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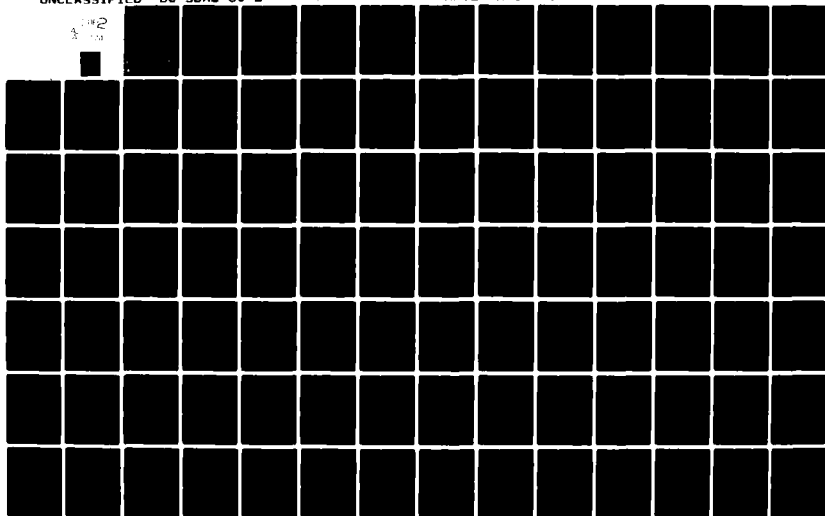
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DATA ANALYSIS SYSTEMS AND DATA BASE DEVELOPMENT FOR THE S3 SATELLITES

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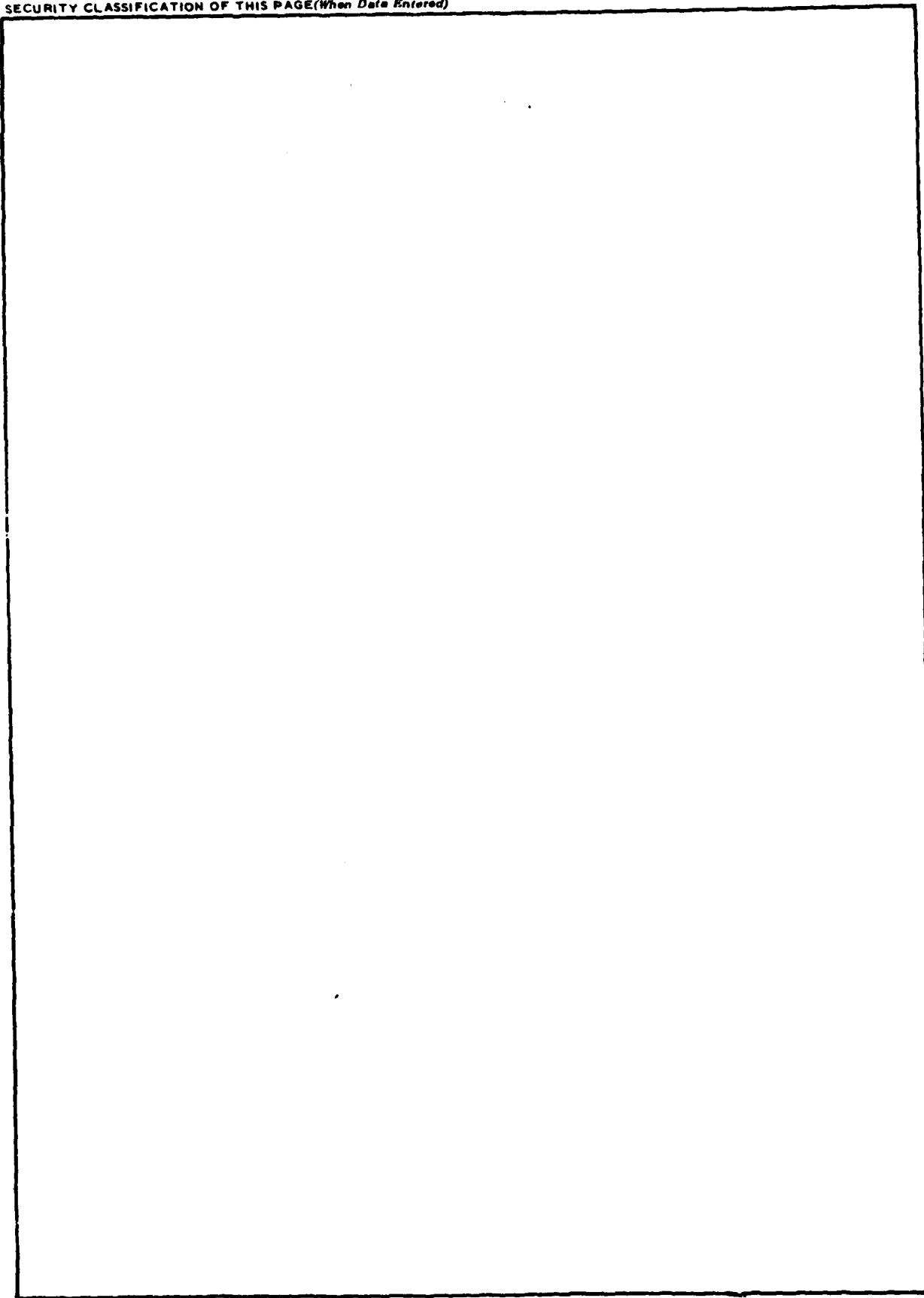
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PREFACE

