ) - TRANSMITTER EXPERIMENT PACKAGE (TEP)			76-004A-01	2/08/76	NORMAL	STND	61
DONOUGHE	UNITED STATES USER EXPERIMENTS			76-004A-05	2/26/76	NORMAL	STND	61
KERR	CANADIAN COMMUNICATIONS EXPERIMENTS			76-004A-04	2/26/76	NORMAL	STND	61
VIGNERON	SOLAR ARRAY TECHNOLOGY EXPERIMENT (SATE)			76-004A-02	3/20/77	INOPERABLE	ZERO	62
VIGNERON	ATTITUDE CONTROL SYSTEM EXPERIMENT(ACSE)			76-004A-03	1/29/76	NORMAL	STND	62
HI.ECCEN LUN OCCULT.SAT.	SEE HELOS							
HIGH ENERGY ASTRON OBS-A	SEE HEAO 1							
HIGH ENERGY ASTRON OBS-B	SEE HEAO-B							
HIGH ENERGY ASTRON OBS-C	SEE HEAO-C							
IK-14	SEE INTERCOSMOS 14							
IME-D	SEE ISEE-B							
IME-H	SEE ISEE-C							
IME-M	SEE ISEE-A							
IMP 7	SEE IMP-H							
IMP 8	SEE IMP-J							
IMP-H	UNITED STATES NASA-OSS		09/23/72 GEOCENTRIC	72-073A	9/23/72	NORMAL	STND	62
BAME	MEASUREMENT OF SOLAR PLASMA			72-073A-10	9/23/72	NORMAL	STND	62
BRIDGE	MEASUREMENT OF SOLAR PLASMA			72-073A-02	12/11/73	PARTIAL	STND	62
CLINE	STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS			72-073A-13	10/13/72	NORMAL	STND	62
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			72-073A-04	9/23/72	NORMAL	STND	62

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HOVESTADT	LOW-ENERGY COSMIC-RAY COMPOSITION				MOTHER -05				152
MOZER	DC TO 12-HZ ELECTRIC FIELD PROBE				MOTHER -06				152
OGILVIE	THREE-DIMENSIONAL (SIX AXES), 6-EV TO 10-KEV ELECTRON SPECTROMETER				MOTHER -02				152
RUSSELL	MAGNETIC FIELDS				MOTHER -04				152
SHARP	PLASMA COMPOSITION				MOTHER -12				153
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS				MOTHER -09				153
ISEE-B		UNITED STATES INTERNATIONAL	NASA-OSS ESA	10/13/77 GEOCENTRIC	DAUGHTR		APPROVED MISSION		153
ANDERSON	ENERGETIC ELECTRONS AND PROTONS				DAUGHTR-08				153
EGIDI	SOLAR WIND IONS				DAUGHTR-02				153
FRANK	HOT PLASMA				DAUGHTR-03				153
GURNETT	10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD MONOAXIAL PROBES				DAUGHTR-05				154
HARVEY	RADIO PROPAGATION RECEIVER				DAUGHTR-06				154
KEPPLER	ENERGETIC ELECTRONS AND PROTONS				DAUGHTR-07				154
PASCHMANN	50-EV TO 40-KEV PROTON AND 5-EV TO 20-KEV ELECTRON PLASMA PROBE				DAUGHTR-01				154
RUSSELL	MAGNETIC FIELDS				DAUGHTR-04				154
ISEE-C		UNITED STATES INTERNATIONAL	NASA-OSS ESA	07/00/78 HELIOCENTRIC	HELOCTR		APPROVED MISSION		154
ANDERSON	X RAYS AND ELECTRONS				HELOCTR-09				155
BAME	150-EV TO 7-KEV PROTON AND 5-EV TO 2.5-KEV ELECTRON PLASMA PROBE				HELOCTR-01				155
HECKMAN	HIGH-ENERGY COSMIC RAYS				HELOCTR-05				155
HOVESTADT	LOW-ENERGY COSMIC-RAY COMPOSITION				HELOCTR-03				155
HYNDS	ENERGETIC PROTONS				HELOCTR-08				155
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI				HELOCTR-06				156
OGILVIE	MASS SPECTROMETER				HELOCTR-11				156
SCARF	20-HZ TO 1-KHZ MAGNETIC AND 20-HZ TO 100-KHZ ELECTRIC FIELD DETECTORS				HELOCTR-07				156
SMITH	MAGNETIC FIELDS				HELOCTR-02				156
STEINBERG	20-KHZ TO 3-MHZ RADIO MAPPING				HELOCTR-10				156
STONE	COSMIC-RAY COMPOSITION				HELOCTR-12				156
VON ROSENVINGE	SOLAR AND GALACTIC ENERGETIC PARTICLES				HELOCTR-04				156
WILCOX	SOLAR AND INTERPLANETARY MAGNETIC FIELDS (CORRELATIVE STUDY)				HELOCTR-13				157
ISIS 1		CANADA	CRC	01/30/69 GEOCENTRIC	69-009A	1/30/70	PARTIAL	SUBS	67
		UNITED STATES	NASA-OSS						
BARRINGTON	VLF RECEIVER				69-009A-03	1/30/70	NORMAL	SUBS	68
BRACE	CYLINDRICAL ELECTROSTATIC PROBE				69-009A-07	1/30/70	NORMAL	SUBS	68
CALVERT	FIXED-FREQUENCY SOUNDER				69-009A-02	1/30/70	NORMAL	SUBS	68
FORSYTH	RADIO BEACON				69-009A-09	3/10/75	PARTIAL	ZERO	68
HARTZ	COSMIC RADIO NOISE				69-009A-10	1/30/70	NORMAL	SUBS	68
MCDIARMID	ENERGETIC PARTICLE DETECTORS				69-009A-04	1/30/70	NORMAL	SUBS	69
SAGALYN	SPHERICAL ELECTROSTATIC ANALYZER				69-009A-08	1/30/70	NORMAL	SUBS	69
WHITTEKER	SWEEP-FREQUENCY SOUNDER				69-009A-01	1/30/70	NORMAL	SUBS	69
ISIS 2		CANADA	CRC	04/01/71 GEOCENTRIC	71-024A	2/04/73	PARTIAL	SUBS	69
		UNITED STATES	NASA-OSS						
ANGER	3914- AND 5577-A PHOTOMETER				71-024A-11	2/04/73	NORMAL	SUBS	69
BARRINGTON	VLF RECEIVER				71-024A-03	2/04/73	NORMAL	SUBS	70
BRACE	CYLINDRICAL ELECTROSTATIC PROBE				71-024A-07	2/04/73	NORMAL	SUBS	70
CALVERT	FIXED-FREQUENCY SOUNDER				71-024A-02	2/04/73	NORMAL	SUBS	70
FORSYTH	RADIO BEACON				71-024A-09	3/10/75	PARTIAL	ZERO	70
HARTZ	COSMIC RADIO NOISE				71-024A-10	2/04/73	NORMAL	SUBS	70
HEIKKILA	SOFT-PARTICLE SPECTROMETER				71-024A-05	1/00/76	INOPERABLE	ZERO	71
HOFFMAN	ION MASS SPECTROMETER				71-024A-06	2/04/73	NORMAL	SUBS	71
MAIER	RETARDING POTENTIAL ANALYZER				71-024A-08	2/04/73	NORMAL	SUBS	71
MCDIARMID	ENERGETIC PARTICLE DETECTORS				71-024A-04	2/04/73	PARTIAL	SUBS	71
SHEPHERD	6300-A PHOTOMETER				71-024A-12	2/04/73	NORMAL	SUBS	71
WHITTEKER	SWEEP-FREQUENCY SOUNDER				71-024A-01	2/04/73	NORMAL	SUBS	72
ISIS-A	SEE ISIS 1								
ISIS-B	SEE ISIS 2								
ISIS-X	SEE ALOUETTE 2								
ISS 1		JAPAN JAPAN	NASDA RRL	02/29/76 GEOCENTRIC	76-019A	4/02/76	INOPERABLE	ZERO	72
FUGONO	POSITIVE ION MASS SPECTROMETER (PIC)				76-019A-04	4/02/76	INOPERABLE	ZERO	72
MIYAZAKI	RETARDING POTENTIAL PROBE				76-019A-03	4/02/76	INOPERABLE	ZERO	72
MURANAGA	RADIO NOISE NEAR 2.5,5,10+25 MHZ (RAN)				76-019A-02	4/02/76	INOPERABLE	ZERO	72
ISS 2		JAPAN	RRL	02/00/78 GEOCENTRIC	ISS-2		APPROVED MISSION		157
FUGONO	ION MASS SPECTROMETER				ISS-2 -04				157
MATUURA	SWEEP FREQUENCY TOPSIDE IONOSPHERIC SOUNDER (TOP)				ISS-2 -01				157

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MARINER 10								
MARINER-J VENUS/MERCURY	SEE MARINER 10							
MEO1	SEE SMS 1							
MEO2	SEE SMS 2							
METEC	SEE METEOROID TECHNOLOGY SAT							
METEOROID TECHNOLOGY SAT	UNITED STATES UNITED STATES	NASA-OAST	08/13/72 GEOCENTRIC	72-061A	6/05/75	NORMAL	ZERO	76
HUMES	METEOROID PENETRATION			72-061A-01	6/05/75	NORMAL	ZERO	76
METEOROLOGICAL SAT-A	SEE METEOSAT-A							
METEOROLOGICAL SAT-B	SEE METEOSAT-B							
METEOSAT-A	INTERNATIONAL	ESA	11/03/77 GEOCENTRIC	METOS-A		APPROVED MISSION		160
ESA STAFF	IMAGING RADIOMETER			METOS-A-01				160
ESA STAFF	DATA COLLECTION PLATFORM (DCP)			METOS-A-02				161
METEOSAT-B	INTERNATIONAL	ESA	11/00/78 GEOCENTRIC	METOS-B		PROPOSED MISSION		161
ESA STAFF	IMAGING RADIOMETER			METOS-B-01				161
ESA STAFF	DATA COLLECTION PLATFORM (DCP)			METOS-B-02				161
MJS 77A	SEE VOYAGER 1							
MJS 77B	SEE VOYAGER 2							
MOTHER	SEE ISEE-A							
MTS	SEE METEOROID TECHNOLOGY SAT							
NEUTRAL POINT EXPLORER	SEE HAWKEYE 1							
NIMBUS 4	UNITED STATES	NASA-OA	04/08/70 GEOCENTRIC	70-025A	4/08/71	PARTIAL	SUBS	77
COTE	INTERROGATION, RECORDING, AND LOCATION SYSTEM (IRLS)			70-025A-07	6/02/75	NORMAL	ZERO	77
HEATH	BACKSCATTER ULTRAVIOLET (BUV) SPECTROMETER			70-025A-05	8/15/76	NORMAL	SUBS	77
NIMBUS 5	UNITED STATES	NASA-OA	12/11/72 GEOCENTRIC	72-097A	1/04/73	PARTIAL	STND	77
HOUGHTON	SELECTIVE CHOPPER RADIOMETER (SCR)			72-097A-02	7/15/75	NORMAL	SUBS	78
MCCULLOCH	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			72-097A-08	3/12/75	INOPERABLE	ZERO	78
SMITH	INFRARED TEMPERATURE PROFILE RADIOMETER (IITPR)			72-097A-01	10/02/76	PARTIAL	ZERO	78
STAELIN	NIMBUS 5 MICROWAVE SPECTROMETER (NEMS)			72-097A-03	8/15/75	NORMAL	SUBS	78
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)			72-097A-04	7/15/75	NORMAL	SUBS	78
NIMBUS 6	UNITED STATES	NASA-OA	06/12/75 GEOCENTRIC	75-052A	6/12/75	NORMAL	STND	79
GILLE	LIMB RADIANCE INVERSION RADIOMETER (LRIR)			75-052A-04	1/07/76	INOPERABLE	ZERO	79
HOUGHTON	PRESSURE-MODULATED RADIOMETER (PMR)			75-052A-09	8/04/76	NORMAL	SUBS	79
JULIAN	TROPICAL WIND ENERGY CONVERSION AND REFERENCE LEVEL EXPERIMENT (TWERLE)			75-052A-01	6/19/75	NORMAL	STND	79
MCCULLOCH	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			75-052A-12	5/31/77	INOPERABLE	ZERO	80
SMITH	HIGH RESOLUTION INFRARED RADIATION SOUNDER (HIRS)			75-052A-02	5/27/76	INOPERABLE	ZERO	80
SMITH	EARTH RADIATION BUDGET (ERB)			75-052A-05	5/23/76	PARTIAL	SUBS	80
STAELIN	SCANNING MICROWAVE SPECTROMETER (SCAMS)			75-052A-10	5/30/76	INOPERABLE	ZERO	80
VONBUN	TRACKING AND DATA RELAY			75-052A-13	3/01/77	PARTIAL	ZERO	81
WILHEIT, JR.	ELECTRICALLY SCANNING MICROWAVE RADIOMETER (ESMR)			75-052A-03	4/26/77	PARTIAL	ZERO	81
NIMBUS-D	SEE NIMBUS 4							
NIMBUS-E	SEE NIMBUS 5							
NIMBUS-F	SEE NIMBUS 6							
NIMBUS-G	UNITED STATES	NASA-OA	10/00/78 GEOCENTRIC	NIMBS-G		PROPOSED MISSION		161
ALLISON	TEMPERATURE/HUMIDITY INFRARED RADIOMETER (THIR)			NIMBS-G-10				162
GLOERSEN	SCANNING MULTISPECTRAL MICROWAVE RADIOMETER (SMMR)			NIMBS-G-08				162
HEATH	SOLAR AND BACKSCATTER ULTRAVIOLET/TOTAL OZONE MAPPING SYSTEM (SBUV/TOMS)			NIMBS-G-09				162
HOUGHTON	STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS)			NIMBS-G-02				162
HOVIS	COASTAL ZONE OCEAN COLOR SCANNER			NIMBS-G-03				163

