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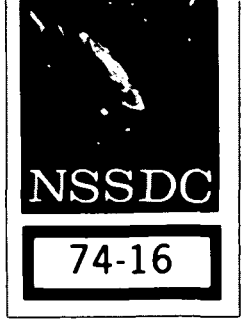

The Space Investigations Documentation System (SIDS) Report

DECEMBER 1974

NATIONAL SPACE SCIENCE DATA CENTER

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION · GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.

NSSDC 74-16

The Space Investigations Documentation System (SIDS) Report

December 1974

FOREWORD

The Space Investigations Documentation System (SIDS) report is prepared by the National Space Science Data Center (NSSDC) at Goddard Space Flight Center for the Office of Space Science (OSS) at NASA Headquarters. The report will serve as a users guide for OSS management. In addition it is intended to provide the professional community with information about OSS current and planned investigative activity in a broad range of scientific disciplines. The report provides brief descriptions for these investigations, as well as the approximate time periods when each investigation operates and collects data.

The SIDS report replaces the Space Science and Applications Program document (NHB 8030.2) from April 1960 to August 1968. Information on the supporting research and technology (SRT) and sounding rocket (SR) programs contained in that predecessor report has been deleted from SIDS, but it is available from the Office of the Associate Administrator for Space Science.

The SIDS report differs from the Report on Active and Planned Spacecraft and Experiments, edited by Julius Brecht and published by NSSDC in January 1974, in that it includes experiments and spacecraft of direct concern to OSS. At the spacecraft level, the report includes names of the program scientist and program manager. At the experiment level, the report shows whether an experiment was approved or approved conditionally, specifies the responsible OSS Division, and lists the SIDS investigation discipline codes.

I would like to acknowledge the cooperation of Battelle Memorial Institute, NASA Headquarters, and the National Space Science Data Center for assisting in the development of the report, obtaining information, and offering suggestions for the preparation of this report.

NSSDC plans to publish a supplement to this report within 6 months and a cumulative edition annually.

Henry J. Smith
Deputy Associate Administrator for
Space Science (Science)
NASA Headquarters

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1. INTRODUCTION

The Office of Space Science (OSS) and the professional community have a continuing need for information relating to and describing the scientific experiments conducted on OSS space flight missions. The Space Investigations Documentation System (SIDS) report includes all active and planned experiments approved by the Associate Administrator for Space Science, plus a few other missions of direct interest to OSS. The SIDS report is arranged to provide information in a number of forms, i.e., geographic, institutional, principal investigators or team leaders, etc. SIDS is a formalized information system to meet these goals. The SIDS report and subsequent editions will provide details on current and planned experiments.

The objective of SIDS is to establish, maintain, and operate a Space Science Steering Committee flight experiments project information system providing the capability to respond to report requirements and also internal and external queries on flight experiments. It has been designed to provide, as a single source, summaries of all approved space flight investigations and experimental and theoretical supporting research.

The SIDS report will provide the professional community with information on current as well as planned spacecraft activity in a broad range of scientific disciplines for OSS. 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 report will be useful to many people interested in the scientific, applied, and operational uses of such data.

The contents and format of individual sections are described at the beginning of each section.

1.1 AVAILABILITY OF THIS REPORT

The Space Science Steering Committee Secretariat will provide copies of the SIDS report and future supplements to an individual or organization who can establish a need, in writing or by telephone, for this information. The official address for requests is:

NASA Headquarters
Office of Space Science
Space Science Steering
Committee Secretariat
Code: SS
Washington, D.C. 20546

Phone: 202 755-8393

1.2 REQUESTS FOR ADDITIONS/CORRECTIONS

All additions/corrections to the SIDS report should be sent directly to the Secretariat of the Space Science Steering Committee. To be included in the June 1975 supplement, these must reach the Secretariat by April 14, 1975.

2. DESCRIPTIONS OF SPACECRAFT AND EXPERIMENTS

This section contains descriptions of spacecraft and experiments. They are sorted first by spacecraft common name. Within each spacecraft listing, experiments are ordered by the principal investigator's or team leader's last name. If the spacecraft common name is not known, the spacecraft can be found by referring to an alternate name found in the Index of Spacecraft and Experiments, section 3.1.

Each spacecraft entry heading consists of the spacecraft common name, alternate names, NSSDC ID code, last reported state of the spacecraft, launch date or planned launch date, weight, launch site, launch vehicle, sponsoring country and agency, orbit parameters if appropriate, and personnel. For unlaunched satellites, a set of planned orbit parameters is given. For launched orbiting spacecraft, two sets of orbit parameters are given; i.e., initial orbit parameters calculated shortly after launch and recent orbit parameters. No orbit parameters are given for lander or fly-by missions. The spacecraft brief description follows immediately below each heading.

Each experiment entry heading consists of experiment name, NSSDC ID code, last reported state of the experiment, the OSS division, the relevant SIDS disciplines, and the experiment personnel. The experiment brief description follows immediately below each heading.

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

SPACECRAFT COMMON NAME- AD-A
ALTERNATE NAMES- EXPLOREP 19, 00714
NSSDC ID- 63-053A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 00/00/67.

LAUNCH DATE- 12/19/63 SPACECRAFT WEIGHT- 7. 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- 12/19/63
ORBIT PERIOD- 115.9 MIN INCLINATION- 78.62 DEG
PERIAPSIS- 749.000 KM ALT APOAPSIS- 2022.00 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/27/72
ORBIT PERIOD- 112.02 MIN INCLINATION- 78.9205 DEG
PERIAPSIS- 874. KM ALT APOAPSIS- 1768. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.W. COFFEE, JR. .....NASA-LARC
HAMPTON, VA
PS - R.F. FELLOWS .....NASA HEADQUARTERS
WASHINGTON, DC
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
EXPLORER 19 WAS THE SECOND IN A SERIES OF 3.66-M INFLATABLE SPHERES PLACED INTO ORBIT SOLELY FOR THE DETERMINATION OF 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. EXPLORER 19 IS EXPECTED TO REMAIN IN ORBIT UNTIL 1976.

------- AD-A, O'SULLIVAN, JR. -------

EXPERIMENT NAME- SATELLITE DRAG ATMOSPHERIC DENSITY

NSSDC ID- 63-053A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/19/63.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.J. O'SULLIVAN, JR. .....NASA-LARC
HAMPTON, VA
OI - L.G. JACCHIA .....SAO
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO YIELD SYSTEMATIC CHANGES IN ATMOSPHERIC DENSITY AS A FUNCTION OF ALTITUDE, LATITUDE, AND TIME BY MEASURING ATMOSPHERIC DRAG ON A LOW MASS-TO-AREA RATIO (0.7680 KG/SQ M) SATELLITE. EXPLORER 19 WAS LAUNCHED INTO A NEAR-POLAR ORBIT, SO THAT AS THE PERIGEE POINT PRECESSED, DENSITIES COULD BE SAMPLED FROM BOTH POLAR AND EQUATORIAL LATITUDES. THE ORBIT WAS ALSO SUN SYNCHRONIZED SO THAT NEAR-POLAR DENSITIES COULD ALWAYS BE OBTAINED NEAR LOCAL NOON AND MIDNIGHT. ATMOSPHERIC DENSITIES NEAR PERIGEE WERE DEDUCED FROM SEQUENTIAL OBSERVATIONS OF THE SPHERE FROM OPTICAL TRACKING. THE EXPERIMENT PERFORMED NORMALLY AFTER LAUNCH, AND GOOD DATA HAVE BEEN COLLECTED. A COMPLETE DESCRIPTION OF THE EXPERIMENT IS CONTAINED IN "DETERMINATION OF MEAN ATMOSPHERIC DENSITIES DURING MINIMUM SOLAR ACTIVITY BY MEANS OF THE EXPLORER 19 SATELLITE," NASA TN-D-3432, JUNE 1966.

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

SPACECRAFT COMMON NAME- AD-C
ALTERNATE NAMES- PL-683J, SPHERE
EXPLORER 39, 03337
NSSDC ID- 68-066A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/00/71.

LAUNCH DATE- 08/08/68 SPACECRAFT WEIGHT- 9.4 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- 08/08/68
ORBIT PERIOD- 118.1 MIN INCLINATION- 80.691 DEG
PERIAPSIS- 665.000 KM ALT APOAPSIS- 2526.00 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/13/74
ORBIT PERIOD- 115.05 MIN INCLINATION- 80.68 DEG
PERIAPSIS- 695. KM ALT APOAPSIS- 2223. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.W. COFFEE, JR. .....NASA-LARC
HAMPTON, VA
PS - R.F. FELLOWS .....NASA HEADQUARTERS
WASHINGTON, DC
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
EXPLORER 39 WAS AN INFLATABLE SPHERE, 3.66 M IN DIAMETER, THAT WAS PLACED INTO ORBIT SOLELY FOR THE PURPOSE OF MAKING DENSITY 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.

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

EXPERIMENT NAME- SATELLITE DRAG ATMOSPHERIC DENSITY

NSSDC ID- 68-066A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 08/08/68.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.M. KEATING .....NASA-LARC
HAMPTON, VA
OI - L.G. JACCHIA .....SAO
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
BECAUSE OF ITS SYMMETRICAL SHAPE, EXPLORER 39 WAS SELECTED BY THE EXPERIMENTERS TO DETERMINE UPPER ATMOSPHERIC DENSITIES AS A FUNCTION OF ALTITUDE, LATITUDE, SEASON, AND SOLAR ACTIVITY. THE EXPERIMENT WAS PLANNED PRIOR TO LAUNCH. 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. A GOOD DISCUSSION OF 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.

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

SPACECRAFT COMMON NAME- AE-C
ALTERNATE NAMES- S 6C, PL-721C
ATMOSPHERE EXPLORER-C, EXPLORER 51
6977
NSSDC ID- 73-101A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

LAUNCH DATE- 12/16/73 SPACECRAFT WEIGHT- 658. 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- 12/17/73
ORBIT PERIOD- 132.5 MIN INCLINATION- 68.1 DEG
PERIAPSIS- 158. KM ALT APOAPSIS- 4303. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/10/74
ORBIT PERIOD- 117.92 MIN INCLINATION- 68.115 DEG
PERIAPSIS- 135.30 KM ALT APOAPSIS- 3039.44 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, PG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - D.A. GRIMES .....NASA-GSFC
GREENBELT, MD
PS - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
PG - F.J. GAETANO .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

ONE OBJECTIVE OF AE-C WAS TO INVESTIGATE THE PHOTOCHEMICAL PROCESSES ACCOMPANYING THE ABSORPTION OF SOLAR UV RADIATION IN THE EARTH'S ATMOSPHERE BY MAKING CLOSELY COORDINATED MEASUREMENTS OF REACTING CONSTITUENTS. THE MEASUREMENTS WERE ORIENTED PRIMARILY TO THE LARGELY UNEXPLORED LOW-ALTITUDE REGION BETWEEN 120 AND 300 KM. HOWEVER, PROPERTIES ABOVE 300 KM WERE ALSO EXTENSIVELY INVESTIGATED. THE EXPERIMENT PAYLOAD INCLUDED INSTRUMENTATION FOR THE MEASUREMENT OF SOLAR EUV RADIATION, NEUTRAL PARTICLE COMPOSITION AND TEMPERATURE, ATMOSPHERIC DENSITY, ION COMPOSITION AND TEMPERATURE, ELECTRON CONCENTRATION AND TEMPERATURE, AIRGLOW EMISSIONS, PARTICLE FLUXES, AND THE PHOTOELECTRON ENERGY SPECTRUM. THE SATELLITE WAS A SHORT (1 M) CYLINDRICAL PRISM WITH A DIAMETER OF APPROXIMATELY 1.4 M. IN THE SPIN-STABILIZED MODE, THE SPACECRAFT'S SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE. POWER WAS SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT USED A PCM TELEMETRY SYSTEM THAT OPERATED IN A REAL-TIME OR TAPE RECORDER MODE. AN ON-BOARD PROPULSION SYSTEM WAS USED FOR MAKING ALTITUDE CHANGES. THE SATELLITE HAD A 1-YR LIFETIME. MORE DETAILS CAN BE FOUND ON PP. 263-269 OF "RADIO SCIENCE," VOL. 8, NO. 4, APRIL 1973.

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

EXPERIMENT NAME- ULTRAVIOLET NITRIC-OXIDE EXPERIMENT

NSSDC ID- 73-101A-13

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.A. BARTH .....U OF COLORADO
BOULDER, CO

EXPERIMENT 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 90 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 20.8 MSEC AND WAS READ OUT ALTERNATELY AT 10.4-MSEC 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, VOL. 8, NO. 4, PP. 379 (1973).

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

EXPERIMENT NAME- ELECTRON TEMPERATURE AND CONCENTRATION

NSSDC ID- 73-101A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD
OI - R.F. THEIS .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THE CYLINDRICAL ELECTROSTATIC PROBE WAS A RETARDING POTENTIAL (LANGMUIR TYPE) PROBE THAT MEASURED THE CURRENT FLOWING TO THE COLLECTOR FOR A KNOWN SAWTOOTH VOLTAGE PATTERN APPLIED. FROM THIS RETARDING POTENTIAL (CURRENT VS VOLTAGE) CURVE, ELECTRON DENSITY AND ELECTRON TEMPERATURE WAS DERIVED. THIS PROBE CONSISTED 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 ELECTRODE EXTENDED ANOTHER 10 CM FURTHER OUTWARD FROM THE END OF THE GUARD RING. TWO IDENTICAL PROBES WERE MOUNTED PARALLEL TO THE SPACECRAFT SPIN AXIS (SPIN AXIS WAS PERPENDICULAR TO THE ORBIT PLANE), AND THE OTHER PROBE WAS MOUNTED PERPENDICULAR TO THE SPIN AXIS. IN ADDITION TO ONBOARD ANALYSES OF THE RETARDING POTENTIAL CURVES, WHICH PROVIDE TEMPERATURES AND DENSITIES, THESE CURVES WERE TELEMETERED.

------- AE-C, BRINTON ----------

EXPERIMENT NAME- BENNETT ION-MASS SPECTROMETER

NSSDC ID- 73-101A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.C. BRINTON .....NASA-GSFC
GREENBELT, MD
OI - L.R. SCOTT .....NASA-GSFC
GREENBELT, MD
OI - W.W. PHARO .....NASA-GSFC
GREENBELT, MD
OI - H.A. TAYLOR, JR. .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WAS FLOWN TO MEASURE, THROUGHOUT THE AE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (AMU), 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 AMU, 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 SEC (APPROXIMATELY 12 KM ALONG ORBIT), BUT THE SCAN TIME PER RANGE WAS INCREASED TO 5.1 SECONDS BY COMMAND. NORMAL OPERATION CONSISTED IN SEQUENCE ABCABC (72 TO 1 AMU IN 4.8 SEC). LABORATORY AND INFLIGHT 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 BENNETT 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 CYLINDRICAL ANALYZER TUBE A SERIES OF 16 PARALLEL TUNGSTEN-MESH GRIDS WERE BRAZED. THE BALANCE BETWEEN ION-CURRENT SENSITIVITY AND MASS-RESOLUTION IN A BENNETT SPECTROMETER COULD BE ALTERED BY CHANGING APPROPRIATE VOLTAGES. THESE VOLTAGE 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. ON-BOARD DATA PROCESSING PROVIDED A READ-OUT OF PRIMARY EXPERIMENT DATA IN THE FORM OF TWO DIGITAL WORDS FOR EACH PEAK IN THE ION SPECTRUM. ONE EIGHT-BIT WORD INDICATED PEAK AMPLITUDE (CURRENT) AND THE OTHER EIGHT-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 SECOND. 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 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, VOL. 8, NO. 4, PP. 323-332 (1973).

------- AE-C, CHAMPION ----------

EXPERIMENT NAME- ATMOSPHERIC DRAG

NSSDC ID- 73-101A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/17/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.S.W.CHAMPION .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - F.A. MARCOS .....USAF CAMBRIDGE RES LAB
BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERIC DENSITY ACCELEROMETER EXPERIMENT OBTAINED DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE 120 TO 400 KM BY THE MEASUREMENT OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE EXPERIMENT CONSISTED OF THREE SINGLE AXIS ACCELEROMETERS. TWO OF THE UNITS WERE LOCATED IN THE SPACECRAFT X-Y PLANE AXIS, AND THE THIRD WAS ALIGNED WITH THE Z AXIS. EACH INSTRUMENT MEASURED THE ELECTROSTATIC FORCE REQUIRED TO RESTRAIN A HOLLOW CYLINDRICAL MASS UNDER EXTERNAL ACCELERATION. THE DYNAMIC RANGE OF EACH UNIT WAS 1E-10 TO 1E-12 GRAMS.

------- AE-C, DOERING ----------

EXPERIMENT NAME- PHOTOELECTRON SPECTROMETER

NSSDC ID- 73-101A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.P. DOERING .....JOHNS HOPKINS U
BALTIMORE, MD
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - J.C. ARMSTRONG .....APPLIED PHYSICS LAB
SILVER SPRING, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE INTENSITY AND ENERGY DISTRIBUTION OF THE PHOTOELECTRON FLUX IN THE THERMOSPHERE IN THE RANGE 2 TO 500 EV. THE INSTRUMENTATION CONSISTED OF TWO OPPOSITELY DIRECTED HEMISPHERICAL-ELECTROSTATIC DEFLECTORS COUPLED TO SEPARATE ELECTRON MULTIPLIER DETECTORS. THE PHOTOELECTRON ENERGY SPECTRUM WAS SCANNED BY 1-SEC SWEEPS OF THE VOLTAGE BETWEEN THE TWO HEMISPHERICAL DEFLECTION ELEMENTS OF EACH DEFLECTOR.

------- AE-C, HANSON ----------

EXPERIMENT NAME- ION TEMPERATURE

NSSDC ID- 73-101A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.B. HANSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - D.R. ZUCCARO .....U OF TEXAS, DALLAS
DALLAS, TX
OI - S. SANTINI .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT BRIEF DESCRIPTION
THE PLANAR ION TRAP, A RETARDING POTENTIAL TYPE OF INSTRUMENT, MEASURED CURRENT FLOWING TO A COLLECTOR FOR A KNOWN LINEAR VOLTAGE SWEEP TO BE APPLIED TO THE COLLECTOR. THE ION TEMPERATURE, ION DENSITY, COMPOSITION, SUPRATHERMAL ELECTRON FLUXES, AND SUPRATHERMAL ELECTRON TEMPERATURES WERE DETERMINED FROM THIS RETARDING POTENTIAL CURVE AND KNOWLEDGE OF THE VOLTAGE ON SUPPRESSOR GRIDS BETWEEN THE INSTRUMENT APERTURE AND THE COLLECTOR. THE EXPERIMENT OPERATED IN ONE MODE WHILE THE SPACECRAFT WAS SPINNING AND IN A SECOND MODE WHEN THE SPACECRAFT WAS NOT SPINNING. A COMPLETE VOLTAGE SWEEP (BOTH DOWN AND UP -- +23 TO 0 TO +23 V) COULD BE ACCOMPLISHED IN 3 SEC. IN THE NONSPINNING MODE, AN ADDITIONAL 3-SEC 'DUCT' MODE OPERATED TO PROVIDE MEASUREMENTS FROM WHICH FRACTIONAL ION CONCENTRATION CHANGES AS SMALL AS 0.001 IONS/CC PER 130 M ALONG TRACK TRAVEL COULD BE MADE.

------- AE-C, HAYS ----------

EXPERIMENT NAME- AIRGLOW PHOTOMETER

NSSDC ID- 73-101A-14

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - P.B. HAYS .....U OF MICHIGAN
ANN ARBOR, MI
OI - G.G. SHEPHERD .....YORK U
TORONTO, ONTARIO, CANADA

EXPERIMENT 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 TO 7330 A. 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 6 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 10 TO THE 6 POWER RAYLEIGHS. IN ORDER THAT THE SENSORS BE ABLE TO RESPOND IN A FRACTION OF A SECOND TO LARGE CHANGES IN SURFACE BRIGHTNESS WITHOUT ANY NOTICEABLE ENHANCEMENT IN THE BACKGROUND COUNT RATE, EACH ONE CONTAINED A 1/100 ATTENUATOR AND AN ELECTRONIC CIRCUIT TO BACK-BIAS THE CATHODE. WITH THESE PROTECTIVE FEATURES IT WAS POSSIBLE TO MEASURE A DARK FEATURE WITH NO APPARENT ENHANCEMENT IN BACKGROUND WITHIN 120 MSEC AFTER A DIRECT VIEW OF THE SUN. PHOTONS REACHING THE CATHODE WERE RECORDED USING A PULSE-COUNTING SYSTEM. THE INTEGRATION TIME WAS 33 MSEC FOR CHANNEL 1 AND 132 MSEC 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 VISIBLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER,' P. 8. HAYS, ET AL., RADIO SCIENCE, VOL. 8, NO. 4, PP. 369 (1973).

------- AE-C, HEATH ----------

EXPERIMENT NAME- SOLAR EUV FILTER PHOTOMETER

NSSDC ID- 73-101A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.F. HEATH .....NASA-GSFC
GREENBELT, MD
OI - J. OSANTOWSKI .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERE EXPLORER C SOLAR EUV FILTER PHOTOMETER EXPERIMENT HAD TWO PRIMARY OBJECTIVES -- (1) TO MONITOR SOLAR EUV FLUX IN SIX WAVELENGTH INTERVALS FROM 40 TO 1100 A AND (2) TO MEASURE THE BROADBAND ATMOSPHERIC ABSORPTION AS A FUNCTION OF ALTITUDE TO DETERMINE EFFECTIVE IONIZATION RATES FOR MOLECULAR NITROGEN AND ATOMIC OXYGEN. SECONDARY OBJECTIVES WERE TO PROVIDE COVERAGE OF TEMPORAL SOLAR EUV VARIATIONS FOR THE SELECTED GRATING SPECTROMETER EXPERIMENT AND TO PROVIDE A CHECK OF THE LONG-TERM STABILITY OF THE EUV SPECTROMETER. THE INSTRUMENT WAS COMPOSED OF FOUR BENDIX SPIRAL ELECTRON MULTIPLIERS, THREE PHOTODIODES, AND A STEPPED EIGHT-POSITION FILTER WHEEL THAT CONTAINED SIX UNBACKED METALLIC FILTERS THAT WERE TRANSPARENT IN THE VICINITY OF THE PLASMA FREQUENCY. THE FILTER PHOTOMETER HAD A TRANSPARENT POSITION, A CALIBRATION POSITION, AND AN OPAQUE POSITION. SINCE EACH OF THE FILTERS WAS WED TO EACH OF THE DETECTORS, THIS CONFIGURATION PROVIDED AN INFLIGHT RELATIVE CALIBRATION OF ALL THE DETECTORS. THE EXPERIMENT WAS RIGIDLY MOUNTED ON THE +Z AXIS. THE TILT ANGLE WAS OPTIMIZED, DEPENDING ON THE SELECTED SPACECRAFT ORBITAL PARAMETERS, FOR MAXIMUM SUN VIEWING TIME FOR BOTH THE SPINNING AND THE EARTH-ORIENTED SPACECRAFT OPERATING MODES. ADEQUATE TEMPORAL COVERAGE OF THE SUN WAS PROVIDED BY THE LARGE INSTRUMENT FIELD OF VIEW (PLUS OR MINUS 30 DEG).

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

EXPERIMENT NAME- SOLAR EUV SPECTROPHOTOMETER

NSSDC ID- 73-101A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.E. HINTEREGGER .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - D.E. BEDO .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - L.A. HALL .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - C.W. CHAGNON .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - J.E. MANSON .....USAF CAMBRIDGE RES LAB
BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION

SIX GRAZING-INCIDENCE GRATING MONOCHROMATORS, WHICH COMPRISED THE EUV SPECTROPHOTOMETER, PROVIDED MEASUREMENTS OF THE SOLAR EUV FLUX IN THE 170- TO 1700-A RANGE. THIS INSTRUMENT HAD MODERATE SPECTRAL RESOLUTION (2 A AT 300 A) AND WAS CAPABLE OF SCANNING THE ENTIRE RANGE OR SELECTING SIX NARROW BANDS FOR CONTINUOUS HIGH TIME RESOLUTION MONITORING. THE INSTRUMENT, WHICH WAS POINTED TOWARDS THE SUN WITH AN ACCURACY OF 2 ARC-MIN, PROVIDED DATA REFLECTING THE SOLAR INPUT AND DATA INDICATING ATMOSPHERIC ATTENUATION.

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

EXPERIMENT NAME- MAGNETIC ION-MASS SPECTROMETER

NSSDC ID- 73-101A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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 (AMU). 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 AMU. IONOSPHERIC IONS WERE ACCELERATED INTO THE ANALYZER SYSTEM BY A NEGATIVE VOLTAGE THAT WILL VARY FROM -1060 TO -225 V. THE THREE MASS RANGES MEASURED SIMULTANEOUSLY WERE 1 TO 4, 4 TO 16, AND 16 TO 64 AMU. 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 SEC. OTHER MODES OF OPERATION WERE POSSIBLE. IN THE ANALOG SHORT MODE, THE THREE MASS RANGES WERE SWEPT IN 3 SEC, ALTERNATING WITH 1-SEC 'PEAKS' MODE SCANS. AN 8-SEC SWEEP TIME WAS REQUIRED IN THE ANALOG LONG MODE, AGAIN ALTERNATING WITH 1-SEC 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", VOL. 8, NO. 4, PP. 315-322, (APRIL 1973).

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

EXPERIMENT NAME- LOW-ENERGY ELECTRONS

NSSDC ID- 73-101A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.A. HOFFMAN .....NASA-GSFC
GREENBELT, MD
OI - D.S. EVANS .....NOAA-EPL
BOULDER, CO
OI - J.L. BURCH .....NASA-MSFC
HUNTSVILLE, AL

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WERE TO STUDY (1) THE ENERGY INPUT TO THE THERMOSPHERE, (2) THE CHARACTERISTICS OF FIELD-ALIGNED CURRENTS IN THE TRANS-AURORAL ZONE, AND (3) THE MAGNETOSPHERIC SUBSTORM PRECIPITATION. THE INSTRUMENT, WHICH MEASURED ELECTRONS IN THE ENERGY RANGE 0.2 TO 25 KEV, CONSISTED OF DETECTORS, EACH CONSISTING OF AN ELECTROSTATIC ANALYZER AND A CHANNEL ELECTRON MULTIPLIER. THERE WERE TWO MODES OF OPERATION, THE MONITOR MODE AND THE DATA MODE. IN THE MONITOR MODE, THERE WERE GOOD ENERGY RESOLUTION, MODERATE TEMPORAL RESOLUTION, AND REDUCED PITCH ANGLE MEASUREMENTS. THE DATA ACQUISITION IN THIS MODE WAS SIMULTANEOUS WITH THE PRIMARY AERONOMICAL AND IONOSPHERIC EXPERIMENTS WHEN THE SATELLITE WAS EITHER IN THE SPINNING OR DESPUN MODES. THE DATA MODE PROVIDED SUFFICIENT ENERGY, PITCH ANGLE, AND TEMPORAL RESOLUTION TO COMPLETELY CHARACTERIZE THE ELECTRON RADIATION ENCOUNTERED IN THE AURORAL AND TRANS-AURORAL REGIONS. DATA ACQUISITION OCCURRED ON A LOW-DUTY CYCLE DURING TIMES WHEN THE HEAVY EXPERIMENT POWER LOAD WAS OFF, ESPECIALLY IN THE DESPIN MODE TO ALLOW MEASUREMENT OF THE PITCH ANGLE. DURING SOME APOGEE PERIODS IN THE DESPIN MODE THE DETECTORS LOOKED DOWN TOWARD THE EARTH ALONG FIELD LINES.

------- AE-C, NIER ----------

EXPERIMENT NAME- OPEN SOURCE NEUTRAL MASS SPECTROMETER

NSSDC ID- 73-101A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - A.O.C.NIER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - F.J. HEYDEN .....MANILA OBS
THE PHILLIPINES
OI - K. MAUERSBERGER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - W.E. POTTER .....U OF MINNESOTA
MINNEAPOLIS, MN

EXPERIMENT 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 CONCENTRATIONS OF BOTH THE MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASSES IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (AMU). A DOUBLE-FOCUSING MATTAUCH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WAS USED. TWO ION COLLECTORS WERE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF EIGHT, I.E., THE TWO MASS RANGES COVERED WILL BE 1 TO 8 AMU AND 7 TO 48 AMU. AN OPEN ION SOURCE WAS USED TO MINIMIZE THE LOSS OF REACTIVE SPECIES SUCH AS ATOMIC OXYGEN. NORMALLY, A 100-MICROAMP BEAM OF 75-EV ELECTRONS WAS USED FOR PRODUCING THE IONS. IN VIEW OF THE OVERALL GEOMETRY OF THIS INSTRUMENT, FOR MOLECULAR NITROGEN GAS, APPROXIMATELY 10 TO THE -5 AMP OF RESOLVED MASS -28 IONS APPEARED AT THE COLLECTOR WHEN THE PRESSURE IN THE SOURCE WAS EQUAL TO 1 TORR (1.33 MB). ON COMMAND, THE ELECTRON ACCELERATING VOLTAGE WAS REDUCED TO 25 EV. ELECTRON MULTIPLIERS IN THE COUNTING MODE WERE USED AS DETECTORS FOR BOTH HIGH- AND LOW-MASS ION COLLECTORS. A 50 PERCENT TRANSMISSION GRID, MOUNTED BETWEEN THE HIGH-MASS COLLECTOR SLIT AND ITS MULTIPLIER DETECTOR, INTERCEPTED HALF THE BEAM. THIS GRID WAS CONNECTED TO AN ELECTROMETER AMPLIFIER, AND THEREFORE, THE DYNAMIC RANGE OF THE MEASUREMENTS WAS EXTENDED BY ALLOWING SENSIBLE READOUTS AT ION CURRENT MAGNITUDES TOO LARGE FOR THE ELECTRON MULTIPLIER OPERATION. PLANNED OVERLAP IN THE RANGES OF THE TWO MEASURING TECHNIQUES PERMITTED A CHECK OF THE GAIN CHARACTERISTICS OF THE MULTIPLIER TO BE MADE. SEVERAL MEASUREMENT MODES WERE POSSIBLE AND WERE SELECTED BY GROUND COMMAND. USUALLY THE MASS SPECTROMETER WAS STEPPED FROM ONE MASS OF INTEREST TO ANOTHER UNDER THE CONTROL OF A 32-STEP READ-ONLY MEMORY DEVICE. THERE WERE EIGHT OF THESE 32-STEP PROGRAMS WHICH FELL INTO THE FOLLOWING FOUR CATEGORIES -- (1) NORMAL PROGRAMS THAT CONCENTRATE ON THE PEAKS OF GREATEST ABUNDANCES, SUCH AS MOLECULAR AND ATOMIC OXYGEN, MOLECULAR NITROGEN, HELIUM, AND ARGON, (2) MINOR CONSTITUENT PROGRAMS THAT OMIT MEASUREMENTS OF THE DOMINANT SPECIES TO PERMIT THE ELECTRON MULTIPLIER TO OPERATE AT LOWER ALTITUDES THAN OTHERWISE POSSIBLE, (3) A LOW MASS PROGRAM THAT CONCENTRATES ON MASSES FROM 1 TO 5 AMU, AND (4) A NITROGEN OXIDE PROGRAM THAT MEASURES THIS MASS -30 CONSTITUENT NEARLY CONTINUOUSLY. IN ADDITION, AN OPTION WAS AVAILABLE TO COMMAND THE SPECTROMETER TO SCAN THE MASS RANGE IN 0.25-AMU STEPS. THE RANGE OF OPERATION FOR THE ELECTROMETER WAS APPROXIMATELY 2.5 BY 10 TO THE -14 TO 4.8 BY 10 TO THE -9 AMP AND FOR THE MULTIPLIER THE UPPER LIMIT WAS 3 BY 10 TO THE +6 COUNTS/SEC. MORE EXPERIMENT DETAILS CAN BE FOUND IN "THE OPEN SOURCE NEUTRAL-MASS SPECTROMETER ON ATMOSPHERE EXPLORER-C, -D, AND -E," A. O. NIER ET AL., RADIO SCIENCE, VOL. 8, NO. 4, PP. 271 (1973).

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

EXPERIMENT NAME- COLD CATHODE ION GAUGE

NSSDC ID- 73-101A-15

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.J. RICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT 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 1.3 E-3 TO 1.3 E-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 1000 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 1.3 E-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 ----------

EXPERIMENT NAME- CAPACITANCE MANOMETER

NSSDC ID- 73-101A-16

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.J. PICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT BRIEF DESCRIPTION

THE CAPACITANCE MANOMETER TO BE FLOWN ON AE-C 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 ----------

EXPERIMENT NAME- NEUTRAL GAS TEMPERATURE AND
CONCENTRATION

NSSDC ID- 73-101A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/16/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI

EXPERIMENT 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 SEC. 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, VOL. 8, NO. 4, PP. 287-296 (1973).

********** AE-D **********

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

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- MARCH 75 SPACECRAFT WEIGHT- 453.6 KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 129. MIN INCLINATION- 98. DEG
PERIAPSIS- 150.000 KM ALT APOAPSIS- 4000.00 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - D.W. GRIMES .....NASA-GSFC
GREENBELT, MD
PS - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
MG - F.W. GAETANO .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

ONE OBJECTIVE OF AE-D WILL BE TO INVESTIGATE THE CHEMICAL PROCESSES AND ENERGY TRANSFER MECHANISMS THAT CONTROL THE STRUCTURE AND BEHAVIOR OF THE EARTH'S ATMOSPHERE AND IONOSPHERE THROUGH THE REGION OF HIGH SOLAR ENERGY ABSORPTION. MEASUREMENTS WILL BE ORIENTED PRIMARILY TO THE LARGELY UNEXPLORED LOW-ALTITUDE REGION BETWEEN 120 AND 300 KM. HOWEVER, PROPERTIES ABOVE 300 KM WILL ALSO BE EXTENSIVELY INVESTIGATED. THE EXPERIMENT PAYLOAD WILL INCLUDE INSTRUMENTATION FOR THE MEASUREMENT OF SOLAR EUV RADIATION, NEUTRAL PARTICLE COMPOSITION AND TEMPERATURE, ATMOSPHERIC DENSITY, ION COMPOSITION AND TEMPERATURE, ELECTRON CONCENTRATION AND TEMPERATURE, ATMOSPHERIC EMISSIONS, PARTICLE FLUXES, IONOSPHERE CURRENTS, AND THE PHOTOELECTRON ENERGY SPECTRUM. THE SATELLITE WILL BE A SHORT (1 M) CYLINDRICAL PRISM WITH A DIAMETER OF APPROXIMATELY 1.4 M, IN THE SPIN-STABILIZED MODE, THE SPACECRAFT'S SPIN AXIS WILL BE PERPENDICULAR TO THE ORBIT PLANE. POWER WILL BE SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT WILL USE A PCM TELEMETRY SYSTEM THAT CAN OPERATE IN A REAL-TIME OR TAPE RECORDER MODE. AN ONBOARD PROPULSION SYSTEM WILL BE USED FOR MAKING ALTITUDE CHANGES. THE SPACECRAFT IS EXPECTED TO HAVE A 1-YR LIFETIME. MORE DETAILS CAN BE FOUND ON PP. 263-269 OF "RADIO SCIENCE", VOL. 8, NO. 4, APRIL, 1973.

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

EXPERIMENT NAME- ULTRAVIOLET NITRIC-OXIDE EXPERIMENT

NSSDC ID- AE-D -11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.A. BARTH .....U OF COLORADO
BOULDER, CO
OI - D.W. RUSCH .....U OF COLORADO
BOULDER, CO
OI - A.I. STEWART .....U OF COLORADO
BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION

THIS ULTRAVIOLET NITRIC-OXIDE EXPERIMENT (UVNO) CONSISTS OF A TWO-CHANNEL FIXED-GRATING EBERT SPECTROMETER WHICH WILL MEASURE THE AIRGLOW IN THE (1, 0) GAMMA BAND IN A 12-A REGION CENTERED AT 2150 A. THE OBSERVED INTENSITY IS PRODUCED BY RESONANCE FLUORESCENCE BY SUNLIGHT OF THE NITRIC-OXIDE MOLECULES IN THE INSTRUMENT'S FIELD OF VIEW. THE INTENSITY PROFILES OBTAINED WILL YIELD ALTITUDE PROFILES OF NITRIC-OXIDE DENSITY AS A FUNCTION OF TIME AND LOCATION. PROFILES WILL BE MEASURED ALONG THE TRACK OF THE SATELLITE AT ALL TIMES WHEN IT

IS ON THE SUNLIT SIDE OF THE EARTH. THE REMOTE SENSING CHARACTER OF THE UVNO EXPERIMENT PERMITS MEASUREMENTS OF NITRIC-OXIDE TO BE MADE AT ALTITUDES BOTH ABOVE AND BELOW SATELLITE PERIGEE. AS THE SPACECRAFT SPINS, THE SPECTROMETER, WHICH WILL LOOK OUTWARD THROUGH THE RIM OF THE SATELLITE, WILL REPEATEDLY HAVE ITS FIELD OF VIEW CARRIED DOWN THROUGH THE ATMOSPHERE ONTO THE EARTH'S LIMB, AND ALTITUDE PROFILES OF THE EMITTED AIRGLOW INTENSITY WILL BE OBTAINED. BELOW SOME ALTITUDE THE MEASURED SIGNAL AT 2150 A WILL BE CONTAMINATED BY RAYLEIGH SCATTERED SUNLIGHT. TO CORRECT FOR THIS CONTAMINATION, A SECOND CHANNEL WILL MEASURE ONLY SCATTERED LIGHT INTENSITY IN A 12-A REGION CENTERED AT 2190 A. THE TWO CHANNELS WILL BE OPTICALLY AND ELECTRICALLY INDEPENDENT. NITRIC-OXIDE AIRGLOW INTENSITY WILL BE DETERMINED BY TAKING THE DIFFERENCE BETWEEN THESE TWO MEASUREMENTS. FROM THE CORRECTED SIGNAL, NITRIC-OXIDE DENSITY PROFILES WILL BE OBTAINED BETWEEN APPROXIMATELY 80 KM AND 250 KM. THE SENSOR'S SPHERICAL FUSED QUARTZ TELESCOPE MIRROR WILL HAVE A 125-MM FOCAL LENGTH, AND WILL FOCUS INCIDENT LIGHT ON THE ENTRANCE SLIT OF THE SPECTROMETER. FROM THIS SLIT THE LIGHT WILL STRIKE ONE-HALF OF THE EBERT MIRROR AND WILL BE COLLIMATED ONTO THE GRATING. THE 3600-LINES-PER-MM GRATING WILL RETURN THE LIGHT COLLIMATED TO THE OTHER HALF OF THE EBERT MIRROR, AND FOCUS IT ON TWO EXIT SLITS. THE SPECTROMETER FIELD OF VIEW WILL BE ZERO DEG FIFTEEN MIN BY FOUR DEG THIRTY NINE MIN. IN NORMAL OPERATION EACH CHANNEL WILL BE INTEGRATED FOR 20.8 MSEC AND READ OUT ALTERNATELY AT 10.4-MSEC INTERVALS. THE INSTRUMENT WILL HAVE LINEAR RESPONSE CHARACTERISTICS, AND THE OBSERVATION OF A 1-KILORAYLEIGH EMISSION RATE WILL PRODUCE, ON THE AVERAGE, 100 COUNTS PER INTEGRATION PERIOD IN THE 2150-A CHANNEL AND 60 COUNTS IN THE 2190-A CHANNEL. THE CAPABILITY WILL EXIST TO INHIBIT OPERATION OF THE 2190-A CHANNEL. WHEN THIS IS DONE, THE INTEGRATION TIME OF THE 2150-A CHANNEL IS HALVED AND THE ALTITUDE RESOLUTION OF THE NITRIC-OXIDE MEASUREMENT IS DOUBLED. THIS CAPABILITY WOULD BE USED WHEN IT IS DESIRED TO MEASURE THE NITRIC-OXIDE PROFILE WELL ABOVE THE RAYLEIGH SCATTERING LAYER IN THE ATMOSPHERE. THE DARK CURRENT CORRESPONDS TO ONE TO THREE COUNTS PER INTEGRATION PERIOD AND WILL NOT SIGNIFICANTLY AFFECT EXPERIMENT ACCURACY. THE INSTRUMENT WILL BE PROTECTED AGAINST CONTAMINATION FROM INTERNAL SCATTERING OF OFF-AXIS UNDISPERSED LIGHT. THE CONTAMINATION IS NOT EXPECTED TO BE MUCH GREATER THAN 10 PERCENT OF THE AIRGLOW SIGNAL, AND IT CAN BE ACCURATELY SUBTRACTED OUT AFTER FLIGHT DATA FROM NEAR APOGEE HAS BEEN USED TO MEASURE THE INSTRUMENT'S SCATTERING FUNCTION. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE UV NITRIC-OXIDE EXPERIMENT FOR THE ATMOSPHERE EXPLORER,' C. A. BARTH, ET AL, RADIO SCIENCE, VOL. 8, NO. 4, PP. 379 (1973).

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

EXPERIMENT NAME- ELECTRON TEMPERATURE AND CONCENTRATION

NSSDC ID- AE-D -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD
OI - R.F. THEIS .....NASA-GSFC
GREENBELT, MD
OI - A. DALGARNO .....HARVARD U
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE CYLINDRICAL ELECTROSTATIC PROBE WILL BE A RETARDING POTENTIAL (LANGMUIR TYPE) PROBE THAT WILL MEASURE THE CURRENT FLOWING TO THE COLLECTOR FOR A KNOWN SAWTOOTH VOLTAGE PATTERN TO BE APPLIED. FROM THIS RETARDING POTENTIAL (CURRENT VS VOLTAGE) CURVE, ELECTRON DENSITY AND ELECTRON TEMPERATURE WILL BE DERIVED. THIS PROBE WILL CONSIST OF A COLLECTOR ELECTRODE EXTENDING ALONG THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE GUARD RING WILL EXTEND 23 CM FROM THE SPACECRAFT, AND THE ELECTRODE WILL EXTEND ANOTHER 10 CM FURTHER FROM THE END OF THE GUARD RING. TWO IDENTICAL PROBES WILL BE MOUNTED PARALLEL TO THE SPACECRAFT SPIN AXIS (SPIN AXIS WILL BE PERPENDICULAR TO THE ORBIT PLANE), AND A THIRD PROBE WILL BE MOUNTED PERPENDICULAR TO THE SPIN AXIS. IN ADDITION TO ONBOARD ANALYSES OF THE RETARDING POTENTIAL CURVES, WHICH PROVIDE TEMPERATURES AND DENSITIES, THESE CURVES WILL BE TELEMETERED.

------- AE-D, CHAMPION ----------

EXPERIMENT NAME- ATMOSPHERIC DRAG

NSSDC ID- AE-D -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.S.W.CHAMPION .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - F.A. MARCOS .....USAF CAMBRIDGE RES LAB
BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERIC DENSITY ACCELEROMETER EXPERIMENT WILL OBTAIN DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE 120 TO 400 KM BY THE MEASUREMENT OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE EXPERIMENT WILL CONSIST OF THREE SINGLE-AXIS ACCELEROMETERS, TWO OF THE UNITS WILL LIE IN THE SPACECRAFT X-Y PLANE, AND THE THIRD WILL BE ALIGNED WITH THE Z AXIS. EACH INSTRUMENT WILL MEASURE THE ELECTROSTATIC FORCE REQUIRED TO RESTRAIN A HOLLOW CYLINDRICAL MASS UNDER EXTERNAL ACCELERATION. THE DYNAMIC RANGE OF EACH UNIT WILL BE 10 TO THE -6 TO 10 TO THE -12 GRAMS.

------- AE-D, DOERING ----------

EXPERIMENT NAME- PHOTOELECTRON SPECTROMETER

NSSDC ID- AE-D -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.P. DOERING .....JOHNS HOPKINS U
BALTIMORE, MD
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - J.C. ARMSTRONG .....APPLIED PHYSICS LAB
SILVER SPRING, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE THE INTENSITY AND ENERGY DISTRIBUTION OF THE PHOTOELECTRON FLUX IN THE THERMOSPHERE IN THE RANGE 2 TO 500 EV. THE INSTRUMENTATION WILL CONSIST OF TWO OPPOSITELY DIRECTED HEMISPHERICAL-ELECTROSTATIC DEFLECTORS COUPLED TO SEPARATE ELECTRON MULTIPLIER DETECTORS. THE PHOTOELECTRON ENERGY SPECTRUM WILL BE SCANNED BY 1-SEC SWEEPS OF THE VOLTAGE BETWEEN THE TWO HEMISPHERICAL DEFLECTION ELEMENTS OF EACH DEFLECTOR.

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

EXPERIMENT NAME- ION TEMPERATURE

NSSDC ID- AE-D -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.B. HANSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - D.R. ZUCCARO .....U OF TEXAS, DALLAS
DALLAS, TX
OI - S. SANTINI .....U OF TEXAS, DALLAS
DALLAS, TX
OI - C.P. LIPPENCOTT .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT BRIEF DESCRIPTION
THE PLANAR ION TRAP, A RETARDING POTENTIAL TYPE OF INSTRUMENT, WILL MEASURE CURRENT FLOWING TO A COLLECTOR FOR A KNOWN LINEAR VOLTAGE SWEEP TO BE APPLIED TO THE COLLECTOR. THE ION TEMPERATURE, ION DENSITY, COMPOSITION, SUPRATHERMAL ELECTRON FLUXES, AND SUPRATHERMAL ELECTRON TEMPERATURES WILL BE DETERMINED FROM THIS RETARDING POTENTIAL CURVE AND FROM KNOWLEDGE OF THE VOLTAGE ON SUPPRESSOR GRIDS BETWEEN THE INSTRUMENT APERTURE AND THE COLLECTOR. THE EXPERIMENT WILL OPERATE IN ONE MODE WHILE THE SPACECRAFT IS SPINNING AND IN A SECOND MODE WHEN THE SPACECRAFT IS NOT SPINNING. A COMPLETE VOLTAGE SWEEP (BOTH DOWN AND UP -- +23 TO 0 TO +23 V) COULD BE ACCOMPLISHED IN THREE SEC IN THE NONSPINNING MODE. AN ADDITIONAL 3-SEC 'DUCT' MODE WILL OPERATE TO PROVIDE MEASUREMENTS FROM WHICH FRACTIONAL ION CONCENTRATION CHANGES AS SMALL AS 0.001 IONS/CC PER 130 M ALONG TRACK TRAVEL COULD BE MADE.

------- AE-D, HAYS ----------

EXPERIMENT NAME- AIRGLOW PHOTOMETER

NSSDC ID- AE-D -13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - P.B. HAYS .....U OF MICHIGAN
ANN ARBOR, MI
OI - G.G. SHEPHERD .....YORK U
TORONTO, ONTARIO, CANADA
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - J.C.G.WALKER .....YALE U
NEW HAVEN, CT

EXPERIMENT BRIEF DESCRIPTION

THE VISIBLE AIRGLOW EXPERIMENT WILL PROVIDE VOLUME EMISSION RATES FOR SEVERAL DAYGLOW, NIGHTGLOW, AND AURORAL OPTICAL EMISSION FEATURES. A PHOTOMETER CONTAINING TWO SEPARATE OPTICAL CHANNELS WILL BE USED. SPECTRAL SELECTION WILL BE ACCOMPLISHED WITH A COMMON FILTER WHEEL THAT WILL CONTAIN SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. ANY ONE OF EIGHT POSSIBLE COMBINATIONS OF FILTERS CAN BE SELECTED FOR THE TWO CHANNELS THAT ARE SEPARATED IN ANGLE BY 90 DEG. ONE CHANNEL WILL HAVE A LARGE FIELD OF VIEW (3 DEG HALF-ANGLE) FOR HIGH SENSITIVITY, NORMALLY POINTING TOWARD THE LOCAL ZENITH, AND THE SECOND CHANNEL WILL HAVE 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 IS IN THE DESPUN MODE. BOTH CHANNELS WILL BE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING DAYTIME BY MULTISTAGE BAFFLE SYSTEMS. PHOTONS THAT HAVE BEEN SPECTRALLY AND SPATIALLY SELECTED WILL BE SENSED BY A PULSE-COUNTING PHOTOMULTIPLIER SYSTEM CAPABLE OF COUNTING AT A RATE OF 5 TIMES 10 TO THE 6 COUNTS/SEC. THE FILTERS CAN BE OPERATED IN SEVERAL MODES, E.G., FIXED FILTER AND AUTOMATIC FILTER CHANGES, CAN BE SYNCHRONIZED EITHER TO SATELLITE ORIENTATION OR TO A FIXED-TIME BASE. BASIC DATA ANALYSIS WILL YIELD VOLUME EMISSION RATE ALONG THE SATELLITE TRACK, AND THE NARROW CHANNEL WILL PROVIDE DATA TO OBTAIN VOLUME EMISSION RATES VS ALTITUDE THROUGHOUT THE ENTIRE PERIGEE REGION. MORE EXPERIMENT DETAILS CAN BE FOUND IN "THE VISIBLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER," P. B. HAYS, ET. AL., "RADIO SCIENCE," VOL. 8, NO. 4, PP. 369 (1973).

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

EXPERIMENT NAME- SOLAR EUV SPECTROPHOTOMETER

NSSDC ID- AE-D -06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES, PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.E. HINTEREGGER .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - D.E. BEDO .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - L.A. HALL .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - C.W. CHAGNON .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - J.E. MANSON .....USAF CAMBRIDGE RES LAB
BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION

SIX GRAZING-INCIDENCE GRATING MONOCHROMATORS, WHICH WILL COMPRISE THE EUV SPECTROPHOTOMETER, WILL PROVIDE MEASUREMENTS OF THE SOLAR EUV FLUX IN THE 170- TO 1700-A RANGE. THIS INSTRUMENT WILL HAVE MODERATE SPECTRAL RESOLUTION (2 A AT 300 A) AND WILL BE CAPABLE OF SCANNING THE ENTIRE RANGE OR SELECTING SIX NARROW BANDS FOR CONTINUOUS HIGH TIME RESOLUTION MONITORING. THE INSTRUMENT, WHICH WILL BE POINTED TOWARDS THE SUN WITH AN ACCURACY OF 2 ARC-MIN, WILL PROVIDE DATA REFLECTING THE SOLAR INPUT AND DATA INDICATING ATMOSPHERIC ATTENUATION.

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

EXPERIMENT NAME- ION COMPOSITION AND CONCENTRATION

NSSDC ID- AE-D -10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES, PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION

A MAGNETIC ION MASS SPECTROMETER WILL BE FLOWN TO MEASURE IN SITU THE CONCENTRATIONS OF THE AMBIENT ION SPECIES IN THE MASS RANGE FROM 1 TO 90 ATOMIC MASS UNITS (AMU). MOUNTED ON THE SATELLITE EQUATOR NORMAL TO THE SPIN AXIS, THE ENTRANCE APERTURE WILL FACE FORWARD WHEN THE SPACECRAFT IS IN THE DESPUN MODE. THE ELECTRIC AND MAGNETIC FIELDS WILL BE ARRANGED TO PRODUCE A MASS SPECTRUM ALONG THE FOCAL PLANE FOLLOWING THE MAGNETIC ANALYZER. THREE SLITS WILL BE PLACED ALONG THE FOCAL PLANE IN APPROPRIATE PLACES TO SIMULTANEOUSLY COLLECT IONS IN THE MASS RATIOS 1-4-16 AMU. IONOSPHERIC IONS WILL BE ACCELERATED INTO THE ANALYZER SYSTEM BY A NEGATIVE VOLTAGE THAT WILL VARY FROM -1060 TO -225 V. THE THREE MASS RANGES MEASURED SIMULTANEOUSLY WILL BE 1 TO 4, 4 TO 16, AND 16 TO 64 AMU. FOLLOWING EACH SLIT WILL BE 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 WILL DETERMINE THE AMPLITUDE OF EACH PEAK IN THE SPECTRUM. ONLY THE AMPLITUDE OF EACH PEAK WILL BE TELEMETERED IN THE PRIMARY PEAKS MODE, AND IN THIS MODE THE TIME REQUIRED TO SIMULTANEOUSLY SWEEP ALL THREE MASS RANGES WILL BE 1 SEC. OTHER MODES OF OPERATION WILL BE POSSIBLE. IN THE ANALOG SHORT MODE, THE THREE MASS RANGES WILL BE SWEPT IN 3 SEC, ALTERNATING WITH 1-SEC "PEAKS" MODE SCANS. AN 8-SEC SWEEP TIME WILL BE REQUIRED IN THE ANALOG LONG MODE, AGAIN ALTERNATING WITH 1-SEC PEAKS MODE SCAN. AN OPTION WILL EXIST IN THE LOCKED MODE TO CONTINUOUSLY MEASURE ANY SET OF MASS NUMBERS IN THE RATIO 1-4-16 TO GIVE HIGH SPATIAL RESOLUTION. THIS MODE, WHICH WILL ALSO INCLUDE AN OCCASIONAL 1-SEC SWEEP OF THE MASS SPECTRUM IN THE PEAKS MODE, WILL BE MOST USEFUL IN THE DESPUN SATELLITE ORIENTATION. MORE EXPERIMENT DETAIL CAN BE FOUND IN "THE MAGNETIC ION-MASS SPECTROMETER ON ATMOSPHERE EXPLORER," J. H. HOFFMAN, ET AL, RADIO SCIENCE, VOL. 8, NO. 4, PP.315-322, (APRIL 1973).

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

EXPERIMENT NAME- LOW-ENERGY ELECTRONS

NSSDC ID- AE-D -12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.A. HOFFMAN .....NASA-GSFC
GREENBELT, MD
OI - D.S. EVANS .....NOAA-ERL
BOULDER, CO
OI - J.L. BURCH .....NASA-MSFC
HUNTSVILLE, AL

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WILL BE TO STUDY (1) THE ENERGY INPUT TO THE THERMOSPHERE FROM ELECTRONS IN THE ENERGY RANGE 0.2 TO 25 KEV, (2) THE CHARACTERISTICS OF FIELD-ALIGNED CURRENTS IN THE TRANS-AURORAL ZONE, AND (3) THE MAGNETOSPHERIC SUBSTORM PRECIPITATION. THE INSTRUMENT WILL CONSIST OF 19 DETECTORS, EACH CONSISTING OF AN ELECTROSTATIC ANALYZER AND A CHANNEL ELECTRON MULTIPLIER. THERE WILL BE TWO MODES OF OPERATION, THE MONITOR MODE AND THE DATA MODE. IN THE MONITOR MODE, THERE WILL BE GOOD ENERGY RESOLUTION, MODERATE TEMPORAL RESOLUTION, AND REDUCED PITCH ANGLE MEASUREMENTS. THE DATA ACQUISITION WILL BE SIMULTANEOUS WITH THE PRIMARY AERONOMICAL AND IONOSPHERIC EXPERIMENTS WHEN THE SATELLITE IS EITHER IN THE SPINNING OR DESPUN MODES. THE DATA MODE WILL PROVIDE SUFFICIENT ENERGY, PITCH ANGLE, AND TEMPORAL RESOLUTION TO COMPLETELY CHARACTERIZE THE ELECTRON RADIATION ENCOUNTERED IN THE AURORAL AND TRANS-AURORAL REGIONS. DATA ACQUISITION WILL OCCUR ON A LOW-DUTY CYCLE DURING TIMES WHEN THE HEAVY EXPERIMENT POWER LOAD IS OFF, ESPECIALLY IN THE DESPIN MODE TO ALLOW MEASUREMENT OF THE PITCH ANGLE. DURING SOME APOGEE PERIODS IN THE DESPIN MODE, THE DETECTORS WILL LOOK TOWARD THE EARTH ALONG FIELD LINES.

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

EXPERIMENT NAME- OPEN SOURCE NEUTRAL MASS SPECTROMETER

NSSDC ID- AE-D -07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES, PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - A.O.C.NIER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - W.E. POTTER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - K. MAUERSBERGER .....U OF MINNESOTA
MINNEAPOLIS, MN

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WILL BE 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 CONCENTRATIONS OF BOTH THE MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASSES IN THE RANGE FROM 1 TO 48 ATOMIC MASS UNITS (AMU). A DOUBLE-FOCUSING MATTAUCH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WILL BE USED. TWO ION COLLECTORS WILL BE INCLUDED TO MEASURE IONS DIFFERING IN MASS BY A FACTOR OF EIGHT, I.E., THE TWO MASS RANGES COVERED WILL BE 1 TO 8 AMU AND 7 TO 48 AMU. AN OPEN ION SOURCE WILL BE USED TO MINIMIZE THE LOSS OF REACTIVE SPECIES SUCH AS ATOMIC OXYGEN. NORMALLY, A 100-MICROAMP BEAM OF 75-EV ELECTRONS WILL BE USED FOR PRODUCING THE IONS. IN VIEW OF THE OVERALL GEOMETRY OF THIS INSTRUMENT, FOR MOLECULAR NITROGEN GAS, APPROXIMATELY 10 TO THE -5 AMP OF RESOLVED MASS -28 IONS WILL APPEAR AT THE COLLECTOR WHEN THE PRESSURE IN THE SOURCE IS EQUAL TO 1 TORR (1.33 MB). ON COMMAND, THE ELECTRON ACCELERATING VOLTAGE CAN BE REDUCED TO 25 EV. AT THIS LOWER ENERGY, THERE SHOULD NOT BE ANY DISSOCIATION OF MOLECULAR

NITROGEN, AND THEREFORE, IT WILL BE POSSIBLE TO MEASURE ATMOSPHERIC ATOMIC NITROGEN. ELECTRON MULTIPLIERS IN THE COUNTING MODE WILL BE USED AS DETECTORS FOR BOTH HIGH AND LOW-MASS ION COLLECTORS. A 50-PERCENT TRANSMISSION GRID, MOUNTED BETWEEN THE HIGH-MASS COLLECTOR SLIT AND ITS MULTIPLIER DETECTOR, WILL INTERCEPT HALF THE BEAM. THIS GRID WILL BE CONNECTED TO AN ELECTROMETER AMPLIFIER, AND THEREFORE, THE DYNAMIC RANGE OF THE MEASUREMENTS WILL BE EXTENDED BY ALLOWING SENSIBLE READOUTS AT ION CURRENT MAGNITUDES TOO LARGE FOR THE ELECTRON MULTIPLIER OPERATION. PLANNED OVERLAP IN THE RANGES OF THE TWO MEASURING TECHNIQUES WILL PERMIT A CHECK OF THE GAIN CHARACTERISTICS OF THE MULTIPLIER TO BE MADE. SEVERAL MEASUREMENT MODES WILL BE AVAILABLE AND WILL BE SELECTED BY GROUND COMMAND DURING FLIGHT. USUALLY THE MASS SPECTROMETER WILL BE STEPPED FROM ONE MASS OF INTEREST TO ANOTHER UNDER THE CONTROL OF A 32-STEP READ-ONLY MEMORY DEVICE. EIGHT OF THESE 32-STEP PROGRAMS FALL INTO THE FOLLOWING FOUR CATEGORIES -- (1) NORMAL PROGRAMS THAT CONCENTRATE ON THE PEAKS OF GREATEST ABUNDANCES, SUCH AS MOLECULAR AND ATOMIC OXYGEN, MOLECULAR NITROGEN, HELIUM, AND ARGON. (2) MINOR CONSTITUENT PROGRAMS THAT OMIT MEASUREMENTS OF THE DOMINANT SPECIES TO PERMIT THE ELECTRON MULTIPLIER TO OPERATE AT LOWER ALTITUDES THAN OTHERWISE POSSIBLE. (3) A LOW-MASS PROGRAM THAT CONCENTRATES ON MASSES FROM 1 TO 5 AMU, AND (4) A NITROGEN OXIDE PROGRAM THAT MEASURES THIS MASS -30 CONSTITUENT NEARLY CONTINUOUSLY. IN ADDITION, AN OPTION WILL BE AVAILABLE TO COMMAND THE SPECTROMETER TO SCAN THE MASS RANGE IN 0.25-AMU STEPS. ABUNDANT CONSTITUENTS WILL BE MEASURED APPROXIMATELY ONCE EACH HALF-SEC, CORRESPONDING TO A SPATIAL RESOLUTION OF ABOUT 5 KM ALONG THE SATELLITE TRACK. THE RANGE OF OPERATION FOR THE ELECTROMETER WILL BE APPROXIMATELY 2.5 BY 10 TO THE -14 TO 4.8 BY 10 TO THE -9 AMP, AND FOR THE MULTIPLIER THE UPPER LIMIT WILL BE 3 BY 10 TO THE +6 COUNTS/SEC. MORE EXPERIMENT DETAILS CAN BE FOUND IN "THE OPEN SOURCE NEUTRAL-MASS SPECTROMETER ON ATMOSPHERE EXPLORER-C, -D, AND -E," A. O. NIER ET AL, RADIO SCIENCE, VOL. 8, NO. 4, PP.271 (1973).

------- AE-D, PELZ ----------

EXPERIMENT NAME- CLOSED SOURCE NEUTRAL MASS SPECTROMETER

NSSDC ID- AE-D -08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.T. PELZ .....NASA-GSFC
GREENBELT, MD
OI - C.A. REBER .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - A.E. HEDIN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE 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 MAY BE OBTAINED FROM COMPARISONS OF THESE MEASUREMENTS WITH THOSE OBTAINED FROM OTHER ONBOARD EXPERIMENTS, NAMELY -- OPEN SOURCE SPECTROMETER (AE-D -07), SOLAR EUV SPECTROPHOTOMETER (AE-D -06), AND DENSITY-ACCELEROMETER (AE-D -02). THE MASS-SPECTROMETER SENSOR WILL INCLUDE A GOLD-PLATED STAINLESS STEEL THERMALIZING CHAMBER AND ION SOURCE, A HYPERBOLIC ROD QUADRUPOLE ANALYZER, AND AN OFF-AXIS ELECTRON MULTIPLIER. APPROXIMATE UPPER ALTITUDE LIMITS OF MEASUREMENT, DETERMINED PRIMARILY BY GAS/SURFACE INTERACTIONS AND INSTRUMENT SENSITIVITY LIMITATIONS, WILL BE -- 250 KM FOR MOLECULAR OXYGEN, 300 KM FOR ARGON, 550 KM FOR MOLECULAR NITROGEN, 700 KM FOR ATOMIC OXYGEN, AND 1000 KM FOR HELIUM. FIVE DIFFERENT SEQUENCES OF MASS SELECTION WILL BE AVAILABLE AND, EXPRESSED IN ATOMIC MASS UNITS (AMU), WILL BE -- (A) GEOPHYSICAL - 1, 2, 4, TOTAL, 16, 28, 32, SELECTED, 40, (B) ANALYTICAL - 12, 14, 18, 20, 22, 30, 44, CALIBRATE, ZERO, (C) INDIVIDUAL - SELECTED, SELECTED, SELECTED, . . . (ANY MASS 1 TO 44), (D) SWEEP DIGITAL - 1, 2, 3, 4, 5, . . . 45 (IN 3/16-AMU STEPS), (E) SWEEP ANALOG 2, 3, 4, 5, 45 (CONTINUOUS). THE FIVE OPERATIONAL FORMATS USED CAN BE SELECTED BY GROUND COMMAND, AND EACH ONE WILL CONTAIN A DIFFERENT COMBINATION OF THE FIVE MASS SELECTION SEQUENCES LISTED ABOVE. WHEN OPERATING IN THE "NORMAL" FORMAT, THE ANALYZER WILL MEASURE ALL MASSES IN THE RANGE 1 TO 44 WITH EMPHASIS ON HYDROGEN, HELIUM, OXYGEN, NITROGEN, AND ARGON. ANOTHER FORMAT WILL BE OPTIMIZED FOR MINOR CONSTITUENT STUDIES OF ANY INDIVIDUAL GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION IS DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. WHEN THE SPACECRAFT IS SPINNING AT 4 RPM, MEASUREMENTS OF THE PRINCIPAL ATMOSPHERIC SPECIES WILL BE OBTAINED AT 12-KM INTERVALS (1.5 SEC) ALONG THE SATELLITE TRACK, WHILE THE INSTRUMENT IS FACING FORWARD, USING "NORMAL" FORMAT. ALL MEASUREMENTS WILL BE MADE AT 12-KM INTERVALS WHEN THE SPACECRAFT IS DESPUN. IN ORBIT, THE PRESEALED SPECTROMETER WILL BE OPENED, AND THE ATMOSPHERIC CONSTITUENTS WILL PASS THROUGH A KNIFE-EDGED ORIFICE INTO THE THERMALIZATION CHAMBER AND ION SOURCE. SELECTED IONS WILL LEAVE THE QUADRUPOLE ANALYZER THROUGH A WEAK FOCUSING LENS AND WILL BE ACCELERATED INTO A 14-STAGE ELECTRON MULTIPLIER, WHERE THEY WILL BE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. FOR EACH IMPACTING ION, THE MULTIPLIER OUTPUT WILL BE A PULSE OF 2 X 10 TO THE SIXTH POWER ELECTRONS. THESE OUTPUT PULSES WILL CONSTITUTE THE MEASUREMENT, AND THE COUNT RATE WILL BE PROPORTIONAL TO THE CHAMBER DENSITY OF THE SELECTED SPECIES. THESE DENSITY VALUES WILL THEN BE CONVERTED TO AMBIENT CONCENTRATIONS. THE ANALYZER WILL NORMALLY OPERATE AT A RESOLUTION OF 1 AMU OVER THE MASS RANGE, SO THAT A MASS PEAK ONE-THOUSANDTH THE AMPLITUDE OF AN ADJACENT PEAK CAN BE MEASURED. FOR THE DYNAMIC RANGE REQUIRED, PULSES OCCURRING DURING 0.015-SEC INTEGRATION INTERVALS WILL BE ACCUMULATED IN A 16-BIT COUNTER. MULTIPLE INTEGRATION PERIODS (UP TO 16) WILL BE ASSIGNED TO EACH MEASUREMENT FOR LESS DENSE ATMOSPHERIC SPECIES. AUTOMATICALLY SELECTED RANGES OF IONIZING ELECTRON CURRENTS WILL BE USED. THE OVERALL RANGE OF THE MEASUREMENTS WILL BE GREATER THAN 10 TO THE SEVENTH POWER. THERE IS A 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, VOL. 8, NO. 4, PP. 272 (1973).

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

EXPERIMENT NAME- CAPACITANCE MANOMETER

NSSDC ID- AE-D -14

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.J. RICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT BRIEF DESCRIPTION
THE CAPACITANCE MANOMETER TO BE FLOWN ON AE-D IS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATIONS. HOWEVER, DATA FROM THIS EXPERIMENT WILL ALSO BE CORRELATED WITH ACCELEROMETER AND ION GAUGE DATA IN EVALUATING SATELLITE DRAG. THE MANOMETER, ALSO REFERRED TO AS PRESSURE SENSOR B (PSB), WILL PROVIDE A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE WILL VARY FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB WILL CONSIST OF TWO SPHERICAL, THERMALLY CONTROLLED CHAMBERS, SEPERATED BY A THIN MEMBRANE STRETCHED FLAT AND UNDER RADIAL TENSION. ANY DEFLECTION OF THE DIAPHRAGM CAUSED BY A PRESSURE DIFFERENTIAL BETWEEN THE TWO SIDES WILL CAUSE A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH WILL BIAS AN AC BRIDGE CIRCUIT. AIR WILL BE 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 WILL BE SAMPLED TWICE EACH SPACECRAFT REVOLUTION.

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

EXPERIMENT NAME- COLD CATHODE ION GAUGE

NSSDC ID- AE-D -15

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.J. RICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT BRIEF DESCRIPTION
THE COLD CATHODE-ION GAUGE TO BE FLOWN ON AE-D IS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WILL BE CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), WILL MEASURE ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 TO 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN 1.3 E-3 TO E-7 MB. THE ESTIMATED ACCURACY OF THE PSA WILL BE PLUS OR MINUS 20 PERCENT. THE CYLINDRICALLY SHAPED SENSOR PACKAGE WILL CONSIST 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 WILL CONTAIN NO PRIMARY SOURCE OF IONIZING ELECTRONS. THE DISCHARGE WILL BE INITIATED BY FIELD EMISSION AND WILL BE SELF-SUSTAINING AT A PRESSURE ABOVE 1.3 E-7 MB. THE ION CURRENT WILL BE COLLECTED AT THE CATHODE. THE SENSOR WILL BE MOUNTED ON THE SPACECRAFT, WITH THE ORIFICE PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WHICH WILL BE NORMAL TO THE ORBITAL PLANE. THE INSTRUMENT CAN BE OPERATED IN TWO MODES, SPINNING OR DESPUN. WHEN THE SPACECRAFT IS IN A SPINNING MODE, THE PSA WILL ALTERNATELY SAMPLE THE RAM AND WAKE PRESSURE. WHEN THE SPACECRAFT IS IN THE DESPUN MODE, THE PSA WILL FACE 30 DEG FROM THE DIRECTION OF MOTION. DATA FROM THIS EXPERIMENT WILL NOT BE TAPE RECORDED, BUT OBSERVED IN REAL TIME.

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

EXPERIMENT NAME- NEUTRAL GAS TEMPERATURE AND CONCENTRATION

NSSDC ID- AE-D -09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - H.B. NIEMANN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS 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 WILL LEAD TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY WILL ALSO BE OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WILL ALSO BE 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 IS IN THE DESPUN MODE, THE BAFFLE WILL BE MADE TO OSCILLATE IN THE STEPWISE FASHION IN ORDER TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICED CHAMBER. THESE CHAMBER DENSITY VARIATIONS CAN BE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE ALSO. A DUAL-FILAMENT ION SOURCE WILL SAMPLE THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND WILL PRODUCE AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WILL BE 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 WILL BE AMPLIFIED AND COUNTED IN A 16-BIT ACCUMULATOR. WHEN THE SATELLITE IS IN THE SPINNING MODE, THE NITROGEN DENSITY WILL BE MEASURED ONCE PER SPIN PERIOD, NOMINALLY EVERY 15 SEC. THE NITROGEN KINETIC TEMPERATURE WILL BE MEASURED TWICE EACH SPIN PERIOD (WITHOUT THE BAFFLE OPERATING) AND ONCE PER SPIN PERIOD WITH BAFFLE OPERATION. WHEN THE SPACECRAFT IS IN THE DESPUN MODE, THE NITROGEN DENSITY WILL BE MEASURED NEARLY CONTINUOUSLY, EXCEPT WHEN THE PARTICLE STREAM IS INTERRUPTED BY THE BAFFLE EACH 2.0 SEC. IN THIS CASE, THE NITROGEN TEMPERATURE WILL BE MEASURED EACH 2.0 SEC AS THE BAFFLE SCANS. THE SENSOR WILL BE VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT IS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN 'THE NEUTRAL-ATMOSPHERE TEMPERATURE INSTRUMENT,' N. W. SPENCER, ET AL, RADIO SCIENCE, VOL. 8, NO. 4, PP. 287-296 (1973).

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

SPACECRAFT COMMON NAME- AE-E
ALTERNATE NAMES- S 6E, ATMOSPHERE EXPLORER-E
NSSDC ID- AE-E

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- SEPT. 75 SPACECRAFT WEIGHT- 453.6 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 129. MIN INCLINATION- 22. DEG
PERIAPSIS- 150.000 KM ALT APOAPSIS- 4000.00 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - D.W. GRIMES .....NASA-GSFC
GREENBELT, MD
PS - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
MG - F.W. GAETANO .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
ONE OBJECTIVE OF AE-E WILL BE TO INVESTIGATE THE CHEMICAL PROCESSES AND ENERGY TRANSFER MECHANISMS THAT CONTROL THE STRUCTURE AND BEHAVIOR OF THE EARTH'S ATMOSPHERE AND IONOSPHERE THROUGH THE REGION OF HIGH SOLAR ENERGY ABSORPTION. MEASUREMENTS WILL BE ORIENTED PRIMARILY TO THE LARGELY UNEXPLORED LOW-ALTITUDE REGION BETWEEN 120 AND 300 KM. HOWEVER, PROPERTIES ABOVE 300 KM WILL ALSO BE EXTENSIVELY INVESTIGATED. THE EXPERIMENT PAYLOAD WILL INCLUDE INSTRUMENTATION FOR THE MEASUREMENT OF SOLAR EUV RADIATION, NEUTRAL PARTICLE COMPOSITION AND TEMPERATURE, ATMOSPHERIC DENSITY, ION COMPOSITION AND TEMPERATURE, ELECTRON CONCENTRATION AND TEMPERATURE, ATMOSPHERIC EMISSIONS, PARTICLE FLUXES, IONOSPHERE CURRENTS, AND THE PHOTOELECTRON ENERGY SPECTRUM. THE SATELLITE WILL BE A SHORT (1 M) CYLINDRICAL PRISM WITH A DIAMETER OF APPROXIMATELY 1.4 M. IN THE SPIN-STABILIZED MODE, THE SPACECRAFT'S SPIN AXIS WILL BE PERPENDICULAR TO THE ORBIT PLANE. POWER WILL BE SUPPLIED BY A SOLAR CELL ARRAY. THE SPACECRAFT WILL USE A PCM TELEMETRY SYSTEM THAT CAN OPERATE IN A REAL-TIME OR TAPE RECORDER MODE. AN ONBOARD PROPULSION SYSTEM WILL BE USED FOR MAKING ALTITUDE CHANGES. THE SPACECRAFT IS EXPECTED TO HAVE A 1-YR LIFETIME. MORE DETAILS CAN BE FOUND ON PP. 263-269 OF 'RADIO SCIENCE,' VOL. 8, NO. 4, APRIL, 1973.

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

EXPERIMENT NAME- ELECTRON TEMPERATURE AND CONCENTRATION

NSSDC ID- AE-E -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD
OI - R.F. THEIS .....NASA-GSFC
GREENBELT, MD
OI - A. DALGARNO .....HARVARD U
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE CYLINDRICAL ELECTROSTATIC PROBE WILL BE A RETARDING POTENTIAL (LANGMUIR TYPE) PROBE THAT WILL MEASURE THE CURRENT FLOWING TO THE COLLECTOR FOR A KNOWN SAWTOOTH VOLTAGE PATTERN TO BE APPLIED. FROM THIS RETARDING POTENTIAL (CURRENT VS VOLTAGE) CURVE, ELECTRON DENSITY AND ELECTRON TEMPERATURE WILL BE DERIVED. THIS PROBE WILL CONSIST OF A COLLECTOR ELECTRODE EXTENDING ALONG THE CENTRAL AXIS OF A CYLINDRICAL GUARD RING. THE GUARD RING WILL EXTEND 23 CM FROM THE SPACECRAFT, AND THE ELECTRODE WILL EXTEND ANOTHER 10 CM FURTHER FROM THE END OF THE GUARD RING. TWO IDENTICAL PROBES WILL BE MOUNTED PARALLEL TO THE SPACECRAFT SPIN AXIS (SPIN AXIS WILL BE PERPENDICULAR TO THE ORBIT PLANE), AND A THIRD PROBE WILL BE MOUNTED PERPENDICULAR TO THE SPIN AXIS. IN ADDITION TO ONBOARD ANALYSES OF THE RETARDING POTENTIAL CURVES, WHICH WILL PROVIDE TEMPERATURES AND DENSITIES, THESE CURVES WILL BE TELEMETERED.

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

EXPERIMENT NAME- ION COMPOSITION AND CONCENTRATION

NSSDC ID- AE-E -10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.C. BRINTON .....NASA-GSFC
GREENBELT, MD
OI - M.W. PHARO .....NASA-GSFC
GREENBELT, MD
OI - H.A. TAYLOR, JR. .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE FLOWN TO MEASURE, THROUGHOUT THE AE ORBIT, THE INDIVIDUAL CONCENTRATIONS OF ALL THERMAL ION SPECIES IN THE MASS RANGE 1 TO 72 ATOMIC MASS UNITS (AMU), 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 ARE EXPRESSED IN AMU, CAN BE SELECTED BY GROUND COMMAND -- RANGE A - 4 TO 1, RANGE B - 18 TO 2, RANGE C - 72 TO 8. EACH RANGE WILL NORMALLY BE SCANNED IN 1.6 SEC (APPROXIMATELY 12 KM ALONG ORBIT), BUT THE SCAN TIME PER RANGE CAN BE INCREASED TO 5.1 SEC BY COMMAND. NORMAL OPERATION WILL CONSIST OF SEQUENCE ABCABC (72 TO 1 AMU IN 4.8 SEC), BUT OTHER COMBINATIONS SUCH AS BCBC AND CCCC MAY BE USED. LABORATORY AND IN-FLIGHT DETERMINATION OF SPECTROMETER EFFICIENCY AND MASS DISCRIMINATION WILL PERMIT DIRECT CONVERSION OF MEASURED ION CURRENTS TO AMBIENT CONCENTRATIONS. CORRELATION OF THESE MEASURED DATA WITH THE RESULTS FROM COMPANION EXPERIMENTS, 'ELECTROSTATIC PROBE (AE-E -01)' AND 'RETARDING POTENTIAL ANALYZER (AE-E -04),' SHOULD PERMIT INDIVIDUAL ION CONCENTRATIONS TO BE DETERMINED WITH AN ACCURACY OF PLUS OR MINUS 10 PERCENT. THE EXPERIMENT'S FOUR PRIMARY MECHANICAL COMPONENTS WILL BE -- GUARD RING AND ION-ANALYZER TUBE, COLLECTOR AND PREAMPLIFIER ASSEMBLY, VENT, AND MAIN ELECTRONICS HOUSING. THE GUARD RING WILL NORMALLY BE AT GROUND POTENTIAL, BUT IT CAN BE PLACED AT -6 VOLTS 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 WILL BE FLOWN, AND HAS BEEN MODIFIED TO PERMIT ION CONCENTRATION MEASUREMENTS TO BE OBTAINED DOWN TO 120 KM ALTITUDE. SPECIFICALLY, A VENT WILL BE PROVIDED AT THE REAR OF THE SPECTROMETER, AND THE USUAL FLAT-DISK ION-CURRENT COLLECTOR WILL BE REPLACED BY A STACK OF WIRE-MESH GRIDS. THE FREQUENCY OF THE 30 V PEAK-TO-PEAK R.F. VOLTAGE WILL VARY WITH THE MASS RANGE MEASURED -- RANGE A - 10 MHZ, RANGE B - 5 MHZ, AND RANGE

C - 2.5 MHZ. MOUNTED IN THE VACUUM TIGHT ALUMINUM-CERAMIC CYLINDRICAL ANALYZER TUBE WILL BE A SERIES OF 16 PARALLEL TUNGSTEN-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 CAN BE CONTROLLED INDEPENDENTLY BY GROUND COMMAND FOR EACH ONE OF THE THREE MASS RANGES. PRIMARY ANALOG INSTRUMENT OUTPUT WILL BE A COMPRESSED ION CURRENT SPECTRUM WHICH WILL DISPLAY THE FULL DYNAMIC RANGE OF THE AMPLIFIER SYSTEM ON A SINGLE TELEMETRY CHANNEL. ONBOARD DATA PROCESSING WILL PROVIDE A READOUT OF PRIMARY EXPERIMENT DATA IN THE FORM OF TWO DIGITAL WORDS FOR EACH PEAK IN THE ION SPECTRUM. ONE EIGHT-BIT WORD WILL INDICATE PEAK AMPLITUDE (CURRENT) AND THE OTHER EIGHT-BIT WORD WILL IDENTIFY SWEEP POSITION, I.E., SPECIES IDENTIFICATION. THE WORDS WILL BE READ OUT IN PAIRS AT THE MAIN FRAME TELEMETRY RATE OF 16 SAMPLES PER SEC. 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, VOL. 8, NO. 4, PP. 323-332 (1973).

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

EXPERIMENT NAME- ATMOSPHERIC DRAG

NSSDC ID- AE-E -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.S.W.CHAMPION .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - F.A. MARCOS .....USAF CAMBRIDGE RES LAB
BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERIC DENSITY ACCELEROMETER EXPERIMENT WILL OBTAIN DATA ON THE NEUTRAL DENSITY OF THE ATMOSPHERE IN THE ALTITUDE RANGE 120 TO 400 KM BY THE MEASUREMENT OF SATELLITE DECELERATION DUE TO AERODYNAMIC DRAG. THE EXPERIMENT WILL CONSIST OF THREE SINGLE-AXIS ACCELEROMETERS, TWO OF THE UNITS WILL LIE IN THE SPACECRAFT X-Y PLANE, AND THE THIRD WILL BE ALIGNED WITH THE Z AXIS. EACH INSTRUMENT WILL MEASURE THE ELECTROSTATIC FORCE REQUIRED TO RESTRAIN A HOLLOW CYLINDRICAL MASS UNDER EXTERNAL ACCELERATION. THE DYNAMIC RANGE OF EACH UNIT WILL BE 10 TO THE -6 TO 10 TO THE -12 GRAMS.

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

EXPERIMENT NAME- PHOTOELECTRON SPECTROMETER

NSSDC ID- AE-E -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.P. DOERING .....JOHNS HOPKINS U
BALTIMORE, MD
OI - C.D. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - J.C. ARMSTRONG .....APPLIED PHYSICS LAB
SILVER SPRING, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE THE INTENSITY AND ENERGY DISTRIBUTION OF THE PHOTOELECTRON FLUX IN THE THERMOSPHERE IN THE RANGE 2 TO 500 EV. THE INSTRUMENTATION WILL CONSIST OF TWO OPPOSITELY DIRECTED HEMISPHERICAL-ELECTROSTATIC DEFLECTORS COUPLED TO SEPARATE ELECTRON MULTIPLIER DETECTORS. THE PHOTOELECTRON ENERGY SPECTRUM WILL BE SCANNED BY 1-SEC SWEEPS OF THE VOLTAGE BETWEEN THE TWO HEMISPHERICAL DEFLECTION ELEMENTS OF EACH DEFLECTOR.

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

EXPERIMENT NAME- ION TEMPERATURE

NSSDC ID- AE-E -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.B. HANSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - D.R. ZUCCARO .....U OF TEXAS, DALLAS
DALLAS, TX
OI - S. SANTINI .....U OF TEXAS, DALLAS
DALLAS, TX
OI - C.R. LIPPENCOTT .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT BRIEF DESCRIPTION
THE PLANAR ION TRAP, A RETARDING POTENTIAL TYPE OF INSTRUMENT, WILL MEASURE CURRENT FLOWING TO A COLLECTOR FOR A KNOWN LINEAR VOLTAGE SWEEP TO BE APPLIED TO THE COLLECTOR. THE ION TEMPERATURE, ION DENSITY, COMPOSITION, SUPRATHERMAL ELECTRON FLUXES, AND SUPRATHERMAL ELECTRON TEMPERATURES WILL BE DETERMINED FROM THIS RETARDING POTENTIAL CURVE AND KNOWLEDGE OF THE VOLTAGE ON SUPPRESSOR GRIDS BETWEEN THE INSTRUMENT APERTURE AND THE COLLECTOR. THE EXPERIMENT WILL OPERATE IN ONE MODE WHILE THE SPACECRAFT IS SPINNING AND IN A SECOND MODE WHEN THE SPACECRAFT IS NOT SPINNING. A COMPLETE VOLTAGE SWEEP (BOTH DOWN AND UP -- +23 TO 0 TO +23 V) COULD BE ACCOMPLISHED IN 3 SEC. IN THE NONSPINNING MODE, AN ADDITIONAL 3-SEC "DUCT" MODE WILL OPERATE TO PROVIDE MEASUREMENTS FROM WHICH FRACTIONAL ION CONCENTRATION CHANGES AS SMALL AS 0.001 IONS/CC PER 130 M ALONG TRACK TRAVEL COULD BE MADE.