The authors wish to thank several members of the Space Data Analysis Laboratory of Boston College for their efforts relating to this contract.

First, for his administrative assistance we wish to thank the Director of the laboratory, Mr. Leo F. Power, Jr.

Analysis, programming and data base development were accomplished through the efforts of (alphabetically) Susan Delay, Kenneth Dieter, Brian Donovan, Neil Grossbard, Timothy Latson, Kevin Martin, Carolyn Parsons, Edward Richards, Lisa Silva, Brian Sullivan, and Roger Vancour.

Thanks go to the Contract Monitor, Mr. Robert E. McInerney, for his assistance during the period of this contract.

Finally, thanks go to Miss Mary Kelly for typing this document.

1.0 INTRODUCTION

The Space Data Analysis Laboratory (SDAL) of Boston College was contracted to develop geophysical unit and user experiment data bases for the S3-1, S3-2 and S3-3 satellites. In addition, analysis studies were performed on these data bases. Work efforts described in this document were performed under contract (F19628-76-C-0190) to the Analysis and Simulation Section (SUWA) of the Air Force Geophysics Laboratory.

This document will summarize the S3 efforts. The analysis used in geophysical unit determination has been detailed in other reports and will not be included here. The data base formats, however, will be included in the appendix.

The volume of data dictated the need for a systematic approach to file development. Hence, structured files and associated program modules were developed for magnetic and ephemeris data (B&L); geophysical support data (GSF); attitude coefficient parameters (OM); and, the geophysical indices.

The functional flow of data has been included in previous documents (e.g. Data Base Development for Air Force Satellites, Delorey) for the S3-1, S3-2 and S3-3 vehicles. The functional flow and program interfaces as well as payload information are included in this document for satellite S3-4. The analyses and associated computer routines for this vehicle have been developed using existing data sets but analysis and data system finalization awaits the receipt of a volume of data.

2.0 SATELLITES S3-1/S3-2/S3-3

A data analysis system was developed for satellite S3-1. This system was then modified for use with the other vehicles in the S3 program.

For each of these vehicles, requirements dictated the need for B&L and OM files. GSF data was required for only the S3-1 and S3-2 spacecrafts. Because of the volume of data, files were created only when spacecraft data was taken. This aided in data compaction and allowed for the data base creation to be performed on an orbit by orbit basis. Satellite Control Facility

(SCF) tape recorder logs were used to determine the time periods for spacecraft operations.

One geophysical index file covering the lifetime of the three vehicles was created.

2.1 Satellite S3-1

Geophysical unit data bases have been created for the ion density gauge (IDG) the MESA accelerometer and for two mass spectrometers (MSI and MSIV). For the MSIV, both neutral high (NH) and ion data bases were created.

For this vehicle, approximately 1500 digital tapes were received. From these tapes, user files for the individual experiments were then created. The user files (along with the auxiliary files) were input to the appropriate analysis routines and the geophysical unit data bases resulted. The final data base for all experiments resides on 10 digital tapes. Thus, the data compaction ratio was 150:1. Coefficient files resulting from polynomial fits to selected parameters (e.g. atmospheric density versus altitude) have been created. These coefficient files have application for history studies. *Coefficient files reside on one tape and hence, for history studies, the data compaction ratio is 1500:1.*

The appendix contains the data base formats for the IDG, MSI, MSIV, MESA, B&L files and GSF files.