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JACOBOWITZ	EARTH RADIATION BUDGET (ERB)			NIMBS-G-07				163
MCCORMICK	STRATOSPHERIC AEROSOL MEASUREMENT-II (SAM-II)			NIMBS-G-06				163
RUSSELL, 3RD	LOWER ATMOSPHERIC COMPOSITION AND TEMPERATURE EXPERIMENT (LACATE)			NIMBS-G-01				163
NOAA 3	UNITED STATES UNITED STATES	NOAA-NESS NASA-OA	11/06/73 GEOCENTRIC	73-086A	8/00/76	INOPERABLE	ZERO	81
WILLIAMS	SOLAR PROTON MONITOR			73-086A-01	8/00/76	INOPERABLE	ZERO	81
NOAA 4	UNITED STATES	NOAA-NESS	11/15/74 GEOCENTRIC	74-089A	12/03/74	NORMAL	UNKN	81
NESS STAFF	SCANNING RADIOMETER (SR)			74-089A-02	12/17/74	NORMAL	STND	82
NESS STAFF	VERY HIGH RESOLUTION RADIOMETER (VHRR)			74-089A-03	12/17/74	NORMAL	STND	82
NESS STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)			74-089A-04	12/17/74	NORMAL	STND	82
WILLIAMS	SOLAR PROTON MONITOR			74-089A-01	4/05/76	PARTIAL	ZERO	82
NOAA 5	UNITED STATES UNITED STATES	NOAA-NESS NASA-OA	07/29/76 GEOCENTRIC	76-077A	7/30/76	NORMAL	STND	82
NESS STAFF	VERY HIGH RESOLUTION RADIOMETER (VHRR)			76-077A-01	9/01/76	NORMAL	STND	83
NESS STAFF	VERTICAL TEMPERATURE PROFILE RADIOMETER (VTPR)			76-077A-02	9/15/76	NORMAL	STND	83
NESS STAFF	SCANNING RADIOMETER (SR)			76-077A-03	8/20/76	NORMAL	STND	83
WILLIAMS	SOLAR PROTON MONITOR (SPM)			76-077A-04	9/15/76	NORMAL	STND	83
NOAA-A	UNITED STATES	NOAA-NESS	1978 GEOCENTRIC	NOAA-A		APPROVED MISSION		164
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-A -04				164
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-A -01				164
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-A -02				164
NESS STAFF	DATA COLLECTION SYSTEM			NOAA-A -03				164
NOAA-B	UNITED STATES	NOAA-NESS	1979 GEOCENTRIC	NOAA-B		APPROVED MISSION		164
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-B -04				165
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-B -01				165
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-B -02				165
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-B -03				165
NOAA-C	UNITED STATES	NOAA-NESS	1980 GEOCENTRIC	NOAA-C		APPROVED MISSION		165
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-C -04				166
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-C -01				166
NESS STAFF				NOAA-C -02				166
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-C -03				166
NOAA-D	UNITED STATES	NOAA-NESS	1981 GEOCENTRIC	NOAA-D		APPROVED MISSION		166
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-D -04				167
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-D -01				167
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-D -02				167
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-D -03				167
NOAA-E	UNITED STATES	NOAA-NESS	1982 GEOCENTRIC	NOAA-E		APPROVED MISSION		167
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-E -04				167
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-E -01				168
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-E -02				168
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-E -03				168
NOAA-F	UNITED STATES	NOAA-NESS	1983 GEOCENTRIC	NOAA-F		APPROVED MISSION		168
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-F -04				168
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-F -01				169
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			NOAA-F -02				169
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-F -03				169
NOAA-G	UNITED STATES	NOAA-NESS	1984	NOAA-G		APPROVED MISSION		169
BOSTROM	SPACE ENVIRONMENT MONITOR			NOAA-G -04				169
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			NOAA-G -01				170
NESS STAFF				NOAA-G -02				170
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			NOAA-G -03				170
NRL-111	SEE SOLRAD 11A							
OAO 3	UNITED STATES	NASA-OSS	08/21/72 GEOCENTRIC	72-065A	8/21/72	NORMAL	STND	83
BOYD	STELLAR X-RAYS			72-065A-02	6/00/73	PARTIAL	STND	84
SPITZER	HIGH-RESOLUTION TELESCOPES			72-065A-01	8/21/72	NORMAL	STND	84
OAO-C	SEE OAO 3							

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OAO 3								
OCEAN DYNAMICS SAT-A	SEE SEASAT-A							
OCEAN DYNAMICS SAT-B	SEE SEASAT-B							
ONE METER UV TELESCOPE	UNITED STATES / NASA-OSS	1982	GEOCENTRIC	OMUVTEL	PROPOSED MISSION			170
HENIZE	INSTRUMENT DEFINITION TEAM			OMUVTEL-01				170
OSO 5	UNITED STATES / NASA-OSS	01/22/69	GEOCENTRIC	69-006A	8/25/75	INOPERABLE	ZERO	84
BLAMONT	MEASUREMENT OF THE SELF-REVERSAL OF THE SOLAR LYMAN-ALPHA LINE			69-006A-06	8/21/75	INOPERABLE	ZERO	84
BOYD	X-RAY SPECTROHELIOGRAPH			69-006A-01	8/25/75	INOPERABLE	ZERO	84
NEY	ZODIACAL LIGHT MONITOR			69-006A-07	8/09/75	INOPERABLE	ZERO	85
OSO 8	UNITED STATES / NASA-OSS	06/21/75	GEOCENTRIC	75-057A	6/22/75	NORMAL	STND	85
ACTON	MAPPING X-RAY HELIOMETER			75-057A-04	6/22/75	NORMAL	STND	85
BARTH	HIGH-RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS			75-057A-01	3/00/76	PARTIAL	STND	85
BONNET	CHROMOSPHERE FINE-STRUCTURE STUDY			75-057A-02	12/00/75	PARTIAL	STND	85
FROST	HIGH-ENERGY CELESTIAL X RAYS			75-057A-07	6/22/75	NORMAL	STND	86
KRAUSHAAR	SOFT X-RAY BACKGROUND RADIATION INVESTIGATION			75-057A-05	6/22/75	NORMAL	STND	86
NOVICK	HIGH-SENSITIVITY CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS			75-057A-03	6/22/75	NORMAL	STND	86
SERLEMITSOS	COSMIC X-RAY SPECTROSCOPY			75-057A-06	6/22/75	NORMAL	STND	86
WELLER, JR.	EUV FROM EARTH AND SPACE			75-057A-08	6/22/75	NORMAL	STND	86
OSO-EYE	SEE OSO 8							
OSO-F	SEE OSO 5							
OSO-I	SEE OSO 8							
OUTER PLANETS A	SEE VOYAGER 1							
OUTER PLANETS B	SEE VOYAGER 2							
OV5-6	UNITED STATES / DOD-USAF	05/23/69	GEOCENTRIC	69-046B	8/00/76	PARTIAL	ZERO	86
YATES	GEIGER-MUELLER TUBE, SOLAR X-RAY DETECTOR, 2 TO 12 A			69-046B-01	8/00/76	PARTIAL	ZERO	86
YATES	SODIUM IODIDE SCINTILLATOR, GAMMA-RAY DETECTOR, 19 TO 1175 KEV			69-046B-02	8/00/76	PARTIAL	ZERO	87
YATES	PROTON ALPHA PARTICLE TELESCOPE			69-046B-03	8/00/76	PARTIAL	ZERO	87
YATES	LOW-ENERGY ELECTRON DETECTOR			69-046B-05	8/00/76	PARTIAL	ZERO	87
P78-2	SEE SCATHA							
PIONEER 6	UNITED STATES / NASA-OSS	12/16/65	HELIOCENTRIC	65-105A	2/07/71	NORMAL	SUBS	87
BRIDGE	SOLAR WIND PLASMA FARADAY CUP			65-105A-02	12/03/74	PARTIAL	SUBS	87
FAN	COSMIC-RAY TELESCOPE			65-105A-03	12/03/74	NORMAL	SUBS	87
MCCRACKEN	COSMIC-RAY ANISOTROPY			65-105A-05	12/03/74	PARTIAL	SUBS	88
WOLFE	ELECTROSTATIC ANALYZER			65-105A-06	12/03/74	NORMAL	SUBS	88
PIONEER 7	UNITED STATES / NASA-OSS	08/17/66	HELIOCENTRIC	66-075A	2/10/76	PARTIAL	ZERO	88
MCCRACKEN	COSMIC-RAY ANISOTROPY			66-075A-05	2/10/76	PARTIAL	ZERO	88
SIMPSON	COSMIC-RAY TELESCOPE			66-075A-06	2/10/76	PARTIAL	ZERO	89
WOLFE	ELECTROSTATIC ANALYZER			66-075A-03	2/10/76	PARTIAL	ZERO	89
PIONEER 8	UNITED STATES / NASA-OSS	12/13/67	HELIOCENTRIC	67-123A	5/02/71	NORMAL	SUBS	89
BERG	COSMIC DUST DETECTOR			67-123A-04	4/25/75	NORMAL	ZERO	89
ESHLEMAN	TWO-FREQUENCY BEACON RECEIVER			67-123A-03	1/25/71	NORMAL	SUBS	90
MCCRACKEN	COSMIC-RAY ANISOTROPY			67-123A-05	4/25/75	INOPERABLE	ZERO	90
NESS	SINGLE-AXIS MAGNETOMETER			67-123A-01	5/02/71	NORMAL	SUBS	90
WEBBER	COSMIC-RAY GRADIENT DETECTOR			67-123A-06	12/03/74	PARTIAL	SUBS	90
WOLFE	ELECTROSTATIC ANALYZER			67-123A-02	1/25/71	PARTIAL	SUBS	91
PIONEER 9	UNITED STATES / NASA-OSS	11/08/68	HELIOCENTRIC	68-100A	5/19/69	NORMAL	SUBS	91
BERG	COSMIC DUST DETECTOR			68-100A-04	5/19/69	NORMAL	SUBS	91
ESHLEMAN	TWO-FREQUENCY BEACON RECEIVER			68-100A-03	12/03/74	NORMAL	STND	91
MCCRACKEN	COSMIC-RAY ANISOTROPY			68-100A-05	5/19/69	NORMAL	SUBS	92
SCARF	PLASMA WAVE DETECTOR			68-100A-07	5/19/69	NORMAL	SUBS	92
SONETT	TRIAXIAL MAGNETOMETER			68-100A-01	5/19/69	NORMAL	SUBS	92
WEBBER	COSMIC-RAY TELESCOPE			68-100A-06	5/19/69	NORMAL	SUBS	92
WOLFE	ELECTROSTATIC ANALYZER			68-100A-02	12/03/74	NORMAL	SUBS	92
PIONEER 10	UNITED STATES / NASA-OSS	03/03/72	JUPITER FLYBY	72-012A	3/03/72	NORMAL	STND	93
ANDERSON	CELESTIAL MECHANICS			72-012A-09	3/03/72	NORMAL	STND	93
FILLIUS	JOVIAN TRAPPED RADIATION			72-012A-05	12/19/73	PARTIAL	SUBS	93
GEHRELS	IMAGING PHOTOPOLARIMETER (IPP)			72-012A-07	12/31/73	NORMAL	ZERO	93
JUDGE	ULTRAVIOLET PHOTOMETRY			72-012A-06	3/03/72	NORMAL	STND	94
KINARD	METEOROID DETECTORS			72-012A-04	3/03/72	NORMAL	STND	94
MCDONALD	COSMIC-RAY SPECTRA			72-012A-12	3/03/72	NORMAL	STND	94
SIMPSON	CHARGED PARTICLE COMPOSITION			72-012A-02	3/03/72	NORMAL	STND	94

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SMITH	MAGNETIC FIELDS			72-012A-01	11/17/75	INOPERABLE	ZERO	94
SOBERMAN	ASTEROID/METEOROID ASTRONOMY			72-012A-03	8/03/76	INOPERABLE	ZERO	95
VAN ALLEN	JOVIAN CHARGED PARTICLES			72-012A-11	3/03/72	NORMAL	STND	95
WEINB.'G	ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY			72-012A-14	1/30/76	NORMAL	ZERO	95
WOLFE	PLASMA			72-012A-13	3/03/72	NORMAL	STND	95
PIONEER 11	UNITED STATES / NASA-OSS	04/06/73	JUPITER FLYBY	73-019A	4/06/73	NORMAL	STND	96
ACUNA	JOVIAN MAGNETIC FIELD			73-019A-16	12/04/74	NORMAL	ZERO	96
ANDERSON	CELESTIAL MECHANICS			73-019A-09	4/06/73	NORMAL	STND	96
FILLIUS	JOVIAN TRAPPED RADIATION			73-019A-05	12/09/74	NORMAL	SUBS	96
GEHRELS	IMAGING PHOTOPOLARIMETER			73-019A-07	12/30/74	NORMAL	ZERO	96
JUDGE	ULTRAVIOLET PHOTOMETRY			73-019A-06	4/06/73	NORMAL	STND	97
KINARD	METEOROID DETECTORS			73-019A-04	4/06/73	NORMAL	STND	97
KLIORE	S-BAND OCCULTATION			73-019A-10	12/03/74	NORMAL	ZERO	97
MCDONALD	COSMIC-RAY SPECTRA			73-019A-12	4/06/73	NORMAL	STND	97
MUNCH	INFRARED RADIOMETER			73-019A-08	12/13/74	NORMAL	ZERO	97
SIMPSON	CHARGED PARTICLE COMPOSITION			73-019A-02	4/06/73	NORMAL	STND	97
SMITH	MAGNETIC FIELDS			73-019A-01	4/06/73	NORMAL	STND	98
SOBERMAN	ASTEROID/METEOROID ASTRONOMY			73-019A-03	6/14/75	INOPERABLE	ZERO	98
VAN ALLEN	JOVIAN CHARGED PARTICLES			73-019A-11	4/06/73	NORMAL	STND	98
WEINBERG	ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY			73-019A-15	5/14/76	NORMAL	ZERO	98
WOLFE	PLASMA			73-019A-13	4/16/75	INOPERABLE	ZERO	98
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE BUS							
PIONEER VENUS 1978 ORBIT	SEE PIONEER VENUS ORBITER							
PIONEER VENUS ORBITER	UNITED STATES / NASA-OSS	05/22/78	VENUSCENTRIC	PI078OR		APPROVED MISSION		170
BRACE	LANGMUIR PROBE			PI078OR-01				171
BROWN	RADAR ALTIMETER			PI078OR-02				171
CROFT	RADIO SCIENCE TEAM			PI078OR-03				171
DONAHUE	PARTICIPATING THEORIST DONAHUE			PI078OR-04				171
EVANS	TRANSIENT GAMMA-RAY SOURCES			PI078OR-05				171
HANSEN	CLOUD PHOTOPOLARIMETER			PI078OR-06				171
KNUDSEN	RETARDING POTENTIAL ANALYZER			PI078OR-07				171
MASURSKY	PARTICIPATING THEORIST MASURSKY			PI078OR-08				172
MCGILL	PARTICIPATING THEORIST MCGILL			PI078OR-09				172
NAGY	PARTICIPATING THEORIST NAGY			PI078OR-10				172
NIEMANN	NEUTRAL PARTICLE MASS SPECTROMETER			PI078OR-11				172
RUSSELL	TRIAXIAL FLUXGATE MAGNETOMETER			PI078OR-12				172
SCARF	ELECTRIC FIELD DETECTOR			PI078OR-13				172
SCHUBERT	PARTICIPATING THEORIST SCHUBERT			PI078OR-14				173
STEWART	PROGRAMMABLE ULTRAVIOLET SPECTROMETER			PI078OR-15				173
TAYLOR	RADIOMETRIC TEMPERATURE-SOUNDING EXPERIMENT			PI078OR-16				173
TAYLOR, JR.	ION MASS SPECTROMETER			PI078OR-17				173
WOLFE	SOLAR WIND PLASMA DETECTOR			PI078OR-18				173
PIONEER VENUS PROBE BUS	UNITED STATES / NASA-OSS	08/00/78	VENUS PROBE	PI078PA		APPROVED MISSION		173
BAUER	PARTICIPATING THEORIST BAUER			PI078PA-08				174
COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PI078PA-06				174
DONAHUE	PARTICIPATING THEORIST DONAHUE			PI078PA-09				174
GOODY	PARTICIPATING THEORIST GOODY			PI078PA-10				174
HUNTEN	PARTICIPATING THEORIST HUNTEN			PI078PA-11				174
PETTENGILL	RADIO SCIENCE TEAM			PI078PA-07				174
POLLACK	PARTICIPATING THEORIST POLLACK			PI078PA-12				174
SPENCER	PARTICIPATING THEORIST SPENCER			PI078PA-13				175
TAYLOR, JR.	ION-MASS SPECTROMETER			PI078PA-02				175
VON ZAHN	NEUTRAL PARTICLE MASS SPECTROMETER			PI078PA-03				175
PIONEER VENUS PROBE LRG	UNITED STATES / NASA-OSS	08/00/78	VENUS PROBE	PI078PB		APPROVED MISSION		175
BOESE	INFRARED RADIOMETER			PI078PB-05				175
COUNSELMAN	DIFFERENTIAL VERY LONG-BASELINE INTERFEROMETRIC TRACKING			PI078PB-09				175
HOFFMAN	NEUTRAL PARTICLE MASS SPECTROMETER			PI078PB-06				175
KNOLLENBERG	CLOUD PARTICLE SIZE SPECTROMETER			PI078PB-03				176
OYAMA	GAS CHROMATOGRAPH			PI078PB-04				176
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PI078PB-02				176
SEIFF	ATMOSPHERE STRUCTURE			PI078PB-01				176
TOMASKO	SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE			PI078PB-07				176
PIONEER VENUS PROBE SM	UNITED STATES / NASA-OSS	08/00/78	VENUS PROBE	PI078PC		APPROVED MISSION		176
COUNSELMAN	DIFFERENTIAL VERY LONG BASELINE INTERFEROMETRIC TRACKING			PI078PC-03				177
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PI078PC-02				177
SEIFF	ATMOSPHERE STRUCTURE			PI078PC-01				177