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

EXPERIMENT NAME- AIRGLOW PHOTOMETER

NSSDC ID- AE-E -11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - P.B. HAYS .....U OF MICHIGAN
ANN ARBOR, MI
OI - G.G. SHEPHERD .....YORK U
TORONTO, ONTARIO, CANADA
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - J.C.G.WALKER .....YALE U
NEW HAVEN, CT

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL PROVIDE VOLUME EMISSION RATES FOR SEVERAL DAYGLOW AND NIGHTGLOW OPTICAL EMISSION FEATURES. A PHOTOMETER WILL BE USED, WHICH WILL CONTAIN TWO SEPARATE OPTICAL CHANNELS. SPECTRAL SELECTION WILL BE ACCOMPLISHED WITH A FILTER WHEEL THAT WILL CONTAIN SIX INTERFERENCE FILTERS AND A DARK AND CALIBRATE POSITION. THE TWO CHANNELS WILL BE SEPARATED IN ANGLE BY 90 DEG. ONE CHANNEL WILL HAVE A 3-DEG HALF-ANGLE CONE FIELD OF VIEW FOR HIGH SENSITIVITY AND WILL NORMALLY POINT TOWARD THE LOCAL ZENITH. THE SECOND CHANNEL WILL HAVE A FIELD OF VIEW OF 0.75-DEG HALF-ANGLE CONE FOR HIGH SPATIAL RESOLUTION POINTING TANGENT TO THE SURFACE OF THE EARTH WHEN THE SATELLITE IS IN THE ORIENTED MODE. BOTH CHANNELS WILL BE PROTECTED FROM STRAY LIGHT CONTAMINATION DURING THE DAYTIME WITH MULTISTAGE BAFFLE SYSTEMS. ENTERING PHOTONS WILL BE MEASURED WITH A PULSE COUNTING PHOTOMULTIPLIER SYSTEM CAPABLE OF COUNTING AT A RATE OF 5 TIMES 10 TO THE 6 COUNTS/SEC. THE SYSTEM DESIGN WILL PERMIT THE PHOTOMETERS TO MAKE VALID DAYGLOW MEASUREMENTS WITHIN 200 MSEC AFTER HAVING THE SUN IN THE FIELD OF VIEW. FILTERS CAN BE OPERATED IN SEVERAL MODES INCLUDING FIXED FILTER AND AUTOMATIC FILTER CHANGE SYNCHRONIZED TO SATELLITE ORIENTATION. THE TWO SEPARATE OPTICAL CHANNELS WILL BE MONITORED AT TIME INTERVALS CONSISTENT WITH THEIR ANGULAR RESOLUTION IN THE SPINNING MODE. THE NARROW CHANNEL WILL HAVE AN INTEGRATION PERIOD OF 30 MSEC AND THE WIDE CHANNEL A PERIOD OF 120 MSEC. BASIC DATA ANALYSIS WILL YIELD THE VOLUME EMISSION RATE ALONG THE SATELLITE TRACK, AND THE NARROW CHANNEL WILL PROVIDE VOLUME EMISSION RATES VS ALTITUDE THROUGHOUT THE ENTIRE PERIGEE REGION. MORE EXPERIMENT DETAILS CAN BE FOUND IN "THE VISIBLE-AIRGLOW EXPERIMENT ON ATMOSPHERE EXPLORER," P. B. HAYES, ET AL, RADIO SCIENCE, VOL. 8, NO. 4, PP. 369 (1973).

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

EXPERIMENT NAME- SOLAR EUV FILTER PHOTOMETER

NSSDC ID- AE-E -05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.F. HEATH .....NASA-GSFC
GREENBELT, MD
OI - J. OSANTOWSKI .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERE EXPLORER E SOLAR EUV FILTER PHOTOMETER EXPERIMENT WILL HAVE TWO PRIMARY OBJECTIVES -- (1) TO MONITOR SOLAR EUV FLUX IN SIX WAVELENGTH INTERVALS FROM 40 TO 1100 A AND (2) TO MEASURE THE BROADBAND ATMOSPHERIC ABSORPTION AS A FUNCTION OF ALTITUDE TO DETERMINE EFFECTIVE IONIZATION RATES AS A FUNCTION OF ALTITUDE FOR MOLECULAR NITROGEN AND ATOMIC OXYGEN. SECONDARY OBJECTIVES WILL BE TO PROVIDE COVERAGE OF TEMPORAL SOLAR EUV VARIATIONS FOR THE SELECTED GRATING SPECTROMETER EXPERIMENT AND TO PROVIDE A CHECK OF THE LONG-TERM STABILITY OF THE EUV SPECTROMETER. THE INSTRUMENT WILL BE COMPOSED OF FOUR BENDIX SPIRAL ELECTRON MULTIPLIERS.

THREE PHOTODIODES, AND A STEPPED EIGHT-POSITION FILTER WHEEL THAT WILL CONTAIN SIX UNBACKED METALLIC FILTERS THAT WILL BE TRANSPARENT IN THE VICINITY OF THE PLASMA FREQUENCY. THE FILTER PHOTOMETER WILL HAVE A TRANSPARENT POSITION, A CALIBRATION POSITION, AND AN OPAQUE POSITION. SINCE EACH OF THE FILTERS WILL BE USED TO EACH OF THE DETECTORS, THIS CONFIGURATION WILL PROVIDE AN INFLIGHT RELATIVE CALIBRATION OF ALL THE DETECTORS. THE EXPERIMENT WILL BE RIGIDLY MOUNTED ON THE +Z AXIS. THE TILT ANGLE WILL BE OPTIMIZED, DEPENDING ON THE SELECTED SPACECRAFT ORBITAL PARAMETERS, FOR MAXIMUM SUN VIEWING TIME FOR BOTH THE SPINNING AND THE EARTH-ORIENTED SPACECRAFT OPERATING MODES. ADEQUATE TEMPORAL COVERAGE OF THE SUN WILL BE PROVIDED BY THE LARGE INSTRUMENT FIELD OF VIEW (PLUS OR MINUS 30 DEG).

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

EXPERIMENT NAME- SOLAR EUV SPECTROPHOTOMETER

NSSDC ID- AE-E -06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.E.	HINTEREGGER	USAF CAMBRIDGE RES LAB BEDFORD, MA
OI -	D.E.	BEDO	USAF CAMBRIDGE RES LAB BEDFORD, MA
OI -	L.A.	HALL	USAF CAMBRIDGE RES LAB BEDFORD, MA
OI -	J.E.	MANSON	USAF CAMBRIDGE RES LAB BEDFORD, MA
OI -	C.W.	CHAGNON	USAF CAMBRIDGE RES LAB BEDFORD, MA

EXPERIMENT BRIEF DESCRIPTION

SIX GRAZING-INCIDENCE GRATING MONOCHROMATORS, WHICH WILL COMPRISE THE EUV SPECTROPHOTOMETER, WILL PROVIDE MEASUREMENTS OF THE SOLAR EUV FLUX IN THE 170- TO 1700-A RANGE. THIS INSTRUMENT WILL HAVE MODERATE SPECTRAL RESOLUTION (2 A AT 300 A) AND WILL BE CAPABLE OF SCANNING THE ENTIRE RANGE OR SELECTING SIX NARROW BANDS FOR CONTINUOUS HIGH TIME RESOLUTION MONITORING. THE INSTRUMENT, WHICH WILL BE POINTED TOWARDS THE SUN WITH AN ACCURACY OF 2 ARC-MIN, WILL PROVIDE DATA REFLECTING THE SOLAR INPUT AND DATA INDICATING ATMOSPHERIC ATTENUATION.

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

EXPERIMENT NAME- OPEN SOURCE NEUTRAL MASS SPECTROMETER

NSSDC ID- AE-E -07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.O.C.NIER	.....	U OF MINNESOTA MINNEAPOLIS, MN
OI -	W.E.	POTTER	U OF MINNESOTA MINNEAPOLIS, MN
OI -	K.	MAUERSBERGER	U OF MINNESOTA MINNEAPOLIS, MN

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WILL BE 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 CONCENTRATIONS OF BOTH THE MAJOR AND MINOR NEUTRAL ATMOSPHERIC CONSTITUENTS HAVING MASSES IN THE RANGE FROM 1 TO 48 AMU. A DOUBLE-FOCUSING MATTAUCH-HERZOG MAGNETIC DEFLECTION MASS SPECTROMETER WITH AN IMPACT ION SOURCE WILL BE USED. TWO ION COLLECTORS WILL BE INCLUDED TO MEASURE SIMULTANEOUSLY IONS DIFFERING IN MASS BY A FACTOR OF EIGHT, I.E., THE TWO MASS RANGES COVERED WILL BE 1 TO 8 AMU AND 7 TO 48 AMU. AN OPEN ION SOURCE WILL BE USED TO MINIMIZE THE LOSS OF REACTIVE SPECIES SUCH AS ATOMIC OXYGEN. NORMALLY, A 100 MICROAMPERE BEAM OF 75 EV ELECTRONS WILL BE USED FOR PRODUCING THE IONS. IN VIEW OF THE OVERALL GEOMETRY OF THIS INSTRUMENT, APPROXIMATELY 10 TO THE -5 AMPERE OF RESOLVED MASS 28 IONS WILL APPEAR AT THE COLLECTOR FOR MOLECULAR NITROGEN GAS WHEN THE MOLECULAR NITROGEN PRESSURE IN THE SOURCE IS EQUAL TO 1 TORR (1.33 MB). THE ELECTRON ACCELERATING VOLTAGE CAN BE REDUCED TO 25 EV ON COMMAND. AT THIS LOWER ENERGY, THERE SHOULD NOT BE ANY DISSOCIATION OF MOLECULAR NITROGEN, AND, THEREFORE, IT WILL BE POSSIBLE TO TRY TO MEASURE ATMOSPHERIC ATOMIC NITROGEN. ELECTRON MULTIPLIERS IN THE COUNTING MODE WILL BE USED AS DETECTORS FOR BOTH HIGH- AND LOW-MASS ION COLLECTORS. A 50-PERCENT TRANSMISSION GRID, MOUNTED BETWEEN THE HIGH-MASS COLLECTOR SLIT AND ITS MULTIPLIER DETECTOR, WILL INTERCEPT HALF THE BEAM. THE GRID WILL BE CONNECTED TO AN ELECTROMETER AMPLIFIER, AND, THEREFORE, THE DYNAMIC RANGE OF THE MEASUREMENTS WILL BE EXTENDED BY ALLOWING SENSIBLE READOUTS AT ION CURRENT MAGNITUDES TOO LARGE FOR THE ELECTRON MULTIPLIER OPERATION. PLANNED OVERLAP IN THE RANGES OF THE TWO MEASURING TECHNIQUES WILL PERMIT A CHECK OF THE GAIN CHARACTERISTICS OF THE MULTIPLIER TO BE MADE. SEVERAL MEASUREMENT MODES WILL BE AVAILABLE AND WILL BE SELECTED BY GROUND COMMAND DURING FLIGHT. USUALLY THE MASS SPECTROMETER WILL BE STEPPED FROM ONE MASS OF INTEREST TO ANOTHER UNDER THE CONTROL OF A 32-STEP READ-ONLY MEMORY DEVICE. EIGHT OF THESE 32-STEP PROGRAMS FALL INTO THE FOLLOWING FOUR CATEGORIES -- (1) NORMAL PROGRAMS THAT CONCENTRATE ON THE PEAKS OF GREATEST ABUNDANCES SUCH AS MOLECULAR AND ATOMIC OXYGEN, MOLECULAR NITROGEN, HELIUM, AND ARGON, (2) MINOR CONSTITUENT PROGRAMS THAT OMIT MEASUREMENTS OF THE DOMINANT SPECIES TO PERMIT THE ELECTRON MULTIPLIER TO OPERATE AT LOWER ALTITUDES THAN OTHERWISE POSSIBLE, (3) A LOW-MASS PROGRAM THAT CONCENTRATES ON MASSES FROM 1 TO 5 AMU, AND (4) A NITROGEN OXIDE PROGRAM THAT MEASURES THIS MASS-30 CONSTITUENT NEARLY CONTINUOUSLY. IN ADDITION, AN OPTION WILL BE AVAILABLE TO COMMAND THE SPECTROMETER TO SCAN THE MASS RANGE IN 0.25-AMU STEPS. ABUNDANT CONSTITUENTS WILL BE MEASURED APPROXIMATELY ONCE EACH HALF-SEC, CORRESPONDING TO A SPATIAL RESOLUTION OF APPROXIMATELY 5 KM ALONG THE SATELLITE TRACK. THE RANGE OF OPERATION FOR THE ELECTROMETER WILL BE APPROXIMATELY 2.4 TIMES 10 TO THE -14 TO 4.8 TIMES 10 TO THE -9 AMP, AND FOR THE MULTIPLIER THE UPPER LIMIT WILL BE 3 TIMES 10 TO THE 6 COUNTS/SEC. MORE EXPERIMENT DETAILS CAN BE FOUND IN "THE OPEN SOURCE NEUTRAL-MASS SPECTROMETER ON ATMOSPHERE EXPLORER-C, -D, AND -E," A. O. NIER ET AL., RADIO SCIENCE, VOL. 8, NO. 4, PP. 271 (1973).

------- AE-E, PELZ ----------

EXPERIMENT NAME- CLOSED SOURCE NEUTRAL MASS SPECTROMETER

NSSDC ID- AE-E -08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	D.T.	PELZ	NASA-GSFC GREENBELT, MD
OI -	C.A.	REBER	NASA-GSFC GREENBELT, MD
OI -	G.R.	CARIGNAN	U OF MICHIGAN ANN ARBOR, MI
OI -	A.E.	HEDIN	NASA-GSFC GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL MEASURE 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 MAY BE OBTAINED FROM COMPARISONS OF THESE MEASUREMENTS WITH THOSE OBTAINED FROM OTHER ONBOARD EXPERIMENTS, NAMELY -- OPEN SOURCE SPECTROMETER (AE-E -07), SOLAR EUV SPECTROPHOTOMETER (AE-E -06), AND DENSITY-ACCELEROMETER (AE-E -02). THE MASS-SPECTROMETER SENSOR WILL INCLUDE A GOLD-PLATED STAINLESS STEEL THERMALIZING CHAMBER AND ION SOURCE, A HYPERBOLIC ROD QUADRUPOLE ANALYZER, AND AN OFF-AXIS ELECTRON MULTIPLIER. APPROXIMATE UPPER ALTITUDE LIMITS OF MEASUREMENT, DETERMINED PRIMARILY BY GAS/SURFACE INTERACTIONS AND INSTRUMENT SENSITIVITY LIMITATIONS, WILL BE -- 250 KM FOR MOLECULAR OXYGEN, 300 KM FOR ARGON, 550 KM FOR MOLECULAR NITROGEN, 700 KM FOR ATOMIC OXYGEN, AND 1000 KM FOR HELIUM. FIVE DIFFERENT SEQUENCES OF MASS SELECTION WILL BE AVAILABLE AND, EXPRESSED IN ATOMIC MASS UNITS (AMU), WILL BE -- (A) GEOPHYSICAL - 1, 2, 4, TOTAL, 16, 28, 32, SELECTED, 40, (B) ANALYTICAL - 12, 14, 18, 20, 22, 30, 44, CALIBRATE, ZERO, (C) INDIVIDUAL - SELECTED, SELECTED, SELECTED, . . . (ANY MASS 1 TO 44), (D) SWEEP DIGITAL - 1, 2, 3, 4, 5, . . . 45 (IN 3/16-AMU STEPS), (E) SWEEP ANALOG 2, 3, 4, 5, 45 (CONTINUOUS). THE FIVE OPERATIONAL FORMATS USED CAN BE SELECTED BY GROUND COMMAND, AND EACH ONE WILL CONTAIN A DIFFERENT COMBINATION OF THE FIVE MASS SELECTION SEQUENCES LISTED ABOVE. WHEN OPERATING IN THE "NORMAL" FORMAT, THE ANALYZER WILL MEASURE ALL MASSES IN THE RANGE 1 TO 44 WITH EMPHASIS ON HYDROGEN, HELIUM, OXYGEN, NITROGEN, AND ARGON. ANOTHER FORMAT WILL BE OPTIMIZED FOR MINOR CONSTITUENT STUDIES OF ANY INDIVIDUAL GAS SPECIES IN THE MEASURED RANGE. SPATIAL RESOLUTION WILL BE DETERMINED PRIMARILY BY THE MODE OF SPACECRAFT OPERATION. WHEN THE SPACECRAFT IS SPINNING AT 4 RPM, MEASUREMENTS OF THE PRINCIPAL ATMOSPHERIC SPECIES WILL BE OBTAINED AT 12-KM INTERVALS (1.5 SEC) ALONG THE SATELLITE TRACK, WHILE THE INSTRUMENT IS FACING FORWARD. USING "NORMAL" FORMAT, ALL MEASUREMENTS WILL BE MADE AT 12-KM INTERVALS WHEN THE SPACECRAFT IS DESPUN, IN ORBIT, THE PRESEALED SPECTROMETER WILL BE OPENED, AND THE ATMOSPHERIC CONSTITUENTS WILL PASS THROUGH A KNIFE-EDGED ORIFICE INTO THE THERMALIZATION CHAMBER AND ION SOURCE. SELECTED IONS WILL LEAVE THE QUADRUPOLE ANALYZER THROUGH A WEAK FOCUSING LENS AND WILL BE ACCELERATED INTO A 14-STAGE ELECTRON MULTIPLIER, WHERE THEY WILL BE TURNED 90 DEG TO STRIKE THE FIRST DYNODE. FOR EACH IMPACTING ION, THE MULTIPLIER OUTPUT WILL BE A PULSE OF 2 X 10 TO THE SIXTH POWER ELECTRONS. THESE OUTPUT PULSES WILL CONSTITUTE THE MEASUREMENT, AND THE COUNT RATE WILL BE PROPORTIONAL TO THE CHAMBER DENSITY OF THE SELECTED SPECIES. THESE DENSITY VALUES WILL THEN BE CONVERTED TO AMBIENT CONCENTRATIONS. THE ANALYZER WILL NORMALLY OPERATE AT A RESOLUTION OF 1 AMU OVER THE MASS RANGE, SO THAT A MASS PEAK ONE-THOUSANDTH THE AMPLITUDE OF AN ADJACENT PEAK CAN BE MEASURED. FOR THE DYNAMIC RANGE REQUIRED, PULSES OCCURRING DURING 0.015-SEC INTEGRATION INTERVALS WILL BE ACCUMULATED IN A 16-BIT COUNTER. MULTIPLE INTEGRATION PERIODS (UP TO 16) WILL BE ASSIGNED TO EACH MEASUREMENT FOR LESS DENSE ATMOSPHERIC SPECIES. AUTOMATICALLY SELECTED RANGES

OF IONIZING ELECTRON CURRENTS WILL BE USED. THE OVERALL DYNAMIC RANGE OF THE MEASUREMENTS WILL BE GREATER THAN 10 TO THE SEVENTH POWER. 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, VOL. 8, NO. 4, PP. 272 (1973).

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

EXPERIMENT NAME- CAPACITANCE MANOMETER

NSSDC ID- AE-E -12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.J. RICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT BRIEF DESCRIPTION
THE CAPACITANCE MANOMETER TO BE FLOWN ON AE-E IS PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATIONS. HOWEVER, DATA FROM THIS EXPERIMENT WILL ALSO BE CORRELATED WITH ACCELEROMETER AND ION GAUGE DATA IN EVALUATING SATELLITE DRAG. THE MANOMETER, ALSO REFERRED TO AS PRESSURE SENSOR B (PSB), WILL PROVIDE A DIRECT MEASURE OF ATMOSPHERIC PRESSURE IN THE REGION BELOW 200 KM. THE ACCURACY OF THE PSB GAUGE WILL VARY FROM ABOUT 10 PERCENT AT 120 KM TO ABOUT 40 PERCENT AT 180 KM. THE PSB WILL CONSIST 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 WILL CAUSE A CHANGE IN CAPACITANCE BETWEEN THE DIAPHRAGM AND AN ADJACENT ELECTRODE WHICH WILL BIAS AN AC BRIDGE CIRCUIT. AIR WILL BE 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 WILL BE SAMPLED TWICE EACH SPACECRAFT REVOLUTION.

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

EXPERIMENT NAME- COLD CATHODE ION GAUGE

NSSDC ID- AE-E -13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.J. RICE .....AEROSPACE CORP
EL SEGUNDO, CA
OI - V.L. CARTER .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT BRIEF DESCRIPTION
THE COLD CATHODE-ION GAUGE TO BE FLOWN ON AE-E WILL BE PRIMARILY AN ENGINEERING EXPERIMENT TO PROVIDE DATA ON SPACECRAFT OPERATION. HOWEVER, DATA FROM THIS EXPERIMENT WILL BE CORRELATED WITH ACCELEROMETER AND CAPACITANCE MANOMETER DATA TO EVALUATE SATELLITE DRAG PERFORMANCE. THE ION GAUGE, ALSO REFERRED TO AS PRESSURE SENSOR A (PSA), WILL MEASURE ATMOSPHERIC PRESSURE IN THE REGION BETWEEN 120 TO 370 KM ABOVE THE EARTH'S SURFACE FOR VALUES OF ATMOSPHERIC PRESSURE BETWEEN 1.3 E-3 TO 1.3 E-7 MB. THE ESTIMATED ACCURACY OF THE PSA WILL BE PLUS OR MINUS 20 PERCENT. THE CYLINDRICALLY-SHAPED SENSOR PACKAGE WILL CONSIST 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 WILL CONTAIN NO PRIMARY SOURCE OF IONIZING ELECTRONS. THE DISCHARGE WILL BE INITIATED BY FIELD EMISSION AND WILL BE SELF-SUSTAINING AT A PRESSURE ABOVE 1.3 E-7 MB. THE ION CURRENT WILL BE COLLECTED AT THE CATHODE. THE SENSOR WILL BE MOUNTED ON THE SPACECRAFT, WITH THE ORIFICE PERPENDICULAR TO THE SPACECRAFT SPIN AXIS, WHICH WILL BE NORMAL TO THE ORBITAL PLANE. THE INSTRUMENT CAN BE OPERATED IN TWO MODES, SPINNING OR DESPUN. WHEN THE SPACECRAFT IS IN A SPINNING MODE, THE PSA WILL ALTERNATELY SAMPLE THE RAM AND WAKE PRESSURE. WHEN THE SPACECRAFT IS IN THE DESPUN MODE, THE PSA WILL FACE 30 DEG FROM THE DIRECTION OF MOTION. DATA FROM THIS EXPERIMENT WILL *NOT BE TAPE RECORDED, BUT OBSERVED IN REAL TIME.*

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

EXPERIMENT NAME- NEUTRAL GAS TEMPERATURE AND
CONCENTRATION

NSSDC ID- AE-E -09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - H.B. NIEMANN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS 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 WILL LEAD TO A DETERMINATION OF THE AMBIENT TEMPERATURE, INDEPENDENT OF SCALE HEIGHT. A MEASUREMENT OF THE AMBIENT NITROGEN DENSITY WILL ALSO BE OBTAINED. AN ALTERNATE MEASUREMENT OF NEUTRAL TEMPERATURE WILL ALSO BE 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 IS IN THE DESPUN MODE, THE BAFFLE WILL BE MADE TO OSCILLATE IN A STEPWISE FASHION IN ORDER TO INTERRUPT THE PARTICLE STREAM SEEN BY THE ORIFICED CHAMBER. THESE CHAMBER DENSITY VARIATIONS CAN BE INTERPRETED TO YIELD THE NEUTRAL GAS KINETIC TEMPERATURE ALSO. A DUAL-FILAMENT ION SOURCE WILL SAMPLE THE THERMALIZED MOLECULAR NITROGEN IN THE CHAMBER AND WILL PRODUCE AN ION BEAM DENSITY PROPORTIONAL TO THE NITROGEN CHAMBER DENSITY. FROM THE SOURCE, THIS IONIZED NITROGEN BEAM WILL BE DIRECTED INTO 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 WILL BE AMPLIFIED AND COUNTED IN A 16-BIT ACCUMULATOR. WHEN THE SATELLITE IS IN THE SPINNING MODE, THE NITROGEN DENSITY WILL BE MEASURED ONCE PER SPIN PERIOD, NOMINALLY EVERY 15 SEC. THE NITROGEN KINETIC TEMPERATURE WILL BE MEASURED TWICE EACH SPIN PERIOD (WITHOUT THE BAFFLE OPERATING) AND ONCE PER SPIN PERIOD WITH BAFFLE OPERATION. WHEN THE SPACECRAFT IS IN THE DESPUN MODE, THE NITROGEN DENSITY WILL BE MEASURED NEARLY CONTINUOUSLY, EXCEPT WHEN THE PARTICLE STREAM IS INTERRUPTED BY THE BAFFLE EACH 2.0 SEC. IN THIS CASE, THE NITROGEN TEMPERATURE WILL BE MEASURED EACH 2.0 SEC AS THE BAFFLE SCANS. THE SENSOR WILL BE VACUUM-SEALED PRIOR TO LAUNCH AND OPENED TO THE ATMOSPHERE AFTER THE SPACECRAFT IS IN ORBIT. MORE EXPERIMENT DETAILS CAN BE FOUND IN, 'THE NEUTRAL-ATMOSPHERE TEMPERATURE INSTRUMENT,' N. W. SPENCER, ET AL., RADIO SCIENCE, VOL. 8, NO. 4, PP. 287-296 (1973).

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

SPACECRAFT COMMON NAME- AEROS 2
ALTERNATE NAMES- AEROS-B
NSSDC ID- 74-055A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

LAUNCH DATE- 07/16/74 SPACECRAFT 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 ALT APOAPSIS- 868. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTPIC EPOCH DATE- 08/06/74
ORBIT PERIOD- 95.206 MIN INCLINATION- 97.45 DEG
PERIAPSIS- 216.85 KM ALT APOAPSIS- 840.20 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.L. WAGNER, JR. .....NASA-GSFC
GREENBELT, MD
PM - N. KIEHNE .....GES FUR WELTRAUMFORSCH
BONN, FED REP OF GERMANY
PS - P. LAEMMERZAHL .....MPI-NUCLEAR PHYS
HEIDELBERG, FED REP OF GERMANY
PS - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE AEROS B 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 UV 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 ----------

EXPERIMENT NAME- MASS SPECTROMETER (MS)

NSSDC ID- 74-055A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.K.H.KRANKOWSKY .....MPI-NUCLEAR PHYS
HEIDELBERG, FED REP OF GERMANY
OI - P. LAEMMERZAHL .....MPI-NUCLEAR PHYS
HEIDELBERG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS FLOWN TO PROVIDE MEASUREMENTS OF NEUTRAL AND IONIZED ATMOSPHERIC SPECIES IN THE MASS RANGE FROM 1 TO 44 AMU. THE QUADRUPOLE MASS ANALYZER, WITH ITS 'SEMI-OPEN' ION SOURCE, WAS SEALED UNDER VACUUM AND OPENED IN ORBIT. FOR AN ATMOSPHERE WITH AN EXOSPHERIC TEMPERATURE OF APPROXIMATELY 1500 DEG K, THE UPPER ALTITUDE LIMITS OF NEUTRAL MEASUREMENTS FOR DIFFERENT GAS SPECIES WAS -- MOLECULAR NITROGEN - 660 KM, MOLECULAR OXYGEN - 500 KM, ATOMIC OXYGEN - 800 KM, ARGON - 250 KM, AND HELIUM - 880 KM. ION DENSITIES FROM 1 PER CC TO 10 TO THE 6 PER CC WERE MEASURED THROUGHOUT THE ORBIT. THE ION SOURCE WERE OPERATED IN TWO MODES. NEUTRAL GAS SPECIES WERE PARTLY IONIZED BY A REGULATED 100-MICROAMPERE BEAM OF 75-EV ELECTRONS PRODUCED BY EITHER OF TWO REDUNDANT HOT FILAMENTS THAT WERE SELECTED BY GROUND COMMAND. THE IONS WERE FOCUSED INTO THE MASS ANALYZER BY AN ION LENS SYSTEM COMPOSED OF A REPELLING GRID AND TWO ACCELERATION LENSES. IN THE ION MODE, THE AMBIENT IONS DRIFTING INTO THE ION SOURCE REGION WERE ATTRACTED BY A NEGATIVELY-BIASED GRID AND SUBSEQUENTLY FOCUSED INTO THE ANALYZER. THE MASS RESOLUTION WAS ADJUSTED TO BE 30, AND A SWEEP THROUGH THE ENTIRE MASS RANGE TOOK 1.22 SEC. AFTER LEAVING THE MASS ANALYZER, THE INDIVIDUAL ION CURRENTS WERE DETECTED BY A PARTICLE MULTIPLIER FOLLOWED BY A LOGARITHMIC ELECTROMETER, AND BY A GRID CURRENT FED INTO A LINEAR ELECTROMETER. THE VOLTAGE OUTPUT OF THE LOGARITHMIC ELECTROMETER REPRESENTED A QUANTITATIVE MEASURE OF THE CORRESPONDING PARTICLE NUMBER DENSITIES OF NEUTRALS WITHIN THE ION SOURCE. THE VOLTAGE OUTPUT OF THE LINEAR ELECTROMETER REPRESENTED A QUANTITATIVE MEASURE OF THE CORRESPONDING ION CURRENT (IONS/SEC) OF AMBIENT IONS ENTERING THE EQUIPMENT. THE UPPER LIMIT OF CURRENT THAT COULD BE MEASURED BY THE LOG AMPLIFIER WAS 5 TIMES 10 TO THE -6 AMP, CORRESPONDING TO A 0-V TELEMETRY OUTPUT SIGNAL. AUTOMATIC CALIBRATION AND REZEROING SIGNALS WERE INCLUDED. THE EXPERIMENT WEIGHED 7.0 KG, AND THE AVERAGE POWER DISSIPATED OVER AN ORBIT WILL BE 8 W.

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

EXPERIMENT NAME- ELECTRON CONCENTRATION IN THE IONOSPHERE

NSSDC ID- 74-055A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E. NESKE .....WGSPR
FREIBURG, FED REP OF GERMANY
OI - R. KIST .....WGSPR
FREIBURG, FED REP OF GERMANY

EXPERIMENT 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 FEEDING 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 X 10E3 TO 10E6 ELECTRONS/CM CUBED.

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

EXPERIMENT NAME- ATMOSPHERIC DRAG ANALYSIS

NSSDC ID- 74-055A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - M. ROEMER .....U OF BONN
BONN, FED REP OF GERMANY
OI - C. WULF-MATHIES .....U OF BONN
BONN, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THE AEROS ATMOSPHERIC DRAG DENSITY EXPERIMENT PROVIDED INDIRECT MEASUREMENTS OF UPPER ATMOSPHERIC DENSITY NEAR SATELLITE PERIGEE. THE EXPERIMENT HAD NO UNIQUE HARDWARE ON BOARD. THE DENSITY VALUES WERE DERIVED FROM SEQUENTIAL OBSERVATIONS OF THE SATELLITE'S POSITION. TO BE LAUNCHED INTO AN ELLIPTIC (APOGEE 864 KM, PERIGEE 218 KM) NEAR-POLAR ORBIT, THE AEROS SATELLITE WAS EXPECTED TO YIELD SYSTEMATIC CHANGES IN DENSITY AS A FUNCTION OF ALTITUDE, LATITUDE, AND TIME. THE DATA OBTAINED WAS CORRELATED WITH DENSITY VALUES SIMULTANEOUSLY DERIVED FROM DIRECT PARTICLE DETECTION USING AN ONBOARD NEUTRAL DENSITY GAUGE.

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

EXPERIMENT NAME- FLUX AND SPECTRAL DISTRIBUTION OF SOLAR
EUV RAD AND THEIR TEMP AND SPATIAL VAR

NSSDC ID- 74-055A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. SCHMIDTKE .....WGSPR
FREIBURG, FED REP OF GERMANY
OI - W. SCHWEIZER .....WGSPR
FREIBURG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A GRATING SPECTROMETER, A SOLAR COLLIMATOR, AND A PHOTOMULTIPLIER. IT OPERATED IN 2 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 ----------

EXPERIMENT NAME- NEUTRAL ATMOSPHERE TEMPERATURE
EXPERIMENT

NSSDC ID- 74-055A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
OI - D.T. PELZ .....NASA-GSFC
GREENBELT, MD
OI - G.P. NEWTON .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - H.B. NIEMANN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT PROVIDED IN SITU MEASUREMENTS OF THE TOTAL GAS DENSITY, THE KINETIC TEMPERATURE OF MOLECULAR NITROGEN IN THE THERMOSPHERE, AND THE MOLECULAR NITROGEN DENSITY. THE USEFUL ALTITUDE RANGE OF THE EXPERIMENT WAS DETERMINED AT THE UPPER LIMIT BY THE SIGNAL-TO-NOISE RATIO, AND AT THE LOWER LIMIT BY THE MAXIMUM INTERNAL NUMBER DENSITY AT WHICH THE ION SOURCE COULD PROPERLY OPERATE ON BY THE UPPER LIMIT OF DETECTION CAPABILITY. THE ION SOURCE SENSITIVITY COULD BE REDUCED UP TO A FACTOR OF 10 ON COMMAND. MOUNTED AT THE SATELLITE PERIPHERY WAS A SPHERICAL ANTECHAMBER WITH A KNIFE-EDGED ORIFICE FACING NORMAL TO THE SPIN AXIS. THIS CHAMBER, SEALED UNDER VACUUM BEFORE LAUNCH, WAS OPENED TO THE ATMOSPHERE ON COMMAND WHEN THE SPACECRAFT WAS IN ORBIT. THE INCOMING ATMOSPHERIC SPECIES UNDERWENT COLLISIONS WITH THE CHAMBER WALLS, AND SOME OF THIS THERMALIZED GAS ENTERED A SMALL DUAL-FILAMENT ION SOURCE, THAT PRODUCED AN ION BEAM PROPORTIONAL TO THE CHAMBER DENSITY. THE BEAM WAS DIRECTED INTO A QUADRUPOLE ANALYZER, THAT TRANSMITTED IONS WITH A MASS-TO-CHARGE RATIO OF 28, TO AN ELECTRON MULTIPLIER WHERE INDIVIDUAL IONS AT THE INPUT WERE CONVERTED TO PULSES OF ELECTRONS WHICH WERE COUNTED AT THE MULTIPLIER OUTPUT. THESE OUTPUT PULSES WERE AMPLIFIED AND SENT TO A DATA PROCESSOR THAT PROVIDED DIGITAL OUTPUT SIGNALS, IN THE PROPER FORMAT, TO THE TELEMETRY SYSTEM. THUS, THE OBJECTIVE OF THE MEASUREMENT SYSTEM WAS TO PROVIDE A DIGITAL OUTPUT THAT IS PROPORTIONAL TO THE INSTANTANEOUS DENSITY OF NEUTRAL MOLECULAR NITROGEN IN THE SPHERICAL ANTECHAMBER. A TURN-ON SEQUENCE PROVIDED THE NECESSARY VOLTAGES TO MEASURE THE CONCENTRATIONS OF SPECIES WITH MASS-TO-CHARGE RATIOS OF 4, 12, 14, 16, 18, 32, 40, AND 44. TOTAL DENSITY MEASUREMENTS WERE ALSO OBTAINED. THE INSTANTANEOUS VALUE OF THE NITROGEN DENSITY WAS SAMPLED A TOTAL OF 44 TIMES PER SPACECRAFT SPIN PERIOD, WITH INCREASED TIME RESOLUTION IN THE REGION OF THE SPIN POSITION WHERE THE ORIFICE NORMAL WAS NEARLY PERPENDICULAR TO THE SATELLITE VELOCITY VECTOR.

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

EXPERIMENT NAME- ENERGY DISTRIBUTION OF IONS AND
ELECTRONS

NSSDC ID- 74-055A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/06/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K. SPENNER .....WGSPR
FREIBURG, FED REP OF GERMANY
OI - A. DUMBS .....WGSPR
FREIBURG, FED REP OF GERMANY

EXPERIMENT 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

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

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

SPONSORING COUNTRY/AGENCY
CANADA CRC
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 11/29/65
ORBIT PERIOD- 121. MIN INCLINATION- 79.724 DEG
PERIAPSIS- 529.000 KM ALT APOAPSIS- 2956.00 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/24/72
ORBIT PERIOD- 120.88 MIN INCLINATION- 79.8197 DEG
PERIAPSIS- 510. KM ALT APOAPSIS- 2935. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.E. JACKSON .....NASA-GSFC
GREENBELT, MD
PS - J.E. JACKSON .....NASA-GSFC
GREENBELT, MD
PS - J.H. WHITTEKER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
MG - F.W. GAETANO .....NASA HEADQUARTERS
WASHINGTON, DC
SC - J.H. CHAPMAN .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
ALOUETTE 2 WAS A SMALL IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP FREQUENCY IONOSPHERIC SOUNDER, A VLF RECEIVER, TWO ENERGETIC PARTICLE EXPERIMENTS, A COSMIC NOISE EXPERIMENT, AND AN ELECTROSTATIC PROBE. THE SPACECRAFT USED TWO LONG DIPOLE ANTENNAS (78.9 M AND 22.8 M LONG, RESPECTIVELY) FOR THE SOUNDER, VLF, AND COSMIC NOISE EXPERIMENTS. THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.25 RPM AFTER ANTENNA DEPLOYMENT. BY JANUARY 1970, THE SPIN HAD DECAYED TO 1.84 RPM. END PLATES ON THE LONG ALOUETTE 2 ANTENNA SEEM TO HAVE CORRECTED THE RAPID DESPIN OCCURRING ON ALOUETTE 1, WHICH WAS BELIEVED TO RESULT FROM THERMAL DISTORTION OF THE ANTENNA AND RADIATION PRESSURE. THERE WAS NO TAPE RECORDER, SO THAT DATA ARE AVAILABLE ONLY FROM WHEN THE SPACECRAFT WAS IN LINE OF SIGHT OF TELEMETRY STATIONS. TELEMETRY STATIONS ARE LOCATED SO THAT PRIMARY DATA COVERAGE IS NEAR THE 80 DEG W MERIDIAN PLUS AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, INDIA, NORWAY, AND CENTRAL AFRICA. INITIALLY, DATA WERE RECORDED FOR ABOUT 7-1/2 HR PER DAY. IN 1972, OBSERVATIONS WERE MADE FOR ABOUT 2 HR PER DAY. ROUTINE SPACECRAFT OPERATION WAS DISCONTINUED IN 1973, BUT SPECIAL REQUEST OPERATION HAS OCCURRED OCCASIONALLY SINCE THEN.

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

EXPERIMENT NAME- VLF RECEIVER

NSSDC ID- 65-098A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.S. BELROSE .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - F.H. PALMER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

EXPERIMENT BRIEF DESCRIPTION
THE VLF EXPERIMENT WAS A WIDEBAND HIGH-GAIN RECEIVER WITH A PASS BAND FROM 0.05 TO 30 KHZ THAT USED THE LONG SOUNDER ANTENNA. THE INSTRUMENT WAS A CONSIDERABLY IMPROVED VERSION OF THE ALOUETTE I RECEIVER. THE STANDARD VLF DATA FORM WAS A SONOGRAM (GRAPH) WHICH 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. PERFORMANCE WAS NOMINAL EXCEPT FOR INTERFERENCE FROM THE SOUNDER. THIS INTERFERENCE DID NOT PREVENT OBSERVATIONS OF USEFUL DATA, THE SOUNDER OPERATION WAS PREDOMINANT, BUT A SMALL PERCENTAGE OF OBSERVATIONS WERE VLF ONLY OR BOTH VLF AND SOUNDER. AN INDEX OF OPERATION TIMES AND LOCATIONS FOR THIS EXPERIMENT APPEARS IN DATA SET 65-098A-00E.

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

EXPERIMENT NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 65-098A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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. THIS EXPERIMENT OPERATED NOMINALLY FROM LAUNCH. AN INDEX OF OPERATION TIMES AND LOCATIONS FOR THIS EXPERIMENT IS AVAILABLE IN DATA SET 65-098A-00E (TAPE) OR 65-098A-00F (HARDCOPY).

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

EXPERIMENT NAME- COSMIC RADIO NOISE

NSSDC ID- 65-098A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.R. HARTZ .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 SEC. 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 -------

EXPERIMENT NAME- ENERGETIC PARTICLES DETECTORS

NSSDC ID- 65-098A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - I.B. MCDIARMID .....NATL RES COUNC OF CAN
OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 WHICH 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 WHICH DETECTED PROTONS GREATER THAN 100 MEV. THE SEVENTH DETECTOR WAS A PLASTIC SCINTILLATOR WHICH DETERMINED THE PROTON SPECTRA IN THE ENERGY RANGE FROM 100 TO 600 MEV. PARTICLES ASSOCIATED WITH AURORAL AND SOLAR EVENTS WERE STUDIED. AN INDEX OF OPERATION TIMES AND LOCATIONS FOR THIS EXPERIMENT IS AVAILABLE IN DATA SET 65-098A-00E.

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

EXPERIMENT NAME- SWEEP FREQUENCY SOUNDER

NSSDC ID- 65-098A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/01/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WHITTEKER	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	J.E.	JACKSON	NASA-GSFC GREENBELT, MD
OI -	J.W.	KING	APPLETON LAB SLOUGH, BUCKS, ENGLAND
OI -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
OI -	J.	TURNER	AUST DEPT OF INTERIOR SYDNEY, AUSTRALIA
OI -	C.	JAIEB	CNET PARIS, FRANCE
OI -	O.	HOLT	AURORAL OBS TROMSO, NORWAY
OI -	G.L.	NELMS	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	Y.	OGATA	RADIO RESEARCH LAB TOKYO, JAPAN
OI -	R.	RAGHAVARAO	PHYSICAL RESEARCH LAB AHMEDABAD, INDIA
OI -	E.S.	WARREN	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	G.E.K.	LOCKWOOD	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 SEC. A MULTIPLICITY OF DELAY TIMES WAS USUALLY OBSERVED DUE TO BIREFRINGENCE OF THE IONOSPHERE, NON-VERTICAL 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. PERFORMANCE WAS EXCELLENT. INITIALLY, ABOUT 7-1/2 HR OF OBSERVATIONS PER DAY WERE RECORDED. IN FEBRUARY 1973, ABOUT 1 HR PER DAY WAS BEING RECORDED. AN INDEX OF OPERATION TIMES AND LOCATIONS FOR THIS EXPERIMENT IS AVAILABLE IN DATA SET 65-098A-00E.

********** AMPS **********

SPACECRAFT COMMON NAME- AMPS
ALTERNATE NAMES- SPACELAB AMPS MODULE
NSSDC ID- AMPS

LAST REPORTED STATE- A PROPOSED MISSION

LAUNCH DATE- STUDY SPACECRAFT 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 ALT APOAPSIS- KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.H.	WAITE	NASA-MSFC HUNTSVILLE, AL
PS -	C.R.	CHAPPEL	NASA-MSFC HUNTSVILLE, AL
MG -	R.H.	CHASE	NASA HEADQUARTERS WASHINGTON, DC
SC -	E.R.	SCHMERLING	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
AMPS, AN ACRONYM FOR ATMOSPHERE, MAGNETOSPHERE, AND PLASMAS-IN-SPACE, REFERS TO A SERIES OF SHUTTLE/SPACELAB MODULES CURRENTLY UNDER STUDY. A SCIENCE DEFINITION WORKING GROUP FOR THE STUDY HAS BEEN FORMED, WITH ATMOSPHERIC SCIENCE, WAVE PHENOMENA, TRACER AND CHEMISTRY, AND PARTICLE INTERACTION SECTIONS. IT IS INTENDED THAT COORDINATED MEASUREMENTS YIELDING INSIGHT ON THE ATMOSPHERE, IONOSPHERE, AND MAGNETOSPHERE AND THEIR INTERRELATIONSHIPS WILL BE REALIZED.

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

SPACECRAFT COMMON NAME- ANS
ALTERNATE NAMES- ASTRO NETHERLAND SAT.
NSSDC ID- 74-070A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/30/74.

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

SPONSORING COUNTRY/AGENCY
NETHERLANDS NIVR
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/31/74
ORBIT PERIOD- 99. MIN INCLINATION- 98.1 DEG
PERIAPSIS- 254. KM ALT APOAPSIS- 1167. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/31/74
ORBIT PERIOD- 99. MIN INCLINATION- 98.1 DEG
PERIAPSIS- 254. KM ALT APOAPSIS- 1167. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	W.	BLOEMENDAL	FOKKER AIRCRAFT CO SCHIPHAL EAST, NETHERLANDS
PM -	E.W.	HYMOWITZ	NASA-GSFC GREENBELT, MD
PS -	T.P.	STECHER	NASA-GSFC GREENBELT, MD
MG -	J.R.	HOLTZ	NASA HEADQUARTERS WASHINGTON, DC
SC -	N.G.	ROMAN	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE ASTRONOMICAL NETHERLANDS SATELLITE (ANS) WAS AN EARTH-ORBITING SUN-SYNCHRONOUS SATELLITE, DESIGNED FOR USE AS AN ASTRONOMICAL OBSERVATORY. THE SPACECRAFT HAD A NEAR-CIRCULAR ORBIT AND 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 ----------

EXPERIMENT NAME- LOW-ENERGY X-RAY EXPERIMENT

NSSDC ID- 74-070A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/30/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.C.	BRINKMAN	SPACE RESEARCH LAB UTRECHT, NETHERLANDS

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED 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 EXPERIMENT, WHICH OBSERVED X RAYS FROM COSMIC SOURCES, REQUIRED AN INSTRUMENT POINTING ACCURACY OF 0.1 DEG.

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

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

NSSDC ID- 74-070A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/30/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO OBSERVE HARD X RAYS FROM COSMIC SOURCES IN THE 2- TO 40-KEV ENERGY REGION. THE INSTRUMENTS CONSISTED OF TWO BERYLLIUM-WINDOWED PROPORTIONAL

COUNTERS AND A TWO-CRYSTAL BRAGG SPECTROMETER MOUNTED OUTSIDE THE CENTRAL SQUARE TUBE NEAR THE TOP OF THE SATELLITE. THE PROPORTIONAL COUNTERS EACH HAD AN APPROXIMATELY 100-CM SQ COLLECTING AREA AND AN ANGULAR RESOLUTION OF PLUS OR MINUS 6 ARC-MIN. THE CRYSTAL SPECTROMETERS POINTED WITH PLUS OR MINUS 1 ARC-MIN ANGULAR RESOLUTION. THE DETECTION LIMITS FOR THE PROPORTIONAL COUNTERS WERE ABOUT 3 X 10 TO THE MINUS THREE PHOTONS/SQ-CM-SEC (OR ABOUT 3 X 10 TO THE MINUS FIVE TIMES THE OBSERVED FLUX OF SCORPIUS X-1). THE BRAGG SPECTROMETER DETECTED IRON EMISSIONS OF GREATER THAN 1 PERCENT IRON IN A SOURCE 0.01 OF SCORPIUS X-1.

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

EXPERIMENT NAME- UV TELESCOPE

NSSDC ID- 74-070A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 08/30/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.J. VANDUINEN .....KAPTEYN OBS
RODEN, NETHERLANDS
OI - J. BORGMAN .....U OF GRONINGEN
RODEN, NETHERLANDS

EXPERIMENT 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 IS DESIGNED TO BE SENSITIVE ENOUGH TO OBSERVE STARS UP TO THE 10TH MAGNITUDE.

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

SPACECRAFT COMMON NAME- APOLLO 12 LM/ALSEP
ALTERNATE NAMES- 04246, ALSEP 12
LEM 12, APOLLO 12C
NSSDC ID- 69-099C

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/19/69.

LAUNCH DATE- 11/14/69 SPACECRAFT WEIGHT- 4379. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN 5

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

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.W.F. EICHELMAN .....NASA-JSC
HOUSTON, TX
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - J.H. HANLEY .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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.

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

EXPERIMENT NAME- SUPRATHERMAL ION DETECTOR

NSSDC ID- 69-099C-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/18/70.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.H. FREEMAN .....RICE U
HOUSTON, TX
OI - F.C. MICHEL .....RICE U
HOUSTON, TX

EXPERIMENT 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 WHICH RESULT FROM ULTRAVIOLET IONIZATION OF THE LUNAR ATMOSPHERE. A LOW-ENERGY CURVED PLATE ANALYZER, WITH A VELOCITY FILTER OF CROSSED ELECTRIC AND MAGNETIC FIELDS, DETERMINED THE PARTICLE FLUX IN SELECTED INTERVALS OVER THE RANGE 0.2 TO 48.6 EV PER UNIT CHARGE, WITH SPECIES DISCRIMINATION OF MASSES UP TO 1000 AMU. ANOTHER ANALYZER WITHOUT A VELOCITY FILTER DETECTED HIGHER-ENERGY PARTICLES SUCH AS THOSE FOUND IN SELECTED ENERGY INTERVALS BETWEEN 10 AND 3500 EV. DUE TO ITS ORIENTATION, THIS INSTRUMENT DID NOT OBSERVE SOLAR WIND PARTICLES EXCEPT IN THE SHEATH AND TAIL. HOWEVER, IT DID SEE UPSTREAMING PARTICLES, ETC.. FROM THE SHOCK. HIGH-VOLTAGE POWER SUPPLY ARCING CAUSED SOME LOSS OF DATA. AFTER MARCH 18, 1970, THE INSTRUMENT WAS NOT OPERATED WHEN SENSOR TEMPERATURE EXCEEDED 85 DEG C.

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

EXPERIMENT NAME- PASSIVE SEISMIC

NSSDC ID- 69-099C-03

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/19/69.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.V. LATHAM .....U OF TEXAS, GALVESTON
GALVESTON, TX
OI - F. PRESS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G. SUTTON .....U OF HAWAII
HONOLULU, HI

EXPERIMENT BRIEF DESCRIPTION
THE PASSIVE SEISMIC EXPERIMENT (PSE) WAS PLACED ON THE LUNAR SURFACE AS PART OF THE ALSEP PACKAGE. IT WAS LOCATED AND DEPLOYED 310 FT (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 COMPONENTS WERE A SENSOR ASSEMBLY, LEVELING STOOL, THERMAL SHROUD, AND RADIOISOTOPE HEATERS. READINGS FROM THE SENSORS WERE SENT TO THE ALSEP CENTRAL STATION WHICH TRANSMITTED THE DATA BACK TO EARTH.

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

EXPERIMENT NAME- SOLAR WIND SPECTROMETER

NSSDC ID- 69-099C-02

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/05/71.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.W. SNYDER .....NASA-JPL
PASADENA, CA
OI - D.R. CLAY .....NASA-JPL
PASADENA, CA
OI - M.M. NEUGEBAUER .....NASA-JPL
PASADENA, CA

EXPERIMENT 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. THE SOLAR WIND SPECTROMETER OPERATED WELL FROM TURN-ON UNTIL NOVEMBER 5, 1971, WHEN TROUBLE WAS ENCOUNTERED IN TWO OF THE SPECTRAL ENERGY LEVELS.

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

SPACECRAFT COMMON NAME- APOLLO 14 LM/ALSEP
ALTERNATE NAMES- ALSEP 14, LEM 14
04905, APOLLO 14C
NSSDC ID- 71-008C

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/05/71.

LAUNCH DATE- 01/31/71 SPACECRAFT WEIGHT- 4857. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN 5

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

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - W.F. EICHELMAN .....NASA-JSC
HOUSTON, TX
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - J.B. HANLEY .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 TO BE 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 SEC S LATITUDE, 17 DEG 27 MIN 55 SEC W 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.

------- APOLLO 14 LM/ALSEP, FREEMAN ----------

EXPERIMENT NAME- SUPRATHERMAL ION DETECTOR

NSSDC ID- 71-008C-06

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/29/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - J.W. FREEMAN .....RICE U
HOUSTON, TX
OI - F.C. MICHEL .....RICE U
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION

THE ALSEP SUPRATHERMAL ION DETECTOR EXPERIMENT MEASURED IONS GENERATED FROM ULTRAVIOLET IONIZATION OF THE LUNAR ATMOSPHERE AND THE FREE-STREAMING SOLAR WIND/LUNAR SURFACE INTERACTION. FROM THE DATA OBTAINED, FLUX, NUMBER DENSITY, VELOCITY, AND ENERGY PER UNIT CHARGE CAN BE DETERMINED. A CURVED PLATE ANALYZER AND AN E-CROSS-B VELOCITY SELECTOR DETECTED IONS WITH NORMAL VELOCITIES FROM 0.4 TO 93.5 KM/SEC AND ENERGIES FROM 0.2 TO 48.6 EV, ENABLING SPECIES DISCRIMINATION OF MASSES UP TO 750 AMU. A SEPARATE CURVED PLATE ANALYZER COUNTED PROTONS IN SELECTED ENERGY INTERVALS FROM 10 TO 3500 EV. DUE TO THE ORIENTATION OF THESE DIRECTIONAL INSTRUMENTS, SOLAR WIND IONS WERE NOT OBSERVED DIRECTLY EXCEPT IN THE TAILWARD SHEATH. HOWEVER, IONS FROM THE BOW SHOCK WERE OBSERVED. ON APRIL 5, 1971 SOME ENGINEERING DATA WERE LOST DUE TO THE PARTIAL FAILURE OF AN ANALOG-TO-DIGITAL CONVERTER. THE EXPERIMENT RETURNED GOOD CONTINUOUS SCIENTIFIC DATA UNTIL OCTOBER 20, 1971 WHEN ARCING IN THE HIGH-VOLTAGE POWER SUPPLY LIMITED OPERATION NEAR LUNAR NOON. AFTER DECEMBER 16, 1971 OPERATION WAS DISCONTINUED WHEN INSTRUMENT TEMPERATURE EXCEEDED 85 DEG C. ALL DATA TAKEN AFTER MARCH 29, 1972 WERE TAKEN IN AN ANOMALOUS STANDBY MODE, AND DATA COVERAGE WAS VERY POOR.

------- APOLLO 14 LM/ALSEP, JOHNSON ----------

EXPERIMENT NAME- COLD CATHODE ION GAUGE EXPERIMENT

NSSDC ID- 71-008C-07

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 04/15/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - F.S. JOHNSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - D.E. EVANS .....NASA-JSC
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION

THE ALSEP COLD CATHODE GAUGE EXPERIMENT DETERMINED PRESSURES FROM 1E-6 TO 1E-12 TORR OF THE AMBIENT LUNAR ATMOSPHERE. THE RESULTS OF THIS EXPERIMENT, COMBINED WITH THOSE OF THE SUPRATHERMAL ION DETECTOR, WERE USED TO MEASURE THE DENSITY AND PRESSURE OF THE LUNAR NEUTRAL ATMOSPHERE. ON APRIL 5, 1971, SOME ENGINEERING DATA WERE LOST DUE TO THE PARTIAL FAILURE OF AN A/D CONVERTER. NOISY AND ERRATIC NIGHT-TIME OPERATION BEGAN IN FEBRUARY 1972, AND CONTINUED UNTIL NOVEMBER 1972 WHEN NIGHT-TIME DATA WERE LOST. OPERATION CONTINUED WITH LITTLE OR NO NIGHT-TIME COVERAGE UNTIL APRIL 15, 1973, WHEN THE EXPERIMENT ANOMALOUSLY WENT INTO STANDBY CONDITION. LITTLE USABLE DATA ARE EXPECTED AFTER APRIL 15, 1973.

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

EXPERIMENT NAME- ACTIVE SEISMIC

NSSDC ID- 71-008C-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/07/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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, 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/SEC, AND A SUBLAYER STARTING AT A DEPTH OF 8.5 M HAS A VELOCITY OF 299 M/SEC. 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 THE EARTH.

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

EXPERIMENT NAME- PASSIVE SEISMIC

NSSDC ID- 71-008C-04

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 03/20/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G.V. LATHAM .....U OF TEXAS, GALVESTON
GALVESTON, TX
OI - W.M. EWING .....COLUMBIA U
NEW YORK, NY
OI - F. PRESS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G. SUTTON .....U OF HAWAII
HONOLULU, HI

EXPERIMENT BRIEF DESCRIPTION

THE PASSIVE SEISMIC EXPERIMENT (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. INFORMATION ABOUT THE INTERIOR TO DEPTHS OF APPROXIMATELY 100 KM HAVE BEEN OBTAINED FROM THIS SEISMOMETER AND FROM THE APOLLO 11 MISSION SEISMOMETER LEFT ON THE MOON AT TRANQUILITY BASE.

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

EXPERIMENT NAME- CHARGED PARTICLE LUNAR ENVIRONMENT

NSSDC ID- 71-008C-08

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 06/06/71.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - B.J. O'BRIEN .....DEPT OF ENVIRON PROT
PERTH, AUSTRALIA
OI - D.L. REASONER .....RICE U
HOUSTON, TX

EXPERIMENT 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-SEC 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 SEC 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-SEC INTERVAL (AUTOMATIC MODE) WERE, FOR EACH ANALYZER, 1.2-SEC 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.

********** 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

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/30/71.

LAUNCH DATE- 07/26/71 SPACECRAFT WEIGHT- 12700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN 5

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

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - W.F. EICHELMAN .....NASA-JSC
HOUSTON, TX
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - J.B. HANLEY .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE APOLLO 15 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 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 SEC N LATITUDE, 3 DEG 39 MIN 30 SEC 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.

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

EXPERIMENT NAME- LUNAR DUST DETECTOR

NSSDC ID- 71-063C-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/31/71.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.R. BATES .....NASA-JSC
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THE FUNCTION OF THE ALSEP LUNAR DUST DETECTOR 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 -- 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, FREEMAN -------

EXPERIMENT NAME- SUPRATHERMAL ION DETECTOR

NSSDC ID- 71-063C-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 09/13/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.W. FREEMAN .....RICE U
HOUSTON, TX
OI - F.C. MICHEL .....RICE U
HOUSTON, TX

EXPERIMENT 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/SEC AND ENERGIES FROM 0.2 TO 48.6 EV. SPECIES DISCRIMINATION OF MASSES UP TO 120 AMU WAS POSSIBLE. A SEPARATE CURVED PLATE ANALYZER COUNTED SOLAR WIND PROTONS IN SELECTED ENERGY INTERVALS FROM 10 TO 3500 EV. OPERATION WAS NORMAL UNTIL LUNAR NOON ON DECEMBER 16, 1971, WHEN SENSOR TEMPERATURE EXCEEDED 85 DEG C. OPERATION WAS CURTAILED DUE TO POWER SUPPLY ARCING. DATA FROM OTHER PERIODS OF OPERATION WERE NORMAL.

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

EXPERIMENT NAME- COLD CATHODE ION GAUGE EXPERIMENT

NSSDC ID- 71-063C-07

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/22/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.S. JOHNSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - D.E. EVANS .....NASA-JSC
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THE ALSEP COLD CATHODE GAUGE EXPERIMENT WAS DESIGNED TO MEASURE THE DENSITY OF NEUTRAL ATOMS AND TO DETERMINE PRESSURES OF THE AMBIENT LUNAR ATMOSPHERE FROM 1E-6 TO 1E-12 TORR. THE DATA ARE TO COMPLEMENT MEASUREMENTS MADE BY THE ALSEP SUPRATHERMAL ION DETECTOR. THE INSTRUMENT WAS NOT OPERATED FOR PROLONGED PERIODS DURING THE LUNAR DAY BECAUSE OF VOLTAGE RESTRICTIONS PLACED ON THE HIGH-VOLTAGE POWER SUPPLY IN THE SIDE PACKAGE. HOWEVER, SUFFICIENT DAYSIDE OPERATION WAS CARRIED OUT OVER THE INSTRUMENT LIFETIME TO ALLOW CONSTRUCTION OF THE AVERAGE DAYSIDE DENSITY AND PRESSURE PROFILES.

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

EXPERIMENT NAME- HEAT FLOW

NSSDC ID- 71-063C-06

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 08/07/71.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - M.G. LANGSETH .....LAMONT-DOHERTY GEO OBS
PALISADES, NY
OI - S.P. CLARK, JR. .....YALE U
NEW HAVEN, CT

EXPERIMENT 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 DEG K TO 250 DEG K (0.1 DEG K), THERMOCOUPLE REFERENCE TEMPERATURE FROM -20 DEG C TO -60 DEG C (0.1 DEG C), AND PROBE CABLE AMBIENT TEMPERATURES FROM 90 DEG K TO 250 DEG K (0.3 DEG 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. PRELIMINARY RESULTS OF THE EXPERIMENT INDICATE A LUNAR HEAT FLOW OF 3.3E-6 W/CM SQ, WHICH IS ONE-HALF THAT OF THE EARTH. THE RATE OF TEMPERATURE INCREASE AS A FUNCTION OF DEPTH IS 1.75 DEG K PER M. TEMPERATURE MEASUREMENTS WERE ALSO OBTAINED DURING LUNAR NIGHT AND DURING A TOTAL ECLIPSE ON AUGUST 6, 1971.

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

EXPERIMENT NAME- PASSIVE SEISMIC

NSSDC ID- 71-063C-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/31/71.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	G.V.	LATHAM	U OF TEXAS, GALVESTON GALVESTON, TX
OI -	W.M.	EWING	COLUMBIA U NEW YORK, NY
OI -	F.	PRESS	MASS INST OF TECH CAMBRIDGE, MA
OI -	G.	SUTTON	U OF HAWAII HONOLULU, HI

EXPERIMENT 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 MICRON 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. THE SEISMOMETERS WERE OPERATING NORMALLY AS OF AUGUST 1972. THE APOLLO 15 SEISMOMETER WAS PART OF A TRIANGULAR NETWORK OF SEISMOMETERS THAT INCLUDED THE APOLLO 12 AND 14 SEISMOMETERS. (THE APOLLO 11 SEISMOMETER CEASED FUNCTIONING ABOUT 2 MONTHS AFTER DEPLOYMENT ON JULY 20, 1969.) THREE MAJOR DISCOVERIES HAVE RESULTED FROM THE SEISMOMETER EXPERIMENTS -- (1) THE EXISTENCE OF A CRUST AND MANTLE, (2) DEPTH OF FOCUS OF CYCLIC MOONQUAKES AT 800 KM, AND (3) EFFICIENT SCATTERING OF ENERGY IN A NEAR-SOURCE REGION.

********** 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

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/21/72.

LAUNCH DATE- 04/16/72 SPACECRAFT WEIGHT- 5040. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN 5

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OMSF
UNITED STATES	NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	W.F.	EICHELMAN	NASA-JSC HOUSTON, TX
MG -	F.I.	ROBERSON	NASA HEADQUARTERS WASHINGTON, DC
SC -	J.B.	HANLEY	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT 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 TO BE 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 SEC S LATITUDE, AND 15 DEG 31 MIN 12 SEC E 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.

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

EXPERIMENT NAME- LUNAR SURFACE MAGNETOMETER

NSSDC ID- 72-031C-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 08/17/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	P.	DYAL	NASA-ARC MOFFETT FIELD, CA
OI -	C.W.	PARKIN	NASA-ARC MOFFETT FIELD, CA
OI -	C.P.	SONETT	U OF ARIZONA TUCSON, AZ

EXPERIMENT 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. THE EXPERIMENT FUNCTIONED NORMALLY FROM EMPLACEMENT TO JULY 24, 1972, WHEN THE SENSOR FLIP MECHANISM FAILED. THE EXPERIMENT CONTINUED IN THIS STATE UNTIL FEBRUARY 15, 1973, WHEN A LONG PERIOD OF INTERMITTENT INSTRUMENT OPERATION ENSUED. ON AUGUST 17, 1973, THE INSTRUMENT RETURNED TO A FULLY OPERATIONAL CONDITION.

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

EXPERIMENT NAME- ACTIVE SEISMIC

NSSDC ID- 72-031C-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/07/73.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THE ACTIVE SEISMIC EXPERIMENT (ASE) (S-033) 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 ----------

EXPERIMENT NAME- PASSIVE SEISMIC

NSSDC ID- 72-031C-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/21/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	G.V.	LATHAM	U OF TEXAS, GALVESTON GALVESTON, TX
OI -	F.	PRESS	MASS INST OF TECH CAMBRIDGE, MA
OI -	G.	SUTTON	U OF HAWAII HONOLULU, HI

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSE OF THE PASSIVE SEISMIC EXPERIMENT (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 WILL ENABLE 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 MICRON 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

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/11/72.

LAUNCH DATE- 12/07/72 SPACECRAFT WEIGHT- 5050. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SATURN 5

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

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - W.F. EICHELMAN .....NASA-JSC
HOUSTON, TX
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - J.B. HANLEY .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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.

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

EXPERIMENT NAME- LUNAR EJECTA AND METEORITES

NSSDC ID- 72-096C-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/17/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- DUST INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - O.E. BERG .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 ASTROMATE 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 1E-4 IMPACTS/SQ M/SEC. 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 -------

EXPERIMENT NAME- LUNAR SEISMIC PROFILING EXPERIMENT

NSSDC ID- 72-096C-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/20/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.L. KOVACH .....STANFORD U
STANFORD, CA
OI - J.S. WATKINS .....U OF TEXAS, GALVESTON
GALVESTON, TX

EXPERIMENT 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 -------

EXPERIMENT NAME- HEAT FLOW

NSSDC ID- 72-096C-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/11/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - M.G. LANGSETH .....LAMONT-DOHERTY GEO OBS
PALISADES, NY
OI - S.P. CLARK, JR. .....YALE U
NEW HAVEN, CT
OI - J.L. CHUTE, JR. .....LEHMAN COLLEGE
NEW YORK, NY

EXPERIMENT 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 -------

EXPERIMENT NAME- LUNAR SURFACE GRAVIMETER

NSSDC ID- 72-096C-09

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/12/72.

OSS DIVISION- LUNAR PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J. WEBER .....U OF MARYLAND
COLLEGE PARK, MD
OI - J.V. LARSON .....U OF MARYLAND
COLLEGE PARK, MD

EXPERIMENT 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 10 TO THE FIFTH POWER). 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. PRECISE MEASURES OF ACCELERATION DUE TO GRAVITY OVER A PERIOD OF SEVERAL MONTHS ESTABLISHED THE DEFORMATION DUE TO TIDAL FORCES AND CONTRIBUTED TO CONCLUSIONS ABOUT THE INTERNAL CONSTITUTION OF THE MOON. 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 OF THE ALSEP CENTRAL STATION. THIS PROCEDURE CONSISTED OF LEVELING WITHIN PLUS OR MINUS 3 DEG, ALIGNMENT WITHIN PLUS OR MINUS 3 DEG USING THE SUNSHIELD SHADOW, AND MATING THE CABLE TO THE CENTRAL STATION.

********** DADE-A **********

SPACECRAFT COMMON NAME- DADE-A
ALTERNATE NAMES- DUAL AIR DENSITY EXPL-A, DAD
AD-1
NSSDC ID- DADE-A

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 75 SPACECRAFT WEIGHT- 40. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 122. MIN INCLINATION- 90. DEG
PERIAPSIS- 400. KM ALT APOAPSIS- 1500. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.E. CANADY, JR. .....NASA-LARC
HAMPTON, VA
PS - E.J. PRIOR .....NASA-LARC
HAMPTON, VA
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE EXPERIMENT AD-A (DUAL AIR DENSITY EXPLORER A) WILL CONSIST OF A 76-CM-DIAM SPHERE DESIGNED TO YIELD GLOBAL DENSITY MEASUREMENTS OF THE UPPER THERMOSPHERE. THIS EXPERIMENT WILL BE PLACED IN A COPLANAR ORBIT WITH THE SECOND SATELLITE IN THE SYSTEM, AD-B (DUAL AIR DENSITY EXPLORER B), USING A SINGLE SCOUT LAUNCH VEHICLE. VALUES OF ATMOSPHERIC DENSITY WILL BE OBTAINED FROM SATELLITE DRAG ANALYSIS NEAR PERIGEE (APPROXIMATELY 400 KM), AND FROM COMPOSITION MEASUREMENTS TAKEN BY AN ONBOARD MASS SPECTROMETER. THE SATELLITE WILL BE EQUIPPED WITH A RADIO BEACON TO FACILITATE TRACKING. ALL DATA WILL BE TELEMETERED IN REAL TIME.

------- DADE-A, KEATING -------

EXPERIMENT NAME- ATMOSPHERIC DRAG DENSITY

NSSDC ID- DADE-A -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.M. KEATING .....NASA-LARC
HAMPTON, VA
OI - E.J. PRIOR .....NASA-LARC
HAMPTON, VA
OI - J.A. MULLINS .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERIC DRAG DENSITY EXPERIMENT ON AD-A IS DESIGNED TO PROVIDE INDIRECT MEASUREMENTS OF UPPER THERMOSPHERIC DENSITY NEAR SATELLITE PERIGEE (APPROXIMATELY 400 KM). THE EXPERIMENT WILL HAVE NO UNIQUE ONBOARD HARDWARE. THE DENSITY VALUES WILL BE DERIVED FROM SEQUENTIAL OBSERVATIONS OF THE SATELLITE'S POSITION. THE EXPERIMENT WILL YIELD SYSTEMATIC VALUES OF ATMOSPHERIC DENSITY AS A FUNCTION OF LATITUDE, SEASON, AND LOCAL SOLAR TIME.

------- DADE-A, NIER -------

EXPERIMENT NAME- ATMOSPHERIC COMPOSITION MASS
SPECTROMETER

NSSDC ID- DADE-A -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.O.C.NIER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - K. MAUERSBERGER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - E.J. PRIOR .....NASA-LARC
HAMPTON, VA
OI - J.A. MULLINS .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE MASS SPECTROMETER EXPERIMENT TO BE FLOWN ON AD-A IS DESIGNED TO PERFORM COMPOSITION MEASUREMENTS IN THE UPPER THERMOSPHERE (APPROXIMATELY 400 KM). THE INSTRUMENT WILL BE A DOUBLE-FOCUSING MATTAUCH-HERZOG SPECTROMETER, AND WILL MEASURE THE DISTRIBUTION OF SUCH ATMOSPHERIC CONSTITUENTS AS OXYGEN, NITROGEN, HELIUM, HYDROGEN, NEON, AND ARGON. ALL DATA WILL BE TRANSMITTED IN REAL TIME.

********** DADE-B **********

SPACECRAFT COMMON NAME- DADE-B
ALTERNATE NAMES- DUAL AIR DENSITY EXPL-B, DAD
AD-2
NSSDC ID- DADE-B

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 75 SPACECRAFT WEIGHT- 43. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 122. MIN INCLINATION- 90. DEG
PERIAPSIS- 400. KM ALT APOAPSIS- 1500. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.E. CANADY, JR. .....NASA-LARC
HAMPTON, VA
PS - E.J. PRIOR .....NASA-LARC
HAMPTON, VA
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE EXPERIMENT AD-B (DUAL AIR DENSITY EXPLORER-B) WILL CONSIST OF A 3.66-M INFLATABLE SPHERE DESIGNED TO YIELD GLOBAL DENSITY MEASUREMENTS OF THE LOWER EXOSPHERE. THIS EXPERIMENT WILL BE PLACED IN A COPLANAR ORBIT WITH AD-A (DUAL AIR DENSITY EXPLORER-A). THE OTHER SATELLITE IN THE SYSTEM, BY A SINGLE SCOUT LAUNCH VEHICLE. VALUES OF ATMOSPHERIC DENSITY WILL BE OBTAINED FROM SATELLITE DRAG ANALYSIS NEAR PERIGEE (APPROXIMATELY 400 KM), AND FROM COMPOSITION MEASUREMENTS TAKEN BY AN ONBOARD MASS SPECTROMETER. THE SATELLITE WILL BE EQUIPPED WITH A RADIO BEACON TO FACILITATE TRACKING. ALL DATA WILL BE TELEMETERED IN REAL TIME.

------- DADE-B, KEATING -------

EXPERIMENT NAME- ATMOSPHERIC DRAG DENSITY

NSSDC ID- DADE-B -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.M. KEATING .....NASA-LARC
HAMPTON, VA
OI - E.J. PRIOR .....NASA-LARC
HAMPTON, VA
OI - J.A. MULLINS .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE ATMOSPHERIC DRAG DENSITY EXPERIMENT ON AD-B IS DESIGNED TO PROVIDE INDIRECT MEASUREMENTS OF LOWER EXOSPHERIC DENSITY NEAR SATELLITE PERIGEE (APPROXIMATELY 400 KM). THE EXPERIMENT WILL HAVE NO UNIQUE ONBOARD HARDWARE. THE DENSITY VALUES WILL BE DERIVED FROM SEQUENTIAL OBSERVATIONS OF THE SATELLITE'S POSITION. THE EXPERIMENT WILL YIELD SYSTEMATIC VALUES OF ATMOSPHERIC DENSITY AS A FUNCTION OF LATITUDE, SEASON, AND LOCAL SOLAR TIME.

------- DADE-B, NIER ----------

EXPERIMENT NAME- ATMOSPHERIC COMPOSITION MASS SPECTROMETER

NSSDC ID- DADE-B -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.O.C.NIER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - K. MAUERSBERGER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - E.J. PRIOR .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE MASS SPECTROMETER EXPERIMENT TO BE FLOWN ON AD-B WILL PERFORM COMPOSITION MEASUREMENTS IN THE LOWER EXOSPHERE (APPROXIMATELY 400 KM). THE INSTRUMENT IS A DOUBLE-FOCUSING MATTAUCH-HERZOG SPECTROMETER AND WILL MEASURE THE DISTRIBUTION OF SUCH ATMOSPHERIC CONSTITUENTS AS OXYGEN, NITROGEN, HELIUM, HYDROGEN, NEON, AND ARGON. ALL DATA WILL BE TRANSMITTED IN REAL TIME.

********** GP-A **********

SPACECRAFT COMMON NAME- GP-A
ALTERNATE NAMES- GRAVITATIONAL REDSHIFT P, GRAVR-A
RELATIVITY
NSSDC ID- GRAVR-A

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 1975 SPACECRAFT WEIGHT- 70. KG
LAUNCH SITE- WALLOPS FLIGHT CENTER, UNITED STATES
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM ALT APOAPSIS- 18530. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.S. STONE .....NASA-MSFC
HUNTSVILLE, AL
PS - R. DECKER .....NASA-MSFC
HUNTSVILLE, AL
MG - H.D. CALAHAN .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WILL CARRY ONE EXPERIMENT ON A FLIGHT OF ABOUT 3.5 HR TO AN ALTITUDE NEAR 18,530 KM. THE SPACECRAFT WILL WEIGH ABOUT 60 KG. UPON COMPLETION OF THE FLIGHT, THE SPACECRAFT SHOULD IMPACT IN THE ATLANTIC OCEAN NEAR BERMUDA. THE SPACECRAFT WILL BE PROVIDED WITH CONTINUOUS TRACKING AND TELEMETRY FROM WALLOPS ISLAND AND BERMUDA. IT IS PLANNED TO STUDY GRAVITATIONAL EFFECT ON TIME MEASUREMENTS (RELATIVISTIC OR EINSTEIN REDSHIFT) BY USE OF A HYDROGEN MASER OSCILLATOR SYSTEM (CLOCK). THIS IS TO VERIFY ONE OF THE RESULTS EXPECTED FROM EINSTEIN'S GENERAL THEORY OF RELATIVITY. THE SPACECRAFT SUPPORT EXPERIMENT WILL CONSIST OF AN S-BAND TELEMETRY TRANSPONDER, A BATTERY, AND A COOLING SYSTEM.

------- GP-A, VESSOT ----------

EXPERIMENT NAME- GRAVITATIONAL POTENTIAL AS A FUNCTION OF TIME

NSSDC ID- GRAVR-A-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.F.C.VESSOT .....SAO
CAMBRIDGE, MA
OI - M.W. LEVINE .....SAO
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS INTENDED TO STUDY THE RELATION BETWEEN TIME PASSAGE AND GRAVITATIONAL POTENTIAL, ACCORDING TO THE EINSTEIN GENERAL THEORY, TIME (FREQUENCY OF AN OSCILLATOR) PASSES SLOWER IN A STRONG GRAVITATIONAL FIELD, THAN IN A WEAKER FIELD (FREQUENCY SHIFT TOWARD THE RED, OR SLOWER FREQUENCY, END OF THE VISIBLE SPECTRUM). FREQUENCY COMPARISONS OF EQUIVALENT HYDROGEN MASER OSCILLATORS ON THE SPACECRAFT AND ON THE EARTH SHOULD PROVIDE OBSERVATIONAL SUPPORT OF THIS EFFECT. RELATIVISTIC FREQUENCY SHIFTS ARE EXPECTED TO OCCUR AS A RESULT OF BOTH VEHICLE VELOCITY AND CHANGE IN GRAVITATIONAL POTENTIAL. TWO SEPARATE SYSTEMS WILL BE USED TO MEASURE THESE SHIFTS. ONE SYSTEM WILL MEASURE THE ELAPSED PHASE CHANGES IN THE TRANSMISSION PATH, THE OTHER WILL MEASURE THE PHASE OF THE SPACECRAFT OSCILLATOR AS RECEIVED VIA THE TRANSMISSION PATH AND COMPARED TO THE EARTH-BASED OSCILLATOR. PHASE CHANGES IN THE TRANSMISSION PATH DUE TO ATMOSPHERIC EFFECTS, IONOSPHERIC EFFECTS, AND RANGE VARIATION WILL BE AUTOMATICALLY AND COHERENTLY CORRECTED.

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

SPACECRAFT COMMON NAME- HAWKEYE 1
ALTERNATE NAMES- INJUN-F, NEUTRAL POINT EXPLORER
EXPLORER 52
NSSDC ID- 74-040A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/03/74.

LAUNCH DATE- 06/03/74 SPACECRAFT 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- 06/03/74
ORBIT PERIOD- 3032. MIN INCLINATION- 89.78 DEG
PERIAPSIS- 6848. KM ALT APOAPSIS- 131948. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/16/74
ORBIT PERIOD- 3077. MIN INCLINATION- 89.84 DEG
PERIAPSIS- 8025. KM ALT APOAPSIS- 132130. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.W. COFFEE, JR. .....U OF IOWA
IOWA CITY, IA
PS - J.A. VAN ALLEN .....U OF IOWA
IOWA CITY, IA
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - L.D. KAVANAGH .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
HAWKEYE WAS PART OF THE U.S. CONTRIBUTION TO THE INTERNATIONAL MAGNETOSPHERIC STUDY. THE MAIN PURPOSE OF THIS FLIGHT WAS TO STUDY THE NEUTRAL POINT REGION OF THE MAGNETOSPHERE. THE EXPERIMENTS INCLUDED PARTICLE AND FIELD OBSERVATIONS AND LOW-ENERGY PLASMA STUDIES RELEVANT TO THE DYNAMICS OF SOLAR WIND INJECTION INTO THE MAGNETOSPHERE. THE SPACECRAFT WAS SPIN-STABILIZED WITH A SPIN RATE OF ABOUT 6 RPM AND A SPIN VECTOR PARALLEL TO THE EARTH'S EQUATORIAL PLANE. INITIAL APOGEE POSITION WAS OVER THE EARTH'S POLAR CAP IN THE NOON-DUSK QUADRANT. INITIAL SPACECRAFT AND EXPERIMENT PERFORMANCE WAS NORMAL.

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

EXPERIMENT NAME- LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 74-040A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/03/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.A. FRANK .....U OF IOWA
IOWA CITY, IA
OI - J.D. CRAVEN .....U OF IOWA
IOWA CITY, IA
OI - D.M. YEAGER .....U OF IOWA
IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF ONE LOW-ENERGY PROTON AND ELECTRON DIFFERENTIAL ENERGY ANALYZER (LEPEDEA) ORIENTED PERPENDICULAR TO THE SATELLITE SPIN AXIS. THE LEPEDEA MEASURED PROTONS AND ELECTRONS IN 16 CHANNELS OVER AN ENERGY RANGE OF 50 EV TO 50 KEV. THE EXPERIMENT SURVEYED THE PARTICLE ENVIRONMENT OF THE MAGNETOSPHERE, ESPECIALLY NEAR THE POLAR CUSPS.

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

EXPERIMENT NAME- ELF/VLF RECEIVERS

NSSDC ID- 74-040A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/03/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - G.W. PFEIFFER .....U OF IOWA
IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF TWO DETECTORS -- (1) A 16-CHANNEL SPECTRUM ANALYZER COVERING THE FREQUENCY RANGE FROM 10 HZ TO 178 KHZ WITH LOGARITHMIC SPACING AND (2) A WIDE-BAND RECEIVER COVERING THE FREQUENCY RANGE FROM 10 HZ TO 10 KHZ. THE SIGNALS FROM THE FIRST DETECTOR WERE SENT TO GROUND STATIONS DIRECTLY IN DIGITAL FORM, WHEREAS THE OUTPUT FROM THE SECOND DETECTOR WAS TRANSMITTED TO GROUND STATIONS IN ANALOG FORM. BOTH DETECTORS WERE USED IN CONNECTION WITH EITHER OF TWO ANTENNAS -- AN ELECTRIC DIPOLE ABOUT 42 METERS IN LENGTH FROM TIP TO TIP AND A SEARCH COIL ANTENNA. THE EXPERIMENT MEASURED PLASMA WAVES IN THE MAGNETOSPHERE ESPECIALLY NEAR THE POLAR CUSPS.

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

EXPERIMENT NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- 74-040A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/03/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.A. VAN ALLEN .....U OF IOWA
IOWA CITY, IA
OI - M.N. OLIVEN .....U OF IOWA
IOWA CITY, IA
OI - L.J. CAHILL, JR. .....U OF MINNESOTA
MINNEAPOLIS, MN

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A TRIAXIAL FLUXGATE MAGNETOMETER CAPABLE OF OPERATION AT TWO LEVELS, LOW GAIN AND HIGH GAIN. IN THE HIGH-GAIN MODE THE MAGNETOMETER RANGE IS FROM ABOUT 0.1 TO 100 GAMMA (STRAY SATELLITE MAGNETIC FIELDS ARE TO BE CONSTRAINED TO LESS THAN 0.1 GAMMA). IN THE LOW-GAIN MODE THE MAGNETOMETER RANGE IS FROM 100 TO ABOUT 1000 GAMMA. THE EXPERIMENT SURVEYED THE MAGNETIC FIELDS IN THE MAGNETOSPHERE, ESPECIALLY NEAR THE POLAR CUSPS.

********** HEAO-A **********

SPACECRAFT COMMON NAME- HEAO-A
ALTERNATE NAMES-
NSSDC ID- HEAO-A

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 1HALF 77 SPACECRAFT WEIGHT- 3000. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 22.5 DEG
PERIAPSIS- 410. KM ALT APOAPSIS- 410. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - F.A. SPEER .....NASA-MSFC
HUNTSVILLE, AL
PS - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
MG - R.E. HALPERN .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OBJECTIVE OF THE HIGH-ENERGY ASTRONOMY OBSERVATORIES WILL BE TO CONDUCT COORDINATE RESEARCH INTO X-RAY AND GAMMA-RAY ASTRONOMY AND COSMIC-RAY ASTROPHYSICS. THE HEAO SPACECRAFT WILL BE DESIGNED TO CARRY THE LARGE AND HEAVY SCIENTIFIC INSTRUMENTATION REQUIRED TO CONDUCT OBSERVATIONS AT THE VERY-HIGH-ENERGY AND LOW-FLUX LEVELS OF THESE PHENOMENA. THE PRIME OBJECTIVE OF THIS MISSION WILL BE TO CONDUCT AN X-RAY SKY SURVEY.