A sample of the data base history listing is included in the appendix. This listing summarizes the data by orbit number; start and stop times of the pass; Kp for the pass; and tape number and file number by experiment.

2.2 Satellite S3-2

Digital data (approximately 2300 tapes) has been received for orbits over the 2 1/2 year lifetime of this vehicle.

Requirements included the creation of user files and geophysical unit data bases for a triaxial fluxgate magnetometer, ion density gauge (IDG), mass spectrometer (MSIV) and an electrostatic analyzer (ESA). In addition,

user files were created for the electric field payload (designated 226-1), the energetic proton flux payload (224-1) and the polar wind payload (219-1).

Payload operations were defined for high latitude studies (referred to as group I payloads); for low altitude studies (group II payloads); and for shared operations during which both group I and group II payloads were operated.

Group I operations resulted in the turn on of the fluxgate magnetometer and the ESA. Group II operations included the MSIV and IDG.

The same file creation philosophy used for S3-1 was applied to S3-2 in relation to the B&L and GSF file creations, i.e. one file per pass as opposed to continuous average. The files were, however, segmented by experiment group.

Data bases were created for prescribed portions of the vehicle lifetime for the MSIV, IDG and fluxgate. The ESA data was created for selected passes.

The appendix contains user file formats for all payloads as well as data base formats for the MSIV, IDG, ESA and fluxgate magnetometer. The B&L and GSF formats will not be included since their structure is the same as for satellite S3-1.

2.3 Satellite S3-3

The prime efforts associated with this vehicle involved the creation of user files, OM files and B&L files. The user files were created for the two AFGL payloads. These payloads were the trapped proton monitor (designated 214) and the electric fields - ion drift experiment (designated 215).

Digital data for this vehicle spans a three year period. Approximately 1800 digital tapes were received.

Formats of the user files are contained in the appendix.

3.0 SATELLITE S3-4

The S3-4 satellite is an Air Force vehicle which carried Air Force Geophysics Laboratory (AFGL) payloads designed to measure atmospheric neutral

density and to provide ultraviolet and vacuum ultraviolet background information. The atmospheric neutral density payloads are a Cold Cathode Ionization Density Gauge (CCG), a Particle Flux Accumulator (PFA) and a Rotating Calibration Accelerometer (ROCA). A photometer will provide Vacuum Ultraviolet (VUV) background data and a spectrometer will produce both VUV and Ultraviolet (UV) background information.

A data analysis support system has been defined by the Analysis and Simulation Section (SUWA) of AFGL.

The resulting Data Analysis System (DAS) has been developed. Program interfaces are well defined and analysis techniques have been developed based on a limited amount of data. Finalization of the DAS and the implied analysis techniques awaits agreement on file structures for agency tapes and the corresponding receipt of a volume of data.

Succeeding sections will provide an overview of satellite telemetry, the DAS and payload information.

3.1 Telemetry

The data from the vehicle is Pulse Code Modulated (PCM). Each mainframe consists of 120 words, 8 bits per word. The data, however, may be acquired at two data rates (32kbps and 64kbps). In general, the mainframe word locations for the designations are different for the two data rates. The 32kbps data rate shall be designated as Format A and the 64KBPS data rate shall be designated as Format C. A masterframe (one readout of each sub-commutated value) is 32 frames in Format A and 64 frames in Format C. The telemetry system may be summarized as follows:

8 bits/word		
120 words/mainframe		
960 bits/mainframe		
<u>Format A</u>		<u>Format C</u>
32K	BITS/SEC	64K
33.33	FRAMES/SEC	66.67
.03	SEC/FRAME	.015

Subcommutated Data (Format A)

<u>MF Word No.</u>	<u>Subcom Length</u>
25	8
26	8
82	32
83	32

Subcommutated Data (Format C)

<u>MF Word No.</u>	<u>Subcom Length</u>
42	64
43	64
69	16
70	16

The Vehicle Time Clock Word (VTCW) is made up of 24 bits which increment approximately every .2 seconds. The VTCW is located on MF 42, 43 and 44 in format A and MF 81, 82 and 83 in format C.