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SUOMI	INFRARED RADIOMETER			PI078PC-04				177
PIONEER VENUS PROBE SM2	UNITED STATES NASA-OSS	08/00/78	VENUS PROBE	PI078PD		APPROVED MISSION		177
COUNSELMAN	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PI078PD-03				177
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PI078PD-02				178
SEIFF	ATMOSPHERE STRUCTURE			PI078PD-01				178
SUOMI	INFRARED RADIOMETER			PI078PD-04				178
PIONEER VENUS PROBE SM3	UNITED STATES NASA-OSS	08/00/78	VENUS PROBE	PI078PE		APPROVED MISSION		178
COUNSELMAN	DIFFERTIAL VERY-LONG-BASELINE INTEROMETRIC TRACKING			PI078PE-03				178
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PI078PE-02				178
SEIFF	ATMOSPHERE STRUCTURE			PI078PE-01				178
SUOMI	INFRARED RADIOMETER			PI078PE-04				179
PIONEER-A	SEE PIONEER 6							
PIONEER-B	SEE PIONEER 7							
PIONEER-C	SEE PIONEER 8							
PIONEER-D	SEE PIONEER 9							
PIONEER-F	SEE PIONEER 10							
PIONEER-G	SEE PIONEER 11							
PROGNOZ 4	U.S.S.R. SAS	12/22/75	GEOCENTRIC	75-122A	3/00/76	INOPERABLE	ZERO	99
GRIGORYEVA	KILOMETRIC/HECTOMETRIC RECEIVER			75-122A-05	3/00/76	INOPERABLE	ZERO	99
GRINGAUZ	PLASMA DETECTOR			75-122A-02	3/00/76	INOPERABLE	ZERO	99
KACHAROV	SOLAR X-RAYS			75-122A-03	3/00/76	INOPERABLE	ZERO	99
LOGACHEV	ENERGETIC PARTICLES AND CHARGE COMPOSITION			75-122A-04	3/00/76	INOPERABLE	ZERO	99
SKREBTSOV	ENERGETIC PARTICLE TELESCOPE			75-122A-06	3/00/76	INOPERABLE	ZERO	99
YEROSHENKO	THREE AXIS FLUXGATE MAGNETOMETER			75-122A-01	3/00/76	INOPERABLE	ZERO	100
PROGNOZ 5	U.S.S.R. SAS	11/25/76	GEOCENTRIC	76-112A	11/25/76	NORMAL	STND	100
GRIGORYEVA	KILOMETRIC/HECTOMETRIC RECEIVER			76-112A-05	11/25/76	NORMAL	STND	100
GRINGAUZ	PLASMA DETECTOR			76-112A-02	11/25/76	NORMAL	STND	100
KACHAROV	SOLAR X-RAYS			76-112A-03	11/25/76	NORMAL	STND	100
KURT	ULTRAVIOLET PHOTOMETERS - HYDROGEN AND HELIUM			76-112A-08	11/25/76	NORMAL	STND	100
LICKIN	SOFT X-RAYS			76-112A-07	11/25/76	NORMAL	STND	100
LOGACHEV	ENERGETIC PARTICLES CHARGE COMPOSITION			76-112A-04	11/25/76	NORMAL	STND	100
LUTSENKO	ENERGETIC PARTICLES CHARGE AND MASS COMPOSITION			76-112A-06	11/25/76	NORMAL	STND	100
YEROSHENKO	THREE-AXIS FLUXGATE MAGNETOMETER			76-112A-01	11/25/76	NORMAL	STND	100
ZERTSALOV	PLASMA SPECTROMETERS			76-112A-09	11/25/76	NORMAL	STND	101
RADIO ASTRONOMY EXPLORER	SEE RAE-B							
RAE-B	UNITED STATES NASA-OSS	06/10/73	GEOCENTRIC	73-039A	4/30/77	NORMAL	ZERO	101
STONE	STEP FREQUENCY RADIOMETERS			73-039A-01	4/30/77	NORMAL	ZERO	101
STONE	RAPID-BURST RECEIVERS			73-039A-02	4/30/77	NORMAL	ZERO	101
STONE	IMPEDANCE PROBE			73-039A-03	12/00/73	INOPERABLE	ZERO	102
ROVER 15	SEE APOLLO 15 LM/ALSEP							
ROVER 16	SEE APOLLO 16 LM/ALSEP							
ROVER 17	SEE APOLLO 17 LM/ALSEP							
S 6C	SEE AE-C							
S 6E	SEE AE-E							
S 27B	SEE ALOUETTE 2							
S 66C	SEE BE-C							
S-6D	SEE AE-D							
S3-1	UNITED STATES DOD-USAF	10/29/74	GEOCENTRIC	74-085C	5/26/75	INOPERABLE	ZERO	102
KOONS	ELF-VLF RECEIVER			74-085C-07	5/26/75	INOPERABLE	ZERO	102
MARCOS	ACCELEROMETER DENSITY OBSERVATIONS			74-085C-01	5/26/75	INOPERABLE	ZERO	102
MCISSAC	ION DENSITY GAUGES			74-085C-02	5/26/75	INOPERABLE	ZERO	102
PHILBRICK	MASS SPECTROMETER			74-085C-03	5/26/75	INOPERABLE	ZERO	102
PRAG	SOLAR UV EXPERIMENT			74-085C-04	5/25/75	INOPERABLE	ZERO	102
RICE	ELECTROSTATIC ANALYZER			74-085C-05	5/26/75	INOPERABLE	ZERO	102

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RICE				RETARDING POTENTIAL ANALYZER	74-085C-06	5/26/75	INOPERABLE	ZERO	102
S3-2	UNITED STATES	DOD-USAF	12/03/75		75-114B	12/03/75	NORMAL	STND	103
FENNELL				ENERGETIC ELECTRON (0.1- 1.0 MEV) SENSOR	75-114B-06	12/04/75	NORMAL	STND	103
FENNELL				PROTON TIME-OF-FLIGHT AND PROTON ALPHA COUNTERS	75-114B-14	12/04/75	NORMAL	STND	103
MARCOS				TRIAXIAL PIEZOELECTRIC ACCELEROMETER	75-114B-10	12/04/75	NORMAL	STND	103
MCISSAC				NEUTRAL DENSITY EXPERIMENTS (COLD AND HOT CATHODE GAUGES)	75-114B-01	12/04/75	NORMAL	STND	103
PHILBRICK				VELOCITY MASS SPECTROMETER	75-114B-02	12/04/75	NORMAL	STND	103
RICE				NEUTRAL DENSITY EXPERIMENT (COLD CATHODE GAGE)	75-114B-03	12/04/75	NORMAL	STND	103
RICE				RETARDING POTENTIAL ANALYZER (RPA)	75-114B-11	12/04/75	NORMAL	STND	103
RICE				RETARDING POTENTIAL ANALYZER	75-114B-13	12/04/75	NORMAL	STND	104
SHUMAN				MAGNETOMETER	75-114B-08	12/04/75	NORMAL	STND	104
SMIDDY				ELECTRIC FIELD OBSERVATIONS	75-114B-07	12/04/75	NORMAL	STND	104
VANDOUR				ELECTROSTATIC ANALYZER	75-114B-09	12/04/75	NORMAL	STND	104
WILDMAN				LOW ENERGY ELECTRONS AND PROTONS	75-114B-12	12/04/75	NORMAL	STND	104
YATES				LOW ENERGY PHOTON SPECTROMETER	75-114B-04	12/04/75	NORMAL	STND	104
YATES				PROTON-ALPHA PARTICLE DETECTOR	75-114B-05	12/04/75	NORMAL	STND	104
S3-3	UNITED STATES	DOD-USAF	07/08/76 GEOCENTRIC		76-065B	7/08/76	NORMAL	STND	104
FENNELL				ION-ELECTRON MASS SPECTROMETER	76-065B-08	7/08/76	NORMAL	STND	104
KOONS				ELF/VLF RECEIVER	76-065B-06	7/08/76	INOPERABLE	ZERO	105
MOZER				DC ELECTRIC FIELDS	76-065B-01	7/09/76	NORMAL	STND	105
SHARP				LOW-ENERGY PARTICLE SPECTROMETER	76-065B-02	7/08/76	NORMAL	STND	105
VAMPOLA				ENERGETIC ELECTRON MAGNETIC SPECTROMETER	76-065B-07	7/08/76	NORMAL	STND	105
WILDMAN				ELECTRIC FIELDS-ION DRIFT	76-065B-05	7/08/76	NORMAL	STND	105
YATES				LOW-ENERGY PHOTON SPECTROMETERS	76-065B-03	7/08/76	NORMAL	STND	105
YATES				PROTON TELESCOPE	76-065B-04	7/08/76	NORMAL	STND	105
S74-2	SEE S3-3								
SAGE	UNITED STATES	NASA-OA	07/01/79 GEOCENTRIC		AEM-B		PROPOSED MISSION		179
MCCORMICK				STRATOSPHERIC AEROSOL AND GAS EXPERIMENT (SAGE)	AEM-B -01				179
SAGM	SEE SAGE								
SAN MARCO 4	UNITED STATES ITALY	NASA-OSS CRA	02/18/74 GEOCENTRIC		74-009A	5/04/76	PARTIAL	ZERO	105
NEWTON				NEUTRAL ATMOSPHERE COMPOSITION	74-009A-02	5/04/76	NORMAL	ZERO	106
SPENCER				NEUTRAL ATMOSPHERE TEMPERATURE	74-009A-03	5/04/76	NORMAL	ZERO	106
SAN MARCO-C-2	SEE SAN MARCO 4								
SAN MARCO-D/L	ITALY UNITED STATES	CRA NASA-OSS	02/00/80 GEOCENTRIC		SM-DL		APPROVED MISSION		179
BROGLIO				DRAG BALANCE AND AIR DENSITY	SM-DL -01				179
HANSON				IVI-ION VELOCITY INSTRUMENT (PLANAR RETARDING POTENTIAL ANALYZER)	SM-DL -03				180
MAYNARD				3-AXIS ELECTRIC FIELD	SM-DL -05				180
SCHMIDTKE				AIRGLOW-SOLAR SPECTROMETER	SM-DL -02				180
SPENCER				WIND AND TEMPERATURE (NATE)	SM-DL -04				180
SAN MARCO-D/M	UNITED STATES ITALY	NASA-OSS CRA	09/00/79 GEOCENTRIC		SM-DM		APPROVED MISSION		180
BUONGIORNO				IR RADIOMETER FOR MONITORING CLOUD COVER AND OZONE CONTENT	SM-DM -01				180
SAS 1	SEE SAS-A								
SAS 3	SEE SAS-C								
SAS-A	UNITED STATES	NASA-OSSA	12/12/70 GEOCENTRIC		70-107A	1/04/75	INOPERABLE	ZERO	106
GIACCONI				ALL-SKY X-RAY SURVEY	70-107A-01	1/04/75	INOPERABLE	ZERO	106
SAS-C	UNITED STATES	NASA-OSS	05/07/75 GEOCENTRIC		75-037A	5/07/75	NORMAL	STND	106
CLARK				ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES	75-037A-01	5/10/75	NORMAL	STND	107
CLARK				ANALYSIS OF GALACTIC X-RAY SOURCES	75-037A-02	5/10/75	PARTIAL	STND	107
CLARK				CONTINUOUS X-RAY FLUCTUATION MONITOR OF SCORPIO X-1	75-037A-03	1/15/77	PARTIAL	STND	107
CLARK				X-RAY ABSORPTION CONTOURS OF THE GALAXY	75-037A-04	11/22/76	PARTIAL	STND	107
SAS-D	SEE IUE								
SATS	SEE HCMM								
SCATHA	UNITED STATES UNITED STATES UNITED STATES	DOD-USAF NASA-OSS DOD-NAVY	01/00/79 GEOCENTRIC		SCATHA		APPROVED MISSION		181
AGGSON				ELECTRIC FIELD DETECTOR	SCATHA -05				181