------- HEAO-A, BOLDT ----------

EXPERIMENT NAME- COSMIC X-RAY EXPERIMENT

NSSDC ID- HEAO-A -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.A. BOLDT .....NASA-GSFC
GREENBELT, MD
OI - G.P. GARMIRE .....CALIF INST OF TECH
PASADENA, CA
OI - C.S. BOWYER .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - R. CRUDDANCE .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - G.B. FIELD .....SAO
CAMBRIDGE, MA
OI - M.L. LAMPTON .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - J.I. SILK .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - S.S. HOLT .....NASA-GSFC
GREENBELT, MD
OI - G. AGRAWAL .....CALIF INST OF TECH
PASADENA, CA
OI - G.R. RIEGLER .....BENDIX CORP
ANN ARBOR, MI

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE USED TO MAP THE X-RAY SKY IN THE RANGE FROM 0.2 TO 60 KEV, EMPHASIZING BRIGHTNESS DISTRIBUTION OF THE DIFFUSE BACKGROUND, CORRELATION OF GALACTIC RADIO EMISSION AND X-RAY EMISSION FROM COSMIC RAY ELECTRONS, AND RELATIVE EMISSION AND ABSORPTION BY INTERSTELLAR MATTER. SIX THIN-WINDOW PROPORTIONAL COUNTERS COVERING THE RANGES FROM 0.2 TO 4 KEV, 1.5 TO 15 KEV, AND 3 TO 60 KEV, AND COLLIMATED TO FIELDS OF VIEW OF 1.5 X 3 DEG, 3 X 3 DEG, OR 3 X 6 DEG, WILL BE USED. THE TOTAL DETECTOR AREA WILL BE 1.32 M SQ.

------- HEAO-A, FRIEDMAN ----------

EXPERIMENT NAME- LARGE AREA COSMIC X-RAY SURVEY

NSSDC ID- HEAO-A -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.D. FRIEDMAN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - T.A. CHUBB .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - E.T. BYRAM .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - G.G. FRITZ .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - J.F. MEEKINS .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - F. SCHULMAN .....US NAVAL RESEARCH LAB
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MAP THE X-RAY SKY FROM 0.15 TO 20 KEV WITH HIGH SENSITIVITY AND MODERATE ANGULAR AND ENERGY RESOLUTION TO LOCATE X-RAY SOURCES WITH SUFFICIENT ACCURACY AND TO DETERMINE THE NATURE AND EXTENT OF BOTH GALACTIC AND EXTRAGALACTIC SOURCES. SIX PROPORTIONAL COUNTER MODULES WILL BE USED, WITH COLLIMATIONS OF 1 X 4 DEG, 1 X 0.5 DEG, OR 2 X 8 DEG, DEPENDING UPON THE MODULE.

------- HEAO-A, GURSKY ----------

EXPERIMENT NAME- X-RAY SCANNING MODULATION COLLIMATOR

NSSDC ID- HEAO-A -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. GURSKY .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - S. RAPPAPORT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G. SPADA .....MASS INST OF TECH
CAMBRIDGE, MA
OI - R. DOXSEY .....MASS INST OF TECH
CAMBRIDGE, MA
OI - R. GIACCONI .....HARVARD COLLEGE OBS
CAMBRIDGE, MA

OI - P. GORENSTEIN .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - E.M. KELLOGG .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - H. TANANBAUM .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - D. SCHWARTZ .....AS&E, INC
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WILL BE (1) TO DETERMINE THE CELESTIAL POSITIONS OF COSMIC X-RAY SOURCES TO A PRECISION OF ABOUT 5 ARC-SEC, (2) TO DETERMINE THE ANGULAR SIZE OF COSMIC X-RAY SOURCES TO A PRECISION OF ABOUT 5 TO 10 ARC-SEC IN THE ENERGY RANGE FROM 1.0 TO 15 KEV, AND (3) TO STUDY THE STRUCTURE OF THE X-RAY EMISSION TO A PRECISION OF 10 ARC-SEC IN THE ENERGY RANGE FROM 1.0 TO 15 KEV. THE EXPERIMENT WILL CONSIST OF TWO INDEPENDENT MODULATION COLLIMATOR BANKS TO SCAN THE CELESTIAL SPHERE IN THE Y-DIRECTION. EACH BANK WILL HAVE A SERIES OF FOUR WIRE GRIDS, WHICH WILL FORM A SERIES OF TRIANGULAR ACCEPTANCE PATTERNS. THE FWHM OF THE TRIANGULAR RESOLUTION ELEMENTS WILL BE 30 ARC-SEC FOR ONE COLLIMATOR BANK AND 120 ARC-SEC FOR THE OTHER. IN ADDITION, EACH BANK WILL HAVE AN EGG-CRATE COLLIMATOR TO LIMIT THE VIEW TO 4-DEG X 8-DEG FWHM. THERE WILL BE FOUR SEALED PROPORTIONAL COUNTERS ASSOCIATED WITH EACH BANK. THE COUNTERS WILL HAVE 25-MICRON BERYLLIUM WINDOWS AND WILL BE FILLED WITH A MIXTURE OF 90-PERCENT ARGON AND 10-PERCENT CARBON DIOXIDE TO A PRESSURE SLIGHTLY GREATER THAN 1 ATM.

------- HEAO-A, PETERSON ----------

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

NSSDC ID- HEAO-A -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- GAMMA-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.E. PETERSON .....U OF CALIF, SAN DIEGO
LA JOLLA, CA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - R.M. PELLING .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - J.L. MATTESON .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - A. SCHEEPMAKER .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - S. RAPPAPORT .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WILL BE TO SEARCH THE CELESTIAL SPHERE FOR PHENOMENA IN THE ENERGY RANGE FROM 0.01 TO 10 MEV. THE SEARCH WILL BE ORIENTED TO THE GATHERING OF DATA WITHIN TWO DISTINCT ENERGY BANDS - 10 TO 200 KEV, AND 0.1 TO 10 MEV. WITHIN THE 10- TO 200-KEV REGION, EMPHASIS WILL BE PLACED ON THE FOLLOWING TYPE OF STUDIES. DETERMINATIONS WILL BE MADE OF THE INTENSITY AND SPECTRA OF POINT X-RAY SOURCES, AT A SENSITIVITY OF 7E-4 PHOTONS/CM SQ/SEC. STUDIES WILL BE MADE TO FIX THE POSITIONS OF STRONG SOURCES (1.6E-2 PHOTONS/CM SQ/SEC OR MORE) TO 0.1 DEGREE, AND TO ABOUT 1 DEG FOR THRESHOLD SOURCES. SEARCHES WILL BE MADE FOR TRANSIENT SOURCES. ALL PERIODIC AND NON-PERIODIC TIME VARIATIONS IN ANY SOURCE ENCOMPASSED BY THIS INVESTIGATION WILL BE AT A TIME RESOLUTION OF APPROXIMATELY 50 MICRO-SECONDS. WORK IN THE 0.1- TO 10-MEV RANGE WILL ADDRESS THREE FUNDAMENTAL STUDIES -- (1) MEASUREMENT OF THE SPECTRUM AND ISOTROPY OF THE DIFFUSE AND THE GALACTIC GAMMA RAYS, (2) MEASUREMENT OF THE SPECTRUM AND TIME VARIATIONS OF STRONG GALACTIC AND EXTRAGALACTIC POINT SOURCES AND, (3) DETERMINATION OF VARIOUS BACKGROUND COMPONENTS AND PRODUCTION EFFECTS NEEDED TO INTERPRET THE ABOVE DATA, AND TO PROVIDE INFORMATION FOR FUTURE MISSIONS SUCH AS THE SHUTTLE. THE EXPERIMENTAL PACKAGE WILL CONTAIN SEVEN PHOSWICH DETECTORS, SHIELDED BY ACTIVE COLLIMATOR ANTICOINCIDENCE CRYSTALS, TO RECORD THE ENERGETIC PHOTONS IN THE ENERGY RANGE FROM 0.01 TO 10 MEV. ONE DETECTOR WILL BE COLLIMATED WITH A 2-DEG SLOT COLLIMATOR TO GIVE HIGH ANGULAR RESOLUTION AT THE LOW ENERGIES. ITS FIELD OF VIEW WILL BE 2 BY 20 DEG. THE OTHER DETECTORS WILL HAVE A FIELD OF VIEW OF 20 BY 40 DEG. A CESIUM IODIDE BLOCKING CRYSTAL WILL BE POSITIONED OVER THE APERTURE OF A DETECTOR TO RECORD THE BACKGROUND EVENTS IN THE DETECTOR.

********** HEAO-B **********

SPACECRAFT COMMON NAME- HEAO-B
ALTERNATE NAMES-
NSSDC ID- HEAO-B

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 78 SPACECRAFT WEIGHT- 3000. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 22.5 DEG
PERIAPSIS- 435. KM ALT APOAPSIS- 435. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - F.A. SPEER .....NASA-MSFC
HUNTSVILLE, AL
PS - S.S. HOLT .....NASA-GSFC
GREENBELT, MD
MG - R.E. HALPERN .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OBJECTIVE OF THE HIGH-ENERGY ASTRONOMY OBSERVATORIES WILL BE TO CONDUCT COORDINATED RESEARCH INTO X-RAY AND GAMMA-RAY ASTRONOMY AND COSMIC-RAY ASTROPHYSICS. THE HEAO SPACECRAFT WILL BE DESIGNED TO CARRY THE LARGE AND HEAVY SCIENTIFIC INSTRUMENTATION REQUIRED TO CONDUCT OBSERVATIONS AT THE VERY-HIGH-ENERGY AND LOW-FLUX LEVELS OF THESE PHENOMENA. THIS MISSION WILL UTILIZE A POINTED X-RAY TELESCOPE. HEAO-B WILL CARRY A GRAZING INCIDENCE X-RAY TELESCOPE POINTED AT VARIOUS X-RAY SOURCES.

------- HEAO-B, BOLDT ----------

EXPERIMENT NAME- SOLID-STATE X-RAY DETECTOR

NSSDC ID- HEAO-B -05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.A. BOLDT .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS INSTRUMENT WILL BE A COOLED SOLID-STATE SPECTROMETER AND WILL BE 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 WILL BE OPERATED AT A TEMPERATURE OF 120 DEG K. THE PRIMARY DETECTOR WILL BE 6 MM IN DIAMETER AND WILL BE SURROUNDED BY TWO VETO GUARD COUNTERS. A TWO-STAGE SOLID CRYOGEN REFRIGERATOR WILL BE USED TO COOL THE DETECTOR. SPECTRAL MEASUREMENTS WILL BE 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 ----------

EXPERIMENT NAME- A CURVED-CRYSTAL BRAGG X-RAY SPECTROMETER

NSSDC ID- HEAO-B -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO SEARCH FOR X-RAY SPECTRAL LINE EMISSIONS ARISING FROM THE SELECTED CELESTIAL OBJECTS. THE SEARCH WILL BE LIMITED TO THE ENERGY LEVEL FROM 0.1 TO 3 KEV. THE INSTRUMENT WILL BE A CURVED-CRYSTAL BRAGG SPECTROMETER USING SIX CRYSTALS. THE SELECTION OF SPECIFIC CRYSTALS WILL BE MADE FROM AMONG PET, ADP, BERYL RAP, LEAD LAURATE, AND LEAD STEARATE. THE SPECTROGRAPH RESOLUTION WILL DEPEND ON THE FINAL SELECTION OF CRYSTALS. RAP AND ADP WOULD GIVE RESOLUTIONS IN LAMBDA/DELTA-LAMBDA OF GREATER THAN 2500. LEAD STEARATE AND LAURATE WOULD GIVE RESOLUTIONS OF APPROXIMATELY 100. THE X-RAY LINES WILL BE DETECTED BY A THIN-WINDOW POSITION-SENSITIVE PROPORTIONAL COUNTER.

------- HEAO-B, GIACCONI ----------

EXPERIMENT NAME- MONITOR PROPORTIONAL COUNTER

NSSDC ID- HEAO-B -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R. GIACCONI .....HARVARD COLLEGE OBS
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL UTILIZE A MONITOR COUNTER AS A SUPPORT INSTRUMENT FOR CALIBRATION AND NORMALIZATION OF THE FOCAL PLANE INSTRUMENTATION. IT WILL BE 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 ----------

EXPERIMENT NAME- HIGH RESOLUTION IMAGER

NSSDC ID- HEAO-B -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R. GIACCONI .....HARVARD COLLEGE OBS
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WILL BE TO (1) DETECT AND ACCURATELY LOCATE X-RAY SOURCES IN THE ENERGY RANGE FROM 0.2 TO 4 KEV, (2) STUDY THE STPUCTURE OF OBJECTS LARGER THAN 2 ARC-SEC, AND (3) MEASURE THE INTENSITY AND TEMPORAL CHARACTERISTICS OF INDIVIDUAL POINT SOURCES.

------- HEAO-B, GURSKY ----------

EXPERIMENT NAME- IMAGING PROPORTIONAL COUNTER

NSSDC ID- HEAO-B -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. GURSKY .....HARVARD COLLEGE OBS
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVES OF THIS EXPERIMENT WILL BE -- (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-
NSSDC ID- HEAO-C

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 79 SPACECRAFT WEIGHT- 3000. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 50. DEG
PERIAPSIS- 480. KM ALT APOAPSIS- 480. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - F.A. SPEER .....NASA-MSFC
HUNTSVILLE, AL
PS - T.A. PARNELL .....NASA-MSFC
HUNTSVILLE, AL
MG - R.E. HALPERN .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OBJECTIVE OF THE HIGH-ENERGY ASTRONOMY OBSERVATORIES WILL BE TO CONDUCT COORDINATED RESEARCH INTO X-RAY AND GAMMA-RAY ASTRONOMY AND COSMIC-RAY ASTROPHYSICS. THE HEAO SPACECRAFT WILL BE DESIGNED TO CARRY LARGE AND HEAVY SCIENTIFIC INSTRUMENTATION REQUIRED TO CONDUCT OBSERVATIONS AT THE VERY-HIGH-ENERGY AND LOW-FLUX LEVELS OF THESE PHENOMENA. THIS MISSION WILL EMPHASIZE GAMMA-RAY ASTRONOMY AND COSMIC-RAY ASTROPHYSICS.

------- HEAO-C, ISRAEL ----------

EXPERIMENT NAME- HEAVY NUCLEII EXPERIMENT

NSSDC ID- HEAO-C -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY COSMIC RAYS
HIGH ENERGY ASTROPHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - M.H. ISRAEL .....WASHINGTON U
ST. LOUIS, MO
OI - W.R. BINNS .....MCDONNELL-DOUGLAS CORP
ST. LOUIS, MO
OI - J. KLARMANN .....WASHINGTON U
ST. LOUIS, MO
OI - R.E. VOGT .....CALIF INST OF TECH
PASADENA, CA
OP - E.C. STONE .....CALIF INST OF TECH
PASADENA, CA
OP - C.J. WADDINGTON .....U OF MINNESOTA
MINNEAPOLIS, MN

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WILL BE 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 WILL CONSIST OF A DOUBLE-ENDED INSTRUMENT OF UPPER AND LOWER HODOSCOPES AND THREE DUAL-GAP ION CHAMBERS. THE TWO ENDS WILL BE SEPARATED BY A CERENKOV RADIATOR. THE GEOMETRICAL FACTOR WILL BE A 4 SO-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 ----------

EXPERIMENT NAME- GAMMA-RAY LINE SPECTROMETER

NSSDC ID- HEAO-C -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY GAMMA-RAY ASTRONOMY
HIGH ENERGY ASTROPHYSIC X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.S. JACOBSON .....NASA-JPL
PASADENA, CA
OI - J.R. ARNOLD .....U OF CALIF, SAN DIEGO
LA JOLLA, CA
OI - A.E. METZGER .....NASA-JPL
PASADENA, CA
OI - L.E. PETERSON .....U OF CALIF, SAN DIEGO
LA JOLLA, CA

EXPERIMENT BRIEF DESCRIPTION
THE BASIC GOALS OF THIS EXPERIMENT WILL BE TO SEARCH FOR GAMMA-RAY LINE EMISSIONS ARISING FROM A VARIETY OF SOURCE PHENOMENA. PARTICULAR EMPHASIS WILL BE 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 WILL BE MADE OF THE SPECTRA AND TIME VARIATIONS OF KNOWN HARD X-RAY SOURCES. THE EXPERIMENT WILL BE 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 1E-4 TO 1E-5 PHOTONS/CM SQ/SEC, DEPENDING ON THE ENERGY. THE EXPERIMENTAL PACKAGE WILL CONTAIN FOUR COOLED DRIFTED GERMANIUM DETECTORS SHIELDED BY CESIUM IODIDE. THE KEY EXPERIMENTAL PARAMETERS WILL BE -- (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 MSEC FOR THE GERMANIUM DETECTOR AND 10 SEC FOR THE CESIUM IODIDE DETECTOR.

------- HEAO-C, KOCH ----------

EXPERIMENT NAME- ISOTOPIC COMPOSITION OF COSMIC RAYS

NSSDC ID- HEAO-C -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY COSMIC RAYS
HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L. KOCH .....CENS
SACLAY, FRANCE
OI - J.P. MEYER .....CENS
SACLAY, FRANCE
OI - D. ROUSSEL .....CENS
SACLAY, FRANCE
OI - A. SOUTOUL .....CENS
SACLAY, FRANCE
OI - M. CASSE .....CENS
SACLAY, FRANCE
OI - P. MESTREAU .....CENS
SACLAY, FRANCE

OI - N. LUND .....DANISH SPACE RES INST
LYNGBY, DENMARK
OI - K. OMO .....DANISH SPACE RES INST
LYNGBY, DENMARK
OI - O. CORYDON-PETERSON ....DANISH SPACE RES INST
LYNGBY, DENMARK
OP - B. PETERS .....DANISH SPACE RES INST
LYNGBY, DENMARK

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE 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 WILL BE COUPLED WITH THE EARTH'S MAGNETIC FIELD TO BE USED AS A SPECTROMETER. THEY WILL DETERMINE CHARGE AND MASS OF COSMIC RAYS TO A PRECISION OF 10 PERCENT FOR THE MOST ABUNDANT ELEMENTS OVER THE MOMENTUM RANGE FROM 2 TO 25 GEV/C.

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

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

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 12/10/74 SPACECRAFT WEIGHT- 210. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 192. DAYS INCLINATION- 0. DEG
PERIAPSIS- 0.3 AU RAD APOAPSIS- AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - A. KUTZER .....GES FUR WELTRAUMFORSCH
BONN, FED REP OF GE
PM - G.W. OUSLEY .....NASA-GSFC
GREENBELT, MD
PS - H. PORSCHE .....ORG FOR SP
MUNICH OF GERMANY
PS - J.H. TRAINOR .....NAS
, MD
MG - F.D. KOCHENDORFER .... EADQUARTERS
SHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF ON
THE HE ACECRAFT IS DESIGNED AS A SOLAR PROBE TO CARRY SCI EXPERIMENTS ON AN INTERPLANETARY MISSION APPROAC ABOUT 0.3 AU OF THE SUN. THE EXPERIMENTS WILL BE BY A GROUP OF GERMAN AND AMERICAN SCIENTISTS, WITH NA LVING THE TITAN CENTAUR LAUNCH VEHICLE AND THE FEL REPUBLIC OF GERMANY SUPPLYING THE SPACECRAFT.

LAUNCHED SUCCESSFULLY 12/10/74

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

EXPERIMENT NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- HELIO-A-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- INTERPLANETARY PHYSICS INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. FECHTIG .....MPI-NUCLEAR PHYS
HEIDELBERG, FED REP OF GERMANY
OI - J. WEIHRAUCH .....MPI
HEIDELBERG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THE AIM OF THE EXPERIMENT WILL BE 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 KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/SEC) WILL CAUSE THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD CAN THEN BE SEPARATED BY APPROPRIATE VOLTAGES INTO ITS NEGATIVE (ELECTRON) PART AND INTO POSITIVE IONS. THE MASS AND THE ENERGY OF THE DUST PARTICLES WILL BE DETERMINED FROM THE IMPULSE HEIGHTS. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET WILL ALLOW THE SMALL ION CLOUD TO BE ANALYZED. IN THIS WAY THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES WILL BECOME POSSIBLE. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WILL BE ABOUT 10 TO THE MINUS 15 GM. MASS AND ENERGY DETERMINATION WILL BE POSSIBLE FOR PARTICLES LARGER THAN ABOUT 10 TO THE MINUS 14 GM. FOR PARTICLES LARGER THAN 10 TO THE MINUS 13 GM, A MASS SPECTRUM MAY BE GATHERED.

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

EXPERIMENT NAME- COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- HELIO-A-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE TO OBSERVE ELECTROSTATIC AND ELECTROMAGNETIC WAVE PHENOMENA OVER THE FREQUENCY RANGE FROM 10 HZ TO 2 MHZ IN INTERPLANETARY SPACE BETWEEN 1 AND 0.3 AU. THE ANTENNA FOR THIS EXPERIMENT WILL CONSIST OF AN ELECTRIC DIPOLE WITH A TIP-TO-TIP LENGTH OF AT LEAST FIVE TIMES THE SPACECRAFT DIAMETER. THREE SPECTRUM ANALYZERS WHICH JOINTLY COVER THE FREQUENCY RANGE OF INTEREST (HELIO-A-04, HELIO-A-05, AND HELIO-A-06) WILL BE USED. THE ANALYZER IN EXPERIMENT HELIO-A-04 WILL BE A 16-CHANNEL SPECTRUM ANALYZER FOR COARSE FREQUENCY RESOLUTION (30 PERCENT) AND HIGH TIME RESOLUTION (.LT. 1 SEC) OVER THE FREQUENCY RANGE FROM 10 HZ TO 100 KHZ.

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

EXPERIMENT NAME- FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS

NSSDC ID- HELIO-A-05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE TO OBSERVE ELECTROSTATIC AND ELECTROMAGNETIC WAVE PHENOMENA OVER THE FREQUENCY RANGE FROM 10 HZ TO 2 MHZ IN INTERPLANETARY SPACE BETWEEN 1 AND 0.3 AU. THE ANTENNA FOR THIS EXPERIMENT WILL CONSIST OF AN ELECTRIC DIPOLE WITH A TIP-TO-TIP LENGTH OF AT LEAST FIVE TIMES THE SPACECRAFT DIAMETER. THREE SPECTRUM ANALYZERS WILL BE USED WHICH JOINTLY COVER THE FREQUENCY RANGE OF INTEREST (HELIO-A-04, HELIO-A-05, AND HELIO-A-06). THE ANALYZER FOR HELIO-A-05 WILL BE A NARROW-BAND SWEEP FREQUENCY SPECTRUM ANALYZER FOR FINE FREQUENCY RESOLUTION (4 PERCENT) AND LOW TIME RESOLUTION (LESS THAN 1 MIN) OVER THE FREQUENCY RANGE FROM 10 HZ TO 100 KHZ.

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

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

NSSDC ID- HELIO-A-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A DUAL STEP-FREQUENCY RADIOMETER (5 KHZ BANDWIDTH), OPERATING BETWEEN 50 KHZ AND 2 MHZ IN A VARIABLE NUMBER OF STEPS. THE RADIOMETER WILL BE COUPLED TO A DIPOLE ANTENNA SHARED WITH TWO OTHER SPECTRUM ANALYZERS, WHICH WILL COVER THE 10 HZ TO 100 KHZ SPECTRAL RANGE. THE PURPOSE OF THIS EXPERIMENT WILL BE TO STUDY TYPE III SOLAR RADIO BURSTS.

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

EXPERIMENT NAME- ENERGETIC ELECTRON DETECTOR

NSSDC ID- HELIO-A-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	E.	KEPPLER	MPI-AERONOMY LINDAU, FED REP OF GERMANY
OI -	B.	WILKEN	MPI-AERONOMY LINDAU, FED REP OF GERMANY
OI -	D.J.	WILLIAMS	NOAA-ERL BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION
ELECTRONS WITH ENERGIES BETWEEN 40 KEV AND 1 MEV WILL BE ENERGY-SELECTED BY TWO PERMANENT MAGNETS AND COUNTED BY SEMICONDUCTOR DETECTORS. PROTONS WILL BE DEFLECTED AND COUNTED SEPARATELY. THE POINTING DIRECTION WILL BE WITHIN THE ECLIPTIC PLANE WITH AN APERTURE ANGLE OF ABOUT 20 DEG. THE TIME RESOLUTION WILL BE ON THE ORDER OF MINUTES.

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

EXPERIMENT NAME- CELESTIAL MECHANICS

NSSDC ID- HELIO-A-14

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY CELESTIAL MECHANICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	W.	KUNDT	U OF HAMBURG HAMBURG, FED REP OF GERMANY
OI -	W.G.	MELBOURNE	NASA-JPL PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL USE 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 ----------

EXPERIMENT NAME- COSMIC-RAY PARTICLES

NSSDC ID- HELIO-A-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.	KUNOW	U OF KIEL KIEL, FED REP OF GERMANY
OI -	G.	WIBBERENZ	U OF KIEL KIEL, FED REP OF GERMANY
OI -	G.	GREEN	U OF KIEL KIEL, FED REP OF GERMANY
OI -	M.	MUELLER-MELLIN	U OF KIEL KIEL, FED REP OF GERMANY
OI -	H.	WITTE	U OF KIEL KIEL, FED REP OF GERMANY
OI -	H.	HEMPE	U OF KIEL KIEL, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO MEASURE SOLAR AND GALACTIC PROTON, ELECTRON, AND ALPHA-PARTICLE FLUXES, SPECTRA, AND DIRECTIONAL CHARACTERISTICS AS FUNCTIONS OF DISTANCE FROM THE SUN. THE INSTRUMENTATION TO BE USED WILL CONSIST OF FIVE SEMICONDUCTOR DETECTORS AND A SAPPHIRE CERENKOV DETECTOR ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE EXPERIMENT WILL BE CAPABLE OF DETECTING PARTICLES FROM 1 TO 1000 MEV/NUCLEON. THE MEASUREMENTS WILL BE CORRELATED WITH THOSE FROM AN IDENTICAL DETECTOR ON HELIOS-B, WITH THOSE FROM OTHER HELIOS-A EXPERIMENTS, AND WITH DATA FROM SATELLITES IN EARTH ORBIT.

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

EXPERIMENT NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- HELIO-A-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- INTERPLANETARY PHYSICS ZODIACAL LIGHT

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	C.	LEINERT	LAND OBS HEIDELBERG, FED REP OF GERMANY
OI -	E.	PITZ	LAND OBS HEIDELBERG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS WILL OBSERVE THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN UV, BLUE, AND VISUAL BANDS. THE PURPOSE OF THIS EXPERIMENT WILL BE TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES.

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

EXPERIMENT NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- HELIO-A-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	N.F.	NESS	NASA-GSFC GREENBELT, MD
OI -	F.	MARIANI	U OF AQUILA AQUILA, ITALY
OI -	L.F.	BURLAGA	NASA-GSFC GREENBELT, MD
OI -	S.C.	CANTARANO	U OF ROME ROME, ITALY

EXPERIMENT BRIEF DESCRIPTION
A TRIAXIAL FLUXGATE MAGNETOMETER WILL MEASURE INTERPLANETARY MAGNETIC FIELD DIRECTIONS AND MAGNITUDES IN THE FOLLOWING THREE RANGES (AND ACCURACIES) -- 25 GAMMAS (0.1 GAMMA), 75 GAMMAS (0.3 GAMMA), 225 GAMMAS (0.9 GAMMA). AT LOW TELEMETRY BIT RATES, AVERAGES AND VARIANCES WILL BE COMPUTED ONBOARD FOR TRANSMISSION TO EARTH.

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

EXPERIMENT NAME- FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS

NSSDC ID- HELIO-A-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	F.M.	NEUBAUER	BRAUNSCHWEIG TECH U BRAUNSCHWEIG, FED REP OF GERMANY
OI -	A.	MAIER	BRAUNSCHWEIG TECH U BRAUNSCHWEIG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
A TRIAXIAL FLUXGATE MAGNETOMETER WILL MEASURE VECTOR COMPONENTS OF THE MAGNETIC FIELD WITH MAGNITUDE UP TO 102.4 GAMMAS (RESOLUTION 0.4 GAMMA) AND WITH MAGNITUDES UP TO 409.6 GAMMAS (RESOLUTION, 1.2 GAMMA). ONE VECTOR MEASUREMENT PER 2 SEC WILL BE OBTAINED IN THE NORMAL MODE. EIGHT MEASUREMENTS PER SEC WILL BE OBTAINED IN THE SHOCK MODE TO BE USED FOR INTERVALS OF ABOUT 3 MIN. THUS, THE QUASI-STATIC COMPONENT AND FLUCTUATING COMPONENTS OF THE INTERPLANETARY MAGNETIC FIELD WILL BE STUDIED.

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

EXPERIMENT NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- HELIO-A-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	F.M.	NEUBAUER	BRAUNSCHWEIG TECH U BRAUNSCHWEIG, FED REP OF GERMANY
OI -	G.	DEHMEL	BRAUNSCHWEIG TECH U BRAUNSCHWEIG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
MAGNETIC FLUCTUATIONS IN THE FREQUENCY RANGE 5 HZ TO 3 KHZ WILL BE MEASURED BY A TRIAXIAL SEARCH-COIL MAGNETOMETER. FOR THE AXIS PARALLEL TO THE SPACECRAFT SPIN AXIS, SPECTRAL RESOLUTION WILL BE OBTAINED. BECAUSE OF THE LOW DATA RATE AVAILABLE, SHORT-TERM HIGH-RESOLUTION DATA ON EVENTS (SHOCKS) WILL BE ACCOMPLISHED USING ONBOARD DATA STORAGE.

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

EXPERIMENT NAME- PLASMA DETECTORS

NSSDC ID- HELIO-A-09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.R. ROSENBAUER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - H. PELLKOFER .....MPI
GARCHING, FED REP OF GERMANY
OI - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION

THESE THREE DETECTORS WILL BE USED TO STUDY THE DIRECTIONAL INTENSITY OF THE PROTONS, ALPHA PARTICLES, AND ELECTRONS IN THE SOLAR WIND. A QUADRISPHERICAL ANALYZER WITH AN ENERGY PER CHARGE RANGE OF 231 V TO 16 KV, AN ANGULAR RESOLUTION OF 5 DEG IN AZIMUTH AND 5 DEG IN ELEVATION, AND A TIME RESOLUTION OF 30 SEC WILL BE USED TO OBSERVE PROTONS AND ALPHA PARTICLES. A HEMISPHERICAL ANALYZER WILL ALSO BE USED TO DETECT PROTONS AND ALPHA PARTICLES. ANOTHER HEMISPHERICAL ANALYZER WITH 10 ENERGY/CHARGE STEPS BETWEEN 16 V AND 1 KV, WILL BE USED TO OBSERVE ELECTRONS. MEASUREMENTS WILL BE MADE IN EIGHT EQUAL AZIMUTHAL SECTORS (45 DEG). THE INTEGRATION ANGLE IN ELEVATION WILL BE ABOUT 100 DEG.

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

EXPERIMENT NAME- GALACTIC AND SOLAR COSMIC RAYS

NSSDC ID- HELIO-A-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD
OI - E.C. ROELOF .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD
OI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST OF THREE PARTICLE TELESCOPES DESIGNED TO MEASURE THE ENTIRE ENERGY RANGE OF 0.1 TO ABOUT 800 MEV FOR PROTONS AND HEAVIER PARTICLES (Z LESS THAN 10) AND OF 0.05 TO 5 MEV FOR ELECTRONS. ENERGY SPECTRA, AND CHEMICAL AND ISOTOPIC COMPOSITION OF GALACTIC AND SOLAR COSMIC RAYS WILL BE STUDIED. ADDITIONALLY, AN X-RAY COUNTER WILL MONITOR THE SOLAR X-RAY EMISSION. THE THREE TELESCOPES WILL BE CONSTRUCTED FROM SOLID-STATE DETECTORS. THE TELESCOPES AND THE X-RAY COUNTER WILL LOOK INTO THE ECLIPTIC PLANE.

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

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

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- JAN. 76 SPACECRAFT WEIGHT- 210. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

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

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 192. DAYS INCLINATION- 0. DEG
PERIAPSIS- 0.3 AU RAD APOAPSIS- AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - A. KUTZER .....GES FUR WELTRAUMFORSCH
BONN, FED REP OF GERMANY
PM - G.W. OUSLEY .....NASA-GSFC
GREENBELT, MD
PS - H. PORSCHE .....ORG FOR SPACE RES
MUNICH, FED REP OF GERMANY
PS - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

THE HELIOS-B SPACECRAFT IS DESIGNED AS A SOLAR PROBE TO CARRY SCIENTIFIC EXPERIMENTS ON AN INTERPLANETARY MISSION APPROACHING TO ABOUT 0.3 AU OF THE SUN. THE EXPERIMENTS WILL BE PROVIDED BY A GROUP OF GERMAN AND U.S. SCIENTISTS, WITH NASA SUPPLYING THE TITAN CENTAUR LAUNCH VEHICLE AND THE FEDERAL REPUBLIC OF GERMANY SUPPLYING THE SPACECRAFT.

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

EXPERIMENT NAME- MICROMETEOROID DETECTOR AND ANALYZER

NSSDC ID- HELIO-B-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H. FECHTIG .....MPI-NUCLEAR PHYS
HEIDELBERG, FED REP OF GERMANY
OI - J. WEIHRAUCH .....MPI
HEIDELBERG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION

THE AIM OF THE EXPERIMENT WILL BE 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 KINETIC ENERGY OF DUST PARTICLES HITTING A TARGET WITH HIGH VELOCITY (SEVERAL KM/SEC) WILL CAUSE THE MATERIAL TO VAPORIZE AND BECOME PARTIALLY IONIZED. THE GENERATED PLASMA CLOUD CAN THEN BE 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 WILL BE DETERMINED. A TIME-OF-FLIGHT MASS SPECTROMETER IN CONNECTION WITH THE TARGET WILL ALLOW THE SMALL ION CLOUD TO BE ANALYZED. IN THIS WAY THE INVESTIGATION OF THE CHEMICAL COMPOSITION OF THE DUST PARTICLES WILL BECOME POSSIBLE. THE THRESHOLD FOR THE DETECTION OF A PARTICLE WILL BE ABOUT 10 TO THE MINUS 15 GM. MASS AND ENERGY DETERMINATION WILL BE POSSIBLE FOR PARTICLES LARGER THAN ABOUT 10 TO THE MINUS 14 GM. FOR PARTICLES LARGER THAN 10 TO THE MINUS 13 GM, A MASS SPECTRUM MAY BE GATHERED.

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

EXPERIMENT NAME- COARSE FREQUENCY, FINE TIME RESOLUTION
SPECTRUM ANALYSIS

NSSDC ID- HELIO-B-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL BE TO OBSERVE ELECTROSTATIC AND ELECTROMAGNETIC WAVE PHENOMENA OVER THE FREQUENCY RANGE FROM 10 HZ TO 2 MHZ IN INTERPLANETARY SPACE BETWEEN 1 AND 0.3 AU. THE ANTENNA FOR THIS EXPERIMENT WILL CONSIST OF AN ELECTRIC DIPOLE WITH A TIP-TO-TIP LENGTH OF AT LEAST FIVE TIMES THE SPACECRAFT DIAMETER. THREE SPECTRUM ANALYZERS WILL BE USED WHICH JOINTLY COVER THE FREQUENCY RANGE OF INTEREST (HELIO-B-04, HELIO-B-05, AND HELIO-B-06). THE ANALYZER IN EXPERIMENT HELIO-B-04 WILL BE A 16-CHANNEL SPECTRUM ANALYZER FOR COARSE FREQUENCY RESOLUTION (30 PERCENT) AND HIGH TIME RESOLUTION (.LT. 1 SECOND) OVER THE FREQUENCY RANGE FROM 10 KZ TO 100 KHZ.

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

EXPERIMENT NAME- FINE FREQUENCY, COARSE TIME RESOLUTION
SPECTRUM ANALYSIS

NSSDC ID- HELIO-B-05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN

OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE TO OBSERVE ELECTROSTATIC AND ELECTROMAGNETIC WAVE PHENOMENA OVER THE FREQUENCY RANGE FROM 10 HZ TO 2 MHZ IN INTERPLANETARY SPACE BETWEEN 1 AND 0.3 AU. THE ANTENNA FOR THIS EXPERIMENT WILL CONSIST OF AN ELECTRIC DIPOLE WITH A TIP-TO-TIP LENGTH OF AT LEAST FIVE TIMES THE SPACECRAFT DIAMETER. THREE SPECTRUM ANALYZERS WILL BE USED WHICH JOINTLY COVER THE FREQUENCY RANGE OF INTEREST (HELIO-B-04, HELIO-B-05, AND HELIO-B-06). THE ANALYZER FOR HELIO-B-05 WILL BE A NARROW-BAND SWEEP FREQUENCY SPECTRUM ANALYZER FOR FINE FREQUENCY RESOLUTION (4 PERCENT) AND LOW TIME RESOLUTION (ABOUT 1 MINUTE) OVER THE FREQUENCY RANGE FROM 10 HZ TO 100 KHZ.

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

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

NSSDC ID- HELIO-B-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - P.S. KELLOGG .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - S.J. BAUER .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT WILL CONSIST OF A DUAL STEP-FREQUENCY RADIOMETER (5 KHZ BANDWIDTH), OPERATING BETWEEN 50 KHZ AND 2 MHZ IN A VARIABLE NUMBER OF STEPS. THE RADIOMETER WILL BE COUPLED TO A DIPOLE ANTENNA SHARED WITH TWO OTHER SPECTRUM ANALYZERS WHICH WILL COVER THE 10-HZ TO 100-KHZ SPECTRAL RANGE. THE PURPOSE OF THE EXPERIMENT WILL BE TO STUDY TYPE III SOLAR RADIO BURSTS.

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

EXPERIMENT NAME- ENERGETIC ELECTRON DETECTOR

NSSDC ID- HELIO-B-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E. KEPPLER .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY
OI - B. WILKEN .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY
OI - D.J. WILLIAMS .....NOAA-ERL
BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION
ELECTRONS WITH ENERGIES BETWEEN 40 KEV AND 1 MEV WILL BE ENERGY SELECTED BY TWO PERMANENT MAGNETS AND COUNTED BY SEMICONDUCTOR DETECTORS. PROTONS WILL BE DEFLECTED AND COUNTED SEPARATELY. THE POINTING DIRECTION WILL BE WITHIN THE ECLIPTIC PLANE WITH AN APERTURE ANGLE OF ABOUT 20 DEG. THE TIME RESOLUTION WILL BE ON THE ORDER OF MINUTES.

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

EXPERIMENT NAME- CELESTIAL MECHANICS

NSSDC ID- HELIO-B-14

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY CELESTIAL MECHANICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W. KUNDT .....U OF HAMBURG
HAMBURG, FED REP GER
OI - W.G. MELBOURNE .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL USE 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-B, KUNOW ----------

EXPERIMENT NAME- COSMIC-RAY PARTICLES

NSSDC ID- HELIO-B-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. KUNOW .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - G. WIBBERENZ .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - G. GREEN .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - M. MUELLER-MELLIN .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - H. WITTE .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - H. HEMPE .....U OF KIEL
KIEL, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO MEASURE SOLAR AND GALACTIC, PROTON, ELECTRON, AND ALPHA-PARTICLE FLUXES, SPECTRA, AND DIRECTIONAL CHARACTERISTICS AS FUNCTIONS OF DISTANCE FROM THE SUN. THE INSTRUMENTATION TO BE USED WILL CONSIST OF FIVE SEMICONDUCTOR DETECTORS AND A SAPPHIRE CERENKOV DETECTOR ENCLOSED BY AN ANTICOINCIDENCE CYLINDER. THE EXPERIMENT WILL BE CAPABLE OF DETECTING PARTICLES FROM 1 TO 1000 MEV/NUCLEON. THE MEASUREMENTS WILL BE CORRELATED WITH THOSE FROM AN IDENTICAL DETECTOR ON HELIOS-A, WITH THOSE FROM OTHER HELIOS-B EXPERIMENTS, AND WITH DATA FROM SATELLITES IN EARTH ORBIT.

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

EXPERIMENT NAME- ZODIACAL LIGHT PHOTOMETER

NSSDC ID- HELIO-B-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ZODIACAL LIGHT INTERPLANETARY PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C. LEINERT .....LAND OBS
HEIDELBERG, FED REP OF GERMANY
OI - E. PITZ .....LAND OBS
HEIDELBERG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF THREE PHOTOMETERS LOOKING AT 15 DEG, 30 DEG, AND 90 DEG FROM THE ECLIPTIC. THESE PHOTOMETERS WILL OBSERVE THE INTENSITY AND POLARIZATION OF THE ZODIACAL LIGHT IN WHITE LIGHT AND IN UV, BLUE, AND VISUAL BANDS. THE PURPOSE OF THIS EXPERIMENT WILL BE TO OBTAIN INFORMATION ABOUT THE SPATIAL DISTRIBUTION, SIZE, AND NATURE OF INTERPLANETARY DUST PARTICLES.

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

EXPERIMENT NAME- FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS

NSSDC ID- HELIO-B-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.F. NESS .....NASA-GSFC
GREENBELT, MD
OI - F. MARIANI .....U OF AQUILA
AQUILA, ITALY
OI - L.F. BURLAGA .....NASA-GSFC
GREENBELT, MD
OI - S.C. CANTARANO .....U OF ROME
ROME, ITALY

EXPERIMENT BRIEF DESCRIPTION
A TRIAXIAL FLUXGATE MAGNETOMETER WILL MEASURE INTERPLANETARY MAGNETIC FIELD DIRECTIONS, AND MAGNITUDES IN THE FOLLOWING THREE RANGES (AND ACCURACIES) -- 25 GAMMAS (0.1 GAMMA), 75 GAMMAS (0.3 GAMMA), 225 GAMMAS (0.9 GAMMA). AT LOW TELEMETRY BIT RATES, AVERAGES AND VARIANCES WILL BE COMPUTED ONBOARD FOR TRANSMISSION TO EARTH.

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

EXPERIMENT NAME- FLUXGATE MAGNETOMETER FOR FIELD
FLUCTUATIONS

NSSDC ID- HELIO-B-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.M. NEUBAUER .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY
OI - A. MAIER .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
A TRIAXIAL FLUXGATE MAGNETOMETER WILL MEASURE VECTOR COMPONENTS OF THE MAGNETIC FIELD WITH MAGNITUDE UP TO 102.4 GAMMAS (RESOLUTION 0.4 GAMMA) AND WITH MAGNITUDES UP TO 409.6 GAMMAS (RESOLUTION 1.2 GAMMA). ONE VECTOR MEASUREMENT PER 2 SEC WILL BE OBTAINED IN THE NORMAL MODE. EIGHT MEASUREMENTS PER SEC WILL BE OBTAINED IN THE SHOCK MODE TO BE USED FOR INTERVALS OF ABOUT 3 MIN. THUS, THE QUASI-STATIC COMPONENT AND FLUCTUATING COMPONENTS OF THE INTERPLANETARY MAGNETIC FIELD WILL BE STUDIED.

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

EXPERIMENT NAME- SEARCH COIL MAGNETOMETER

NSSDC ID- HELIO-B-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.M. NEUBAUER .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY
OI - G. DEMMEL .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
MAGNETIC FLUCTUATIONS IN THE FREQUENCY RANGE 5 HZ TO 3 KHZ WILL BE MEASURED BY A TRIAXIAL SEARCH-COIL MAGNETOMETER. FOR THE AXIS PARALLEL TO THE SPACECRAFT SPIN AXIS, SPECTRAL RESOLUTION WILL BE OBTAINED. BECAUSE OF THE LOW DATA RATE AVAILABLE, SHORT-TERM HIGH-RESOLUTION DATA ON EVENTS (SHOCKS) WILL BE OBTAINED USING ONBOARD DATA STORAGE.

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

EXPERIMENT NAME- PLASMA DETECTORS

NSSDC ID- HELIO-B-09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.R. ROSENBAUER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - H. PELLKOFER .....MPI
GARCHING, FED REP OF GERMANY
OI - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THESE THREE DETECTORS WILL BE USED TO STUDY THE DIRECTIONAL INTENSITY OF THE PROTONS, ALPHA PARTICLES, AND ELECTRONS IN THE SOLAR WIND. A QUADRISPHERICAL ANALYZER WITH AN ENERGY PER CHARGE RANGE OF 231 V TO 16 KV, AN ANGULAR RESOLUTION OF 5 DEG IN AZIMUTH AND 5 DEG IN ELEVATION, AND A TIME RESOLUTION OF 30 SEC WILL BE USED TO OBSERVE PROTONS AND ALPHA PARTICLES. A HEMISPHERICAL ANALYZER WILL ALSO BE USED TO DETECT PROTONS AND ALPHA PARTICLES. ANOTHER HEMISPHERICAL ANALYZER WITH 10 ENERGY/CHARGE STEPS BETWEEN 16 V AND 1 KV, WILL BE USED TO OBSERVE ELECTRONS. MEASUREMENTS WILL BE MADE IN EIGHT EQUAL AZIMUTHAL SECTORS (45 DEG). THE INTEGRATION ANGLE IN ELEVATION WILL BE ABOUT 100 DEG.

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

EXPERIMENT NAME- GALACTIC AND SOLAR COSMIC RAYS

NSSDC ID- HELIO-B-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD
OI - E.C. ROELOF .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD
OI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF THREE PARTICLE TELESCOPES DESIGNED TO MEASURE THE ENTIRE ENERGY RANGE OF 0.1 TO ABOUT 800 MEV FOR PROTONS AND HEAVIER PARTICLES (Z LESS THAN 10) AND OF 0.05 TO 5 MEV FOR ELECTRONS. ENERGY SPECTRA, AND CHEMICAL AND ISOTOPIC COMPOSITION OF GALACTIC AND SOLAR COSMIC RAYS WILL BE STUDIED. ADDITIONALLY, AN X-RAY COUNTER WILL MONITOR THE SOLAR X-RAY EMISSION. THE THREE TELESCOPES WILL BE CONSTRUCTED FROM SOLID-STATE DETECTORS. THE TELESCOPES AND THE X-RAY COUNTER WILL LOOK INTO THE ECLIPTIC PLANE.

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

SPACECRAFT COMMON NAME- IMP-H
ALTERNATE NAMES- PL-713A, EXPLORER 47
IMP 7, 06197
NSSDC ID- 72-073A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/23/72.

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

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/25/72
ORBIT PERIOD- 17365. MIN INCLINATION- 28.6 DEG
PERIAPSIS- 201599. KM ALT APOAPSIS- 235639. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 07/13/74
ORBIT PERIOD- 17482. MIN INCLINATION- 9.215 DEG
PERIAPSIS- 198878. KM ALT APOAPSIS- 243626. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - P. BUTLER .....NASA-GSFC
GREENBELT, MD
PS - J.H. KING .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 SEC. 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 ----------

EXPERIMENT NAME- MEASUREMENT OF SOLAR PLASMA

NSSDC ID- 72-073A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/23/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.J. BAME .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - J.R. ASBRIDGE .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM

EXPERIMENT 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 200 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 -------

EXPERIMENT NAME- MEASUREMENT OF SOLAR PLASMA

NSSDC ID- 72-073A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/11/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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 STUDIED IN EIGHT LOGARITHMICALLY EQUISPACED CHANNELS BETWEEN 17 EV AND 7 KEV. POSITIVE IONS WERE STUDIED IN EIGHT CHANNELS BETWEEN 50 EV AND 7 KEV. A SPECTRUM WAS OBTAINED EVERY EIGHT SPACECRAFT REVOLUTIONS. ANGULAR INFORMATION WAS OBTAINED IN EITHER 15 EQUALLY SPACED INTERVALS DURING A 360-DEG REVOLUTION OF THE SATELLITE OR IN 15 ANGULAR SEGMENTS CENTERED MORE CLOSELY ABOUT THE SPACECRAFT SUN LINE.

------- IMP-H, CLINE -------

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

NSSDC ID- 72-073A-13

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/13/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS COSMIC RAYS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - T.L. CLINE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WILL BE STUDIED. PULSE AMPLITUDE AND SHAPE WERE TO YIELD ENERGY (10 PERCENT RESOLUTION) AND PARTICLE SPECIES INFORMATION.

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

EXPERIMENT NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND
ELECTRONS

NSSDC ID- 72-073A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/23/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - L.A. FRANK .....U OF IOWA
IOWA CITY, IA

EXPERIMENT 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 X 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 SEC, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS WAS MEASURED EVERY 68 SEC.

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

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

NSSDC ID- 72-073A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/25/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ
OI - D.K. HOVESTADT .....MPI
GARCHING, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES ASSOCIATED WITH SOLAR ACTIVITY. 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 (NO CHARGE RESOLUTION FOR Z GREATER THAN 8). 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 -------

EXPERIMENT NAME- CHARGED PARTICLE MEASUREMENTS EXPERIMENT

NSSDC ID- 72-073A-08

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 12/11/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - S.M. KRIMIGIS .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - T.P. ARMSTRONG .....U OF KANSAS
LAWRENCE, KS
OI - J.A. VAN ALLEN .....U OF IOWA
IOWA CITY, IA

EXPERIMENT 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 ONE MILLION (PER SQUARE CM-SEC-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 SQUARE CM-SEC-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 -------

EXPERIMENT NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 72-073A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/26/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - D.E. HAGGE .....NASA-JSC
HOUSTON, TX
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WHICH 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 AMU 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 AMU 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 ----------

EXPERIMENT NAME- SOLAR WIND ION COMPOSITION

NSSDC ID- 72-073A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/24/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.W. OGILVIE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 4HE++, 4HE+, 3HE++, 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/SEC. A COMPLETE SET OF MEASUREMENTS REQUIRED ABOUT 10 MIN AND CONSISTED OF THIRTY 1-STEP SEQUENCES FOR 4 HE++ IONS AND FIVE 30-STEP SEQUENCES FOR EACH OF THE OTHER THREE SPECIES.

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

EXPERIMENT NAME- PLASMA WAVE EXPERIMENT

NSSDC ID- 72-073A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 09/24/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - G.M. CROOK .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - I.M. GREEN .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - R.W. FREDERICKS .....TRW SYSTEMS GROUP
REDONDO BEACH, CA

EXPERIMENT 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 SEC). 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 LITTLE IF ANY USABLE DATA WERE OBTAINED IN THIS MODE OF OPERATION. FOR THE DIGITAL MODES, THE ELECTRIC AND MAGNETIC THRESHOLDS WERE SET BY INTERFERENCE CAUSED BY THE SOLAR CELL ARRAYS. THIS INTERFERENCE WAS DUE TO THE ASYMMETRIC SHEATH RELATED TO THE NON-CONDUCTING SATELLITE SURFACE AND THE SIX-SIDED GEOMETRY OF THE SPACECRAFT PANELS. IT IS EXPECTED THAT THESE INTERFERENCE PROBLEMS WILL ADVERSELY AFFECT MOST AMBIENT FIELD MEASUREMENTS.

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

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

NSSDC ID- 72-073A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/23/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.A. SIMPSON .....U OF CHICAGO
CHICAGO, IL
OI - M. GARCIA-MUNOZ .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS TO INCREASE THE UNDERSTANDING OF SOLAR FLARE PARTICLE ACCELERATION AND PARTICLE CONTAINMENT IN MAGNETIC FIELDS IN THE VICINITY OF THE SUN. THE DETECTOR POINTED ALONG THE SPACECRAFT SPIN AXIS. IT WAS A WINDOWLESS DE/DX VS E TELESCOPE WITH ANTICOINCIDENCE SHIELDING AND OPERATED IN EITHER OF TWO MODES -- (1) THE HIGH Z - LOW E MODE HAVING AN ENERGY RANGE 0.5 TO 50 MEV/NUCLEON AND A CHARGE RANGE Z=5 TO 50 AND (2) THE LOW Z MODE, HAVING AN ENERGY RANGE 6 TO 1200 MEV/NUCLEON (ISOTOPES - HYDROGEN, DEUTERIUM, TRITIUM, HELIUM-3, HELIUM-4). THE ENERGY RANGE FOR ELECTRONS WAS PRIMARILY 0.3 TO 10 MEV. THE ACCEPTANCE ANGLE OF THE DETECTOR WAS 50-DEG FULL ANGLE.

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

EXPERIMENT NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES

NSSDC ID- 72-073A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/23/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.C. STONE .....CALIF INST OF TECH
PASADENA, CA
OI - R.E. VOGT .....CALIF INST OF TECH
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT STUDIED (VIA DIFFERENTIAL ENERGY SPECTRA) LOCAL ACCELERATION OF PARTICLES, ACCELERATION PROCESSES OF SOLAR PARTICLES, STORAGE IN THE INTERPLANETARY MEDIUM, AND SOLAR MODULATION OF PARTICLES IN THE INTERPLANETARY MEDIUM. THE DETECTOR USED WAS A MULTI-ELEMENT, TOTALLY DEPLETED SOLID-STATE TELESCOPE WITH ANTICOINCIDENCE SHIELDING AND WAS OPERATED IN ANY OF THREE MODES -- (1) THE ENERGY RANGE MODE, (2) THE ELECTRON MODE (150 KEV TO 2.8 MEV), AND (3) THE HYDROGEN AND HELIUM ISOTOPES MODE (0.5 TO 40 MEV/NUCLEON). THE DETECTOR HAD AN ANGULAR RESOLUTION OF PLUS TO MINUS 22 DEG.

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

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 72-073A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 09/26/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.J. WILLIAMS .....NOAA-ERL
BOULDER, CO
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - J.C. ARMSTRONG .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

LAUNCH DATE- 10/26/73 SPACECRAFT 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- 10/29/73
ORBIT PERIOD- 17279. MIN INCLINATION- 28.674 DEG
PERIAPSIS- 141185. KM ALT APOAPSIS- 288857. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 10/29/73
ORBIT PERIOD- 17279. MIN INCLINATION- 28.674 DEG
PERIAPSIS- 141185. KM ALT APOAPSIS- 288857. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - P. BUTLER .....NASA-GSFC
GREENBELT, MD
PS - J.H. KING .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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. IMP 8 WAS 180 DEG OUT OF PHASE WITH IMP 7 (WITH WHOSE DATA MUCH CORRELATION IS INTENDED) AND WAS EXPECTED TO REMAIN APPROXIMATELY SO FOR ITS FIRST 500 DAYS IN ORBIT. ITS INITIAL ORBIT WAS MORE ELLIPTICAL THAN INTENDED, WITH APOGEE AND PERIGEE DISTANCES OF ABOUT 45 AND 25 EARTH RADII. IT IS EXPECTED TO HAVE A NEAR-CIRCULAR ORBIT AFTER ABOUT TWO YEARS. THE SPACECRAFT SPIN AXIS WAS NORMAL TO THE ECLIPTIC PLANE, AND THE SPIN RATE WAS 23 RPM. AFTER SOME EARLY SPACECRAFT PROBLEMS, WHICH WERE OVERCOME WITHIN A FEW WEEKS AFTER LAUNCH, THE SPACECRAFT PERFORMED NORMALLY.

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

EXPERIMENT NAME- ELECTROSTATIC FIELDS

NSSDC ID- 73-078A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.L. AGGSON .....NASA-GSFC
GREENBELT, MD
OI - J.P. HEPPNER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
A BIAXIAL ANTENNA SYSTEM WITH ELECTROMETERS TO MEASURE THE POTENTIAL DIFFERENCE BETWEEN THE TWO HALVES OF EACH ANTENNA DETERMINED THE VECTOR ELECTROSTATIC FIELD WITH A SENSITIVITY OF 0.1 MV PER METER. ONE ANTENNA LAID ALONG THE SPACECRAFT SPIN AXIS AND THE OTHER WAS NORMAL TO THIS AXIS. MEASUREMENTS WERE MADE IN THE SOLAR WIND, IN THE TRANSITION REGION, AND IN THE GEOMAGNETIC TAIL.

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

EXPERIMENT NAME- MEASUREMENT OF SOLAR PLASMA

NSSDC ID- 73-078A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.J. BAME .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - J.R. ASBRIDGE .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM

EXPERIMENT 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 -------

EXPERIMENT NAME- MEASUREMENT OF SOLAR PLASMA

NSSDC ID- 73-078A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.S. BRIDGE .....MASS INST OF TECH
CAMBRIDGE, MA
OI - A.J. LAZARUS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - J.H. BINSACK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - E.F. LYON .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT 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 -------

EXPERIMENT NAME- MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS

NSSDC ID- 73-078A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.A. FRANK .....U OF IOWA
IOWA CITY, IA

EXPERIMENT 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 X 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 SEC, AND (2) ONE PROVIDING GOOD TEMPORAL RESOLUTION IN WHICH THE ENTIRE ENERGY RANGE IN FOUR DIRECTIONS IS MEASURED EVERY 68 SEC.

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

EXPERIMENT NAME- SOLID-STATE DETECTORS

NSSDC ID- 73-078A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ
OI - D.K. HOVESTADT .....MPI
GARCHING, FED REP OF GERMANY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE COMPOSITION AND ENERGY SPECTRA OF LOW-ENERGY PARTICLES OBSERVED DURING SOLAR FLARES AND 27-DAY RECURRENT EVENTS. THE DETECTORS USED INCLUDE (1) AN ELECTROSTATIC ANALYZER (TO SELECT PARTICLES OF THE DESIRED ENERGY PER CHARGE) COMBINED WITH AN ARRAY OF WINDOWLESS SOLID-STATE DETECTORS (TO MEASURE THE ENERGY LOSS) AND SURROUNDED BY AN ANTICOINCIDENCE SHIELDING AND (2) A THIN WINDOW PROPORTIONAL COUNTER, SOLID-STATE PARTICLE TELESCOPE. THE EXPERIMENT MEASURED PARTICLE ENERGIES FROM 0.1 TO 10 MEV PER CHARGE IN 12 BANDS AND UNIQUELY IDENTIFIED POSITRONS AND ELECTRONS AS WELL AS NUCLEI WITH CHARGES OF Z FROM 1 TO 8 (NO CHARGE RESOLUTION FOR Z GREATER THAN 8). TWO 1000-CHANNEL PULSE HEIGHT ANALYZERS, ONE FOR EACH DETECTOR, WERE INCLUDED IN THE EXPERIMENT PAYLOAD.

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

EXPERIMENT NAME- ELECTROSTATIC WAVES AND RADIO NOISE

NSSDC ID- 73-078A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. & RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - T.L. AGGSON .....NASA-GSFC
GREENBELT, MD
OI - G.W. PFEIFFER .....U OF IOWA
IOWA CITY, IA

EXPERIMENT 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 ----------

EXPERIMENT NAME- CHARGED PARTICLE MEASUREMENTS
EXPERIMENT

NSSDC ID- 73-078A-08

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/00/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.M. KRIMIGIS .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - T.P. ARMSTRONG .....U OF KANSAS
LAWRENCE, KS
OI - J.A. VAN ALLEN .....U OF IOWA
IOWA CITY, IA

EXPERIMENT 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 ONE MILLION (PER SQUARE CM-SEC-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 SQUARE CM-SEC-STER). PARTICLES AND X RAYS PRIMARILY OF SOLAR ORIGIN WERE STUDIED, BUT THE DYNAMIC RANGE AND RESOLUTION OF THE INSTRUMENT PERMITTED OBSERVATION OF COSMIC RAYS AND MAGNETOTAIL PARTICLES.

------- IMP-J, MCDONALD ----------

EXPERIMENT NAME- SOLAR AND COSMIC-RAY PARTICLES

NSSDC ID- 73-078A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - D.E. HAGGE .....NASA-JSC
HOUSTON, TX
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WHICH 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 ----------

EXPERIMENT NAME- MAGNETIC FIELD EXPERIMENT

NSSDC ID- 73-078A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.F. NESS .....NASA-GSFC
GREENBELT, MD
OI - C.S. SCEARCE .....NASA-GSFC
GREENBELT, MD
OI - J.B. SEEK .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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.

------- IMP-J, SIMPSON ----------

EXPERIMENT NAME- SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z
EXPERIMENTS

NSSDC ID- 73-078A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.A. SIMPSON .....U OF CHICAGO
CHICAGO, IL
OI - M. GARCIA-MUNOZ .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO INCREASE THE UNDERSTANDING OF SOLAR FLARE PARTICLE ACCELERATION AND PARTICLE CONTAINMENT IN MAGNETIC FIELDS IN THE VICINITY OF THE

SUN. THE DETECTOR POINTED ALONG THE SPACECRAFT SPIN AXIS. IT WAS A WINDOWLESS DE/DX VS E TELESCOPE WITH ANTICOINCIDENCE SHIELDING AND OPERATED IN EITHER OF TWO MODES - (1) A HIGH-Z, LOW-E MODE HAVING AN ENERGY RANGE FROM 0.5 TO 50 MEV/NUCLEON AND A CHARGE RANGE Z FROM 5 TO 50 AND (2) A LOW MODE HAVING AN ENERGY RANGE 6 TO 1200 MEV/NUCLEON (ISOTOPES - HYDROGEN, DEUTERIUM, TRITIUM, HELIUM-3, HELIUM-4). THE ENERGY RANGE FOR ELECTRONS WAS PRIMARILY 0.3 TO 10 MEV. THE ACCEPTANCE ANGLE OF THE DETECTOR WAS A 50 DEG FULL ANGLE.

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

EXPERIMENT NAME- ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES

NSSDC ID- 73-078A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	E.C.	STONE	CALIF INST OF TECH PASADENA, CA
OI -	R.E.	VOGT	CALIF INST OF TECH PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WAS DESIGNED TO STUDY (VIA DIFFERENTIAL ENERGY SPECTRA) LOCAL ACCELERATION OF PARTICLES, ACCELERATION PROCESSES OF SOLAR PARTICLES, STORAGE IN THE INTERPLANETARY MEDIUM, AND SOLAR MODULATION OF PARTICLES IN THE INTERPLANETARY MEDIUM. THE DETECTOR USED WAS A MULTI-ELEMENT, TOTALLY DEPLETED SOLID-STATE TELESCOPE WITH ANTICOINCIDENCE SHIELDING, AND WAS OPERATED IN ONE OF THREE MODES — (1) THE ENERGY RANGE MODE, (2) THE ELECTRON MODE (150 KEV TO 2.8 MEV), AND (3) THE HYDROGEN AND HELIUM ISOTOPES MODE (0.5 TO 40 MEV/NUCLEON). THE DETECTOR HAD AN ANGULAR RESOLUTION OF PLUS TO MINUS 22 DEG.

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

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- 73-078A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY AT THE STANDARD DATA ACQUISITION RATE SINCE 10/26/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	D.J.	WILLIAMS	NOAA-ERL BOULDER, CO
OI -	C.O.	BOSTROM	APPLIED PHYSICS LAB SILVER SPRING, MD
OI -	J.C.	ARMSTRONG	APPLIED PHYSICS LAB SILVER SPRING, MD
OI -	J.H.	TRAINOR	NASA-GSFC GREENBELT, MD

EXPERIMENT 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 GREATEP THAN 2 AT E GREATER THAN 5 MEV.

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

SPACECRAFT COMMON NAME- INTASAT
ALTERNATE NAMES- INTA SATELLITE
NSSDC ID- INTASAT

LAST REPORTED STATE- AN APPROVED MISSION

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

SPONSORING COUNTRY/AGENCY

SPAIN	CNIE-INTA
UNITED STATES	NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 114.6 MIN INCLINATION- 101.8 DEG
PERIAPSIS- 1438. KM ALT APOAPSIS- 1455. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.M.	DORADO	CONIE-INTA TORREJON, SPAIN
PM -	W.R.	WITT, JR.	NASA-GSFC GREENBELT, MD
PS -	G.	SAGREDO	CONIE-INTA MADRID, SPAIN
PS -	L.	BRACE	NASA-GSFC GREENBELT, MD
MG -	J.R.	HOLTZ	NASA HEADQUARTERS WASHINGTON, DC
SC -	E.R.	SCHMERLING	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

INTASAT, THE FIRST SPANISH SATELLITE, WILL BE A SMALL, MAGNETICALLY ORIENTED, SPIN STABILIZED SPACECRAFT CARRYING A BEACON EXPERIMENT TO STUDY THE IONOSPHERE. INTASAT IS BEING LAUNCHED PIGGYBACK WITH ITOS-G. THE SPACECRAFT WILL BE A 12-SIDED RIGHT PRISM, 44.2 CM ACROSS OPPOSITE CORNERS, AND 41 CM HIGH. THE BEACON ANTENNAS EXTEND ALONG THE SPIN AXIS FOR ABOUT 175 CM FROM THE CENTER OF BOTH ENDS OF THE SATELLITE. FOUR 49 CM TELEMETRY ANTENNAS EXTEND DIAGONALLY OUTWARD FROM ONE END. THE ATTITUDE CONTROL MAGNET WITH DAMPING BARS WILL PROVIDE ALIGNMENT TO THE LOCAL MAGNETIC FIELD VECTOR WITHIN 14 DAYS OF LAUNCH. THE 16-V POWER SYSTEM WILL BE OPERATED BY 12 NICKEL-CADMIUM BATTERIES CHARGED BY SOLAR CELLS ON THE SIDES OF THE SATELLITE. THE ORBIT WILL BE SUN-SYNCHRONOUS, WITH EQUATOR CROSSING INITIALLY OCCURRING AT NOON AND MIDNIGHT LOCAL TIME. IT IS EXPECTED THAT ABOUT 30 GROUND OBSERVERS WILL USE THE EXPERIMENT FOR IONOSPHERIC STUDY. NASA-GSFC WILL OBTAIN TELEMETRY AND SATELLITE POSITION DATA TO MONITOR AND CONTROL SPACECRAFT CONDITION AND TO PROVIDE ORBIT INFORMATION TO INCLUDE 'M' FACTORS. TELEMETRY WILL ALSO CONTAIN DATA FROM A TECHNOLOGY EXPERIMENT. INTA WILL BE RESPONSIBLE FOR COORDINATING ALL BEACON DATA ACQUISITION AND PROCESSING. BEACON POWER WILL BE TURNED ON BY A TIMER ABOUT A MINUTE AFTER SPACECRAFT SEPARATION FROM THE LAUNCH VEHICLE. A KILLER-TIMER SYSTEM WILL TURN OFF THE SPACECRAFT AT THE END OF 2 YEARS.

------- INTASAT, UNKNOWN ----------

EXPERIMENT NAME- IONOSPHERIC BEACON

NSSDC ID- INTASAT-01

LAST REPORTED STATE- APPROVED

11/15/74

LAUNCHED SUCCESSFULLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -		UNKNOWN	UNKNOWN

EXPERIMENT BRIEF DESCRIPTION

THIS BEACON EXPERIMENT WILL CONSIST OF A TWO-FREQUENCY (40.0100 AND 41.525 MHZ) TRANSMITTER, THAT WILL CONTINUOUSLY RADIATE LINEARLY POLARIZED, STABLE AND UNMODULATED SIGNALS AT A MINIMUM POWER LEVEL OF 200 MW. THE TWO-BEACON MONOPOLE ANTENNA FOR BEACON FOR EACH FREQUENCY, WILL EXTEND FROM THE TOP TO BOTTOM OF THE SPACECRAFT ALONG THE SPACECRAFT AXIS. OVER EXPERIMENTERS IN 21 DIFFERENT COUNTRIES ARE PLANNING TO PARTICIPATE, AND ADDITIONAL PARTICIPATION IS EXPECTED. THE EXPERIMENTERS WILL CALCULATE TOTAL ELECTRON CONTENT ALONG THE PROPAGATION PATH FROM SATELLITE TO GROUND, AND WILL OBSERVE IONOSPHERIC IRREGULARITIES AND SCINTILLATIONS.

********** ISEE-A **********

SPACECRAFT COMMON NAME- ISEE-A
ALTERNATE NAMES- IMP-K, IME-M
MOTHER
NSSDC ID- MOTHER

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 77 SPACECRAFT WEIGHT- 270. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY

UNITED STATES	NASA-OSS
INTERNATIONAL	ESRO

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- 28. DEG
PERIAPSIS- 500. KM ALT APOAPSIS- 131000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.J.	MADDEN	NASA-GSFC GREENBELT, MD
PS -	K.	OGILVIE	NASA-GSFC GREENBELT, MD
MG -	J.R.	HOLTZ	NASA HEADQUARTERS WASHINGTON, DC

SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE EXPLORER CLASS MOTHER SPACECRAFT WILL BE PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A,B, AND C). THE PURPOSES OF THE MISSION WILL BE -- (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 WILL THUS EXTEND THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION WILL CONSIST OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE FROM 18 TO 23 EARTH RADII. THE SPACECRAFT WILL MAINTAIN A SMALL SEPARATION DISTANCE, AND WILL MAKE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE.

------- ISEE-A, ANDERSON ----------

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- MOTHER -10

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.A. ANDERSON .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - C.I. MENG .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - F.V. CORONITI .....U OF CALIF, LA
LOS ANGELES, CA
OI - J.M. BOSQUED .....PAUL SABATIER U
TOULOUSE, FRANCE
OI - R. PELLAT .....PAUL SABATIER U
TOULOUSE, FRANCE
OI - G.K. PARKS .....U OF WASHINGTON
SEATTLE, WA
OI - R.P. LIN .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - H. REME .....PAUL SABATIER U
TOULOUSE, FRANCE

EXPERIMENT 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 TO BE MEASURED IN TWO INTERVALS OVER THE ENERGY RANGE FROM 8 TO 200 KEV, AND PROTONS ARE TO BE MEASURED IN THREE INTERVALS OVER THE ENERGY RANGE FROM 10 TO 380 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT WILL CONSIST 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 WILL BE USED TO MEASURE ELECTRONS AND PROTONS SEPARATELY AT 2 AND 6 KEV.

------- ISEE-A, BAME ----------

EXPERIMENT NAME- 50-EV TO 40-KEV PROTON AND 5-EV TO
20-KEV ELECTRON PLASMA PROBE

NSSDC ID- MOTHER -01

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.J. BAME .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - H. MIGGENRIEDER .....MPI
GARCHING, FED REP OF GERMANY
OI - K. SCHINDLER .....INST FOR THEOR PHYS
GARCHING, FED REP OF GERMANY
OI - J.R. ASBRIDGE .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - H.R. ROSENBAUER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - H. VOLK .....MPI
GARCHING, FED REP OF GERMANY
OI - M.D. MONTGOMERY .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - G. PASCHMANN .....MPI
GARCHING, FED REP OF GERMANY
OI - W.C. FELDMAN .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - E.W. HONES .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM

EXPERIMENT 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 WILL BE MEASURED IN ONE, TWO, AND THREE DIMENSIONS BY THREE 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS. THE EXPERIMENT, WHICH WILL UTILIZE CHANNELTRON ELECTRON MULTIPLIERS AS DETECTORS, WILL OPERATE IN TWO RANGES, WITH ENERGY RESOLUTION FOR SEVERAL STEPS IN EACH RANGE OF 10 PERCENT OF THE CENTER ENERGY LEVEL.

------- ISEE-A, FRANK ----------

EXPERIMENT NAME- HOT PLASMA

NSSDC ID- MOTHER -03

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.A. FRANK .....U OF IOWA
IOWA CITY, IA
OI - V.M. VASYLIUNAS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - C.F. KENNEL .....U OF CALIF, LA
LOS ANGELES, CA

EXPERIMENT 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 WILL BE 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, WILL BE FLOWN ON BOTH THE MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR-PI STER SOLID ANGLE FOR PARTICLE VELOCITY VECTORS WILL BE COVERED.

------- ISEE-A, GURNETT ----------

EXPERIMENT NAME- 10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO
200-KHZ ELECTRIC FIELD TRIAXIAL PROBES

NSSDC ID- MOTHER -07

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - R.W. FREDERICKS .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - E.J. SMITH .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT, IN CONJUNCTION WITH A SIMILAR EXPERIMENT FLOWN ON THE DAUGHTER 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 WILL BE USED. THE SEARCH COILS WILL HAVE A FREQUENCY RESPONSE OF 10 HZ TO 10 KHZ. THE TIME REQUIRED FOR ONE 16-CHANNEL TRIAXIAL SPECTRUM ANALYSIS WILL BE 100 MS. BROADBAND DATA WILL ALSO BE AVAILABLE WITH A 10-KHZ BANDWIDTH ABOUT EVERY 1 MS. ELECTRIC FIELDS WILL BE 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 WILL ALSO BE 100 MS. BROADBAND DATA WILL ALSO BE AVAILABLE WITH A 10-KHZ BANDWIDTH AND 1-MS TIME RESOLUTION.

------- ISEE-A, HARVEY ----------

EXPERIMENT NAME- ACTIVE PLASMA EXPERIMENT

NSSDC ID- MOTHER -08

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.C. HARVEY .....PARIS OBSERVATORY
PARIS, FRANCE
OI - M. PETIT .....CNET
PARIS, FRANCE
OI - J.R. MCAFEE .....NOAA-ERL
BOULDER, CO

OI - D. JONES .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - J.M. ETCHETO .....CNET
PARIS, FRANCE
OI - R.J.L.GRARD .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - R. GENDRIN .....CNET
PARIS, FRANCE

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL MEASURE THE PLASMA ELECTRON DENSITY NEAR THE MOTHER SATELLITE AND ALSO THE TOTAL ELECTRON CONTENT BETWEEN THE MOTHER AND DAUGHTER SPACECRAFT. THE EXPERIMENT WILL CONSIST OF TWO DISTINCT PARTS -- (1) THE MOTHER SPACECRAFT WILL CARRY 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' WILL BE OBSERVED. THESE RESONANCES OCCUR AT THE PLASMA FREQUENCY, THE UPPER HYBRID RESONANCE, THE CYCLOTRON FREQUENCY AND ITS HARMONICS, AND THE MEASUREMENT OF THEIR FREQUENCIES WILL PERMIT THE DETERMINATION OF SEVERAL PLASMA PARAMETERS, INCLUDING THE ELECTRON DENSITY. IN THIS EXPERIMENT, THE TRANSMITTER WILL BE 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 WILL BE OBTAINED FROM A SECOND EXPERIMENT WHICH WILL MEASURE 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 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-A, HELLIWELL ----------

EXPERIMENT NAME- VLF WAVE INJECTION

NSSDC ID- MOTHER -13

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.A. HELLIWELL .....STANFORD U
STANFORD, CA

EXPERIMENT 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 WILL BE PRODUCED BY A GROUND-BASED TRANSMITTER. INJECTION OF THE WAVE BEYOND THE IONOSPHERE WILL BE 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 WILL BE RECORDED THROUGH A LOOP ANTENNA BY A 1- TO 20-KHZ BROADBAND RECEIVER ON THE SATELLITE. THE OBSERVED PARAMETERS WILL BE INTENSITY OF RECEIVED RADIO FREQUENCY AS A FUNCTION OF TIME.

------- ISEE-A, HEPPNER ----------

EXPERIMENT NAME- DC ELECTRIC FIELDS

NSSDC ID- MOTHER -11

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.P. HEPPNER .....NASA-GSFC
GREENBELT, MD
OI - T.L. AGGSON .....NASA-GSFC
GREENBELT, MD
OI - N.C. MAYNARD .....NASA-GSFC
GREENBELT, MD
OI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - D.A. CAUFFMAN .....AEROSPACE CORP
EL SEGUNDO, CA

EXPERIMENT 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. A 165-M TIP-TO-TIP DIPOLE ANTENNA WILL BE 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 WILL BE MADE IN ANY OF 256 ANGULAR SECTIONS THREE TIMES OR 24 TIMES PER SEC, DEPENDING ON THE BIT RATE. DC MODE MEASUREMENTS WILL HAVE A TWO-STEP VARIABLE GAIN CONTROLLED FROM THE GROUND. THE RESOLUTION IN THE HIGHEST GAIN STATE WILL BE 0.12 MV WITH A DYNAMIC RANGE OF PLUS OR MINUS 0.983 V. THE AC MEASUREMENT ELECTRONICS WILL CONSIST OF TWO AMPLIFIER SECTIONS. ONE AMPLIFIER WILL BE USED FOR LOW-FREQUENCY CHANNELS, AND ONE FOR HIGH-FREQUENCY CHANNELS. GAIN FOR EACH AMPLIFIER WILL BE CONTROLLABLE INDEPENDENTLY FROM THE GROUND. IN THE HIGHEST GAIN MODE, EACH ANALYZER CHANNEL WILL HAVE A SENSITIVITY OF 0.6 MICROVOLTS RMS. THE EXPERIMENT CAN BE RUN IN EITHER A SUN-SENSOR SYNCHRONIZED OR 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 PER TELEMETRY READOUT SEQUENCE.

------- ISEE-A, HOVESTADT ----------

EXPERIMENT NAME- LOW-ENERGY COSMIC-RAY COMPOSITION

NSSDC ID- MOTHER -05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.K. HOVESTADT .....MPI
GARCHING, FED REP OF GERMANY
OI - J.J. O'GALLAGHER .....U OF MARYLAND
COLLEGE PARK, MD
OI - M. SCHOLER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - L.A. FISK .....NASA-GSFC
GREENBELT, MD
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ
OI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD

EXPERIMENT 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 WILL BE MADE OF THE FOLLOWING SPECIES IN THE DESIGNATED RANGES -- (1) SOLAR WIND IONS (5 KEV/CHARGE TO 20 MEV/CHARGE), (2) SUPRATHERMAL MULTIPLE-CHARGED IONS (Z, 0 LESS THAN OR EQUAL TO 26 IN THE ENERGY RANGE 5 TO 50 KEV/NUCLEON), AND (3) TRAPPED PARTICLES (0.05 TO 6 MEV/NUCLEON). THE INSTRUMENTATION WILL CONSIST OF TWO SENSORS ON EACH SPACECRAFT WHICH WILL USE ELECTROSTATIC DEFLECTION TECHNIQUES, THIN WINDOW PROPORTIONAL COUNTERS, AND POSITION-SENSITIVE SOLID-STATE DETECTORS. THE SENSORS WILL 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 ----------

EXPERIMENT NAME- DC TO 12-HZ ELECTRIC FIELD PROBE

NSSDC ID- MOTHER -06

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.S. MOZER .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - M.C. KELLEY .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - C.G. FALTHAMMER .....ROYAL INST OF TECH
STOCKHOLM, SWEDEN
OI - K. KNOTT .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - A. PEDERSON .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - U.V. FAHLESON .....ROYAL INST OF TECH
STOCKHOLM, SWEDEN

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO STUDY THE QUASI-STATIC ELECTRIC FIELD IN THE PLASMASPHERE, MAGNETOSPHERE, MAGNETOSHEATH, AND SOLAR WIND. THE 4-IN.-DIAM SPHERES WILL BE MOUNTED AT THE END OF A 30-M BOOM IN THE SATELLITE SPIN PLANE, TO ATTEMPT TO OVERCOME THE SPACECRAFT SHEATH (A POTENTIAL PROBLEM WHICH PLAGUES MOST ELECTRIC FIELD DETECTORS). AN ELECTRON GUN IS INCLUDED ON THE SPACECRAFT BODY. THE INSTRUMENT IS TO BE SENSITIVE TO FIELDS FROM THRESHOLD TO 5 MV/M IN THE FREQUENCY BAND OF 0 TO 12 HZ.

------- ISEE-A, OGILVIE ----------

EXPERIMENT NAME- THREE-DIMENSIONAL (SIX AXES), 6-EV TO
10-KEV ELECTRON SPECTROMETERS

NSSDC ID- MOTHER -02

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - K.W. OGILVIE .....NASA-GSFC
GREENBELT, MD
OI - J.D. SCUDDER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT IS TO STUDY THE TRANSPORT COEFFICIENTS OF, AND 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 WILL BE USED TO MAKE THREE-DIMENSIONAL MEASUREMENTS OF THE ELECTRON DISTRIBUTION FUNCTION FROM 6 EV TO 10 KEV. MEASUREMENTS WILL BE MADE IN TWO ENERGY RANGES WITH AN ENERGY RESOLUTION OF 0.07. THE ENTIRE SET OF SIX SIMULTANEOUS SPECTROMETER MEASUREMENTS WILL BE TAKEN WHILE THE SATELLITE ROTATES THROUGH 60 DEG. EACH SPECTROMETER AXIS WILL CONSIST OF THE CURVED PLATE ANALYZER AND A CHANNELTRON DETECTOR.

------- ISEE-A, RUSSELL ----------

EXPERIMENT NAME- MAGNETIC FIELDS

NSSDC ID- MOTHER -04

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.T. RUSSELL .....U OF CALIF, LA
LOS ANGELES, CA
OI - R.L. MCPHERRON .....U OF CALIF, LA
LOS ANGELES, CA
OI - P.C. HEDGECOCK .....IMPERIAL COLLEGE
LONDON, ENGLAND

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST OF A FLIPPABLE BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER THAT WILL MEASURE THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. THE MAGNETOMETER HAS TWO OPERATING RANGES MINUS TO PLUS (M-P) 8192 GAMMA AND M-P 512 GAMMA IN EACH VECTOR COMPONENT. THERE ARE ALSO THREE MODES, SELECTABLE IN EACH OPERATING RANGE. THE FIRST MODE DIGITIZES DATA INTO 16 BITS, AND THE OTHER TWO INVOLVE 8 BIT DIGITIZATION. OF THE LATTER TWO MODES, THE FIRST HAS DYNAMIC RANGES OF M-P 1024 GAMMA AND M-P 64 GAMMA AND THE SECOND HAS DYNAMIC RANGES OF M-P 256 GAMMA AND M-P 16 GAMMA. THE TELEMETRY BANDWIDTH OF THE MAGNETOMETER IS A FUNCTION OF OPERATING MODE AND SPACECRAFT TELEMETRY RATE, AND VARIES FROM 2 HZ AT THE 2048 BIT PER SECOND RATE IN THE DOUBLE PRECISION MODE TO 32 HZ AT THE 16 KILOBIT RATE IN EITHER OF THE TWO SINGLE PRECISION MODES. AN IDENTICAL INSTRUMENT IS TO BE FLOWN ON THE DAUGHTER SPACECRAFT, PERMITTING SEPARATION OF TEMPORAL AND SPATIAL MAGNETIC FLUCTUATIONS.

------- ISEE-A, SHARP ----------

EXPERIMENT NAME- PLASMA COMPOSITION

NSSDC ID- MOTHER -12

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.D. SHARP .....LOCKHEED PALO ALTO
PALO ALTO, CA
OI - G. HAERENDEL .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - H.R. ROSENBAUER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - R.G. JOHNSON .....LOCKHEED PALO ALTO
PALO ALTO, CA
OI - E.G. SHELLEY .....LOCKHEED PALO ALTO
PALO ALTO, CA
OI - J. GEISS .....U OF BERNE
BERNE, SWITZERLAND
OI - P.X. EBERHARDT .....U OF BERNE
BERNE, SWITZERLAND
OI - H. BALSIGER .....U OF BERNE
BERNE, SWITZERLAND

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVE OF THIS INVESTIGATION WILL BE 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 WILL BE FLOWN THAT WILL HAVE AN ELECTROSTATIC ENERGY ANALYZER FOLLOWED BY A COMBINED CYLINDRICAL, ELECTROSTATIC/MAGNETIC MASS ANALYZER. A COMBINATION OF ELECTRON MULTIPLIERS WILL BE USED AS THE DETECTORS. THE ENERGY-PER-UNIT-CHARGE RANGE MEASURED WILL BE FROM 0 TO 40 KEV. THE MASS-PER-UNIT-CHARGE RANGE MEASURED WILL EXTEND FROM 1 TO 138 AMU.

------- ISEE-A, SIMPSON ----------

EXPERIMENT NAME- MEDIUM-ENERGY COSMIC RAYS

NSSDC ID- MOTHER -14

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - J.A. SIMPSON .....U OF CHICAGO
CHICAGO, IL
OI - G.M. MASON .....U OF CHICAGO
CHICAGO, IL
OI - B. CARTWRIGHT .....U OF CHICAGO
CHICAGO, IL
OI - M. GARCIA-MUNOZ .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO STUDY A WIDE RANGE OF INTENSITIES ENCOUNTERED IN INTERPLANETARY SPACE AND THE MAGNETOSPHERE FOR ENERGETIC COSMIC RAY NUCLEONS. THE ISOTOPES TO BE SEPARATED ARE HYDROGEN 1, HYDROGEN 2, HELIUM 3, AND HELIUM 4 FROM 10 TO 150 MEV/NUCLEON. DIFFERENTIAL ENERGY SPECTRA ARE TO BE OBTAINED FOR HYDROGEN AND HELIUM FROM 0.5 TO 150 MEV/NUCLEON AND FOR LITHIUM THROUGH COBALT (Z FROM 3 THROUGH 27) IN THE ENERGY RANGE FROM 10 TO 700 MEV/NUCLEON. THE INSTRUMENTATION WILL CONSIST OF AN EXTENDED RANGE TELESCOPE (ERT) FORMED BY A COMBINATION OF SOLID-STATE DETECTORS, A CESIUM IODIDE SCINTILLATOR, AND A PLASTIC ANTICOINCIDENCE SCINTILLATOR.