The tape recorder aboard the vehicle can record 90 minutes of data in format A and 45 minutes of data in format C. The data stored on the tape recorder is to be played back at 256kbps.

Data will be acquired from two types of orbital operations: approximately 90 minutes of data in format A or approximately 45 minutes of data in format C.

3.2 Data Analysis System

This section is intended to overview the flow of data through the DAS.

In Figure 1, the functional flow of data through the DAS is depicted.

The PCM data from the vehicle will be recorded on instrumentation tape by the Satellite Control Facility (SCF). The tape will be sent to a digitization facility where three separate digital tapes will be created. One tape will contain spectrometer and photometer data; another will contain the PFA

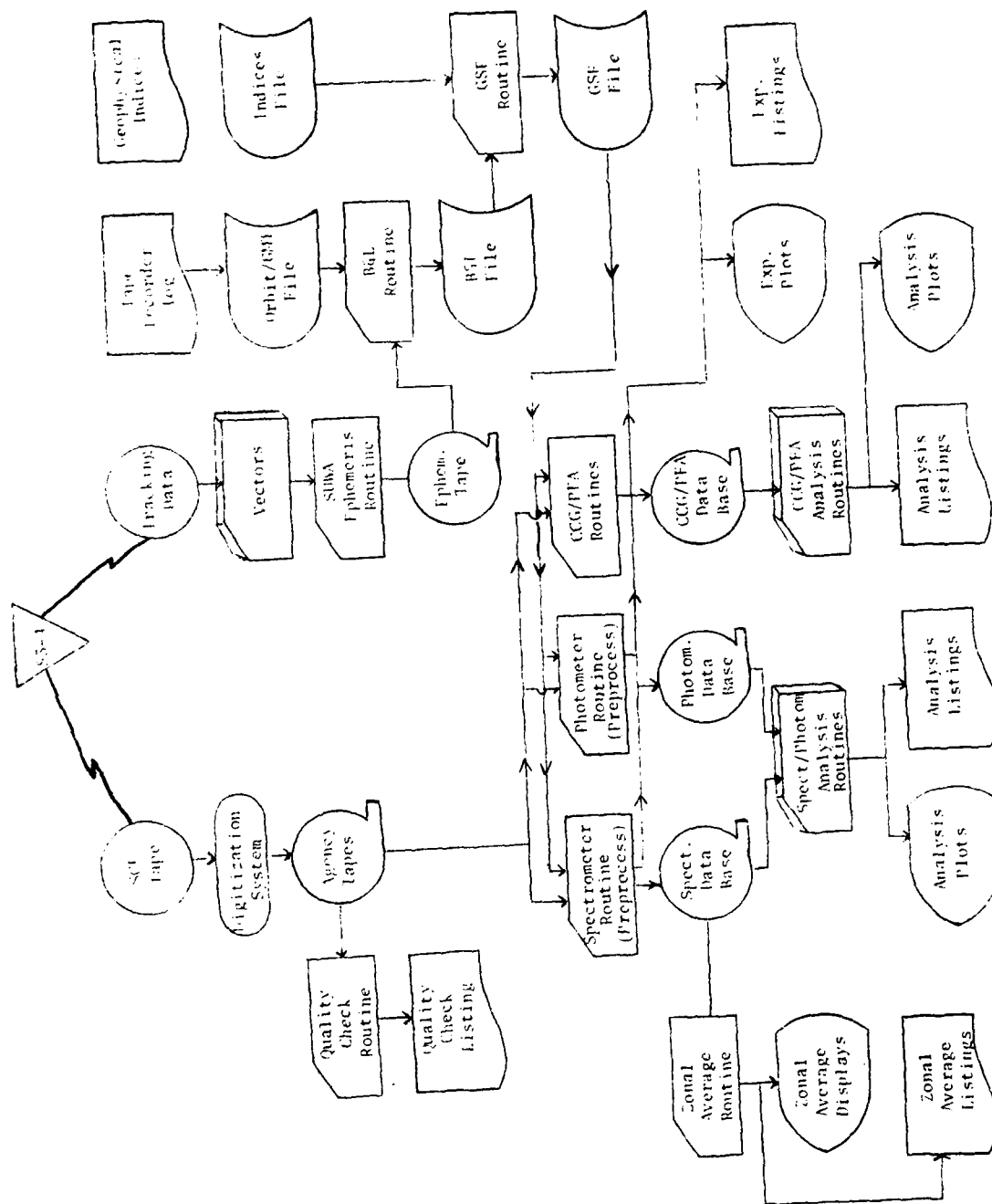


Figure 1

and CCG data; the third will contain the ROCA data. These tapes will be 9 track written at 1600bpi. The term used to describe these tapes is the Agency Tape (AT).