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BLAKE	ENERGETIC PROTON DETECTOR			SCATHA -14				181
CHAPPELL	LIGHT ION MASS SPECTROMETER			SCATHA -09				181
COHEN	ELECTRON GUN-ION GUN			SCATHA -07				181
DEFOREST	SAN DIEGO PARTICLE DETECTOR			SCATHA -11				181
FENNELL	SPACECRAFT SHEATH FIELDS DETECTOR			SCATHA -06				182
JOHNSON	ENERGETIC ION SPECTROMETER			SCATHA -13				182
KOONS	SPACECRAFT SURFACE POTENTIAL MONITOR			SCATHA -01				182
KOONS	CHARGING ELECTRICAL EFFECTS ANALYZER			SCATHA -02				182
LEDLEY	MAGNETIC FIELD MONITOR			SCATHA -08				182
LEHN	QUARTZ CRYSTAL MICROBALANCES IN RETARDING POTENTIAL ANALYZERS			SCATHA -03				182
LEHN	THERMAL CONTROL SAMPLE MONITOR			SCATHA -04				182
PAVEL	RAPID SCAN PARTICLE DETECTOR			SCATHA -12				182
REAGAN	HIGH-ENERGY PARTICLE DETECTOR			SCATHA -15				183
SAGALYN	PLASMA PROBE			SCATHA -10				183
SE-C	SEE SOLRAD 10							
SEA SATELLITE-A	SEE SEASAT-A							
SEA SATELLITE-B	SEE SEASAT-B							
SEASAT-A	UNITED STATES NASA-OA	05/17/78	GEOCENTRIC	SEAST-A		APPROVED MISSION		183
MCLAIN	SCANNING VISUAL/INFRARED RADIOMETER			SEAST-A-04				183
PIERSON	MICROWAVE WIND SCATTEROMETER			SEAST-A-03				183
ROSS	SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR)			SEAST-A-05				183
SMITH, III	COMPRESSED PULSE RADAR ALTIMETER (RA)			SEAST-A-01				183
TELEKI	COHERENT SYNTHETIC APERTURE IMAGING RADAR (SAR)			SEAST-A-02				184
SEASAT-B	UNITED STATES NASA-OA	1981	GEOCENTRIC	SEAST-B		PROPOSED MISSION		184
MCLAIN	SCANNING VISUAL/INFRARED RADIOMETER			SEAST-B-04				184
PIERSON	MICROWAVE WIND SCATTEROMETER			SEAST-B-03				184
ROSS	SCANNING MULTI-CHANNEL MICROWAVE RADIOMETER (SMMR)			SEAST-B-05				184
SMITH, III	COMPRESSED PULSE RADAR ALTIMETER (RA)			SEAST-B-01				185
TELEKI	COHERENT SYNETHIC APERTURE IMAGING RADAR (SAR)			SEAST-B-02				185
SESP NO. NRL-111-0264	SEE SOLRAD 11A							
SESP P73-5	SEE S3-1							
SESP P74-1C	SEE SOLRAD 11A							
SESP P74-1D	SEE SOLRAD 11B							
SESP P78-2A	SEE SCATHA							
SESP S73-6	SEE S3-2							
SESP S74-2A	SEE S3-3							
SMM	SEE SOLAR MAXIMUM MISSION							
SMS 1	UNITED STATES NOAA-NESS UNITED STATES NASA-OA	05/17/74	GEOCENTRIC	74-033A	7/19/77	NORMAL	ZERO	107
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			74-033A-01	7/19/77	NORMAL	ZERO	107
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			74-033A-05	7/19/77	PARTIAL	ZERO	108
WILLIAMS	ENERGETIC PARTICLE MONITOR			74-033A-02	7/19/77	NORMAL	ZERO	108
WILLIAMS	SOLAR X-RAY MONITOR			74-033A-03	7/19/77	NORMAL	ZERO	108
WILLIAMS	MAGNETIC FIELD MONITOR			74-033A-04	7/19/77	NORMAL	ZERO	108
SMS 2	UNITED STATES NOAA-NESS UNITED STATES NASA-OA	02/06/75	GEOCENTRIC	75-011A	8/13/77	NORMAL	STND	108
NESS STAFF	VISIBLE-INFRARED SPIN-SCAN RADIOMETER (VISSR)			75-011A-04	8/13/77	NORMAL	STND	109
NESS STAFF	METEOROLOGICAL DATA COLLECTION AND TRANSMISSION SYSTEM			75-011A-05	8/13/77	NORMAL	STND	109
WILLIAMS	ENERGETIC PARTICLE MONITOR			75-011A-01	8/13/77	NORMAL	STND	109
WILLIAMS	SOLAR X-RAY MONITOR			75-011A-02	8/13/77	NORMAL	STDN	109
WILLIAMS	MAGNETIC FIELD MONITOR			75-011A-03	8/13/77	NORMAL	STDN	109
SMS-A	SEE SMS 1							
SMS-B	SEE SMS 2							
SMS-C	SEE GOES 1							

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SMS 2	SEE SOLRAD 10							
SOLAR EXPLORER-C						APPROVED MISSION		185
SOLAR MAXIMUM MISSION	UNITED STATES	NASA-OSS	10/00/79 GEOCENTRIC	SMM				185
ACTON	SOFT X-RAY POLYCHROMATOR			SMM -04				185
CHUPP	GAMMA RAY EXPERIMENT			SMM -07				185
DE JAGER	HARD X-RAY IMAGING SPECTROMETER			SMM -05				186
FROST	X-RAY SPECTROMETER			SMM -06				186
MACQUEEN	CORONAGRAPH/POLARIMETER			SMM -01				186
REEVES	XUV SPECTROHELIOMETER			SMM -03				186
TANDBERG-HANSSEN	ULTRAVIOLET SPECTROMETER AND POLARIMETER			SMM -02				186
WILLSON	ACTIVE CAVITY RADIOMETER IRRADIANCE MONITOR			SMM -08				186
SOLRAD 10	UNITED STATES	NASA-OSS	07/08/71 GEOCENTRIC	71-058A	7/00/73	NORMAL	SUBS	109
	UNITED STATES	DOD-NAVY		71-058A-01	7/00/73	PARTIAL	SUBS	110
KREPLIN	SOLAR RADIATION DETECTORS							
SOLRAD 11A	UNITED STATES	DOD-NAVY	03/15/76 GEOCENTRIC	76-023C	6/12/77	INOPERABLE	ZERO	110
BLAKE	SOLAR PROTONS			76-023C-14	6/12/77	INOPERABLE	ZERO	110
BLAKE	OMNIDIRECTIONAL PROTONS			76-023C-17	6/12/77	INOPERABLE	ZERO	110
BLAKE	ANTISOLAR PROTONS			76-023C-23	6/12/77	INOPERABLE	ZERO	110
BYRAM	STELLAR/AURORAL X-RAYS			76-023C-16	6/12/77	INOPERABLE	ZERO	111
DOSCHEK	THOMSON X-RAY POLARIMETER			76-023C-10	6/12/77	INOPERABLE	ZERO	111
EVANS	COSMIC GAMMA-RAY BURST AND BACKGROUND DETECTOR (0.2 TO 2.0 MEV)			76-023C-25	6/12/77	INOPERABLE	ZERO	111
FELDMAN	1175- TO 1800-A SOLAR UV SPECTROMETER			76-023C-09	6/12/77	INOPERABLE	ZERO	111
FRITZ	15- TO 150-KEV SOLAR X-RAY MONITOR			76-023C-01	6/12/77	INOPERABLE	ZERO	111
FRITZ	X-RAY BACKGROUND			76-023C-24	3/16/76	INOPERABLE	ZERO	111
KREPLIN	1- TO 8-A SOLAR X-RAY MONITOR			76-023C-04	6/12/77	INOPERABLE	ZERO	111
KREPLIN	8- TO 16-A SOLAR X-RAY MONITOR			76-023C-05	6/12/77	INOPERABLE	ZERO	112
KREPLIN	44- TO 60-A SOLAR X-RAY MONITOR			76-023C-06	6/12/77	INOPERABLE	ZERO	112
KREPLIN	170- TO 1050-A SOLAR EUV MONITOR			76-023C-07	6/12/77	INOPERABLE	ZERO	112
KREPLIN	1080- TO 1350-A SOLAR UV MONITOR			76-023C-08	6/12/77	INOPERABLE	ZERO	112
KREPLIN	0.5- TO 3-A SOLAR X-RAY MONITOR			76-023C-12	6/12/77	INOPERABLE	ZERO	112
KREPLIN	2- TO 20-A SOLAR X-RAY MONITOR			76-023C-13	6/12/77	INOPERABLE	ZERO	112
KREPLIN	SOLAR WIND SPECTROMETER			76-023C-15	1/00/77	INOPERABLE	ZERO	112
LAZARUS	CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR			76-023C-03	6/12/77	INOPERABLE	ZERO	113
MEEKINS	BRAGG X-RAY POLARIMETER			76-023C-11	3/04/77	INOPERABLE	ZERO	113
MEEKINS	X-RAY MONITOR (0.1-1.6 A, 0.5-3 A, 1-4 A)			76-023C-02	6/12/77	INOPERABLE	ZERO	113
SMATHERS								
VAMPOLA	SOLAR FLARE ELECTRONS			76-023C-22	6/12/77	INOPERABLE	ZERO	113
WELLER, JR.	GEOCORONAL-EXTRATERRESTRIAL EUV - DETECTOR 1			76-023C-18	6/12/77	INOPERABLE	ZERO	113
WELLER, JR.	GEOCORONAL-EXTRATERRESTRIAL EUV - DETECTOR 2			76-023C-19	6/12/77	INOPERABLE	ZERO	113
YATES	PROTON-ALPHA TELESCOPE			76-023C-20	6/12/77	INOPERABLE	ZERO	114
YATES	LOW-ENERGY PROTON SPECTROMETER			76-023C-21	12/00/76	INOPERABLE	ZERO	114
SOLRAD 11B	UNITED STATES	DOD-NAVY	03/15/76 GEOCENTRIC	76-023D	12/00/76	PARTIAL	SUBS	114
BLAKE	SOLAR PROTONS			76-023D-14	12/00/76	INOPERABLE	ZERO	114
BLAKE	OMNIDIRECTIONAL PROTONS			76-023D-17	1/00/77	INOPERABLE	ZERO	114
BLAKE	ANTISOLAR PROTONS			76-023D-23	1/00/77	INOPERABLE	ZERO	114
BYRAM	STELLAR/AURORAL X RAYS			76-023D-16	12/00/76	INOPERABLE	ZERO	114
DOSCHEK	THOMSON X-RAY POLARIMETER			76-023D-10	12/00/76	INOPERABLE	ZERO	115
EVANS	COSMIC GAMMA-RAY BURST AND BACKGROUND DETECTOR (0.2 TO 2.0 MEV)			76-023D-25	1/00/77	INOPERABLE	ZERO	115
FELDMAN	1175- TO 1800-A SOLAR UV SPECTROMETER			76-023D-09	12/00/76	NORMAL	SUBS	115
FRITZ	15- TO 150-KEV SOLAR X-RAY MONITOR			76-023D-01	12/00/76	INOPERABLE	ZERO	115
FRITZ	X-RAY BACKGROUND			76-023D-24	6/00/76	INOPERABLE	ZERO	115
KREPLIN	1- TO 8-A SOLAR X-RAY MONITOR			76-023D-04	12/00/76	NORMAL	SUBS	115
KREPLIN	8- TO 16-A SOLAR X-RAY MONITOR			76-023D-05	12/00/76	NORMAL	SUBS	116
KREPLIN	44- TO 60-A SOLAR X-RAY MONITOR			76-023D-06	12/00/76	NORMAL	SUBS	116
KREPLIN	170- TO 1050-A SOLAR EUV MONITOR			76-023D-07	12/00/76	NORMAL	SUBS	116
KREPLIN	1080- TO 1350-A SOLAR UV MONITOR			76-023D-08	1/00/77	INOPERABLE	ZERO	116
KREPLIN	0.5- TO 3-A SOLAR X-RAY MONITOR			76-023D-12	12/00/76	NORMAL	SUBS	116
KREPLIN	2- TO 10-A SOLAR X-RAY MONITOR			76-023D-13	12/00/76	NORMAL	SUBS	116
KREPLIN	SOLAR WIND SPECTROMETER			76-023D-15	12/00/76	NORMAL	SUBS	116
LAZARUS	CONTINUUM (8.8 A) AND MAGNESIUM LINE (9.17 A AND 8.42 A) MONITOR			76-023D-03	12/00/76	NORMAL	SUBS	117
MEEKINS	BRAGG X-RAY POLARIMETER			76-023D-11	12/00/76	INOPERABLE	ZERO	117
MEEKINS	X-RAY MONITOR (0.1-1.6 A, 0.5-3 A, 1-4A)			76-023D-02	12/00/76	INOPERABLE	ZERO	117
SMATHERS	SOLAR FLARE ELECTRONS			76-023D-22	1/00/77	INOPERABLE	ZERO	117
VAMPOLA	GEOCORONAL-EXTRATERRESTRIAL EUV DETECTOR 1			76-023D-18	12/00/76	INOPERABLE	ZERO	117
WELLER, JR.	GEOCORONAL-EXTRATERRESTRIAL EUV DETECTOR 2			76-023D-19	12/00/76	INOPERABLE	ZERO	117
WELLER, JR.	PROTON-ALPHA TELESCOPE			76-023D-20	1/00/77	INOPERABLE	ZERO	117
YATES	LOW-ENERGY PROTON SPECTROMETER			76-023D-21	12/00/76	NORMAL	SUBS	118
YATES								
SOLRAD HI-TRIP	SEE SOLRAD 11A							