------- ISEE-A, WILLIAMS ----------

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- MOTHER -09

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - D.J. WILLIAMS .....NOAA-ERL
BOULDER, CO
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - B. WILKEN .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY
OI - T.A. FRITZ .....NOAA-ERL
BOULDER, CO
OI - G. WIBBERENZ .....U OF KIEL
KIEL, FED REP OF GERMANY
OI - E. KEPPLER .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY

EXPERIMENT 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 WILL BE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRUM AND ANGULAR DISTRIBUTIONS. THESE DETECTORS WILL 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 WILL BE MEASURED. A SEPARATE SOLID STATE DETECTOR SYSTEM WILL MEASURE 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
NSSDC ID- DAUGHTR

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 77 SPACECRAFT WEIGHT- 120. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
INTERNATIONAL ESRO

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- 28. DEG
PERIAPSIS- 500. KM ALT APOAPSIS- 131000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - A. HAWKYARD .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS

PS - D.E. PAGE .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 WILL BE -- (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 WILL THUS EXTEND THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE MOTHER/DAUGHTER PORTION OF THE MISSION WILL CONSIST OF TWO SPACECRAFT WITH A STATION-KEEPING CAPABILITY IN A HIGHLY ECCENTRIC EARTH ORBIT WITH APOGEE FROM 18 TO 23 EARTH RADII. THE SPACECRAFT WILL MAINTAIN A SMALL SEPARATION DISTANCE, AND WILL MAKE SIMULTANEOUS COORDINATED MEASUREMENTS TO PERMIT SEPARATION OF SPATIAL FROM TEMPORAL IRREGULARITIES IN THE NEAR-EARTH SOLAR WIND, THE BOW SHOCK, AND INSIDE THE MAGNETOSPHERE.

------- ISEE-B, ANDERSON ----------

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- DAUGHTR-08

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.A. ANDERSON .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - C.I. MENG .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - J.M. BOSQUED .....PAUL SABATIER U
TOULOUSE, FRANCE
OI - R. PELLAT .....PAUL SABATIER U
TOULOUSE, FRANCE
OI - F.V. CORONITI .....U OF CALIF, LA
LOS ANGELES, CA
OI - H. REME .....PAUL SABATIER U
TOULOUSE, FRANCE
OI - R.P. LIN .....U OF CALIF, BERKELEY
BERKELEY, CA
OI - G.K. PARKS .....U OF WASHINGTON
SEATTLE, WA

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WILL BE 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 WILL BE MEASURED IN TWO INTERVALS OVER THE ENERGY RANGE FROM 8 TO 200 KEV, AND PROTONS WILL BE MEASURED IN THREE INTERVALS OVER THE ENERGY RANGE FROM 10 TO 380 KEV. IDENTICAL INSTRUMENTATION ON EACH SPACECRAFT WILL CONSIST 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 WILL BE USED TO MEASURE ELECTRONS AND PROTONS SEPARATELY AT 2 AND 6 KEV.

------- ISEE-B, EGIDI ----------

EXPERIMENT NAME- 50-EV TO 25-KEV ION AND 35-EV TO 7-KEV ELECTRON PLASMA PROBES

NSSDC ID- DAUGHTR-02

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A. EGIDI .....U OF ROME
ROME, ITALY
OI - G. MORENO .....U OF ROME
ROME, ITALY
OI - P. CERULLI .....U OF ROME
ROME, ITALY
OI - V. FORMISANO .....U OF ROME
ROME, ITALY
OI - S.C. CANTARANO .....U OF ROME
ROME, ITALY

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO GAIN A BETTER UNDERSTANDING OF THE INTERACTION OF THE SOLAR WIND WITH THE EARTH'S MAGNETIC FIELD BY MEASURING ION AND ELECTRON FLUXES AS FUNCTIONS OF DIRECTION AND ENERGY. ONE ELECTROSTATIC ANALYZER AND FIVE FARADAY CUPS WILL BE USED TO MEASURE THE ION DISTRIBUTION FUNCTION FROM 50 EV TO 25 KEV PER UNIT CHARGE. TWO FARADAY CUPS WILL BE USED TO MEASURE THE ELECTRON DISTRIBUTION FUNCTION FROM 36 EV TO 7 KEV. THE ELECTROSTATIC ANALYZER WILL HAVE SEVERAL NARROW ENERGY WINDOWS TO MAP THE PARTICLE (ION AND ELECTRON) DISTRIBUTION FUNCTION IN DETAIL. EACH OF THE FIVE FARADAY CUP-CHANNELTRON DETECTORS WILL SERVE AS FLUX DETECTORS TO SIMULTANEOUSLY MAP THE ION DISTRIBUTION FUNCTION TO A COARSE ENERGY RESOLUTION. EACH OF THE TWO FARADAY CUP-CHANNELTRON DETECTORS WILL SERVE AS A FLUX DETECTOR TO MAP THE ELECTRON DISTRIBUTION FUNCTION TO COARSE ENERGY RESOLUTION.

------- ISEE-B, FRANK ----------

EXPERIMENT NAME- HOT PLASMA

NSSDC ID- DAUGHTR-03

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.A. FRANK .....U OF IOWA
IOWA CITY, IA
OI - V.M. VASYLIUNAS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - C.F. KENNEL .....U OF CALIF, LA
LOS ANGELES, CA

EXPERIMENT 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 WILL BE 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 WILL BE FLOWN ON BOTH MOTHER AND DAUGHTER SPACECRAFT. ALL BUT 2 PERCENT OF THE FOUR PI STER SOLID-ANGLE WILL BE COVERED FOR PARTICLE VELOCITY VECTORS.

------- ISEE-B, GURNETT ----------

EXPERIMENT NAME- 10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD MONOAXIAL PROBES

NSSDC ID- DAUGHTR-05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - E.J. SMITH .....NASA-JPL
PASADENA, CA
OI - R.W. FREDERICKS .....TRW SYSTEMS GROUP
REDONDO BEACH, CA

EXPERIMENT BRIEF DESCRIPTION
IN THIS EXPERIMENT, A SINGLE-AXIS SEARCH COIL MAGNETOMETER WITH A HIGH PERMEABILITY CORE AND A SINGLE ELECTRIC FIELD DIPOLE (RELATIVELY SHORT) WILL MEASURE WAVE PHENOMENON OCCURRING 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 WILL BE 100 MS. THE TIME REQUIRED FOR A 16-CHANNEL SPECTRUM ANALYSIS IN A RANGE OF 10 HZ TO 200 KHZ FROM THE ELECTRIC DIPOLE WILL ALSO BE 100 MS. THE DIPOLE WILL BE MOUNTED PERPENDICULAR TO THE SPIN AXIS.

------- ISEE-B, HARVEY ----------

EXPERIMENT NAME- RADIO PROPAGATION RECEIVER

NSSDC ID- DAUGHTR-06

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.C. HARVEY .....PARIS OBSERVATORY
PARIS, FRANCE
OI - R. GENDRIN .....CNET
PARIS, FRANCE
OI - J.R. MCAFEE .....NOAA-ERL
BOULDER, CO
OI - M. PETIT .....CNET
PARIS, FRANCE
OI - D. JONES .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS

OI - J.M. ETCHETO .....CNET
PARIS, FRANCE
OI - R.J.L.GRARD .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS

EXPERIMENT BRIEF 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 ----------

EXPERIMENT NAME- ENERGETIC ELECTRONS AND PROTONS

NSSDC ID- DAUGHTR-07

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E. KEPPLER .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY
OI - D.J. WILLIAMS .....NOAA-ERL
BOULDER, CO
OI - T.A. FRITZ .....NOAA-ERL
BOULDER, CO
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - B. WILKEN .....MPI-AERONOMY
LINDAU, FED REP OF GERMANY
OI - G. WIBBERENZ .....U OF KIEL
KIEL, FED REP OF GERMANY

EXPERIMENT 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 WILL BE FLOWN ON EACH SPACECRAFT TO MEASURE DETAILED ENERGY SPECTRA AND ANGULAR DISTRIBUTIONS. THESE DETECTORS WILL USE SILICON, SURFACE-BARRIER, TOTALLY DEPLETED SOLID-STATE DEVICES OF VARIOUS THICKNESSES, AREAS, AND CONFIGURATIONS. PROTONS IN 4 AND 16 CHANNELS BETWEEN 25 KEV AND 2 MEV AND ELECTRONS IN 4 AND 16 CHANNELS BETWEEN 20 KEV AND 2 MEV WILL BE MEASURED.

------- ISEE-B, PASCHMANN ----------

EXPERIMENT NAME- 50-EV TO 40-KEV PROTON AND 5-EV TO
20-KEV ELECTRON PLASMA PROBE

NSSDC ID- DAUGHTR-01

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. PASCHMANN .....MPI
GARCHING, FED REP OF GERMANY
OI - W.C. FELDMAN .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - E.W. HONES .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - K. SCHINDLER .....INST FOR THEOR PHYS
GARCHING, FED REP OF GERMANY
OI - H. MIGGENRIEDER .....MPI
GARCHING, FED REP OF GERMANY
OI - S.J. BAME .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - H. VOLK .....MPI
GARCHING, FED REP OF GERMANY
OI - H.R. ROSENBAUER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - M.D. MONTGOMERY .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - J.R. ASBRIDGE .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO STUDY THE PLASMA VELOCITY DISTRIBUTIONS AND THEIR SPATIAL AND TEMPORAL VARIATIONS IN THE SOLAR WIND, BOW SHOCK, MAGNETOSHEATH, MAGNETOPAUSE, AND MAGNETOTAIL (WITHIN THE MAGNETOSPHERE). ONE-, TWO-, AND THREE-DIMENSIONAL VELOCITY DISTRIBUTIONS FOR POSITIVE IONS AND ELECTRONS WILL BE MEASURED USING TWO 90-DEG SPHERICAL ELECTROSTATIC ANALYZERS 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) WILL BE MEASURED WITH 10 PERCENT ENERGY RESOLUTION IN TWO RANGES EACH.

------- ISEE-B, RUSSELL ----------

EXPERIMENT NAME- MAGNETIC FIELDS

NSSDC ID- DAUGHTR-04

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.T. RUSSELL .....U OF CALIF, LA
LOS ANGELES, CA
OI - R.L. MCPHERRON .....U OF CALIF, LA
LOS ANGELES, CA
OI - P.C. HEDGECOCK .....IMPERIAL COLLEGE
LONDON, ENGLAND

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A FLIPPABLE BOOM-MOUNTED TRIAXIAL FLUXGATE MAGNETOMETER THAT WILL MEASURE THE STEADY MAGNETIC FIELD AND ITS LOW-FREQUENCY VARIATIONS. THE MAGNETOMETER HAS TWO OPERATING RANGES MINUS TO PLUS (M-P) 8192 GAMMA AND M-P 512 GAMMA IN EACH VECTOR COMPONENT. THERE ARE ALSO THREE MODES, SELECTABLE IN EACH OPERATING RANGE. THE FIRST MODE DIGITIZES DATA INTO 16 BITS, AND THE OTHER TWO INVOLVE 8 BIT DIGITIZATION. OF THE LATTER TWO MODES, THE FIRST HAS DYNAMIC RANGES OF M-P 1024 GAMMA AND M-P 64 GAMMA AND THE SECOND HAS DYNAMIC RANGES OF M-P 256 GAMMA AND M-P 16 GAMMA. THE TELEMETRY BANDWIDTH OF THE MAGNETOMETER IS A FUNCTION OF OPERATING MODE AND SPACECRAFT TELEMETRY RATE, AND VARIES FROM 2 HZ AT THE 2048 BIT PER SECOND RATE IN THE DOUBLE PRECISION MODE TO 32 HZ AT THE 16 KILOBIT RATE IN EITHER OF THE TWO SINGLE PRECISION MODES. AN IDENTICAL INSTRUMENT WILL BE FLOWN ON THE MOTHER SPACECRAFT, PERMITTING SEPARATION OF TEMPORAL AND SPATIAL MAGNETIC FLUCTUATIONS.

********** ISEE-C **********

SPACECRAFT COMMON NAME- ISEE-C
ALTERNATE NAMES- STP PROBE, IME-H
HELIOCENTRIC
NSSDC ID- HELOCTR

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 78 SPACECRAFT WEIGHT- 465. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC
ORBIT PERIOD- 365. DAYS INCLINATION- 0. DEG
PERIAPSIS- 1. AU RAD APOAPSIS- 1. AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.J. MADDEN .....NASA-GSFC
GREENBELT, MD
PS - T.T. VON ROSENVINGE .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE EXPLORER CLASS HELIOCENTRIC SPACECRAFT WILL BE PART OF THE MOTHER/DAUGHTER/HELIOCENTRIC MISSION (ISEE A,B,AND C). THE PURPOSES OF THE MISSION WILL BE (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 WILL THUS EXTEND THE INVESTIGATIONS OF PREVIOUS IMP SPACECRAFT. THE LAUNCH OF THREE COORDINATED SPACECRAFT IN THIS MISSION WILL PERMIT THE SEPARATION OF SPATIAL AND TEMPORAL EFFECTS. THE HELIOCENTRIC SPACECRAFT WILL BE PLACED NEAR A LIBRATION POINT IN THE EARTH/SUN GRAVITATIONAL FIELD, ALLOWING IT TO REMAIN BEYOND THE MAGNETOSPHERIC CAVITY IN THE SOLAR WIND. IT WILL THUS CONTINUOUSLY MONITOR CHANGES IN THE NEAR-EARTH INTERPLANETARY MEDIUM, BECAUSE BOTH THE MOTHER AND DAUGHTER SPACECRAFT WILL HAVE ECCENTRIC GEOCENTRIC ORBITS, IT IS HOPED THAT THIS MISSION WILL MEASURE THE CAUSE/EFFECT RELATIONSHIPS BETWEEN THE INCIDENT SOLAR PLASMA AND THE MAGNETOSPHERE. FINALLY, THE HELIOCENTRIC SPACECRAFT WILL ALSO PROVIDE A NEAR-EARTH BASE FOR MAKING COSMIC RAY AND OTHER PLANETARY MEASUREMENTS FOR COMPARISON WITH COINCIDENT MEASUREMENTS FROM DEEP-SPACE PROBES.

------- ISEE-C, ANDERSON ----------

EXPERIMENT NAME- X RAYS AND ELECTRONS

NSSDC ID- HELOCTR-09

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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 SEC RESOLUTION THE SPECTRA OF SOLAR X RAYS (6 TO 228 KEV). THE ELECTRONS WILL BE 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 WILL BE MEASURED BY A PROPORTIONAL COUNTER (6-20 KEV) AND A SODIUM IODIDE SCINTILLATOR (12 TO 228 KEV).

------- ISEE-C, BAME ----------

EXPERIMENT NAME- 150-EV TO 7-KEV PROTON AND 5-EV TO 2.5-KEV ELECTRON PLASMA PROBE

NSSDC ID- HELOCTR-01

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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 WILL BE STUDIED, UNPERTURBED BY THE EARTH'S BOW SHOCK. IN THE EXPERIMENT PROTON AND ELECTRON SOLAR PLASMA WILL BE MEASURED FROM 150 EV TO 7 KEV AND 5 EV TO 2.5 KEV IN 12 AND 16 ENERGY STEPS, RESPECTIVELY. PROTONS WILL BE MEASURED BY A 135-DEG SPHERICAL ELECTROSTATIC ANALYZER IN BOTH TWO AND THREE DIMENSIONS. STEP ENERGY RESOLUTION FOR EACH ENERGY WINDOW WILL BE 4.2 PERCENT. ELECTRONS WILL BE MEASURED BY A 90-DEG SPHERICAL ELECTROSTATIC ANALYZER, ALSO IN TWO AND THREE DIMENSIONS. THE ENERGY WINDOW PER STEP FOR ELECTRONS WILL BE 10 PERCENT. CHANNELTRON ELECTRON MULTIPLIERS WILL BE USED AS DETECTORS FOR EACH OF THE ANALYZERS.

------- ISEE-C, DE FEITER ----------

EXPERIMENT NAME- ENERGETIC PROTONS

NSSDC ID- HELOCTR-08

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - L.D. DE FEITER .....SPACE RESEARCH LAB
UTRECHT, NETHERLANDS
OI - J.J. VAN ROOIJEN .....SPACE RESEARCH LAB
UTRECHT, NETHERLANDS
OI - J.N. VAN GILS .....SPACE RESEARCH LAB
UTRECHT, NETHERLANDS
OI - R.M. VAN DEN NIEUWENHOF ..SPACE RESEARCH LAB
UTRECHT, NETHERLANDS
OI - K.P. WENZEL .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - A.C. DURNEY .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - T.R. SANDERSON .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - R.J. HYNDS .....IMPERIAL COLLEGE
LONDON, ENGLAND
OI - V. DOMINGO .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - D.E. PAGE .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - A. BALOGH .....IMPERIAL COLLEGE
LONDON, ENGLAND
OI - H. ELLIOT .....IMPERIAL COLLEGE
LONDON, ENGLAND
OI - C. DE JAGER .....SPACE RESEARCH LAB
UTRECHT, NETHERLANDS

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO STUDY PARTICLE ACCELERATION AND PROPAGATION PROCESSES IN INTERPLANETARY SPACE. MEASUREMENTS WILL BE MADE OF PROTONS FROM 0.03 TO 1.40 MEV USING THREE TWO-ELEMENT TELESCOPES. THE TELESCOPES WILL BE MOUNTED AT 30, 60, AND 135 DEG RELATIVE TO THE SPACECRAFT SPIN AXIS. EIGHT-SECTOR DATA WILL BE OBTAINED FOR SELECTED ENERGY CHANNELS.

------- ISEE-C, HECKMAN ----------

EXPERIMENT NAME- HIGH-ENERGY COSMIC RAYS

NSSDC ID- HELOCTR-05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.H. HECKMAN .....LAWRENCE BERKELEY LAB
BERKELEY, CA
OI - D. GREINER .....U OF CALIF, BERKELEY
BERKELEY, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT IS DESIGNED TO DETERMINE THE ISOTOPIC ABUNDANCE IN THE PRIMARY COSMIC RAYS FOR HYDROGEN THROUGH IRON. THE INSTRUMENT WILL BE A 10-ELEMENT SOLID-STATE PARTICLE TELESCOPE CONSISTING OF LITHIUM DRIFTED SILICON DETECTORS. ENERGY RANGES MEASURED WILL RUN FROM 31 TO 110 MEV FOR Z=1, AND FROM 125 TO 445 MEV FOR Z=26. ISOTOPIC RESOLUTION WILL BE LESS THAN 0.15 AMU FOR Z=1 THROUGH 26. DIRECTION OF INCIDENT NUCLEI WILL BE OBTAINED FROM A PAIR OF MULTI-WIRE PROPORTIONAL COUNTERS WITH 2 DEG RESOLUTION.

------- ISEE-C, HOVESTADT ----------

EXPERIMENT NAME- LOW-ENERGY COSMIC-RAY COMPOSITION

NSSDC ID- HELOCTR-03

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - D.K. HOVESTADT .....MPI
GARCHING, FED REP OF GERMANY
OI - J.J. O'GALLAGHER .....U OF MARYLAND
COLLEGE PARK, MD
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ
OI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD
OI - M. SCHOLER .....MPI-EXTRATERR PHYS
GARCHING, FED REP OF GERMANY
OI - L.A. FISK .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WILL BE MADE OF 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 WILL CONSIST OF TWO SENSORS ON EACH SPACECRAFT THAT WILL USE ELECTROSTATIC DEFLECTION TECHNIQUES, THIN WINDOW PROPORTIONAL COUNTERS, AND POSITION SENSITIVE SOLID-STATE DETECTORS. THE SENSORS WILL 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, MEYER ----------

EXPERIMENT NAME- COSMIC-RAY ELECTRONS AND NUCLEI

NSSDC ID- HELOCTR-06

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - P. MEYER .....U OF CHICAGO
CHICAGO, IL

OI - P. EVENSON .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO STUDY PARTICLE PROPAGATION WITHIN THE SOLAR SYSTEM AND THE PROPERTIES OF THE INTERPLANETARY MEDIUM. THE FOLLOWING SPECIES WILL BE 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 WILL BE USED TO MAKE THESE MEASUREMENTS. IT WILL CONSIST 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 ----------

EXPERIMENT NAME- MASS SPECTROMETER FOR 470 TO 10,500 EV PER CHARGE AND 1 TO 5.6 AMU PER CHARGE

NSSDC ID- HELOCTR-11

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.W. OGILVIE .....NASA-GSFC
GREENBELT, MD
OI - J. GEISS .....U OF BERNE
BERNE, SWITZERLAND
OI - M.H. ACUNA .....NASA-GSFC
GREENBELT, MD
OI - M.A. COPLAN .....U OF MARYLAND
COLLEGE PARK, MD
OI - D.L. LIND .....NASA-JSC
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST 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 WILL HAVE AN ENERGY PER UNIT CHARGE RANGE OF 0.47 TO 10.5 KEV AND A MASS PER UNIT CHARGE RANGE OF 1 TO 5.6.

------- ISEE-C, SCARF ----------

EXPERIMENT NAME- 20-HZ TO 1-KHZ MAGNETIC AND 20-HZ TO 100-KHZ ELECTRIC FIELD DETECTORS

NSSDC ID- HELOCTR-07

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA
OI - E.J. SMITH .....NASA-JPL
PASADENA, CA
OI - R.W. FREDERICKS .....TRW SYSTEMS GROUP
REDONDO BEACH, CA

EXPERIMENT 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, WILL BE 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 IN 16 CHANNELS.

------- ISEE-C, SMITH ----------

EXPERIMENT NAME- MAGNETIC FIELDS

NSSDC ID- HELOCTR-02

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.J. SMITH .....NASA-JPL
PASADENA, CA
OI - L. DAVIS .....CALIF INST OF TECH
PASADENA, CA
OI - G.L. SISCOE .....U OF CALIF, LA
LOS ANGELES, CA
OI - D.E. JONES .....BRIGHAM YOUNG U
PROVO, UT
OI - B.T. TSURUTANI .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENTATION FOR THIS EXPERIMENT WILL CONSIST OF A BOOM-MOUNTED, TRIAXIAL VECTOR HELIUM MAGNETOMETER. MEASUREMENTS WILL BE MADE OF THE STEADY MAGNETIC FIELD AND ITS LOW FREQUENCY VARIATIONS. FOUR FIELD AMPLITUDE RANGES (MINUS TO PLUS 4, 14, 42, AND 146 GAMMAS) WILL BE AVAILABLE. THE INSTRUMENT WILL RANGE 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 -0.5 HZ. A SINGLE AXIS SPECTRUM ANALYZER WILL MEASURE FLUCTUATIONS PARALLEL TO THE SPACECRAFT SPIN AXIS IN THREE FREQUENCY BANDS OF 0.1-1, 1-3, AND 3-10 HZ.

------- ISEE-C, STEINBERG ----------

EXPERIMENT NAME- 20-KHZ TO 3-MHZ RADIO MAPPING

NSSDC ID- HELOCTR-10

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.L. STEINBERG .....MEUDON OBS
MEUDON, FRANCE
OI - P. COUTURIER .....MEUDON OBS
MEUDON, FRANCE
OI - R. KNOLL .....MEUDON OBS
MEUDON, FRANCE
OI - J. FAINBERG .....NASA-GSFC
GREENBELT, MD
OI - R.G. STONE .....NASA-GSFC
GREENBELT, MD
OI - S.R. MOSIER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST 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 WILL BE 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 ----------

EXPERIMENT NAME- COSMIC-RAY COMPOSITION

NSSDC ID- HELOCTR-12

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.C. STONE .....CALIF INST OF TECH
PASADENA, CA
OI - R.E. VOGT .....CALIF INST OF TECH
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO STUDY THE ISOTOPIC CONSTITUTION OF SOLAR MATTER AND GALACTIC COSMIC-RAY SOURCES, THE PROCESSES OF NUCLEOSYNTHESIS IN THE SUN AND IN THE GALAXY, AND THE ASTROPHYSICAL PARTICLE ACCELERATION 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 ISOTOPIC ABUNDANCES AND ENERGY SPECTRA WILL BE MEASURED BY A HEAVY ISOTOPE 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 ROSENVING ----------

EXPERIMENT NAME- SOLAR AND GALACTIC ENERGETIC PARTICLES

NSSDC ID- HELOCTR-04

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - T.T. VON ROSENVING .....NASA-GSFC
GREENBELT, MD

OI - L.A. FISK .....NASA-GSFC
GREENBELT, MD

OI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD

OI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD

OI - M.A.I.VAN HOLLEBEKE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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, WILL COMPRISE THE INSTRUMENTATION. NUCLEI WITH Z BETWEEN 1 AND 26 WILL BE MEASURED IN VARIOUS ENERGY WINDOWS IN THE RANGE 0.5-500 MEV PER NUCLEON. ISOTOPES IN THE Z RANGES 1 TO 2, 3 TO 7, AND 8 TO 16 WILL BE MEASURED IN THE ENERGY RANGES 4 TO 80, 8 TO 120, AND 10 TO 200 MEV PER NUCLEON, RESPECTIVELY. ELECTRONS WILL BE MEASURED IN THE ENERGY RANGES 0.07 TO 0.2 MEV AND 0.3 TO 12 MEV. ANISOTROPY INFORMATION WILL BE OBTAINED FOR THE ELECTRONS AND FOR 0.5-150 MEV/NUCLEON NUCLEI.

------- ISEE-C, WILCOX ----------

EXPERIMENT NAME- SOLAR AND INTERPLANETARY MAGNETIC FIELDS
(CORRELATIVE STUDY)

NSSDC ID- HELOCTR-13

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - J.M. WILCOX .....STANFORD U
STANFORD, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST 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 WILL BE TO STUDY THE LARGE SCALE STRUCTURE OF THE SOLAR MAGNETIC FIELD AND ITS EXTENSION INTO INTERPLANETARY SPACE BY THE SOLAR WIND.

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

SPACECRAFT COMMON NAME- ISIS 1
ALTERNATE NAMES- ISIS-A, 03669
NSSDC ID- 69-009A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

LAUNCH DATE- 01/30/69 SPACECRAFT 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- 01/30/69
ORBIT PERIOD- 128. MIN INCLINATION- 88.425 DEG
PERIAPSIS- 574.000 KM ALT APOAPSIS- 3522.00 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/07/73
ORBIT PERIOD- 128.21 MIN INCLINATION- 88.429 DEG
PERIAPSIS- 574.20 KM ALT APOAPSIS- 3514.80 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - L.H. BRACE .....NASA-GSFC
GREENBELT, MD

PS - J.H. WHITTEKER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

MG - F.W. GAETANO .....NASA HEADQUARTERS
WASHINGTON, DC

SC - J.H. CHAPMAN .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

ISIS 1 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH SWEEP FREQUENCY 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 LONG DIPOLE ANTENNAS (78.9 AND 20.2 M LONG, RESPECTIVELY). THE SATELLITE WAS SPIN-STABILIZED AT ABOUT 2.9 RPM AFTER ANTENNA DEPLOYMENT. SOME CONTROL COULD BE EXERCISED OVER THE SPIN RATE AND ATTITUDE BY USING MAGNETICALLY INDUCED TORQUES TO CHANGE THE SPIN RATE AND TO PRECESS THE SPIN AXIS. A TAPE RECORDER WITH 1-HR CAPACITY WAS INCLUDED ON THE SATELLITE. THE SATELLITE COULD BE PROGRAMMED TO TAKE RECORDED OBSERVATIONS FOR FOUR DIFFERENT TIME PERIODS FOR EACH FULL RECORDING PERIOD. THE RECORDER WAS DUMPED ONLY AT OTTAWA. FOR NON-TAPE-RECORDED OBSERVATIONS, DATA FOR THE SATELLITE AND SUBSATELLITE REGIONS COULD BE OBSERVED AND TELEMETERED WHEN THE SPACECRAFT WAS IN THE LINE OF SIGHT OF TELEMETRY STATIONS. THE SELECTED TELEMETRY STATIONS WERE IN AREAS THAT PROVIDED PRIMARY DATA COVERAGE NEAR THE 80-DEG W MERIDIAN, PLUS AREAS NEAR HAWAII, SINGAPORE, AUSTRALIA, ENGLAND, NORWAY, INDIA, JAPAN, ANTARCTICA, NEW ZEALAND, AND CENTRAL AFRICA. NO TAPE-RECORDED DATA WERE AVAILABLE AFTER JANUARY 30, 1970, BECAUSE OF FAILURE OF THE RECORDER. THE ION MASS SPECTROMETER FAILED ABOUT 3 DAYS AFTER LAUNCH. INITIALLY, 6 TO 9 HR OF OBSERVATIONS WERE MADE DAILY, BUT BY THE SPRING OF 1973, ONLY 4 TO 5 HR OF OBSERVATIONS PER DAY WERE BEING MADE. THE DECREASE IN OBSERVATION TIME WAS DUE TO A COMBINATION OF FUNDING AND POWER LIMITATIONS, AND SCHEDULING.

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

EXPERIMENT NAME- VLF RECEIVER

NSSDC ID- 69-009A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.E. BARRINGTON .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

OI - F.H. PALMER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

EXPERIMENT BRIEF DESCRIPTION

THE VLF EXPERIMENT WAS A LOW-FREQUENCY, BROADBAND RECEIVER THAT SENSED SIGNALS RECEIVED BY THE 79-M DIPOLE (SPLIT MONOPOLE) ANTENNA, BETWEEN .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 ZERO TO .3 TO ZERO TO ELEVEN TO ZERO KHZ OVER A 3.5-SEC 'FRAME' PERIOD. THE TRANSMISSION AT .3 KHZ OCCURRED FOR ABOUT 2 SEC. THE NON-LINEAR SWEEP TO 11 KHZ REQUIRED 0.9 SEC. TRANSMISSION AT 11 KHZ FOR ABOUT 0.3 SEC, AND THE NON-LINEAR SWEEP BACK TO ZERO TOOK ABOUT 0.3 SEC. THE FRAMES SEQUENCED THROUGH FOUR STEPS WHERE THE TRANSMISSIONS WERE ATTENUATED BY ZERO, 20, 20, THEN 40 DB. THUS REQUIRING 14 SEC FOR ONE COMPLETE CYCLE OF EXCITER OPERATION. THE EXCITER TRANSMITTED ON THE SHORT ANTENNAS AND THE RECEIVER SENSED THE SIGNALS COUPLED BETWEEN THE TWO ANTENNAS BY THE AMBIENT PLASMA, PLUS ANY NOISE SIGNALS WHICH WERE EXCITED IN THE PLASMA. EXCITER OPERATION PERMITTED THE CONTROLLED STUDY OF ION RESONANCES IN ADDITION TO STUDY OF NATURAL AND OTHER MAN-MADE VLF RADIO NOISE. THIS VLF EXPERIMENT ALSO PERMITTED ANTENNA IMPEDANCE MEASUREMENTS, WITH OR WITHOUT A DC BIAS ON THE ANTENNA. THE REAL-TIME DATA WERE TRANSMITTED ON 136.08 MHZ TELEMETRY. THE VLF DATA COULD BE RECORDED ON ONE OF THE FOUR TAPE-RECORDER CHANNELS DURING THE TIME THE TAPE RECORDER OPERATED (TO JANUARY 1970). 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 ----------

EXPERIMENT NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 69-009A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD

OI - J.A. FINDLAY .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSE OF THIS EXPERIMENT WAS TO STUDY THE GLOBAL VARIATIONS OF ELECTRON TEMPERATURE AND ELECTRON CONCENTRATION AT SPACECRAFT (SC) ALTITUDES DURING SOLAR MAXIMUM, AND TO STUDY CHARACTERISTICS OF THE SC ION SHEATH. THIS CYLINDRICAL PROBE WAS A TYPE OF LANGMUIR PROBE THAT OBSERVED CURRENT FLOW FOR A GIVEN VOLTAGE PROFILE PLACED ON THE COLLECTOR. FROM THIS CURRENT-VOLTAGE PROFILE, THE ELECTRON DENSITY AND ELECTRON TEMPERATURE COULD BE CALCULATED. THERE WAS A BOOM PROBE AND AN AXIAL PROBE EXTENDING FROM THE SC. THE AXIAL PROBE EXTENDED 48.3 CM FROM THE SC, ALONG THE SPIN AXIS, AND WAS CENTERED AMONG THE FOUR TELEMETRY ANTENNAS ON THE UNDERSIDE OF THE SC. THIS PROBE WAS CAPABLE OF MEASUREMENTS UNDISTURBED BY THE SATELLITE MOTION ONLY WHEN THE PROBE PRECEDED THE SC IN ITS MOTION THROUGH THE PLASMA. THE BOOM PROBE EXTENDED HORIZONTALLY AND OUTWARD (IN SC FRAME OF REFERENCE) FROM A BOOM 1 M LONG, WHICH IN TURN EXTENDED FROM AN UPPER SURFACE OF THE SATELLITE AT AN ANGLE OF ABOUT 45 DEG TO THE SPIN AXIS.

THIS PROBE PROVIDED SOME OBSERVATIONS DURING EACH SC SPIN CYCLE THAT WAS FREE OF SC WAKE EFFECTS. THE PROBES CONSISTED OF THREE CONCENTRIC, ELECTRICALLY ISOLATED, STAINLESS STEEL TUBES. THE OUTER (0.24-CM DIAM AND 23-CM LONG) TUBE FLOATED AT ITS OWN EQUILIBRIUM POTENTIAL AND SERVED TO PLACE THE COLLECTOR WELL AWAY FROM THE SC PLASMA SHEATH. THE CENTER TUBE (0.165-CM DIAM) EXTENDING 23 CM OUTWARD FROM THE OUTER TUBE ACTED AS AN ELECTRICAL GUARD FOR THE COLLECTOR. ITS ELECTRICAL POTENTIAL WAS CONTROLLED. THE COLLECTOR (0.058-CM DIAM) EXTENDED 23 CM OUTWARD FROM THE DRIVEN GUARD. DURING EACH 2-MIN SEQUENCE, A VOLT-AMPERE CURVE WAS OBTAINED FROM THE SAWTOOTH VOLTAGE (-2 TO PLUS 10V) APPLIED TO THE COLLECTOR. THIS CAN BE INTERPRETED IN ELECTRON DENSITIES OVER A RANGE FROM 100 TO 1,500,000 ELECTRONS PER CM SQ, AND TEMPERATURES FROM ABOUT 400 TO 50,000 DEG K.

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

EXPERIMENT NAME- FIXED FREQUENCY SOUNDER

NSSDC ID- 69-009A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	W.	CALVERT	NOAA-ERL BOULDER, CO
OI -	R.B.	NORTON	NOAA-ERL BOULDER, CO
OI -	J.M.	WARNOCK	NOAA-ERL BOULDER, CO
OI -	G.L.	NELMS	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	G.E.K.	LOCKWOOD	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	J.H.	WHITTEKER	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	C.E.	PETRIE	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	T.E.	VAN ZANDT	NOAA-ERL BOULDER, CO

EXPERIMENT 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 SEC DURING THE FREQUENCY FLY-BACK PERIOD OF THE SWEEP FREQUENCY OPERATION WHICH WAS EVERY 19 OR 29 SEC. ONE OF SIX FREQUENCIES (0.25, 0.48, 1.00, 1.95, 4.00, OR 9.303 MHZ) WAS CHOSEN FOR USE BY THE EXPERIMENTER AS DESIRED. OTHER MODES OF OPERATION WERE AVAILABLE, INCLUDING CONTINUOUS OBSERVATION AT A SELECTED FREQUENCY, AND A SPECIAL MIXED MODE WITH TRANSMISSION AT THE FIXED FREQUENCY OF 0.82 MHZ AND SWEEP RECEPTION. THIS EXPERIMENT WAS DESIGNED TO STUDY IONOSPHERIC FEATURES OF A SMALLER SCALE THAN COULD BE DETECTED BY THE SWEEP SOUNDER, AND TO STUDY PLASMA RESONANCES. PARAMETERS MEASURED WERE VIRTUAL RANGE (A FUNCTION OF PROPAGATION TIME OF THE REFLECTED PULSE) AND TIME (A FUNCTION OF GEOGRAPHICAL POSITION). THESE DATA WERE NORMALLY OBSERVED ONLY WHEN THE SPACECRAFT WAS IN RANGE OF THE TELEMETRY STATION. A LIMITED AMOUNT OF DATA WAS TAPE RECORDED DURING THE FIRST YEAR AFTER LAUNCH.

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

EXPERIMENT NAME- RADIO BEACON

NSSDC ID- 69-009A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/69.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT 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. THE BEACON HAS BEEN OPERABLE SINCE LAUNCH, BUT IT HAS BEEN IMPRACTICAL TO OBTAIN TEC MEASUREMENTS DUE TO POOR CHARACTERISTICS OF THE BEACON ANTENNA RADIATION PATTERN. USEFUL DATA HAVE BEEN OBTAINED FROM THE INCIDENT DIRECTION, PHASE, AND AMPLITUDE MEASUREMENTS. REFERENCE 'ISIS TECHNICAL PLAN,' PP. 84, 85 FOR FURTHER DETAILS.

------- ISIS 1, HARTZ ----------

EXPERIMENT NAME- COSMIC RADIO NOISE

NSSDC ID- 69-009A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	T.R.	HARTZ	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT USED THE SWEEP-FREQUENCY IONOSONDE RECEIVER AUTOMATIC GAIN CONTROL VOLTAGE 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 ----------

EXPERIMENT NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 69-009A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	I.B.	MCDIARMID	NATL RES COUNC OF CAN OTTAWA, ONTARIO, CANADA
OI -	J.R.	BURROWS	NATL RES COUNC OF CAN OTTAWA, ONTARIO, CANADA
OI -	R.C.	ROSE	NATL RES COUNC OF CAN OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 5 SILICON JUNCTION DETECTORS WHICH 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 ----------

EXPERIMENT NAME- SPHERICAL ELECTROSTATIC ANALYZER

NSSDC ID- 69-009A-08

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.C.	SAGALYN	USAF CAMBRIDGE RES LAB BEDFORD, MA
OI -	M.	SMIDDY	USAF CAMBRIDGE RES LAB BEDFORD, MA

EXPERIMENT 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 1E1 TO 1E6 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 DEG K, (C) THE FLUX AND ENERGY SPECTRUM OF PROTONS IN THE RANGE FROM 0 TO 2 KEV, AND (D) THE SATELLITE POTENTIAL WITH RESPECT TO THE UNDISTURBED PLASMA. 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 SIXTY TIMES A SECOND, CORRESPONDING TO A SPATIAL RESOLUTION OF 150 METERS. ONCE PER MINUTE THE RATIO OF MASS TO TEMPERATURE WAS SAMPLED, AND THE ENERGY DISTRIBUTION WAS SAMPLED ONCE EVERY TWO MINUTES.

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

EXPERIMENT NAME- SWEEP FREQUENCY SOUNDER

NSSDC ID- 69-009A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/30/70.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WHITTEKER	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	G.E.K.	LOCKWOOD	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	G.L.	NELMS	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
OI -	J.E.	JACKSON	NASA-GSFC GREENBELT, MD
OI -	J.W.	KING	APPLETON LAB SLOUGH, BUCKS, ENGLAND
OI -	J.	TURNER	AUST DEPT OF INTERIOR SYDNEY, AUSTRALIA
OI -	M.	SYLVAIN	IONOSPHERIC RES GROUP ORLEANS, FRANCE
OI -	O.	HOLT	AURORAL OBS TROMSO, NORWAY
OI -	Y.	OGATA	RADIO RESEARCH LAB TOKYO, JAPAN
OI -	R.	RAGHAVARAO	PHYSICAL RESEARCH LAB AHMEDABAD, INDIA
OI -	W.	CALVERT	NOAA-ERL BOULDER, CO
OI -	T.E.	VAN ZANDT	NOAA-ERL BOULDER, CO
OI -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
OI -	R.B.	NORTON	NOAA-ERL BOULDER, CO
OI -	C.E.	PETRIE	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 SEC, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO SOUNDED FOR A PERIOD OF 3 TO 5 SEC DURING THIS 19- OR 29-SEC 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 IONOSPHERE, NON-VERTICAL 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 FORM 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

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

LAUNCH DATE- 04/01/71 SPACECRAFT 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- 04/01/71
ORBIT PERIOD- 113.61 MIN	INCLINATION- 88.1564 DEG
PERIAPSIS- 1367. KM ALT	APOAPSIS- 1429. KM ALT

RECENT ORBIT PARAMETERS

ORBIT TYPE- GEOCENTRIC	EPOCH DATE- 09/07/73
ORBIT PERIOD- 113.55 MIN	INCLINATION- 88.181 DEG
PERIAPSIS- 1354.33 KM ALT	APOAPSIS- 1424.39 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	L.H.	BRACE	NASA-GSFC GREENBELT, MD
PS -	J.H.	WHITTEKER	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
MG -	F.W.	GAETANO	NASA HEADQUARTERS WASHINGTON, DC
SC -	J.H.	CHAPMAN	COMMUN RESEARCH CENTRE OTTAWA, ONTARIO, CANADA
SC -	E.R.	SCHMERLING	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

ISIS 2 WAS AN IONOSPHERIC OBSERVATORY INSTRUMENTED WITH A SWEEP FREQUENCY 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 M AND 20.2 M LONG, RESPECTIVELY) 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 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-HR CAPACITY, FOR NON-RECORDED 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. INITIAL OPERATION OF ALL EXPERIMENTS WAS NOMINAL. THE TAPE RECORDERS FAILED ON FEBRUARY 4, 1972, BUT REAL-TIME OBSERVATIONS CONTINUED TO BE TELEMETERED TO GROUND STATIONS. AFTER APRIL 1973, DATA TAKEN WERE TO BE STORED ON TAPE FOR AT LEAST 18 MONTHS. THESE DATA TAPES MAY BE ERASED FOR REUSE IF NO REQUIREMENT (AND FUNDING) FOR DATA REDUCTION OCCURS WITHIN THAT PERIOD. SATELLITE OPERATION OCCURRED (JUNE 1974) FOR ABOUT 5 HOURS PER DAY.

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

EXPERIMENT NAME- 3914- TO 5577-A PHOTOMETER

NSSDC ID- 71-024A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	C.D.	ANGER	U OF CALGARY EDMONTON, ALBERTA, CANADA

EXPERIMENT 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 SEC. 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 WILL BE REPRODUCED DIRECTLY IN THE FORM OF SEPARATE PICTURES REPRESENTING EMISSIONS AT EACH WAVELENGTH, WHICH WILL BE USED TO STUDY THE LARGE-SCALE DISTRIBUTION AND MORPHOLOGY OF AURORAS AND TO COMPARE WITH OTHER MEASUREMENTS FROM THIS AND OTHER SPACECRAFT AND FROM 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, VOL 12, NO. 8, PP. 1753-1766, AUGUST (1973).

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

EXPERIMENT NAME- VLF RECEIVER

NSSDC ID- 71-024A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.E. BARRINGTON .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - F.H. PALMER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 .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 ZERO HZ, THEN TO 9500 HZ, OVER A PERIOD OF 1.0 SEC. 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 FOR THE FIRST YR WHEN THE SPACECRAFT TAPE RECORDER WAS OPERATING. TAPE RECORDED (AND BACKUP REAL-TIME CAPABILITY) DATA WERE TRANSMITTED ON 400-MHZ TELEMETRY.

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

EXPERIMENT NAME- CYLINDRICAL ELECTROSTATIC PROBE

NSSDC ID- 71-024A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L.H. BRACE .....NASA-GSFC
GREENBELT, MD
OI - J.A. FINDLAY .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 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 SQ, AND IN TEMPERATURE VALUES FROM 400 TO 50,000 DEG K.

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

EXPERIMENT NAME- FIXED FREQUENCY SOUNDER

NSSDC ID- 71-024A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W. CALVERT .....NOAA-ERL
BOULDER, CO
OI - R.B. NORTON .....NOAA-ERL
BOULDER, CO
OI - G.L. NELMS .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - C.E. PETRIE .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - G.E.K.LOCKWOOD .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - J.H. WHITTEKER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - J.M. WARNOCK .....NOAA-ERL
BOULDER, CO
OI - T.E. VAN ZANDT .....NOAA-ERL
BOULDER, CO

EXPERIMENT 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 SEC DURING THE FREQUENCY FLY-BACK PERIOD OF THE SWEEP FREQUENCY OPERATION WHICH WAS EVERY 14 OR 21 SEC. 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. A LIMITED AMOUNT OF DATA WAS TAPE RECORDED DURING THE FIRST 2 YEARS AFTER LAUNCH.

------- ISIS 2, FORSYTH ----------

EXPERIMENT NAME- RADIO BEACON

NSSDC ID- 71-024A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 04/23/71.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - P.A. FORSYTH .....WESTERN ONTARIO U
LONDON, ONTARIO, CANADA
OI - G.F. LYON .....WESTERN ONTARIO U
LONDON, ONTARIO, CANADA
OI - E.H. TULL .....WESTERN ONTARIO U
LONDON, ONTARIO, CANADA

EXPERIMENT 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. INTERFERENCE DIFFICULTIES WITH OTHER SPACECRAFT OPERATIONS PREVENTED NOMINAL ELECTRON CONTENT DATA FROM BEING OBTAINED. HOWEVER SOME LIMITED AMOUNT OF USEFUL SCINTILLATION DATA WAS OBSERVED.

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

EXPERIMENT NAME- COSMIC RADIO NOISE

NSSDC ID- 71-024A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.R. HARTZ .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA

EXPERIMENT 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 ----------

EXPERIMENT NAME- SOFT-PARTICLE SPECTROMETER

NSSDC ID- 71-024A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/04/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.J. HEIKKILA .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT BRIEF DESCRIPTION
THE SOFT PARTICLE SPECTROMETER (WHICH WAS 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, HUFFMAN ----------

EXPERIMENT NAME- ION MASS SPECTROMETER

NSSDC ID- 71-024A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.H. HOFFMAN .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT 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 SOLAR 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 SEC. A BACKUP MODE WAS PROVIDED WHICH PRODUCED AN ANALOG OUTPUT WITH A SWEEP PERIOD OF 8 SEC. 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. INFLIGHT 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 ----------

EXPERIMENT NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- 71-024A-08

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.J.R.MAIER .....NASA-GSFC
GREENBELT, MD
OI - M. SMIDDY .....USAF CAMBRIDGE RES LAB
BEDFORD, MA
OI - B.E. TROY, JR. .....NASA-GSFC
GREENBELT, MD
OI - J.L. DONLEY .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED ION AND/OR ELECTRON CURRENT IN ORDER TO STUDY HEAT TRANSFER PROCESSES WHICH ARE IMPORTANT IN THE DYNAMICS OF THE IONOSPHERE. THIS RETARDING POTENTIAL ANALYZER CONSISTED OF THREE GRIDS (APERTURE GRID, RETARDING GRID AND A SUPPRESSOR GRID) WHICH PROVIDED A VOLT-AMPERE CURVE RELATING SWEEP VOLTAGE ON THE RETARDING GRID TO CURRENT FLOW TO THE COLLECTOR. ANALYSIS OF THE CURVES COULD PROVIDE ION/ELECTRON TEMPERATURES AND DENSITIES.

------- ISIS 2, MCDIARMID ----------

EXPERIMENT NAME- ENERGETIC PARTICLE DETECTORS

NSSDC ID- 71-024A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/04/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - I.B. MCDIARMID .....NATL RES COUNC OF CAN
OTTAWA, ONTARIO, CANADA
OI - J.R. BURROWS .....NATL RES COUNC OF CAN
OTTAWA, ONTARIO, CANADA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF FOUR SETS OF DETECTORS. THE FIRST DETECTOR CONSISTED OF THREE GEIGER COUNTERS (OF WHICH ONE FAILED RIGHT AFTER LAUNCH) AND MEASURED ELECTRONS GREATER THAN 20 AND 40 KEV PERPENDICULAR AND PARALLEL TO THE SPIN AXIS. THESE GEIGERS WERE ALSO SENSITIVE TO PROTONS WITH ENERGIES GREATER THAN 240 AND 600 KEV, RESPECTIVELY. ALL REMAINING DETECTORS MEASURED PARTICLES PERPENDICULAR TO THE SPIN AXIS. THE TWO GEIGER COUNTERS WERE CORRECTED FOR SATURATION AND DEADTIME. ALL OTHER COUNTERS FOR DEADTIME ONLY. THE SECOND SET CONSISTED OF TWO SOLID-STATE SILICON JUNCTION DETECTORS. BOTH 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 - 4.0, 3.2 - 12.7, AND 12.9 - 28.0 MEV, ALPHA PARTICLES IN THE ENERGY RANGE 2.5 - 16.0 MEV, AND ELECTRONS IN THE ENERGY RANGE 1.0 - 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, 0.15, AND MEASURED PROTONS AT 26.2, 21.6, 17.0, 12.4, 9.4, 7.6, 5.2, AND 2.2 KEV. OTHER DETECTORS WERE PLANNED INITIALLY FOR THIS EXPERIMENT BUT IT APPEARS THAT THE ABOVE ARE THE ONLY ONES THAT WERE FLOWN.

------- ISIS 2, SHEPHERD ----------

EXPERIMENT NAME- 6300-A PHOTOMETER

NSSDC ID- 71-024A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.G. SHEPHERD .....YORK U
TORONTO, ONTARIO, CANADA

EXPERIMENT 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 ONE MEGARAYLEIGH. SUNLIGHT COULD ENTER THE OPTICAL SYSTEMS DIRECTLY IN ADDITION TO EARTH-REFLECTED LIGHT. THE INSTRUMENT BAFFLE WAS ILLUMINATED BY THE SUN ONLY FOR THE OFF-AXIS ANGLES LESS THAN 47 DEG. OUTSIDE THIS LIMIT, THE DATA WERE NOT DEGRADED BY SUNLIGHT, PERMITTING NORMAL OPERATION IN THE REGION OF THE ORBIT WHERE THE SPACECRAFT WAS IN SUNLIGHT BUT THE PORTION OF THE EARTH BENEATH IT WAS DARK. AN EXTERNAL LIGHT SOURCE 'SAW' THE FILTER ONLY WHEN IT WAS 7.5 DEG OR LESS OFF AXIS. IN THE RANGE 7.5 TO 47 DEG, GOOD DATA WERE STILL OBTAINED WHEN THE SUNLIT EARTH WAS THE ORIGIN OF THE CONTAMINATION. TO GIVE ACCURATE LOW LIGHT LEVEL READINGS, AS WELL AS COVER THE FULL DYNAMIC RANGE, AND TO PRESENT THE MEASUREMENTS IN A FORM COMPATIBLE WITH ENCODING AS AN 8-BIT BINARY WORD FOR TELEMETRY, A HYBRID LINEAR-LOG AMPLIFIER SYSTEM WAS USED. THE ELECTRONIC SYSTEM PULSE COUNTED AT LOW LIGHT LEVELS AND AMPLIFIED ON A LOG SCALE FOR HIGHER LIGHT LEVELS. IT WAS COMPOSED OF A PREAMP, TWO SIGNAL PROCESSING CHANNELS (LINEAR AND LOGARITHMIC), AND AN OUTPUT COMMUTATOR TO SELECT BETWEEN THEM AS WELL AS TO INTERFACE THEM TO THE SPACECRAFT SYSTEM. ALSO PROVIDED WERE CALIBRATION AND PROTECTION CIRCUITRY TO OPERATE THE CALIBRATE LAMPS AND TO PROTECT THE PHOTOTUBE FROM THE EFFECTS OF EXPOSURE TO HIGH LIGHT LEVELS. TO PERFORM THE DATA ANALYSIS, IT WAS NECESSARY, AMONG OTHER OPERATIONS, TO EVALUATE DIFFERENT GEOMETRICAL SITUATIONS, AND TO LOCATE THE ON-EARTH LIMB CROSSING OF THE 12 A BANDPASS PHOTOMETER SO THAT THE DATA COULD BE ORGANIZED INTO SPIN MAPS.

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

EXPERIMENT NAME- SWEEP FREQUENCY SOUNDER

NSSDC ID- 71-024A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/04/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- IONOSPH. & RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - J.H. WHITTEKER .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - G.E.K.LOCKWOOD .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - G.L. NELMS .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - J. TURNER .....AUST DEPT OF INTERIOR
SYDNEY, AUSTRALIA
OI - M. SYLVAIN .....IONOSPHERIC RES GROUP
ORLEANS, FRANCE
OI - O. HOLT .....AURORAL OBS
TROMSO, NORWAY
OI - Y. OGATA .....RADIO RESEARCH LAB
TOKYO, JAPAN
OI - R. RAGHAVARAO .....PHYSICAL RESEARCH LAB.
AHMEDABAD, INDIA
OI - J.E. JACKSON .....NASA-GSFC
GREENBELT, MD
OI - C.E. PETRIE .....COMMUN RESEARCH CENTRE
OTTAWA, ONTARIO, CANADA
OI - T.E. VAN ZANDT .....NOAA-ERL
BOULDER, CO
OI - L. COLIN .....NASA-ARC
MOFFETT FIELD, CA
OI - W. CALVERT .....NOAA-ERL
BOULDER, CO
OI - R.B. NORTON .....NOAA-ERL
BOULDER, CO
OI - J.W. KING .....APPLETON LAB
SLOUGH, BUCKS, ENGLAND

EXPERIMENT 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 WERE SAMPLED EVERY 14 OR 21 SEC, AND ONE OF SIX SELECTED FREQUENCIES WAS ALSO USED FOR SOUNDING FOR A FEW SECONDS DURING EACH 14- OR 21-SEC 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, NON-VERTICAL 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. INITIAL OPERATION OF THIS EXPERIMENT WAS NORMAL AND BOTH REAL-TIME AND TAPE RECORDED DATA WERE TAKEN UNTIL FEBRUARY 4, 1972, WHEN THE RECORDERS FAILED. REAL-TIME DATA HAVE BEEN TAKEN SUBSEQUENTLY.

********** IUE **********

SPACECRAFT COMMON NAME- IUE
ALTERNATE NAMES- INT ULTRAVIOLET EXPL, SAS-D
NSSDC ID- SAS-D

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2HALF 76 SPACECRAFT WEIGHT- 400. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS
INTERNATIONAL ESRO
SRC

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- DEG
PERIAPSIS- 42000. KM ALT APOAPSIS- 42000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - G.W. LONGANECKER .....NASA-GSFC
GREENBELT, MD
PS - A.B. UNDERHILL .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

THE INTERNATIONAL ULTRAVIOLET EXPLORER (IUE, FORMERLY SAS-D) SATELLITE IS AN APPROVED MISSION FOR THE CONSTRUCTION OF A SPACE-BORNE ULTRAVIOLET ASTRONOMICAL OBSERVATORY TO BE USED AS AN INTERNATIONAL FACILITY. THE IUE IS TO CONTAIN A 45-CM TELESCOPE USED SOLELY FOR SPECTROSCOPY IN THE WAVELENGTH RANGE OF 1100 TO 3300 A. THE PLANNING, CONSTRUCTION, AND ULTIMATE OPERATION OF THE IUE IS THE RESULT OF A CO-OPERATIVE INTERNATIONAL EFFORT. THE SATELLITE AND OPTICAL INSTRUMENTATION ARE TO BE PROVIDED BY THE GODDARD SPACE FLIGHT CENTER (GSFC). THE TELEVISION CAMERAS TO BE USED AS DETECTORS WILL BE PROVIDED BY THE UNITED KINGDOM SPACE RESEARCH COUNCIL (UKSRC). THE EUROPEAN SPACE RESEARCH ORGANIZATION (ESRO) IS TO SUPPLY SOLAR PADDLES FOR THE SATELLITE AND WILL CONSTRUCT A EUROPEAN CONTROL CENTER. AFTER LAUNCH, TWO-THIRDS OF THE OBSERVING TIME WILL BE DIRECTED FROM A CONTROL CENTER AT GSFC, AND ONE-THIRD OF THE TIME THE SATELLITE WILL BE OPERATED FROM THE EUROPEAN CONTROL CENTER NEAR MADRID. GUEST OBSERVERS WILL SUBMIT THEIR PROGRAMS FOR REVIEW AND EVALUATION TO EITHER NASA, UKSRC, OR ESRO AS THEY ARE RESIDENTS OF THE UNITED STATES, UNITED KINGDOM, OR ESRO COUNTRIES. SCIENTISTS NOT COVERED BY THESE CONDITIONS WILL SUBMIT THEIR PROJECT PLANS TO ANY ONE OF THESE NATIONAL AGENCIES. TO ACHIEVE THE OBJECTIVE THAT THE IUE BE AN EFFECTIVE GUEST ASTRONOMICAL OBSERVATORY IT WILL BE LAUNCHED INTO A SYNCHRONOUS ORBIT. THE CHOICE OF A SYNCHRONOUS ORBIT IS MADE TO TRANSFORM THE PROBLEMS AND TECHNIQUES OF TELESCOPE OPERATION INTO A SET SIMILAR TO THOSE FOR GROUND OBSERVATORIES, WHICH ARE ALREADY FAMILIAR TO EVERY OBSERVING ASTRONOMER. THE 45-CM RITCHEY-CHRETIEN F/15 TELESCOPE WILL FEED A SPECTROGRAPH PACKAGE. THE SPECTROGRAPH PACKAGE, USING SEC VIDICON CAMERAS AS DETECTORS, WILL COVER THE SPECTRAL RANGE FROM 1100 TO 3300 A. IT WILL OPERATE 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 HR. THIS INTEGRATION TIME WILL LIMIT DETECTION IN THE HIGH- AND LOW-RESOLUTION MODES TO APPROXIMATELY 5 AND 0.03 PHOTONS/(CM SQ-SEC-ANGSTROM), RESPECTIVELY, FOR A SIGNAL-TO-NOISE RATIO OF 50. THESE SENSITIVITIES ARE EQUALIVALENT TO OBSERVATIONS OF A 80 STAR OF NINTH TO FOURTEENTH MAGNITUDE, RESPECTIVELY.

------- IUE, NONE ASSIGNED ----------

EXPERIMENT NAME- LOW/HIGH RESOLUTION, ULTRAVIOLET
SPECTROGRAPH PACKAGE

NSSDC ID- SAS-D -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - NONE ASSIGNED .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL INCLUDE THE ULTRAVIOLET SPECTROGRAPH PACKAGE CARRIED BY THE IUE, CONSISTING OF TWO PHYSICALLY DISTINCT ECHELLE-SPECTROGRAPH/CAMERA UNITS CAPABLE OF ASTRONOMICAL OBSERVATIONS. EACH SPECTROGRAPH WILL BE A THREE-ELEMENT ECHELLE SYSTEM, COMPOSED OF AN OFF-AXIS PARABOLOIDAL COLLIMATOR, AN ECHELLE GRATING, AND A SPHERICAL FIRST-ORDER GRATING THAT WILL BE USED TO SEPARATE THE ECHELLE ORDERS AND, FOCUS THE SPECTRAL DISPLAY ON AN IMAGE CONVERTER-PLUS-SEC VIDICON CAMERA. (FOR EACH UNIT THERE WILL BE A SPARE CAMERA). THE CAMERA UNITS WILL BE ABLE TO INTEGRATE THE SIGNAL. THE READOUT/PREPARATION CYCLE FOR THE CAMERAS WILL TAKE APPROXIMATELY 4 MIN. WAVELENGTH CALIBRATION WILL BE PROVIDED BY THE USE OF A HOLLOW CATHODE COMPARISON LAMP. THE PHOTOMETRIC CALIBRATION WILL BE ACCOMPLISHED BY OBSERVING STANDARD STARS WHOSE SPECTRAL FLUXES HAVE BEEN PREVIOUSLY CALIBRATED BY OTHER MEANS. BOTH ECHELLE-SPECTROGRAPH/CAMERA UNITS WILL BE CAPABLE OF HIGH-RESOLUTION (0.2 A) OR LOW-RESOLUTION (6 A) PERFORMANCE. THE DUAL HIGH/LOW RESOLUTION CAPABILITY WILL BE IMPLEMENTED BY THE INSERTION OF A FLAT IN FRONT OF THE ECHELLE GRATING, SO THAT THE ONLY DISPERSION WILL BE PROVIDED BY THE SPHERICAL GRATING. AS THE SEC VIDICONS CAN INTEGRATE THE SIGNAL FOR UP TO 1 HR, DATA WITH A SIGNAL-TO-NOISE RATIO OF 50 CAN BE OBTAINED FOR A 80 STAR OF THE NINTH AND FOURTEENTH MAGNITUDE IN THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. THE DISTINGUISHING CHARACTERISTICS OF THE UNITS WILL BE THEIR WAVELENGTH COVERAGE. ONE UNIT WILL COVER 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 WILL BE FROM 1893 TO 3031 A, AND 1800 TO 3255 A FOR THE HIGH- AND LOW-RESOLUTION MODES, RESPECTIVELY. EACH UNIT WILL ALSO HAVE ITS OWN CHOICE OF ENTRANCE APERTURES EITHER FOR A 3-ARC-SEC HOLE OR A 10-X 20-ARC-SEC SLOT. THE 10-X 20-ARC-SEC SLOTS CAN BE BLOCKED BY A COMMON SHUTTER, BUT THE 3-ARC-SEC APERTURE WILL ALWAYS BE OPEN. AS A RESULT, TWO APERTURE CONFIGURATIONS ARE POSSIBLE -- (1) BOTH 3-ARC-SEC APERTURES OPEN AND BOTH 10-X 20-ARC-SEC 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.

********** LST **********

SPACECRAFT COMMON NAME- LST
ALTERNATE NAMES- LARGE SPACE TELESCOPE
NSSDC ID- LST

LAST REPORTED STATE- A PROPOSED MISSION

LAUNCH DATE- 00/00/80 SPACECRAFT 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- MIN INCLINATION- 28.5 DEG
PERIAPSIS- 6928. KM ALT APOAPSIS- 6928. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PS - C.R. O'DELL .....NASA-MSFC
HUNTSVILLE, AL
MG - M.J. AUCREMANNE .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE PROPOSED LARGE SPACE TELESCOPE (LST) WILL BE A SPACE-BORNE, 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 WILL BE USED FOR INITIAL LAUNCH, IN-ORBIT SERVICING, AND FOR RETURN OF THE LST TO THE GROUND FOR MAINTENANCE. THE ANTICIPATED MINIMUM OPERATIONAL LIFETIME, EXCLUDING DOWN TIME FOR PERIODIC MAINTENANCE AND UPDATING, IS 15 YRS. THE LST SYSTEM WILL SERVE AS A NATIONAL ASTRONOMICAL SPACE OBSERVATORY FACILITY. THE USE OF THE ONBOARD INSTRUMENTATION WILL BE OPEN TO SCIENTISTS OF ALL COUNTRIES. THUS, ITS DESIGN WILL BE 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 WILL BE 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 10 TO THE FIFTH, 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., AND (5) AN INFRARED PHOTOMETER AND/OR SPECTROMETER TO COVER THE WAVELENGTH INTERVAL FROM 1 TO 1000 MICRONS.

********** LUNAR POLAR ORB-DAUGHTER *********

SPACECRAFT COMMON NAME- LUNAR POLAR ORB-DAUGHTER
ALTERNATE NAMES- ALPO, AUTO.LUNAR POLAR ORBITER
NSSDC ID- LPO-D

LAST REPORTED STATE- A PROPOSED MISSION

LAUNCH DATE- PROPSD79 SPACECRAFT WEIGHT- 80. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- LTTAT-DLTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- SELENOCENTRIC
ORBIT PERIOD- MIN INCLINATION- 0. DEG
PERIAPSIS- 6000. KM ALT APOAPSIS- 6000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - W.D. HIBBARD .....NASA-GSFC
GREENBELT, MD
PS - J. PHILPOTTS .....NASA-GSFC
GREENBELT, MD
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - F.D. MARTIN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WILL BE FOR A PROPOSED PROBE OF THE LUNAR ENVIRONMENT. IT IS CONCEIVED TO BE COMPOSED OF TWO SPACECRAFT IN A MOTHER-DAUGHTER RELATIONSHIP. THE DAUGHTER SPACECRAFT, WHICH WILL BE A RANGING AND COMMUNICATION STATION, WILL BE SENT INTO AN EQUATORIAL CIRCULAR ORBIT AT AN ALTITUDE OF 6000 TO 12000 KM. IN ORBIT THE PAYLOAD ANTICIPATED WILL BE ABOUT 80 KG (175 LBS) FOR THE DAUGHTER SHIP. THE SCIENTIFIC PAYLOAD WILL BE CONSTRAINED TO A DELTA VEHICLE. THE PROJECT IS IN THE STUDY PHASE NOW. IT IS EXPECTED THAT AFO'S WILL BE SENT OUT IN FISCAL '75.

********** LUNAR POLAR ORB-MOTHER **********

SPACECRAFT COMMON NAME- LUNAR POLAR ORB-MOTHER
ALTERNATE NAMES- ALPO, AUTO.LUNAR POLAR ORBITER
NSSDC ID- LPO-M

LAST REPORTED STATE- A PROPOSED MISSION

LAUNCH DATE- PROPSD79 SPACECRAFT WEIGHT- 230. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- LTTAT-DLTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- SELENOCENTRIC
ORBIT PERIOD- MIN INCLINATION- 85. DEG
PERIAPSIS- 100. KM ALT APOAPSIS- 100. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - W.D. HIBBARD .....NASA-GSFC
GREENBELT, MD
PS - J. PHILPOTTS .....NASA-GSFC
GREENBELT, MD
MG - F.I. ROBERSON .....NASA HEADQUARTERS
WASHINGTON, DC
SC - F.D. MARTIN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WILL BE FOR A PROPOSED PROBE OF THE LUNAR ENVIRONMENT. IT IS CONCEIVED TO BE COMPOSED OF TWO SPACECRAFT IN A MOTHER-DAUGHTER RELATIONSHIP. THE MOTHER SHIP WILL CONTAIN THE SCIENTIFIC EXPERIMENTS, WHICH WILL INCLUDE X-RAY, GAMMA-RAY, MAGNETIC FIELD, AND GRAVITY-DETECTING SENSORS. IT IS PROPOSED THAT THE MOTHER SHIP HAVE A CIRCULAR NEAR-POLAR, NON-STABLE ORBIT WITH AN INCLINATION OF 85 DEG AT AN ALTITUDE OF 100 KM. IN ORBIT THE PAYLOAD ANTICIPATED WILL BE APPROXIMATELY 230 KG (500 LBS) FOR THE MOTHER SHIP. THE SCIENTIFIC PAYLOAD WILL BE CONSTRAINED TO A DELTA VEHICLE. THE PROJECT IS IN THE STUDY PHASE NOW. IT IS EXPECTED THAT AFO'S WILL BE SENT OUT IN FISCAL '75.

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

SPACECRAFT COMMON NAME- MARINER 10
ALTERNATE NAMES- MARINER 73, PL-732A
MARINER-J VENUS/MERCURY, MARINER VENUS/MERCURY 6919
NSSDC ID- 73-085A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

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

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - W.E. GIBERSON .....NASA-JPL
PASADENA, CA
MG - N.W. CUNNINGHAM .....NASA HEADQUARTERS
WASHINGTON, DC
SC - S.E. DWORNIK .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WAS THE FIRST ONE TO USE THE GRAVITATIONAL PULL OF ONE PLANET (VENUS) TO REACH ANOTHER (MERCURY). THE SPACECRAFT STRUCTURE WAS AN 18.15-KG, 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 SQUARE METERS 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, AND 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 MINUTES, THEN PLACED IN ORBIT AROUND THE SUN EN ROUTE 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 2046 UT, AT A DISTANCE OF ABOUT 704 KM FROM THE SURFACE. THE TV AND ULTRAVIOLET 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.

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

EXPERIMENT NAME- MEASUREMENT OF PLASMA ENVIRONMENT

NSSDC ID- 73-085A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

OSS DIVISION- PLANETARY PROGRAMS

DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.S.	BRIDGE	MASS INST OF TECH CAMBRIDGE, MA
OI -	J.H.	BINSACK	MASS INST OF TECH CAMBRIDGE, MA
OI -	A.J.	LAZARUS	MASS INST OF TECH CAMBRIDGE, MA
OI -	S.	OLBERT	MASS INST OF TECH CAMBRIDGE, MA
OI -	S.J.	BAME	LOS ALAMOS SCI LAB LOS ALAMOS, NM
OI -	M.D.	MONTGOMERY	LOS ALAMOS SCI LAB LOS ALAMOS, NM
OI -	A.J.	HUNDHAUSEN	NATL CTR FOR ATMOS RES BOULDER, CO
OI -	J.R.	ASBRIDGE	LOS ALAMOS SCI LAB LOS ALAMOS, NM
OI -	K.W.	OGILVIE	NASA-GSFC GREENBELT, MD
OI -	L.F.	BURLAGA	NASA-GSFC GREENBELT, MD
OI -	R.E.	HARTLE	NASA-GSFC GREENBELT, MD
OI -	C.W.	SNYDER	NASA-JPL PASADENA, CA
OI -	G.L.	SISCOE	U OF CALIF, LA LOS ANGELES, CA

EXPERIMENT BRIEF DESCRIPTION
A SET OF HEMISPHERICAL ANALYZER PLATES AND AN ELECTRON MULTIPLIER, ALL MOUNTED ON A SCAN PLATFORM, ARE PROGRAMMED WITH A SEQUENCE OF ANALYZER PLATE VOLTAGES TO DETERMINE THE DIRECTIONAL CHARACTERISTICS AND THE ENERGY SPECTRUM FOR ELECTRONS FROM 4 TO 400 EV AND IONS FROM 80 EV TO 8 KEV IN THE SOLAR WIND BETWEEN 0.4 AND 1 AU DISTANCE FROM THE SUN.

------- MARINER 10, BROADFOOT ----------

EXPERIMENT NAME- EUV SPECTROSCOPY

NSSDC ID- 73-085A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.L.	BROADFOOT	KITT PEAK NATL OBS TUCSON, AZ
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	M.J.S.	BELTON	KITT PEAK NATL OBS TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE FLIGHT EXPERIMENT WAS MADE UP TO TWO INDEPENDENT INSTRUMENTS A POINTING OCCULTATION SPECTROMETER FIXED ON THE SPACECRAFT BODY, AND AN AIRGLOW INSTRUMENT MOUNTED ON THE SPACECRAFT SCAN PLATFORM. NEAR MERCURY, THE OCCULTATION SPECTROMETER SEARCHED FOR AN ATMOSPHERE ABOVE THE EDGE (LIMB) OF THE PLANET'S DISK, AND THE AIRGLOW INSTRUMENT SCANNED THE ENTIRE DISK TO DETECT RADIATION FROM AND MEASURE THE ALTITUDE DISTRIBUTION OF CONSTITUENT GASES. DURING CRUISE, THE TWO INSTRUMENTS MEASURED THE DISTRIBUTION OF HYDROGEN LYMAN-ALPHA COMING FROM GALACTIC AND MAGELLANIC CLOUD SOURCES. IN ADDITION THE AIRGLOW INSTRUMENT OBSERVED THE HYDROGEN CORONA OF THE EARTH, SEARCHED FOR HELIUM, AND MEASURED THE REFLECTIVE PROPERTIES OF THE MOON AT EXTREME UV WAVELENGTH. THE OBJECTIVE GRATING SPECTROMETER WAS DESIGNED TO MEASURE AIRGLOW RADIATIONS IN THE SPECTRAL RANGE FROM 200 TO 1700 A. CHANNEL ELECTRON MULTIPLIERS WERE USED TO MEASURE THE RADIATION INTENSITY. THE FOLLOWING WAVELENGTHS (EXPRESSED IN ANGSTROMS) WERE SEARCHED WITH A SPECTRAL RESOLUTION OF 20 A, WITH THE CANDIDATE EMITTING SPECIES INDICATED IN BRACKETS --- 304 (HE+), 430 (BACKGROUND), 584 (HE), 740 (NE), 867 (A), 1048 (A), 1216 (H), 1304 (O), 1480 (CO-FOURTH POS. BAND), AND 1657 (C). IN ADDITION, THE EXPERIMENT CONTAINED A PAIR OF ZERO-ORDER CHANNELS WITH EFFECTIVE BANDWIDTH FROM 200 TO 1500 A AND 1150 TO 1700 A, RESPECTIVELY. TO OBTAIN THE DESIRED MERCURY/SPACECRAFT ENCOUNTER, AN APPROPRIATE SOLAR OCCULTATION WAS NOT POSSIBLE AT VENUS, AND HENCE, THE OCCULTATION SPECTROMETER DID NOT FUNCTION FOR THE VENUS ENCOUNTER. THE AIRGLOW SPECTROMETER OBTAINED DESIRED MEASUREMENTS INCLUDING EMISSIONS FROM HYDROGEN, HELIUM, ATOMIC OXYGEN AND ATOMIC CARBON. MORE DETAILS OF THE VENUS MEASUREMENTS CAN BE OBTAINED FROM THE PAPER, 'ULTRAVIOLET OBSERVATIONS OF VENUS FROM MARINER 10 -- PRELIMINARY RESULTS,' A. L. BROADFOOT, ET AL., SCIENCE, VOL 183, MARCH 29, 1974, PP 1315-1318.

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

EXPERIMENT NAME- TWO-CHANNEL IR RADIOMETER

NSSDC ID- 73-085A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT ZERO DATA ACQUISITION RATE SINCE 04/00/74.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
AN INFRARED RADIOMETER HAVING TWO CHANNELS, 22 TO 39 MICRONS (80 DEG K TO 300 DEG K) AND 10 TO 17 MICRONS (200 DEG K TO 650 DEG 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.

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

EXPERIMENT NAME- S- AND X-BAND RADIO PROPAGATION

NSSDC ID- 73-085A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. & RADIO PHYSIC PARTICLES AND FIELDS
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED THE ONBOARD S- AND X-BAND RADIO SUBSYSTEMS TO OBTAIN INFORMATION ON THE MERCURIAN AND VENUSIAN MASSES, GRAVITIES, HARMONICS, EPHEMERIDES, IONOSPHERES, ATMOSPHERES, RADII, AND SURFACE CHARACTERISTICS.

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

EXPERIMENT NAME- TELEVISION PHOTOGRAPHY

NSSDC ID- 73-085A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT ZERO DATA ACQUISITION RATE SINCE 09/25/74.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	B.C.	MURRAY	CALIF INST OF TECH PASADENA, CA
OI -	M.J.S.	BELTON	KITT PEAK NATL OBS TUCSON, AZ
OI -	G.P.	KUIPER	U OF ARIZONA TUCZON, AZ
OI -	V.E.	SUOMI	U OF WISCONSIN MADISON, WI
OI -	N.J.	TRASK, JR.	US GEOLOGICAL SURVEY MENLO PARK, CA
OI -	D.E.	GAULT	NASA-ARC MOFFETT FIELD, CA
OI -	B.W.	HAPKE	U OF PITTSBURGH PITTSBURGH, PA
OI -	M.E.	DAVIES	RAND CORP SANTA MONICA, CA
OI -	B.T.	O'LEARY	CORNELL U ITHACA, NY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT TOOK TELEVISION-VIDEO PHOTOGRAPHY OF BOTH VENUS AND MERCURY. THE OBJECTIVES OF THE EXPERIMENT WERE - (1) TO MAP AND IDENTIFY THE MAJOR PHYSIOGRAPHIC PROVINCES OF MERCURY, (2) TO DETERMINE THE ORIENTATION OF THE SPIN AXIS OF MERCURY, (3) TO COMBINE ALL OF THE MERCURY DATA TO ESTABLISH A CARTOGRAPHIC COORDINATE SYSTEM, (4) TO INVESTIGATE THE TIME-DEPENDENT PROPERTIES OF THE VENUS ULTRAVIOLET 'CLOUDS,' AND (5) TO OBTAIN HIGH-RESOLUTION IMAGERY OF THE MAIN CLOUDS OF VENUS. THE INSTRUMENT WAS A GEC 1 'VIDICON TUBE.' IT HAD A 42-SEC FRAMING RATE AND A 0.48- BY 0.37-DEG FIELD OF VIEW AND USED TWO SPHERICAL TELESCOPE 150-MM OPTICS. APPROXIMATELY 6700 PICTURES, WITH A RESOLUTION OF 100 M, WERE OBTAINED.

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

EXPERIMENT NAME- FLUXGATE MAGNETOMETERS

NSSDC ID- 73-085A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF TWO TRIAXIAL FLUXGATE MAGNETOMETERS DESIGNED TO MAKE VECTOR MEASUREMENTS OF THE MAGNETIC FIELD IN THE VICINITY OF MERCURY AND VENUS AND IN THE INTERPLANETARY MEDIUM. EACH SENSOR HAD DUAL OPERATING RANGES OF MINUS TO PLUS 16 GAMMAS AND 128 GAMMAS. BIAS OFFSET CAPABILITY EXTENDED THE OPERATING RANGE TO MINUS TO PLUS 4096 GAMMAS.

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

EXPERIMENT NAME- ENERGETIC PARTICLES

NSSDC ID- 73-085A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 11/03/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE CHEMICAL AND ISOTOPIC SPECIES OF SOLAR CHARGED PARTICLES BOMBARDING THE ATMOSPHERE AND SURFACE OF MERCURY. THE MEASUREMENTS ALSO INCLUDED A SEARCH FOR TRAPPED HIGH-ENERGY ELECTRONS AND PROTONS IN THE POSSIBLE MAGNETOSPHERES OF MERCURY AND VENUS. THE CHARGED PARTICLE TELESCOPE WAS SENSITIVE TO ELECTRONS AND PROTONS WITH ENERGIES E.GT. 200 KEV AND E.GT. 600 KEV, RESPECTIVELY.

********** MJS 77A **********

SPACECRAFT COMMON NAME- MJS 77A
ALTERNATE NAMES- MARINER JUPITER/SATURN A, OUTER PLANETS A
MARINER 77A
NSSDC ID- MARN77A

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 08/00/77 SPACECRAFT WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	H.M.	SCHURMEIER	NASA-JPL PASADENA, CA
MG -	J.W.	KELLER	NASA HEADQUARTERS WASHINGTON, DC
SC -	M.A.	MITZ	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OVERALL OBJECTIVES OF THE TWO SPACECRAFT, MARINER 77A AND MARINER 77B, WILL BE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WILL BE 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 WILL BE ATTAINED BY USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING TV, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOMETER, ULTRAVIOLET 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 IN ALL APPROVED EXPERIMENTS. THE TWO SPACECRAFT WILL BE LAUNCHED WITHIN A MONTH OF EACH OTHER.

------- MJS 77A, BRIDGE -------

EXPERIMENT NAME- PLASMA

NSSDC ID- MARN77A-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.S.	BRIDGE	MASS INST OF TECH CAMBRIDGE, MA
OI -	J.W.	BELCHER	MASS INST OF TECH CAMBRIDGE, MA
OI -	J.H.	BINSACK	MASS INST OF TECH CAMBRIDGE, MA
OI -	A.J.	LAZARUS	MASS INST OF TECH CAMBRIDGE, MA
OI -	S.	OLBERT	MASS INST OF TECH CAMBRIDGE, MA
OI -	V.M.	VASYLIUNAS	MASS INST OF TECH CAMBRIDGE, MA
OI -	L.F.	BURLAGA	NASA-GSFC GREENBELT, MD
OI -	R.E.	HARTLE	NASA-GSFC GREENBELT, MD
OI -	K.W.	OGILVIE	NASA-GSFC GREENBELT, MD
OI -	G.L.	SISCOE	U OF CALIF, LA LOS ANGELES, CA
OI -	A.J.	HUNDHAUSEN	NATL CTR FOR ATMOS RES BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION
THE PLASMA INVESTIGATION WILL MAKE 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 WILL DETERMINE THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WILL BE 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 WILL MAKE MEASUREMENTS OF ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV. THE INSTRUMENT WILL WEIGH 8.2 KG AND USE 6.5 W OF POWER.

------- MJS 77A, BROADFOOT -------

EXPERIMENT NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- MARN77A-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.L.	BROADFOOT	KITT PEAK NATL OBS TUCSON, AZ
OI -	H.W.	MOOS	JOHNS HOPKINS U BALTIMORE, MD
OI -	M.J.S.	BELTON	KITT PEAK NATL OBS TUCSON, AZ
OI -	D.F.	STROBEL	KITT PEAK NATL OBS TUCSON, AZ
OI -	T.M.	DONAHUE	U OF MICHIGAN ANN ARBOR, MI
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	J.C.	MCCONNELL	HARVARD U CAMBRIDGE, MA
OI -	R.M.	GOODY	HARVARD U CAMBRIDGE, MA
OI -	A.	DALGARNO	HARVARD U CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL BE CARRIED OUT WITH AN EXTREME ULTRAVIOLET SPECTROMETER, UTILIZING 12 CHANNEL MULTIPLIERS AS SENSORS AND COVERING SELECTED SPECTRAL LINES IN THE RANGE FROM 400 TO 1800 A, SIMILAR IN DESIGN TO THE INSTRUMENT CURRENTLY BEING FLOWN ON MARINER 10 MISSION. THE INVESTIGATION WILL ANALYZE THE ATMOSPHERES OF JUPITER, SATURN AND ENCOUNTERED SATELLITES FOR THEIR MAJOR CONSTITUENTS, INCLUDING THE DETERMINATION OF THE MIXING RATIO OF H2 AND HE AND THE THERMAL STRUCTURE OF THE ATMOSPHERE. AN ADDITIONAL OBJECTIVE WILL BE TO STUDY THE DISTRIBUTION OF H2 AND HE IN THE INTERPLANETARY AND INTERSTELLAR MEDIUM.

------- MJS 77A, ESHLEMAN -------

EXPERIMENT NAME- RADIO SCIENCE TEAM

NSSDC ID- MARN77A-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS

DISCIPLINE(S)- ATMOSPHERIC PHYSICS CELESTIAL MECHANICS
HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

TL - V.R. ESHLEMAN .....STANFORD U
STANFORD, CA
TM - J.D. ANDERSON .....NASA-JPL
PASADENA, CA
TM - T.A. CROFT .....STANFORD U
STANFORD, CA
TM - G.L. TYLER .....STANFORD U
STANFORD, CA
TM - G. FJELDBO .....NASA-JPL
PASADENA, CA
TM - G.S. LEVY .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THE RADIO SCIENCE TEAM WILL USE THE TELECOMMUNICATIONS SYSTEM OF THE MJS77 SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WILL BE A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION INCLUDE -- (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL FREQUENCY RADIO SIGNAL DURING IMMERSION AND EMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS AND DENSITIES BY PRECISE TRACKING OF A DUAL FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE *ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE* DISTRIBUTION OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION, AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

------- MJS 77A, HANEL -------

EXPERIMENT NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- MARN77A-03

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.A. HANEL .....NASA-GSFC
GREENBELT, MD
OI - B.J. CONRATH .....NASA-GSFC
GREENBELT, MD
OI - V.G. KUNDE .....NASA-GSFC
GREENBELT, MD
OI - P.D. LOWMAN, JR. .....NASA-GSFC
GREENBELT, MD
OI - W.C. MAGUIRE .....NASA-GSFC
GREENBELT, MD
OI - J.C. PEARL .....NASA-GSFC
GREENBELT, MD
OI - J. PIRRAGLIA .....NASA-GSFC
GREENBELT, MD
OI - R.E. SAMUELSON .....NASA-GSFC
GREENBELT, MD
OI - T.E. BURKE .....NASA-JPL
PASADENA, CA
OI - P. GIERASH .....CORNELL U
ITHACA, NY
OI - C.A. PONNAMPERUMA .....U OF MARYLAND
COLLEGE PARK, MD

EXPERIMENT BRIEF DESCRIPTION

THIS INVESTIGATION WILL BE 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 WILL STUDY BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WILL ALSO BE INVESTIGATED, INCLUDING DETERMINATION OF THE H2/HE RATIO, AND THE ABUNDANCE OF CH4 AND NH3. VERTICAL TEMPERATURE PROFILES WILL BE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WILL BE CONDUCTED. THE INTERFEROMETER WILL HAVE A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE WILL COVER 5000 TO 33,000 1/CM. THE INSTRUMENT WILL USE A SINGLE PRIMARY MIRROR 51 CM IN DIAM, WITH A FIELD OF VIEW OF 0.25 DEG.

------- MJS 77A, KRIMIGIS -------

EXPERIMENT NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND
TELESCOPE

NSSDC ID- MARN77A-07

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- COSMIC RAYS PLANETARY PHYSICS
PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - S.M. KRIMIGIS .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ
OI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD
OI - L.J. LANZEROTTI .....BELL TELEPHONE LAB
MURRAY HILL, NJ
OI - T.P. ARMSTRONG .....U OF KANSAS
LAWRENCE, KS
OI - W.I. AXFORD .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - C.O. BOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR WILL MAKE 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 WILL BE ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WILL BE 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) WILL BE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED *IN THE RANGE FROM 0.05 TO 30 MEV, USING A LOW-ENERGY PARTICLE* TELESCOPE. HOWEVER, SELECTION OF THE LOW-ENERGY TELESCOPE IS CONDITIONAL ON DEMONSTRATING THE PRODUCTION OF SUFFICIENTLY UNIFORM DETECTORS TO EFFECT THE SEPARATION OF THE NUCLEI IN THE LOW-ENERGY END OF THE PROPOSED INVESTIGATION RANGE (LESS THAN 1.8 MEV/NUCLEON).

------- MJS 77A, LILLIE -------

EXPERIMENT NAME- MULTIFILTER PHOTOPOLARIMETER,
2200-7300 A

NSSDC ID- MARN77A-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- DUST ZODIACAL LIGHT

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.F. LILLIE .....U OF COLORADO
BOULDER, CO
OI - C.W. HORD .....U OF COLORADO
BOULDER, CO
OI - K. PANG .....U OF COLORADO
BOULDER, CO
OI - J.W. HANSEN .....U OF ARIZONA
TUCSON, AZ
OI - D.L. COFFEEN .....U OF ARIZONA
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST OF AN 8-IN F/1.1 TELESCOPE, WHICH 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.

------- MJS 77A, NESS -------

EXPERIMENT NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- MARN77A-05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY MAG. FIELD PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - N.F. NESS .....NASA-GSFC
GREENBELT, MD
OI - M.H. ACUNA .....NASA-GSFC
GREENBELT, MD
OI - K.W. BEHANNON .....NASA-GSFC
GREENBELT, MD
OI - L.F. BURLAGA .....NASA-GSFC
GREENBELT, MD
OI - R.P. LEPPING .....NASA-GSFC
GREENBELT, MD
OI - F.M. NEUBAUER .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY

EXPERIMENT 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 WILL BE CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WILL BE PLUS OR MINUS 0.1 GAMMA, AND THE RANGE OF MEASUREMENTS WILL BE FROM 0.01 GAMMA TO 20 GAUSS. THE INSTRUMENTATION WILL WEIGH 5.8 KG AND CONSUME 5.2 WATTS.

------- MJS 77A, SCARF ----------

EXPERIMENT NAME- PLASMA WAVE

NSSDC ID- MARN77A-13

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	F.L.	SCARF	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	D.A.	GURNETT	U OF IOWA IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION

THIS INVESTIGATION WILL PROVIDE CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT WILL ALSO GIVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION WILL CONSIST OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND IT MAY INCLUDE LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WILL BE FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT WILL SHARE THE 10-M ANTENNAS BEING DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

------- MJS 77A, SMITH ----------

EXPERIMENT NAME- TV PHOTOGRAPHY

NSSDC ID- MARN77A-01

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- METEROLOGY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	B.A.	SMITH	NEW MEXICO STATE U LAS CRUCES, NM
OI -	G.A.	BRIGGS	NASA-JPL PASADENA, CA
OI -	A.F.	COOK	SMITHSONIAN INST WASHINGTON, DC
OI -	G.	DANIELSON	NASA-JPL PASADENA, CA
OI -	M.E.	DAVIES	RAND CORP SANTA MONICA, CA
OI -	G.E.	HUNT	METEOROLOGICAL OFFICE DIDCOT,BERKSHIRE, ENGLAND
OI -	T.	OWEN	STATE U OF NEW YORK BUFFALO, NY
OI -	C.	SAGAN	CORNELL U ITHACA, NY
OI -	L.A.	SODERBLOM	US GEOLOGICAL SURVEY FLAGSTAFF, AZ
OI -	V.E.	SUOMI	U OF WISCONSIN MADISON, WI

EXPERIMENT BRIEF DESCRIPTION

THE TV PHOTOGRAPHIC EXPERIMENT WILL USE A TWO-CAMERA SYSTEM, BASED ON THE MARINER 9 TV SYSTEM. THIS SYSTEM WILL INCLUDE ONE NARROW-ANGLE, LONG FOCAL LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE WILL DEPEND GREATLY 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, AT JUPITER AND SATURN. THE RESOLUTION WILL BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WILL BE 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 WILL 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 WILL INCLUDE -- (1) GROSS CHARACTERISTICS - SIZE, SHAPE, ROTATION, SPIN AXIS, CARTOGRAPHY, IMPPOVED 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 (ESPECIALLY IAPETUS), AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS WILL BE CARRIED OUT. OBJECTIVES WILL INCLUDE -- (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULTATION - OPTICAL DEPTH, AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WILL BE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

------- MJS 77A, VOGT ----------

EXPERIMENT NAME- HIGH- AND MODERATELY LOW-ENERGY
COSMIC-RAY TELESCOPE

NSSDC ID- MARN77A-08

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- COSMIC RAYS MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.E.	VOGT	CALIF INST OF TECH PASADENA, CA
OI -	J.R.	JOKIPII	CALIF INST OF TECH PASADENA, CA
OI -	E.C.	STONE	CALIF INST OF TECH PASADENA, CA
OI -	F.B.	MCDONALD	NASA-GSFC GREENBELT, MD
OI -	B.J.	TEEGARDEN	NASA-GSFC GREENBELT, MD
OI -	J.H.	TRAINOR	NASA-GSFC GREENBELT, MD
OI -	W.R.	WEBBER	U OF NEW HAMPSHIRE DURHAM, NH

EXPERIMENT BRIEF DESCRIPTION

THIS INVESTIGATION WILL STUDY 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 WILL INCLUDE A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS WILL COVER 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 WILL BE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS WILL MEASURE THE ENERGY AND DETERMINE THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS WILL ALSO MEASURE THE ANISOTROPIES OF ELECTRONS AND NUCLEI. THE WEIGHT AND POWER ALLOCATIONS FOR THIS INVESTIGATION WILL BE 5.2 KG AND 5.4 W.

------- MJS 77A, WARWICK ----------

EXPERIMENT NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- MARN77A-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.W.	WARWICK	U OF COLORADO BOULDER, CO
OI -	J.K.	ALEXANDER, JR.	NASA-GSFC GREENBELT, MD
OI -	T.D.	CARR	U OF FLORIDA GAINESVILLE, FL
OI -	F.T.	HADDOCK	U OF MICHIGAN ANN ARBOR, MI
OI -	D.H.	STAELIN	MASS INST OF TECH CAMBRIDGE, MA
OI -	A.	BOISCHOT	PARIS OBSERVATORY PARIS, FRANCE
OI -	C.C.	HARVEY	PARIS OBSERVATORY PARIS, FRANCE
OI -	Y.	LEBLANC	PARIS OBSERVATORY PARIS, FRANCE
OI -	W.E.	BROWN	NASA-JPL PASADENA, CA
OI -	S.	GULKIS	NASA-JPL PASADENA, CA
OI -	R.	PHILLIPS	NASA-JPL PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST OF A SWEEP FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WILL BE RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAE. STUDY OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES WILL YIELD DATA CONCERNING THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NON-THERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS.

********** MJS 77B **********

SPACECRAFT COMMON NAME- MJS 77B
ALTERNATE NAMES- MARINER JUPITER/SATURN B, OUTER PLANETS B
MARINER 77B
NSSDC ID- MARN77B

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 08/00/77 SPACECRAFT WEIGHT- 700. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - H.M. SCHURMEIER .....NASA-JPL
PASADENA, CA
MG - J.W. KELLER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - M.A. MITZ .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OVERALL OBJECTIVES OF THE SPACECRAFT MARINER 77A AND MARINER 77B WILL BE TO CONDUCT EXPLORATORY INVESTIGATIONS OF THE PLANETARY SYSTEMS OF JUPITER AND SATURN AND OF THE INTERPLANETARY MEDIUM OUT TO SATURN. PRIMARY EMPHASIS WILL BE 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 WILL BE OBTAINED USING A VARIETY OF INSTRUMENTS AND METHODS INCLUDING TV, A COHERENT S- AND X-BAND RF RECEIVER, AN INFRARED INTERFEROMETER AND RADIOMETER, AN ULTRAVIOLET 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. THE TWO SPACECRAFT WILL BE LAUNCHED WITHIN A MONTH OF EACH OTHER.

------- MJS 77B, BRIDGE -------

EXPERIMENT NAME- PLASMA

NSSDC ID- MARN77B-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS HIGH ENERGY ASTROPHYSIC
PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.S. BRIDGE .....MASS INST OF TECH
CAMBRIDGE, MA
OI - A.J. LAZARUS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - S. OLBERT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - J.W. BELCHER .....MASS INST OF TECH
CAMBRIDGE, MA
OI - V.M. VASYLIUNAS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - L.F. BURLAGA .....NASA-GSFC
GREENBELT, MD
OI - J.H. BINSACK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G.L. SISCOE .....U OF CALIF, LA
LOS ANGELES, CA
OI - A.J. HUNDHAUSEN .....NATL CTR FOR ATMOS RES
BOULDER, CO
OI - R.E. HARTLE .....NASA-GSFC
GREENBELT, MD
OI - K.W. OGILVIE .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE PLASMA INVESTIGATION WILL MAKE 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 WILL DETERMINE THE MACROSCOPIC PROPERTIES OF THE PLASMA IONS, OBTAINING ACCURATE VALUES OF THEIR VELOCITY, DENSITIES, AND PRESSURE. THREE SEQUENTIAL ENERGY SCANS WILL BE 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 WILL MAKE MEASUREMENTS OF ELECTRONS IN THE ENERGY RANGE FROM 5 EV TO 1 KEV. THE INSTRUMENT WILL WEIGH 8.2 KG AND USE 6.5 W OF POWER.

------- MJS 77B, BROADFOOT -------

EXPERIMENT NAME- ULTRAVIOLET SPECTROSCOPY

NSSDC ID- MARN77B-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.L. BROADFOOT .....KITT PEAK NATL OBS
TUCSON, AZ
OI - A. DALGARNO .....HARVARD U
CAMBRIDGE, MA
OI - J.C. MCCONNELL .....HARVARD U
CAMBRIDGE, MA
OI - R.M. GOODY .....HARVARD U
CAMBRIDGE, MA
OI - T.M. DONAHUE .....U OF MICHIGAN
ANN ARBOR, MI
OI - M.B. MCELROY .....HARVARD U
CAMBRIDGE, MA
OI - M.J.S.BELTON .....KITT PEAK NATL OBS
TUCSON, AZ
OI - D.F. STROBEL .....KITT PEAK NATL OBS
TUCSON, AZ
OI - H.W. MOOS .....JOHNS HOPKINS U
BALTIMORE, MD

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL BE CARRIED OUT WITH AN EXTREME ULTRAVIOLET SPECTROMETER UTILIZING 12 CHANNEL MULTIPLIERS AS SENSORS AND COVERING SELECTED SPECTRAL LINES IN THE RANGE FROM 400 TO 1800 A, SIMILAR IN DESIGN TO THE INSTRUMENT CURRENTLY BEING FLOWN ON THE MARINER 10 MISSION. THE INVESTIGATION WILL ANALYZE THE ATMOSPHERES OF JUPITER, SATURN AND ENCOUNTERED SATELLITES FOR THEIR MAJOR CONSTITUENTS, INCLUDING THE DETERMINATION OF THE MIXING RATIO OF H2 AND HE AND THE THERMAL STRUCTURE OF THE ATMOSPHERE. AN ADDITIONAL OBJECTIVE WILL BE TO STUDY THE DISTRIBUTION OF H2 AND HE IN THE INTERPLANETARY AND INTERSTELLAR MEDIUM.

------- MJS 77B, ESHLEMAN -------

EXPERIMENT NAME- RADIO SCIENCE TEAM

NSSDC ID- MARN77B-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS CELESTIAL MECHANICS
HIGH ENERGY ASTROPHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
TL - V.R. ESHLEMAN .....STANFORD U
STANFORD, CA
TM - G. FJELDBO .....NASA-JPL
PASADENA, CA
TM - G.S. LEVY .....NASA-JPL
PASADENA, CA
TM - T.A. CROFT .....STANFORD U
STANFORD, CA
TM - G.L. TYLER .....STANFORD U
STANFORD, CA
TM - J.D. ANDERSON .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THE RADIO SCIENCE TEAM WILL USE THE TELECOMMUNICATIONS SYSTEM OF THE MJS77 SPACECRAFT TO PERFORM THEIR STUDIES. THE SYSTEM WILL BE A COHERENT S- AND X-BAND DOWNLINK AND S-BAND UPLINK. THE SCIENCE OBJECTIVES OF THE RADIO SCIENCE INVESTIGATION INCLUDE -- (1) DETERMINE THE PHYSICAL PROPERTIES OF PLANETARY AND SATELLITE IONOSPHERES AND ATMOSPHERES BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL FREQUENCY RADIO SIGNAL DURING IMMERSION AND EMERSION OF SPACECRAFT OCCULTATION BY THE SUBJECT BODY, (2) DETERMINE PLANETARY AND SATELLITE MASSES, GRAVITY FIELDS AND DENSITIES BY PRECISE TRACKING OF A DUAL FREQUENCY RADIO SIGNAL FROM THE SPACECRAFT DURING THE ENCOUNTER PERIOD, AND (3) DETERMINE THE AMOUNT AND SIZE DISTRIBUTION OF MATERIAL IN SATURN'S RINGS AND THE RING DIMENSIONS BY EXAMINING THE PROPAGATION EFFECTS ON A DUAL FREQUENCY RADIO SIGNAL THAT PASSES THROUGH EACH RING IN SUCCESSION, AND THROUGH THE GAP BETWEEN THE C RING AND SATURN'S SURFACE.

------- MJS 77B, HANEL -------

EXPERIMENT NAME- INFRARED SPECTROSCOPY AND RADIOMETRY

NSSDC ID- MARN77B-03

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.A. HANEL .....NASA-GSFC
GREENBELT, MD
OI - C.A. PONNAMPERUMA .....U OF MARYLAND
COLLEGE PARK, MD
OI - T.E. BURKE .....NASA-JPL
PASADENA, CA
OI - P. GIERASH .....CORNELL U
ITHACA, NY
OI - J. PIRRAGLIA .....NASA-GSFC
GREENBELT, MD

OI - R.E. SAMUELSON .....NASA-GSFC
GREENBELT, MD
OI - W.C. MAGUIRE .....NASA-GSFC
GREENBELT, MD
OI - J.C. PEARL .....NASA-GSFC
GREENBELT, MD
OI - V.G. KUNDE .....NASA-GSFC
GREENBELT, MD
OI - P.D. LOWMAN, JR. .....NASA-GSFC
GREENBELT, MD
OI - B.J. CONRATH .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL BE 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 WILL STUDY BOTH GLOBAL AND LOCAL ENERGY BALANCE, USING INFRARED SPECTRAL MEASUREMENTS IN CONJUNCTION WITH BROAD-BAND MEASUREMENTS OF REFLECTED SOLAR ENERGY. ATMOSPHERIC COMPOSITION WILL ALSO BE INVESTIGATED, INCLUDING DETERMINATION OF THE H2/HE RATIO, AND THE ABUNDANCE OF CH4 AND NH3. VERTICAL TEMPERATURE PROFILES WILL BE OBTAINED ON THE PLANETS AND SATELLITES WITH ATMOSPHERES. STUDIES OF THE COMPOSITION, THERMAL PROPERTIES, AND SIZE OF PARTICLES IN SATURN'S RINGS WILL BE CONDUCTED. THE INTERFEROMETER WILL HAVE A SPECTRAL RANGE OF 200 TO 4000 1/CM, WHILE THE RADIOMETER RANGE WILL COVER 5000 TO 33,000 1/CM. THE INSTRUMENT WILL USE A SINGLE PRIMARY MIRROR 51 CM IN DIAM, WITH A FIELD OF VIEW OF 0.25 DEG.

------- MJS 77B, KRIMIGIS ----------

EXPERIMENT NAME- LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE

NSSDC ID- MARN77B-07

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- COSMIC RAYS PLANETARY PHYSICS
PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.M. KRIMIGIS .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - C.O. HOSTROM .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - T.P. ARMSTRONG .....U OF KANSAS
LAWRENCE, KS
OI - W.I. AXFORD .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - G. GLOECKLER .....U OF MARYLAND
COLLEGE PARK, MD
OI - L.J. LANZEROTTI .....BELL TELEPHONE LAB
MURRAY HILL, NJ
OI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO STUDY THE MAGNETOSPHERES OF JUPITER AND SATURN USING A LOW-ENERGY MAGNETOSPHERIC PARTICLE ANALYZER. THIS DETECTOR WILL MAKE MEASUREMENTS (1) IN 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 WILL BE ABLE TO STUDY LOW-ENERGY PARTICLES IN THE INTERPLANETARY MEDIUM. THE ENERGY RANGE OF THIS DETECTOR WILL BE 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) WILL BE SEPARATELY IDENTIFIED AND THEIR ENERGY MEASURED IN THE RANGE FROM 0.05 TO 30 MEV USING A LOW-ENERGY PARTICLE TELESCOPE. HOWEVER, SELECTION OF THE LOW-ENERGY TELESCOPE IS CONDITIONAL ON DEMONSTRATING THE PRODUCTION OF SUFFICIENTLY UNIFORM DETECTORS TO EFFECT THE SEPARATION OF THE NUCLEI IN THE LOW-ENERGY END OF THE PROPOSED INVESTIGATION RANGE (LESS THAN 1.8 MEV/NUCLEON).

------- MJS 77B, LILLIE ----------

EXPERIMENT NAME- MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A

NSSDC ID- MARN77B-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- DUST ZODIACAL LIGHT

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.F. LILLIE .....U OF COLORADO
BOULDER, CO
OI - C.W. HORD .....U OF COLORADO
BOULDER, CO
OI - K. PANG .....U OF COLORADO
BOULDER, CO
OI - J.W. HANSEN .....U OF ARIZONA
TUCSON, AZ
OI - D.L. COFFEEN .....U OF ARIZONA
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF AN 8-IN. F/1.1 TELESCOPE, WHICH WILL 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 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.

------- MJS 77B, NESS ----------

EXPERIMENT NAME- TRIAXIAL FLUXGATE MAGNETOMETERS

NSSDC ID- MARN77B-05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY MAG. FIELD PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.F. NESS .....NASA-GSFC
GREENBELT, MD
OI - R.P. LEPPING .....NASA-GSFC
GREENBELT, MD
OI - F.M. NEUBAUER .....BRAUNSCHWEIG TECH U
BRAUNSCHWEIG, FED REP OF GERMANY
OI - K.W. BEHANNON .....NASA-GSFC
GREENBELT, MD
OI - L.F. BURLAGA .....NASA-GSFC
GREENBELT, MD
OI - M.H. ACUNA .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WILL BE CARRIED OUT USING TWO HIGH-FIELD AND TWO LOW-FIELD TRIAXIAL FLUXGATE MAGNETOMETERS. DATA ACCURACY OF THE INTERPLANETARY FIELDS WILL BE PLUS OR MINUS 0.1 GAMMA, AND THE RANGE OF MEASUREMENTS WILL BE FROM 0.01 GAMMA TO 20 GAUSS. THE INSTRUMENTATION WILL WEIGH 5.8 KG AND CONSUME 5.2 WATTS.

------- MJS 77B, SCARF ----------

EXPERIMENT NAME- PLASMA WAVE

NSSDC ID- MARN77B-13

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - D.A. GURNETT .....U OF IOWA
IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL PROVIDE CONTINUOUS, SHEATH-INDEPENDENT MEASUREMENTS OF THE ELECTRON DENSITY PROFILES AT JUPITER AND SATURN. IT WILL ALSO GIVE BASIC INFORMATION ON LOCAL WAVE-PARTICLE INTERACTIONS REQUIRED TO CARRY OUT COMPARATIVE STUDIES OF THE PHYSICS OF THE JUPITER AND SATURN MAGNETOSPHERES. THE INSTRUMENTATION WILL CONSIST OF A 16-CHANNEL STEP FREQUENCY RECEIVER AND IT MAY INCLUDE LOW-FREQUENCY WAVEFORM RECEIVER WITH ASSOCIATED ELECTRONICS. THE FREQUENCY RANGE FOR THIS INSTRUMENT WILL BE FROM 10 HZ TO 56 KHZ. THIS INSTRUMENT WILL SHARE THE 10-M ANTENNAS BEING DEVELOPED FOR THE PLANETARY RADIO ASTRONOMY INVESTIGATION.

------- MJS 77B, SMITH ----------

EXPERIMENT NAME- TV PHOTOGRAPHY

NSSDC ID- MARN77B-01

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- METEROLOGY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - B.A. SMITH .....NEW MEXICO STATE U
LAS CRUCES, NM
OI - G.A. BRIGGS .....NASA-JPL
PASADENA, CA
OI - A.F. COOK .....SMITHSONIAN INST
WASHINGTON, DC
OI - G. DANIELSON .....NASA-JPL
PASADENA, CA

OI - M.E. DAVIES .....RAND CORP
SANTA MONICA, CA
OI - G.E. HUNT .....METEOROLOGICAL OFFICE
DIDCOT, BERKSHIRE, UKING
OI - T. OWEN .....STATE U OF NEW YORK
BUFFALO, NY
OI - C. SAGAN .....CORNELL U
ITHACA, NY
OI - L.A. SODERBLOM .....US GEOLOGICAL SURVEY
FLAGSTAFF, AZ
OI - V.E. SUOMI .....U OF WISCONSIN
MADISON, WI

EXPERIMENT BRIEF DESCRIPTION
THE TV PHOTOGRAPHIC EXPERIMENT WILL USE A TWO-CAMERA SYSTEM, BASED ON THE MARINER 9 TV SYSTEM. THIS SYSTEM WILL INCLUDE ONE NARROW-ANGLE, LONG FOCAL LENGTH CAMERA AND ONE WIDE-ANGLE, SHORT FOCAL LENGTH CAMERA. THE MAXIMUM RESOLUTION ACHIEVABLE WILL DEPEND 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. AT JUPITER AND SATURN, THE RESOLUTION WILL BE 20 KM AND 5 KM, RESPECTIVELY. THE OBJECTIVES OF THE EXPERIMENT WILL BE 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 WILL 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 WILL 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 (ESPECIALLY IAPETUS), AND SEARCH FOR NEW SATELLITES. STUDIES OF SATURN'S RINGS WILL BE CARRIED OUT. OBJECTIVES WILL INCLUDE -- (1) RESOLUTION OF INDIVIDUAL RING COMPONENTS OR CLUMPS OF MATERIAL, (2) VERTICAL AND RADIAL DISTRIBUTION OF MATERIAL OF VERY HIGH RESOLUTION, (3) SCATTERING FUNCTION, (4) COARSE POLARIMETRY, (5) OCCULTATION - OPTICAL DEPTH, AND (6) DISTINGUISHING DIFFERENT TYPES OF MATERIAL IN THE RINGS. OTHER OBJECTIVES WILL BE TO SEARCH FOR NEW COMETS, ASTEROIDS, AND TARGETS OF OPPORTUNITY.

-------- MJS 778, VOGT ----------

EXPERIMENT NAME- HIGH- AND MODERATELY LOW-ENERGY
COSMIC-RAY TELESCOPE

NSSDC ID- MARN77B-08

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- COSMIC RAYS MAGNETOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.E. VOGT .....CALIF INST OF TECH
PASADENA, CA
OI - J.R. JOKIPII .....CALIF INST OF TECH
PASADENA, CA
OI - E.C. STONE .....CALIF INST OF TECH
PASADENA, CA
OI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD
OI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD
OI - W.R. WEBBER .....U OF NEW HAMPSHIRE
DURHAM, NH

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL STUDY 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 WILL INCLUDE A HIGH-ENERGY TELESCOPE SYSTEM (HETS) AND A LOW-ENERGY TELESCOPE SYSTEM (LETS). THE HETS WILL COVER 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 WILL BE MEASURED BY THIS TELESCOPE AND AN ELECTRON TELESCOPE (TET). THE LETS WILL MEASURE THE ENERGY AND DETERMINE THE IDENTITY OF NUCLEI FOR ENERGIES BETWEEN .15 AND 30 MEV/NUCLEON AND ATOMIC NUMBERS FROM 1 TO 30. THE INSTRUMENTS WILL ALSO MEASURE THE ANISOTROPIES OF ELECTRONS AND NUCLEI. THE WEIGHT AND POWER ALLOCATIONS FOR THIS INVESTIGATION WILL BE 5.2 KG AND 5.4 W.

-------- MJS 778, WARWICK ----------

EXPERIMENT NAME- PLANETARY RADIO ASTRONOMY

NSSDC ID- MARN77B-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.W. WARWICK .....U OF COLORADO
BOULDER, CO
OI - W.E. BROWN .....NASA-JPL
PASADENA, CA
OI - S. GULKIS .....NASA-JPL
PASADENA, CA
OI - C.C. HARVEY .....PARIS OBSERVATORY
PARIS, FRANCE
OI - Y. LEBLANC .....PARIS OBSERVATORY
PARIS, FRANCE
OI - D.H. STAELIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - A. BOISCHOT .....PARIS OBSERVATORY
PARIS, FRANCE
OI - T.D. CARR .....U OF FLORIDA
GAINESVILLE, FL
OI - F.T. HADDOCK .....U OF MICHIGAN
ANN ARBOR, MI
OI - J.K. ALEXANDER, JR. .....NASA-GSFC
GREENBELT, MD
OI - R. PHILLIPS .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A SWEEP FREQUENCY RADIO RECEIVER OPERATING IN BOTH POLARIZATION STATES, BETWEEN 20 KHZ AND 40.5 MHZ. THE SIGNAL WILL BE RECEIVED BY A PAIR OF ORTHOGONAL 10-M MONOPOLE ANTENNAS. THE PHYSICS OF MAGNETOSPHERIC PLASMA RESONANCES AND NON-THERMAL RADIO EMISSIONS FROM THESE PLANETARY REGIONS WILL BE STUDIED BY INVESTIGATION OF THE RADIO EMISSION SIGNALS FROM JUPITER AND SATURN OVER THIS RANGE OF FREQUENCIES.

********** OAO 3 **********

SPACECRAFT COMMON NAME- OAO 3
ALTERNATE NAMES- PL-701D, OAO-C
COPERNICUS, 06153
NSSDC ID- 72-065A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 08/21/72.

LAUNCH DATE- 08/21/72 SPACECRAFT WEIGHT- 2150. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/21/72
ORBIT PERIOD- 99.7 MIN INCLINATION- 35.012 DEG
PERIAPSIS- 739.000 KM ALT APOAPSIS- 751.000 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/07/74
ORBIT PERIOD- 99.705 MIN INCLINATION- 35.011 DEG
PERIAPSIS- 738.68 KM ALT APOAPSIS- 750.23 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J. PURCELL .....NASA-GSFC
GREENBELT, MD
PS - J.E. KUPPERIAN, JR. .....NASA-GSFC
GREENBELT, MD
MG - M.E. MCDONALD .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
OAO-C CONTINUED THE MISSION OF THE OAO PROGRAM TO OBSERVE THE CELESTIAL SPHERE FROM ABOVE THE EARTH'S ATMOSPHERE. A SPECTROMETER MEASURED HIGH-RESOLUTION SPECTRA OF THE STARS, GALAXIES, PLANETS, NEBULAE, THE SUN, ETC., IN THE ULTRAVIOLET REGION OF THE SPECTRUM. THREE SMALL X-RAY TELESCOPES STUDIED X-RAY RADIATION IN THREE PASSBANDS BETWEEN 3 AND 60 A. THE OAO-C SPACECRAFT WAS A GROUND-CONTROLLABLE SPACECRAFT THAT WAS PLACED IN A LOW-ALTITUDE EARTH ORBIT. THE SPACECRAFT SHAPE WAS THAT OF AN OCTAGONAL CYLINDER WITH EXTENDABLE SOLAR PANELS. THE SILICON SOLAR CELL ARRAY SUPPLIED 30 W AND 60 W PEAK POWER. DATA WAS TRANSMITTED IN BOTH REAL TIME AND DELAYED TIME.

-------- OAO 3, BOYD ----------

EXPERIMENT NAME- STELLAR PHOTOMETRY

NSSDC ID- 72-065A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/00/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.L.F.BOYD .....U COLLEGE LONDON
LONDON, ENGLAND

EXPERIMENT 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 ANGSTROMS 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. THE 3- TO 9-A AND 6- TO 18-A DETECTORS FAILED IN JUNE 1973. THE 20- TO 70-A DETECTOR APPEARS TO BE QUITE NOISY.

------- OAO 3, SPITZER ----------

EXPERIMENT NAME- HIGH RESOLUTION TELESCOPES

NSSDC ID- 72-065A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 08/21/72.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - L. SPITZER .....PRINCETON U
PRINCETON, NJ
OI - J. ROGERSON, JR. .....PRINCETON U
PRINCETON, NJ

EXPERIMENT 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 ULTRAVIOLET SPECTRA OF SELECTED BRIGHTER STARS IN DETAIL. THE PRIME OPTICAL SYSTEM WAS AN 80-CM DIAM CASSEGRAIN TELESCOPE WITH A 16-M FOCAL LENGTH (F/20). THIS TELESCOPE WAS COUPLED TO A PASCHEN-RUNGE SPECTROMETER CAPABLE OF 0.1-A RESOLUTION IN FIRST ORDER AND 0.05-A RESOLUTION IN SECOND ORDER. THE PHOTONS WERE DETECTED BY FOUR EMR PHOTOTUBES, EACH EQUIPPED WITH ITS OWN EXIT SLIT, AND MOVABLE IN PAIRS ALONG THE ROWLAND CIRCLE. A GUIDANCE ERROR SENSOR ATTACHED TO THE PRIME OPTICS CONTROLLED THE SPACECRAFT ATTITUDE TO WITHIN 0.1 ARC-SEC. THIS GUIDANCE SYSTEM LOCKED ONTO A STAR AS WEAK AS 7TH MAGNITUDE. THE OVERALL SYSTEM COULD MAKE USEFUL MEASUREMENTS ON O- AND B-TYPE STARS OF 7TH MAGNITUDE.

********** ONE METER UV TELESCOPE **********

SPACECRAFT COMMON NAME- ONE METER UV TELESCOPE
ALTERNATE NAMES- SPACELAB ASTRONOMY MISS, SPACELAB IM UV TELESC
NSSDC ID- OMUVTEL

LAST REPORTED STATE- A PROPOSED MISSION

LAUNCH DATE- 1982 SPACECRAFT WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 29. DEG
PERIAPSIS- 300. KM ALT APOAPSIS- 300. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - D.S. LECKRONE .....NASA-GSFC
GREENBELT, MD
SC - J.D. ROSENDHAL .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
DURING THE 1980'S NASA WILL BE USING 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. THE SPACELAB EFFORT IS DIRECTED BY THE EUROPEAN SPACE RESEARCH ORGANIZATION (ESRO). ONE OF THE PROPOSED SPACECRAFT MISSIONS IS THE FLYING OF A 1-METER TELESCOPE CAPABLE OF PERFORMING NONSOLAR-ASTRONOMICAL OBSERVATIONS FROM THE VACUUM ULTRAVIOLET (UV) THROUGH THE VISIBLE WAVELENGTH RANGE. THE INITIAL DEFINITION OF THE REQUIREMENTS ON THIS 1-M UV-OPTICAL SPACELAB TELESCOPE AND ITS RELATED SUPPORT SYSTEMS WILL BEGIN IN DECEMBER 1974. THE ORGANIZATION AND IMPLEMENTATION OF THE UV-OPTICAL TELESCOPE STUDY WILL BE CARRIED OUT BY AN INSTRUMENT DEFINITION TEAM (IDT). THE MEMBERS OF THIS IDT WILL BE CHOSEN FROM SCIENTISTS FROM THROUGHOUT THE WORLD ON THE BASIS OF SUBMITTED PROPOSALS. THIS IDT WILL INTERACT WITH NASA THROUGH THE NASA STUDY SCIENTIST, A GODDARD SPACE FLIGHT CENTER APPOINTEE. THE SIGNIFICANT DATES OF THIS PHASE A EFFORT ARE AS FOLLOWS - (1) MAY 3, 1974 - ISSUANCE OF THE 'ANNOUNCEMENT OF OPPORTUNITIES FOR PARTICIPATION IN THE DEFINITION OF A ONE METER CLASS ULTRAVIOLET-OPTICAL FACILITY TELESCOPE FOR SPACELAB ASTRONOMY MISSIONS.' (2) JULY 22, 1974 - DEADLINE FOR THE RECEIPT OF PROPOSALS, (3) NOVEMBER 1974 - ANNOUNCEMENT OF PROPOSAL SELECTION, (4) DECEMBER 1974 - INITIAL IDT MEETING, (5) MAY 1975 - PRELIMINARY IDT REPORT, (6) DECEMBER 1975 - FINAL IDT REPORT.

********** OSO 5 **********

SPACECRAFT COMMON NAME- OSO 5
ALTERNATE NAMES- OSO-F, PL-684A
03663
NSSDC ID- 69-006A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/15/74.

LAUNCH DATE- 01/22/69 SPACECRAFT WEIGHT- 645. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSSA

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/22/69
ORBIT PERIOD- 95.77 MIN INCLINATION- 32.965 DEG
PERIAPSIS- 532.000 KM ALT APOAPSIS- 570.000 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/22/69
ORBIT PERIOD- 95.77 MIN INCLINATION- 32.965 DEG
PERIAPSIS- 532.000 KM ALT APOAPSIS- 570.000 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - R.H. PICKARD .....NASA-GSFC
GREENBELT, MD
PS - S.P. MARAN .....NASA-GSFC
GREENBELT, MD
MG - M.E. MCDONALD .....NASA HEADQUARTERS
WASHINGTON, DC
SC - G.K. OERTEL .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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, 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. THE SPACECRAFT WAS COMMANDED OFF ON DECEMBER 31, 1972. AFTER THE REENTRY OF OSO 7 IN JULY 1974, THE OSO 5 SPACECRAFT WAS COMMANDED BACK ON IN JULY 1974.

------- OSO 5, BLAMONT ----------

EXPERIMENT NAME- MEASUREMENT OF THE SELF REVERSAL OF THE
SOLAR LYMAN ALPHA LINE

NSSDC ID- 69-006A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/15/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.E. BLAMONT .....CNES
PARIS, FRANCE
OI - P. COUFLEAU .....U OF PARIS
PARIS, FRANCE

EXPERIMENT 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 ONE HR EVERY TWO CALENDAR DAYS, AND AFTER TWO YRS OF OPERATION IT WAS STILL FUNCTIONING PROPERLY. 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 EXPOSURE (1969-1970).' A. VIDAL-MADJAR, ET AL, JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 78, NO. 7, PP. 1115 (1973).

------- OSO 5, BOYD ----------

EXPERIMENT NAME- X RAY SPECTROHELIOGRAPH

NSSDC ID- 69-006A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/15/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.L.F.BOYD	U COLLEGE LONDON	LONDON, ENGLAND
OI -	E.A. STEWARDSON	U COLLEGE LONDON	LONDON, ENGLAND
OI -	A.P. WILLMORE	U COLLEGE LONDON	LONDON, ENGLAND
OI -	K.A. POUNDS	U OF LEICESTER	LEICESTER, ENGLAND

EXPERIMENT BRIEF DESCRIPTION
PROPORTIONAL COUNTERS ATTACHED TO COLLIMATORS PROVIDED 8-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 WHICH 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 ----------

EXPERIMENT NAME- ZODIACAL LIGHT MONITOR

NSSDC ID- 69-006A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 07/15/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	E. NEY	U OF MINNESOTA	MINNEAPOLIS, MN

EXPERIMENT 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 FIELD OF VIEW AND A RED/VISUAL PASSBAND. PM-2 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS WITH A 9.25- BY 57-DEG FIELD OF VIEW AND A BLUE (3500 TO 5000 A) PASSBAND. PM-3 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH AN 11-DEG-DIAMETER CONICAL FIELD OF VIEW 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 FIELD OF VIEW, AND A BLUE (3500 TO 5000 A) PASSBAND. PM-5 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS WITH A 9-DEG-DIAMETER CONICAL FIELD OF VIEW 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 FIELD OF VIEW 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 POLAROID 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 SEC. EYE-1 WAS ORIENTED PARALLEL TO THE SPIN AXIS WITH A 10.5-DEG OFFSET AND HAD A 21-DEG-DIAMETER CONICAL FIELD OF VIEW. EYE-2 WAS ORIENTED ANTIPARALLEL TO THE SPIN AXIS, OFFSET BY 5 DEG, AND HAD A 17.5-DEG DIAMETER FIELD OF VIEW.

********** OSO-I **********

SPACECRAFT COMMON NAME- OSO-I
ALTERNATE NAMES- OSO-EYE, PL-731D
NSSDC ID- OSO-I

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 1 QTR 75 SPACECRAFT WEIGHT- 4280. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96. MIN INCLINATION- 33. DEG
PERIAPSIS- 550.000 KM ALT APOAPSIS- 550.000 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	R.H. PICKARD	NASA-GSFC	GREENBELT, MD
PS -	S.P. MARAN	NASA-GSFC	GREENBELT, MD
MG -	M.E. MCDONALD	NASA HEADQUARTERS	WASHINGTON, DC
SC -	G.K. OERTEL	NASA HEADQUARTERS	WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE OBJECTIVES OF THE OSO SATELLITE SERIES WILL BE 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 AND GAMMA RADIATION. THE OSO-I PLATFORM WILL CONSIST OF A 'SAIL' SECTION, WHICH WILL POINT TWO EXPERIMENTS CONTINUALLY TOWARD THE SUN, AND A 'WHEEL' SECTION, WHICH WILL SPIN ABOUT AN AXIS PERPENDICULAR TO THE POINTING DIRECTION OF THE SAIL AND WILL CARRY FIVE EXPERIMENTS. ATTITUDE ADJUSTMENT WILL BE PERFORMED BY GAS JETS AND A MAGNETIC TORQUING COIL. POINTING CONTROL WILL PERMIT THE POINTED EXPERIMENTS TO SCAN THE REGION OF THE SOLAR DISK IN A 40- X 40-ARC-MIN TO 60- X 60-ARC-MIN RASTER PATTERN. IN ADDITION, THE POINTED SECTION MAY BE COMMANDED TO SELECT AND SCAN A 1- X 1-ARC-MIN OR 5- X 5-ARC-MIN REGION ANYWHERE ON THE SOLAR DISK. DATA WILL BE SIMULTANEOUSLY RECORDED ON TAPE AND TRANSMITTED BY PCM/PM TELEMETRY. A COMMAND SYSTEM WILL PROVIDE FOR AT LEAST 512 GROUND-BASED COMMANDS.

------- OSO-I, ACTON ----------

EXPERIMENT NAME- MAPPING X-RAY HELIOMETER

NSSDC ID- OSO-I -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	L.W. ACTON	LOCKHEED PALO ALTO	PALO ALTO, CA
OI -	J.L. CULHANE	LOCKHEED PALO ALTO	PALO ALTO, CA
OI -	R.C. CATURA	LOCKHEED PALO ALTO	PALO ALTO, CA

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS DESIGNED TO MEASURE THE LOCATION, SPECTRUM, AND INTENSITY OF INTERMEDIATE ENERGY X-RAYS (2- TO 30-KEV) FROM INDIVIDUAL SOLAR ACTIVE REGIONS AND FROM EXTRA-SOLAR X-RAY SOURCES. THE INSTRUMENT WILL CONSIST OF THREE INDEPENDENT X-RAY DETECTION SYSTEMS, EACH COMPOSED OF TWO GAS-FILLED PROPORTIONAL COUNTERS WHICH WILL VIEW SPACE THROUGH A MULTIPLE FAN-BEAM COLLIMATOR. THE FIELD OF VIEW WILL BE 2 ARC-MIN (FULL-WIDTH HALF-MAXIMUM), AND EACH PRIMARY DETECTOR WILL HAVE AN EFFECTIVE AREA OF 100 CM SQ.

------- OSO-I, BOLDT ----------

EXPERIMENT NAME- COSMIC X-RAY SPECTROSCOPY

NSSDC ID- OSO-I -06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	E.A. BOLDT	NASA-GSFC	GREENBELT, MD
OI -	S.S. HOLT	NASA-GSFC	GREENBELT, MD
OI -	P.J. SERLEMITSOS	NASA-GSFC	GREENBELT, MD
OI -	D. SCHWARTZ	HARVARD COLLEGE OBS	CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS DESIGNED TO OBTAIN THE SPECTRA OF X-RAY SOURCES AND THE DIFFUSE BACKGROUND IN THE ENERGY RANGE OF 2- TO 40-KEV, USING TWO PROPORTIONAL COUNTERS, ONE FILLED WITH ARGON, THE OTHER WITH XENON TO PRESSURES GREATER THAN 1 ATMOSPHERE. THE ARGON DETECTOR WILL EMPHASIZE ENERGIES BELOW 10 KEV. MECHANICALLY COLLIMATED TO A FIELD OF VIEW OF 1 DEG BY 5 DEG. THE XENON DETECTOR WILL EMPHASIZE ENERGIES ABOVE 10 KEV AND WILL HAVE A FIELD OF VIEW OF 1 DEG BY 20 DEG. THE DETECTORS WILL BE MOUNTED ON THE WHEEL SECTION, SO THAT THEY WILL BOTH BE OFFSET FROM THE SPIN AXIS BY ABOUT 5 DEG.

------- OSO-I, BONNETT ----------

EXPERIMENT NAME- CHROMOSPHERE FINE STRUCTURE STUDY

NSSDC ID- OSO-I -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.M. BONNETT .....NATL CENT SCI RES-LPSP
VERRIERES-LE-BUISSON, FRANCE
OI - P. LEMAIRE .....U OF PARIS
PARIS, FRANCE
OI - A. VIDAL-MADJAR .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
OI - J.C. VIAL .....NATL CENT SCI RES-LPSP
VERRIERES-LE-BUISSON, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS 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 WILL BE COMPOSED OF A CASSEGRAIN TELESCOPE AND A GRATING SPECTROMETER, CAN OPERATE IN TWO MODES - (1) IT CAN HOLD A FIXED SOLAR LOCATION AND SCAN THE SPECTRAL LINES, (2) IT CAN SIMULTANEOUSLY FIX ON THREE OF THE SIX SPECTRAL LINES AND SCAN A 1-ARC-MIN X 1-ARC-MIN REGION OF THE SOLAR DISK.

------- OSO-I, BRUNER, JR. ----------

EXPERIMENT NAME- HIGH RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS

NSSDC ID- OSO-I -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.C. BRUNER, JR. .....U OF COLORADO
BOULDER, CO
OI - G. ATHAY .....HIGH ALTITUDE OBS
BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS DESIGNED TO MEASURE SOLAR ULTRAVIOLET LINE SHAPES (FROM 1050 A TO 2200 A IN WAVELENGTH) AND THEIR VARIATION WITH TIME AND POSITION ON THE DISK. THE INSTRUMENT WILL BE AN EBERT-TYPE HIGH-RESOLUTION SPECTROMETER MOUNTED IN THE OSO SAIL, AND WILL HAVE ENOUGH SELF-CONTAINED LOGIC TO OPERATE IN SEVERAL DIFFERENT MODES BY GROUND COMMAND.

------- OSO-I, FROST ----------

EXPERIMENT NAME- HIGH-ENERGY CELESTIAL X RAYS

NSSDC ID- OSO-I -07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.J. FROST .....NASA-GSFC
GREENBELT, MD
OI - B.R. DENNIS .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THIS EXPERIMENT WILL BE TO MEASURE THE ENERGY SPECTRA OF ALL KNOWN X-RAY SOURCES ABOVE THE INTENSITY THRESHOLD OF 10 TO THE MINUS 6 PHOTONS/CM-SQ-SEC-KEV IN THE ENERGY REGION .01 TO 1 MEV. THE INSTRUMENT WILL CONSIST OF 57-CM-SQ CSI (SODIUM) SCINTILLATION CRYSTALS SURROUNDED BY A HONEYCOMB-TYPE CSI (SODIUM) ANTICOINCIDENCE COLLIMATOR, WHICH WILL PROVIDE AN ACCEPTANCE ANGLE OF 6.30 DEG FROM THE VIEWING AXIS. THE INSTRUMENT WILL BE MOUNTED ON THE OSO WHEEL SECTION NEARLY PARALLEL TO THE SATELLITE SPIN AXIS.

------- OSO-I, KRAUSHAAR ----------

EXPERIMENT NAME- SOFT X-RAY BACKGROUND RADIATION INVESTIGATION

NSSDC ID- OSO-I -05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.L. KRAUSHAAR .....U OF WISCONSIN
MADISON, WI
OI - A. BUNNER .....U OF WISCONSIN
MADISON, WI

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS 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 WILL VIEW PARALLEL AND ANTIPARALLEL TO THE WHEEL SPIN DIRECTION THROUGH A 4- BY 4-DEG (FULL-WIDTH HALF-MAXIMUM) COLLIMATOR. SENSITIVITY IS EXPECTED TO BE ABOUT 1 PERCENT STATISTICAL ACCURACY NEAR THE GALACTIC POLES, AND ENERGY RESOLUTION WILL BE PROVIDED BY SELECTED FILTERS.

------- OSO-I, NOVICK ----------

EXPERIMENT NAME- HIGH-SENSITIVITY GRAPHITE CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS

NSSDC ID- OSO-I -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R. NOVICK .....COLUMBIA U
NEW YORK, NY
OI - J.R.P.ANGEL .....COLUMBIA U
NEW YORK, NY
OI - P.A. VANDENBOUT .....COLUMBIA U
NEW YORK, NY
OI - M. WEISSKOFF .....COLUMBIA U
NEW YORK, NY
OI - R.S. WOLFF .....COLUMBIA U
NEW YORK, NY

EXPERIMENT BRIEF DESCRIPTION
THE EXPERIMENT IS DESIGNED TO MONITOR CONTINUOUSLY THE SUN'S EMISSION IN THE 2- TO 8-KEV RANGE, AND TO OBTAIN A COMPLETE SPECTRUM IN THAT RANGE EVERY 12 SEC DURING FLARES. THE EXPERIMENT IS ALSO DESIGNED TO OBTAIN HIGH-RESOLUTION SPECTRA OF MANY CELESTIAL X-RAY SOURCES. THE INSTRUMENT WILL BE A SLITLESS BRAGG SPECTROMETER MOUNTED ON THE OSO WHEEL SECTION, WHICH WILL UTILIZE THE WHEEL ROTATION TO PROVIDE SPECTRAL SCANNING. THREE PROPORTIONAL COUNTERS WILL BE COLLIMATED TO OPTIMIZE DETECTION AT 2 KEV, 2.6 KEV, AND 7.2 KEV, RESPECTIVELY. THE GRAPHITE CRYSTAL WILL HAVE A 1000-CM-SQ AREA.

------- OSO-I, WELLER, JR. ----------

EXPERIMENT NAME- EUV FROM EARTH AND SPACE

NSSDC ID- OSO-I -08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.S. WELLER, JR. .....US NAVAL RESEARCH LAB
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT, MOUNTED IN THE WHEEL SECTION, WILL OBTAIN 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. THE INSTRUMENTATION WILL CONSIST OF TWO PHOTOMETERS DESIGNED TO MEASURE EUV RESONANCE RADIATION IN VARIOUS WAVELENGTHS FROM 150 TO 1070 A AND IN PORTIONS OF THE 1125- TO 1230-A BAND. EACH PHOTOMETER WILL CONSIST 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 ARE FOUR SUCH BANDPASS FILTERS -- (1) A THIN FILM OF 1000-A-THICK AL AND 500-A-THICK CARBON (BANDWIDTH OF 150 TO 350 A), (2) A THIN FILM OF 1000-A-THICK AL (BANDWIDTH OF 150 TO 800 A), (3) A THIN FILM OF 1500-A-THICK INDIUM (BANDWIDTH OF 740 TO 1070 A), AND (4) A CELL WITH MAGNESIUM FLUORIDE WINDOWS FILLED WITH ONE ATMOSPHERE OF OXYGEN (BANDWIDTH CONSISTING OF PORTIONS OF 1125 TO 1230 A). THESE BANDPASS FILTERS WILL BE MOUNTED ON A WHEEL IN FRONT OF THE PHOTOMULTIPLIERS, WHICH WILL BE ROTATED AT

REGULAR INTERVALS TO CHANGE THE FILTERS. THIS WILL MAKE TWO OF THE INDICATED WAVELENGTH RANGES OPERATIONAL AT ANY GIVEN TIME. THE INSTRUMENT WILL BE MOUNTED WITH THE PHOTOMETER AXES AT A SMALL ANGLE WITH RESPECT TO THE SATELLITE-SUN LINE AND WITH SUFFICIENT BAFFLING THAT THE PHOTOMETERS WILL NEVER 'SEE' THE SUN.

********** PIONEER 6 **********

SPACECRAFT COMMON NAME- PIONEER 6
ALTERNATE NAMES- PIONEER-A, 01841
NSSDC ID- 65-105A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/07/71.

LAUNCH DATE- 12/16/65 SPACECRAFT WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 12/16/65
ORBIT PERIOD- 311.3 DAYS INCLINATION- .1639 DEG
PERIAPSIS- .8143 AU RAD APOAPSIS- .936 AU RAD

RECENT ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 12/16/65
ORBIT PERIOD- 311.3 DAYS INCLINATION- .1639 DEG
PERIAPSIS- .8143 AU RAD APOAPSIS- .936 AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC
MOFFETT FIELD, CA
PS - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 OF INTERPLANETARY PHENOMENA FROM WIDELY SEPARATED POINTS IN SPACE ON A CONTINUING BASIS. 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 THIRTY-TWO 7-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 HR, 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. THE BIT RATE WAS 512 BPS FROM DECEMBER 16, 1965, TO FEBRUARY 28, 1966, 256 BPS FROM MARCH 1, 1966, TO MARCH 17, 1966, 64 BPS FROM MARCH 18, 1966, TO APRIL 13, 1966, AND 16 OR 8 BPS FOR ALL SUBSEQUENT PERIODS. THE REAL-TIME TRANSMISSION MODE WAS USED PREDOMINANTLY THROUGHOUT THE FLIGHT WHEN TRACKING STATIONS WERE AVAILABLE. BETWEEN TRACKING PERIODS, THE DUTY CYCLE STORE MODE WAS GENERALLY USED. DATA COVERAGE AMOUNTED TO ALMOST 100 PERCENT FOR THE FIRST 23 WEEKS AFTER LAUNCH. THEN THE COVERAGE DROPPED TO BETWEEN 10 AND 20 PERCENT UNTIL NOVEMBER, 1969 AT WHICH TIME THE DATA COVERAGE ROSE TO BETWEEN 20 AND 60 PERCENT. THERE HAS BEEN ALMOST NO TRACKING SINCE JULY, 1972. A LEAK IN THE ATTITUDE GAS SYSTEM PREVENTED FURTHER ATTITUDE CORRECTIONS FOLLOWING AN ADJUSTMENT MADE ON JUNE 9, 1966, HOWEVER, THE SENSORS THAT DETERMINED THE SPIN AXIS DIRECTION CONTINUED TO WORK AND INDICATED THAT THE SPIN AXIS DIRECTION REMAINED CLOSE TO NOMINAL DURING THE MAJOR PERIODS OF DATA ACQUISITION.

------- PIONEER 6, BRIDGE -------

EXPERIMENT NAME- SOLAR WIND PLASMA FARADAY CUP

NSSDC ID- 65-105A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/07/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.S. BRIDGE .....MASS INST OF TECH
CAMBRIDGE, MA
OI - A.J. LAZARUS .....MASS INST OF TECH
CAMBRIDGE, MA
OI - F. SCHERB .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT 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 (-45 DEG TO +45 DEG) WERE TELEMETERED, BUT ONLY THE LARGEST MEASUREMENT IN EACH SUCCEEDING 45-DEG INTERVAL (45 DEG TO 270 DEG) WAS TELEMETERED. IN ADDITION, DURING THIS ROTATION, THE CURRENT FROM ONE OF THE COLLECTORS WAS MEASURED IN ALL TWENTY-EIGHT 11.25-DEG SECTORS, AND THE LARGEST WAS IDENTIFIED AND TELEMETERED (BOTH MAGNITUDE AND SECTOR). A COMPLETE SET OF POSITIVE ION MEASUREMENTS AND ONE ENERGY CHANNEL OF ELECTRON MEASUREMENTS WERE COMPLETED EVERY 32 SEC. THE TIME BETWEEN EACH 32-SEC GROUP OF MEASUREMENTS VARIED WITH THE BIT RATE. FOR A MORE COMPLETE DESCRIPTION, SEE *J. GEOPHYS. RES.*, 71, 3787-3791, AUGUST 1966.

------- PIONEER 6, ESHLEMAN -------

EXPERIMENT NAME- TWO-FREQUENCY RADIO RECEIVER

NSSDC ID- 65-105A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/07/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - V.R. ESHLEMAN .....STANFORD U
STANFORD, CA
OI - T.A. CROFT .....STANFORD U
STANFORD, CA
OI - R.L. LEADABRAND .....STANFORD RES INST
MENLO PARK, CA
OI - O.K. GARRIOTT .....STANFORD U
STANFORD, CA
OI - A.M. PETERSON .....STANFORD U
STANFORD, CA

EXPERIMENT 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 LENGTHENED BY ELECTRONS ALONG THE PATH. 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, 67-123A-03, 66-075A-04, AND 67-060A-02. A MORE DETAILED DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 71, P. 3325-3327, AND IN RADIO SCIENCE, VOL. 6, P. 55-63.

------- PIONEER 6, FAN -------

EXPERIMENT NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 65-105A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/30/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.Y. FAN .....U OF ARIZONA
TUCSON, AZ

OI - J.A. SIMPSON .....U OF CHICAGO
CHICAGO, IL
OI - J.E. LAMPORT .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT 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 (CORRESPONDING TO DETECTOR COINCIDENCES D1NOTD2NOTD4, D1D2NOTD3NOTD4, D1D2D3NOTD4, AND NOTD1D2D3NOTD4). THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.4 TO 55.6 MEV, 55.6 TO 293 MEV, AND E.GT. 293 MEV (CORRESPONDING TO THE FIRST THREE DETECTOR COINCIDENCES GIVEN ABOVE). THE TIME RESOLUTION RANGED FROM ABOUT ONE MEASUREMENT PER 0.4 SEC TO ABOUT ONE MEASUREMENT PER 28 SEC DEPENDING ON THE TELEMETRY BIT RATE. THE DETECTOR WAS MOUNTED SO THAT IT MADE A 360-DEG SCAN IN THE ECLIPTIC PLANE ABOUT ONCE PER SECOND. PULSE HEIGHT ANALYSIS OF DETECTOR D1 OUTPUT (128 CHANNEL) AND D3 OUTPUT (32 CHANNEL) WAS ACCOMPLISHED FOR THE LAST EVENT PRIOR TO EACH TELEMETRY READOUT FOR THE EXPERIMENT. THE D3 DETECTOR FAILED ON OCTOBER 22, 1967. THE D4 DETECTOR PERFORMED INTERMITTENTLY UP TO LATE 1969.

------- PIONEER 6, MCCRACKEN ----------

EXPERIMENT NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 65-105A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/30/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA
OI - W.C. BARTLEY .....U OF TEXAS, DALLAS
DALLAS, TX
OI - U.R. RAO .....PHYSICAL RESEARCH LAB
AHMADABED, INDIA

EXPERIMENT 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 SEC AND 112 SEC (SPACECRAFT SPIN PERIOD WAS ABOUT 1 SEC) 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, PAGE 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

********** PIONEER 7 **********

SPACECRAFT COMMON NAME- PIONEER 7
ALTERNATE NAMES- PIONEER-B, 02398
NSSDC ID- 66-075A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/09/69.

LAUNCH DATE- 08/17/66 SPACECRAFT WEIGHT- 138. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 08/17/66
ORBIT PERIOD- 402.9 DAYS INCLINATION- .09767 DEG
PERIAPSIS- 1.0100 AU RAD APOAPSIS- 1.1250 AU RAD

RECENT ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 08/17/66
ORBIT PERIOD- 402.9 DAYS INCLINATION- .09767 DEG
PERIAPSIS- 1.0100 AU RAD APOAPSIS- 1.1250 AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC
MOFFETT FIELD, CA
PS - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 HR, 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. THE BIT RATE FOR THE MAJORITY OF THE DATA WAS 512 BPS FROM AUGUST 17, 1966, TO OCTOBER 23, 1966, 256 BPS FROM OCTOBER 25, 1966, TO NOVEMBER 6, 1966, 64 BPS FROM NOVEMBER 9, 1966, TO DECEMBER 16, 1966, 16 BPS FROM DECEMBER 16, 1966, TO MAY 15, 1967, AND 8 BPS FROM MAY 15, 1967, AND THEREAFTER. HIGHER BIT RATES WERE POSSIBLE WHEN THE SPACECRAFT WAS BEING TRACKED BY THE 64-M ANTENNA, BUT THE DATA COVERAGE AT THESE TIMES WAS LOW. BY FEBRUARY 1968, ALL REAL-TIME DATA WERE BEING RECEIVED AT 8 BPS. DATA COVERAGE AVERAGED BETWEEN 50 AND 100 PERCENT COVERAGE FOR THE FIRST 30 WEEKS AFTER LAUNCH. THE DATA COVERAGE THEN FELL TO BETWEEN 20 AND 30 PERCENT UNTIL SEPTEMBER 1968. AFTER THIS TIME, IT DROPPED TO BETWEEN 0 AND 20 PERCENT THROUGH JANUARY 1971. ONLY AN INSIGNIFICANT AMOUNT OF DATA HAS BEEN OBTAINED SINCE JANUARY 1971. REAL-TIME TRANSMISSION WAS GENERALLY USED WHEN TRACKING STATIONS WERE AVAILABLE. OTHERWISE, THE DUTY CYCLE STORE MODE WAS USED. SOMETIME BETWEEN FEBRUARY 9, 1969, AND FEBRUARY 16, 1969, THE SUN SENSOR THAT GENERATED THE SPACECRAFT SUN PULSES FOR ONBOARD SECTORING OF EXPERIMENTS FAILED. HOWEVER, THE REMAINING SUN SENSORS CONTINUED TO FUNCTION, THUS PERMITTING DETERMINATION OF THE SPIN AXIS DIRECTION UNTIL ABOUT JANUARY 1972.

------- PIONEER 7, MCCRACKEN ----------

EXPERIMENT NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 66-075A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/01/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA
OI - W.C. BARTLEY .....U OF TEXAS, DALLAS
DALLAS, TX
OI - U.R. RAO .....PHYSICAL RESEARCH LAB
AHMADABED, INDIA

EXPERIMENT 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 SEC (SPACECRAFT SPIN PERIOD WAS ABOUT 1 SEC) DEPENDING ON THE TELEMETRY BIT RATE. DIRECTIONAL FLUX DATA RELIABILITY WAS REDUCED BY THE MALFUNCTION OF THE SUN PULSE MECHANISM BETWEEN FEBRUARY 9 AND FEBRUARY 16, 1969. OTHERWISE, THE INSTRUMENT FUCTIONED NORMALLY, OBTAINING USEFUL OMNIDIRECTIONAL DATA. SEE THE SPACECRAFT BRIEF DESCRIPTION (66-075A) FOR INFORMATION ON PERCENT TIME COVERAGE VS TIME. SEE BARTLEY ET AL., REV. SCI. INSTRUM., 38, PAGE 266, 1967, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

------- PIONEER 7, SIMPSON ----------

EXPERIMENT NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 66-075A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/01/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.A.	SIMPSON	U OF CHICAGO CHICAGO, IL
OI -	C.Y.	FAN	U OF ARIZONA TUCSON, AZ
OI -	J.E.	LAMPORT	U OF CHICAGO CHICAGO, IL

EXPERIMENT 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 (CORRESPONDING TO DETECTOR COINCIDENCES D1D2NOTD4, D1D2NOTD3NOTD4, D1D2D3NOTD4, AND NOTD1D2D3NOTD4). THE ALPHA PARTICLE ENERGY RANGES SAMPLED WERE 2.5 TO 52 MEV, 52 TO 280 MEV, AND E.GT. 280 MEV (CORRESPONDING TO THE FIRST THREE DETECTOR COINCIDENCES). THE TIME RESOLUTION RANGED FROM ABOUT ONE MEASUREMENT PER 0.4 SEC TO ABOUT ONE MEASUREMENT PER 28 SEC DEPENDING ON THE TELEMETRY BIT RATE. THE DETECTOR WAS MOUNTED TO MAKE A 360-DEG SCAN IN THE ECLIPTIC PLANE ABOUT ONCE PER SECOND. THE D3 DETECTOR FAILED ON MAY 26, 1969.

------- PIONEER 7, WOLFE ----------

EXPERIMENT NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 66-075A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/16/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
OI -	R.W.	SILVA	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
A QUADRISPHERICAL ELECTROSTATIC ANALYZER WITH EIGHT CONTIGUOUS CURRENT COLLECTORS WAS USED TO STUDY THE DIRECTIONAL INTENSITY OF THE ELECTRONS AND POSITIVE IONS IN THE SOLAR WIND. IONS WERE DETECTED IN 16 LOGARITHMICALLY EQUISPACED ENERGY PER UNIT CHARGE (E/Q) STEPS FROM 200 TO 10,000 V. THERE WAS AN ELECTRON MODE OF OPERATION IN WHICH ELECTRONS WERE MEASURED IN EIGHT LOGARITHMICALLY EQUISPACED ENERGY PER CHARGE STEPS RANGING FROM 0 TO 500 V. THE EIGHT COLLECTORS MEASURED PARTICLES INCIDENT FROM EIGHT DIFFERENT CONTIGUOUS ANGULAR INTERVALS RELATIVE TO THE SPACECRAFT EQUATORIAL PLANE (SAME AS THE ECLIPTIC PLANE). THERE WERE FOUR 15-DEG INTERVALS, TWO 20-DEG INTERVALS, AND TWO 30-DEG INTERVALS. AS THE SPACECRAFT WAS SPINNING, FLUXES WERE MEASURED IN 15 AZIMUTHAL ANGULAR SECTORS. EIGHT OF THESE SECTORS WERE 5-5/8 DEG WIDE, WERE CONTIGUOUS, AND BRACKETED THE SOLAR DIRECTION. THE REMAINING SEVEN SECTORS WERE 45 DEG WIDE. THREE DIFFERENT MODES OF DATA COLLECTION WERE USED. AT THE HIGHEST BIT RATE (512 BPS), THE FULL SCAN MODE WAS ALTERNATED WITH THE MAXIMUM FLUX MODE AT EACH E/Q STEP. IN THE FULL SCAN MODE, THE MAXIMUM FLUX OBSERVED IN EACH OF THE 15 AZIMUTHAL SECTORS AS THE SPACECRAFT ROTATED WAS RECORDED FOR A GIVEN SINGLE COLLECTOR AT A GIVEN 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 EXCEPT THAT ONLY THE PEAK FLUX IN EACH OF THE EIGHT 5-5/8-DEG-WIDE AZIMUTHAL SECTORS WAS RECORDED. THUS, THIS CYCLE ALSO TOOK 400 SPACECRAFT REVOLUTIONS. AT THE LOW BIT RATES (64, 16, AND 8 BPS), THE MAXIMUM FLUX MODE ALONE WAS USED. THUS, NO AZIMUTHAL DISTRIBUTIONS WERE MEASURED. AT THE LOW BIT RATES, IT TOOK 32 SEC FOR A COMPLETE SET OF ION MEASUREMENTS AND 16 SEC FOR A COMPLETE SET OF ELECTRON MEASUREMENTS. AT 64 BPS, THE ION AND ELECTRON MEASUREMENTS WERE TAKEN AND TELEMETERED EVERY 84 SEC. AT 16 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 336 SEC. AT 8 BPS, THEY WERE TAKEN AND TELEMETERED EVERY 672 SEC.

********** PIONEER 8 **********

SPACECRAFT COMMON NAME- PIONEER 8
ALTERNATE NAMES- PIONEER-C, 03066
NSSDC ID- 67-123A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/02/71.

LAUNCH DATE- 12/13/67 SPACECRAFT WEIGHT- 146. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 12/13/67
ORBIT PERIOD- 386.6 DAYS INCLINATION- .0578 DEG
PERIAPSIS- .9892 AU RAD APOAPSIS- 1.0880 AU RAD

RECENT ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 12/13/67
ORBIT PERIOD- 386.6 DAYS INCLINATION- .0578 DEG
PERIAPSIS- .9892 AU RAD APOAPSIS- 1.0880 AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	A.G.	OPP	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT 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 THIRTY-TWO 7-BIT WORDS PER FRAME. ONE SCIENTIFIC DATA FORMAT WAS USED AT THE TWO HIGHEST BIT RATES. ANOTHER WAS USED AT THE THREE LOWEST BIT RATES. THE THIRD WAS USED FOR DATA FROM ONLY THE RADIO PROPAGATION EXPERIMENT. THE FOURTH DATA FORMAT WAS USED MAINLY FOR ENGINEERING DATA. THE FOUR OPERATING MODES WERE (1) REAL TIME, (2) TELEMETRY STORE, (3) DUTY CYCLE STORE, AND (4) MEMORY READOUT. IN THE REAL-TIME MODE, DATA WERE SAMPLED AND TRANSMITTED DIRECTLY (WITHOUT STORAGE) AS SPECIFIED BY THE DATA FORMAT AND BIT RATE SELECTED. IN THE TELEMETRY STORE MODE, DATA WERE STORED AND TRANSMITTED SIMULTANEOUSLY IN THE FORMAT AND AT THE BIT RATE SELECTED. IN THE DUTY CYCLE STORE MODE, A SINGLE FRAME OF SCIENTIFIC DATA WAS COLLECTED AND STORED AT A RATE OF 512 BPS. THE TIME INTERVAL BETWEEN THE COLLECTION AND STORAGE OF SUCCESSIVE FRAMES COULD BE VARIED BY GROUND COMMAND BETWEEN 2 AND 17 MIN TO PROVIDE PARTIAL DATA COVERAGE FOR PERIODS UP TO 19 HR, 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. THE BIT RATE FOR THE MAJORITY OF THE DATA WAS 512 BPS FROM DECEMBER 13, 1967 TO MARCH 20, 1968, 256 BPS FROM MARCH 20, 1968 TO MAY 6, 1968, 64 BPS FROM MAY 6, 1968 TO AUGUST 29, 1968, AND 16 OR 8 BPS THEREAFTER. HIGHER BIT RATES WERE USED WHEN THE SPACECRAFT WAS TRACKED BY THE 64-M ANTENNA, BUT THE DATA COVERAGE BY THIS ANTENNA WAS LOW. DATA COVERAGE AVERAGED CLOSE TO 100 PERCENT FOR THE FIRST YEAR AFTER LAUNCH. AFTER THAT, THE DATA COVERAGE AVERAGED BETWEEN 50 AND 80 PERCENT UNTIL NOVEMBER 1970 WHEN COVERAGE DROPPED TO BETWEEN 50 AND 0 PERCENT. ALMOST NO DATA HAVE BEEN ACQUIRED SINCE MAY, 1971. DURING A REORIENTATION MANEUVER IN MARCH 1968, ONE OF THE FOUR SUN SENSORS (WHICH WAS CONNECTED TO THE ATTITUDE GAS SYSTEM USED TO KEEP THE SPIN AXIS POINTED) WAS FOUND TO BE

INOPERATIVE. IT WAS NOTED AT THIS TIME THAT THE SPACECRAFT ATTITUDE WAS OFF 4 DEG. ANOTHER ORIENTATION WAS ATTEMPTED IN JUNE 1968, AND IT WAS FOUND THAT THREE OF THE FOUR ATTITUDE SUN SENSORS WERE INOPERATIVE.

------- PIONEER 8, BERG ----------

EXPERIMENT NAME- COSMIC DUST DETECTOR

NSSDC ID- 67-123A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/25/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETOLOGY
INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	O.E.	BERG	NASA-GSFC GREENBELT, MD
OI -	L.	SECRETAN	NASA-LARC HAMPTON, VA

EXPERIMENT 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 FIVE 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 THREE CM INTO THE EXPERIMENT HOUSING, CONSISTED OF AN 8-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-MICRON 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 INITIATED BY GROUND COMMAND, WHICH 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/SEC. THE MASSES, DENSITIES, AND SPEEDS, HOWEVER, WERE TOO NARROW IN RANGE TO PROVIDE ANY COMPREHENSIVE CALIBRATION WHEN USING REAL DATA.

------- PIONEER 8, ESHLEMAN ----------

EXPERIMENT NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 67-123A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/25/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PLANETARY ATMOSPHERES
PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	V.R.	ESHLEMAN	STANFORD U STANFORD, CA
OI -	T.A.	CROFT	STANFORD U STANFORD, CA
OI -	H.T.	HOWARD	STANFORD U STANFORD, CA
OI -	R.L.	LEADABRAND	STANFORD RES INST MENLO PARK, CA
OI -	R.A.	LONG	STANFORD RES INST MENLO PARK, CA
OI -	A.M.	PETERSON	STANFORD U STANFORD, CA
OI -	F.L.	SCARF	TRW SYSTEMS GROUP REDONDO BEACH, CA

EXPERIMENT 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 JOURNAL OF GEOPHYSICAL RESEARCH, VOL 17, PP 3325-3327, AND IN RADIO SCIENCE, VOL 6, PP 55-63.

------- PIONEER 8, MCCRACKEN ----------

EXPERIMENT NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 67-123A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/02/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	K.G.	MCCRACKEN	U OF ADELAIDE ADELAIDE, AUSTRALIA
OI -	U.R.	RAO	PHYSICAL RESEARCH LAB AHMADABED, INDIA
OI -	W.C.	BARTLEY	U OF TEXAS, DALLAS DALLAS, TX

EXPERIMENT 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. INFLIGHT 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 ----------

EXPERIMENT NAME- SINGLE-AXIS MAGNETOMETER

NSSDC ID- 67-123A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/02/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	N.F.	NESS	NASA-GSFC GREENBELT, MD
OI -	S.C.	CANTARANO	U OF ROME ROME, ITALY
OI -	F.	MARIANI	U OF AQUILA AQUILA, ITALY

EXPERIMENT 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 SEC). AT TELEMETRY BIT RATES LESS THAN OR EQUAL TO 16 BPS, AVERAGES WERE COMPUTED ON BOARD FOR TRANSMISSION TO EARTH.

------- PIONEER 8, WEBBER ----------

EXPERIMENT NAME- COSMIC-RAY GRADIENT DETECTOR

NSSDC ID- 67-123A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/02/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.R. WEBBER .....U OF NEW HAMPSHIRE
DURHAM, NH

EXPERIMENT 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. THE EXPERIMENT FUNCTIONED WELL DURING THE SPACECRAFT LIFETIME, ALTHOUGH AT LOW TELEMETRY BIT RATES, ACCUMULATOR SATURATION RENDERED SOME COUNTING MODES TO BE OF NO VALUE. FOR FURTHER DETAILS, SEE J. GEOPHYS RES, VOL 76, P 1605, 1971.

------- PIONEER 8, WOLFE ----------

EXPERIMENT NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 67-123A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/25/71.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
OI - D.D. MCKIBBIN .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT 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. IN OPERATION, THE ELECTRONS WERE MEASURED FIRST, THEN BACKGROUND, AND THEN THE IONS. 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 (AS DETERMINED BY REFERENCING THE NORMAL TO THE INSTRUMENT APERTURE TO THE SPACE SUN SENSOR PULSE). 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 SEC AND ONE SET OF ELECTRON MEASUREMENTS 38 SEC. AT THE LOW BIT RATES (64, 16, AND 8 BPS), ONE SET OF ION MEASUREMENTS TOOK 37 SEC AND ONE SET OF ELECTRON MEASUREMENTS 28 SEC. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 SEC. AT 16 BPS, IT TOOK 1610 SEC AND AT 8 BPS, IT TOOK 3220 SEC.

********** PIONEER 9 **********

SPACECRAFT COMMON NAME- PIONEER 9
ALTERNATE NAMES- PIONEER-D, PL-684K
03533
NSSDC ID- 68-100A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

LAUNCH DATE- 11/08/68 SPACECRAFT WEIGHT- 147. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 11/08/68
ORBIT PERIOD- 297.6 DAYS INCLINATION- .086509 DEG
PERIAPSIS- 0.7542 AU RAD APOAPSIS- 0.9905 AU RAD

RECENT ORBIT PARAMETERS
ORBIT TYPE- HELIOCENTRIC EPOCH DATE- 11/08/68
ORBIT PERIOD- 297.6 DAYS INCLINATION- .086509 DEG
PERIAPSIS- 0.7542 AU RAD APOAPSIS- 0.9905 AU RAD

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC
MOFFETT FIELD, CA
PS - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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 THIRTY-TWO 7-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 HR, 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. THE BIT RATE FOR THE MAJORITY OF THE DATA WAS 512 BPS FROM NOVEMBER 8, 1968, TO JANUARY 15, 1969, 256 BPS FROM JANUARY 16, 1969, TO JANUARY 29, 1969, 64 BPS FROM JANUARY 30, 1969 TO MARCH 27, 1969, AND 16 OR 8 BPS THEREAFTER. HIGHER BIT RATES WERE USED WHEN THE SPACECRAFT WAS TRACKED BY THE 64-CM ANTENNA, BUT THE DATA COVERAGE BY THIS ANTENNA WAS LOW. THE DATA COVERAGE AVERAGED CLOSE TO 100 PERCENT FOR THE FIRST 29 WEEKS AFTER LAUNCH. AFTER THIS, DATA COVERAGE DROPPED TO CLOSE TO 50 PERCENT UNTIL DECEMBER 1969, AND IT VARIED BETWEEN 10 AND 30 PERCENT THROUGH JULY 1971. ALMOST NO DATA WERE ACQUIRED BETWEEN JULY 1971 AND

JUNE 1972. FOR THE NEXT 10 MONTHS COVERAGE WAS TYPICALLY BETWEEN 10 AND 30 PERCENT, WITH 100 PERCENT COVERAGE FOR THE MAJOR SOLAR ACTIVE PERIOD OF AUGUST 1972. FROM APRIL 1973 THROUGH FEBRUARY 1974 PERCENT COVERAGE AVERAGED 5 PERCENT.

------- PIONEER 9, BERG ----------

EXPERIMENT NAME- COSMIC DUST DETECTOR

NSSDC ID- 68-100A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETOLOGY
INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - O.E. BERG .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 ----------

EXPERIMENT NAME- TWO-FREQUENCY BEACON RECEIVER

NSSDC ID- 68-100A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS PLANETARY ATMOSPHERES
IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - V.R. ESHLEMAN .....STANFORD U
STANFORD, CA
OI - T.A. CROFT .....STANFORD U
STANFORD, CA
OI - H.T. HOWARD .....STANFORD U
STANFORD, CA
OI - R.L. LEADABRAND .....STANFORD RES INST
MENLO PARK, CA
OI - R.A. LONG .....STANFORD RES INST
MENLO PARK, CA
OI - A.M. PETERSON .....STANFORD U
STANFORD, CA

EXPERIMENT 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 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. A MORE DETAILED DESCRIPTION OF THE EXPERIMENT CAN BE FOUND IN JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 17, PP. 3325-3327, AND IN RADIO SCIENCE, VOL. 6,, PP. 55-63.

------- PIONEER 9, MCCRACKEN ----------

EXPERIMENT NAME- COSMIC-RAY ANISOTROPY

NSSDC ID- 68-100A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA
OI - U.R. RAO .....PHYSICAL RESEARCH LAB
AHMADABED, INDIA
OI - W.C. BARTLEY .....U OF TEXAS, DALLAS
DALLAS, TX

EXPERIMENT 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. INFLIGHT CALIBRATION OF THE SCINTILLATOR AND OF SOME OF THE ELECTRONICS WAS PERFORMED DAILY. SEE BUKATA ET AL, IEEE TRANS. NUC. SCI., NS-17, PP. 18-24, 1970, FOR A MORE DETAILED EXPERIMENT DESCRIPTION.

------- PIONEER 9, SCARF ----------

EXPERIMENT NAME- PLASMA WAVE DETECTOR

NSSDC ID- 68-100A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - I.M. GREEN .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - G.M. CROOK .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - R.W. FREDERICKS .....TRW SYSTEMS GROUP
REDONDO BEACH, CA

EXPERIMENT 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. THE TELEMETRY SEQUENCE WAS REPEATED OVER TIME INTERVALS FROM 7 MIN 28 SEC TO 472 MIN 52 SEC, WITH MOST OF THE DATA OBTAINED AT 59 MIN 44 SEC PER TELEMETRY SEQUENCE DURING THE FIRST YEAR OF ACQUISITION. THIS IMPLIES THAT ONE 8-STEP PULSE HEIGHT ANALYSIS AND EIGHT 400-HZ AND 30-KHZ MEASUREMENTS WERE MADE EVERY 7 MIN 28 SEC.

------- PIONEER 9, SONETT ----------

EXPERIMENT NAME- THREE-AXIS MAGNETOMETER

NSSDC ID- 68-100A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C.P. SONETT .....U OF ARIZONA
TUCSON, AZ

OI - D.S. COLBURN .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT 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 INFLIGHT 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 ----------

EXPERIMENT NAME- COSMIC-RAY TELESCOPE

NSSDC ID- 68-100A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.R. WEBBER .....U OF NEW HAMPSHIRE
DURHAM, NH

EXPERIMENT 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. AT THE PRESENT LOW TELEMETRY BIT RATES, THE DATA ARE RATHER SPARSE.

------- PIONEER 9, WOLFE ----------

EXPERIMENT NAME- ELECTROSTATIC ANALYZER

NSSDC ID- 68-100A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 05/19/69.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
OI - D.D. MCKIBBIN .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT 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. IN OPERATION, THE ELECTRONS WERE MEASURED FIRST, THEN BACKGROUND, AND THEN THE IONS. 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 (AS DETERMINED BY REFERENCING THE NORMAL TO THE INSTRUMENT APERTURE TO THE SPACE SUN SENSOR PULSE). 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 SEC AND ONE SET OF ELECTRON MEASUREMENTS 38 SEC. AT THE LOW BIT RATES (64, 16, AND 8 BPS), ONE SET OF ION MEASUREMENTS TOOK 37 SEC AND ONE SET OF ELECTRON MEASUREMENTS 28 SEC. AT 64 BPS, A COMPLETE SET OF MEASUREMENTS (SEVEN IONS PLUS ONE ELECTRON) WAS TAKEN AND TELEMETERED EVERY 402.5 SEC. AT 16 BPS, IT TOOK 1610 SEC, AND, AT 8 BPS, IT TOOK 3220 SEC.

********** PIONEER 10 **********

SPACECRAFT COMMON NAME- PIONEER 10
ALTERNATE NAMES- PIONEER-F, PL-723D
05860
NSSDC ID- 72-012A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

LAUNCH DATE- 03/02/72 SPACECRAFT WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC
MOFFETT FIELD, CA
PS - J.H. WOLFE .....NASA-ARC
MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - A.G. OPP .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
PIONEER 10 WAS THE FIRST OF TWO 258-KG, SPIN-STABILIZED (AT 4.8 RPM), EARTH-POINTING SPACECRAFT DESIGNED TO PROVIDE INFORMATION ON THE INTERPLANETARY MEDIUM, THE ASTEROID BELT, AND JUPITER AND ITS ENVIRONMENT. THE SPACECRAFT COMPLEMENT OF 11 EXPERIMENTS INCLUDED PLASMA AND ENERGETIC PARTICLE DETECTORS, A MAGNETOMETER, METEROID DETECTORS, AN IMAGING PHOTOPOLARIMETER, A UV PHOTOMETER AND AN IR RADIOMETER. PASSIVE IONOSPHERIC OCCULTATION AND CELESTIAL MECHANICS STUDIES WERE ALSO CARRIED OUT. POWER WAS PROVIDED BY FOUR BOOM-MOUNTED RADIOISOTOPE THERMOELECTRIC GENERATORS. EIGHT BIT RATES (8 TO 2048 BPS) WERE AVAILABLE. DURING JOVIAN ENCOUNTER THE BIT RATE WAS 1024 BPS. PIONEER 10 CROSSED THE JOVIAN BOW SHOCK AT ABOUT 108 PLANETARY RADII ON NOVEMBER 26, 1973, ALMOST 21 MONTHS AFTER LAUNCH AND AFTER SURVIVING ITS TRANSIT OF THE ASTEROID BELT WITH NO DAMAGE. CLOSEST APPROACH OCCURRED ON DECEMBER 4, 1973, AT 130,000 KM (1.8 PLANETARY RADII) ABOVE THE CLOUD TOPS. FINAL EXIT FROM THE JOVIAN MAGNETOSHEATH OCCURRED AT ABOUT 240 PLANETARY RADII. DESPITE THE INTENSE FLUXES OF VERY ENERGETIC PARTICLES, THE SPACECRAFT SYSTEMS (EXCEPT THE SPACECRAFT STELLAR REFERENCE ASSEMBLY) AND EXPERIMENTS (EXCEPT FOR THE ASTEROID-METEOROID DETECTOR) SURVIVED THE JOVIAN ENCOUNTER WELL. THE SPACECRAFT IS NOW ON A TRAJECTORY OF ESCAPE FROM THE SOLAR SYSTEM. IT IS EXPECTED TO TRANSMIT DATA UNTIL 1977, WHEN THE SPACECRAFT WILL BE ABOUT 20 AU IN THE DISTANCE.

------- PIONEER 10, ANDERSON ----------

EXPERIMENT NAME- CELESTIAL MECHANICS

NSSDC ID- 72-012A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. & RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.D. ANDERSON .....NASA-JPL
PASADENA, CA
OI - G.W. NULL .....NASA-JPL
PASADENA, CA

EXPERIMENT 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 ----------

EXPERIMENT NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 72-012A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.W. FILLIUS .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA
OI - C.E. MCILWAIN .....U OF CALIF, SAN DIEGO
SAN DIEGO, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF FOUR DETECTORS. A CERENKOV COUNTER MEASURED ELECTRONS ABOVE 3, 7, AND 10 MEV. A SOLID-STATE ELECTRON SCATTER DETECTOR USED THREE DISCRIMINATION LEVELS TO MEASURE ELECTRONS BETWEEN 100 KEV AND 3 MEV. A DC SCINTILLATOR DETECTOR MEASURED THE SUM OF 25- TO 250-KEV ELECTRONS AND 800-KEV TO 250-MEV PROTONS. A SECOND SOLID-STATE DETECTOR SEPARATELY MEASURED OMNIDIRECTIONAL 60-TO 250-MEV PROTONS AND MINIMUM IONIZING PARTICLES. THE FIRST THREE DETECTORS LOOKED PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. EACH DETECTOR HAD A 30 DEG HALF-ANGLE APERATURE, AND EACH MADE EIGHT MEASUREMENTS PER SPACECRAFT SPIN PERIOD. WHILE THIS EXPERIMENT IS PRIMARILY DESIGNED FOR ENCOUNTER, DATA WERE OBTAINED AT A LOW RATE IN INTERPLANETARY SPACE.