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SOLRAD 11B								
SOLRAD-C	SEE SOLRAD 10							
SOYUZ APOLLO	SEE ASTP-SOYUZ							
SP74-10	SEE SOLRAD 11B							
SPACE TELESCOPE	SEE ST							
SPACELAB 1	INTERNATIONAL	ESA	11/00/80	GEOCENTRIC	SPALAB1		APPROVED MISSION	187
	UNITED STATES	NASA-OMSF			SPALAB1-25			187
BEGHIN	PHENOMENA INDUCED BY CHARGED PARTICLE BEAMS							187
BENTON	HZE-PARTICLE DOSIMETERY				SPALAB1-11			187
BERTAUX	INVESTIGATION ON ATMOSPHERIC H AND D THROUGH THE MEASUREMENT OF LYMAN-ALPHA				SPALAB1-22			187
BISWAS	IONIZATION STATES OF SOLAR AND GALACTIC COSMIC RAY HEAVY NUCLEI STUDIES				SPALAB1-06			187
BOELLA	ASTRONOMICAL X-RAY SPECTROSCOPY USING A GAS SCINTILLATION PROPORTIONAL COUNTER				SPALAB1-28			188
BOWYER	FAR UV OBSERVATIONS USING THE FAUST INSTRUMENT				SPALAB1-07			188
BROWN	NUTATION OF HELIANTHUS ANNUUS				SPALAB1-12			188
BUCKER	ADVANCED BIOSTACK EXPERIMENT				SPALAB1-32			188
COGOLI	LYMPHOCYTE PROLIFERATION IN WEIGHTLESSNESS				SPALAB1-36			188
COURTES	VERY WIDE FIELD GALACTIC CAMERA				SPALAB1-27			188
CROMMELYNCK	ABSOLUTE MEASUREMENT OF THE SOLAR CONSTANT				SPALAB1-26			188
DEMOREST	TRIBIOLOGICAL STUDIES OF FLUID LUBRICANT JOURNAL				SPALAB1-10			188
ENGE	ISOTOPE STACK				SPALAB1-29			189
ESA STAFF	METRIC CAMERA FACILITY				SPALAB1-38			189
ESA STAFF	MICROWAVE FACILITY				SPALAB1-39			189
ESA STAFF	SPACE SLED FACILITY				SPALAB1-40			189
ESA STAFF	SPACE PROCESSING LABORATORY				SPALAB1-42			189
FARMER	ATMOSPHERIC TRACE MOLECULES OBSERVED BY SPECTROSCOPY				SPALAB1-05			189
GAUER	MEASUREMENT OF (CENTRAL) VENOUS PRESSURE BY PUNCTURING AN ARM VEIN				SPALAB1-31			189
GAUER	COLLECTION BLOOD SAMPLES FOR DETERMINING A.D.H., ALDOSTERONE, AND OTHER HORMONES				SPALAB1-37			190
GIRARD	GRILLE SPECTROMETER				SPALAB1-18			190
GREEN	ELECTRO-PHYSIOLOGICAL TAPE RECORDER				SPALAB1-35			190
HART	GEOPHYSICAL FLUID FLOW				SPALAB1-08			190
HERSE	WAVES IN THE OH EMISSIVE LAYER				SPALAB1-19			190
HONECK	MICRO-ORGANISMS AND BIOMOLECULES IN THE SPACE ENVIRONMENT				SPALAB1-34			190
KIMZEY	INFLUENCE OF SPACEFLIGHT ON ERYTHROKINETICS IN MAN				SPALAB1-14			190
MENDE	ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING				SPALAB1-03			190
OBAYASHI	SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC)				SPALAB1-02			191
PAN	BEARING LUBRICANT WETTING, SPREADING AND OPERATING CHARACTERISTICS IN O-G				SPALAB1-09			191
RESCHKE	VESTIBULO-SPINAL REFLEX MECHANISMS				SPALAB1-16			191
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THEILE	DC AND LOW FREQUENCY VECTOR MAGNETOMETER				SPALAB1-23			191
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TORR	AN IMAGING SPECTROMETRIC OBSERVATORY				SPALAB1-01			192
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WILHELM	STUDY OF LOW-ENERGY ELECTRON FLUX AND ITS REACTION TO ACTIVE EXPERIMENTATION				SPALAB1-24			192
WILLSON	ACTIVE CAVITY RADIOMETER SOLAR IRRADIANCE MONITOR				SPALAB1-04			192
YOUNG	VESTIBULAR STUDIES				SPALAB1-13			193
SPACELAB ASTRONOMY MISS	SEE ONE METER UV TELESCOPE							
SPACELAB IM UV TELESCOPE	SEE ONE METER UV TELESCOPE							
SRATS	JAPAN	ISAS	02/24/75	GEOCENTRIC	75-014A	3/14/77	NORMAL	ZERO 118

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FUGONO	IONIC COMPOSITION			75-014A-07	2/24/75	INOPERABLE	ZERO	118
HIRAO	ELECTRON TEMPERATURE			75-014A-05	11/03/76	INOPERABLE	ZERO	118
MATSUOKA	SOLAR X-RAY MONITOR			75-014A-01	3/14/77	NORMAL	ZERO	118
MIYAZAKI	RETARDING POTENTIAL ANALYZER			75-014A-06	3/14/77	NORMAL	ZERO	118
OSHIO	HYDROGEN LYMAN-ALPHA			75-014A-02	3/14/77	PARTIAL	ZERO	118
OYA	ELECTRON DENSITY MEASUREMENT			75-014A-04	3/14/77	PARTIAL	ZERO	118
TOHMATSU	GEOCORONAL UV GLOW AND EARTH UV ALBEDO			75-014A-03	3/14/77	PARTIAL	ZERO	119
SS76-2A	SEE S3-3							
ST	UNITED STATES / NASA-OSS	00/00/80	GEOCENTRIC	LST		APPROVED MISSION		193
UNKNOWN	SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 1 - HIGH-RESOLUTION CAMERA			LST -01				193
UNKNOWN	SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 2 - HIGH-RESOLUTION SPECTROGRAPH			LST -02				193
UNKNOWN	SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 3 - FAINT-OBJECT SPECTROGRAPH			LST -03				193
UNKNOWN	SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 4 - INFRARED PHOTOMETER			LST -04				193
UNKNOWN	SCIENTIFIC INSTRUMENT PACKAGE UNIT NO. 5 - ASTROMETRIC INSTRUMENT			LST -05				193
UNKNOWN	SCIENTIFIC PACKAGE UNIT NO. 6 - HIGH SPEED POINT/AREA PHOTOMETER			LST -06				194
STP P78-2	SEE SCATHA							
STP PROBE	SEE ISEE-C							
STRAT AERO AND GAS EXP	SEE SAGE							
SYNCH METEOROL SATELL A	SEE SMS 1							
SYNCH METEOROL SATELL B	SEE SMS 2							
TAIYO	SEE SRATS							
TIP 1	UNITED STATES / DOD-NAVY	09/02/72	GEOCENTRIC	72-069A	12/00/74	NORMAL	STND	119
POTEMRA	TRIAXIAL FLUXGATE MAGNETOMETER			72-069A-01	9/02/72	NORMAL	STND	119
TIROS-N	UNITED STATES / NOAA-NESS	05/00/78	GEOCENTRIC	TIROS-N		APPROVED MISSION		194
BOSTROM	SPACE ENVIRONMENT MONITOR			TIROS-N-04				194
NESS STAFF	ADVANCED VERY HIGH RESOLUTION RADIOMETER (AVHRR)			TIROS-N-01				194
NESS STAFF	OPERATIONAL VERTICAL SOUNDER			TIROS-N-02				194
NESS STAFF	DATA COLLECTION SYSTEM (DCS)			TIROS-N-03				194
TOS-F	SEE ESSA 8							
TRIAD 1	SEE TIP 1							
TRIAD OI 1X	SEE TIP 1							
UHURU 1	SEE SAS-A							
UK 5	UNITED KINGDOM / SRC UNITED STATES / NASA-OSS	10/15/74	GEOCENTRIC	74-077A	10/18/74	NORMAL	STND	119
BOYD	0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR			74-077A-01	10/18/74	NORMAL	STND	119
BOYD	HIGH-RESOLUTION SOURCE SPECTRA			74-077A-03	10/31/74	NORMAL	STND	119
ELLIOT	HIGH-ENERGY COSMIC X-RAY SPECTRA			74-077A-05	10/18/74	NORMAL	STND	120
HOLT	ALL-SKY MONITOR			74-077A-06	10/18/74	NORMAL	STND	120
POUNDS	2- TO 10-KEV SKY SURVEY			74-077A-02	12/03/74	PARTIAL	STND	120
POUNDS	POLARIMETER/SPECTROMETER			74-077A-04	10/18/74	NORMAL	STND	120
UK 6	UNITED KINGDOM / SRC	07/27/78	GEOCENTRIC	UK-6		APPROVED MISSION		195
UNKNOWN	COSMIC RAY			UK-6 -01				195
UNKNOWN	LEICESTER X-RAY			UK-6 -02				195
UNKNOWN	MSSL/B X-RAY			UK-6 -03				195
UNITED KINGDOM 5	SEE UK 5							
UNITED KINGDOM-6	SEE UK 6							
VELA 5A	UNITED STATES / DOD-USAF	05/23/69	GEOCENTRIC	69-046D	5/23/69	NORMAL	STND	120
BAME	SOLAR WIND			69-046D-05	9/17/73	PARTIAL	STND	121
BAME	NEUTRON DETECTOR			69-046D-07	5/23/69	NORMAL	STND	121
CHAMBERS	SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A			69-046D-02	7/01/75	PARTIAL	SUBS	121
KLEBESADEL	GAMMA-RAY ASTRONOMY			69-046D-08	5/23/69	NORMAL	STND	121
VELA 5A (USAF)	SEE VELA 5A							

INDEX OF ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
BY SPACECRAFT NAMES AND PRINCIPAL INVESTIGATOR

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATUS EPOCH MMDDYY	CURRENT STATUS STATUS	CURRENT STATUS DATA RATE	PAGE NO.
VELA 5B	UNITED STATES DOD-USAF	05/23/69	GEOCENTRIC	69-046E	7/00/74	PARTIAL	SUBS	121
BAME	SOLAR WIND			69-046E-05	1/00/74	PARTIAL	SUBS	121
BAME	NEUTRON DETECTOR			69-046E-07	1/00/74	NORMAL	SUBS	122
DELIAN	COSMIC X RAYS			69-046E-06	1/00/74	NORMAL	SUBS	122
HIGBIE	SOLAR PARTICLE TELESCOPES			69-046E-03	1/00/74	NORMAL	SUBS	122
HIGBIE	ELECTRON DETECTORS			69-046E-04	1/00/74	NORMAL	SUBS	122
KLEBESADEL	GAMMA RAY ASTRONOMY			69-046E-08	4/15/75	PARTIAL	SUBS	122
VELA 5B (USAF)	SEE VELA 5B							
VELA 6A	UNITED STATES DOD-USAF	04/08/70	GEOCENTRIC	70-027A	4/08/70	NORMAL	STND	122
BAME	SOLAR WIND EXPERIMENT			70-027A-05	4/12/72	PARTIAL	SUBS	123
BAME	NEUTRON DETECTOR			70-027A-07	4/08/70	NORMAL	STND	123
CHAMBERS	SOLAR X-RAY DETECTORS, 0.5 TO 3.0 A, 1 TO 8 A, 1 TO 16 A, 44 TO 60 A			70-027A-02	7/01/75	PARTIAL	SUBS	123
HIGBIE	SOLAR PARTICLE TELESCOPES			70-027A-03	12/01/76	NORMAL	SUBS	123
HIGBIE	ELECTRON DETECTORS			70-027A-04	12/01/76	NORMAL	SUBS	123
KLEBESADEL	GAMMA-RAY ASTRONOMY			70-027A-08	4/08/70	NORMAL	STND	123
VELA 6A (USAF)	SEE VELA 6A							
VELA 6B	UNITED STATES DOD-USAF	04/08/70	GEOCENTRIC	70-027B	2/05/75	PARTIAL	SUBS	124
BAME	NEUTRON DETECTOR			70-027B-07	4/08/70	NORMAL	STND	124
HIGBIE	SOLAR PARTICLE TELESCOPES			70-027B-03	12/01/76	NORMAL	SUBS	124
HIGBIE	ELECTRON DETECTORS			70-027B-04	12/01/76	NORMAL	SUBS	124
KLEBESADEL	GAMMA-RAY ASTRONOMY			70-027B-08	2/05/75	INOPERABLE	ZERO	124
VELA 6B (USAF)	SEE VELA 6B							
VELA 9 (TRW)	SEE VELA 5A							
VELA 10 (TRW)	SEE VELA 5B							
VELA 11 (TRW)	SEE VELA 6A							
VELA 12 (TRW)	SEE VELA 6B							
VIKING 1 LANDER	UNITED STATES NASA-OSS	08/20/75	MARS LANDER	75-075C	7/20/76	NORMAL	STND	124
ANDERSON	SEISMOLOGY			75-075C-08	7/20/76	INOPERABLE	ZERO	125
BIEMANN	MOLECULAR ANALYSIS			75-075C-04	3/03/77	INOPERABLE	ZERO	125
HARGRAVES	MAGNETIC PROPERTIES			75-075C-10	3/31/77	NORMAL	ZERO	125
HESS	METEOROLOGY EXPERIMENT			75-075C-07	7/08/77	PARTIAL	SUBS	125
KLEIN	BIOLOGY INVESTIGATION			75-075C-03	5/30/77	NORMAL	ZERO	125
MICHAEL, JR.	RADIO SCIENCE			75-075C-11	8/20/75	NORMAL	STND	126
MUTCH	FACSIMILE CAMERA			75-075C-06	7/20/76	NORMAL	STND	126
NIER	ENTRY-ATMOSPHERIC STRUCTURE			75-075C-02	7/20/76	INOPERABLE	ZERO	126
NIER	ENTRY-ATMOSPHERIC COMPOSITION			75-075C-12	7/20/76	INOPERABLE	ZERO	126
SHORTHILL	PHYSICAL PROPERTIES INVESTIGATION			75-075C-01	7/20/76	NORMAL	STND	126
TOULMIN, 3RD	X-RAY FLUORESCENCE SPECTROMETER			75-075C-13	7/20/76	NORMAL	STND	127
VIKING 1 ORBITER	UNITED STATES NASA-OSS	08/20/75	MARSCENTRIC	75-075A	8/21/75	NORMAL	STND	127
CARR	ORBITER IMAGING			75-075A-01	6/14/76	NORMAL	STND	127
FARMER	IR SPECTROMETER -- WATER VAPOR MAPPING			75-075A-03	6/14/76	NORMAL	STND	127
KIEFFER	IR RADIOMETRY -- THERMAL MAPPING			75-075A-02	6/14/76	NORMAL	STND	127
VIKING 2 LANDER	UNITED STATES NASA-OSS	09/09/75	MARS LANDER	75-083C	9/03/76	NORMAL	STND	127
ANDERSON	SEISMOLOGY			75-083C-08	9/03/76	NORMAL	STND	128
BIEMANN	MOLECULAR ANALYSIS			75-083C-04	4/03/77	INOPERABLE	ZERO	128
HARGRAVES	MAGNETIC PROPERTIES			75-083C-10	9/03/76	NORMAL	STND	128
HESS	METEOROLOGY EXPERIMENT			75-083C-07	9/03/76	NORMAL	STND	128
KLEIN	BIOLOGY INVESTIGATION			75-083C-03	5/28/77	INOPERABLE	ZERO	128
MICHAEL, JR.	RADIO SCIENCE			75-083C-11	9/10/75	NORMAL	STND	129
MUTCH	FACSIMILE CAMERA			75-083C-06	9/03/76	NORMAL	STND	129
NIER	ENTRY-ATMOSPHERIC STRUCTURE			75-083C-02	9/03/76	INOPERABLE	ZERO	129
NIER	ENTRY-ATMOSPHERIC COMPOSITION			75-083C-12	9/03/76	INOPERABLE	ZERO	129
SHORTHILL	PHYSICAL PROPERTIES INVESTIGATION			75-083C-01	9/03/76	NORMAL	STND	129
TOULMIN, 3RD	X-RAY FLUORESCENCE SPECTROMETER			75-083C-13	9/09/76	NORMAL	STND	130
VIKING 2 ORBITER	UNITED STATES NASA-OSS	09/09/75	MARSCENTRIC	75-083A	9/09/75	NORMAL	STND	130
CARR	ORBITER IMAGING			75-083A-01	8/01/76	NORMAL	STND	130
FARMER	IR SPECTROMETER -- WATER VAPOR MAPPING			75-083A-03	8/01/76	NORMAL	STND	130
KIEFFER	IR RADIOMETRY -- THERMAL MAPPING			75-083A-02	8/01/76	NORMAL	STND	130
VIKING-A LANDER	SEE VIKING 2 LANDER							
VIKING-A ORBITER	SEE VIKING 2 ORBITER							
VIKING-B LANDER	SEE VIKING 1 LANDER							
VIKING-B ORBITER	SEE VIKING 1 ORBITER							
VIKNG-A	SEE VIKING 2 ORBITER							

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATUS: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
VIKNG-B	SEE VIKING 1 ORBITER							
VOYAGER 1	UNITED STATES / NASA-OSS	09/05/77	JUPITER FLYBY	77-084A	9/06/77	NORMAL	STND	130
BRIDGE	PLASMA SPECTROMETERS			77-084A-06	9/06/77	NORMAL	STND	131
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-084A-04	9/06/77	NORMAL	STND	131
ESHLEMAN	RADIO SCIENCE TEAM			77-084A-02	9/06/77	NORMAL	STND	131
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-084A-03	9/06/77	NORMAL	STND	131
KRIMIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-084A-07	9/06/77	NORMAL	STND	131
LILLIE	MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A			77-084A-11	9/06/77	NORMAL	STND	132
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-084A-05	9/06/77	NORMAL	STND	132
SCARF	PLASMA WAVE			77-084A-13	9/06/77	NORMAL	STND	132
SMITH	TV PHOTOGRAPHY			77-084A-01	9/06/77	NORMAL	STND	132
VOGT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-084A-08	9/06/77	NORMAL	STND	132
WARWICK	PLANETARY RADIO ASTRONOMY			77-084A-10	9/06/77	NORMAL	STND	132
VOYAGER 2	UNITED STATES / NASA-OSS	08/20/77	JUPITER FLYBY	77-076A	9/06/77	NORMAL	STND	133
BRIDGE	PLASMA SPECTROMETERS			77-076A-06	9/06/77	NORMAL	STND	133
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			77-076A-04	9/06/77	NORMAL	STND	133
ESHLEMAN	RADIO SCIENCE TEAM			77-076A-02	9/06/77	NORMAL	STND	133
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			77-076A-03	9/06/77	NORMAL	STND	133
KRIMIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE			77-076A-07	9/06/77	NORMAL	STND	134
LILLIE	MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A			77-076A-11	9/06/77	NORMAL	STND	134
NESS	TRIAXIAL FLUXGATE MAGNETOMETERS			77-076A-05	9/06/77	NORMAL	STND	134
SCARF	PLASMA WAVE			77-076A-13	9/06/77	NORMAL	STND	134
SMITH	TV IMAGING			77-076A-01	9/06/77	NORMAL	STND	134
VOGT	HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE			77-076A-08	9/06/77	NORMAL	STND	135
WARWICK	PLANETARY RADIO ASTRONOMY			77-076A-10	9/06/77	NORMAL	STND	135

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INVESTIGATOR NAME INDEX

5. INVESTIGATOR NAME INDEX

This index contains an alphabetical listing of the names of the investigators or team members associated with each experiment described in Sections 2 and 3 of this report. The current organizational affiliation of the person is also shown. Listed under each person's name are the associated experiments. Each experiment contains the spacecraft and experiment name, NSSDC ID code, and the page number referencing the description of the experiment found in this report. An asterisk, which precedes an experiment name, identifies the person associated with that experiment as the principal investigator or team leader.

INVESTIGATORS AND EXPERIMENTS

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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. Some missions that are under study are also 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.

Spacecraft Name	Sponsoring Country and Agency		Launch Date	NSSDC ID	Current Starus
AMPS	United States	NASA-OSS	Under Study	AMPS	Under Study
Corsa	Japan	ISAS	02/06/76	CORSA	Failed Mission
DADE-A	United States	NASA-OSS	12/05/75	DADE-A	Failed Mission
DADE-B	United States	NASA-OSS	12/05/75	DADE-B	Failed Mission
Diapo	France	Unknown	Canceled	DIAPO	Canceled Mission
Dual-A	U.S.S.R.	Unknown	Canceled	DUAL-A	Canceled Mission
Dual-A1	U.S.S.R.	Unknown	Canceled	DUAL-A1	Canceled Mission
Dynamics Explorer	United States	NASA-OSS	00/00/80	DE	Under Study
Egret	United States	NASA-OSS	00/00/79	EGRET	Mission Being Rescoped
Electrodynamics Explorer	United States	NASA-OSS	00/00/79	EE	Mission Being Rescoped
EOS-A	United States	NASA-OA	Canceled	EOS-A	Canceled Mission
GP-A	United States	NASA-OSS	06/17/76	GRAVR-A	Rocket 7606-1701
Intercosmos 10	U.S.S.R.	Unknown	10/30/73	73-082A	Inoperable Prior to 1975
ITOS-E2	United States United States	NOAA-NESS NASA-OA	Canceled	ITOS-E2	Canceled Mission
ITOS-I	United States United States	NOAA-NESS NASA-OA	Canceled	ITOS-I	Canceled Mission
ITOS-J	United States United States	NASA-OA NOAA-NESS	Canceled	ITOS-J	Canceled Mission
Jupiter Orbiter Probe	United States	NASA-OSS	01/00/82	JOP	Approved Mission (See Appendix B4.)
Landsat-E	United States	NASA-OA	00/00/83	LAND-E	Under Study
Lunar Polar Orb-Daughter	United States	NASA-OSS	Canceled	LPO-D	Canceled Mission
Lunar Polar Orb-Mother	United States	NASA-OSS	Canceled	LPO-M	Canceled Mission
OSO-J	United States	NASA-OSS	Canceled	OSO-J	Canceled Mission
RM 20	United States	DOD-USAF	04/12/75	RM20	Failed Mission
Sari	France	Unknown	Canceled	SARI	Canceled Mission
Space Shuttle LDEF	United States	NASA-OAST	07/00/79	SSLDEF	Under Study

APPENDIX B - SPECIAL INVESTIGATORS

B1. IUE Guest Investigators

The International Ultraviolet Explorer (IUE) has a facility class payload that will be 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 names 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. Jupiter Orbiter Probe Investigators

The investigators and investigations for the Jupiter Orbiter Probe to be launched in early 1982 were recently selected. The investigators with their affiliations are listed for each of the probe and orbiter investigations. The Principal Investigators are indicated by an asterisk. The Orbiter Imaging and Radio Science team members with their affiliations are listed separately. Team Leaders are indicated. Scientists with their affiliations who are making interdisciplinary studies are also listed.

B1. 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

Conti - 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

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 Ultraviolet 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

Pennamperuma - 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

Member	Affiliation
Aumann, H. H.	NASA-JPL
Beintema, D.	University of Groningen, Netherlands
Borgman, J.	University of Groningen, Netherlands
Clegg, P.	Queen Mary College, UK
Dejong, T.	University of Leiden, Netherlands
Gillette, F.	Kitt Peak National Observatory
Habing, A.	University of Leiden, Netherlands
Hauser, M.	NASA-GSFC
Houck, J.	Cornell University
Jennings, R.	University of College London, UK
Low, F.	University of Arizona
Marsden, P.	University of Leeds, UK
Neugebauer, G.	California Institute of Technology (U.S. Principal Scientist, Co-Chairman)
Pottasch, S.	University of Groningen, Netherlands
Soiffer, T.	University of California, San Diego
Van Duinen, R.	University of Groningen, Netherlands (European Principal Scientist, Co-Chairman)
Walker, R.	NASA-ARC

B3. The Caravane Collaboration (COS-B)

Member	Affiliation
Bennett, K.	European Space Research and Technology Centre, Noordwijk, Netherlands
Bignami, G. F.	Instituto di Scienze Fisiche dell'Università di Milano, Italy
Boella, G.	Instituto di Scienze Fisiche dell'Università di Milano, Italy
Buccheri, R.	Università di Palermo, Italy
Burger, J. J.	European Space Research and Technology Centre, Noordwijk, Netherlands
Cuccia, A.	Università di Palermo, Italy
Hermsen, W.	Huygens Laboratorium, Leiden, Netherlands
Higdon, J.	Huygens Laboratorium, Leiden, Netherlands
Hutchinson, G. W.	University of Southampton, United Kingdom
Kanbach, G.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Koch, L.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Labeyrie, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Lichti, G. G.	European Space Research and Technology Centre, Noordwijk, Netherlands
Lüst, R.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Masnou, J.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France

Member	Affiliation
Mayer-Hasselwander, H. A.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Occhialini, G. P.	Instituto di Scienze Fisiche dell'Università di Milano, Italy
Occhialini-Dilworth, C.	Instituto di Scienze Fisiche dell'Università di Milano, Italy
Paul, J. A.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Pinkau, K.	Max-Planck-Institut für Physik und Astrophysik, Garching bei München, Federal Republic of Germany
Scarsi, L.	Università di Palermo, Italy
Shukla, P. G.	Centre d'Etudes Nucléaires de Saclay, Gif-sur-Yvette, France
Swanenburg, B. N.	Huygens Laboratorium, Leiden, Netherlands
Taylor, B. G.	European Space Research and Technology Centre, Noordwijk, Netherlands
Trendelenburg, E. A.	European Space Research and Technology Centre, Noordwijk, Netherlands
van de Hulst, H. C.	Netherlands Committee for Geophysical and Space Research, Leiden, Netherlands
Wills, R. D.	European Space Research and Technology Centre, Noordwijk, Netherlands

B4. Jupiter Orbiter Probe Investigators

Probe Investigations

He/H_2 Ratio

Hoffman, H.-J.	Universität Bonn, Federal Republic of Germany
*Von Zahn, U.	Universität Bonn, Federal Republic of Germany

Atmospheric Structure

Blanchard, R.	NASA-LaRC
Kirk, D. B.	NASA-ARC
Schubert, G.	University of California, Los Angeles
*Sieff, A.	NASA-ARC
Sommer, S. C.	NASA-ARC
Young, R. E.	NASA-ARC

Mass Spectrometer

Atreya, S. K.	University of Michigan
Carignan, G. R.	University of Michigan
Donahue, T. M.	University of Michigan
Hartle, R. E.	NASA-GSFC
Hunten, D. M.	Kitt Peak National Observatory
*Niemann, H. B.	NASA-GSFC
Owen, T. C.	State University of New York, Buffalo
Spencer, N. W.	NASA-GSFC

Net Flux Radiometer

*Boese, R. W.	NASA-ARC
Pollack, J. B.	NASA-ARC
Silvaggio, P. M.	NASA-ARC

Nephelometer

Blamont, J. E.	Centre National de la Recherche Scientifique, Verrières-le-Buisson, France
Grams, G. W.	NCAR
Pollack, J. B.	NASA-ARC
*Ragent, B.	NASA-ARC

Probe Investigations

Sferics

Dehmel, G.	Technische Universität Braunschweig, Federal Republic of Germany
Gleim, F. O.	Technische Universität Braunschweig, Federal Republic of Germany
Krider, E. P.	University of Arizona
*Lanzerotti, L. J.	Bell Telephone Laboratories
Rinnert, K.	Max-Planck-Institut für Aeronomie, Hanover, Federal Republic of Germany
Uman, M.	University of Florida, Gainesville

Orbiter Investigations

IR Reflectance Spectrometer/Mapper

Carlson, R.	University of Southern California, Los Angeles
Danielson, E.	NASA-JPL
Fanale, F. P.	NASA-JPL
*Johnson, T. V.	NASA-JPL
Kieffer, H.	University of California, Los Angeles
Lewis, J. S.	Massachusetts Institute of Technology
Masursky, H.	U. S. Geological Survey, Flagstaff
Matson, D. L.	NASA-JPL
McCord, T. B.	University of Hawaii
Soderblom, L. A.	U. S. Geological Survey, Flagstaff
Taylor, F. W.	NASA-JPL

UV Spectrometer

Barth, C. A.	Laboratory for Atmospheric and Space Physics, University of Colorado
*Hord, C. W.	Laboratory for Atmospheric and Space Physics, University of Colorado
Kelly, K.	Laboratory for Atmospheric and Space Physics, University of Colorado
Lane, L.	NASA-JPL
Stewart, A. I.	Laboratory for Atmospheric and Space Physics, University of Colorado
Thomas, E.	Laboratory for Atmospheric and Space Physics, University of Colorado

Orbiter Investigations

Magnetometer

Coleman, P. J.	University of California, Los Angeles
Kennell, C. F.	University of California, Los Angeles
*Kivelson, M. G.	University of California, Los Angeles
McPherron, R. L.	University of California, Los Angeles
Russell, C. T.	University of California, Los Angeles

Plasma

Coroniti, F. V.	University of California, Los Angeles
*Frank, L. A.	University of Iowa
Vasyliunas, V. M.	Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Federal Republic of Germany

Electron Emitter

DeForest, S.	University of California, San Diego
Goldstein, R.	NASA-JPL
Gonfalone, A.	ESA-ESTEC, Noordwijk, Netherlands
*Grard, R.	ESA-ESTEC, Noordwijk, Netherlands
Jones, D.	ESA-ESTEC, Noordwijk, Netherlands
Knott, K.	ESA-ESTEC, Noordwijk, Netherlands
Pedersen, A.	ESA-ESTEC, Noordwijk, Netherlands

Energetic Particles

Armstrong, T. P.	University of Kansas, Lawrence
Axford, W. I.	Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Federal Republic of Germany
Fritz, T. A.	NOAA-ERL
Hasegawa, A.	Bell Telephone Laboratories
Krimigis, S. M.	APL
Lanzerotti, L. J.	Bell Telephone Laboratories
Lyons, L. R.	NOAA Space Environment Laboratory
McEntire, R. W.	APL
Roederer, J. G.	University of Denver
Roelof, E. C.	APL
Studemann, W.	Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Federal Republic of Germany
Thorne, R. M.	University of California, Los Angeles
Wilkin, B.	Max-Planck-Institut für Aeronomie, Katlenburg-Lindau, Federal Republic of Germany
*Williams, D. J.	NOAA Space Environment Laboratory

Orbiter Investigations

Plasma Wave

Gendrin, R.	Centre National d'Etudes des Télécommunications, Issy-les-Moulineaux, France
*Gurnett, D. A.	University of Iowa
Kennel, C. F.	University of California, Los Angeles
Scarf, F. L.	TRW Systems Group, Redondo Beach
Shawhan, S. D.	University of Iowa

Photopolarimeter Radiometer

Coffeen, D. L.	NASA-GISS
Hansen, J. E.	NASA-GISS
*Lacis, A. A.	NASA-GISS
Stone, P. H.	Massachusetts Institute of Technology
Travis, L. D.	NASA-GISS
Wang, W-C.	NASA-GISS
Yung, Y-L.	Harvard University

Dust

Fechtig, H.	Max-Planck-Institut für Kernphysik, Heidelberg, Federal Republic of Germany
*Grün, E.	Max-Planck-Institut für Kernphysik, Heidelberg, Federal Republic of Germany
Kissel, J.	Max-Planck-Institut für Kernphysik, Heidelberg, Federal Republic of Germany
Lindblad, B. A.	Lund Observatory, Lund, Sweden
Morfill, G.	Max-Planck-Institut für Kernphysik, Heidelberg, Federal Republic of Germany
Zook, H. A.	NASA-JSC

Orbiter Imaging Team

Anger, C. D.	University of Calgary, Calgary, Alberta, Canada
*Belton, M. J. S.	Kitt Peak National Observatory (Team Leader)
Carr, M. H.	U. S. Geological Survey Menlo Park
Chapman, C. R.	Planetary Science Institute
Davies, M. E.	RAND Corporation, Santa Monica
Greeley, R.	NASA-ARC
Greenberg, R.	Planetary Science Institute
Head, J. W.	Brown University
Neukum, G.	Max-Planck-Institut für Kernphysik, Heidelberg, Federal Republic of Germany

Orbiter Imaging Team

Schubert, G.	University of California, Los Angeles
Pilcher, C. B.	University of Hawaii
Veverka, J.	Cornell University

Radio Science Team

*Anderson, J.	NASA-JPL (Team Leader)
Eshleman, V.	Stanford University
Estabrook, F.	NASA-JPL
Fjeldbo, G.	NASA-JPL
Gerard, E.	Observatoire de Paris, Meudon, France
Gulkis, S.	NASA-JPL
Kliore, A.	NASA-JPL (Deputy Team Leader)
Woo, R.	NASA-JPL

Interdisciplinary Scientists

Fanale, F.	NASA-JPL
Gierasch, P.	Cornell University
Hunten, D. M.	Kitt Peak National Observatory
Masursky, H.	U. S. Geological Survey, Flagstaff
McElroy, M. B.	Harvard University
Orton, G.	NASA-JPL
Owen, T.	State University of New York, Buffalo
Pollack, J. B.	NASA-ARC
Russell, C.	University of California, Los Angeles
Sagan, C.	Cornell University
Scarf, F.	TRW Systems Group, Redondo Beach
Schubert, G.	University of California, Los Angeles
Sonett, C. P.	University of Arizona

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 tc this report, a general status-of-operation term that means the spacecraft or experiment has been launched and was reported to NSSDC to be in 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 project.