------- PIONEER 10, GEHRELS ----------

EXPERIMENT NAME- IMAGING PHOTOPOLARIMETER (IPP)

NSSDC ID- 72-012A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T. GEHRELS .....U OF ARIZONA
TUCSON, AZ
OI - D.L. COFFEEN .....U OF ARIZONA
TUCSON, AZ
OI - J. HAMEEN-ANTILLA .....U OF ARIZONA
TUCSON, AZ
OI - C.E. KENKNIGHT .....U OF ARIZONA
TUCSON, AZ
OI - R.F. HUMMER .....SANTA BARBARA RES CTR
GOLETA, CA
OI - M.G. TOMASKO .....U OF ARIZONA
TUCZON, AZ
OI - W. SWINDELL .....U OF ARIZONA
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE IMAGING PHOTOPOLARIMETER EXPERIMENT (IPP) 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- X 0.5-MRAD APERTURE STOP. RELATIVE RADIOMETRIC CALIBRATION WAS DERIVED USING AN INTERNAL TUNGSTEN LAMP. LONG-TERM ABSOLUTE CALIBRATION OF THE INSTRUMENT WAS ACCOMPLISHED BY MEANS OF A SUNLIGHT DIFFUSER/ATTENUATOR ELEMENT LOCATED IN THE SPACECRAFT ANTENNA STRUCTURE, I.E., PRIMARY RADIOMETRIC CALIBRATION WAS OBTAINED THROUGHOUT THE MISSION BY PERIODICALLY COMMANDING THE TELESCOPE TO VIEW THIS DIFFUSE 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 ----------

EXPERIMENT NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 72-012A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.L. JUDGE .....U OF SOUTHERN CALIF
LOS ANGELES, CA
OI - R.W. CARLSON .....U OF SOUTHERN CALIF
LOS ANGELES, CA

EXPERIMENT 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 ----------

EXPERIMENT NAME- METEOROID DETECTORS

NSSDC ID- 72-012A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.H. KINARD .....NASA-LARC
HAMPTON, VA
OI - R.E. TURNER .....NASA-MSFC
HUNTSVILLE, AL
OI - J.M. ALVAREZ .....NASA-LARC
HAMPTON, VA
OI - D.H. HUMES .....NASA-LARC
HAMPTON, VA
OI - R.L. O'NEAL .....NASA-LARC
HAMPTON, VA

EXPERIMENT 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. AFTER PIONEER 10 ENTERED THE ASTEROID BELT BETWEEN MARS AND JUPITER ON JULY 1, 1972, THE METEOROID EXPERIMENT DETECTED UNUSUALLY LARGE NUMBERS OF METEOROIDS AND DUST PARTICLES.

------- PIONEER 10, KLIORE ----------

EXPERIMENT NAME- S-BAND OCCULTATION

NSSDC ID- 72-012A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. & RADIO PHYSIC PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.J. KLIORE .....NASA-JPL
PASADENA, CA
OI - G. FJELDBO .....NASA-JPL
PASADENA, CA
OI - D.L. CAIN .....NASA-JPL
PASADENA, CA
OI - B.L. SEIDEL .....NASA-GISS
NEW YORK, NY
OI - S.I. RASOOL .....NASA HEADQUARTERS
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED RADIO REFRACTION EFFECTS ON THE SPACECRAFT'S S-BAND RADIO SIGNAL TO DETERMINE THE VERTICAL DISTRIBUTION OF NEUTRAL AND IONIZED SPECIES IN THE JOVIAN ATMOSPHERE.

------- PIONEER 10, MCDONALD ----------

EXPERIMENT NAME- COSMIC-RAY SPECTRA

NSSDC ID- 72-012A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	F.B.	MCDONALD	NASA-GSFC GREENBELT, MD
OI -	K.G.	MCCRACKEN	U OF ADELAIDE ADELAIDE, AUSTRALIA
OI -	W.R.	WEBBER	U OF NEW HAMPSHIRE DURHAM, NH
OI -	E.C.	ROELOF	APPLIED PHYSICS LAB SILVER SPRING, MD
OI -	J.H.	TRAINOR	NASA-GSFC GREENBELT, MD
OI -	B.J.	TEEGARDEN	NASA-GSFC GREENBELT, MD

EXPERIMENT 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 ----------

EXPERIMENT NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 72-012A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.A.	SIMPSON	U OF CHICAGO CHICAGO, IL
OI -	J.J.	O'GALLAGHER	U OF MARYLAND COLLEGE PARK, MD
OI -	A.	TUZZOLINO	U OF CHICAGO CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE CHARGE COMPOSITION USING THREE TYPES OF DETECTORS - (1) A SEVEN-ELEMENT SOLID-STATE DETECTOR TELESCOPE, (2) A HIGH ENERGY ELECTRON DETECTOR (EGG), AND (3) A HIGH-ENERGY PROTON DETECTOR (FISSION FOIL). THE FIRST DETECTOR WAS TO MEASURE PROTONS (450 KEV TO 150 MEV), ELECTRONS (200 KEV TO 30 MEV), AND PARTICLES FROM HE (Z = 2) TO O (Z = 16) (8 TO 150 MEV/NUCLEON). THE SECOND DETECTOR WAS TO MEASURE BREMSSTRAHLUNG RADIATION FROM ELECTRONS AND ELECTRONS DIRECTLY (E.GT. 9 MEV) AND IS DESIGNED TO EXCLUDE PROTONS OF ENERGIES LESS THAN 50 MEV. THE THIRD DETECTOR WAS TO MEASURE PROTONS OF ENERGIES GREATER THAN 50 MEV. THE DETECTOR SAMPLE TIME WAS TO BE SYNCHRONIZED WITH THE SPACECRAFT SPIN AND SHOULD BE 1/8 SPACECRAFT ROTATION OR ABOUT 1-1/2 SEC.

------- PIONEER 10, SMITH ----------

EXPERIMENT NAME- MAGNETIC FIELDS

NSSDC ID- 72-012A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	E.J.	SMITH	NASA-JPL PASADENA, CA
OI -	D.S.	COLBURN	NASA-ARC MOFFETT FIELD, CA
OI -	P.	DYAL	NASA-ARC MOFFETT FIELD, CA
OI -	C.P.	SONETT	U OF ARIZONA TUCSON, AZ
OI -	P.J.	COLEMAN, JR.	U OF CALIF, LA LOS ANGELES, CA
OI -	L.	DAVIS	CALIF INST OF TECH PASADENA, CA
OI -	D.E.	JONES	BRIGHAM YOUNG U PROVO, UT

EXPERIMENT BRIEF DESCRIPTION
THE MAGNETOMETER ON PIONEER 10 WAS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 GAMMAS TO PLUS OR MINUS 10 GAUSS. THE LINEARITY WAS 0.1 PERCENT, AND THE NOISE THRESHOLD WAS 0.01 GAMMA RMS FOR 0-1 HZ. THE ACCURACY WAS 0.5 PERCENT OF FULL SCALE RANGE.

------- PIONEER 10, SOBERMAN ----------

EXPERIMENT NAME- ASTEROID/METEOROID ASTRONOMY

NSSDC ID- 72-012A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY, PLANETOLOGY, PLANETARY ATMOSPHERES, INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.K.	SOBERMAN	DREXEL INST OF TECH PHILADELPHIA, PA
OI -	H.A.	ZOOK	NASA-JSC HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT SEARCHED FOR PARTICLES WITH MASSES LARGER THAN ABOUT ONE MICROGRAM BY OBSERVING THE SOLAR LIGHT THEY REFLECTED AND SCATTERED. FOUR INDEPENDENT TELESCOPIC SUBSYSTEMS WITH FOUR OVERLAPPING FIELDS OF VIEW WERE USED, WITH THE ENTRY AND DEPARTURE TIMES OF THE LIGHT FROM THE PARTICLES BEING USED TO DETERMINE THE RANGE AND VELOCITIES OF THE PARTICLES THEMSELVES. THE OPTICAL SUBSYSTEMS WERE COMPOSED OF 8-IN. RITCHEY-CHRETIEN TELESCOPES WITH A 10-IN. FOCAL LENGTH AND A 0.2-RAD FIELD OF VIEW.

------- PIONEER 10, VAN ALLEN ----------

EXPERIMENT NAME- JOVIAN CHARGED PARTICLES EXPERIMENT

NSSDC ID- 72-012A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.A.	VAN ALLEN	U OF IOWA IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO MEASURE PARTICLES IN THE VICINITY OF JUPITER USING THREE SETS OF DETECTORS -- (1) A THREE-ELEMENT GEIGER TUBE TELESCOPE, (2) A THREE-ELEMENT TRIANGULAR ARRAY OF DETECTORS, AND (3) A LOW-ENERGY GEIGER TUBE DETECTOR. THE FIRST DETECTOR IS TO MEASURE ELECTRONS (E.GT. 2 MEV) AND PROTONS (E.GT. 10 MEV). THE SECOND IS TO MEASURE ELECTRONS (E.GT. 10 MEV), AND THE THIRD IS ALSO TO MEASURE ELECTRONS (E.GT. 50 KEV). THE DETECTOR SAMPLE TIME IS TO BE SYNCHRONIZED WITH THE SPACECRAFT TELEMETRY SYSTEM AND WOULD DEPEND UPON THE TELEMETRY BIT RATE, I.E., THE SAMPLE TIME MAY RANGE FROM 3/32 SEC TO 12 SEC. USEFUL JOVIAN AND INTERPLANETARY DATA HAVE BEEN OBTAINED.

------- PIONEER 10, WEINBERG ----------

EXPERIMENT NAME- ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY

NSSDC ID- 72-012A-14

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY, PLANETOLOGY, PLANETARY ATMOSPHERES, ZODIACAL LIGHT

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.L.	WEINBERG	STATE U OF NEW YORK ALBANY, NY
OI -	M.S.	HANNER	STATE U OF NEW YORK ALBANY, NY

EXPERIMENT BRIEF DESCRIPTION
THE IMAGING PHOTOPOLARIMETER EXPERIMENT (IPP) 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-X 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 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 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, WOLFE ----------

EXPERIMENT NAME- PLASMA EXPERIMENT

NSSDC ID- 72-012A-13

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 03/03/72.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
OI -	L.A.	FRANK	U OF IOWA IOWA CITY, IA
OI -	R.	LUST	MPI GARCHING, FED REP OF GERMANY
OI -	D.S.	INTRILIGATOR	U OF SOUTHERN CALIF LOS ANGELES, CA
OI -	D.D.	MCKIBBIN	NASA-ARC MOFFETT FIELD, CA
OI -	V.T.	ZAVIENTSEFF	NASA-ARC MOFFETT FIELD, CA
OI -	F.L.	SCARF	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	H.R.	COLLARD	NASA-ARC MOFFETT FIELD, CA
OI -	W.C.	FELDMAN	LOS ALAMOS SCI LAB LOS ALAMOS, NM
OI -	Z.A.	SMITH	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
TWO QUADRISPHERICAL ELECTROSTATIC ANALYZERS WERE USED TO STUDY THE DIRECTIONAL INTENSITY OF SOLAR WIND IONS AND ELECTRONS. THE DETECTORS WERE USED TO OBSERVE A POSSIBLE JOVIAN BOW SHOCK, MAGNETOSHEATH, AND MAGNETOPAUSE. THE INSTRUMENTS STUDIED POSITIVE IONS IN 32 ENERGY/CHARGE STEPS BETWEEN 100 V AND 18 KV, AND ELECTRONS IN 16 STEPS BETWEEN 100 V AND 18 KV.

********** PIONEER 11 **********

SPACECRAFT COMMON NAME- PIONEER 11
ALTERNATE NAMES- PIONEER-G, PL-733C
6421
NSSDC ID- 73-019A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

LAUNCH DATE- 04/06/73 SPACECRAFT WEIGHT- 231. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	A.G.	OPP	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
PIONEER 11 WAS THE SECOND OF TWO 231-KG, SPIN-STABILIZED EARTH POINTING SPACECRAFT DESIGNED TO PROVIDE INFORMATION ON THE INTERPLANETARY MEDIUM, THE ASTEROID BELT AND THE NEAR-JUPITER ENVIRONMENT. THIS JUPITER FLY-BY SPACECRAFT WAS POWERED BY A RADIOISOTOPE THERMOELECTRIC GENERATOR AND A BATTERY. THE SPACECRAFT INSTRUMENTATION STUDIED THE INTERPLANETARY AND POSSIBLE JOVIAN MAGNETIC FIELDS, THE SOLAR WIND AND POSSIBLE JOVIAN BOW SHOCK AND MAGNETOPAUSE BOUNDARIES, SOLAR AND GALACTIC COSMIC RAYS, INTERPLANETARY CHARGED PARTICLES AND POSSIBLE JOVIAN TRAPPED RADIATION, JOVIAN THERMAL ENERGY FLUX, ZODIACAL LIGHT, ASTEROIDS AND METEOROIDS, AND INTERPLANETARY AND JOVIAN ULTRAVIOLET RADIATION. AN S-BAND OCCULTATION EXPERIMENT AND A JUPITER IMAGING AND PHOTOPOLARIZATION EXPERIMENT WERE PERFORMED. THE SPACECRAFT WAS TO EXPERIENCE CLOSEST JUPITER APPROACH (0.6 PLANETARY RADII FROM SURFACE) ON DECEMBER 3, 1974, AND DEPENDING ON THE AMOUNT OF THRUSTER FUEL LEFT AFTER THE JUPITER ENCOUNTER, CONTINUE ON TO ENCOUNTER WITH SATURN APPROXIMATELY 7 YEARS AFTER LAUNCH.

------- PIONEER 11, ANDERSON ----------

EXPERIMENT NAME- CELESTIAL MECHANICS

NSSDC ID- 73-019A-09

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.D.	ANDERSON	NASA-JPL PASADENA, CA
OI -	G.W.	NULL	NASA-JPL PASADENA, CA

EXPERIMENT 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 ----------

EXPERIMENT NAME- JOVIAN TRAPPED RADIATION

NSSDC ID- 73-019A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

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

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF FOUR DETECTORS. A CERENKOV COUNTER MEASURED ELECTRONS ABOVE 3, 7, AND 10 MEV. A SOLID-STATE ELECTRON SCATTER DETECTOR USED THREE DISCRIMINATION LEVELS TO MEASURE ELECTRONS BETWEEN 100 KEV AND 3 MEV. A DC SCINTILLATOR DETECTOR MEASURED THE SUM OF 25- TO 250-KEV ELECTRONS AND 800-KEV TO 250-MEV PROTONS. A SECOND SOLID-STATE DETECTOR MEASURED SEPARATELY OMNIDIRECTIONAL 60- TO 250-MEV PROTONS AND MINIMUM IONIZING PARTICLES. THE FIRST THREE DETECTORS LOOKED PERPENDICULAR TO THE SPACECRAFT SPIN AXIS. EACH DETECTOR HAD A 30-DEG HALF-ANGLE APERTURE, AND EACH MADE EIGHT MEASUREMENTS PER SPACECRAFT SPIN PERIOD. WHILE THIS EXPERIMENT WAS DESIGNED PRIMARILY FOR ENCOUNTER, IT DID OBTAIN DATA AT A LOW RATE IN INTERPLANETARY SPACE.

------- PIONEER 11, GEHRELS ----------

EXPERIMENT NAME- IMAGING PHOTOPOLARIMETER

NSSDC ID- 73-019A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	T.	GEHRELS	U OF ARIZONA TUCSON, AZ
OI -	D.L.	COFFEEN	U OF ARIZONA TUCSON, AZ
OI -	J.	HAMEEN-ANTILLA	U OF ARIZONA TUCSON, AZ
OI -	C.E.	KENKNIGHT	U OF ARIZONA TUCSON, AZ
OI -	R.F.	HUMMER	SANTA BARBARA RES CTR GOLETA, CA
OI -	M.G.	TOMASKO	U OF ARIZONA TUCSON, AZ
OI -	W.	SWINDELL	U OF ARIZONA TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE IMAGING PHOTOPOLARIMETER EXPERIMENT (IPP) 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- X 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 ----------

EXPERIMENT NAME- ULTRAVIOLET PHOTOMETRY

NSSDC ID- 73-019A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.L. JUDGE .....U OF SOUTHERN CALIF
LOS ANGELES, CA
OI - R.W. CARLSON .....U OF SOUTHERN CALIF
LOS ANGELES, CA

EXPERIMENT 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 ----------

EXPERIMENT NAME- METEOROID DETECTORS

NSSDC ID- 73-019A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.H. KINARD .....NASA-LARC
HAMPTON, VA
OI - J.M. ALVAREZ .....NASA-LARC
HAMPTON, VA
OI - D.H. HUMES .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE PIONEER-G 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 TRAJECTORY DATA, ALLOWED THE SPATIAL DENSITY OF THE METEOROIDS TO BE DETERMINED. THE PANELS DETECTED IMPACTS, WITH PARTICLES HAVING A MASS OF GREATER THAN 1E-8 GM. THE PANELS COVERED 0.46 M SQ OF EXPOSED AREA ON PIONEER-G. RESULTS FROM THIS EXPERIMENT WERE COMBINED WITH THOSE FROM A SIMILAR EXPERIMENT FLOWN ON PIONEER 10 TO DETERMINE THE RANGE IN MASS OF SMALL PARTICLES ON BOTH THE INNER AND OUTER BOUNDARIES AND WITHIN THE ASTEROID BELT.

------- PIONEER 11, KLIORE ----------

EXPERIMENT NAME- S-BAND OCCULTATION

NSSDC ID- 73-019A-10

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. & RADIO PHYSIC PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.J. KLIORE .....NASA-JPL
PASADENA, CA
OI - G. FJELDBO .....NASA-JPL
PASADENA, CA
OI - D.L. CAIN .....NASA-JPL
PASADENA, CA
OI - B.L. SEIDEL .....NASA-GISS
NEW YORK, NY
OI - S.I. RASOOL .....NASA HEADQUARTERS
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT UTILIZED RADIO REFRACTION EFFECTS ON THE SPACECRAFT S-BAND RADIO SIGNAL TO DETERMINE THE VERTICAL DISTRIBUTION OF NEUTRAL AND IONIZED SPECIES IN THE JOVIAN ATMOSPHERE.

------- PIONEER 11, MCDONALD ----------

EXPERIMENT NAME- COSMIC-RAY SPECTRA

NSSDC ID- 73-019A-12

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - F.B. MCDONALD .....NASA-GSFC
GREENBELT, MD
OI - K.G. MCCRACKEN .....U OF ADELAIDE
ADELAIDE, AUSTRALIA
OI - W.R. WEBBER .....U OF NEW HAMPSHIRE
DURHAM, NH
OI - E.C. ROELOF .....APPLIED PHYSICS LAB
SILVER SPRING, MD
OI - B.J. TEEGARDEN .....NASA-GSFC
GREENBELT, MD
OI - J.H. TRAINOR .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF THREE 3-ELEMENT TELESCOPES, ALL LOOKING NORMAL TO THE SPACECRAFT SPIN AXIS. A BIDIRECTIONAL TELESCOPE MEASURED 20- TO 800-MEV/NUCLEON PARTICLES WITH 5 TO 10 PERCENT ENERGY RESOLUTION. ANOTHER TELESCOPE MEASURED 3- TO 22-MEV/NUCLEON PARTICLES WITH 5 PERCENT RESOLUTION. THESE TWO TELESCOPES MEASURED PARTICLES WITH Z VALUES BETWEEN 1 AND 8. THE THIRD TELESCOPE MEASURED 50-KEV TO 1-MEV ELECTRONS AND 50-KEV TO 20-MEV PROTONS WITH 20 PERCENT RESOLUTION.

------- PIONEER 11, MUNCH ----------

EXPERIMENT NAME- INFRARED RADIOMETER

NSSDC ID- 73-019A-08

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT ZERO DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. MUNCH .....CALIF INST OF TECH
PASADENA, CA
OI - R.W. BOESE .....NASA-ARC
MOFFETT FIELD, CA
OI - S.C. CHASE, JR. .....SANTA BARBARA RES CTR
GOLETA, CA
OI - A.P. INGERSOLL .....CALIF INST OF TECH
PASADENA, CA
OI - G. NEUGEBAUER .....CALIF INST OF TECH
PASADENA, CA
OI - L.M. TRAFTON .....U OF TEXAS, AUSTIN
AUSTIN, TX

EXPERIMENT BRIEF DESCRIPTION
THE PIONEER G 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 ILLUMINATED A PAIR OF 88-CHANNEL, THIN-FILM BIMETALLIC THERMOPILES IN TWO BANDS OF THE IR SPECTRUM (14 TO 25 MICRONS AND 19 TO 56 MICRONS) 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, NESS ----------

EXPERIMENT NAME- JOVIAN MAGNETIC FIELD

NSSDC ID- 73-019A-14

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PLANETARY MAG. FIELD

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.F. NESS .....NASA-GSFC
GREENBELT, MD
OI - M.H. ACUNA .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THIS TRIAXIAL FLUXGATE MAGNETOMETER WAS DESIGNED TO STUDY THE JOVIAN MAGNETIC FIELD. EACH SENSOR OPERATED IN THE RANGE 0.01- TO 10-GAUSS, WITH 0.1 PERCENT DIGITIZATION ACCURACY. ONE VECTOR MEASUREMENT WAS OBTAINED EACH 36 SEC.

------- PIONEER 11, SIMPSON ----------

EXPERIMENT NAME- CHARGED PARTICLE COMPOSITION

NSSDC ID- 73-019A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.A. SIMPSON .....U OF CHICAGO
CHICAGO, IL
OI - J.J. O'GALLAGHER .....U OF MARYLAND
COLLEGE PARK, MD
OI - A. TUZZOLINO .....U OF CHICAGO
CHICAGO, IL

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE CHARGE COMPOSITION USING THREE TYPES OF DETECTORS -- (1) A 7-ELEMENT SOLID-STATE DETECTOR TELESCOPE, (2) A HIGH-ENERGY ELECTRON DETECTOR (EGG), AND (3) A HIGH-ENERGY PROTON DETECTOR (FISSION FOIL). THE FIRST DETECTOR WAS TO MEASURE PROTONS (450 KEV TO 150 MEV), ELECTRONS (200 KEV TO 30 MEV), AND PARTICLES FROM H(Z=2) TO O(Z=16) (6 TO 150 MEV/NUCLEON). THE SECOND DETECTOR WAS TO MEASURE BREMSSTRAHLUNG RADIATION FROM ELECTRONS AND ELECTRONS DIRECTLY (E.GT. 9 MEV) AND WAS DESIGNED TO EXCLUDE PROTONS OF ENERGIES LESS THAN 50 MEV. THE THIRD DETECTOR WAS TO MEASURE PROTONS OF ENERGIES GREATER THAN 50 MEV. THE DETECTOR SAMPLE TIME WAS TO BE SYNCHRONIZED WITH THE SPACECRAFT SPIN AND SHOULD BE EQUAL TO 1/8 OF A SPACECRAFT ROTATION OR ABOUT 1-1/2 SEC.

------- PIONEER 11, SMITH ----------

EXPERIMENT NAME- MAGNETIC FIELDS

NSSDC ID- 73-019A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PLANETARY MAG. FIELD

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - E.J. SMITH .....NASA-JPL
PASADENA, CA
OI - D.S. COLBURN .....NASA-ARC
MOFFETT FIELD, CA
OI - P. DYAL .....NASA-ARC
MOFFETT FIELD, CA
OI - C.P. SONETT .....U OF ARIZONA
TUCSON, AZ
OI - P.J. COLEMAN, JR. .....U OF CALIF, LA
LOS ANGELES, CA
OI - L. DAVIS .....CALIF INST OF TECH
PASADENA, CA
OI - D.E. JONES .....BRIGHAM YOUNG U
PROVO, UT

EXPERIMENT BRIEF DESCRIPTION
THE MAGNETOMETER ON PIONEER 11 IS A TRIAXIAL HELIUM MAGNETOMETER WITH SEVEN DYNAMIC RANGES, FROM PLUS OR MINUS 2.5 GAMMA TO PLUS OR MINUS 10 GAUSS. THE LINEARITY IS 0.1 PERCENT. THE NOISE THRESHOLD IS 0.01 GAMMA RMS FOR 0-1 HZ. THE ACCURACY IS 0.5 PERCENT OF FULL SCALE RANGE.

------- PIONEER 11, SOBERMAN ----------

EXPERIMENT NAME- ASTEROID/METEOROID ASTRONOMY

NSSDC ID- 73-019A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY PLANETARY ATMOSPHERES
PLANETOLOGY INTERPLANETARY DUST

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.K. SOBERMAN .....DREXEL INST OF TECH
PHILADELPHIA, PA
OI - H.A. ZOOK .....NASA-JSC
HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT SEARCHED FOR PARTICLES WITH MASSES LARGER THAN ABOUT 1 MICROGRAM BY OBSERVING THE SOLAR LIGHT THE PARTICLES REFLECT AND SCATTER. FOUR INDEPENDENT TELESCOPIC SUBSYSTEMS WITH FOUR OVERLAPPING FIELDS OF VIEW WERE USED, WITH THE ENTRY AND DEPARTURE TIMES OF THE LIGHT FROM THE PARTICLES BEING USED TO DETERMINE THE RANGE AND VELOCITIES OF THE PARTICLES THEMSELVES. THE OPTICAL SUBSYSTEMS WERE COMPOSED OF 8-IN. RITCHEY-CHRETIEN TELESCOPES WITH A 10-IN. FOCAL LENGTH AND A 0.2-RAD FIELD OF VIEW.

------- PIONEER 11, VAN ALLEN ----------

EXPERIMENT NAME- JOVIAN CHARGED PARTICLES EXPERIMENT

NSSDC ID- 73-019A-11

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.A. VAN ALLEN .....U OF IOWA
IOWA CITY, IA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MEASURE PARTICLES IN THE VICINITY OF JUPITER USING THREE SETS OF DETECTORS -- (1) A THREE-ELEMENT GEIGER TUBE TELESCOPE, (2) A THREE-ELEMENT TRIANGULAR ARRAY OF DETECTORS, AND (3) A LOW-ENERGY GEIGER TUBE DETECTOR. THE FIRST DETECTOR MEASURED ELECTRONS (E.GT. 2 MEV) AND PROTONS (E.GT. 10 MEV). THE SECOND MEASURED ELECTRONS (E.GT. 10 MEV), AND THE THIRD ALSO MEASURED ELECTRONS (E.GT. 50 KEV). THE DETECTOR SAMPLE TIME WAS SYNCHRONIZED WITH THE SPACECRAFT TELEMETRY SYSTEM AND DEPENDED UPON THE TELEMETRY BIT RATE, I.E., THE SAMPLE TIME MAY RANGE FROM 3/32 SEC TO 12 SEC.

------- PIONEER 11, WEINBERG ----------

EXPERIMENT NAME- ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY

NSSDC ID- 73-019A-15

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ZODIACAL LIGHT

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.L. WEINBERG .....STATE U OF NEW YORK
ALBANY, NY
OI - M.S. HANNER .....STATE U OF NEW YORK
ALBANY, NY

EXPERIMENT BRIEF DESCRIPTION
THE IMAGING PHOTOPOLARIMETER EXPERIMENT (IPP) 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-X 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 ----------

EXPERIMENT NAME- PLASMA EXPERIMENT

NSSDC ID- 73-019A-13

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 04/06/73.

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPH. + RADIO PHYSIC PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
OI -	L.A.	FRANK	U OF IOWA IOWA CITY, IA
OI -	R.	LUST	MPI GARCHING, FED REP OF GERMANY
OI -	D.S.	INTRILIGATOR	U OF SOUTHERN CALIF LOS ANGELES, CA
OI -	V.T.	ZAVIENTSEFF	NASA-ARC MOFFETT FIELD, CA
OI -	Z.A.	SMITH	NASA-ARC MOFFETT FIELD, CA
OI -	F.L.	SCARF	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	H.R.	COLLARD	NASA-ARC MOFFETT FIELD, CA
OI -	W.C.	FELDMAN	LOS ALAMOS SCI LAB LOS ALAMOS, NM
OI -	D.D.	MCKIBBIN	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
TWO QUADRISPHERICAL ELECTROSTATIC ANALYZERS WERE USED TO STUDY THE DIRECTIONAL INTENSITY OF SOLAR WIND IONS AND ELECTRONS. THE DETECTORS WERE ALSO USED TO OBSERVE A POSSIBLE JOVIAN BOW SHOCK, MAGNETOSHEATH, AND MAGNETOPAUSE. THE INSTRUMENTS WILL STUDY POSITIVE IONS IN 32 ENERGY/CHARGE STEPS BETWEEN 100 V AND 18 KV, AND ELECTRONS IN 16 STEPS BETWEEN 100 V AND 18 KV.

********** PIONEER VENUS ORBITER **********

SPACECRAFT COMMON NAME- PIONEER VENUS ORBITER
ALTERNATE NAMES- PIONEER VENUS 1978 ORBIT
NSSDC ID- PIO78OR

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- MAY 1978 SPACECRAFT WEIGHT- 517. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- VENUSCENTRIC
ORBIT PERIOD- 1440. MIN INCLINATION- 60. DEG
PERIAPSIS- 200. KM ALT APOAPSIS- 66000. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	R.F.	FELLOWS	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT 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 TO BE 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 WILL INCLUDE STUDIES OF THE UPPER ATMOSPHERE, IONOSPHERE, AND THE INTERACTIONS OF THE SOLAR WIND WITH THE VENUSIAN ATMOSPHERE. REMOTE SENSING TECHNIQUES WILL 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 WILL BE OF COMMON ORIGIN.

------- PIONEER VENUS ORBITER, BRACE ----------

EXPERIMENT NAME- LANGMUIR PROBE

NSSDC ID- PIO78OR-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	L.H.	BRACE	NASA-GSFC GREENBELT, MD
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	A.	PEDERSON	ESRO-ESTEC NOORDWIJK, NETHERLANDS
OI -	A.F.	NAGY	U OF MICHIGAN ANN ARBOR, MI
OI -	T.M.	DONAHUE	U OF MICHIGAN ANN ARBOR, MI

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST 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 WILL BE USED BOTH TO STUDY THE UPPER ATMOSPHERE AND IONOSPHERE AND TO INVESTIGATE THE INTERACTION OF THE SOLAR WIND WITH THE VENUSIAN IONOSPHERE. THIS EXPERIMENT WILL PROVIDE 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 ----------

EXPERIMENT NAME- RADAR ALTIMETER

NSSDC ID- PIO78OR-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- GEODESY AND CARTOGRAPHY PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

TL -	W.E.	BROWN	NASA-JPL PASADENA, CA
TM -	G.	PETTENGILL	MASS INST OF TECH CAMBRIDGE, MA
TM -	W.M.	KAULA	U OF CALIF, LA LOS ANGELES, CA
TM -	D.H.	STAELIN	MASS INST OF TECH CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL USE A RADAR ALTIMETER TO OBTAIN INFORMATION ON ORBITER ALTITUDE, PLANETARY SURFACE TEMPERATURE, AND RADAR SCATTERING PROPERTIES TO INFER SURFACE TOPOGRAPHY, GEOLOGY, INTERIOR THERMAL, AND MECHANICAL PROPERTIES.

------- PIONEER VENUS ORBITER, CROFT ----------

EXPERIMENT NAME- RADIO SCIENCE TEAM

NSSDC ID- PIO78OR-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- GEODESY AND CARTOGRAPHY IONOSPH. + RADIO PHYSIC
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

TL -	T.A.	CROFT	STANFORD U STANFORD, CA
TM -	G.M.	KEATING	U OF ARIZONA TUCSON, AZ
TM -	A.J.	KLIORE	NASA-JPL PASADENA, CA
TM -	R.	PHILLIPS	NASA-JPL PASADENA, CA
TM -	I.I.	SHAPIRO	MASS INST OF TECH CAMBRIDGE, MA
TM -	R.	WOO	NASA-JPL PASADENA, CA

EXPERIMENT 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 -------------------------

EXPERIMENT NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- PI0780R-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- AERONOMY IONOSPHERES
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.M. DONAHUE .....U OF MICHIGAN
ANN ARBOR, MI

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL COMBINE RESULTS OBTAINED FROM THE ORBITER MISSION WITH RESULTS FROM THE MULTIPROBE MISSION TO OBTAIN A UNIFIED PICTURE OF THE ATMOSPHERIC AND IONOSPHERIC CHEMISTRY AND TRANSPORT PROCESSES OCCURRING IN THE ATMOSPHERE OF VENUS.

------- PIONEER VENUS ORBITER, EVANS -------------------------

EXPERIMENT NAME- TRANSIENT GAMMA-RAY SOURCES

NSSDC ID- PI0780R-05

LAST REPORTED STATE- APPROVED CONDITIONALLY

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- GAMMA-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.D. EVANS .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - J.P. CONNER .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - P.H. HIGBIE .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - R.W. KLEBESADEL .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - R.A. OLSON .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - I.B. STRONG .....LOS ALAMOS SCI LAB
LOS ALAMOS, NM
OI - R.E. SPALDING .....SANDIA LABORATORIES
SANDIA, NM

EXPERIMENT BRIEF DESCRIPTION
AN OMNIDIRECTIONAL GAMMA-RAY DETECTOR EMPLOYING TWO PHOSWICH SCINTILLATION SPECTROMETERS SENSITIVE TO PROTONS FROM 0.2 - 2.0 MEV WILL BE USED WITH LOGIC CIRCUITRY TO DETECT THE BEGINNING OF A GAMMA EVENT AND TO INITIATE A PERIOD OF RAPID DATA COLLECTION. DATA WILL BE STORED IN A MEMORY UNIT FOR SUBSEQUENT TRANSMISSION TO EARTH. CONFIRMATION THAT A TRUE GAMMA EVENT HAS OCCURRED WILL BE OBTAINED BY COMPARISON WITH RESULTS FROM OTHER EXPERIMENTS IN EARTH SATELLITES. THIS EXPERIMENT WILL PROVIDE THE LONG BASELINE TIME CORRELATIONS NECESSARY FOR CALCULATING ACCURATE SOURCE LOCATIONS.

------- PIONEER VENUS ORBITER, HANSEN -------------------------

EXPERIMENT NAME- CLOUD PHOTOPOLARIMETER

NSSDC ID- PI0780R-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.W. HANSEN .....U OF ARIZONA
TUCSON, AZ
OI - P. STONE .....NASA-GISS
NEW YORK, NY
OI - A.A. LACIS .....COMPUTER SCIENCES CORP
NEW YORK, NY
OI - D.L. COFFEEN .....U OF ARIZONA
TUCSON, AZ
OI - L. TRAVIS .....COMPUTER SCIENCES CORP
NEW YORK, NY

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL USE A SIMPLIFIED VERSION OF THE IMAGING PHOTOPOLARIMETER FLOWN ON PIONEERS 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 -------------------------

EXPERIMENT NAME- RETARDING POTENTIAL ANALYZER

NSSDC ID- PI0780R-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.C. KNUDSEN .....LOCKHEED PALO ALTO
PALO ALTO, CA
OI - K. SPENNER .....WGSPR
FREIBURG, FED REP OF GERMANY
OI - R.C. WHITTEN .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT 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 -------------------------

EXPERIMENT NAME- PARTICIPATING THEORIST MASURSKY

NSSDC ID- PI0780R-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- GEODESY AND CARTOGRAPHY PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. MASURSKY .....US GEOLOGICAL SURVEY
FLAGSTAFF, AZ

EXPERIMENT BRIEF DESCRIPTION
SURFACE PROFILE, ROUGHNESS, AND ELECTRICAL PROPERTIES DATA FROM THE PIONEER VENUS RADAR ALTIMETER WILL BE 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 WILL INCLUDE GEOMETRIC ARRAYS OF RADAR PROFILES AND TOPOGRAPHIC CONTOUR DATA. THESE WILL THEN BE UTILIZED TO PRODUCE A SHADED RELIEF CARTOGRAPHIC MAP, 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 -------------------------

EXPERIMENT NAME- PARTICIPATING THEORIST MCGILL

NSSDC ID- PI0780R-09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.E. MCGILL .....U OF MASSACHUSETTS
AMHERST, MA

EXPERIMENT BRIEF DESCRIPTION
INVESTIGATIONS OF THE TOPOGRAPHY AND GEOLOGY OF VENUS WILL BE 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 -------------------------

EXPERIMENT NAME- PARTICIPATING THEORIST NAGY

NSSDC ID- PI0780R-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- AERONOMY IONOSPHERES
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - A.F. NAGY .....U OF MICHIGAN
ANN ARBOR, MI

EXPERIMENT BRIEF DESCRIPTION

INVESTIGATIONS OF THE IONOSPHERE OF VENUS WILL BE 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 ----------

EXPERIMENT NAME- NEUTRAL PARTICLE, MASS SPECTROMETER

NSSDC ID- PIO780R-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- AERONOMY PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.B. NIEMANN .....NASA-GSFC
GREENBELT, MD
OI - G.R. CARIGNAN .....U OF MICHIGAN
ANN ARBOR, MI
OI - R.E. HARTLE .....NASA-GSFC
GREENBELT, MD
OI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION

THE EXPERIMENT WILL USE 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 WILL BE USED TO REDUCE THE BIT RATE REQUIRED FOR A GIVEN INFORMATION RETURN RATE. THE RESOLUTION WILL BE 1E-4 FOR ADJACENT MASSES, AND THE MASS RANGE 1 TO 45 AMU. VERTICAL AND HORIZONTAL DENSITY VARIATIONS OF THE MAJOR NEUTRAL CONSTITUENTS OF THE UPPER ATMOSPHERE OF VENUS WILL BE 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, H, AND NO.

------- PIONEER VENUS ORBITER, RUSSELL ----------

EXPERIMENT NAME- TRIAXIAL FLUXGATE MAGNETOMETER

NSSDC ID- PIO780R-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.T. RUSSELL .....U OF CALIF, LA
LOS ANGELES, CA
OI - P.J. COLEMAN, JR. .....U OF CALIF, LA
LOS ANGELES, CA
OI - F.V. CORONITI .....U OF CALIF, LA
LOS ANGELES, CA
OI - C.F. KENNEL .....U OF CALIF, LA
LOS ANGELES, CA
OI - R.L. MCPHERRON .....U OF CALIF, LA
LOS ANGELES, CA
OI - G.L. SISCOE .....U OF CALIF, LA
LOS ANGELES, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL USE 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 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 SEC. WHILE IN VENETIAN 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 VENETIAN IONOSPHERE IN THE PERIAPSIS MODE, THE SAMPLE RATE WILL BE FOUR VECTORS PER SEC.

------- PIONEER VENUS ORBITER, SCARF ----------

EXPERIMENT NAME- ELECTRIC FIELD DETECTOR

NSSDC ID- PIO780R-13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - F.L. SCARF .....TRW SYSTEMS GROUP
REDONDO BEACH, CA
OI - I.M. GREEN .....TRW SYSTEMS GROUP
REDONDO BEACH, CA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL CONSIST 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 WILL ALSO BE STUDIED. A SELF-CONTAINED BALANCED V-TYPE ANTENNA WILL BE USED WITH A DIFFERENTIAL PREAMPLIFIER TO MAKE THE MEASUREMENTS. AT THE 512-BIT-PER-SEC SATELLITE MODE, ONE FREQUENCY SCAN PER SECOND WILL BE MEASURED.

------- PIONEER VENUS ORBITER, SCHUBERT ----------

EXPERIMENT NAME- PARTICIPATING THEORIST SCHUBERT

NSSDC ID- PIO780R-14

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES MAGNETOSPHERIC PHYSICS
PLANETARY ATMOSPHERES PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G. SCHUBERT .....U OF CALIF, LA
LOS ANGELES, CA

EXPERIMENT BRIEF DESCRIPTION

MEASUREMENTS OF PLASMA TEMPERATURES, MAGNETIC FIELDS, COMPOSITION, AND OTHER DATA WILL BE 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) WILL BE 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 ----------

EXPERIMENT NAME- PROGRAMMABLE ULTRAVIOLET SPECTROMETER

NSSDC ID- PIO780R-15

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - A.I. STEWART .....U OF COLORADO
BOULDER, CO
OI - C.A. BARTH .....U OF COLORADO
BOULDER, CO
OI - C.W. HORD .....U OF COLORADO
BOULDER, CO
OI - G.E. THOMAS .....U OF COLORADO
BOULDER, CO
OI - J.G. ANDERSON .....U OF COLORADO
BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION

THIS INVESTIGATION WILL USE 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 WILL BE DETECTED IN THE THERMOSPHERE, MESOSPHERE, AND EXOSPHERE OF VENUS. THESE MEASUREMENTS WILL BE 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 ----------

EXPERIMENT NAME- RADIOMETRIC TEMPERATURE SOUNDING
EXPERIMENT

NSSDC ID- PIO78OR-16

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	F.W.	TAYLOR	NASA-JPL PASADENA, CA
OI -	H.H.	AUMANN	NASA-JPL PASADENA, CA
OI -	M.T.	CHAHINE	NASA-JPL PASADENA, CA
OI -	C.B.	FARMER	NASA-JPL PASADENA, CA
OI -	J.V.	MARTONCHIK	NASA-JPL PASADENA, CA
OI -	A.P.	INGERSOLL	CALIF INST OF TECH PASADENA, CA
OI -	J.T.	HOUGHTON	OXFORD U OXFORD, ENGLAND
OI -	G.D.	PESKETT	OXFORD U OXFORD, ENGLAND
OI -	C.D.	RODGERS	OXFORD U OXFORD, ENGLAND
OI -	E.J.	WILLIAMSON	OXFORD U OXFORD, ENGLAND
OI -	R.	DICKINSON	NATL CTR FOR ATMOS RES BOULDER, CO
OI -	J.C.	GILLE	NATL CTR FOR ATMOS RES BOULDER, CO

EXPERIMENT BRIEF DESCRIPTION
THIS INVESTIGATION WILL USE AN EIGHT-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. ----------

EXPERIMENT NAME- ION MASS SPECTROMETER

NSSDC ID- PIO78OR-17

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.A.	TAYLOR, JR.	NASA-GSFC GREENBELT, MD
OI -	S.J.	BAUER	NASA-GSFC GREENBELT, MD
OI -	R.E.	HARTLE	NASA-GSFC GREENBELT, MD
OI -	H.C.	BRINTON	NASA-GSFC GREENBELT, MD
OI -	J.R.	HERMAN	NASA-GSFC GREENBELT, MD
OI -	T.M.	DONAHUE	U OF MICHIGAN ANN ARBOR, MI
OI -	P.A.	CLOUTIER	RICE U HOUSTON, TX
OI -	F.C.	MICHEL	RICE U HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THE COMPOSITION AND CONCENTRATION OF THERMAL POSITIVE IONS IN THE IONOSPHERE OF VENUS WILL BE DETERMINED AND INTERPRETED IN TERMS OF VERTICAL AND HORIZONTAL COMPONENTS. THE INSTRUMENT USED WILL BE A BENNETT RADIO-FREQUENCY MASS SPECTROMETER BASED ON THE DESIGN OF ONES FLOWN ON OGO AND ATMOSPHERIC EXPLORER SATELLITES. A MASS RANGE OF 1 TO 60 AMU WILL BE COVERED WITH A VARIETY OF AUTOMATIC SCAN-SEARCH MODES AVAILABLE.

------- PIONEER VENUS ORBITER, WOLFE ----------

EXPERIMENT NAME- SOLAR WIND PLASMA DETECTOR

NSSDC ID- PIO78OR-18

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- MAGNETOSPHERIC PHYSICS PARTICLES AND FIELDS
PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	WOLFE	NASA-ARC MOFFETT FIELD, CA
OI -	A.	BARNES	NASA-ARC MOFFETT FIELD, CA
OI -	H.R.	COLLARD	NASA-ARC MOFFETT FIELD, CA
OI -	D.D.	MCKIBBIN	NASA-ARC MOFFETT FIELD, CA
OI -	J.D.	MIHALOV	NASA-ARC MOFFETT FIELD, CA
OI -	R.C.	WHITTEN	NASA-ARC MOFFETT FIELD, CA
OI -	D.S.	INTRILIGATOR	U OF SOUTHERN CALIF LOS ANGELES, CA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENT PROPOSED 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), 32 STEPS AND 1-500 (ELECTRONS), 16 STEPS. THE ANGULAR RANGE TO BE 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 WILL BE ESSENTIALLY THAT USED ON PIONEERS 8 AND 9. THE OBJECTIVES ARE TO MEASURE SOLAR WIND CONDITIONS OUTSIDE THE VENUS BOW SHOCK, INSIDE THE MAGNETOSHEATH FLOW FIELD, AND ATTEMPT STUDIES IN THE IONOPAUSE STRUCTURE. SOLAR WIND MEASUREMENTS WILL ALSO BE MADE DURING THE TRANSIT TO VENUS. PARTICULARLY TO STUDY MACROSCALE PROBLEMS AND TO DETERMINE AVERAGE GRADIENTS. THE NEAR-PLANET WAKE REGION WILL BE STUDIED.

********** PIONEER VENUS PROBE BUS **********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE BUS
ALTERNATE NAMES- PIONEER VENUS 1978
NSSDC ID- PIO78PA

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 05/00/78 SPACECRAFT WEIGHT- 380. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	R.F.	FELLOWS	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT IS THE BUS PORTION OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WILL BE CARRIED BY THIS BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES WILL ENTER ON THE NIGHTSIDE AND ONE SMALL PROBE AND ONE LARGE PROBE WILL ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT WILL BE SPIN STABILIZED, AND THE TRIP TO VENUS WILL TAKE 125 DAYS. THE FOUR PROBES WILL SEPARATE FROM THE BUS ABOUT 10 TO 20 DAYS BEFORE ENTRY. THE LARGE PROBE WILL TAKE 1-1/2 HOURS TO DESCEND THROUGH THE ATMOSPHERE, WHILE THE THREE SMALLER PROBES WILL REACH THE SURFACE OF THE PLANET 75 MINUTES AFTER ENTRY. THE BUS PORTION OF THE SPACECRAFT WILL BE 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 WILL 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 WILL PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

------- PIONEER VENUS PROBE BUS, BAUER ----------

EXPERIMENT NAME- PARTICIPATING THEORIST BAUER

NSSDC ID- PIO78PA-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
INTERPLANETARY PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	S.J.	BAUER	NASA-GSFC GREENBELT, MD

EXPERIMENT 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 WHICH INCLUDES ANALYSIS AND INTERPRETATION OF THE IN-SITU 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, DONAHUE ----------

EXPERIMENT NAME- PARTICIPATING THEORIST DONAHUE

NSSDC ID- PIO78PA-09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.M. DONAHUE .....U OF MICHIGAN
ANN ARBOR, MI

EXPERIMENT 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 WHICH 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 ----------

EXPERIMENT NAME- PARTICIPATING THEORIST GOODY

NSSDC ID- PIO78PA-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.M. GOODY .....HARVARD U
CAMBRIDGE, MA

EXPERIMENT 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 WHICH INCLUDES THE THEORY OF THE CIRCULATION OF THE LOWER ATMOSPHERE AND THE RECOMBINATION OF THE PRODUCTS OF PHOTOLYSIS.

------- PIONEER VENUS PROBE BUS, HUNTEN ----------

EXPERIMENT NAME- PARTICIPATING THEORIST HUNTEN

NSSDC ID- PIO78PA-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - D.M. HUNTEN .....KITT PEAK NATL OBS
TUCSON, AZ

EXPERIMENT 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 WHICH 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 ----------

EXPERIMENT NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- PIO78PA-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES METEROLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. PETTENGILL .....MASS INST OF TECH
CAMBRIDGE, MA
OI - I.I. SHAPIRO .....MASS INST OF TECH
CAMBRIDGE, MA
OI - R. PRINN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - J. CHARNEY .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL INVOLVE 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 WILL BE USED IN MODELLING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WILL BE 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, PETTENGILL ----------

EXPERIMENT NAME- RADIO SCIENCE TEAM

NSSDC ID- PIO78PA-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
TL - G. PETTENGILL .....MASS INST OF TECH
CAMBRIDGE, MA
TM - T.A. CROFT .....STANFORD U
STANFORD, CA
TM - A.J. KLIORE .....NASA-JPL
PASADENA, CA
TM - R. WOO .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THE RADIO SCIENCE TEAM SHALL HAVE 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 WILL BE 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 WILL BE 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 ----------

EXPERIMENT NAME- PARTICIPATING THEORIST POLLACK

NSSDC ID- PIO78PA-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
GEODESY AND CARTOGRAPHY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J.B. POLLACK .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT 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 WHICH 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 ----------

EXPERIMENT NAME- PARTICIPATING THEORIST SPENCER

NSSDC ID- PIO78PA-13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 WHICH 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 WHICH TAKE PLACE.

------- PIONEER VENUS PROBE BUS, TAYLOR, JR. ----------

EXPERIMENT NAME- ION MASS SPECTROMETER

NSSDC ID- PI078PA-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES IONOSPHERES
AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.A.	TAYLOR, JR.	NASA-GSFC GREENBELT, MD
OI -	S.J.	BAUER	NASA-GSFC GREENBELT, MD
OI -	T.M.	DONAHUE	U OF MICHIGAN ANN ARBOR, MI
OI -	P.A.	CLOUTIER	RICE U HOUSTON, TX
OI -	R.E.	HARTLE	NASA-GSFC GREENBELT, MD
OI -	H.C.	BRINTON	NASA-GSFC GREENBELT, MD
OI -	F.C.	MICHEL	RICE U HOUSTON, TX

EXPERIMENT BRIEF DESCRIPTION
THIS ION MASS SPECTROMETER EXPERIMENT WILL OBTAIN MEASUREMENTS WHICH WILL 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, WILL MEASURE VENUS' UPPER ATMOSPHERE ION CONCENTRATIONS IN THE MASS RANGE FROM 1 TO 60 ATOMIC MASS UNITS (AMU) FROM THE TIME OF CROSSING VENUS' BOWSHOCK TO BUS BURNUP.

------- PIONEER VENUS PROBE BUS, VON ZAHN ----------

EXPERIMENT NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- PI078PA-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	U.	VON ZAHN	U OF BONN BONN, FED REP OF GERMANY
OI -	A.O.C.NIER		U OF MINNESOTA MINNEAPOLIS, MN
OI -	D.M.	HUNTEN	KITT PEAK NATL OBS TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THIS NEUTRAL PARTICLE MASS SPECTROMETER EXPERIMENT WILL OBTAIN MEASUREMENTS WHICH WILL 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

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 05/00/78 SPACECRAFT WEIGHT- 300. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	R.F.	FELLOWS	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT IS THE LARGE PROBE PORTION OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WILL BE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES WILL ENTER ON THE NIGHTSIDE AND A SMALL PROBE AND THIS LARGE PROBE WILL ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS WILL ENTER THE ATMOSPHERE AND OBTAIN ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS WILL 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 TWO WEEKS BEFORE THE PROBES ARE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER WILL PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

------- PIONEER VENUS PROBE LRG, BOESE ----------

EXPERIMENT NAME- INFRARED RADIOMETER

NSSDC ID- PI078PB-05

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.W.	BOESE	NASA-ARC MOFFETT FIELD, CA
OI -	J.B.	POLLACK	NASA-ARC MOFFETT FIELD, CA
OI -	J.H.	MILLER	NASA-ARC MOFFETT FIELD, CA
OI -	L.P.	GIVER	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT 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 WILL USE A 4-CHANNEL INFRARED RADIOMETER LOOKING DOWN FROM THE PROBE. TWO INTERNAL BLACKBODIES WILL BE USED TO ALLOW ABSOLUTE MEASUREMENTS OF THE FLUX IN EACH CHANNEL. THE INSTRUMENT WILL WEIGH ABOUT 2 KG AND WILL USE ABOUT 3 W OF POWER.

------- PIONEER VENUS PROBE LRG, HOFFMAN ----------

EXPERIMENT NAME- NEUTRAL PARTICLE MASS SPECTROMETER

NSSDC ID- PI078PB-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	J.H.	HOFFMAN	U OF TEXAS, DALLAS DALLAS, TX
OI -	R.	HODGES	U OF TEXAS, DALLAS DALLAS, TX
OI -	M.	KOLPIN	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	T.M.	DONAHUE	U OF MICHIGAN ANN ARBOR, MI

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION IS TO MEASURE THE COMPOSITION OF THE LOWER ATMOSPHERE OF VENUS. THIS INVESTIGATION WILL USE A CERAMIC MICRO LEAK GAS INLET AND A DOUBLE FOCUSSING MAGNETIC DEFLECTION MASS SPECTROMETER. ABOUT 50 ANALYSES OF THE VENUSIAN ATMOSPHERE WILL BE MADE DURING THE PROBE DESCENT. A SEPARATE SAMPLE OF THE ATMOSPHERE WILL BE ANALYZED FOR RARE GASSES. THE ANALYZER WILL HAVE A MASS RANGE OF 1 - 212 AMU AND A DYNAMIC RANGE OF 1E7. THE INSTRUMENT IS BASED ON A DESIGN FLOWN ON THE APOLLO 15 AND 16 COMMAND MODULE. THE WEIGHT WILL BE ABOUT 9 KG AND POWER CONSUMPTION WILL BE ABOUT 12 W.

------- PIONEER VENUS PROBE LRG, KNOLLENBERG ----------

EXPERIMENT NAME- CLOUD PARTICLE SIZE SPECTROMETER

NSSDC ID- PI078PB-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS

DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R. KNOLLENBERG .....U OF CHICAGO
CHICAGO, IL
OI - D.M. HUNTEN .....KITT PEAK NATL OBS
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO MEASURE VENUS' CLOUD PARTICLE SIZES AND CONCENTRATIONS. A LASER WILL BE USED TO ILLUMINATE CLOUD PARTICLES. OPTICAL LENSES WILL IMAGE THE PARTICLE SHADOWS ON ARRAYS OF DETECTORS. THE PARTICLE SHADOWS WILL BE USED TO DETERMINE PARTICLE SIZE AND CONCENTRATION. THE FLIGHT SENSOR WILL BE SIMILAR TO THOSE FLOWN IN AIRCRAFT AND BALLOONS.

------- PIONEER VENUS PROBE LRG, OYAMA -----------------------

EXPERIMENT NAME- GAS CHROMATOGRAPH

NSSDC ID- PI078PB-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - V.I. OYAMA .....NASA-ARC
MOFFETT FIELD, CA
OI - J.B. POLLACK .....NASA-ARC
MOFFETT FIELD, CA
OI - G. CARLE .....NASA-ARC
MOFFETT FIELD, CA
OI - F. WOELLER .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS EXPERIMENT WILL BE TO DETERMINE THE COMPOSITION OF VENUS' LOWER ATMOSPHERE. FROM THESE MEASUREMENTS, DEDUCTIONS WILL BE 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 WILL BE USED TO ANALYZE SAMPLES OF THE ATMOSPHERE DURING PROBE DESCENT. THREE OR FOUR SAMPLES WILL BE ANALYZED.

------- PIONEER VENUS PROBE LRG, PETTENGILL -----------------------

EXPERIMENT NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- PI078PB-09

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES METEROLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
TL - G. PETTENGILL .....MASS INST OF TECH
CAMBRIDGE, MA
TM - J. CHARNEY .....MASS INST OF TECH
CAMBRIDGE, MA
TM - I.I. SHAPIRO .....MASS INST OF TECH
CAMBRIDGE, MA
TM - R. PRINN .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL INVOLVE 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 WILL BE USED IN MODELLING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WILL BE 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, RAGENT -----------------------

EXPERIMENT NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- PI078PB-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - B. RAGENT .....NASA-ARC
MOFFETT FIELD, CA
OP - J.E. BLAMONT .....U OF PARIS
PARIS, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT WILL USE A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE THE CLOUDS. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL WILL INDICATE THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORIES. COMPARISONS WITH THE MEASUREMENTS FROM THE SMALL PROBES WILL INDICATE THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER WILL OPERATE AT ABOUT 9000 A. THE EXPERIMENT WILL WEIGH ABOUT 0.5 KG AND USE ABOUT 1.3 W OF POWER.

------- PIONEER VENUS PROBE LRG, SEIFF -----------------------

EXPERIMENT NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PB-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A. SEIFF .....NASA-ARC
MOFFETT FIELD, CA
OI - S. SOMMER .....NASA-ARC
MOFFETT FIELD, CA
OI - R. BLANCHARD .....NASA-LARC
HAMPTON, VA
OI - D.B. KIRK .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENTS FOR THIS EXPERIMENT WILL INCLUDE A THREE-AXIS ACCELEROMETER, PRESSURE SENSORS, AND TEMPERATURE SENSORS. THEY WILL BE BASED ON THE TECHNOLOGY DEMONSTRATED BY THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WILL BE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR THE LARGE PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THEY WILL ALSO BE 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 WILL BE DETERMINED. THE INSTRUMENTS WILL WEIGH ABOUT 2.5 KG AND WILL CONSUME ABOUT 4.7 W OF POWER.

------- PIONEER VENUS PROBE LRG, TOMASKO -----------------------

EXPERIMENT NAME- SOLAR ENERGY PENETRATION INTO THE
ATMOSPHERE

NSSDC ID- PI078PB-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - M.G. TOMASKO .....U OF ARIZONA
TUCSON, AZ
OI - W. WOLFE .....U OF ARIZONA
TUCSON, AZ
OI - A. CLEMENTS .....U OF ARIZONA
TUCSON, AZ

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVE OF THIS INVESTIGATION WILL BE TO DETERMINE THE REGIONS IN VENUS' ATMOSPHERE WHERE SOLAR ENERGY IS DEPOSITED. SIX NARROW-FIELD-OF-VIEW DETECTORS WILL BE 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 SMI **********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SMI
ALTERNATE NAMES- PIONEER VENUS 1978
NSSDC ID- PI078PC

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 05/00/78 SPACECRAFT WEIGHT- 1.5 KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC
MOFFETT FIELD, CA
PS - L. COLIN .....NASA-ARC
MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS
WASHINGTON, DC
SC - R.F. FELLOWS .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT IS THE FIRST SMALL PROBE OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WILL BE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES WILL ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE WILL ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS WILL ENTER THE ATMOSPHERE AND OBTAIN ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS WILL 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 TWO WEEKS BEFORE THE PROBES ARE RELEASED. SIMULTANEOUS MEASUREMENTS BY THE PROBES AND ORBITER WILL PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

------- PIONEER VENUS PROBE SM1, PETTENGILL ----------

EXPERIMENT NAME- DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING

NSSDC ID- PIO78PC-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES METEROLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. PETTENGILL .....MASS INST OF TECH CAMBRIDGE, MA
OI - I.I. SHAPIRO .....MASS INST OF TECH CAMBRIDGE, MA
OI - R. PRINN .....MASS INST OF TECH CAMBRIDGE, MA
OI - J. CHARNEY .....MASS INST OF TECH CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL INVOLVE 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 WILL BE USED IN MODELLING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WILL BE 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 SM1, RAGENT ----------

EXPERIMENT NAME- CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION

NSSDC ID- PIO78PC-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - B. RAGENT .....NASA-ARC MOFFETT FIELD, CA
OP - J.E. BLAMONT .....U OF PARIS PARIS, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT WILL USE A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE CLOUD PARTICLES. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL WILL INDICATE THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY OF EACH PROBE. COMPARISONS OF THE SIGNALS FROM EACH PROBE WILL INDICATE THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER SIGNAL SOURCE AND DETECTOR WILL OPERATE AT ABOUT 9000 A. THE PACKAGE WILL WEIGH ABOUT 0.6 KG AND WILL USE ABOUT 1.3 W OF POWER.

------- PIONEER VENUS PROBE SM1, SEIFF ----------

EXPERIMENT NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PIO78PC-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A. SEIFF .....NASA-ARC MOFFETT FIELD, CA
OI - S. SOMMER .....NASA-ARC MOFFETT FIELD, CA
OI - D.B. KIRK .....NASA-ARC MOFFETT FIELD, CA
OI - R. BLANCHARD .....NASA-LARC HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENTS FOR THIS EXPERIMENT WILL INCLUDE A SINGLE-AXIS ACCELEROMETER, A PRESSURE SENSOR, AND A TEMPERATURE SENSOR. THEY WILL BE BASED ON THE TECHNOLOGY DEMONSTRATED ON THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WILL BE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR EACH PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THE MEASUREMENTS WILL ALSO BE USED TO DETERMINE VERTICAL WIND VELOCITIES, HORIZONTAL WIND VELOCITIES, AND TURBULENCE FOR EACH PROBE TRAJECTORY. CIRCULATION MODELS OF THE ATMOSPHERE WILL ALSO BE DRAWN FROM THESE RESULTS. THE INSTRUMENTS WILL WEIGH ABOUT 1 KG AND WILL USE ABOUT 4.8 OF W POWER.

------- PIONEER VENUS PROBE SM1, SUOMI ----------

EXPERIMENT NAME- INFRARED RADIOMETER

NSSDC ID- PIO78PC-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - V.E. SUOMI .....U OF WISCONSIN MADISON, WI
OI - J. LENOBLE .....U OF LILLE LILLE, FRANCE
OI - L.A. SROMOVSKY .....U OF WISCONSIN MADISON, WI
OI - A. FYMAT .....NASA-JPL PASADENA, CA
OI - G. DANIELSON .....NASA-JPL PASADENA, CA
OI - M. HERMAN .....U OF LILLE LILLE, FRANCE

EXPERIMENT 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 WILL USE 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 MICRON REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET WILL CARRY NET INFRARED FLUX SENSORS COVERING THE 1 TO 25 MICRON REGION. THE INSTRUMENT WILL WEIGH ABOUT 0.4 KG AND USE 2.2 W OF POWER.

********** PIONEER VENUS PROBE SM2 **********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM2
ALTERNATE NAMES- PIONEER VENUS 1978
NSSDC ID- PIO78PD

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 05/00/78 SPACECRAFT WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - C.F. HALL .....NASA-ARC MOFFETT FIELD, CA
PS - L. COLIN .....NASA-ARC MOFFETT FIELD, CA
MG - F.D. KOCHENDORFER .....NASA HEADQUARTERS WASHINGTON, DC
SC - R.F. FELLOWS .....NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT IS THE SECOND SMALL PROBE OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WILL BE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES WILL ENTER ON THE NIGHTSIDE, AND ONE SMALL PROBE AND ONE LARGE PROBE WILL ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS WILL ENTER THE ATMOSPHERE AND OBTAIN ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS WILL 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 WILL PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

-------- PIONEER VENUS PROBE SM2, PETTENGILL --------

EXPERIMENT NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- PI078PD-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES METEROLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	G.	PETTENGILL	MASS INST OF TECH CAMBRIDGE, MA
OI -	I.I.	SHAPIRO	MASS INST OF TECH CAMBRIDGE, MA
OI -	R.	PRINN	MASS INST OF TECH CAMBRIDGE, MA
OI -	J.	CHARNEY	MASS INST OF TECH CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL INVOLVE APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WILL BE USED IN MODELLING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WILL BE 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 -------

EXPERIMENT NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- PI078PD-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	B.	RAGENT	NASA-ARC MOFFETT FIELD, CA
OP -	J.E.	BLAMONT	U OF PARIS PARIS, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT WILL USE A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE CLOUD PARTICLES. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL WILL INDICATE THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY OF EACH PROBE. COMPARISONS OF THE SIGNALS FROM EACH PROBE WILL INDICATE THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER SIGNAL SOURCE AND DETECTOR WILL OPERATE AT ABOUT 9000 A. THE PACKAGE WILL WEIGH ABOUT 0.6 KG AND WILL USE ABOUT 1.2 W OF POWER.

------- PIONEER VENUS PROBE SM2, SEIFF -------

EXPERIMENT NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PD-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.	SEIFF	NASA-ARC MOFFETT FIELD, CA
OI -	S.	SOMMER	NASA-ARC MOFFETT FIELD, CA
OI -	D.B.	KIRK	NASA-ARC MOFFETT FIELD, CA
OI -	R.	BLANCHARD	NASA-LARC HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENTS FOR THIS EXPERIMENT WILL INCLUDE A SINGLE-AXIS ACCELEROMETER, A PRESSURE SENSOR, AND A TEMPERATURE SENSOR. THEY WILL BE BASED ON THE TECHNOLOGY DEMONSTRATED ON THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WILL BE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR EACH PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THE MEASUREMENTS WILL ALSO BE USED TO DETERMINE VERTICAL WIND VELOCITIES, HORIZONTAL WIND VELOCITIES, AND TURBULENCE FOR EACH PROBE TRAJECTORY. CIRCULATION MODELS OF THE ATMOSPHERE WILL ALSO BE DRAWN FROM THESE RESULTS. THE INSTRUMENTS WILL WEIGH ABOUT 1.2 KG AND WILL USE ABOUT 3.4 W POWER.

-------- PIONEER VENUS PROBE SM2, SUOMI --------

EXPERIMENT NAME- INFRARED RADIOMETER

NSSDC ID- PI078PD-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	V.E.	SUOMI	U OF WISCONSIN MADISON, WI
OI -	J.	LENOBLE	U OF LILLE LILLE, FRANCE
OI -	L.A.	SROMOVSKY	U OF WISCONSIN MADISON, WI
OI -	A.	FYMAT	NASA-JPL PASADENA, CA
OI -	G.	DANIELSON	NASA-JPL PASADENA, CA
OI -	M.	HERMAN	U OF LILLE LILLE, FRANCE

EXPERIMENT 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 WILL USE 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 MICRON REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET WILL CARRY NET INFRARED FLUX SENSORS COVERING THE 1 TO 25 MICRON REGION. THE INSTRUMENT WILL WEIGH ABOUT 0.4 KG AND USE 2.2 W OF POWER.

********** PIONEER VENUS PROBE SM3 **********

SPACECRAFT COMMON NAME- PIONEER VENUS PROBE SM3
ALTERNATE NAMES- PIONEER VENUS 1978
NSSDC ID- PI078PE

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 05/00/78 SPACECRAFT WEIGHT- 75. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- ATLAS-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	C.F.	HALL	NASA-ARC MOFFETT FIELD, CA
PS -	L.	COLIN	NASA-ARC MOFFETT FIELD, CA
MG -	F.D.	KOCHENDORFER	NASA HEADQUARTERS WASHINGTON, DC
SC -	R.F.	FELLOWS	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT IS THE THIRD SMALL PROBE OF THE PIONEER VENUS MULTIPROBE MISSION. ON THIS MISSION FOUR INSTRUMENTED ATMOSPHERIC ENTRY PROBES WILL BE CARRIED BY A SPACECRAFT BUS TO THE VICINITY OF VENUS AND RELEASED FOR DESCENT THROUGH THE ATMOSPHERE TO THE PLANETARY SURFACE. TWO SMALL PROBES WILL ENTER ON THE NIGHTSIDE AND ONE SMALL PROBE AND ONE LARGE PROBE WILL ENTER ON THE DAYSIDE OF THE PLANET. THE SPACECRAFT BUS WILL ENTER THE ATMOSPHERE AND ORTAIN ATMOSPHERIC COMPOSITION DATA UNTIL BURNUP. INVESTIGATIONS WILL 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 WILL PERMIT RELATING SPECIFIC LOCAL MEASUREMENTS TO THE GENERAL STATE OF THE PLANET AND ITS ENVIRONMENT AS OBSERVED FROM ORBIT.

------- PIONEER VENUS PROBE SM3, PETTENGILL -------

EXPERIMENT NAME- DIFFERENTIAL VERY-LONG-BASELINE
INTERFEROMETRIC TRACKING

NSSDC ID- PI078PE-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES METEROLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	G.	PETTENGILL	MASS INST OF TECH CAMBRIDGE, MA
OI -	I.I.	SHAPIRO	MASS INST OF TECH CAMBRIDGE, MA
OI -	R.	PRINN	MASS INST OF TECH CAMBRIDGE, MA

OI - J. CHARNEY .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL INVOLVE APPLYING DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRY TECHNIQUES TO THE RADIO SIGNALS FROM THE ENTRY PROBE AND BUS (ORBITING SPACECRAFT) TO INFER OR PLACE UPPER LIMITS ON WIND SPEEDS IN THE LOWER ATMOSPHERE. THESE RESULTS WILL BE USED IN MODELLING THE CIRCULATION PATTERNS OF VENUS' ATMOSPHERE. DATA TAKEN PRIOR TO PROBE ENTRY WILL BE 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 ----------

EXPERIMENT NAME- CLOUD EXTENT, STRUCTURE, AND
DISTRIBUTION

NSSDC ID- PI078PE-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY
METEROLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - B. RAGENT .....NASA-ARC
MOFFETT FIELD, CA
OP - J.E. BLAMONT .....U OF PARIS
PARIS, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL CONSIST OF A NEPHELOMETER TO MEASURE THE ENERGY BACKSCATTERED FROM CLOUD PARTICLES. IT WILL USE A PULSED GALLIUM ARSENIDE LASER DIODE TO ILLUMINATE CLOUD PARTICLES. THE ALTITUDE HISTORY OF THE BACKSCATTERED SIGNAL WILL INDICATE THE PRESENCE AND VERTICAL EXTENT OF CLOUDS ALONG THE TRAJECTORY OF EACH PROBE. COMPARISONS OF THE SIGNALS FROM EACH PROBE WILL INDICATE THE SPATIAL VARIABILITY OF THE CLOUD STRUCTURE. THE LASER SIGNAL SOURCE AND DETECTOR WILL OPERATE AT ABOUT 9000 A. THE PACKAGE WILL WEIGH ABOUT 0.6 KG AND WILL USE ABOUT 1.3 W OF POWER.

------- PIONEER VENUS PROBE SM3, SEIFF ----------

EXPERIMENT NAME- ATMOSPHERE STRUCTURE

NSSDC ID- PI078PE-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A. SEIFF .....NASA-ARC
MOFFETT FIELD, CA
OI - S. SOMMER .....NASA-ARC
MOFFETT FIELD, CA
OI - R. BLANCHARD .....NASA-LARC
HAMPTON, VA
OI - D.B. KIRK .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE INSTRUMENTS FOR THIS EXPERIMENT WILL INCLUDE A SINGLE-AXIS ACCELEROMETER, A PRESSURE SENSOR, AND A TEMPERATURE SENSOR. THEY WILL BE BASED ON THE TECHNOLOGY DEMONSTRATED ON THE PAET VEHICLE (PLANETARY ATMOSPHERE EXPERIMENT TEST R7106-2001). THE MEASUREMENTS WILL BE USED TO CONSTRUCT A PROFILE OF ATMOSPHERE STATE PROPERTIES FOR EACH PROBE TRAJECTORY FROM THE SURFACE TO APPROXIMATELY 140 KM ALTITUDE. THE MEASUREMENTS WILL ALSO BE USED TO DETERMINE VERTICAL WIND VELOCITIES, HORIZONTAL WIND VELOCITIES, AND TURBULENCE FOR EACH PROBE TRAJECTORY. CIRCULATION MODELS OF THE ATMOSPHERE WILL ALSO BE DRAWN FROM THESE RESULTS. THE INSTRUMENTS WILL WEIGH ABOUT 1.2 KG AND WILL USE ABOUT 3.4 W OF POWER.

------- PIONEER VENUS PROBE SM3, SUOMI ----------

EXPERIMENT NAME- INFRARED RADIOMETER

NSSDC ID- PI078PE-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES AERONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - V.E. SUOMI .....U OF WISCONSIN
MADISON, WI
OI - J. LENOBLE .....U OF LILLE
LILLE, FRANCE
OI - A. FYMAT .....NASA-JPL
PASADENA, CA
OI - L.A. SROMOVSKY .....U OF WISCONSIN
MADISON, WI
OI - G. DANIELSON .....NASA-JPL
PASADENA, CA
OI - M. HERMAN .....U OF LILLE
LILLE, FRANCE

EXPERIMENT 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 WILL USE 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 MICRON REGION. THE TWO PROBES TARGETED TO THE NIGHTSIDE OF THE PLANET WILL CARRY NET INFRARED FLUX SENSORS COVERING THE 1 TO 25 MICRON REGION. THE INSTRUMENT WILL WEIGH ABOUT 0.4 KG AND USE 2.2 W OF POWER.

********** RAE-B **********

SPACECRAFT COMMON NAME- RAE-B
ALTERNATE NAMES- RADIO ASTRONOMY EXPLORER, PL-6938
EXPLORER 49, 06686
6686
NSSDC ID- 73-039A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/10/73.

LAUNCH DATE- 06/10/73 SPACECRAFT WEIGHT- 328. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- LT DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

INITIAL ORBIT PARAMETERS
ORBIT TYPE- SELENOCENTRIC EPOCH DATE- 06/21/73
ORBIT PERIOD- 221.17 MIN INCLINATION- 38.721 DEG
PERIAPSIS- 1052.98 KM ALT APOAPSIS- 1063.84 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- SELENOCENTRIC EPOCH DATE- 08/14/74
ORBIT PERIOD- 221.98 MIN INCLINATION- 55.340 DEG
PERIAPSIS- 1052.66 KM ALT APOAPSIS- 1077.82 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.T. SHEA .....NASA-GSFC
GREENBELT, MD
PS - R.G. STONE .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE RAE-B SPACECRAFT MEASURED WITH DIRECTIVITY THE INTENSITY OF CELESTIAL RADIO SOURCES AS A FUNCTION OF TIME, DIRECTION, AND FREQUENCY (0.03 TO 13 MHZ). THREE RAPID-BURST RECEIVERS, TWO RYLE-VONBERG RECEIVERS, AND AN IMPEDANCE PROBE CONNECTED TO TWO 229-M LONG 'V' ANTENNAS AND A 37-M LONG DIPOLE ANTENNA WERE USED. THE SPACECRAFT WAS IN A LUNAR ORBIT ENABLING LUNAR OCCULTATIONS TO BE USED TO DETERMINE CELESTIAL SOURCE POSITIONS FROM A LOCATION FAR REMOVED FROM THE TERRESTRIAL NOISE BACKGROUND.

------- RAE-B, STONE ----------

EXPERIMENT NAME- STEP FREQUENCY RADIOMETERS

NSSDC ID- 73-039A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/10/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.G. STONE .....NASA-GSFC
GREENBELT, MD
OI - R.R. WEBER .....NASA-GSFC
GREENBELT, MD
OI - L. BROWN .....NASA-GSFC
GREENBELT, MD
OI - J.F. CLARK .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
TWO RYLE-VONBERG RADIOMETERS WERE EACH CONNECTED TO A 229-M, ACUTE ANGLE 'V' ANTENNA. EACH RADIOMETER WAS SUCCESSIVELY TUNED TO NINE DIFFERENT FREQUENCIES IN THE BAND 0.45 TO 9.18 MHZ. PRECISE, AUTOMATIC, AND CONTINUOUS CALIBRATION WAS INHERENT IN THIS TYPE OF DESIGN.

------- RAE-B, STONE ----------

EXPERIMENT NAME- CAPACITANCE PROBE

NSSDC ID- 73-039A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 06/10/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. + RADIO PHYSIC

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R.G. STONE .....NASA-GSFC
GREENBELT, MD
OI - J.L. DONLEY .....NASA-GSFC
GREENBELT, MD
OI - J.E. GUTHRIE .....NASA-GSFC
GREENBELT, MD
OI - J.A. KANE .....NASA-GSFC
GREENBELT, MD
OI - R.C. SOMERLOCK .....NASA-GSFC
GREENBELT, MD

EXPERIMENT BRIEF DESCRIPTION
THE ANTENNA AND SPACECRAFT FUNCTIONED AS TWO CAPACITOR PLATES WITH THE AMBIENT PLASMA ACTING AS THE DIELECTRIC. FREQUENCY SHIFTS IN TWO COUPLED OSCILLATORS CONNECTED TO THE ANTENNA INDICATED CHANGES IN ANTENNA CAPACITANCE CAUSED BY VARIATIONS IN THE AMBIENT ELECTRON DENSITY.

********** SAN MARCO 4 **********

SPACECRAFT COMMON NAME- SAN MARCO 4
ALTERNATE NAMES- SAN MARCO C-2, SAN MARCO C-2
7154, SM-C2
NSSDC ID- 74-009A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/18/74.

LAUNCH DATE- 02/18/74 SPACECRAFT WEIGHT- 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- 02/22/74
ORBIT PERIOD- 95.9 MIN INCLINATION- 2.92 DEG
PERIAPSIS- 231. KM ALT APOAPSIS- 910. KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 08/11/74
ORBIT PERIOD- 95.370 MIN INCLINATION- 2.900 DEG
PERIAPSIS- 241.49 KM ALT APOAPSIS- 831.51 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - A.J. CAPORALE .....NASA-GSFC
GREENBELT, MD
PS - G.P. NEWTON .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - E.R. SCHMERLING .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE ITALIAN-BUILT SAN MARCO C-2 SPACECRAFT WAS PART OF A COOPERATIVE SPACE EFFORT BETWEEN THE ITALIAN SPACE COMMISSION (CRS) 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 -------

EXPERIMENT NAME- NEUTRAL ATMOSPHERE COMPOSITION

NSSDC ID- 74-009A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G.P. NEWTON .....NASA-GSFC
GREENBELT, MD
OI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 -------

EXPERIMENT NAME- NEUTRAL ATMOSPHERE TEMPERATURE

NSSDC ID- 74-009A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 02/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ATMOSPHERIC PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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-701C
04797
NSSDC ID- 70-107A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 01/23/71.

LAUNCH DATE- 12/12/70 SPACECRAFT WEIGHT- 143. 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- 12/12/70
ORBIT PERIOD- 95.7 MIN INCLINATION- 3.04 DEG
PERIAPSIS- 531.000 KM ALT APOAPSIS- 572.000 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 09/06/73
ORBIT PERIOD- 95.072 MIN INCLINATION- 3.036 DEG
PERIAPSIS- 505.96 KM ALT APOAPSIS- 538.14 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - M.R. TOWNSEND .....NASA-GSFC
GREENBELT, MD
PS - C.E. FICHTEL .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
EXPLORER 42 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 EXPLORER 42 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 DIAM 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. NORMAL OPERATION OF THE SPACECRAFT STARTED ON DECEMBER 18, 1970. 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. AFTER DECEMBER 27, 1970, THE SUN SENSOR WAS NOT EFFECTIVE BECAUSE THE SPIN AXIS OF THE SPACECRAFT WAS MAINTAINED WITHIN 30 DEG OF THE SUN DUE TO HEAT PROBLEMS. THIS RESTRICTION RESULTED IN A MODIFICATION OF THE ORIGINAL OBSERVING PROGRAM. THE TAPE RECORDER FAILED ON JANUARY 23, 1971. ONLY REAL-TIME DATA FROM BACKUP GROUND STATIONS WERE AVAILABLE AFTER JANUARY 23, 1971. THE STAR SENSOR FAILED IN NOVEMBER 1971. THE SPACECRAFT BATTERY FAILED IN EARLY APRIL 1973. SINCE THAT TIME THE SPACECRAFT HAS OPERATED ON SOLAR POWER ONLY AND HAS PRODUCED TWO TO THREE USABLE FRAMES OF DATA PER DAY.

------- SAS-A, GIACCONI -------

EXPERIMENT NAME- ALL-SKY X-RAY SURVEY

NSSDC ID- 70-107A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 04/00/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - R. GIACCONI .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - E.M. KELLOGG .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - H. GURSKY .....HARVARD COLLEGE OBS
CAMBRIDGE, MA
OI - H. TANANBAUM .....HARVARD COLLEGE OBS
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION

THE X-RAY INSTRUMENT ABOARD SAS-A (EXPLORER 42) CONSISTED OF TWO SIDES THAT WERE NEARLY IDENTICAL, 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 X 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 X 5 DEG FWHM. THIS SIDE 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 CARBON DIOXIDE FOR QUENCHING, AND 0.5 PERCENT HELIUM AT A PRESSURE OF 940 MM OF MERCURY. A SET OF 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 ONE DAY. AN ARRAY WAS CREATED OF X-RAY SUPERPOSITION (REPRESENTING THE 360-DEG CIRCLE SCANNED) BROKEN INTO 4320 ELEMENTS OF AZIMUTH OF FIVE MINUTES EACH FOR THE 0.5-DEG DETECTOR AND 1080 ELEMENTS OF AZIMUTH OF 20 MINUTES EACH FOR THE 5-DEG DETECTOR.

********** SAS-C **********

SPACECRAFT COMMON NAME- SAS-C
ALTERNATE NAMES- PL-743D
NSSDC ID- SAS-C

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 2 QTR 75 SPACECRAFT WEIGHT- 193. KG
LAUNCH SITE- SAN MARCO PLATFORM, OFF COAST OF KENYA
LAUNCH VEHICLE- SCOUT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 96. MIN INCLINATION- 2.9 DEG
PERIAPSIS- 486. KM ALT APOAPSIS- 486. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM - M.R. TOWNSEND .....NASA-GSFC
GREENBELT, MD
PS - C.E. FICHTEL .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

SAS-C WILL BE THE THIRD OF A SERIES OF SMALL SPACECRAFT WHOSE OBJECTIVES WILL BE TO SURVEY THE CELESTIAL SPHERE AND SEARCH FOR SOURCES RADIATING IN THE X-RAY, GAMMA-RAY, UV, AND OTHER SPECTRAL REGIONS. THE PRIMARY MISSIONS OF SAS-C WILL BE 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 WILL BE LAUNCHED FROM THE SAN MARCO PLATFORM OFF THE COAST OF KENYA, AFRICA, INTO A NEAR CIRCULAR EQUATORIAL ORBIT. FOUR SOLAR PADDLES WILL BE USED IN CONJUNCTION WITH A 12-CELL NICKEL-CADMIUM BATTERY TO PROVIDE 65 W OF AVERAGE POWER OVER THE ENTIRE ORBIT. THE SPACECRAFT WILL BE STABILIZED ALONG THE Z AXIS AND WILL ROTATE AT ABOUT 0.1 DEG/SEC. CHANGES TO THE SPIN AXIS ORIENTATION WILL BE BY GROUND COMMAND, EITHER IN REAL TIME OR DELAYED. THE SPACECRAFT CAN 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 -------

EXPERIMENT NAME- ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES

NSSDC ID- SAS-C -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.W. SCHNOPPER .....SAO
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL DETERMINE THE POSITIONS OF VERY WEAK EXTRAGALACTIC X-RAY SOURCES. THE INSTRUMENT WILL VIEW A 100-DEG-SQ REGION OF THE SKY AROUND THE DIRECTION OF THE SPIN AXIS OF THE SATELLITE. THE NOMINAL TARGETS FOR A ONE-YEAR STUDY WILL BE -- (1) THE VIRGO CLUSTER OF GALAXIES FOR FOUR MONTHS, (2) THE GALACTIC EQUATOR FOR TWO MONTHS, (3) THE ANDROMEDA NEBULA FOR THREE MONTHS, AND (4) THE MAGELLANIC CLOUDS FOR THREE MONTHS. THE INSTRUMENTATION WILL CONSIST 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 WILL BE ABOUT 225 CM-SQ. THE ASPECT SYSTEM WILL PROVIDE INFORMATION ON THE ORIENTATION OF THE COLLIMATORS TO AN ACCURACY OF 15 ARC-SEC.