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.

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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 proposed 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, selenocentric, heliocentric, Venuscentric, Marscentric, lunar lander, Venus lander, Mars lander, Jupiter lander, lunar flyby, Venus flyby, Mars flyby, Mercury flyby, and Jupiter flyby.

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 were 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
ABMA	Army Ballistic Missile Agency
ACAD	Academy
ACIC	Aeronautical Chart and Information Center (now Defense Mapping Agency Aerospace Center)
ACS	attitude control system
AD	Dual Air Density Explorer (satellite, NASA)
A/D	analog to digital
AE	Atmosphere Explorer (satellite, NASA)
AEC	Atomic Energy Commission
AEROPROPUL	aeropropulsion
AEROSAT	Aeronautical Satellite (NASA-ESA)
AEROSP	aerospace
AFB	Air Force Base
AFCRL	Air Force Cambridge Research Laboratories (now US Air Force Geophysics Laboratory)
AFGL	Air Force Geophysics Laboratory
AFO	Announcements of Flight Opportunities
AFSC	Air Force Systems Command
AGC	automatic gain control
AGCY	agency
AIMP	Anchored Interplanetary Monitoring Platform (satellite, NASA)
ALOSYN	Alouette topside sounder synoptic (data)
ALPO	Apollo Lunar Polar Orbiter (satellite, NASA); Association of Lunar and Planetary Observers
ALSEP	Apollo Lunar Surface Experiments Package (NASA)
ALT	altitude
AM	amplitude modulation
AMP	ampere
AMPS	Atmosphere, Magnetosphere, and Plasmas in Space (satellite, NASA)
AMS	Army Map Service (now Defense Mapping Agency Topographic Center)
AMSAT	Radio Amateur Satellite Corporation
AMU	atomic mass unit; astronaut maneuvering unit
ANIK	Canadian Telecommunications Satellite; also referred to as TELESAT
ANNA	Army, Navy, NASA, Air Force (geodetic satellite)
ANS	Astronomical Netherlands Satellite (Netherlands-NASA)
AOSO	Advanced Orbiting Solar Observatory
AP	magnetic activity index Ap
APL	Applied Physics Laboratory of Johns Hopkins University
APPL	application
APT	automatic picture transmission
A/R	acquisition/reference
ARC	Ames Research Center (NASA)
ARC-MIN	arc-minute
ARC-S	arc-second
ARDC	Air Research and Development Command (now AFSC)
ARPA	Advanced Research Projects Agency
ARSP	Aerospace Research Support Program (USAF)
AS+E	American Science & Engineering, Inc.
ASOS	antimony-sulfide oxy-sulfide
ASTP	Apollo-Soyuz Test Project (USSR-NASA)
ASTROPHYS	astrophysics
AT	atomic
ATCOS	Atmospheric Composition Satellite (NASA)
ATDA	Alternate Target Docking Adapter
ATFE	advanced thermal control flight experiment
ATM	Apollo Telescope Mount; atmosphere
ATS	Applications Technology Satellite (NASA)
AT+T	American Telephone & Telegraph Corp.
AU	astronomical unit
AUST	Australia
AVCS	advanced vidicon camera system
AVG	average
AVHRR	advanced very high resolution radiometer
AWRE	Atomic Weapons Research Establishment (Australia)
BCD	binary coded decimal
BE	Beacon Explorer (satellite, NASA); beryllium
BEV	billion electron volts
BIC	barium iodide cloud
BIOS	Biological Satellite (NASA)
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)
CAL	calorie
CAL TECH	California Institute of Technology
CALSPHERE	calibration sphere
CAN	Canada
CAS	Cooperative Applications Satellite (France-NASA)
CAV	composite analog video
CDA	command and data acquisition (station)
CDC	Control Data Corporation
CDS	cadmium sulfide
CENS	Centre d'Etudes Nucleaires de Saclay (France)
CHEM	chemical
CM	command module; centimeter
CMD	command
CNES	Centre National d'Etudes Spatiales (France)
CNET	Centre National d'Etudes des Telecommunications (France)
CNRS	Centre National de la Recherche Scientifique (France)
COMM	commission
COMSAT	Communications Satellite Corporation
CONIE	Comision Nacional de Investigacion del Espacio (Spain)
CORSA	Cosmic-Ray Satellite (Japan)
COS	Cosmic-Ray Satellite (ESA); cosmic
COSPAR	Committee on Space Research
COUNC	council
CPS	cycles per second
CPU	central processing unit
CRC	Communications Research Centre (Canada)
CRPL	Central Radio Propagation Laboratories (later ITSA; formerly part of ESSA; now NOAA/ERL)
CRREL	Cold Region Research & Engineering Laboratories
CRS	Commission for Space Research (Italy)
CRT	cathode ray tube
CSI	cesium iodide
CSM	command service module
CTR	center
CTS	Canadian Telecommunications Satellite
CZCS	coastal zone ocean color scanner
D	day
DAC	data acquisition camera
DADE	Dual Air Density Explorer (satellite, NASA)
DAN	Danish
DAPP	Defense Acquisition and Processing Program (DOD)
DASA	Defense Atomic Support Agency
DATS	Despun Antenna Test Satellite (DOD)
DB	decibel
DCP	data collection platform
DCS	direct couple system; data collection system
DEF	defense
DEG	degree
DENPA	Density Phenomena (satellite, Japan)
DEV	development
DFVLR	Deutsche Forschungs-und Versuchsanstalt für Luft-und Raumfahrt; English translation, Research Laboratory for Aeronautics and Astronautics, Fed Rep of Germany
DIAL/MIKA	Diament Allemande/Mini Kapsel (satellite, Fed Rep of Germany-France)
DIAL/MIKA	Diament Allemande/Wissenschaftliche Kapsel (satellite, Fed Rep of Germany-France)
DIAM	diameter
DIAPO	Diapason (satellite, France)
DIT	Drexel Institute of Technology
DMAAC	Defense Mapping Agency Aerospace Center
DMATC	Defense Mapping Agency Topographic Center
DME	Direct Measurements Explorer (satellite, NASA)
DMSP	Defense Military Satellite Program (DOD)
DOD	Department of Defense
DODGE	Department of Defense Gravity Experiment (satellite, DOD)
DRID	direct readout image dissector (camera system)
DRIR	direct readout infrared radiometer
DRTE	Defence Research Telecommunications Establishment (now CRC)
DSAP	Defense System Applications Program (DOD)
DSCS	Defense Satellite Communications System (DOD)
DSIR	Department of Science and Industrial Research (England)
DSN	Deep Space Network
DV	digital video
DYN	dynamic

E	energy
EASEP	Early Apollo Scientific Experiment Package
ECS	Experimental Communications Satellite (NASA)
EDS	Environmental Data Service (NOAA)
EGO	Eccentric (Orbiting) Geophysical Observatory (satellite, NASA)
EGRS	Engineers Satellite (DOD)
EIRP	effective isotropic radiative power
EL	electric (data camera carried on Apollo)
ELDO	European Launch Development Organization (ESA)
ELEC	electric
ELECTR	electronics
ELMS	Earth Limb Measurement Satellite (NASA-USAF)
EME	environmental measurement experiment
EMR	Electromechanical Research (Company, England)
ENVIRON	environment; environmental
EOF	end of file
EOGO	Eccentric Orbiting Geophysical Observatory (satellite, NASA)
EOS	Earth Observation Satellite (NASA)
EPE	Energetic Particle Explorer (satellite, NASA)
E/Q	energy per unit charge
ERB	Earth radiation budget (experiment)
ERDC	Earth Resources Data Center
ERGS	Earth Geodetic Satellite (USAF)
ERL	Environmental Research Laboratory (NOAA)
EROS	Earth Resources Observation System
ERS	Environmental Research Satellite (USAF)
ERT	extended range telescope
ERTS	Earth Resources Technology Satellite (NASA)
ESA	European Space Agency
ESMR	electrically scanning microwave radiometer
ESOC	European Space Operations Centre (ESA)
ESRO	European Space Research Organization (now ESA)
ESSA	Environmental Science Services Administration (now NOAA)
ESTABL	establishment
ESTEC	European Space Technology Center (ESA)
ETR	Eastern Test Range (also referred to as Cape Canaveral)
ETS	Engineering Test Satellite
EUV	extreme ultraviolet
EV	electron volt
EVA	extravehicular activity
EVM	Earth viewing (equipment) module
EXOS	Exospheric Satellite (Japan)
EXOSAT	European X-ray Observation Satellite (ESA)
EXTRATERR	extraterrestrial
FARO	Flare-Activated Radiobiological Observatory (satellite, DOD)
FED	Federal
FLT-SAT	Fleet Satellite (USN)
FM	frequency modulation
FMRT	final meteorological radiation tape
FOUND	foundation
FOV	field of view
FPR	flat plate radiometer
FR	French Research (satellite, France)
FRC	Flight Research Center (NASA)
FSC	FLEETSATCOM (satellite, USN-USAF)
FSK	frequency shift key
FWHM	full width at half maximum
FWS	filter wedge spectrometer
GARP	Global Atmospheric Research Program
GCA	Geophysics Corporation of America
GE	General Electric (Company)
.GE.	greater than or equal to
GEMS	Geostationary European Meteorological Satellite (ESA)
GEOPHYS	geophysical
GEOS	Geodetic Earth-Orbiting Satellite (NASA); Geostationary Earth-Orbiting Satellite (ESA)
GES FUR WELTRAUM-FORSCH	Gesellschaft für Weltraumforschung (Center for Space Research, Fed Rep of Germany)
G.E.T.	ground elapsed time
GEX	gas exchange
GGSE	gravity gradient stabilization experiment
GHZ	gigahertz
GISS	Goddard Institute for Space Studies (NASA)
GM	Geiger-Mueller; gram
GMS	Geostationary Meteorological Satellite (Japan)
GMT	Greenwich mean time
GOES	Geosynchronous Operational Environmental Satellite (NASA-NOAA; also called SMS)
GP	Gravitational Redshift Space Probe (NASA)
GRAVR	Gravitational Redshift Space Probe (NASA)
GRE	ground reconstruction equipment; ground reconstruction electronics
GREB	Galactic Radiation Experiment Background (satellite, USN)
GRI	Groupe de Recherche Ionospherique (France)
GROC	Netherlands Committee for Geophysics and Space Research
GRS	German Research Satellite (NASA-Fed Rep of Germany)
GSD	Grid Sphere Drag (satellite, DOD)
GSE	geocentric solar ecliptic (coordinate system)
GSFC	Goddard Space Flight Center (NASA)
GSM	geocentric solar magnetospheric (coordinate system)
.GT.	greater than
GUGMS	Glavnoye Upravleniye Gidrometeorologicheskoi Sluzhby (Main Administration of the Hydrometeorological Service, USSR)
GV	gigavolt
GVHSR	geosynchronous very high resolution radiometer
H	hour
HAO	High Altitude Observatory
HCMM	Heat Capacity Map Mission (satellite, NASA)
HCMR	Heat Capacity Mapping Radiometer
HCO	Harvard College Observatory
HDRSS	high data rate storage system
HE	helium
HEAO	High-Energy Astrophysical Observatory (NASA)
HEOS	High-Eccentricity Earth-Orbiting Satellite (ESA)
HET	health, education, telecommunications
HETS	high-energy telescope system
HEW	health, education, and welfare
HFE	heat-flow experiment; heat-flow electronics
HR	high resolution
HRIR	high-resolution infrared radiometer
HRIRS	high-resolution infrared radiometer sounder
H.S.	high school
HYDROMET	hydrometeorological
HZ	hertz (cycles per second)
IAP	Institute of Atmospheric Physics (USSR)
IBM	International Business Machines (Corp)
ICBM	intercontinental ballistic missile
ICSU	International Council of Scientific Unions
ID	identification
IDC	image dissector camera
IDCS	image dissector camera system
IDCSP	Initial (or Interim) Defense Communication Satellite Program (or Project) (DOD)
IDSCS	Initial Defense Satellite Communication System (DOD)
IDT	instrument definition team
IE	Ionospheric Explorer (satellite, NASA-NBS)
IFOV	instrument field of view
IGRF	International Geomagnetic Reference Field
IGY	International Geophysical Year
IME	International Magnetospheric Explorer (satellite, NASA-ESA)
IMP	Interplanetary Monitoring Platform (satellite, NASA)
IMS	International Magnetospheric Study
INDASAT	Indian Scientific Satellite (ISRO-USSR)
INOP	inoperable
INSAT	Indian National Satellite (ISRO-USSR)
INST	institute
INTA	Instituto Nacional de Tecnica Aeroespacial (Spain); the National Institute of Aerospace Science
INTASAT	satellite (INTA, Spain)
INTELSAT	International Telecommunications Satellite (NASA-COMSAT)
ION COMP	Ionospheric Composition (satellite--see DIAPO)
IPA	Institute for Physics of the Atmosphere (SAS)
IQSY	International Quiet Sun Year
IR	infrared
IRAS	Infrared Astronomy Satellite
IRBM	intermediate range ballistic missile
IRIG	Inter-Range Instrumentation Group
IRIS	infrared-interferometer spectrometer; International Radiation Investigation Satellite (NASA-ESA)
IRLS	interrogation, recording, and location system

IRR	infrared radiometry
IRTRN	infrared transmission
ISAS	Institute of Space & Aeronautical Science (Japan)
ISEE	International Sun-Earth Explorer (satellite, NASA-ESA)
ISIS	International Satellite for Ionospheric Studies (NASA-Canada)
ISRO	Indian Space Research Organization
ISS	Ionospheric Sounding Satellite (Japan)
ITCZ	intertropical convergence zone
ITOS	Improved TIROS Operational Satellite (NOAA)
ITPR	infrared temperature profile radiometer
ITR	incremental tape recorder
ITSA	Institute for Telecommunication of Sciences and Aeronomy (formerly a subdivision of ESSA; now NOAA-ERL)
IU	instrument unit
IUE	International Ultraviolet Explorer (satellite, NASA-UK-ESA)
IUWDS	International URSIGRAM and World Days Service
IZMIRAN	Institute of Terrestrial Magnetism and Aeronomy of the Academy of Sciences (USSR)
JHU	Johns Hopkins University
JPL	Jet Propulsion Laboratory (NASA)
JSC	Johnson Space Center (NASA)
KBS	kilobits per second
KEV	kiloelectron volt
KG	kilogram
KHZ	kilohertz
KM	kilometer
KP	magnetic activity index Kp
KPNO	Kitt Peak National Observatory
KSC	Kennedy Space Center (NASA)
LA	Los Angeles
LAB	laboratory
LACATE	lower atmosphere composition and temperature
LAGEOS	Laser Geodetic Earth-Orbiting Satellite (NASA)
LARC	Langley Research Center (NASA)
LAS	Large Astronomical Satellite (ESA)
LASL	Los Alamos Scientific Laboratory
LCS	Lincoln Calibration Sphere
.LE.	less than or equal to
LEM	lunar excursion module
LEPEDEA	low-energy proton and electron differential energy analyzer
LERC	Lewis Research Center (NASA)
LES	Lincoln Experimental Satellite (DOD)
LETS	low-energy telescope system
LL	Lincoln Laboratory (MIT)
LM	lunar module
LMD	Laboratory of Meteorological Dynamics
LOFTI	Low-Frequency Trans-Ionospheric (satellite, USN-NRL)
LOGACS	Low-G Accelerometer Calibration System (USAF)
LPSP	Laboratoire de Physique Stellaire et Planetaire (CNRS)
LR	labeled release
LRIR	limb radiance inversion radiometer; low-resolution infrared radiometer
LRL	Lunar Receiving Laboratory (JSC)
LRV	lunar roving vehicle
LST	Large Space Telescope (satellite, NASA)
.LT.	less than
LTV	Ling-Temco-Vought (Company)
M	meter, milli- (prefix)
MA	Mercury Atlas
MAPS	measurement of air pollution from satellite
MARENTS	Modified Advanced Research Environmental Test Satellite (USAF)
MAS	Ministry of Aviation Supply (UK)
MASC	magnetic attitude spin coil
MASS	Massachusetts
MATER	material
MB	millibar
MC	megacycle
MED	medicine; medical
METEC	Meteoroid Technology (satellite, NASA)
METEOSAT	Meteorological Satellite (ESA)
MEV	million electron volts
MG	milligram
MHZ	megahertz
MIDAS	Missile Defense Alarm System (USAF)
MIN	minute
MIT	Massachusetts Institute of Technology
MJS	Mariner Jupiter/Saturn (spacecraft, NASA)
MM	millimeter
MMW	millimeter wave
MOL	Manned Orbiting Laboratory (satellite, DOD)
M-P	minus-plus
MPI	Max-Planck-Institut (Fed Rep of Germany)
MR	medium resolution
MRIR	medium-resolution infrared radiometer
MS	microsecond; millisecond
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)
NACE	neutral atmosphere composition experiment
NADUC	Nimbus/ATS Data Utilization Center
NASA	National Aeronautics and Space Administration (Washington, D.C., Headquarters)
NASC	National Aeronautics and Space Council
NASDA	National Space Development Agency (Japan)
NATL	national
NATO	North Atlantic Treaty Organization
NBS	National Bureau of Standards
NCAR	National Center for Atmospheric Research
NCC	National Climatic Center (NOAA)
NDRE	Norwegian Defence Research Establishment
NEMS	Nimbus-E microwave spectrometer; Near-Earth Magnetospheric Satellite (ESA)
NESC	National Environmental Satellite Center (now NESS)
NESS	National Environmental Satellite Service (NOAA)
NGSP	National Geodetic Satellite Program
NHC	National Hurricane Center
NIH	National Institutes of Health
NMC	National Meteorological Center
NMRT	Nimbus meteorological radiation tape
NNN	no national name
NNSS	Navy Navigational Satellite System
NOAA	National Oceanic and Atmospheric Administration (formerly ESSA)
NOMSS	National Operational Meteorological Satellite System
NORAD	North American Air Defense Command
NORW	Norwegian
NOS	National Ocean Survey (NOAA)
NOTS	Naval Ordnance Test Station
NRC	National Research Council
NRL	Naval Research Laboratory
NSA	National Security Agency
NSF	National Science Foundation
NSSDC	National Space Science Data Center
NUCL	nuclear
NWL	Naval Weapons Laboratory
NWRC	National Weather Records Center (presently NCC)
OA	Office of Applications (NASA)
OAO	Orbiting Astronomical Observatory (satellite, NASA)
OAR	Office of Aerospace Research (USAF-AFSC)
OART	Office of Advanced Research and Technology (NASA)
OAST	Office of Aeronautics and Space Technology (NASA)
OBS	observatory
OCC	OPLE Command Center
OFO	Orbiting Frog Otolith (NASA experimental spacecraft)
OGO	Orbiting Geophysical Observatory (satellite, NASA)
OI	other investigator
OMNI	low-resolution omnidirectional radiometer (on Explorer 7)
OMSF	Office of Manned Space Flight (NASA)
ONR	Office of Naval Research
OPEP	orbital-plane experiment package
OPLE	Omega position and location experiment
OP OFF	operational off
ORBIS	Orbiting Radio Beacon Ionospheric Satellite (NASA)
ORS	Octahedral Research Satellite (NASA); Orbiting Research Satellite (DOD)
OSCAR	Orbiting Satellite Carrying Amateur Radio

OSO	Orbiting Solar Observatory (satellite, NASA)
OSS	Office of Space Science (NASA)
OSSA	Office of Space Science and Applications (NASA; now two separate offices)
OT	Operational TIROS (satellite, NASA)
OTDA	Office of Tracking and Data Acquisition (NASA)
OV	Orbiting Vehicle (satellite, USAF)
OVT	organic vapor trap
PAC	Packaged Attitude Control (satellite, NASA)
PAET	Planetary Atmosphere Experiment Test
PAGEOS	Passive Geodetic Earth-Orbiting Satellite (NASA)
PAM	pulse amplitude modulation
PCM	pulse coded modulation
PD	project director
PE	Planetary Explorer
PEP	platform electronic package
PFM	pulse frequency modulation
PHASR	Personnel Hazards Associated with Space Radiation (satellite, USAF)
PHYS	physics
PI	principal investigator
PIXEL	picture element
PL	prelaunch
PLACE	position location and aircraft communication experiment
PM	pulse modulation; photomultiplier
PMR	pressure modulation radiometer; Pacific Missile Range
PMT	photomultiplier tube
P-N	positive-negative (junction)
POGO	Polar Orbiting Geophysical Observatory (satellite, NASA)
PPS	pulses per second
PR	pyrolytic release
PROT	protection
PS	pressure sensor
PSE	passive seismograph experiment
PTL	Photographic Technology Laboratory (JSC)
QOMAC	quarter-orbit magnetic attitude control (system)
RA	Ranger (spacecraft, NASA)
RAD	radium; radiation
RADCAT	Radar Calibration Target (satellite, ARPA)
RADOSE	Radiation Dosimeter (satellite, DOD)
RAE	Radio Astronomy Explorer (satellite, NASA)
RAM	random access memory (system)
RBV	return beam vidicon (camera)
RC	resistance capacitor
RCA	Radio Corporation of America
R+D	research and development
REP	republic
RES	research
REXS	Radio Exploration Satellite (Japan)
RF	radio frequency
RFI	radio frequency interference
RM	Radiation Meteoroid (satellite, NASA); Radiometric Measurement (satellite, DOD)
RMS	root mean square; Radiation Meteoroid Satellite (NASA); Radiometric Measurement Satellite (DOD)
RPA	retarding potential analyzer
RPM	revolutions per minute
RPS	revolutions per second
RRL	Radio Research Laboratories (Japan)
RSRS	Radio and Space Research Station (England)
RTD	Research Technology Division (USAF)
RTG	radioisotope thermoelectric generator
RTTS	real-time transmission system
S	second
SAM	stratospheric aerosol measurement
SAMOS	Satellite Mission Observation System (satellite, USAF)
SAMS	stratospheric and mesospheric sounder
SAMSO	Space and Missile Systems Organization (USAF)
SAO	Smithsonian Astrophysical Observatory
SAPPSAC	spacecraft attitude precision pointing and slewing adaptive control
SAS	Small Astronomy Satellite (NASA); Soviet Academy of Sciences
SATAR	Satellite for Aerospace Research (NASA)
SATELL	satellite
SATS	Satellite Antenna Test System (NASA)
SBRC	Santa Barbara Research Center
SC	project scientist
SCAMS	scanning microwave spectrometer
SCEL	Signal Corps Engineering Laboratories
SCH	school
SCI	science
SCMR	surface composition mapping radiometer
SCORE	Signal Communication by Orbiting Relay Equipment (satellite, DOD)
SCR	selective chopper radiometer
SD	San Diego
SE	Solar Explorer (satellite, NASA)
SEASAT	Ocean Dynamic Satellite (NASA)
SEC	secondary electron conduction (vidicon tube)
SECOR	Sequential Collation of Range (satellite, USAF)
SEM	space environment monitor
SERT	Spinning Satellite for Electric Rocket Test (NASA)
SESP	Space Experiment Support Program
SESPO	Space Environmental Support Project Office
SHS	Soviet Hydrometeorological Service
SIBS	Salk Institute for Biological Studies
SIDS	Space Investigations Documentation System (NASA)
SIM	scientific instrument module
SIRS	satellite infrared spectrometer; System for Information Retrieval and Storage (NSSDC)
SM	San Marco (satellite, NASA-Italy)
SMM	solar maximum mission
SMMR	scanning multispectral microwave radiometer
SMS	Synchronous Meteorological Satellite (NASA)
SNAP	systems for nuclear auxiliary power
SOEP	solar-oriented experiment package
SOLRAD	Solar Radiation (satellite, NASA-DOD)
SPADES	Solar Perturbation and Atmospheric Density Measurement Satellite (DOD)
SPHINX	Space Plasma High Voltage Interactive Experiment (satellite, NASA)
SPM	solar proton monitor
SR	Solar Radiation (satellite, NASA); scanning radiometer; sounding rocket
SRATS	Solar Radiation and Thermospheric Structure (satellite, Japan)
SRC	Space Research Council; Science Research Council
SRI	Stanford Research Institute
SRT	supporting research and technology
SSC	Satellite Situation Center
SSCC	spin-scan cloudcover camera
SSD	Space Science Division (JPL)
SSS	Small Scientific Satellite (NASA)
SST	satellite-to-satellite tracking
STADAN	Spacecraft Tracking and Data Acquisition Network (now STDN)
STARAD	Starfish Radiation (satellite, NASA)
STD	standard
STDN	Spaceflight Tracking and Data Network (NASA)
STER	steradian
STL	Space Technology Laboratories (now TRW Systems Group)
STN	station
STP	Solar Terrestrial Probe (satellite, NASA); Solar Terrestrial Physics
STRATOS	stratosphere
STUD	studies
SUI	State University of Iowa (now University of Iowa)
SURCAL	Surveillance Calibration (satellite, DOD)
SVC	service
SW	southwest
SWRF	Sine Wave Response Filter (program)
SYNCOM	Synchronous Communication (satellite, NASA)
SYST	system
TAC	Technology Application Center
TACOMSAT	Tactical Communications Satellite (DOD)
TATS	Test and Training Satellite (NASA)
TATSACOM	Tactical Satellite Communications (program, DOD)
TD	technical director
TD	Thor-Delta (satellite, ESA); launch vehicle (NASA-USAF)
TDP	Tracking Data Processor (program)
T+DR	tracking & data relay
TDRSS	tracking and data relay satellite system
TEC	telemetry and command; transearth coast
TECH	technical; technology
TEI	transearth injection
TELESAT	satellite, Canada (also referred to as ANIK)
TEMP	temporal; temperature
TET	telescope and electron telescope

TETR	Test and Training (satellite, NASA)
THIR	temperature-humidity infrared radiometer
THORAD-AGE	Thor Augmented Delta Agena (launch vehicle)
TIMATION	Time Location System (USN)
TIP	Tracking Impact Prediction (satellite, DOD)
TIROS	Television and Infrared Observation Satellite (NASA)
TL	team leader
TLI	translunar injection
TM	team member
TOMS	total ozone mapping system
TOPO	topographic
TOPS	Thermal Noise Optical Optimization Communication System (NASA)
TOPSI	topside (sounder) (satellite, NASA)
TOS	TIROS Operational Satellite (or System) (NASA)
TOVS	TIROS operational vertical sounder
TRAAC	Transit Research and Attitude Control (satellite, USN)
TRANET	Doppler Tracking Network (USN)
TRANSP	transportation
TRS	Tetrahedral Research Satellite (USAF)
TRUST	television relay using small terminals
TRW	Thompson, Ramo, Wooldridge, Inc
TTS	Test and Training Satellite (NASA) (also called TATS, TETR)
TWERLE	tropical wind energy conversion and reference level experiment
U	university
UCLA	University of California at Los Angeles
UHF	ultrahigh frequency
UK	United Kingdom
US	United States
USA	United States Army; United States of America
USAF	United States Air Force
USN	United States Navy
USSR	Union of Soviet Socialist Republics
UT	universal time
UV	ultraviolet
UVNO	ultraviolet nitric-oxide experiment
UVS	ultraviolet spectrometer
V	volt
VAR	variation
VHF	very high frequency
VHRR	very high resolution radiometer
VISSR	visible infrared spin-scan radiometer
VLF	very low frequency
VTPR	vertical temperature profile radiometer
W	watt
WBVTR	wideband video tape recorder
WDC	World Data Center
WDC-A-R&S	World Data Center A for Rockets and Satellites
WEFAX	weather facsimile
WFC	Wallops Flight Center (NASA)
WGSPR	Working Group for Space Physics Research
WMO	World Meteorological Organization
WPM	words per minute
WRESAT	Weapons Research Establishment Satellite (Australia)
WS	Wallops Station (NASA; now Wallops Flight Center)
WSMR	White Sands Missile Range
WTR	Western Test Range (also referred to as Vandenberg AFB)
WWW	World Weather Watch
Z	atomic number