------- SAS-C, CLARK -------

EXPERIMENT NAME- ANALYSIS OF GALACTIC X-RAY SOURCES

NSSDC ID- SAS-C -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.W. SCHNOPPER .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THIS EXPERIMENT WILL BE TO LOCATE GALACTIC X-RAY SOURCES TO 15 ARC-SEC AND TO MONITOR THESE SOURCES FOR INTENSITY VARIATIONS. THE SOURCE POSITIONS WILL BE DETERMINED WITH THE USE OF THE MODULATION COLLIMATORS OF THE EXTRAGALACTIC EXPERIMENT DURING THE NOMINAL TWO-MONTH OBSERVATION OF THE GALACTIC EQUATOR. THE MONITORING OF THE X-RAY SKY WILL BE ACCOMPLISHED BY THE USE OF THREE SLAT COLLIMATORS. ONE COLLIMATOR, 1-BY-70-DEG FWHM, WILL BE ORIENTED PERPENDICULAR TO THE EQUATORIAL PLANE OF THE SATELLITE, WHILE THE OTHER TWO EACH 0.5-BY-45-DEG FWHM, WILL BE ORIENTED 30 DEG ABOVE AND 30 DEG BELOW THE FIRST. THE DETECTOR BEHIND EACH COLLIMATOR WILL BE A PROPORTIONAL COUNTER, SENSITIVE FROM 1.5 TO 13 KEV, WITH AN EFFECTIVE AREA OF ABOUT 100 CM SQ. THE 1.0-DEG COLLIMATOR WILL HAVE AN ADDITIONAL COUNTER OF THE SAME AREA, SENSITIVE FROM 8 TO 50 KEV. THREE LINES OF POSITION WILL BE OBTAINED FOR ANY GIVEN SOURCE WHEN THE SATELLITE IS BEING SPUN AT A STEADY ROTATION OF FOUR ARC-MIN/SEC ABOUT THE Z AXIS.

------- SAS-C, CLARK -------

EXPERIMENT NAME- CONTINUOUS X-RAY FLUCTUATION MONITOR OF
SCORPIO X-1

NSSDC ID- SAS-C -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.W. SCHNOPPER .....SAO
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
A 12-BY-50-DEG FWHM SLAT COLLIMATOR WILL BE 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 WILL BE INCLINED BY 31 DEG WITH RESPECT TO THE EQUATORIAL PLANE OF THE SATELLITE, SO THAT SCORPIO X-1 WILL BE OBSERVED WHILE THE Z AXIS IS ORIENTED TO THE VIRGO CLUSTER OF GALAXIES. THE DETECTORS USED IN THIS EXPERIMENT WILL BE PROPORTIONAL COUNTERS WITH A 1-MIL BE WINDOW. THE ENERGY RANGE WILL BE FROM 1.0 TO 60 KEV, AND THE TOTAL EFFECTIVE AREA WILL BE ABOUT 40 CM SQ.

------- SAS-C, CLARK ----------

EXPERIMENT NAME- X-RAY ABSORPTION CONTOURS OF THE GALAXY

NSSDC ID- SAS-C -04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G.W. CLARK .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.V.D.BRADT .....MASS INST OF TECH
CAMBRIDGE, MA
OI - W.H.G.LEWIN .....MASS INST OF TECH
CAMBRIDGE, MA
OI - H.W. SCHNOPPER .....MASS INST OF TECH
CAMBRIDGE, MA

EXPERIMENT BRIEF DESCRIPTION
THE DENSITY AND DISTRIBUTION OF THE INTERSTELLAR MATTER WILL BE DETERMINED BY MEASURING THE VARIATION IN THE INTENSITY OF THE LOW ENERGY DIFFUSE X-RAY BACKGROUND AS A FUNCTION OF GALACTIC LATITUDE. A ONE-MICRON POLYPROPYLENE WINDOW PROPORTIONAL COUNTER WILL BE USED FOR THE 0.1- TO 0.25-KEV AND 0.5- TO 1.0-KEV ENERGY RANGES, WHILE A TWO-MICRON TITANIUM WINDOW COUNTER WILL COVER THE ENERGY RANGE FROM 0.3 TO 0.5 KEV. IN ADDITION, TWO 1-MIL BE WINDOW COUNTERS WILL BE USED FOR THE 1.0- TO 10-KEV ENERGY RANGE. THE COLLIMATORS IN THIS EXPERIMENT WILL HAVE FIELDS OF VIEW OF 3 DEG FOR THE ONE-MICRON COUNTER, 2 DEG FOR THE TWO-MICRON COUNTER, AND 2 DEG FOR THE ONE-MIL COUNTERS.

********** SOLAR MAXIMUM MISSION **********

SPACECRAFT COMMON NAME- SOLAR MAXIMUM MISSION
ALTERNATE NAMES- SMM
NSSDC ID- SMM

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- MID 1978 SPACECRAFT WEIGHT- 1300. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- DELTA

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- 90. MIN INCLINATION- 28. DEG
PERIAPSIS- 6828. KM ALT APOAPSIS- 6828. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PS - K.J. FROST .....NASA-GSFC
GREENBELT, MD
MG - M.E. MCDONALD .....NASA HEADQUARTERS
WASHINGTON, DC
SC - S.D. JORDAN .....NASA-GSFC
GREENBELT, MD

SPACECRAFT BRIEF DESCRIPTION
THE SCIENTIFIC OBJECTIVE OF THIS MISSION IS THE STUDY OF SOLAR FLARES AND FLARE-RELATED PHENOMENA. THE SPACECRAFT WILL BE POINTED AT THE SUN CONTINUOUSLY DURING THE DAYLIGHT PORTION OF THE ORBIT. IT WILL BE SPACE-SHUTTLE-COMPATIBLE TO ALLOW THE CAPABILITY OF RETRIEVING THE SPACECRAFT, REFITTING AND REFURBISHING IT, AND RETURNING IT TO ORBIT. THE SPACECRAFT WILL BE OPERATED BY A SOLAR OBSERVATORY OPERATIONS CENTER LOCATED AT THE GODDARD SPACE FLIGHT CENTER, GREENBELT, MARYLAND. A SUBSTANTIAL GUEST INVESTIGATOR PROGRAM WILL BE SCHEDULED, TO ALLOW BROAD PARTICIPATION BY THE SCIENTIFIC COMMUNITY.

********** SOLRAD 9 **********

SPACECRAFT COMMON NAME- SOLRAD 9
ALTERNATE NAMES- EXPLORER 37, 03141
NSSDC ID- 68-017A

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/25/74.

LAUNCH DATE- 03/05/68 SPACECRAFT WEIGHT- 198. 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- 03/06/68
ORBIT PERIOD- 98.68 MIN INCLINATION- 59.43 DEG
PERIAPSIS- 513.000 KM ALT APOAPSIS- 881.000 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/25/73
ORBIT PERIOD- 98.025 MIN INCLINATION- 59.4082 DEG
PERIAPSIS- 501. KM ALT APOAPSIS- 766. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - R.W. KREPLIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - G.K. OERTEL .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE NRL SOLRAD 9 SATELLITE WAS ONE OF A SERIES OF SATELLITES THAT BEGAN IN 1960 TO PROVIDE CONTINUOUS COVERAGE OF SOLAR RADIATION WITH A SET OF STANDARD PHOTOMETERS. SOLRAD 9 WAS A SPIN-STABILIZED SATELLITE ORIENTED WITH ITS SPIN AXIS PERPENDICULAR TO THE SUN-SATELLITE LINE SO THAT THE 14 SOLAR X-RAY AND UV PHOTOMETERS POINTING RADIALLY OUTWARD FROM ITS EQUATORIAL BELT VIEWED THE SUN WITH EACH REVOLUTION. DATA WERE SIMULTANEOUSLY TRANSMITTED VIA FM/AM TELEMETRY AND RECORDED IN A CORE MEMORY THAT READ OUT ITS CONTENTS ON COMMAND. INDIVIDUAL SCIENTISTS AND INSTITUTIONS ARE INVITED TO RECEIVE AND USE THE DATA TRANSMITTED ON THE 136-MHZ TELEMETRY BAND ON THE STANDARD IRIG CHANNELS 3 THROUGH 8.

------- SOLRAD 9, KREPLIN ----------

EXPERIMENT NAME- SOLAR RADIATION DETECTORS

NSSDC ID- 68-017A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING PARTIALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/25/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.W. KREPLIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - T.A. CHUBB .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - H.D. FRIEDMAN .....US NAVAL RESEARCH LAB
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF 14 DETECTORS COVERING THE RANGES 20 TO 80 KEV, 0.5 TO 60 A, AND 1080 TO 1350 A. THE DETECTORS WERE DESIGNED TO MEASURE WAVELENGTH AND FLUX SHIFTS OF SOLAR RADIATION DURING PERIODS OF LOW AND HIGH SOLAR ACTIVITY. THE DETECTORS WERE STANDARDIZED PHOTOMETERS SIMILAR TO THOSE FLOWN ON SOLRAD 8. DATA FROM THREE PAIRS OF THESE DETECTORS COVERING THE RANGE 0.5 TO 16 A WERE STORED IN THE ONBOARD MEMORY TO PROVIDE FULL TIME COVERAGE, WHILE THE OTHER DATA WERE TRANSMITTED IN REAL TIME ONLY. (REAL-TIME DATA WERE RECORDED FOR AT LEAST 10 MIN PER ORBIT.) THE UV AND 20- TO 80-KEV DETECTORS FAILED SHORTLY AFTER LAUNCH.

********** SOLRAD 10 **********

SPACECRAFT COMMON NAME- SOLRAD 10
ALTERNATE NAMES- EXPLORER 44, SOLAR EXPLORER-C
SE-C, SOLRAD-C
PL-703A
NSSDC ID- 71-058A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/00/73.

LAUNCH DATE- 07/08/71 SPACECRAFT 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- 95.23 MIN INCLINATION- 58.06 DEG
PERIAPSIS- 433.000 KM ALT APOAPSIS- 632.000 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 01/28/73
ORBIT PERIOD- 95.027 MIN INCLINATION- 51.0465 DEG
PERIAPSIS- 435. KM ALT APOAPSIS- 577.0 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - E.W. PETERKIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
PS - R.W. KREPLIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC

SC - G.K. OERTEL .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT 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, SP-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. THE EXPERIMENTS WERE TURNED ON AT 1430 UT ON JULY 9, 1971. 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. THE FIRST CORE DUMP WAS OBTAINED AT 2100 UT ON JULY 9, 1971. DATA WERE ALSO TRANSMITTED IN REAL TIME AT 137.710 MHZ. THE CORE MEMORY FAILED IN JULY, 1973. ONLY REAL-TIME DATA WERE TAKEN AFTER THAT TIME.

------- SOLRAD 10, KREPLIN ----------

EXPERIMENT NAME- SOLAR RADIATION DETECTORS

NSSDC ID- 71-058A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 12/11/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.W. KREPLIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - D.D. BROUSSEAU .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - E.T. BYRAM .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - J.H. CARVER .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - R.E. EISENHAUER .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - G.G. FRITZ .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - D.M. HORAN .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - A.T. MCCLINTON, JR. .....WOLF RES + DEV CORP
RIVERDALE, MD
OI - R.G. TAYLOR .....US NAVAL RESEARCH LAB
WASHINGTON, DC
OI - J. WINKLER .....US NAVAL RESEARCH LAB
WASHINGTON, DC

EXPERIMENT 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 B). 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 MINUTE FOR 14.25 HR) ON COMMAND.

------- SOLRAD 10, KREPLIN ----------

EXPERIMENT NAME- ALL-SKY X-RAY SURVEY

NSSDC ID- 71-058A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/00/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.W. KREPLIN .....US NAVAL RESEARCH LAB
WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS DESIGNED TO MAP THE SOURCES OF X-RAY EMISSION IN THE SKY IN THE 0.5- TO 15-A REGION. THE DETECTOR, MOUNTED ON THE SIDE OF THE SPACECRAFT, WAS A LARGE-AREA PROPORTIONAL COUNTER MOUNTED TO POINT RADIALLY OUTWARD FROM THE SPIN AXIS, WHICH POINTED CONTINUALLY TOWARD THE SUN. THE DETECTOR WINDOW WAS MADE OF 1/8-MIL-THICK MYLAR WITH AN EFFECTIVE AREA OF 100 SQ CM. THE GAS FILLER WAS A MIXTURE OF 0.45 ARGON, 0.45 XENON, AND 0.10 CARBON DIOXIDE MAINTAINED AT 4 LB/SQ CM. A COLLIMATOR LIMITED THE FIELD OF VIEW TO 8 DEG (FULL-WIDTH AT HALF-MAXIMUM) IN A PLANE CONTAINING THE SPIN AXIS AND 1 DEG (FWHM) IN THE PLANE PERPENDICULAR TO THE SPIN AXIS. CHARGED PARTICLE INFORMATION WAS PROVIDED BY PROPORTIONAL COUNTERS MOUNTED ON THREE SIDES OF THE X-RAY DETECTOR. ASPECT INFORMATION WAS PROVIDED BY A BLUE-SENSITIVE PHOTOMULTIPLIER CAPABLE OF DETECTING ALL FOURTH-MAGNITUDE AND NOT FIFTH-MAGNITUDE STARS. THE RESOLUTION OF THE ASPECT SYSTEM AND THE ACCURACY WITH WHICH THE EXPERIMENT COULD LOCATE X-RAY SOURCES WAS BETTER THAN PLUS OR MINUS 0.25 DEG. THE DETECTOR WAS CONNECTED TO A 400-CHANNEL PULSE TIME ANALYZER WHICH WAS SYNCHRONIZED WITH THE SPIN PERIOD TO GIVE A 2-DEG SPATIAL RESOLUTION IN THE SPIN DIRECTION. THE WHOLE CELESTIAL SPHERE WAS SURVEYED EVERY SIX MONTHS.

********** SPACE SHUTTLE **********

SPACECRAFT COMMON NAME- SPACE SHUTTLE
ALTERNATE NAMES-
NSSDC ID- SHUTTLE

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 12/00/78 SPACECRAFT WEIGHT- KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE-

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OMSF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM ALT APOAPSIS- KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - M.S. MALKIN .....NASA HEADQUARTERS
WASHINGTON, DC
PM - R. THOMPSON .....NASA-JSC
HOUSTON, TX
SC - UNKNOWN .....UNKNOWN

SPACECRAFT BRIEF DESCRIPTION
THE SPACE SHUTTLE PROJECT WILL CONSIST OF A SERIES OF REUSABLE SPACE TRANSPORTATION SYSTEMS THAT WILL BE USED IN THREE DIFFERENT WAYS -- (1) TO CARRY AUTOMATED SATELLITES TO NEAR-EARTH ORBIT FROM WHICH THEY MAY BE LAUNCHED TO HIGHER ALTITUDES WITH ADDITIONAL BOOSTER STAGES, (2) TO LAUNCH MAJOR AUTOMATED SATELLITES INTO NEAR-EARTH ORBIT AND TO PROVIDE REVISIT AND MAINTENANCE OPPORTUNITIES, AND (3) TO CARRY SCIENTIFIC EQUIPMENT INTO ORBIT AND RETURN TO EARTH AFTER PERIODS OF 7 TO 30 DAYS (SORTIE MISSIONS). THE "FINAL REPORT OF THE SPACE SHUTTLE PAYLOAD PLANNING WORKING GROUPS" (NASA-GSFC, MAY 1973) PROPOSES THAT EXPERIMENTS BE CARRIED OUT IN THE FOLLOWING MAJOR FIELDS -- (1) ASTRONOMY, USING A LARGE SPACE TELESCOPE (LST) AND SEVERAL OTHER IR AND UV TELESCOPES, (2) ATMOSPHERIC AND SPACE PHYSICS, USING TRACER RELEASE TECHNIQUES, (3) HIGH-ENERGY ASTROPHYSICS (X-RAY ASTRONOMY, STRUCTURE AND DYNAMICS OF THE INTERSTELLER MEDIUM), USING VARIOUS TELESCOPES, SPECTROMETERS, PROPORTIONAL COUNTER ARRAYS, AND PROBES, (4) LIFE SCIENCES, AN AGGREGATE OF RELATED RESEARCH AND TECHNOLOGY EFFORTS INCLUDING PLANETARY BIOLOGY, BIOMEDICINE, BIOLOGY, AND ADVANCED TECHNOLOGY, (5) SOLAR PHYSICS, USING VARIOUS POLARIMETERS, SCINTILLATORS, PROPORTIONAL COUNTERS, SPARK CHAMBERS, AND NEUTRON DETECTORS, (6) COMMUNICATIONS AND NAVIGATION, (7) EARTH OBSERVATIONS, INCLUDING MONITORING OVER LONG PERIODS OF TIME OF THE PHYSICAL STATE AND DYNAMIC BEHAVIOR OF THE EARTH'S LAND SURFACE FEATURES AS WELL AS THE OTHER ELEMENTS OF GLOBAL ENVIRONMENT (AIR, WATER, AND ICE), (8) EARTH AND OCEAN PHYSICS, (9) MATERIALS PROCESSING AND SPACE MANUFACTURING, AND (10) SPACE TECHNOLOGY. APPROXIMATELY 445 LAUNCHES HAVE BEEN PROPOSED, TO COVER A PERIOD OF 12 YEARS.

********** SPACELAB **********

SPACECRAFT COMMON NAME- SPACELAB
ALTERNATE NAMES-
NSSDC ID- SPACLAB

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 11/00/80 SPACECRAFT WEIGHT- 14500. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES

LAUNCH VEHICLE- SHUTTLE

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESRO
UNITED STATES NASA-OMSF

PLANNED ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC
ORBIT PERIOD- MIN INCLINATION- DEG
PERIAPSIS- KM ALT APOAPSIS- KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - H. STOEWER .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
MG - J.P. CAUSSE .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
MG - D.R. LORD .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
SPACELAB WILL CONSIST OF MANNABLE PRESSURIZED LABORATORY MODULES AND UNPRESSURIZED INSTRUMENT PLATFORMS (PALLETS) SUITABLE FOR CONDUCTING RESEARCH AND APPLICATION ACTIVITIES ON SPACE SHUTTLE (NASA) SORTIE MISSIONS. THE MODULE AND THE PALLET, EITHER SEPARATELY OR TOGETHER, WILL BE TRANSPORTED TO AND FROM EARTH ORBIT IN THE SPACE SHUTTLE ORBITER PAYLOAD BAY AND WILL REMAIN ATTACHED TO, AND SUPPORTED BY, THE ORBITER THROUGHOUT EACH MISSION. SPACELAB WILL BE DESIGNED FOR AN OPERATIONAL LIFETIME OF 50 MISSIONS, EACH OF 7 DAYS DURATION AFTER GROUND REFURBISHMENT. NON-ASTRONAUT SCIENTISTS AND ENGINEERS (AVERAGE CREW SIZE WILL BE FOUR SCIENTISTS IN ADDITION TO THE TWO CREWMEN OPERATING THE SPACE SHUTTLE) WILL BE ON THE FLIGHT TO CONTROL EXPERIMENTS AND SUBSYSTEMS AND BRING BACK THEIR DATA. THE SPACELAB CREW WILL RIDE IN THE ORBITER DURING ASCENT AND DESCENT AND WILL USE THESE FACILITIES FOR EATING, SLEEPING, AND PERSONAL HYGIENE. SPACELAB WILL BE THE WORKING BASE, AND THE USE (FOR THE FIRST TIME IN SPACE WORK) OF A SEA-LEVEL OXYGEN/NITROGEN ATMOSPHERE WILL MEAN THAT THE SPACELAB CREW WILL HAVE AN EARTH-TYPE ENVIRONMENT (EXCEPT FOR ZERO-G) IN THEIR LABORATORY. SEE ESRO/ELDO BULLETIN, AUGUST 1973, FOR FURTHER INFORMATION.

********** TD 1A **********

SPACECRAFT COMMON NAME- TD 1A
ALTERNATE NAMES- PL-721E, TD 1
05879
NSSDC ID- 72-014A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

LAUNCH DATE- 03/12/72 SPACECRAFT WEIGHT- 472. KG
LAUNCH SITE- VANDENBERG AFB, UNITED STATES
LAUNCH VEHICLE- TA DELTA

SPONSORING COUNTRY/AGENCY
INTERNATIONAL ESRO

INITIAL ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 03/12/72
ORBIT PERIOD- 95.291 MIN INCLINATION- 97.555 DEG
PERIAPSIS- 523.43 KM ALT APOAPSIS- 541.9 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- 12/28/73
ORBIT PERIOD- 95.177 MIN INCLINATION- 97.5677 DEG
PERIAPSIS- 525. KM ALT APOAPSIS- 532. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - T.I. CURL .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
PM - R.J. GOSS .....NASA-GSFC
GREENBELT, MD
PS - J. VON VOCHEL .....ESRO-ESTEC
NOORDWIJK, NETHERLANDS
SC - NONE ASSIGNED .....UNKNOWN

SPACECRAFT BRIEF DESCRIPTION
THE TD-1 SPACECRAFT WAS ESSENTIALLY COMPOSED OF TWO BOXES. THE UPPER BOX CONTAINED THE EXPERIMENTS AND THE LOWER BOX CONTAINED THE SPACECRAFT EQUIPMENT. THE EXPERIMENT COMPARTMENT WAS BUILT AROUND TWO LARGE TELESCOPES (26 AND 30 CM IN DIAM) AND A SPARK CHAMBER. THE SPACECRAFT WAS SOLAR POWERED, AND DURING THE SUNLIT PHASE OF ITS ORBIT WAS ATTITUDE CONTROLLED TO ABOUT 1 MIN OF ARC. ONE AXIS WAS POINTED TO WITHIN ONE ARC-MIN OF THE SUN, AND ANOTHER AXIS LAY WITHIN 0.5 DEG OF THE PLANE OF THE SUN, EARTH, AND SPACECRAFT (I.E., THE SPACECRAFT Z AXIS ALWAYS POINTED TOWARDS THE EARTH). BOTH TAPE RECORDERS FAILED WITHIN TWO MONTHS OF LAUNCH, CAUSING DATA RECOVERY TO DROP FROM 95 PERCENT TO LESS THAN 25 PERCENT. IN OCTOBER 1972, THE SPACECRAFT WAS PLACED IN HIBERNATION FOR ABOUT FOUR MONTHS SINCE IT COULD NOT WITHSTAND, FOR ANY LENGTH, PERIODS OF SPACECRAFT NIGHT WHILE IN ACTIVE USE. IN FEBRUARY 1973 THE SPACECRAFT WAS SUCCESSFULLY REACTIVATED AND REAL-TIME TELEMETRY COVERAGE WAS INCREASED TO ABOUT 70 PERCENT. THE COSMIC X-RAY SPECTROMETER EXPERIMENT (S-77) CAUSED ABNORMAL READOUTS IN THE HOUSEKEEPING TELEMETRY CHANNELS, AND HENCE WAS NOT OPERATED UNTIL JULY, 1973.

------- TD 1A, DE JAGER -------

EXPERIMENT NAME- SOLAR X-RAY MONITOR

NSSDC ID- 72-014A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - C. DE JAGER .....U OF UTRECHT
UTRECHT, NETHERLANDS

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT OBSERVED HARD X RAYS EMITTED BY THE SUN, DIVIDING PULSES OBTAINED FROM A CESIUM IODIDE (CSI) CRYSTAL INTO 12 LOGARITHMICALLY EQUISPACED ENERGY INTERVALS BETWEEN 24 AND 900 KEV. THE EXPERIMENT TOOK ADVANTAGE OF THE CONTINUOUS SUN POINTING. A TIME RESOLUTION OF 1.2 SEC WAS ACHIEVED FOR THE FOUR CHANNELS BETWEEN 24 AND 90 KEV. THE RESOLUTION WAS 4.8 SEC FOR THE OTHER CHANNELS.

------- TD 1A, KAMPERMAN -------

EXPERIMENT NAME- UV STELLAR SPECTROMETER

NSSDC ID- 72-014A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T. KAMPERMAN .....SPACE RESEARCH LAB
UTRECHT, NETHERLANDS

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A CASSEGRAIN TELESCOPE (PRIMARY MIRROR 26 CM IN DIAM) AND A GRATING SPECTROMETER WHICH OPERATED IN THREE PASSBANDS (2260 TO 2155 A, 2495 TO 2590 A, AND 2775 TO 2865 A). WHEN A STAR OF SUFFICIENT BRIGHTNESS APPEARED IN THE TELESCOPE, THE TELESCOPE LOCKED ONTO IT WITH A SELF-CONTAINED GUIDANCE SYSTEM AND THEN SCANNED THREE 100-A PASSBANDS IN 0.5 A INCREMENTS WITH AN OVERALL ACCURACY OF 1 A AND SPECTRAL RESOLUTION OF 1.8 A.

------- TD 1A, LABEYRIE -------

EXPERIMENT NAME- SPECTROMETRY OF PRIMARY CHARGED PARTICLES

NSSDC ID- 72-014A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- COSMIC RAYS PARTICLES AND FIELDS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J. LABEYRIE .....CENS
SACLAY, FRANCE

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT MEASURED THE CHARGE SPECTRUM OF PRIMARY COSMIC RAYS BY USING A CHARGED PARTICLE TELESCOPE AND COINCIDENCE TECHNIQUES. THE TELESCOPE WAS MOUNTED ALONG THE MAIN AXIS OF THE SATELLITE, WHICH WAS ALWAYS POINTED TOWARD THE CENTER OF THE SUN.

------- TD 1A, LABEYRIE -------

EXPERIMENT NAME- SPECTROMETRY OF EXTRATERRESTRIAL X RAYS

NSSDC ID- 72-014A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 07/02/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J. LABEYRIE .....CENS
SACLAY, FRANCE

EXPERIMENT BRIEF DESCRIPTION
A 100-SQ-CM PROPORTIONAL COUNTER WAS USED TO MEASURE THE SPECTRA OF COSMIC X-RAY SOURCES IN 10 CHANNELS BETWEEN 3 AND 30 KEV. THE PROPORTIONAL COUNTER WAS LOCATED BEHIND A CROSSED PAIR OF SLOT COLLIMATORS WHICH TOGETHER YIELDED A 5- BY 1-DEG FIELD OF VIEW. THE PROPORTIONAL COUNTER HAD A 0.5-MM BERYLLIUM WINDOW AND A XENON FILLER GAS. IT WAS CONSTRUCTED IN TWO PARTS, WHICH WERE THEN ANTICOINCIDENCED TO REMOVE THE BACKGROUND DUE TO COSMIC-RAY PARTICLES. DUE TO OPERATIONAL DIFFICULTIES, THIS EXPERIMENT WAS TURNED OFF SOON AFTER IT WAS TURNED ON, AND WAS NOT TURNED ON AGAIN UNTIL JULY 2, 1973.

------- TD 1A, LABEYRIE ----------

EXPERIMENT NAME- GAMMA-RAY MEASUREMENT

NSSDC ID- 72-014A-07

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- GAMMA-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - J. LABEYRIE .....CENS
SACLAY, FRANCE

EXPERIMENT BRIEF DESCRIPTION
AN OPTICAL SPARK CHAMBER WITH COUNTERS AND A VIDICON SYSTEM WAS USED TO MEASURE GAMMA RAYS IN THE 70- TO 300-MEV ENERGY RANGE. THE SENSITIVE AREA OF THE DETECTOR WAS 200 SQ CM, AND THE EFFICIENCY FOR GAMMA RAYS WAS 16 PERCENT. ALL OF THE SKY WAS SCANNED IN 6 MONTHS WITH A SENSITIVITY CAPABLE OF DETECTING A FLUX OF GREATER THAN 1E-6 PHOTONS/SQ CM-SEC.

------- TD 1A, MONFILS ----------

EXPERIMENT NAME- STELLAR UV RADIATION EXPERIMENT

NSSDC ID- 72-014A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.G. MONFILS .....U OF LIEGE
LIEGE, BELGIUM
OI - C. JAMAR .....U OF LIEGE
LIEGE, BELGIUM
OI - P.J. BARKER .....RUTHERFORD LAB
CHILTON, DIDCOT, BERKSHIRE, ENGLAND
OP - R. WILSON .....U COLLEGE LONDON
LONDON, ENGLAND

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT CONSISTED OF A 1.4-M TELESCOPE WITH A SPECTROMETER BOX ATTACHED TO IT. AN OFF-AXIS PARABOLOID MIRROR (F/3.5, DIAM 275 MM) REFLECTED STARLIGHT ONTO A SYSTEM OF TWO SLITS SITUATED IN THE PRIME FOCAL PLANE. ONE OF THE TWO SLITS FED THE STELLAR LIGHT INTO A SINGLE PHOTOMETRIC CHANNEL WITH A FILTER LIMITING THE PASSBAND TO 400 A CENTERED AT 2750 A. THE OTHER SLIT WAS MUCH WIDER (11.9 X 17 ARC-MIN), AND LED INTO THE THREE-CHANNEL GRATING SPECTROMETER. ONCE PER ORBIT, THE TELESCOPE, ALIGNED ALONG THE Z AXIS, SCANNED A GREAT CIRCLE OF THE SKY. BECAUSE OF THIS MOTION ACROSS THE SKY, THE PRIMARY IMAGE OF A CERTAIN STAR ENTERING THE TELESCOPE'S FIELD OF VIEW MOVED ACROSS THE PHOTOMETER AND SPECTROPHOTOMETER SLOTS. WHILE THE STAR IMAGE TRAVERSED THE WIDE SPECTROPHOTOMETER SLOT, ITS CORRESPONDING SPECTRUM MOVED IN THE FOCAL PLANE OF THE SPECTROGRAPH ACROSS THE THREE EXIT SLITS, BEHIND WHICH THERE WERE THREE PULSE-COUNTING PHOTOMULTIPLIERS. BY EMPLOYING THE SCANNING MOTION OF THE SATELLITE, A SPECTRUM SCANNING ACTION WAS ACHIEVED WITHOUT THE NEED FOR MOVING PARTS. THE THREE EXIT SLITS OF THE SPECTROPHOTOMETER WERE FIXED AT THE FOLLOWING WAVELENGTHS -- 1350 TO 1760 A, 1760 TO 2160 A AND 2150 TO 2550 A. THE WAVELENGTH REGION FROM 1350 TO 2550 A WAS FULLY COVERED BY THE THREE CHANNELS IN 3.3 SEC, YIELDING A TOTAL OF ABOUT 60 DATA POINTS. IN EACH CHANNEL THE SPECTRUM WAS SCANNED AT 19.4-A INTERVALS. THE EFFECTIVE PASSBAND DURING EACH INTEGRATION INTERVAL HAVING A FULL-WIDTH HALF-MAXIMUM OF 35 TO 40 A, JUST BEFORE THE TELESCOPE WAS INTEGRATED INTO THE SATELLITE, THE INSTRUMENT WAS EXTENSIVELY CALIBRATED IN ORDER TO ACHIEVE AN ABSOLUTE PHOTOMETRIC ACCURACY BETWEEN 10 AND 20 PERCENT, A RELATIVE PHOTOMETRIC ACCURACY WITHIN 10 PERCENT AND A WAVELENGTH CALIBRATION ACCURATE TO A FEW ANGSTROMS. THIS EXPERIMENT WAS TO DETECT 20,000 STARS, OF WHICH 6000 SHOULD HAVE GIVEN USEFUL UV SPECTRA. IT WAS ABLE TO MEASURE STARS OF MAGNITUDE 10.5. TWO MAJOR OBJECTIVES WERE THE STUDY OF INTERSTELLAR EXTINCTION AND THE PREPARATION OF A UV STAR CATALOG.

------- TD 1A, OCCHIALINI ----------

EXPERIMENT NAME- SOLAR GAMMA RAYS IN THE 50- TO 500-MEV
ENERGY RANGE

NSSDC ID- 72-014A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT A SUBSTANDARD DATA ACQUISITION RATE SINCE 02/14/73.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- GAMMA-RAY ASTRONOMY SOLAR PHYSICS

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - G. OCCHIALINI .....U OF MILAN
MILAN, ITALY

EXPERIMENT BRIEF DESCRIPTION
A COMBINATION OF SCINTILLATORS AND PHOTOMULTIPLIERS WERE USED TO DETECT SOLAR GAMMA RAYS (PHOTON ENERGY .LT. 50 AND .GT. 500 MEV) WHILE DISCRIMINATING AGAINST CHARGED PARTICLES. A DIRECTIONAL ACCURACY OF A FEW DEG WAS ACHIEVED. THE EFFECTIVE AREA OF 100 SQ CM ALLOWED A BACKGROUND OF 1E-5 PHOTONS/SQ CM-SEC TO BE OBTAINED WHILE THE DYNAMIC RANGE ALLOWED FLUXES UP TO 1E-2 TO BE MEASURED DURING SOLAR FLARES.

********** UK 5 **********

SPACECRAFT COMMON NAME- UK 5
ALTERNATE NAMES- UNITED KINGDOM 5, PL-7328
NSSDC ID- 74-077A

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/15/74.

LAUNCH DATE- 10/15/74 SPACECRAFT 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- / /
ORBIT PERIOD- 95.3 MIN INCLINATION- 2.875 DEG
PERIAPSIS- 512.93 KM ALT APOAPSIS- 557.23 KM ALT

RECENT ORBIT PARAMETERS
ORBIT TYPE- GEOCENTRIC EPOCH DATE- / /
ORBIT PERIOD- 95.3 MIN INCLINATION- 2.875 DEG
PERIAPSIS- 512.93 KM ALT APOAPSIS- 557.23 KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - H.L. EAKER .....NASA-GSFC
GREENBELT, MD
PS - S.S. HOLT .....NASA-GSFC
GREENBELT, MD
MG - J.R. HOLTZ .....NASA HEADQUARTERS
WASHINGTON, DC
SC - N.G. ROMAN .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE UK-5 SPACECRAFT CARRIED SIX EXPERIMENTS THAT MEASURED THE SPECTRUM, POLARIZATION, AND PULSAR FEATURES OF NON-SOLAR 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 ARE STORED ON BOARD THE SPACECRAFT IN A CORE STORAGE AND DUMPED TO GROUND STATIONS ONCE PER ORBIT.

------- UK 5, BOYD ----------

EXPERIMENT NAME- 0.3- TO 30-KEV COSMIC X RAY WITH A
ROTATION COLLIMATOR

NSSDC ID- 74-077A-01

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.L.F.BOYD .....U COLLEGE LONDON
LONDON, ENGLAND
OI - A.P. WILLMORE .....U COLLEGE LONDON
LONDON, ENGLAND
OI - P.W. SANFORD .....U COLLEGE LONDON
LONDON, ENGLAND

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT COMBINED THE FUNCTION OF OBSERVING X RAYS IN DIFFERENT ENERGY RANGES WITH THAT OF STAR TRACKING. THE EXPERIMENT CONTAINS A ROTATION COLLIMATOR, UTILIZING THE SATELLITE SPIN, BEHIND WHICH THERE ARE THREE DETECTORS. THE FIELD OF VIEW IS 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 IS A VISIBLE LIGHT PHOTOMULTIPLIER WHICH ENABLES THE SPIN AXIS TO BE ACCURATELY DETERMINED BY VIEWING THE BACKGROUND OF OPTICAL STARS. SECONDLY, THERE IS AN ARRAY OF CHANNEL ELECTRON MULTIPLIERS, WITH SELECTABLE FILTERS, COVERING THE WAVELENGTH RANGE 0.3 TO 6 KEV. THIRD, THERE IS A GROUP OF PROPORTIONAL COUNTERS COVERING THE RANGE 2.5 TO 30 KEV. IT IS BELIEVED THAT SOURCE POSITIONS COULD BE DETERMINED TO WITHIN 2 ARC-MIN FOR BRIGHT SOURCES.

------- UK 5, BOYD ----------

EXPERIMENT NAME- HIGH RESOLUTION SOURCE SPECTRA

NSSDC ID- 74-077A-03

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/31/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.L.F.BOYD .....U COLLEGE LONDON
LONDON, ENGLAND

OI - A.P. WILLMORE .....U COLLEGE LONDON
LONDON, ENGLAND
OI - P.W. SANFORD .....U COLLEGE LONDON
LONDON, ENGLAND

EXPERIMENT 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 WAS 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 TWO DEG OFF THE SPIN AXIS. SO, WHEN OBSERVING A SOURCE ALSO TWO 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 ORBITS 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 ----------

EXPERIMENT NAME- HIGH-ENERGY COSMIC X-RAY SPECTRA

NSSDC ID- 74-077A-05

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H. ELLIOT .....IMPERIAL COLLEGE
LONDON, ENGLAND
OI - J.J. QUENBY .....IMPERIAL COLLEGE
LONDON, ENGLAND
OI - A.R. ENGEL .....IMPERIAL COLLEGE
LONDON, ENGLAND

EXPERIMENT 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 WHICH WAS PART OF THE SPACECRAFT HANDLING ELECTRONICS.

------- UK 5, HOLT ----------

EXPERIMENT NAME- ALL-SKY MONITOR

NSSDC ID- 74-077A-06

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.S. HOLT .....NASA-GSFC
GREENBELT, MD
OI - E.A. BOLDT .....NASA-GSFC
GREENBELT, MD
OI - P.J. SERLEMITSOS .....NASA-GSFC
GREENBELT, MD

EXPERIMENT 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 ON-BOARD 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 ----------

EXPERIMENT NAME- 2- TO 10-KEV SKY SURVEY

NSSDC ID- 74-077A-02

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.A. POUNDS .....U OF LEICESTER
LEICESTER, ENGLAND
OI - B.A. COOKE .....U OF LEICESTER
LEICESTER, ENGLAND
OI - D.J. ADAMS .....U OF LEICESTER
LEICESTER, ENGLAND
OI - R.E. GRIFFITHS .....U OF LEICESTER
LEICESTER, ENGLAND

EXPERIMENT 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 ALLOWS THE DETECTION OF SOURCES OF THE ORDER OF 10 TO THE MINUS FOUR TIMES THE INTENSITY OF SCO XR-1, WITHIN THE TIME OF ABOUT ONE DAY. THE ABILITY OF THE SURVEY INSTRUMENTS TO DETERMINE THE POSITIONS OF A SOURCE DEPENDS ON THE STRENGTH OF THE SOURCE AND THE NUMBER OF OTHER SOURCES IN A GIVEN PART OF THE SKY. A SOURCE OF 5 X 10 TO THE MINUS THREE TIMES THE STRENGTH OF SCO XR-1 COULD BE LOCATED WITH A PRECISION OF ABOUT 15 ARC-MIN.

------- UK 5, POUNDS ----------

EXPERIMENT NAME- POLARIMETER/SPECTROMETER

NSSDC ID- 74-077A-04

LAST REPORTED STATE- LAUNCHED AND OPERATING NORMALLY
AT THE STANDARD DATA ACQUISITION RATE SINCE 10/18/74.

OSS DIVISION- PHYSICS AND ASTRONOMY PROGRAMS
DISCIPLINE(S)- X-RAY ASTRONOMY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - K.A. POUNDS .....U OF LEICESTER
LEICESTER, ENGLAND
OI - B.A. COOKE .....U OF LEICESTER
LEICESTER, ENGLAND
OI - D.J. ADAMS .....U OF LEICESTER
LEICESTER, ENGLAND
OI - R.E. GRIFFITHS .....U OF LEICESTER
LEICESTER, ENGLAND

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WAS A POLARIMETER/SPECTROMETER OPERATING IN THE 2- TO 8-KEV RANGE. IT USES TWO LARGE PLANE CRYSTALS, LITHIUM HYDRIDE AND GRAPHITE, IN A BRAGG SPECTROMETER WITH A HONEYCOMB COLLIMATOR. IT IS MOUNTED TO VIEW ALONG THE SATELLITE SPIN AXIS AND 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 MAY 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.

********** VIKING-A LANDER **********

SPACECRAFT COMMON NAME- VIKING-A LANDER
ALTERNATE NAMES- VIKNG-A
NSSDC ID- VIKG-AL

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 3 QTR 75 SPACECRAFT WEIGHT- 598. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)
PM - J.S. MARTIN, JR. .....NASA-LARC
HAMPTON, VA
PS - G.A. SOFFEN .....NASA-LARC
HAMPTON, VA
MG - W. JAKOBOWSKI .....NASA HEADQUARTERS
WASHINGTON, DC
SC - L.G. GOFF .....NASA HEADQUARTERS
WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WILL BE THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT WILL SOFT-LAND ON THE MARTIAN SURFACE SOMEWHERE IN THE LATITUDE RANGE PLUS OR MINUS 30 DEG (PREDETERMINED FROM THE ORBITER VEHICLE EXPERIMENTS DESIGNED TO CHOOSE A LANDING SPOT). THE LIFETIME OF THE LANDER IS DESIGNED TO BE AT LEAST 90 DAYS AFTER LANDING. THE PRIME LANDING AREA WILL BE SELECTED FROM A LOW-ALTITUDE REGION, WITH

A SECONDARY AREA ALSO PRESELECTED IN LOW-ALTITUDE REGIONS. IF THE PRIMARY SITE PROVES TO BE UNSATISFACTORY, THE SECONDARY AREA WILL BE EXAMINED FOR SELECTION. THE ORBITER WILL HAVE THE CAPABILITY OF BEING MADE SYNCHRONOUS WITH THE LANDER TO PROVIDE FOR DAILY RELAY AND LANDING SITE OBSERVATION FOR 90 DAYS. IT WILL ALSO BE CAPABLE OF OBTAINING DATA FOR THE SELECTION OF LANDING SITES FOR FUTURE MISSIONS. THE LANDER VEHICLE WILL CONTAIN THE MAJORITY OF EXPERIMENTS TO BE CONDUCTED ON MARS. THE LANDER WILL HAVE A 70-W POWER CAPACITY. THE SCIENTIFIC PAYLOAD FOR THE LANDER WILL WEIGH APPROXIMATELY 91 KG (200 LBS).

------- VIKING-A LANDER, ANDERSON ----------

EXPERIMENT NAME- SEISMOLOGY

NSSDC ID- VIKG-AL-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	D.L.	ANDERSON	CALIF INST OF TECH PASADENA, CA
OI -	F.	PRESS	MASS INST OF TECH CAMBRIDGE, MA
OI -	M.N.	TOKSOZ	MASS INST OF TECH CAMBRIDGE, MA
OI -	G.	SUTTON	U OF HAWAII HONOLULU, HI
OI -	R.L.	KOVACH	STANFORD U STANFORD, CA
OI -	G.V.	LATHAM	U OF TEXAS, GALVESTON GALVESTON, TX

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSE OF THE SEISMOLOGY INVESTIGATION WILL BE TO DETERMINE THE SEISMIC BACKGROUND AND EVENT ACTIVITY OF MARS. THREE PERPENDICULAR COMPONENTS OF GROUND MOTION WILL BE MEASURED OVER AS BROAD A FREQUENCY RANGE AS PRACTICAL (MAXIMUM EMPHASIS OVER THE BAND 0.4 TO 4 HZ). THE RESOLUTION WILL BE 50 MILLIMICRONS OR LESS OF GROUND DISPLACEMENT AT 1 HZ, WITH AN ACCURACY SUCH THAT TRUE GROUND MOTION AMPLITUDE CAN BE RECOVERED TO PLUS OR MINUS 10 PERCENT OR BETTER. DYNAMIC RANGE MAY BE INCREASED BY NARROWBAND FILTERING OF THE SEISMIC DATA AT THREE FREQUENCIES. THE SEISMOMETER WILL BE MOUNTED IN THE EQUIPMENT AREA OF THE LANDER. THE ORIENTATION OF THE SENSOR WILL BE KNOWN TO WITHIN 15 DEG IN AZIMUTH AND 5 DEG IN ELEVATION. TRANSMISSIBILITY OF THE LANDER SHOULD BE GREATER THAN 0.8 FOR FREQUENCIES LESS THAN 10 HZ. THE LANDER SHALL HAVE NO RESONANCES LESS THAN 10 HZ WITH Q GREATER THAN TWO.

------- VIKING-A LANDER, BIEMANN ----------

EXPERIMENT NAME- MOLECULAR ANALYSIS

NSSDC ID- VIKG-AL-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	K.	BIEMANN	MASS INST OF TECH CAMBRIDGE, MA
OI -	H.C.	UREY	U OF CALIF, SAN DIEGO SAN DIEGO, CA
OI -	D.M.	ANDERSON	USA-CRREL HANOVER, NH
OI -	T.	OWEN	STATE U OF NEW YORK BUFFALO, NY
OI -	J.	ORO	U OF HOUSTON HOUSTON, TX
OI -	L.E.	ORGEL	SALK INST BIOL STUDIES SAN DIEGO, CA
OI -	G.P.	SHULMAN	CASA LOMA COLLEGE PACOIMA, CA
OI -	A.O.C.	NIER	U OF MINNESOTA MINNEAPOLIS, MN
OI -	P.	TOULMIN, 3RD	US GEOLOGICAL SURVEY WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSE OF THIS INVESTIGATION IS TO ANALYZE THE MARTIAN SURFACE FOR ITS ORGANIC CONTENT BY VAPORIZING MATERIAL ONTO A GAS CHROMATOGRAPHIC COLUMN WHICH WILL BE CONNECTED TO A FAST-SCANNING (10-SEC) MASS SPECTROMETER. THE HEATING WILL BE ACCOMPLISHED IN STEPS TO VAPORIZE THOSE MATERIALS PRESENT WHICH HAVE SUFFICIENT VAPOR PRESSURE, AND ULTIMATELY TO DECOMPOSE PYROLYTICALLY NONVOLATILE SUBSTANCES INTO VOLATILE DEGRADATION PRODUCTS FROM WHICH THE NATURE OF THE MATERIAL CAN THEN BE DEDUCED. TO ACCOMPLISH THE OBJECTIVES OF THIS INVESTIGATION, CERTAIN PRIMARY REQUIREMENTS MUST BE MET. THE SENSITIVITY OF THE MASS SPECTROMETER SHOULD BE SUCH THAT A MASS SPECTRUM TAKEN OF A SINGLE ORGANIC COMPOUND WHICH IS ONE PART IN TEN MILLION (0.1 PPM) SHOWS PEAKS WHICH ARE 1 PERCENT OF THE BASE PEAK. THE MASS RANGE REQUIRED FOR ANALYSIS WILL BE AT LEAST 12 TO 200, WITH UNIT RESOLUTION OR BETTER. THE RELATIVE DYNAMIC RANGE FOR EACH MASS SPECTRUM SHOULD BE 500 TO 1. A CONTROLLED TEMPERATURE WILL BE REQUIRED FOR VAPORIZATION PYROLYSIS UP TO 500 DEG C. PROVISIONS WILL BE MADE TO ENSURE THAT THE EVOLUTION OF LARGE QUANTITIES OF GAS (AS MUCH AS 10 PERCENT OF SAMPLE WEIGHT) DOES NOT IMPAIR THE FUNCTION OF THE MASS SPECTROMETER. THIS IS TO BE ACCOMPLISHED BY VENTING THE EXCESS GAS BEFORE IT REACHES THE MASS SPECTROMETER. THREE DIFFERENT SAMPLES TAKEN AT SPECIFIED TIMES DURING THE FIRST 60 DAYS OF THE MISSION (COVERING SEASONAL CHANGES) WILL BE STUDIED. THE ORGANIC INVESTIGATION WILL NOT BE INITIATED UNTIL AFTER THE OPERATION OF THE ATMOSPHERIC ANALYSES REQUIRED DURING THE FIRST THREE DAYS. ATMOSPHERIC ANALYSES WILL BE CARRIED OUT PERIODICALLY THROUGHOUT THE MISSION.

------- VIKING-A LANDER, HARGRAVES ----------

EXPERIMENT NAME- MAGNETIC PROPERTIES

NSSDC ID- VIKG-AL-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.B.	HARGRAVES	PRINCETON U PRINCETON, NJ

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT, WHICH WILL BE PART OF THE LANDER SECTION EXPERIMENTS, WILL MEASURE THE MAGNETIC PROPERTIES OF THE SURFACE PARTICLES ON MARS USING THREE MAGNET ARRAYS FOR SAMPLING. DATA RETURNED WILL BE IN THE FORM OF IMAGES OF THE MAGNETIC ARRAYS.

------- VIKING-A LANDER, HESS ----------

EXPERIMENT NAME- METEOROLOGY EXPERIMENT

NSSDC ID- VIKG-AL-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	S.L.	HESS	FLORIDA STATE U TALLAHASSEE, FL
OI -	C.B.	LEOVY	U OF WASHINGTON SEATTLE, WA
OI -	R.M.	HENRY	NASA-LARC HAMPTON, VA
OI -	J.A.	RYAN	MCDONNELL-DOUGLAS CORP REDONDO BEACH, CA
OI -	J.E.	TILLMAN	U OF WASHINGTON SEATTLE, WA

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL MEASURE THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAIN INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ELEMENTS TO BE DETERMINED ARE PRESSURE, TEMPERATURE, AND WIND VELOCITY AND DIRECTION OF THE MARTIAN ATMOSPHERE. DIURNAL AND TEMPORAL VARIATIONS OF THE PARAMETERS WILL BE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY ARE TO BE SELECTABLE BY GROUND COMMAND. ALL MEASUREMENTS ARE TO BE CONTINUED FOR THE LANDER LIFETIME. THE SENSORS WILL BE MOUNTED ON AN ERECTABLE BOOM.

------- VIKING-A LANDER, KLEIN ----------

EXPERIMENT NAME- BIOLOGY INVESTIGATION

NSSDC ID- VIKG-AL-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY BIOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.P.	KLEIN	NASA-ARC MOFFETT FIELD, CA
OI -	J.	LEDERBERG	STANFORD U STANFORD, CA
OI -	A.	RICH	MASS INST OF TECH CAMBRIDGE, MA
OI -	N.H.	HOROWITZ	CALIF INST OF TECH PASADENA, CA
OI -	V.I.	OYAMA	NASA-ARC MOFFETT FIELD, CA
OI -	G.V.	LEVIN	BIOSPHERICS, INC ROCKVILLE, MD

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL BE COMPOSED OF THREE PARTS. IT WILL MEASURE -- (1) THE PHOTOSYNTHETIC AND RESPIRATORY FIXATION OF CARBON DIOXIDE, (2) THE CHANGES IN GAS COMPOSITION ABOVE A SURFACE SAMPLE IN CONTACT WITH A LIQUID MEDIUM, AND

(3) THE CARBON DIOXIDE RELEASED FROM ADDED LABELED ORGANIC COMPOUNDS. IT WILL ATTEMPT TO DETERMINE THE PRESENCE OF LIFE ON MARS. THE CAPABILITY EXISTS TO STERILIZE A SAMPLE FOR CONTROL.

------- VIKING-A LANDER, MICHAEL, JR. ----------

EXPERIMENT NAME- RADIO SCIENCE

NSSDC ID- VIKG-AL-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPH. & RADIO PHYSIC
PLANETARY ATMOSPHERES PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	W.H.	MICHAEL, JR.	NASA-LARC HAMPTON, VA
OI -	I.I.	SHAPIRO	MASS INST OF TECH CAMBRIDGE, MA
OI -	G.	FJELDBO	NASA-JPL PASADENA, CA
OI -	J.G.	DAVIES	U OF MANCHESTER MANCHESTER, ENGLAND
OI -	D.L.	CAIN	NASA-JPL PASADENA, CA
OI -	M.D.	GROSSI	RAYTHEON CORP SUDBURY, MA
OI -	G.L.	TYLER	STANFORD U STANFORD, CA
OI -	J.	BRENKLE	NASA-JPL PASADENA, CA
OI -	R.H.	TOLSON	NASA-LARC HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL UTILIZE 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, THE RADAR ALTIMETER, THE TERMINAL DESCENT LANDING RADAR, 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-A LANDER, MUTCH ----------

EXPERIMENT NAME- FACSIMILE CAMERA

NSSDC ID- VIKG-AL-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	T.A.	MUTCH	BROWN U PROVIDENCE, RI
OI -	C.	SAGAN	CORNELL U ITHACA, NY
OI -	A.B.	BINDER	PLANETARY SCIENCE INST TUCSON, AZ
OI -	E.C.	MORRIS	US GEOLOGICAL SURVEY FLAGSTAFF, AZ
OI -	A.T.	YOUNG	TEXAS A+M U COLLEGE STATION, TX
OI -	F.O.	HUCK	NASA-LARC HAMPTON, VA
OI -	E.C.	LEVINTHAL	STANFORD U STANFORD, CA
OI -	S.	LIEBES, JR.	STANFORD U STANFORD, CA

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THE IMAGING INVESTIGATION FROM THE LANDER WILL BE TO VISUALLY CHARACTERIZE THE LANDING SITE, PROVIDING DATA WITH BIOLOGICAL, GEOLOGICAL, AND METEOROLOGICAL RELEVANCE. TWO CAMERAS WITH A 0.04-DEG SCANNING RESOLUTION WILL BE REQUIRED. THE VERTICAL FIELD OF VIEW FOR EACH CAMERA WILL BE 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 WILL BE REQUIRED. AZIMUTH POINTING BY COMMAND WILL BE IN 2.5-DEG INCREMENTS. THE CAMERAS WILL BE MOUNTED AT LEAST 1.3 M ABOVE THE MARTIAN SURFACE AND MUST BE CAPABLE OF VIEWING TWO FOOTPADS AND AT LEAST 90 PERCENT OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. EACH CAMERA MUST BE CAPABLE OF OBTAINING VISUAL COLOR IMAGERY. PROVISION HAS BEEN MADE TO OPERATE IN IR SPECTRAL BANDS BETWEEN 0.8 AND 1.1 MICRONS. HORIZONTAL STEREO WITH A MINIMUM BASE OF 0.8 M WILL BE REQUIRED.

------- VIKING-A LANDER, NIER ----------

EXPERIMENT NAME- ENTRY-ATMOSPHERIC STRUCTURE

NSSDC ID- VIKG-AL-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.O.C.	NIER	U OF MINNESOTA MINNEAPOLIS, MN
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	W.B.	HANSON	U OF TEXAS, DALLAS DALLAS, TX
OI -	N.W.	SPENCER	NASA-GSFC GREENBELT, MD
OI -	A.	SEIFF	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT IS DESIGNED TO DETERMINE THE PRESSURE, TEMPERATURE, AND DENSITY VARIATIONS WITH ALTITUDE IN THE LOWER MARTIAN ATMOSPHERE THROUGH MEASUREMENT OF ACCELERATION, PRESSURE, AND TEMPERATURE. THE ACCELEROMETER OF THE GUIDANCE AND CONTROL SYSTEM WILL BE USED FOR THE ATMOSPHERIC STRUCTURE INVESTIGATION.

------- VIKING-A LANDER, NIER ----------

EXPERIMENT NAME- ENTRY-ATMOSPHERIC COMPOSITION

NSSDC ID- VIKG-AL-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- INTERPLANETARY PHYSICS PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.O.C.	NIER	U OF MINNESOTA MINNEAPOLIS, MN
OI -	N.W.	SPENCER	NASA-GSFC GREENBELT, MD
OI -	M.B.	MCELROY	HARVARD U CAMBRIDGE, MA
OI -	W.B.	HANSON	U OF TEXAS, DALLAS DALLAS, TX
OI -	A.	SEIFF	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE VIKING ENTRY-ATMOSPHERIC COMPOSITION EXPERIMENT IS 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. A DOUBLE-FOCUSING (ELECTROSTATIC AND MAGNETIC) MASS SPECTROMETER, MOUNTED IN AN OPENING IN THE AEROSHELL WITH ITS ELECTRON IMPACT OPEN ION SOURCE RECESSED BELOW THE SURFACE OF THE AEROSHELL, WILL BE USED TO MEASURE THE CONCENTRATIONS OF THE ATMOSPHERIC SPECIES THAT HAVE MASS-TO-CHARGE RATIOS FROM 1 TO 49. IT IS PLANNED THAT THE EXPERIMENT WILL OBTAIN ACCURATE ALTITUDE PROFILES OF ALL SPECIES, AND IN PARTICULAR FOR BOTH ATOMIC AND MOLECULAR OXYGEN, CARBON MONOXIDE, AND CARBON DIOXIDE. TWO COLLECTORS WILL BE USED -- ONE COVERING THE MASS RANGE FROM 1 TO 7 AMU AND THE OTHER SIMULTANEOUSLY COVERING THE RANGE FROM 7 TO 49 AMU. MASS SPECTRA WILL BE OBTAINED BY SWEEPING THE ION ACCELERATION VOLTAGE AND THE DEFLECTION VOLTAGE ACROSS THE ELECTROSTATIC PLATES. THE SWEEP PERIOD WILL BE APPROXIMATELY FIVE SEC, AND A DYNAMIC RANGE OF TEN TO THE FIFTH POWER WILL BE PROVIDED WITHIN EACH SPECTRUM. AFTER CALIBRATION, THE INSTRUMENT WILL BE SEALED UNDER VACUUM AND OPENED WHEN THE LANDER IS RELEASED FROM THE ORBITER. DURING ENTRY, THE LANDER WILL BE TRAVELING WITH ITS AXIS ORIENTED ESSENTIALLY ALONG THE VELOCITY VECTOR, SO THE AMBIENT SPECIES WILL ENTER AT AN ANGLE NORMAL TO THE ENTRANCE PLANE. A RETARDING POTENTIAL ANALYZER (RPA) WILL MEASURE THE IONOSPHERIC PROPERTIES OVER APPROXIMATELY THE SAME ALTITUDE RANGE AS THE MASS SPECTROMETER. ITS FRONT END WILL MATE TO THE AEROSHELL SO THAT THE ENTRANCE GRID IS NEARLY FLUSH TO THE SURFACE, WHICH WILL BE MADE CONDUCTING IN THE REGION OF THE RPA TO PROVIDE A GROUND PLANE. THE SPACE BETWEEN THE ENTRANCE AND COLLECTOR WILL BE ELECTRICALLY SEGMENTED BY FIVE GRIDS WHOSE POTENTIALS WILL DETERMINE THE ENERGY AND SIGN OF THE CHARGED PARTICLES THAT CAN REACH THE COLLECTOR. THE FIRST (ENTRANCE GRID), SECOND, AND LAST GRID WILL BE GROUNDED TO THE SPACECRAFT. THE THIRD AND FOURTH GRIDS TOGETHER WILL COMPRISE THE RETARDING GRID, AND THE FIFTH GRID, THE SUPPRESSOR GRID, WILL BE HELD AT A FIXED POTENTIAL OPPOSITE IN SIGN TO THAT ON THE RETARDING GRID. THREE DIFFERENT LINEAR VOLTAGE RAMPS WILL BE APPLIED IN SUCCESSION TO THE RETARDING GRID. ONE RAMP WILL COVER THE VOLTAGE RANGE FROM - 75 TO 0 V (IN ABOUT 1 SEC), USED TO MEASURE SOLAR WIND ELECTRONS AND IONOSPHERIC PHOTOELECTRONS. ANOTHER WILL COVER FROM -1.5 TO 0 V (IN ABOUT ONE SEC), AND MEASURE ELECTRON TEMPERATURES IN THE IONOSPHERE. THE LAST RAMP WILL COVER FROM +15 TO 0 V (IN ABOUT 2 SEC), AND PROVIDE ION TEMPERATURES AND ION CONCENTRATION DATA. WHEN THE LANDER IS ALIGNED WITH ITS AXIS ALONG THE VELOCITY VECTOR, LOW-ENERGY PLASMA WILL ENTER THE RPA AT AN ANGLE NEARLY NORMAL TO THE

APERTURE GRID. EACH PARAMETER WILL BE EVALUATED APPROXIMATELY EVERY 4 KM IN ALTITUDE. A SMALL DISTANCE COMPARED TO THE ANTICIPATED SCALE HEIGHTS. MORE EXPERIMENT DETAIL CAN BE FOUND IN 'ENTRY SCIENCE EXPERIMENT FOR VIKING 1975,' BY A. O. C. NIER, ET AL., ICARUS, VOL. 16, PP. 74, 1972.

------- VIKING-A LANDER, SHORTHILL ----------

EXPERIMENT NAME- PHYSICAL PROPERTIES INVESTIGATION

NSSDC ID- VIKG-AL-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.W.	SHORTHILL	U OF UTAH SALT LAKE CITY, UT
OI -	R.E.	HUTTON	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	H.J.	MOORE, 2ND	US GEOLOGICAL SURVEY MENLO PARK, CA
OI -	R.F.	SCOTT	CALIF INST OF TECH PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSE OF THE PHYSICAL PROPERTIES EXPERIMENT INVESTIGATION WILL BE 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 WILL ATTEMPT 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 WILL BE 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, ARE BEING ADDED FOR THIS EXPERIMENT.

------- VIKING-A LANDER, TOULMIN, 3RD ----------

EXPERIMENT NAME- X-RAY FLUORESCENCE SPECTROMETER

NSSDC ID- VIKG-AL-13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	P.	TOULMIN, 3RD	US GEOLOGICAL SURVEY WASHINGTON, DC
OI -	A.K.	BAIRD	POMONA COLLEGE CLAREMONT, CA
OI -	K.	KEIL	U OF NEW MEXICO ALBUQUERQUE, NM
OI -	H.J.	ROSE	US GEOLOGICAL SURVEY WASHINGTON, DC
OI -	B.C.	CLARK	MARTIN-MARIETTA AEROSP DENVER, CO

EXPERIMENT BRIEF DESCRIPTION

THIS EXPERIMENT WILL UTILIZE AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER IN WHICH FOUR SEALED AND GAS-FILLED PROPORTIONAL COUNTERS WILL DETECT 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 WILL BE SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WILL BE LOCATED INSIDE THE LANDER BODY, AND SAMPLES WILL BE DELIVERED TO IT BY THE LANDER SURFACE SAMPLER; CALIBRATION STANDARDS WILL BE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA ARE EXPECTED TO YIELD 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-A ORBITER **********

SPACECRAFT COMMON NAME- VIKING-A ORBITER
ALTERNATE NAMES- PL-733A, VIKNG-A
NSSDC ID- VIKG-A

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 3 QTR 75 SPACECRAFT WEIGHT- 1092. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- MARSCENTRIC
ORBIT PERIOD- 1476. MIN INCLINATION- 34. DEG
PERIAPSIS- 1500. KM ALT APOAPSIS- 32500. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST, MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.S.	MARTIN, JR.	NASA-LARC HAMPTON, VA
PS -	G.A.	SOFFEN	NASA-LARC HAMPTON, VA
MG -	W.	JAKOBOWSKI	NASA HEADQUARTERS WASHINGTON, DC
SC -	L.G.	GOFF	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION

THE VIKING SPACECRAFT WILL CONSIST OF AN ORBITER AND A LANDER. THE ORBITER WILL BE CAPABLE OF ORBITING THE PLANET MARS IN A HIGH-ECCENTRICITY ELLIPTICAL ORBIT. A LANDER WILL SEPARATE FROM THE ORBITER, ENTER THE MARTIAN ATMOSPHERE, AND SOFT-LAND ON THE SURFACE. ORBITAL, ENTRY, AND SCIENTIFIC DATA FROM THE LANDER WILL BE COLLECTED AND TRANSMITTED TO EARTH. THE SPACECRAFT WILL BE A SOLAR-CELL-POWERED SATELLITE STABILIZED IN 3 AXES, USING INERTIAL AND CELESTIAL REFERENCES. BOTH THE ORBITER AND THE LANDER WILL HAVE A 90-DAY LIFE EXPECTANCY. THERE WILL BE 500-W POWER CAPACITY FOR THE ORBITER AND A 70-W CAPACITY FOR THE LANDER. SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS WILL WEIGH APPROXIMATELY 72 KG (158 LB).

------- VIKING-A ORBITER, CARR ----------

EXPERIMENT NAME- ORBITER IMAGING

NSSDC ID- VIKG-A -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	M.H.	CARR	US GEOLOGICAL SURVEY MENLO PARK, CA
OI -	W.A.	BAUM	LOWELL OBSERVATORY FLAGSTAFF, AZ
OI -	H.	MASURSKY	US GEOLOGICAL SURVEY FLAGSTAFF, AZ
OI -	D.U.	WISE	U OF MASSACHUSETTS AMHERST, MA
OI -	G.A.	BRIGGS	NASA-JPL PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSES OF THE VIKING ORBITER TV IMAGING EXPERIMENT INVESTIGATION ARE 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 DYNAMIC CHARACTERISTICS OF MARS. THE GEOMETRIC RESOLUTION OF THE ORBITER IMAGING SYSTEM WILL BE 40 M PER LINE OR BETTER AT A REFERENCE ALTITUDE OF 1500 KM, WITH IMAGE SMEARING FROM ORBITER MOTION TO BE LESS THAN 50 PERCENT OF THIS RESOLUTION. PRIOR TO LANDER SEPARATION, THE ORBITER WILL BE 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-PERIAPSIS PORTION OF THE ORBIT. THE NEAR-PERIAPSIS COVERAGE REQUIREMENT AFTER LANDER SEPARATION WILL OBTAIN COMPLETE COVERAGE WITH CONTIGUOUS PICTURES OF AN AREA AT LEAST 50 KM IN RADIUS CENTERED ON THE LANDER. TO OBTAIN BOTH BROAD AREA AND HIGH RESOLUTION COVERAGE, IT WILL BE REQUIRED THAT IMAGERY BE OBTAINABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT USING THE SAME IMAGING SYSTEM. THE DYNAMIC RANGE WILL BE 80 TO 1, AND THE SENSITIVITY WILL BE 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.

------- VIKING-A ORBITER, FARMER ----------

EXPERIMENT NAME- IR SPECTROMETER -- WATER VAPOR MAPPING

NSSDC ID- VIKG-A -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	C.B.	FARMER	NASA-JPL PASADENA, CA
OI -	D.D.	LAPORTE	SANTA BARBARA RES CTR GOLETA, CA

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THE IR SPECTROMETRY EXPERIMENT WILL BE 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 WILL BE BORESIGHTED WITH THE IMAGING SYSTEM. IT WILL BE OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. THE WATER VAPOR MEASUREMENT RANGE WILL BE FROM 1 TO 1000 MICRONS OF PRECIPITABLE WATER WITH AN ACCURACY OF 1 MICRON BETWEEN 1 AND 20 MICRONS AND 5 PERCENT BETWEEN 20 AND 1000 MICRONS. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT IS 2 BY 16 MILLIRADIANS.

------- VIKING-A ORBITER, KIEFFER ----------

EXPERIMENT NAME- IR RADIOMETRY -- THERMAL MAPPING

NSSDC ID- VIKG-A -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	H.H.	KIEFFER	U OF CALIF, LA LOS ANGELES, CA
OI -	G.	MUNCH	CALIF INST OF TECH PASADENA, CA
OI -	E.D.	MINER	NASA-JPL PASADENA, CA
OI -	G.	NEUGEBAUER	CALIF INST OF TECH PASADENA, CA
OI -	S.C.	CHASE, JR.	SANTA BARBARA RES CTR GOLETA, CA

EXPERIMENT BRIEF DESCRIPTION
THE OBJECTIVES OF THE INFRARED RADIOMETRY EXPERIMENT WILL BE TO OBTAIN SURFACE AND ATMOSPHERIC TEMPERATURE DATA FOR MARS, TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS, AND (FOR FUTURE MISSIONS) TO MONITOR THE REGIONS SURROUNDING THE LANDER AND STUDY THE DYNAMIC CHARACTERISTICS OF MARS. THE INFRARED RADIOMETER WILL BE BORESIGHTED WITH THE IMAGING SYSTEM ON THE SCAN PLATFORM AND WILL BE OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. A TOTAL OF 28 DETECTORS IN FOUR TELESCOPES WILL COVER FIVE INFRARED WAVELENGTH BANDS AND THE INTEGRAL SOLAR SPECTRUM. THE TEMPERATURE RESOLUTION WILL BE 1 DEG K AT 200 DEG K, AND THE MEASUREMENT RANGE WILL BE FROM 140 TO 330 DEG K. THERE WILL BE SEVEN SIMULTANEOUS FIELDS OF VIEW ARRANGED IN A 'V' PATTERN, EACH FIVE MILLIRADIANS IN DIAMETER.

********** VIKING-B LANDER **********

SPACECRAFT COMMON NAME- VIKING-B LANDER
ALTERNATE NAMES- VIKNG-B
NSSDC ID- VIKG-BL

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 3 QTR 75 SPACECRAFT WEIGHT- 598. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.S.	MARTIN, JR.	NASA-LARC HAMPTON, VA
PS -	G.A.	SOFFEN	NASA-LARC HAMPTON, VA
MG -	W.	JAKOBOWSKI	NASA HEADQUARTERS WASHINGTON, DC
SC -	L.G.	GOFF	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THIS SPACECRAFT WILL BE THE LANDING VEHICLE FOR THE TWO-PART SPACECRAFT MISSION. IT WILL SOFT-LAND ON THE MARTIAN SURFACE SOMEWHERE WITHIN 30 DEG OF THE MARTIAN EQUATOR. THE LANDING SITE FOR THIS SECOND MISSION (VIKING-B) WILL BE SELECTED BASED ON KNOWLEDGE GAINED FROM THE VIKING-A LANDER'S OPERATION DURING ENTRY AND ON THE SURFACE AND FROM ORBITAL RECONNAISSANCE DATA OBTAINED EITHER BY THE VIKING-A ORBITER OR THE VIKING-B-ORBITER DEPENDING ON ARRIVAL AND SEPARATION. IF THE VIKING-A ORBITER IS USED THE RELAY OPERATION WILL NOT BE INTERRUPTED PRIOR TO ABOUT THE 20TH DAY ON THE SURFACE. THE SECOND LANDER WILL BE CAPABLE OF ACCOMPLISHING THE FIRST LANDER MISSION AS A BACKUP. THE LANDER WILL CARRY THE MAJORITY OF THE SCIENTIFIC EXPERIMENTS TO BE CONDUCTED ON MARS. IT WILL HAVE A 70-W POWER CAPACITY AND A SCIENTIFIC PAYLOAD OF APPROXIMATELY 91 KG (200 LBS.).

------- VIKING-B LANDER, ANDERSON ----------

EXPERIMENT NAME- SEISMOLOGY

NSSDC ID- VIKG-BL-08

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	D.L.	ANDERSON	CALIF INST OF TECH PASADENA, CA
OI -	F.	PRESS	MASS INST OF TECH CAMBRIDGE, MA
OI -	M.N.	TOKSOZ	MASS INST OF TECH CAMBRIDGE, MA
OI -	G.	SUTTON	U OF HAWAII HONOLULU, HI
OI -	R.L.	KOVACH	STANFORD U STANFORD, CA
OI -	G.V.	LATHAM	U OF TEXAS, GALVESTON GALVESTON, TX

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THE SEISMOLOGY INVESTIGATION WILL BE TO DETERMINE THE SEISMIC BACKGROUND AND EVENT ACTIVITY OF MARS. THREE PERPENDICULAR COMPONENTS OF GROUND MOTION WILL BE MEASURED OVER AS BROAD A FREQUENCY RANGE AS PRACTICAL (MAXIMUM EMPHASIS OVER THE BAND 0.4 TO 4 HZ). THE RESOLUTION WILL BE 50 MILLIMICRONS OR LESS OF GROUND DISPLACEMENT AT 1 HZ, WITH AN ACCURACY SUCH THAT TRUE GROUND MOTION AMPLITUDE CAN BE RECOVERED TO PLUS OR MINUS 10 PERCENT OR BETTER. DYNAMIC RANGE MAY BE INCREASED BY NARROWBAND FILTERING OF THE SEISMIC DATA AT THREE FREQUENCIES. THE SEISMOMETER WILL BE MOUNTED IN THE EQUIPMENT AREA OF THE LANDER. THE ORIENTATION OF THE SENSOR WILL BE KNOWN TO WITHIN 15 DEG IN AZIMUTH AND 5 DEG IN ELEVATION. TRANSMISSIBILITY OF THE LANDER SHOULD BE GREATER THAN 0.8 FOR FREQUENCIES LESS THAN 10 HZ. THE LANDER SHALL HAVE NO RESONANCES LESS THAN 10 HZ WITH Q GREATER THAN TWO.

------- VIKING-B LANDER, BIEMANN ----------

EXPERIMENT NAME- MOLECULAR ANALYSIS

NSSDC ID- VIKG-BL-04

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	K.	BIEMANN	MASS INST OF TECH CAMBRIDGE, MA
OI -	H.C.	UREY	U OF CALIF, SAN DIEGO SAN DIEGO, CA
OI -	D.M.	ANDERSON	USA-CRREL HANOVER, NH
OI -	T.	OWEN	STATE U OF NEW YORK BUFFALO, NY
OI -	J.	ORO	U OF HOUSTON HOUSTON, TX
OI -	L.E.	ORGEL	SALK INST BIOL STUDIES SAN DIEGO, CA
OI -	G.P.	SHULMAN	CASA LOMA COLLEGE PACOIMA, CA
OI -	A.O.C.	NIER	U OF MINNESOTA MINNEAPOLIS, MN
OI -	P.	TOULMIN, 3RD	US GEOLOGICAL SURVEY WASHINGTON, DC

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THIS INVESTIGATION IS TO ANALYZE THE MARTIAN SURFACE FOR ITS ORGANIC CONTENT BY VAPORIZING MATERIAL ONTO A GAS CHROMATOGRAPHIC COLUMN WHICH WILL BE CONNECTED TO A FAST-SCANNING (10-SEC) MASS SPECTROMETER. THE HEATING WILL BE ACCOMPLISHED IN STEPS TO VAPORIZE THOSE MATERIALS PRESENT WHICH HAVE SUFFICIENT VAPOR PRESSURE, AND ULTIMATELY TO DECOMPOSE PYROLYTICALLY NONVOLATILE SUBSTANCES INTO VOLATILE DEGRADATION PRODUCTS FROM WHICH THE NATURE OF THE MATERIAL CAN THEN BE DEDUCED. TO ACCOMPLISH THE OBJECTIVES OF THIS INVESTIGATION, CERTAIN PRIMARY REQUIREMENTS MUST BE MET. THE SENSITIVITY OF THE MASS SPECTROMETER SHOULD BE SUCH THAT A MASS SPECTRUM TAKEN OF A SINGLE ORGANIC COMPOUND WHICH IS ONE PART IN TEN MILLION (0.1 PPM) SHOWS PEAKS WHICH ARE 1 PERCENT OF THE BASE PEAK. THE MASS RANGE REQUIRED FOR ANALYSIS WILL BE AT LEAST 12 TO 200, WITH UNIT RESOLUTION OR BETTER. THE RELATIVE DYNAMIC RANGE FOR EACH MASS SPECTRUM SHOULD BE 500 TO 1. A CONTROLLED TEMPERATURE WILL BE REQUIRED FOR VAPORIZATION PYROLYSIS UP TO 500 DEG C. PROVISIONS WILL BE MADE TO ENSURE THAT THE EVOLUTION OF LARGE QUANTITIES OF GAS (AS MUCH AS 10 PERCENT OF SAMPLE WEIGHT) DOES NOT IMPAIR THE FUNCTION OF THE MASS SPECTROMETER. THIS IS TO BE ACCOMPLISHED BY VENTING THE EXCESS GAS BEFORE IT REACHES THE MASS SPECTROMETER. THREE DIFFERENT SAMPLES TAKEN AT SPECIFIED TIMES DURING THE FIRST 60 DAYS OF THE MISSION (COVERING SEASONAL CHANGES) WILL BE STUDIED. THE ORGANIC INVESTIGATION WILL NOT BE INITIATED UNTIL AFTER THE OPERATION OF THE ATMOSPHERIC ANALYSES REQUIRED DURING THE FIRST THREE DAYS. ATMOSPHERIC ANALYSES WILL BE CARRIED OUT PERIODICALLY THROUGHOUT THE MISSION.

------- VIKING-B LANDER, HARGRAVES ----------

EXPERIMENT NAME- MAGNETIC PROPERTIES

NSSDC ID- VIKG-BL-10

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS

DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - R.B. HARGRAVES .....PRINCETON U
PRINCETON, NJ

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT, WHICH WILL BE PART OF THE LANDER SECTION EXPERIMENTS, WILL MEASURE THE MAGNETIC PROPERTIES OF THE SURFACE PARTICLES ON MARS USING THREE MAGNET ARRAYS FOR SAMPLING. DATA RETURNED WILL BE IN THE FORM OF IMAGES OF THE MAGNETIC ARRAYS.

------- VIKING-B LANDER, HESS ----------

EXPERIMENT NAME- METEOROLOGY EXPERIMENT

NSSDC ID- VIKG-BL-07

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - S.L. HESS .....FLORIDA STATE U
TALLAHASSEE, FL
OI - C.B. LEOVY .....U OF WASHINGTON
SEATTLE, WA
OI - R.M. HENRY .....NASA-LARC
HAMPTON, VA
OI - J.A. RYAN .....MCDONNELL-DOUGLAS CORP
REDONDO BEACH, CA
OI - J.E. TILLMAN .....U OF WASHINGTON
SEATTLE, WA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL MEASURE THE METEOROLOGICAL ENVIRONMENT NEAR THE PLANETARY SURFACE AND OBTAIN INFORMATION ABOUT MOTION SYSTEMS OF VARIOUS SCALES. THE ELEMENTS TO BE DETERMINED ARE PRESSURE, TEMPERATURE, AND WIND VELOCITY AND DIRECTION OF THE MARTIAN ATMOSPHERE. DIURNAL AND TEMPORAL VARIATIONS OF THE PARAMETERS WILL BE OF PARTICULAR IMPORTANCE. THE SAMPLING RATES AND DURATIONS FOR ANY ONE MARTIAN DAY ARE TO BE SELECTABLE BY GROUND COMMAND. ALL MEASUREMENTS ARE TO BE CONTINUED FOR THE LANDER LIFETIME. THE SENSORS WILL BE MOUNTED ON AN ERECTABLE BOOM.

------- VIKING-B LANDER, KLEIN ----------

EXPERIMENT NAME- BIOLOGY INVESTIGATION

NSSDC ID- VIKG-BL-03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - H.P. KLEIN .....NASA-ARC
MOFFETT FIELD, CA
OI - J. LEDERBERG .....STANFORD U
STANFORD, CA
OI - A. RICH .....MASS INST OF TECH
CAMBRIDGE, MA
OI - N.H. HOROWITZ .....CALIF INST OF TECH
PASADENA, CA
OI - V.I. OYAMA .....NASA-ARC
MOFFETT FIELD, CA
OI - G.V. LEVIN .....BIOSPHERICS, INC
ROCKVILLE, MD

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL BE COMPOSED OF THREE PARTS. IT WILL MEASURE -- (1) THE PHOTOSYNTHETIC AND RESPIRATORY FIXATION OF CARBON DIOXIDE, (2) THE CHANGES IN GAS COMPOSITION ABOVE A SURFACE SAMPLE IN CONTACT WITH A LIQUID MEDIUM, AND (3) THE CARBON DIOXIDE RELEASED FROM ADDED LABELED ORGANIC COMPOUNDS. IT WILL ATTEMPT TO DETERMINE THE PRESENCE OF LIFE ON MARS. THE CAPABILITY EXISTS TO STERILIZE A SAMPLE FOR A CONTROL.

------- VIKING-B LANDER, MICHAEL, JR. ----------

EXPERIMENT NAME- RADIO SCIENCE

NSSDC ID- VIKG-BL-11

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- ASTRONOMY IONOSPHERES
PLANETARY ATMOSPHERES PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - W.H. MICHAEL, JR. .....NASA-LARC
HAMPTON, VA
OI - I.I. SHAPIRO .....MASS INST OF TECH
CAMBRIDGE, MA
OI - G. FJELDBO .....NASA-JPL
PASADENA, CA
OI - J.G. DAVIES .....U OF MANCHESTER
MANCHESTER, ENGLAND
OI - D.L. CAIN .....NASA-JPL
PASADENA, CA
OI - M.D. GROSSI .....RAYTHEON CORP
SUDBURY, MA
OI - G.L. TYLER .....STANFORD U
STANFORD, CA
OI - J. BRENKLE .....NASA-JPL
PASADENA, CA
OI - R.H. TOLSON .....NASA-LARC
HAMPTON, VA

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL UTILIZE 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, THE RADAR ALTIMETER, THE TERMINAL DESCENT LANDING RADAR, 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-B LANDER, MUTCH ----------

EXPERIMENT NAME- FACSIMILE CAMERA

NSSDC ID- VIKG-BL-06

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - T.A. MUTCH .....BROWN U
PROVIDENCE, RI
OI - C. SAGAN .....CORNELL U
ITHACA, NY
OI - A.B. BINDER .....PLANETARY SCIENCE INST
TUCSON, AZ
OI - E.C. MORRIS .....US GEOLOGICAL SURVEY
FLAGSTAFF, AZ
OI - A.T. YOUNG .....TEXAS A+M U
COLLEGE STATION, TX
OI - F.O. HUCK .....NASA-LARC
HAMPTON, VA
OI - E.C. LEVINTHAL .....STANFORD U
STANFORD, CA
OI - S. LIEBES, JR. .....STANFORD U
STANFORD, CA

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THE IMAGING INVESTIGATION FROM THE LANDER WILL BE TO VISUALLY CHARACTERIZE THE LANDING SITE, PROVIDING DATA WITH BIOLOGICAL, GEOLOGICAL, AND METEOROLOGICAL RELEVANCE. TWO CAMERAS WITH A 0.04-DEG SCANNING RESOLUTION WILL BE REQUIRED. THE VERTICAL FIELD OF VIEW FOR EACH CAMERA WILL BE 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 WILL BE REQUIRED. AZIMUTH POINTING BY COMMAND WILL BE IN 2.5-DEG INCREMENTS. THE CAMERAS WILL BE MOUNTED AT LEAST 1.3 M ABOVE THE MARTIAN SURFACE AND MUST BE CAPABLE OF VIEWING TWO FOOTPADS AND AT LEAST 90 PERCENT OF THE AREA ACCESSIBLE TO THE SURFACE SAMPLER. EACH CAMERA MUST BE CAPABLE OF OBTAINING VISUAL COLOR IMAGERY. PROVISION WILL BE MADE TO OPERATE IN IR SPECTRAL BANDS BETWEEN 0.8 AND 1.1 MICRONS. HORIZONTAL STEREO WITH A MINIMUM BASE OF 0.8 M WILL BE REQUIRED.

------- VIKING-B LANDER, NIER ----------

EXPERIMENT NAME- ENTRY-ATMOSPHERIC STRUCTURE

NSSDC ID- VIKG-BL-02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)
PI - A.O.C.NIER .....U OF MINNESOTA
MINNEAPOLIS, MN
OI - M.B. MCELROY .....HARVARD U
CAMBRIDGE, MA
OI - W.B. HANSON .....U OF TEXAS, DALLAS
DALLAS, TX
OI - N.W. SPENCER .....NASA-GSFC
GREENBELT, MD
OI - A. SEIFF .....NASA-ARC
MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE PARTICULAR ELEMENTS OF MARTIAN ATMOSPHERIC STRUCTURE TO BE DETERMINED WILL BE PRESSURE, TEMPERATURE, AND DENSITY

VARIATIONS WITH ALTITUDE IN THE LOWER MARTIAN ATMOSPHERE. THE MEASUREMENTS TO BE MADE TO DETERMINE THESE ATMOSPHERIC PARAMETERS ARE SPACECRAFT ACCELERATION, PRESSURE, AND TEMPERATURE. THE ACCELEROMETER OF THE GUIDANCE AND CONTROL SYSTEM WILL BE USED FOR THE ATMOSPHERIC STRUCTURE INVESTIGATION.

-------- VIKING-B LANDER, NIER ----------

EXPERIMENT NAME- ENTRY-ATMOSPHERIC COMPOSITION

NSSDC ID- VIKG-BL-12

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- IONOSPHERES PLANETARY ATMOSPHERES

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	A.O.C.NIER	.....	U OF MINNESOTA MINNEAPOLIS, MN
OI -	N.W. SPENCER	.....	NASA-GSFC GREENBELT, MD
OI -	M.B. MCELROY	.....	HARVARD U CAMBRIDGE, MA
OI -	W.B. HANSON	.....	U OF TEXAS, DALLAS DALLAS, TX
OI -	A. SEIFF	.....	NASA-ARC MOFFETT FIELD, CA

EXPERIMENT BRIEF DESCRIPTION
THE VIKING ENTRY-ATMOSPHERIC COMPOSITION EXPERIMENT IS 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. A DOUBLE-FOCUSING (ELECTROSTATIC AND MAGNETIC) MASS SPECTROMETER, MOUNTED IN AN OPENING IN THE AEROSHELL WITH ITS ELECTRON IMPACT "OPEN" ION SOURCE RECESSED BELOW THE SURFACE OF THE AEROSHELL, WILL BE USED TO MEASURE THE CONCENTRATIONS OF THE ATMOSPHERIC SPECIES THAT HAVE MASS-TO-CHARGE RATIOS FROM 1 TO 49. IT IS PLANNED THAT THE EXPERIMENT WILL OBTAIN ACCURATE ALTITUDE PROFILES OF ALL SPECIES, SPECIFICALLY FOR BOTH ATOMIC AND MOLECULAR *OXYGEN, CARBON MONOXIDE, AND CARBON DIOXIDE. TWO COLLECTORS* WILL BE USED, ONE FOR THE MASS RANGE FROM 1 TO 7 AMU, AND THE OTHER SIMULTANEOUSLY MEASURING IN THE MASS RANGE FROM 7 TO 49 AMU. MASS SPECTRA WILL BE OBTAINED BY SWEEPING THE ION ACCELERATION VOLTAGE AND THE DEFLECTION VOLTAGE ACROSS THE ELECTROSTATIC PLATES. THE SWEEP PERIOD WILL BE APPROXIMATELY FIVE SEC, AND A DYNAMIC RANGE OF TEN TO THE FIFTH POWER WILL *BE PROVIDED WITHIN EACH SPECTRUM. A RETARDING POTENTIAL* ANALYZER (RPA) WILL MEASURE THE IONOSPHERIC PROPERTIES OVER APPROXIMATELY THE SAME ALTITUDE RANGE AS THE MASS SPECTROMETER. ITS FRONT END WILL MATE TO THE AEROSHELL SO THAT THE ENTRANCE GRID IS NEARLY FLUSH TO THE SURFACE, WHICH IS MADE CONDUCTING IN THE REGION OF THE RPA TO PROVIDE A GROUND PLANE. THE SPACE BETWEEN THE ENTRANCE GRID AND COLLECTOR WILL BE ELECTRICALLY SEGMENTED BY FIVE GRIDS WHOSE POTENTIALS WILL DETERMINE THE ENERGY AND SIGN OF THE CHARGED PARTICLES THAT CAN REACH THE COLLECTOR. THREE DIFFERENT LINEAR VOLTAGE RAMPS WILL BE APPLIED IN SUCCESSION TO THE RETARDING GRID, ONE RAMP WILL COVER THE VOLTAGE RANGE FROM -75 V TO 0 V (IN ABOUT 1 SEC), WHICH WILL BE USED TO MEASURE SOLAR WIND ELECTRONS AND IONOSPHERIC PHOTOELECTRONS. ANOTHER RAMP WILL COVER FROM -1.5 VV TO 0V (IN ABOUT 1 SEC), AND MEASURE ELECTRON TEMPERATURES IN THE IONOSPHERE AND THE LAST FROM +15 V TO 0 V (IN ABOUT 2 SEC), WHICH WILL BE USED TO PROVIDE ION TEMPERATURE AND ION CONCENTRATION DATA. MORE EXPERIMENT DETAILS CAN BE FOUND IN, 'ENTRY SCIENCE EXPERIMENT FOR VIKING 1975,' ICARUS, VOL 16, PP. 74-91, 1972, BY A. O. NIER, ET AL.

-------- VIKING-B LANDER, SHORTHILL ----------

EXPERIMENT NAME- PHYSICAL PROPERTIES INVESTIGATION

NSSDC ID- VIKG-BL-01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	R.W. SHORTHILL	.....	U OF UTAH SALT LAKE CITY, UT
OI -	R.E. HUTTON	.....	TRW SYSTEMS GROUP REDONDO BEACH, CA
OI -	H.J. MOORE, 2ND	.....	US GEOLOGICAL SURVEY MENLO PARK, CA
OI -	R.F. SCOTT	.....	CALIF INST OF TECH PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION
THE PURPOSE OF THE PHYSICAL PROPERTIES EXPERIMENT INVESTIGATION WILL BE 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 WILL ATTEMPT 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 WILL BE 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, ARE BEING ADDED FOR THIS EXPERIMENT.

------- VIKING-B LANDER, TOULMIN, 3RD ----------

EXPERIMENT NAME- X-RAY FLUORESCENCE SPECTROMETER

NSSDC ID- VIKG-BL-13

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI -	P. TOULMIN, 3RD	.....	US GEOLOGICAL SURVEY WASHINGTON, DC
OI -	A.K. BAIRD	.....	POMONA COLLEGE CLAREMONT, CA
OI -	K. KEIL	.....	U OF NEW MEXICO ALBUQUERQUE, NM
OI -	H.J. ROSE	.....	US GEOLOGICAL SURVEY WASHINGTON, DC
OI -	B.C. CLARK	.....	MARTIN-MARIETTA AEROSP DENVER, CO

EXPERIMENT BRIEF DESCRIPTION
THIS EXPERIMENT WILL UTILIZE AN ENERGY-DISPERSIVE X-RAY FLUORESCENCE SPECTROMETER IN WHICH FOUR SEALED AND GAS-FILLED PROPORTIONAL COUNTERS WILL DETECT 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 WILL BE SUBJECTED TO PULSE HEIGHT ANALYSIS BY AN ONBOARD STEP-SCANNING SINGLE-CHANNEL ANALYZER WITH ADJUSTABLE COUNTING PERIODS. THIS INSTRUMENT WILL BE LOCATED INSIDE THE LANDER BODY, AND SAMPLES WILL BE DELIVERED TO IT BY THE LANDER SURFACE SAMPLER. CALIBRATION STANDARDS WILL BE AN INTEGRAL PART OF THE INSTRUMENT. RECONSTRUCTED SPECTRA ARE EXPECTED TO YIELD 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-B ORBITER **********

SPACECRAFT COMMON NAME- VIKING-B ORBITER
ALTERNATE NAMES- PL-7338, VIKNG-B
NSSDC ID- VIKG-B

LAST REPORTED STATE- AN APPROVED MISSION

LAUNCH DATE- 3 QTR 75 SPACECRAFT WEIGHT- 1170. KG
LAUNCH SITE- CAPE CANAVERAL, UNITED STATES
LAUNCH VEHICLE- TITAN-CENT

SPONSORING COUNTRY/AGENCY
UNITED STATES NASA-OSS

PLANNED ORBIT PARAMETERS
ORBIT TYPE- MARSCENTRIC
ORBIT PERIOD- 1476. MIN INCLINATION- 49. DEG
PERIAPSIS- 1500. KM ALT APOAPSIS- 32500. KM ALT

SPACECRAFT PERSONNEL (PM=PROJECT MANAGER, PS=PROJECT SCIENTIST,
MG=PROGRAM MANAGER, SC=PROGRAM SCIENTIST)

PM -	J.S. MARTIN, JR.	.....	NASA-LARC HAMPTON, VA
PS -	G.A. SOFFEN	.....	NASA-LARC HAMPTON, VA
MG -	W. JAKOBOWSKI	.....	NASA HEADQUARTERS WASHINGTON, DC
SC -	L.G. GOFF	.....	NASA HEADQUARTERS WASHINGTON, DC

SPACECRAFT BRIEF DESCRIPTION
THE VIKING SPACECRAFT WILL CONSIST OF AN ORBITER AND A LANDER. THE ORBITER WILL BE CAPABLE OF ORBITING THE PLANET MARS IN A HIGH-ECCENTRICITY ELLIPTICAL ORBIT. A LANDER WILL SEPARATE FROM THE ORBITER, ENTER THE MARTIAN ATMOSPHERE, AND SOFT-LAND ON THE SURFACE. ORBITAL, ENTRY, AND SCIENTIFIC DATA FROM THE LANDER WILL BE COLLECTED AND TRANSMITTED TO EARTH. THE SPACECRAFT WILL BE A SOLAR-CELL-POWERED SATELLITE STABILIZED IN 3 AXES, USING INERTIAL AND CELESTIAL REFERENCES. BOTH THE ORBITER AND THE LANDER WILL HAVE A 90-DAY LIFE EXPECTANCY. THERE WILL BE 500-W POWER CAPACITY FOR THE ORBITER AND A 70-W CAPACITY FOR THE LANDER. SCIENTIFIC AND PHOTOGRAPHIC ANALYSIS INSTRUMENTS WILL WEIGH APPROXIMATELY 72 KG (158 LB).

------- VIKING-B ORBITER, CARR ----------

EXPERIMENT NAME- ORBITER IMAGING

NSSDC ID- VIKG-B -01

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - M.H. CARP .....US GEOLOGICAL SURVEY
MENLO PARK, CA
OI - W.A. BAUM .....LOWELL OBSERVATORY
FLAGSTAFF, AZ
OI - H. MASURSKY .....US GEOLOGICAL SURVEY
FLAGSTAFF, AZ
OI - D.U. WISE .....U OF MASSACHUSETTS
AMHERST, MA
OI - G.A. BRIGGS .....NASA-JPL
PASADENA, CA
OI - J.A. CUTTS .....NASA-JPL
PASADENA, CA

EXPERIMENT BRIEF DESCRIPTION

THE PURPOSES OF THE VIKING ORBITER TV IMAGING EXPERIMENT INVESTIGATION ARE TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS AND FOR FUTURE MISSIONS, TO MONITOR THE REGION SURROUNDING THE LANDER, AND TO STUDY THE DYNAMIC CHARACTERISTICS OF MARS. THE GEOMETRIC RESOLUTION OF THE ORBITER IMAGING SYSTEM WILL BE 40 METERS PER LINE OR BETTER AT A REFERENCE ALTITUDE OF 1500 KM WITH IMAGE SMEARING FROM ORBITER MOTION TO BE LESS THAN 50 PERCENT OF THIS RESOLUTION. PRIOR TO LANDER SEPARATION, IT WILL BE REQUIRED TO COVER COMPLETELY WITH CONTIGUOUS PICTURES A SWATH AT LEAST 40 KM CROSS-TRACK BY 500 KM DOWN-TRACK ON A SINGLE ORBITAL PASS FROM THE NEAR-PERIAPSIS OF THE ORBIT. THE NEAR-PERIAPSIS COVERAGE REQUIREMENT AFTER LANDER SEPARATION WILL BE TO OBTAIN COMPLETE COVERAGE WITH CONTIGUOUS PICTURES OF AN AREA AT LEAST 50 KM IN RADIUS, CENTERED ON THE LANDER, ON A SINGLE ORBITAL PASS. THE CAPABILITIES PROVIDED TO ACCOMPLISH THE ABOVE REQUIREMENTS WILL BE UTILIZED TO ACCOMPLISH THE OTHER CITED PURPOSES. TO OBTAIN BOTH BROAD-AREA AND HIGH-RESOLUTION COVERAGE, IT WILL BE REQUIRED THAT IMAGERY BE OBTAINABLE FROM ONE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT USING THE SAME IMAGING SYSTEM. THE DYNAMIC RANGE WILL BE 80 TO 1, AND THE SENSITIVITY WILL BE 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.

------- VIKING-B ORBITER, FARMER ----------

EXPERIMENT NAME- IR SPECTROMETER -- WATER VAPOR MAPPING

NSSDC ID- VIKG-B -03

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - C.B. FARMER .....NASA-JPL
PASADENA, CA
OI - D.D. LAPORTE .....SANTA BARBARA RES CTR
GOLETA, CA

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THE IR SPECTROMETRY EXPERIMENT WILL BE 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 WILL BE BORESIGHTED WITH THE IMAGING SYSTEM. IT WILL BE OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. THE WATER VAPOR MEASUREMENT RANGE WILL BE FROM 1 TO 1000 MICRON OF PRECIPITABLE WATER WITH AN ACCURACY OF 1 MICRON BETWEEN 1 AND 20 MICRONS AND 5 PERCENT BETWEEN 20 AND 1000 MICRONS. THE INSTANTANEOUS FIELD OF VIEW OF THE INSTRUMENT IS 2 BY 16 MILLIRADIANS.

------- VIKING-B ORBITER, KIEFFER ----------

EXPERIMENT NAME- IR RADIOMETRY -- THERMAL MAPPING

NSSDC ID- VIKG-B -02

LAST REPORTED STATE- APPROVED

OSS DIVISION- PLANETARY PROGRAMS
DISCIPLINE(S)- PLANETARY ATMOSPHERES PLANETARY BIOLOGY
PLANETOLOGY

EXPERIMENT PERSONNEL (PI=PRINCIPAL INVESTIGATOR, TL=TEAM LEADER
OI=OTHER INVESTIGATOR, TM=TEAM MEMBER)

PI - H.H. KIEFFER .....U OF CALIF, LA
LOS ANGELES, CA
OI - G. MUNCH .....CALIF INST OF TECH
PASADENA, CA
OI - E.D. MINER .....NASA-JPL
PASADENA, CA
OI - G. NEUGEBAUER .....CALIF INST OF TECH
PASADENA, CA
OI - S.C. CHASE, JR. .....SANTA BARBARA RES CTR
GOLETA, CA

EXPERIMENT BRIEF DESCRIPTION

THE OBJECTIVES OF THE INFRARED RADIOMETRY EXPERIMENT WILL BE TO OBTAIN SURFACE AND ATMOSPHERIC TEMPERATURE DATA FOR MARS, TO AID IN THE SELECTION OF LANDING SITES FOR THE VIKING LANDERS, AND (FOR FUTURE MISSIONS) TO MONITOR THE REGIONS SURROUNDING THE LANDER AND STUDY THE DYNAMIC CHARACTERISTICS OF MARS. THE INFRARED RADIOMETER WILL BE BORESIGHTED WITH THE IMAGING SYSTEM ON THE SCAN PLATFORM AND WILL BE OPERABLE FROM THE PERIAPSIS AND APOAPSIS REGIONS OF THE ORBIT. A TOTAL OF 28 DETECTORS IN FOUR TELESCOPES WILL COVER FIVE INFRARED WAVELENGTH BANDS AND THE INTEGRAL SOLAR SPECTRUM. THE TEMPERATURE RESOLUTION WILL BE 1 DEG K AT 200 DEG K, AND THE MEASUREMENT RANGE WILL BE FROM 140 TO 330 DEG K. THERE WILL BE SEVEN SIMULTANEOUS FIELDS OF VIEW ARRANGED IN A "V" PATTERN, EACH FIVE MILLIRADIANS IN DIAMETER.

Index of Spacecraft and Experiments

3. INDEXES

3.1 INDEX OF SPACECRAFT AND EXPERIMENTS

The following pages contain a list of the names of all spacecraft and experiments described in section 2. The spacecraft are listed alphabetically by both common 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 status. For launched spacecraft, the epoch date, status, and data rate of the spacecraft or experiment are listed under the CURRENT STATE heading. For unlaunched spacecraft, the state is given as PROPOSED or APPROVED, and each experiment is given as APPROVED or APPROVED CONDITIONALLY. The state values are those current as of October 31, 1974, which, in the case of launched spacecraft and experiments, became effective as of the date shown in the EPOCH date column. An explanation of the terms used in these columns may be found in Appendix A - Definitions. 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 experiment status are also given for each experiment. Finally, each name is followed by a page number that references the description of the spacecraft or experiment.

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATE: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
AD-1	SEE DADE-A							
AD-2	SEE DADE-B							
AD-A	UNITED STATES / NASA-OSS	12/19/63	GEOCENTRIC	63-053A	00/00/67	PARTIAL	SUBS	5
O'SULLIVAN, JR.	SATELLITE DRAG ATMOSPHERIC DENSITY			63-053A-01	12/19/63	PARTIAL	SUBS	5
AD-C	UNITED STATES / NASA-OSS	08/08/68	GEOCENTRIC	68-066A	06/00/71	PARTIAL	STD	5
KEATING	SATELLITE DRAG ATMOSPHERIC DENSITY			68-066A-01	08/08/68	NORMAL	STD	5
AE-C	UNITED STATES / NASA-OSS	12/16/73	GEOCENTRIC	73-101A	12/16/73	NORMAL	STD	5
BARTH	ULTRAVIOLET NITRIC-OXIDE EXPERIMENT			73-101A-13	12/16/73	NORMAL	STD	6
BRACE	ELECTRON TEMPERATURE AND CONCENTRATION			73-101A-01	12/16/73	NORMAL	STD	6
BRINTON	BENNETT ION-MASS SPECTROMETER			73-101A-11	12/16/73	NORMAL	STD	6
CHAMPION	ATMOSPHERIC DRAG			73-101A-02	12/17/73	NORMAL	STD	6
DOERING	PHOTOELECTRON SPECTROMETER			73-101A-03	12/16/73	NORMAL	STD	7
HANSON	ION TEMPERATURE			73-101A-04	12/16/73	NORMAL	STD	7
HAYS	AIRGLOW PHOTOMETER			73-101A-14	12/16/73	NORMAL	STD	7
HEATH	SOLAR EUV FILTER PHOTOMETER			73-101A-05	12/16/73	NORMAL	STD	7
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER			73-101A-06	12/16/73	NORMAL	STD	7
HOFFMAN	MAGNETIC ION-MASS SPECTROMETER			73-101A-10	12/16/73	NORMAL	STD	8
HOFFMAN	LOW-ENERGY ELECTRONS			73-101A-12	12/16/73	NORMAL	STD	8
NIER	OPEN SOURCE NEUTRAL MASS SPECTROMETER			73-101A-07	12/16/73	NORMAL	STD	8
RICE	COLD CATHODE ION GAUGE			73-101A-15	12/16/73	NORMAL	STD	8
RICE	CAPACITANCE MANOMETER			73-101A-16	12/16/73	NORMAL	STD	9
SPENCER	NEUTRAL GAS TEMPERATURE AND CONCENTRATION			73-101A-09	12/16/73	NORMAL	STD	9
AE-D	UNITED STATES / NASA-OSS	MARCH 75	GEOCENTRIC	AE-D		APPROVED		9
BARTH	ULTRAVIOLET NITRIC-OXIDE EXPERIMENT			AE-D -11	APPROVED			9
BRACE	ELECTRON TEMPERATURE AND CONCENTRATION			AE-D -01	APPROVED			10
CHAMPION	ATMOSPHERIC DRAG			AE-D -02	APPROVED			10
DOERING	PHOTOELECTRON SPECTROMETER			AE-D -03	APPROVED			10
HANSON	ION TEMPERATURE			AE-D -04	APPROVED			10
HAYS	AIRGLOW PHOTOMETER			AE-D -13	APPROVED			10
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER			AE-D -06	APPROVED			11
HOFFMAN	ION COMPOSITION AND CONCENTRATION			AE-D -10	APPROVED			11
HOFFMAN	LOW-ENERGY ELECTRONS			AE-D -12	APPROVED			11
NIER	OPEN SOURCE NEUTRAL MASS SPECTROMETER			AE-D -07	APPROVED			11
PELZ	CLOSED SOURCE NEUTRAL MASS SPECTROMETER			AE-D -08	APPROVED			12
RICE	CAPACITANCE MANOMETER			AE-D -14	APPROVED			12
RICE	COLD CATHODE ION GAUGE			AE-D -15	APPROVED			12
SPENCER	NEUTRAL GAS TEMPERATURE AND CONCENTRATION			AE-D -09	APPROVED			13
AE-E	UNITED STATES / NASA-OSS	SEPT. 75	GEOCENTRIC	AE-E		APPROVED		13
BRACE	ELECTRON TEMPERATURE AND CONCENTRATION			AE-E -01	APPROVED			13
BRINTON	ION COMPOSITION AND CONCENTRATION			AE-E -10	APPROVED			13
CHAMPION	ATMOSPHERIC DRAG			AE-E -02	APPROVED			14
DOERING	PHOTOELECTRON SPECTROMETER			AE-E -03	APPROVED			14
HANSON	ION TEMPERATURE			AE-E -04	APPROVED			14
HAYS	AIRGLOW PHOTOMETER			AE-E -11	APPROVED			14
HEATH	SOLAR EUV FILTER PHOTOMETER			AE-E -05	APPROVED			14
HINTEREGGER	SOLAR EUV SPECTROPHOTOMETER			AE-E -06	APPROVED			15
NIER	OPEN SOURCE NEUTRAL MASS SPECTROMETER			AE-E -07	APPROVED			15
PELZ	CLOSED SOURCE NEUTRAL MASS SPECTROMETER			AE-E -08	APPROVED			15
RICE	CAPACITANCE MANOMETER			AE-E -12	APPROVED			16
RICE	COLD CATHODE ION GAUGE			AE-E -13	APPROVED			16
SPENCER	NEUTRAL GAS TEMPERATURE AND CONCENTRATION			AE-E -09	APPROVED			16
AEROS 2	FED REP OF GERMANY / GFR UNITED STATES / NASA-OSS	07/16/74	GEOCENTRIC	74-055A	08/06/74	PARTIAL	SUBS	16
KRANKOWSKY	MASS SPECTROMETER (MS)			74-055A-01	08/06/74	NORMAL	SUBS	17
NESKE	ELECTRON CONCENTRATION IN THE IONOSPHERE			74-055A-03	08/06/74	NORMAL	SUBS	17
ROEMER	ATMOSPHERIC DRAG ANALYSIS			74-055A-06	08/06/74	NORMAL	SUBS	17
SCHMIDTKE	FLUX AND SPECTRAL DISTRIBUTION OF SOLAR EUV RAD AND THEIR TEMP AND SPATIAL VAR			74-055A-04	08/06/74	NORMAL	SUBS	17
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE EXPERIMENT			74-055A-05	08/06/74	NORMAL	SUBS	17
SPENNER	ENERGY DISTRIBUTION OF IONS AND ELECTRONS			74-055A-02	08/06/74	NORMAL	SUBS	17
AEROS-B	SEE AEROS 2							
ALOUETTE 2	CANADA / CRC UNITED STATES / NASA-OSS	11/29/65	GEOCENTRIC	65-098A	03/01/73	PARTIAL	SUBS	18
BELROSE	VLF RECEIVER			65-098A-02	03/01/73	NORMAL	SUBS	18
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			65-098A-05	03/01/73	NORMAL	SUBS	18
HARTZ	COSMIC RADIO NOISE			65-098A-03	03/01/73	NORMAL	SUBS	18
MCDIARMID	ENERGETIC PARTICLES DETECTORS			65-098A-04	03/01/73	NORMAL	SUBS	18
WHITTEKER	SWEEP FREQUENCY SOUNDER			65-098A-01	03/01/73	NORMAL	SUBS	19
ALOUETTE-B	SEE ALOUETTE 2							
ALPO	SEE LUNAR POLAR ORB-DAUGHTER							
ALPO	SEE LUNAR POLAR ORB-MOTHER							
ALSEP 12	SEE APOLLO 12 LM/ALSEP							
ALSEP 14	SEE APOLLO 14 LM/ALSEP							
ALSEP 15	SEE APOLLO 15 LM/ALSEP							

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATE: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
ALSEP 16	SEE APOLLO 16 LM/ALSEP							
ALSEP 17	SEE APOLLO 17 LM/ALSEP							
AMPS	UNITED STATES / NASA-OSS	STUDY	GEOCENTRIC	AMPS		PROPOSED		19
ANS	NETHERLANDS / NIVR UNITED STATES / NASA-OSS	08/30/74	GEOCENTRIC	74-070A	08/30/74	NORMAL	SUBS	19
BRINKMAN	LOW-ENERGY X-RAY EXPERIMENT			74-070A-02	08/30/74	NORMAL	SUBS	19
GURSKY	HIGH ANGULAR AND SPECTRAL RESOLUTION OBSERVATIONS OF COSMIC X-RAY SOURCES			74-070A-03	08/30/74	NORMAL	SUBS	19
VANDUINEN	UV TELESCOPE			74-070A-01	08/30/74	NORMAL	SUBS	20
APOLLO 12 LM/ALSEP	UNITED STATES / NASA-OMSF UNITED STATES / NASA-CSS	11/14/69	LUNAR LANDER	69-099C	11/19/69	NORMAL	STD	20
FREEMAN	SUPRATHERMAL ION DETECTOR			69-099C-05	03/18/70	NORMAL	SUBS	20
LATHAM	PASSIVE SEISMIC			69-099C-03	11/19/69	PARTIAL	STD	20
SNYDER	SOLAR WIND SPECTROMETER			69-099C-02	11/05/71	PARTIAL	STD	20
APOLLO 12C	SEE APOLLO 12 LM/ALSEP							
APOLLO 14 LM/ALSEP	UNITED STATES / NASA-OMSF UNITED STATES / NASA-CSS	01/31/71	LUNAR LANDER	71-008C	02/05/71	NORMAL	STD	20
FREEMAN	SUPRATHERMAL ION DETECTOR			71-008C-06	03/29/72	PARTIAL	SUBS	21
JOHNSON	COLD CATHODE ION GAUGE EXPERIMENT			71-008C-07	04/15/73	PARTIAL	SUBS	21
KOVACH	ACTIVE SEISMIC			71-008C-05	12/07/73	PARTIAL	SUBS	21
LATHAM	PASSIVE SEISMIC			71-008C-04	03/20/72	PARTIAL	SUBS	21
O'BRIEN	CHARGED PARTICLE LUNAR ENVIRONMENT			71-008C-08	06/06/71	PARTIAL	SUBS	21
APOLLO 14C	SEE APOLLO 14 LM/ALSEP							
APOLLO 15 LM/ALSEP	UNITED STATES / NASA-OMSF UNITED STATES / NASA-OSS	07/26/71	LUNAR LANDER	71-063C	07/30/71	NORMAL	STD	22
BATES	LUNAR DUST DETECTOR			71-063C-09	07/31/71	NORMAL	STD	22
FREEMAN	SUPRATHERMAL ION DETECTOR			71-063C-05	09/13/73	PARTIAL	SUBS	22
JOHNSON	COLD CATHODE ION GAUGE EXPERIMENT			71-063C-07	02/22/73	PARTIAL	SUBS	22
LANGSETH	HEAT FLOW			71-063C-06	08/07/71	PARTIAL	STD	22
LATHAM	PASSIVE SEISMIC			71-063C-01	07/31/71	NORMAL	STD	23
APOLLO 15C	SEE APOLLO 15 LM/ALSEP							
APOLLO 16 LM/ALSEP	UNITED STATES / NASA-OMSF UNITED STATES / NASA-CSS	04/16/72	LUNAR LANDER	72-031C	04/21/72	NORMAL	STD	23
DYAL	LUNAR SURFACE MAGNETOMETER			72-031C-03	08/17/73	NORMAL	STD	23
KOVACH	ACTIVE SEISMIC			72-031C-02	12/07/73	NORMAL	SUBS	23
LATHAM	PASSIVE SEISMIC			72-031C-01	04/21/72	NORMAL	STD	23
APOLLO 16C	SEE APOLLO 16 LM/ALSEP							
APOLLO 17 LM/ALSEP	UNITED STATES / NASA-OMSF UNITED STATES / NASA-CSS	12/07/72	LUNAR LANDER	72-096C	12/11/72	NORMAL	STD	24
BERG	LUNAR EJECTA AND METEORITES			72-096C-05	12/17/72	PARTIAL	SUBS	24
KOVACH	LUNAR SEISMIC PROFILING EXPERIMENT			72-096C-06	12/20/72	NORMAL	SUBS	24
LANGSETH	HEAT FLOW			72-096C-01	12/11/72	NORMAL	STD	24
WEBER	LUNAR SURFACE GRAVIMETER			72-096C-09	12/12/72	PARTIAL	SUBS	24
APOLLO 17C	SEE APOLLO 17 LM/ALSEP							
ASTRO NETHERLAND SAT.	SEE ANS							
ATMOSPHERE EXPLORER-C	SEE AE-C							
ATMOSPHERE EXPLORER-D	SEE AE-D							
ATMOSPHERE EXPLORER-E	SEE AE-E							
AUTO.LUNAR POLAR ORBITER	SEE LUNAR POLAR ORB-DAUGHTER							
AUTO.LUNAR POLAR ORBITER	SEE LUNAR POLAR ORB-MOTHER							
COPERNICUS	SEE OAO 3							
DAD	SEE DADE-A							
DAD	SEE DADE-B							
DADE-A	UNITED STATES / NASA-CSS	2HALF 75	GEOCENTRIC	DADE-A		APPROVED		25
KEATING	ATMOSPHERIC DRAG DENSITY			DADE-A -01	APPROVED			25
NIER	ATMOSPHERIC COMPOSITION MASS SPECTROMETER			DADE-A -02	APPROVED			25
DADE-B	UNITED STATES / NASA-CSS	2HALF 75	GEOCENTRIC	DADE-B		APPROVED		25
KEATING	ATMOSPHERIC DRAG DENSITY			DADE-B -01	APPROVED			25
NIER	ATMOSPHERIC COMPOSITION MASS SPECTROMETER			DADE-B -02	APPROVED			26
DAUGHTER	SEE ISEE-B							
DUAL AIR DENSITY EXPL-A	SEE DADE-A							
DUAL AIR DENSITY EXPL-B	SEE DADE-B							
EXPLORER 19	SEE AD-A							
EXPLORER 37	SEE SOLRAD 9							

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATE EPOCH MMDDYY	CURRENT STATE STATUS	CURRENT STATE DATA RATE	PAGE NO.
EXPLORER 39	SEE AD-C							
EXPLORER 42	SEE SAS-A							
EXPLORER 44	SEE SOLRAD 10							
EXPLORER 47	SEE IMP-H							
EXPLORER 49	SEE RAE-B							
EXPLORER 50	SEE IMP-J							
EXPLORER 51	SEE AE-C							
EXPLORER 52	SEE HAWKEYE 1							
GP-A	UNITED STATES / NASA-OSS	1975	GEOCENTRIC	GRAVR-A		APPROVED		26
VESSOT	GRAVITATIONAL POTENTIAL AS A FUNCTION OF TIME			GRAVR-A-01	APPROVED			26
GRAVITATIONAL REDSHIFT P	SEE GP-A							
GRAVR-A	SEE GP-A							
HAWKEYE 1	UNITED STATES / NASA-OSS	06/03/74	GEOCENTRIC	74-040A	06/03/74	NORMAL	STD	26
FRANK	LOW-ENERGY PROTONS AND ELECTRONS			74-040A-02	06/03/74	NORMAL	STD	26
GURNETT	ELF/VLF RECEIVERS			74-040A-03	06/03/74	NORMAL	STD	26
VAN ALLEN	TRIAXIAL FLUXGATE MAGNETOMETER			74-040A-01	06/03/74	NORMAL	STD	27
HEAO-A	UNITED STATES / NASA-OSS	1HALF 77	GEOCENTRIC	HEAO-A		APPROVED		27
BOLDT	COSMIC X-RAY EXPERIMENT			HEAO-A -02	APPROVED			27
FRIEDMAN	LARGE AREA COSMIC X-RAY SURVEY			HEAO-A -01	APPROVED			27
GURSKY	X-RAY SCANNING MODULATION COLLIMATOR			HEAO-A -03	APPROVED			27
PETERSON	LOW-ENERGY GAMMA-RAY AND HARD X-RAY SKY SURVEY			HEAO-A -04	APPROVED			28
HEAO-B	UNITED STATES / NASA-OSS	2HALF 78	GEOCENTRIC	HEAO-B		APPROVED		28
BOLDT	SOLID-STATE X-RAY DETECTOR			HEAO-B -05	APPROVED			28
CLARK	A CURVED-CRYSTAL BRAGG X-RAY SPECTROMETER			HEAO-B -03	APPROVED			28
GIACCONI	MONITOR PROPORTIONAL COUNTER			HEAO-B -01	APPROVED			28
GIACCONI	HIGH RESOLUTION IMAGER			HEAO-B -02	APPROVED			29
GURSKY	IMAGING PROPORTIONAL COUNTER			HEAO-B -04	APPROVED			29
HEAO-C	UNITED STATES / NASA-OSS	2HALF 79	GEOCENTRIC	HEAO-C		APPROVED		29
ISRAEL	HEAVY NUCLEII EXPERIMENT			HEAO-C -03	APPROVED			29
JACOBSON	GAMMA-RAY LINE SPECTROMETER			HEAO-C -01	APPROVED			29
KOCH	ISOTOPIC COMPOSITION OF COSMIC RAYS			HEAO-C -04	APPROVED			29
HELIOCENTRIC	SEE ISEE-C							
HELIOS-A	FED REP OF GERMANY / BMWF UNITED STATES / NASA-OSS	12/10/74	HELIOCENTR	HELIO-A		APPROVED		30
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER			HELIO-A-12	APPROVED			30
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			HELIO-A-04	APPROVED			30
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTI SPECTRUM ANALYSIS			HELIO-A-05	APPROVED			30
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			HELIO-A-06	APPROVED			30
KEPPLER	ENERGETIC ELECTRON DETECTOR			HELIO-A-10	APPROVED			31
KUNDT	CELESTIAL MECHANICS			HELIO-A-14	APPROVED	CONDITIONALLY		31
KUNOW	COSMIC-RAY PARTICLES			HELIO-A-07	APPROVED			31
LEINERT	ZODIACAL LIGHT PHOT			HELIO-A-11	APPROVED			31
NESS	FLUXGATE MAGNETOMET R AVERAGE FIELDS			HELIO-A-02	APPROVED			31
NEUBAUER	FLUXGATE MAGNETOMETE FOR FIELD FLUCTUATIONS			HELIO-A-01	APPROVED			31
NEUBAUER	SEARCH COIL MAGNETOMETER			HELIO-A-03	APPROVED			31
ROSENBAUER	PLASMA DETECTORS			HELIO-A-09	APPROVED			32
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			HELIO-A-08	APPROVED			32
HELIOS-B	FED REP OF GERMANY / BMWF UNITED STATES / NASA-OSS	JAN. 76	HELIOCENTRIC	HELIO-B		APPROVED		32
FECHTIG	MICROMETEOROID DETECTOR AND ANALYZER			HELIO-B-12	APPROVED			32
GURNETT	COARSE FREQUENCY, FINE TIME RESOLUTION SPECTRUM ANALYSIS			HELIO-B-04	APPROVED			32
GURNETT	FINE FREQUENCY, COARSE TIME RESOLUTION SPECTRUM ANALYSIS			HELIO-B-05	APPROVED			32
GURNETT	50-KHZ TO 2-MHZ RADIO WAVE			HELIO-B-06	APPROVED			33
KEPPLER	ENERGETIC ELECTRON DETECTOR			HELIO-B-10	APPROVED			33
KUNDT	CELESTIAL MECHANICS			HELIO-B-14	APPROVED	CONDITIONALLY		33
KUNOW	COSMIC-RAY PARTICLES			HELIO-B-07	APPROVED			33
LEINERT	ZODIACAL LIGHT PHOTOMETER			HELIO-B-11	APPROVED			33
NESS	FLUXGATE MAGNETOMETER FOR AVERAGE FIELDS			HELIO-B-02	APPROVED			33
NEUBAUER	FLUXGATE MAGNETOMETER FOR FIELD FLUCTUATIONS			HELIO-B-01	APPROVED			33
NEUBAUER	SEARCH COIL MAGNETOMETER			HELIO-B-03	APPROVED			34
ROSENBAUER	PLASMA DETECTORS			HELIO-B-09	APPROVED			34
TRAINOR	GALACTIC AND SOLAR COSMIC RAYS			HELIO-B-08	APPROVED			34
IME-D	SEE ISEE-B							
IME-H	SEE ISEE-C							
IME-M	SEE ISEE-A							
IMP 7	SEE IMP-H							

LAUNCHED SUCCESSFULLY 12/10/74

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATE EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
IMP 8	SEE IMP-J							
IMP-H	UNITED STATES NASA-OSS	09/23/72	GEOCENTRIC	72-073A	09/23/72	NORMAL	STD	34
BAME	MEASUREMENT OF SOLAR PLASMA			72-073A-10	09/23/72	NORMAL	STD	34
BRIDGE	MEASUREMENT OF SOLAR PLASMA			72-073A-02	12/11/73	PARTIAL	STD	35
CLINE	STUDY OF COSMIC-RAY, SOLAR, AND MAGNETOSPHERIC ELECTRONS			72-073A-13	10/13/72	NORMAL	STD	35
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			72-073A-04	09/23/72	NORMAL	STD	35
GLOECKLER	IONS AND ELECTRONS IN THE ENERGY RANGE 0.1 TO 2 MEV			72-073A-03	11/25/72	PARTIAL	STD	35
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			72-073A-08	12/11/73	PARTIAL	STD	35
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			72-073A-09	09/26/72	NORMAL	STD	35
OGILVIE	SOLAR WIND ION COMPOSITION			72-073A-12	09/24/72	NORMAL	STD	36
SCARF	PLASMA WAVE EXPERIMENT			72-073A-11	09/24/72	NORMAL	SUBS	36
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z ISOTOPE EXPERIMENT			72-073A-07	09/23/72	NORMAL	STD	36
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			72-073A-06	09/23/72	NORMAL	STD	36
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			72-073A-05	09/26/72	NORMAL	STD	36
IMP-J	UNITED STATES NASA-OSS	10/26/73	GEOCENTRIC	73-078A	10/26/73	NORMAL	STD	37
AGGSON	ELECTROSTATIC FIELDS			73-078A-11	10/26/73	NORMAL	STD	37
BAME	MEASUREMENT OF SOLAR PLASMA			73-078A-10	10/26/73	NORMAL	STD	37
BRIDGE	MEASUREMENT OF SOLAR PLASMA			73-078A-02	10/26/73	NORMAL	STD	37
FRANK	MEASUREMENT OF LOW-ENERGY PROTONS AND ELECTRONS			73-078A-04	10/26/73	NORMAL	STD	37
GLOECKLER	SOLID-STATE DETECTORS			73-078A-03	10/26/73	NORMAL	STD	37
GURNETT	ELECTROSTATIC WAVES AND RADIO NOISE			73-078A-12	10/26/73	NORMAL	STD	38
KRIMIGIS	CHARGED PARTICLE MEASUREMENTS EXPERIMENT			73-078A-08	04/00/74	PARTIAL	STD	38
MCDONALD	SOLAR AND COSMIC-RAY PARTICLES			73-078A-09	10/26/73	NORMAL	STD	38
NESS	MAGNETIC FIELD EXPERIMENT			73-078A-01	10/26/73	NORMAL	STD	38
SIMPSON	SOLAR FLARE HIGH-Z/LOW-E AND LOW-Z EXPERIMENTS			73-078A-07	10/26/73	NORMAL	STD	38
STONE	ELECTRONS AND HYDROGEN AND HELIUM ISOTOPES			73-078A-06	10/26/73	NORMAL	STD	39
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			73-078A-05	10/26/73	NORMAL	STD	39
IMP-K	SEE ISEE-A							
IMP-K PRIME	SEE ISEE-B							
INJUN-F	SEE HAWKEYE 1							
INT ULTRAVIOLET EXPL	SEE IUE							
INTA SATELLITE	SEE INTASAT							
INTASAT	SPAIN	15/74	GEOCENTRIC	INTASAT	APPROVED			39
	UNITED STATES							
UNKNOWN	IONOSPHER			INTASAT-01	APPROVED			39
ISEE-A	UNITED STATES NASA-OSS	2HALF 77	GEOCENTRIC	MOTHER	APPROVED			39
	INTERNATIONAL ESRO							
ANDERSON	ENERGETIC ELECTRONS AND PROTONS			MOTHER -10	APPROVED CONDITIONALLY			40
BAME	50-EV TO 40-KEV PROTON AND 5-EV TO 20-KEV ELECTRON PLASMA PROBE			MOTHER -01	APPROVED CONDITIONALLY			40
FRANK	HOT PLASMA			MOTHER -03	APPROVED CONDITIONALLY			40
GURNETT	10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD TRIAXIAL PROBES			MOTHER -07	APPROVED CONDITIONALLY			40
HARVEY	ACTIVE PLASMA EXPERIMENT			MOTHER -08	APPROVED CONDITIONALLY			40
HELLIWELL	VLF WAVE INJECTION			MOTHER -13	APPROVED CONDITIONALLY			41
HEPPNER	DC ELECTRIC FIELDS			MOTHER -11	APPROVED CONDITIONALLY			41
HOVESTADT	LOW-ENERGY COSMIC-RAY COMPOSITION			MOTHER -05	APPROVED CONDITIONALLY			41
MOZER	DC TO 12-HZ ELECTRIC FIELD PROBE			MOTHER -06	APPROVED CONDITIONALLY			41
OGILVIE	THREE-DIMENSIONAL (SIX AXES), 6-EV TO 10-KEV ELECTRON SPECTROMETERS			MOTHER -02	APPROVED CONDITIONALLY			41
RUSSELL	MAGNETIC FIELDS			MOTHER -04	APPROVED CONDITIONALLY			42
SHARP	PLASMA COMPOSITION			MOTHER -12	APPROVED CONDITIONALLY			42
SIMPSON	MEDIUM-ENERGY COSMIC RAYS			MOTHER -14	APPROVED CONDITIONALLY			42
WILLIAMS	ENERGETIC ELECTRONS AND PROTONS			MOTHER -09	APPROVED CONDITIONALLY			42
ISEE-B	UNITED STATES NASA-OSS	2HALF 77	GEOCENTRIC	DAUGHTR	APPROVED			42
	INTERNATIONAL ESRO							
ANDERSON	ENERGETIC ELECTRONS AND PROTONS			DAUGHTR-08	APPROVED CONDITIONALLY			43
EGIDI	50-EV TO 25-KEV ION AND 35-EV TO 7-KEV ELECTRON PLASMA PROBES			DAUGHTR-02	APPROVED CONDITIONALLY			43
FRANK	HOT PLASMA			DAUGHTR-03	APPROVED CONDITIONALLY			43
GURNETT	10-HZ TO 10-KHZ MAGNETIC AND 10-HZ TO 200-KHZ ELECTRIC FIELD MONOAXIAL PROBES			DAUGHTR-05	APPROVED CONDITIONALLY			43
HARVEY	RADIO PROPAGATION RECEIVER			DAUGHTR-06	APPROVED CONDITIONALLY			43
KEPPLER	ENERGETIC ELECTRONS AND PROTONS			DAUGHTR-07	APPROVED CONDITIONALLY			44
PASCHMANN	50-EV TO 40-KEV PROTON AND 5-EV TO 20-KEV ELECTRON PLASMA PROBE			DAUGHTR-01	APPROVED CONDITIONALLY			44
RUSSELL	MAGNETIC FIELDS			DAUGHTR-04	APPROVED CONDITIONALLY			44
ISEE-C	UNITED STATES NASA-OSS	2HALF 78	HELIOCENTRIC	HELOCTR	APPROVED			44
ANDERSON	X RAYS AND ELECTRONS			HELOCTR-09	APPROVED CONDITIONALLY			44
BAME	150-EV TO 7-KEV PROTON AND 5-EV TO 2.5-KEV ELECTRON PLASMA PROBE			HELOCTR-01	APPROVED CONDITIONALLY			45
DE FEITER	ENERGETIC PROTONS			HELOCTR-08	APPROVED CONDITIONALLY			45
HECKMAN	HIGH-ENERGY COSMIC RAYS			HELOCTR-05	APPROVED CONDITIONALLY			45
HOVESTADT	LOW-ENERGY COSMIC-RAY COMPOSITION			HELOCTR-03	APPROVED CONDITIONALLY			45
MEYER	COSMIC-RAY ELECTRONS AND NUCLEI			HELOCTR-06	APPROVED CONDITIONALLY			45

LAUNCHED SUCCESSFULLY 11/15/74

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY / EXPERIMENT NAME	LAUNCH DATE	ORBIT TYPE	NSSDC ID	CURRENT STATE: EPOCH MMDDYY	STATUS	DATA RATE	PAGE NO.
OGILVIE	MASS SPECTROMETER FOR 470 TO 10,500 EV PER CHARGE AND 1 TO 5.6 AMU PER CHARGE			HELOCTR-11		APPROVED CONDITIONALLY		46
SCARF	20-HZ TO 1-KHZ MAGNETIC AND 20-HZ TO 100-KHZ ELECTRIC FIELD DETECTORS			HELOCTR-07		APPROVED CONDITIONALLY		46
SMITH	MAGNETIC FIELDS			HELOCTR-02		APPROVED CONDITIONALLY		46
STEINBERG	20-KHZ TO 3-MHZ RADIO MAPPING			HELOCTR-10		APPROVED CONDITIONALLY		46
STONE	COSMIC-RAY COMPOSITION			HELOCTR-12		APPROVED CONDITIONALLY		46
VON ROSENVING	SOLAR AND GALACTIC ENERGETIC PARTICLES			HELOCTR-04		APPROVED CONDITIONALLY		46
WILCOX	SOLAR AND INTERPLANETARY MAGNETIC FIELDS (CORRELATIVE STUDY)			HELOCTR-13		APPROVED CONDITIONALLY		47
ISIS 1	CANADA / UNITED STATES	CRC / NASA-OSS	01/30/69 GEOCENTRIC	69-009A	01/30/70	PARTIAL	SUBS	47
BARRINGTON	VLF RECEIVER			69-009A-03	01/30/70	NORMAL	SUBS	47
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			69-009A-07	01/30/70	NORMAL	SUBS	47
CALVERT	FIXED FREQUENCY SOUNDER			69-009A-02	01/30/70	NORMAL	SUBS	48
FORSYTH	RADIO BEACON			69-009A-09	01/30/69	PARTIAL	SUBS	48
HARTZ	COSMIC RADIO NOISE			69-009A-10	01/30/70	NORMAL	SUBS	48
MCDIARMID	ENERGETIC PARTICLE DETECTORS			69-009A-04	01/30/70	NORMAL	SUBS	48
SAGALYN	SPHERICAL ELECTROSTATIC ANALYZER			69-009A-08	01/30/70	NORMAL	SUBS	48
WHITTEKER	SWEEP FREQUENCY SOUNDER			69-009A-01	01/30/70	NORMAL	SUBS	49
ISIS 2	CANADA / UNITED STATES	CRC / NASA-OSS	04/01/71 GEOCENTRIC	71-024A	02/04/73	NORMAL	SUBS	49
ANGER	3914- TO 5577-A PHOTOMETER			71-024A-11	02/04/73	NORMAL	SUBS	49
BARRINGTON	VLF RECEIVER			71-024A-03	02/04/73	NORMAL	SUBS	50
BRACE	CYLINDRICAL ELECTROSTATIC PROBE			71-024A-07	02/04/73	NORMAL	SUBS	50
CALVERT	FIXED FREQUENCY SOUNDER			71-024A-02	02/04/73	NORMAL	SUBS	50
FORSYTH	RADIO BEACON			71-024A-09	04/23/71	PARTIAL	SUBS	50
HARTZ	COSMIC RADIO NOISE			71-024A-10	02/04/73	NORMAL	SUBS	50
HEIKKILA	SOFT-PARTICLE SPECTROMETER			71-024A-05	02/04/72	PARTIAL	STD	50
HOFFMAN	ION MASS SPECTROMETER			71-024A-06	02/04/73	NORMAL	SUBS	51
MAIER	RETARDING POTENTIAL ANALYZER			71-024A-08	02/04/73	NORMAL	SUBS	51
MCDIARMID	ENERGETIC PARTICLE DETECTORS			71-024A-04	02/04/72	PARTIAL	STD	51
SHEPHERD	6300-A PHOTOMETER			71-024A-12	02/04/73	NORMAL	SUBS	51
WHITTEKER	SWEEP FREQUENCY SOUNDER			71-024A-01	02/04/73	NORMAL	SUBS	51
ISIS-A	SEE ISIS 1							
ISIS-B	SEE ISIS 2							
ISIS-X	SEE ALOUETTE 2							
IUE	UNITED STATES / INTERNATIONAL / UNITED KINGDOM	NASA-OSS / ESRO / SRC	2HALF 76 GEOCENTRIC	SAS-D		APPROVED		52
NONE ASSIGNED	LOW/HIGH RESOLUTION, ULTRAVIOLET SPECTROGRAPH PACKAGE			SAS-D -01	APPROVED			52
LARGE SPACE TELESCOPE	SEE LST							
LEM 12	SEE APOLLO 12 LM/ALSEP							
LEM 14	SEE APOLLO 14 LM/ALSEP							
LEM 15	SEE APOLLO 15 LM/ALSEP							
LEM 16	SEE APOLLO 16 LM/ALSEP							
LEM 17	SEE APOLLO 17 LM/ALSEP							
LST	UNITED STATES	NASA-OSS	00/00/80 GEOCENTRIC	LST		PROPOSED		52
LUNAR POLAR ORB-DAUGHTER	UNITED STATES	NASA-OSS	PROPSD79 SELENOCENTRIC	LPO-D		PROPOSED		53
LUNAR POLAR ORB-MOTHER	UNITED STATES	NASA-OSS	PROPSD79 SELENOCENTRIC	LPO-M		PROPOSED		53
MARINER 10	UNITED STATES	NASA-OSS	11/03/73 VENUS FLYBY	73-085A	11/03/73	NORMAL	STD	53
BRIDGE	MEASUREMENT OF PLASMA ENVIRONMENT			73-085A-03	11/03/73	NORMAL	STD	53
BROADFOOT	EUV SPECTROSCOPY			73-085A-05	11/03/73	NORMAL	STD	54
CHASE, JR.	TWO-CHANNEL IR RADIOMETER			73-085A-06	04/00/74	NORMAL	ZERO	54
HOWARD	S- AND X-BAND RADIO PROPAGATION			73-085A-02	11/03/73	NORMAL	STD	54
MURRAY	TELEVISION PHOTOGRAPHY			73-085A-01	09/25/74	NORMAL	ZERO	54
NESS	FLUXGATE MAGNETOMETERS			73-085A-04	11/03/73	NORMAL	STD	55
SIMPSON	ENERGETIC PARTICLES			73-085A-07	11/03/73	NORMAL	STD	55
MARINER 73	SEE MARINER 10							
MARINER 77A	SEE MJS 77A							
MARINER 77B	SEE MJS 77B							
MARINER JUPITER/SATURN A	SEE MJS 77A							
MARINER JUPITER/SATURN B	SEE MJS 77B							
MARINER VENUS/MERCURY 73	SEE MARINER 10							
MARINER-J VENUS/MERCURY	SEE MARINER 10							
MJS 77A	UNITED STATES	NASA-OSS	08/00/77 JUPITER FLYBY	MARN77A		APPROVED		55
BRIDGE	PLASMA			MARN77A-06	APPROVED			55
BROADFOOT	ULTRAVIOLET SPECTROSCOPY			MARN77A-04	APPROVED			55
ESHLEMAN	RADIO SCIENCE TEAM			MARN77A-02	APPROVED			55
HANEL	INFRARED SPECTROSCOPY AND RADIOMETRY			MARN77A-03	APPROVED	CONDITIONALLY		56
KRIMIGIS	LOW-ENERGY CHARGED PARTICLE ANALYZER AND			MARN77A-07	APPROVED	CONDITIONALLY		56

SPACECRAFT NAME / *PRINC.INVEST.NAME	COUNTRY AND AGENCY	LAUNCH DATE	ORBIT TYPE	EXPERIMENT NAME	NSSDC ID	CURRENT STATE EPOCH MMDDYY	CURRENT STATE STATUS	CURRENT STATE DATA RATE	PAGE NO.
				TELESCOPE					
LILLIE				MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A	MARN77A-11	APPROVED			56
NESS				TRIAXIAL FLUXGATE MAGNETOMETERS	MARN77A-05	APPROVED	CONDITIONALLY		56
SCARF				PLASMA WAVE	MARN77A-13	APPROVED	CONDITIONALLY		57
SMITH				TV PHOTOGRAPHY	MARN77A-01	APPROVED	CONDITIONALLY		57
VOGT				HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE	MARN77A-08	APPROVED	CONDITIONALLY		57
WARWICK				PLANETARY RADIO ASTRONOMY	MARN77A-10	APPROVED			57
MJS 77B	UNITED STATES	NASA-OSS	08/00/77	JUPITER FLYBY	MARN77B		APPROVED		58
BRIDGE				PLASMA	MARN77B-06	APPROVED			58
BROADFOOT				ULTRAVIOLET SPECTROSCOPY	MARN77B-04	APPROVED			58
ESHLEMAN				RADIO SCIENCE TEAM	MARN77B-02	APPROVED			58
HANEL				INFRARED SPECTROSCOPY AND RADIOMETRY	MARN77B-03	APPROVED	CONDITIONALLY		58
KRIMIGIS				LOW-ENERGY CHARGED PARTICLE ANALYZER AND TELESCOPE	MARN77B-07	APPROVED	CONDITIONALLY		59
LILLIE				MULTIFILTER PHOTOPOLARIMETER, 2200-7300 A	MARN77E-11	APPROVED			59
NESS				TRIAXIAL FLUXGATE MAGNETOMETERS	MARN77B-05	APPROVED	CONDITIONALLY		59
SCARF				PLASMA WAVE	MARN77B-13	APPROVED	CONDITIONALLY		59
SMITH				TV PHOTOGRAPHY	MARN77B-01	APPROVED	CONDITIONALLY		59
VOGT				HIGH- AND MODERATELY LOW-ENERGY COSMIC-RAY TELESCOPE	MARN77B-08	APPROVED	CONDITIONALLY		60
WARWICK				PLANETARY RADIO ASTRONOMY	MARN77B-10	APPROVED			60
MOTHER	SEE ISEE-A								
NEUTRAL POINT EXPLORER	SEE HAWKEYE 1								
OAO 3	UNITED STATES	NASA-OSS	08/21/72	GEOCENTRIC	72-065A	08/21/72	NORMAL	STD	60
BOYD				STELLAR PHOTOMETRY	72-065A-02	06/00/73	PARTIAL	STD	60
SPITZER				HIGH RESOLUTION TELESCOPES	72-065A-01	08/21/72	NORMAL	STD	61
OAO-C	SEE OAO 3								
ONE METER UV TELESCOPE	UNITED STATES	NASA-OSS	1982	GEOCENTRIC	OMUVTEL		PROPOSED		61
OSO 5	UNITED STATES	NASA-OSSA	01/22/69	GEOCENTRIC	69-006A	07/15/74	PARTIAL	STD	61
BLAMONT				MEASUREMENT OF THE SELF REVERSAL OF THE SOLAR LYMAN ALPHA LINE	69-006A-06	07/15/74	NORMAL	STD	61
BOYD				X RAY SPECTROHELIOGRAPH	69-006A-01	07/15/74	NORMAL	STD	62
NEY				ZODIACAL LIGHT MONITOR	69-006A-07	07/15/74	NORMAL	STD	62
OSO-EYE	SEE OSO-I								
OSO-F	SEE OSO 5								
OSO-I	UNITED STATES	NASA-OSS	1 QTR 75	GEOCENTRIC	OSO-I		APPROVED		62
ACTON				MAPPING X-RAY HELIOMETER	OSO-I -04	APPROVED			62
BOLDT				COSMIC X-RAY SPECTROSCOPY	OSO-I -06	APPROVED			62
BONNETT				CHROMOSPHERE FINE STRUCTURE STUDY	OSO-I -02	APPROVED			63
BRUNER, JR.				HIGH RESOLUTION ULTRAVIOLET SPECTROMETER MEASUREMENTS	OSO-I -01	APPROVED			63
FROST				HIGH-ENERGY CELESTIAL X RAYS	OSO-I -07	APPROVED			63
KRAUSHAAR				SOFT X-RAY BACKGROUND RADIATION INVESTIGATION	OSO-I -05	APPROVED			63
NOVICK				HIGH-SENSITIVITY GRAPHITE CRYSTAL SPECTROSCOPY OF STELLAR AND SOLAR X RAYS	OSO-I -03	APPROVED			63
WELLER, JR.				EUV FROM EARTH AND SPACE	OSO-I -08	APPROVED			63
OUTER PLANETS A	SEE MJS 77A								
OUTER PLANETS B	SEE MJS 77B								
PIONEER 6	UNITED STATES	NASA-OSS	12/16/65	HELIOCENTRIC	65-105A	02/07/71	NORMAL	SUBS	64
BRIDGE				SOLAR WIND PLASMA FARADAY CUP	65-105A-02	02/07/71	NORMAL	SUBS	64
ESHLEMAN				TWO-FREQUENCY RADIO RECEIVER	65-105A-04	02/07/71	NORMAL	SUBS	64
FAN				COSMIC-RAY TELESCOPE	65-105A-03	07/30/72	PARTIAL	SUBS	64
MCCRACKEN				COSMIC-RAY ANISOTROPY	65-105A-05	07/30/72	NORMAL	SUBS	65
PIONEER 7	UNITED STATES	NASA-OSS	08/17/66	HELIOCENTRIC	66-075A	02/09/69	PARTIAL	SUBS	65
MCCRACKEN				COSMIC-RAY ANISOTROPY	66-075A-05	01/01/71	PARTIAL	SUBS	65
SIMPSON				COSMIC-RAY TELESCOPE	66-075A-06	01/01/71	PARTIAL	SUBS	66
WOLFE				ELECTROSTATIC ANALYZER	66-075A-03	02/16/69	PARTIAL	SUBS	66
PIONEER 8	UNITED STATES	NASA-OSS	12/13/67	HELIOCENTRIC	67-123A	05/02/71	NORMAL	SUBS	66
BERG				COSMIC DUST DETECTOR	67-123A-04	01/25/71	NORMAL	SUBS	67
ESHLEMAN				TWO-FREQUENCY BEACON RECEIVER	67-123A-03	01/25/71	NORMAL	SUBS	67
MCCRACKEN				COSMIC-RAY ANISOTROPY	67-123A-05	05/02/71	NORMAL	SUBS	67
NESS				SINGLE-AXIS MAGNETOMETER	67-123A-01	05/02/71	NORMAL	SUBS	67
WEBBER				COSMIC-RAY GRADIENT DETECTOR	67-123A-06	05/02/71	NORMAL	SUBS	68
WOLFE				ELECTROSTATIC ANALYZER	67-123A-02	01/25/71	PARTIAL	SUBS	68
PIONEER 9	UNITED STATES	NASA-OSS	11/08/68	HELIOCENTRIC	68-100A	05/19/69	NORMAL	SUBS	68
BERG				COSMIC DUST DETECTOR	68-100A-04	05/19/69	NORMAL	SUBS	69
ESHLEMAN				TWO-FREQUENCY BEACON RECEIVER	68-100A-03	05/19/69	PARTIAL	STD	69
MCCRACKEN				COSMIC-RAY ANISOTROPY	68-100A-05	05/19/69	NORMAL	SUBS	69
SCARF				PLASMA WAVE DETECTOR	68-100A-07	05/19/69	NORMAL	SUBS	69
SONETT				THREE-AXIS MAGNETOMETER	68-100A-01	05/19/69	NORMAL	SUBS	69
WEBBER				COSMIC-RAY TELESCOPE	68-100A-06	05/19/69	NORMAL	SUBS	70
WOLFE				ELECTROSTATIC ANALYZER	68-100A-02	05/19/69	PARTIAL	SUBS	70
PIONEER 10	UNITED STATES	NASA-OSS	03/02/72	JUPITER FLYBY	72-012A	03/03/72	NORMAL	STD	70
ANDERSON				CELESTIAL MECHANICS	72-012A-09	03/03/72	NORMAL	STD	70
FILLIUS				JOVIAN TRAPPED RADIATION	72-012A-05	03/03/72	NORMAL	STD	71

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GEHRELS	IMAGING PHOTOPOLARIMETER (IPP)			72-012A-07	03/03/72	NORMAL	STD	71
JUDGE	ULTRAVIOLET PHOTOMETRY			72-012A-06	03/03/72	NORMAL	STD	71
KINARD	METEOROID DETECTORS			72-012A-04	03/03/72	NORMAL	STD	71
KLIORE	S-BAND OCCULTATION			72-012A-10	03/03/72	NORMAL	STD	71
MCDONALD	COSMIC-RAY SPECTRA			72-012A-12	03/03/72	NORMAL	STD	71
SIMPSON	CHARGED PARTICLE COMPOSITION			72-012A-02	03/03/72	NORMAL	STD	72
SMITH	MAGNETIC FIELDS			72-012A-01	03/03/72	NORMAL	STD	72
SOBERMAN	ASTEROID/METEOROID ASTRONOMY			72-012A-03	03/03/72	NORMAL	STD	72
VAN ALLEN	JOVIAN CHARGED PARTICLES EXPERIMENT			72-012A-11	03/03/72	NORMAL	STD	72
WEINBERG	ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY			72-012A-14	03/03/72	NORMAL	STD	72
WOLFE	PLASMA EXPERIMENT			72-012A-13	03/03/72	NORMAL	STD	73
PIONEER 11	UNITED STATES / NASA-OSS	04/06/73	JUPITER FLYBY	73-019A	04/06/73	NORMAL	STD	73
ANDERSON	CELESTIAL MECHANICS			73-019A-09	04/06/73	NORMAL	STD	73
FILLIUS	JOVIAN TRAPPED RADIATION			73-019A-05	04/06/73	NORMAL	STD	73
GEHRELS	IMAGING PHOTOPOLARIMETER			73-019A-07	04/06/73	NORMAL	STD	73
JUDGE	ULTRAVIOLET PHOTOMETRY			73-019A-06	04/06/73	NORMAL	STD	74
KINARD	METEOROID DETECTORS			73-019A-04	04/06/73	NORMAL	STD	74
KLIORE	S-BAND OCCULTATION			73-019A-10	04/06/73	NORMAL	STD	74
MCDONALD	COSMIC-RAY SPECTRA			73-019A-12	04/06/73	NORMAL	STD	74
MUNCH	INFRARED RADIOMETER			73-019A-08	04/06/73	NORMAL	ZERO	74
NESS	JOVIAN MAGNETIC FIELD			73-019A-14	04/06/73	NORMAL	SUBS	75
SIMPSON	CHARGED PARTICLE COMPOSITION			73-019A-02	04/06/73	NORMAL	STD	75
SMITH	MAGNETIC FIELDS			73-019A-01	04/06/73	NORMAL	STD	75
SOBERMAN	ASTEROID/METEOROID ASTRONOMY			73-019A-03	04/06/73	NORMAL	STD	75
VAN ALLEN	JOVIAN CHARGED PARTICLES EXPERIMENT			73-019A-11	04/06/73	NORMAL	STD	75
WEINBERG	ZODIACAL-LIGHT TWO-COLOR PHOTOPOLARIMETRY			73-019A-15	04/06/73	NORMAL	STD	75
WOLFE	PLASMA EXPERIMENT			73-019A-13	04/06/73	NORMAL	STD	76
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE BUS							
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE LRG							
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM1							
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM2							
PIONEER VENUS 1978	SEE PIONEER VENUS PROBE SM3							
PIONEER VENUS 1978 ORBIT	SEE PIONEER VENUS ORBITER							
PIONEER VENUS ORBITER	UNITED STATES / NASA-OSS	MAY 1978	VENUSCENTRIC	PIO78OR		APPROVED		76
BRACE	LANGMUIR PROBE			PIO78OR-01	APPROVED			76
BROWN	RADAR ALTIMETER			PIO78OR-02	APPROVED			76
CROFT	RADIO SCIENCE TEAM			PIO78OR-03	APPROVED			76
DONAHUE	PARTICIPATING THEORIST DONAHUE			PIO78OR-04	APPROVED			77
EVANS	TRANSIENT GAMMA-RAY SOURCES			PIO78OR-05	APPROVED	CONDITIONALLY		77
HANSEN	CLOUD PHOTOPOLARIMETER			PIO78OR-06	APPROVED			77
KNUDSEN	RETARDING POTENTIAL ANALYZER			PIO78OR-07	APPROVED			77
MASURSKY	PARTICIPATING THEORIST MASURSKY			PIO78OR-08	APPROVED			77
MCGILL	PARTICIPATING THEORIST MCGILL			PIO78OR-09	APPROVED			77
NAGY	PARTICIPATING THEORIST NAGY			PIO78OR-10	APPROVED			77
NIEMANN	NEUTRAL PARTICLE, MASS SPECTROMETER			PIO78OR-11	APPROVED			78
RUSSELL	TRIAXIAL FLUXGATE MAGNETOMETER			PIO78OR-12	APPROVED			78
SCARF	ELECTRIC FIELD DETECTOR			PIO78OR-13	APPROVED			78
SCHUBERT	PARTICIPATING THEORIST SCHUBERT			PIO78OR-14	APPROVED			78
STEWART	PROGRAMMABLE ULTRAVIOLET SPECTROMETER			PIO78OR-15	APPROVED			78
TAYLOR	RADIOMETRIC TEMPERATURE SOUNDING EXPERIMENT			PIO78OR-16	APPROVED			79
TAYLOR, JR.	ION MASS SPECTROMETER			PIO78OR-17	APPROVED			79
WOLFE	SOLAR WIND PLASMA DETECTOR			PIO78OR-18	APPROVED			79
PIONEER VENUS PROBE BUS	UNITED STATES / NASA-OSS	05/00/78	VENUS FLYBY	PIO78PA		APPROVED		79
BAUER	PARTICIPATING THEORIST BAUER			PIO78PA-08	APPROVED			79
DONAHUE	PARTICIPATING THEORIST DONAHUE			PIO78PA-09	APPROVED			80
GOODY	PARTICIPATING THEORIST GOODY			PIO78PA-10	APPROVED			80
HUNTEN	PARTICIPATING THEORIST HUNTEN			PIO78PA-11	APPROVED			80
PETTENGILL	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PIO78PA-06	APPROVED			80
PETTENGILL	RADIO SCIENCE TEAM			PIO78PA-07	APPROVED			80
POLLACK	PARTICIPATING THEORIST POLLACK			PIO78PA-12	APPROVED			80
SPENCER	PARTICIPATING THEORIST SPENCER			PIO78PA-13	APPROVED			80
TAYLOR, JR.	ION MASS SPECTROMETER			PIO78PA-02	APPROVED			81
VON ZAHN	NEUTRAL PARTICLE MASS SPECTROMETER			PIO78PA-03	APPROVED			81
PIONEER VENUS PROBE LRG	UNITED STATES / NASA-OSS	05/00/78	VENUS LANDER	PIO78PB		APPROVED		81
BOESE	INFRARED RADIOMETER			PIO78PB-05	APPROVED			81
HOFFMAN	NEUTRAL PARTICLE MASS SPECTROMETER			PIO78PB-06	APPROVED			81
KNOLLENBERG	CLOUD PARTICLE SIZE SPECTROMETER			PIO78PB-03	APPROVED			81
OYAMA	GAS CHROMATOGRAPH			PIO78PB-04	APPROVED			82
PETTENGILL	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PIO78PB-09	APPROVED			82
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PIO78PB-02	APPROVED			82
SEIFF	ATMOSPHERE STRUCTURE			PIO78PB-01	APPROVED			82
TOMASKO	SOLAR ENERGY PENETRATION INTO THE ATMOSPHERE			PIO78PB-07	APPROVED			82
PIONEER VENUS PROBE SM1	UNITED STATES / NASA-OSS	05/00/78	VENUS LANDER	PIO78PC		APPROVED		82
PETTENGILL	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PIO78PC-03	APPROVED			83
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PIO78PC-02	APPROVED			83
SEIFF	ATMOSPHERE STRUCTURE			PIO78PC-01	APPROVED			83

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SUOMI	INFRARED RADIOMETER			PIO78PC-04	APPROVED			83
PIONEER VENUS PROBE SM2	UNITED STATES / NASA-OSS	05/00/78	VENUS LANDER	PIO78PD		APPROVED		83
PETTENGILL	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PIO78PD-03	APPROVED			84
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PIO78PD-02	APPROVED			84
SEIFF	ATMOSPHERE STRUCTURE			PIO78PD-01	APPROVED			84
SUOMI	INFRARED RADIOMETER			PIO78PD-04	APPROVED			84
PIONEER VENUS PROBE SM3	UNITED STATES / NASA-OSS	05/00/78	VENUS LANDER	PIO78PE		APPROVED		84
PETTENGILL	DIFFERENTIAL VERY-LONG-BASELINE INTERFEROMETRIC TRACKING			PIO78PE-03	APPROVED			84
RAGENT	CLOUD EXTENT, STRUCTURE, AND DISTRIBUTION			PIO78PE-02	APPROVED			85
SEIFF	ATMOSPHERE STRUCTURE			PIO78PE-01	APPROVED			85
SUOMI	INFRARED RADIOMETER			PIO78PE-04	APPROVED			85
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							
RADIO ASTRONOMY EXPLORER	SEE RAE-B							
RAE-B	UNITED STATES / NASA-OSS	06/10/73	SELENOCENTRIC	73-039A	06/10/73	NORMAL	STD	85
STONE	STEP FREQUENCY RADIOMETERS			73-039A-01	06/10/73	NORMAL	STD	85
STONE	CAPACITANCE PROBE			73-039A-03	06/10/73	NORMAL	STD	85
RELATIVITY	SEE GP-A							
ROVER 15	SEE APOLLO 15 LM/ALSEP							
ROVER 16	SEE APOLLO 16 LM/ALSEP							
ROVER 17	SEE APOLLO 17 LM/ALSEP							
S 27B	SEE ALOUETTE 2							
S 6C	SEE AE-C							
S 6D	SEE AE-D							
S 6E	SEE AE-E							
SAN MARCO 4	UNITED STATES / ITALY / NASA-OSS, CRA	02/18/74	GEOCENTRIC	74-009A	02/18/74	PARTIAL	STD	86
NEWTON	NEUTRAL ATMOSPHERE COMPOSITION			74-009A-02	02/18/74	NORMAL	STD	86
SPENCER	NEUTRAL ATMOSPHERE TEMPERATURE			74-009A-03	02/18/74	NORMAL	STD	86
SAN MARCO C-2	SEE SAN MARCO 4							
SAS 1	SEE SAS-A							
SAS-A	UNITED STATES / NASA-OSS	12/12/70	GEOCENTRIC	70-107A	01/23/71	PARTIAL	SUBS	86
GIACCONI	ALL-SKY X-RAY SURVEY			70-107A-01	04/00/73	PARTIAL	SUBS	86
SAS-C	UNITED STATES / NASA-OSS	2 QTR 75	GEOCENTRIC	SAS-C		APPROVED		87
CLARK	ANALYSIS OF EXTRAGALACTIC X-RAY SOURCES			SAS-C -01	APPROVED			87
CLARK	ANALYSIS OF GALACTIC X-RAY SOURCES			SAS-C -02	APPROVED			87
CLARK	CONTINUOUS X-RAY FLUCTUATION MONITOR OF SCORPIO X-1			SAS-C -03	APPROVED			87
CLARK	X-RAY ABSORPTION CONTOURS OF THE GALAXY			SAS-C -04	APPROVED			88
SAS-D	SEE IUE							
SE-C	SEE SOLRAD 10							
SM-C2	SEE SAN MARCO 4							
SMM	SEE SOLAR MAXIMUM MISSION							
SOLAR EXPLORER-C	SEE SOLRAD 10							
SOLAR MAXIMUM MISSION	UNITED STATES / NASA-OSS	MID 1978	GEOCENTRIC	SMM		APPROVED		88
SOLRAD 9	UNITED STATES / NASA-OSS	03/05/68	GEOCENTRIC	68-017A	02/25/74	PARTIAL	SUBS	88
	UNITED STATES / DOD-NAVY							
KREPLIN	SOLAR RADIATION DETECTORS			68-017A-01	02/25/74	PARTIAL	SUBS	88
SOLRAD 10	UNITED STATES / NASA-OSS	07/08/71	GEOCENTRIC	71-058A	07/00/73	NORMAL	SUBS	88
	UNITED STATES / DOD-NAVY							
KREPLIN	SOLAR RADIATION DETECTORS			71-058A-01	12/11/73	NORMAL	SUBS	89
KREPLIN	ALL-SKY X-RAY SURVEY			71-058A-02	07/00/73	NORMAL	SUBS	89
SOLRAD-C	SEE SOLRAD 10							
SPACE SHUTTLE	UNITED STATES / NASA-OMSF	12/00/78	GEOCENTRIC	SHUTTLE		APPROVED		89

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SPACELAB	INTERNATIONAL UNITED STATES ESRO NASA-OMSF	11/00/80	GEOCENTRIC	SPACLAB		APPROVED		89
SPACELAB AMPS MODULE	SEE AMPS							
SPACELAB ASTRONOMY MISS	SEE ONE METER UV TELESCOPE							
SPACELAB IM UV TELESCOPE	SEE ONE METER UV TELESCOPE							
SPHERE	SEE AD-C							
STP PROBE	SEE ISEE-C							
TD 1	SEE TD 1A							
TD 1A	INTERNATIONAL ESRO	03/12/72	GEOCENTRIC	72-014A	02/14/73	NORMAL	SUBS	90
DE JAGER	SOLAR X-RAY MONITOR			72-014A-06	02/14/73	NORMAL	SUBS	90
KAMPERMAN	UV STELLAR SPECTROMETER			72-014A-02	02/14/73	NORMAL	SUBS	90
LABEYRIE	SPECTROMETRY OF PRIMARY CHARGED PARTICLES			72-014A-03	02/14/73	NORMAL	SUBS	90
LABEYRIE	SPECTROMETRY OF EXTRATERRESTRIAL X RAYS			72-014A-04	07/02/73	NORMAL	SUBS	90
LABEYRIE	GAMMA-RAY MEASUREMENT			72-014A-07	02/14/73	NORMAL	SUBS	91
MONFILS	STELLAR UV RADIATION EXPERIMENT			72-014A-01	02/14/73	NORMAL	SUBS	91
OCCHIALINI	SOLAR GAMMA RAYS IN THE 50- TO 500-MEV ENERGY RANGE			72-014A-05	02/14/73	NORMAL	SUBS	91
UHURU 1	SEE SAS-A							
UK 5	UNITED KINGDOM UNITED STATES SRC NASA-OSS	10/15/74	GEOCENTRIC	74-077A	10/15/74	NORMAL	STD	91
BOYD	0.3- TO 30-KEV COSMIC X RAY WITH A ROTATION COLLIMATOR			74-077A-01	10/18/74	NORMAL	STD	91
BOYD	HIGH RESOLUTION SOURCE SPECTRA			74-077A-03	10/31/74	NORMAL	STD	91
ELLIOT	HIGH-ENERGY COSMIC X-RAY SPECTRA			74-077A-05	10/18/74	NORMAL	STD	92
HOLT	ALL-SKY MONITOR			74-077A-06	10/18/74	NORMAL	STD	92
POUNDS	2- TO 10-KEV SKY SURVEY			74-077A-02	10/18/74	NORMAL	STD	92
POUNDS	POLARIMETER/SPECTROMETER			74-077A-04	10/18/74	NORMAL	STD	92
UNITED KINGDOM 5	SEE UK 5							
VIKING-A LANDER	UNITED STATES NASA-OSS	3 QTR 75	MARS LANDER	VIKG-AL		APPROVED		92
ANDERSON	SEISMOLOGY			VIKG-AL-08	APPROVED			93
BIEMANN	MOLECULAR ANALYSIS			VIKG-AL-04	APPROVED			93
HARGRAVES	MAGNETIC PROPERTIES			VIKG-AL-10	APPROVED			93
HESS	METEOROLOGY EXPERIMENT			VIKG-AL-07	APPROVED			93
KLEIN	BIOLOGY INVESTIGATION			VIKG-AL-03	APPROVED			93
MICHAEL, JR.	RADIO SCIENCE			VIKG-AL-11	APPROVED			94
MUTCH	FACSIMILE CAMERA			VIKG-AL-06	APPROVED			94
NIER	ENTRY-ATMOSPHERIC STRUCTURE			VIKG-AL-02	APPROVED			94
NIER	ENTRY-ATMOSPHERIC COMPOSITION			VIKG-AL-12	APPROVED			94
SHORTHILL	PHYSICAL PROPERTIES INVESTIGATION			VIKG-AL-01	APPROVED			95
TOULMIN, 3RD	X-RAY FLUORESCENCE SPECTROMETER			VIKG-AL-13	APPROVED			95
VIKING-A ORBITER	UNITED STATES NASA-OSS	3 QTR 75	MARSCENTRIC	VIKG-A		APPROVED		95
CARR	ORBITER IMAGING			VIKG-A -01	APPROVED			95
FARMER	IR SPECTROMETER -- WATER VAPOR MAPPING			VIKG-A -03	APPROVED			95
KIEFFER	IR RADIOMETRY -- THERMAL MAPPING			VIKG-A -02	APPROVED			96
VIKING-B LANDER	UNITED STATES NASA-OSS	3 QTR 75	MARS LANDER	VIKG-BL		APPPROVED		96
ANDERSON	SEISMOLOGY			VIKG-BL-08	APPROVED			96
BIEMANN	MOLECULAR ANALYSIS			VIKG-BL-04	APPROVED			96
HARGRAVES	MAGNETIC PROPERTIES			VIKG-BL-10	APPROVED			96
HESS	METEOROLOGY EXPERIMENT			VIKG-BL-07	APPROVED			97
KLEIN	BIOLOGY INVESTIGATION			VIKG-BL-03	APPROVED			97
MICHAEL, JR.	RADIO SCIENCE			VIKG-BL-11	APPROVED			97
MUTCH	FACSIMILE CAMERA			VIKG-BL-06	APPROVED			97
NIER	ENTRY-ATMOSPHERIC STRUCTURE			VIKG-BL-02	APPROVED			97
NIER	ENTRY-ATMOSPHERIC COMPOSITION			VIKG-BL-12	APPROVED			98
SHORTHILL	PHYSICAL PROPERTIES INVESTIGATION			VIKG-BL-01	APPROVED			98
TOULMIN, 3RD	X-RAY FLUORESCENCE SPECTROMETER			VIKG-BL-13	APPROVED			98
VIKING-B ORBITER	UNITED STATES NASA-OSS	3 QTR 75	MARSCENTRIC	VIKG-B		APPROVED		98
CARR	ORBITER IMAGING			VIKG-B -01	APPROVED			98
FARMER	IR SPECTROMETER -- WATER VAPOR MAPPING			VIKG-B -03	APPROVED			99
KIEFFER	IR RADIOMETRY -- THERMAL MAPPING			VIKG-B -02	APPROVED			99

3.2 INVESTIGATOR NAME INDEX

The following index lists (in alphabetical order) the names of the principal investigators or team leaders and other investigators or team members associated with each experiment described in section 2 (Descriptions of Spacecraft and Experiments) of this report. The current organizational affiliation of the person is also shown. Under each person's name is listed each of the experiment entries with which he is associated. Each experiment entry contains the spacecraft and experiment name, NSSDC ID code, and the page number on which the experiment is described in this document. An asterisk that precedes an experiment name identifies the person associated with that experiment as the principal investigator or team leader.

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Current Experiment Institution Index

3.3 CURRENT EXPERIMENT INSTITUTION INDEX

The following index is a current list that indicates those experiments from section 2 (Descriptions of Spacecraft and Experiments) associated with a given institution. The listing is sorted first alphabetically by state or country of the institution, i.e., domestic institutions by state, then foreign institutions by country. Under each state or country, the list is in alphabetical order by institution name. In the institution portion, the principal investigators and team leaders are listed alphabetically by last name. Under each person, the experiment entries are listed containing the spacecraft and experiment name, NSSDC ID code, and the page number on which the experiment is described in this document.

APPENDIX A - DEFINITIONS

Several words and phrases are used in this report in a precise and specific sense. These terms are defined here to clarify the intended meaning to the reader.

Active - As applied to a spacecraft mission or one of its experiments pertinent to this report, a general status-of-operation term that means the spacecraft or experiment has been launched and was last 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 and 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.

Experiment Brief Description - A description of an experiment containing a concise summary of the experiment purpose and instrument characteristics, emphasizing those relevant to the scientific use of the resulting data. Information about the performance of individual components of the instrumentation is often included.

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.

Normal - As applied to an active spacecraft, a status-of-operation term that means the spacecraft and other required systems are capable of working so that the data would be suitable for all of the scientific studies planned for the spacecraft when the spacecraft is turned on and the data are recorded. As applied to an active experiment, a status-of-operation term that means all experiment and spacecraft systems are working so that the data would be suitable for all of the scientific studies originally planned for the experiment.

NSSDC ID Code - An identification code used in the NSSDC information system. In this system each successfully launched spacecraft and experiment is assigned a code based on the launch sequence of the spacecraft. Subsequent to 1962, this code; e.g., 72-012A for the spacecraft Pioneer 10, corresponds to the COSPAR international designation. The experiment codes are based on the spacecraft code. For example, the experiments carried aboard the spacecraft 73-019A (Pioneer 11) are numbered 73-019A-01, 73-019A-02, etc. Each prelaunch spacecraft and experiment is also assigned an NSSDC ID code based on the name of the spacecraft. For example, the proposed NASA launch, Mariner Jupiter/Saturn A, would be coded MARN77A. The experiments to be carried aboard this spacecraft

NSSDC ID Code - (continued) would be coded MARN77A-01, MARN77A-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.

Operational Off - As applied to a spacecraft, a status-of-operation term that means the spacecraft can still be operated, but it is either turned off or not being used. As applied to an experiment, a status-of-operation term that means when last tested, the experiment and other required systems were capable of producing at least partially usable data, but the experiment is either turned off or telemetered data are not being recorded. The systems could be activated at some future time to obtain usable data.

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 and 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 future 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 spacecraft mission status term that means the mission is under study; however, no funds have been approved to perform this mission.

Spacecraft Brief Description - A spacecraft description containing a concise summary of the spacecraft mission, specifically outlining the overall objectives of the mission and the scientific studies being performed. Information about the performance of individual components of the spacecraft is often included.

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.

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-ESRO)
AEROSP	aerospace
AFB	Air Force Base
AFCRL	Air Force Cambridge Research Laboratories
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 A_p
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-SEC	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
ATM	Apollo Telescope Mount
ATMOS	atmosphere; atmospheric
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	Coopérative 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 (ESRO); 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
CTS	Canadian Telecommunications Satellite
CTR	center
CZCS	coastal zone ocean color scanner
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/WIKA	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)
EL	electric (data camera carried on Apollo)
ELDO	European Launch Development Organization (ESRO)
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)
ESGEO	ESRO Geostationary Earth-Orbiting (satellite)
ESMR	electrically scanning microwave radiometer
ESOC	European Space Operations Centre (ESRO)
ESRO	European Space Research Organization
ESSA	Environmental Science Services Administration (now NOAA)
ESTABL	establishment
ESTEC	European Space Technology Center (ESRO)
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 (ESRO)
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 (ESRO)
GEOPHYS	geophysical
GEOS	Geodetic Earth-Orbiting Satellite (NASA); Geostationary Earth-Orbiting Satellite (ESRO)
GES FUR WELTRAUM-FORSCH	Gesellschaft für Weltraumforschung (Center for Space Research, Fed Rep of Germany)
G.E.T.	ground elapsed time
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
GVHRR	geosynchronous very high resolution radiometer
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 (ESRO)
HETS	high-energy telescope system
HFE	heat-flow experiment; heat-flow electronics
HR	high resolution; hour
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-ESRO)
IMP	Interplanetary Monitoring Platform (satellite, NASA)
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
IRBM	intermediate range ballistic missile
IRIG	Inter-Range Instrumentation Group
IRIS	infrared-interferometer spectrometer; International Radiation Investigation Satellite (NASA-ESRO)
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-ESRO)
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-ESRO)
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 K_p
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 (ESRO)
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)
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 (ESRO)
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
MOL	Manned Orbiting Laboratory (satellite, DOD)
M-P	minus to plus
MPI	Max-Planck-Institut (Fed Rep of Germany)
MR	medium resolution
MRIR	medium-resolution infrared radiometer
MS	microsecond
MSC	Manned Spacecraft Center (now Johnson Space Center)
MSEC	millisecond
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 (ESRO)
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)

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
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
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
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
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
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
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
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	second; 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)
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
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	Thor-Delta (satellite, ESRO); 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)
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