Each orbit on the AT will have four types of records; header record, scan record, event record and telemetry records. The header record contains information specific to the vehicle and orbit such as orbit number, date of orbit, GMT at the start and end of the pass and telemetry format type (A or C). The scan record will contain information pertaining to areas of digitization dropout. The event record is specific to each agency tape type. It may contain information from the telemetry stream obtained in the first pass of the 2 pass digitization system. For example, the event record for the CCG and PFA may contain the times at which the extendable baffle is deployed. The telemetry records will contain only the parameters designated for insertion into the agency tape data stream.

Each telemetry record contains masterframes of data with each masterframe starting at the mainframe containing subcommutator frame 1. By storing masterframes, as opposed to mainframes, in each physical record, a maximum of information may be stored on each magnetic tape. Further, by storing each masterframe in a consistent manner (starting at subcommutator level zero), the necessity of searching each file to find word locations of subcommutated data is removed.

When a complete tape recorder playback requires several station contacts, individual agency files will be received for each contact. Some data dropout between files is anticipated.

Upon receipt of the AT and associated data products at AFGL/SUWA, the tapes will be logged in and a tape copy will be made while a readability quality check is performed.

Formats of the individual agency tapes are contained in the appendix.

Tracking data is received at AFGL/SUWA and this data is input to the SUWA ephemeris routines and coverage for each one month period (in 60 second increments) is generated on an output file. Parameters included on this file are altitude, longitude, geocentric latitude, geodetic latitude, velocity and local time.

The ephemeris file is the basic input to the B&L program.

Another input to the B&L program is the orbit/GMT file which is a card image file containing the times and dates for which tape recorded data is acquired. By use of this file, the size of the magnetic parameter file is minimized by having ephemeris and magnetic information only during instrument "on" times.

In order to create the magnetic parameter file, called the B&L file, an existing routine was modified for use with this satellite. The modified routine, called the B&L program, uses as input the monthly ephemeris file and pertinent parameters from the Orbit/GMT file to create a B&L file for the prime data of each orbit. One B&L tape is created for each month of the lifetime of the satellites. Among the quantities stored on the B&L file for each orbit are all pertinent ephemeris parameters, magnetic field components, total field, L-Shell and geomagnetic longitude, latitude and local time. Data occurs at 60 second increments for each pass.

As Geophysical indices such as K_p , F10.7 CM solar flux and A_p are received, they are inserted into the INDICES file. Parameters contained on this file are essential to the computation of the neutral atmospheric model.

The INDICES file and the B&L file are input to the model atmosphere routine and the resulting file is called the Geophysical Support File (GSF). This file is identical in structure to the B&L file. Vacant words on the B&L file are filled on the GSF with such model parameters as temperature, pressure, mass density and constituent densities for O, O₂, N₂, H_e, H and Λ_r .

Pre-processing routines will input the agency tapes and either the B&L or GSF files. From these routines, plots and listings are generated as required and a data base is created. Processing routines are required for the spectrometer, photometer, PFA and CCG.

Zonal average routines will access the spectrometer data base.

Analysis routines are required and these routines will access the appropriate data bases and generate listings and plots to specifications.

3.3 Payloads and Processing Requirements

In this section a brief description of each payload and the associated telemetry is included. In addition, an overview of the requirements for the PFA, CCG, photometer and spectrometer are described.

3.3.1 Cold Cathode Gauge (CCG)-CRL 737

The CCG provides direct measurements of atmospheric neutral density. The CCG consists of two packages, a sensor and an electronic unit. The sensor houses the ionization gauge, magnet, thermistor circuitry, high voltage circuits, baffle motor, baffle operating circuits, magnetic shield and sensor decapping mechanism. The electronics unit contains the low voltage power supplied, converters, filters and signal measurement and calibration circuits.

The CCG ionization gauge monitors the internal gas density which can, in turn, be related to ambient atmospheric density.

The baffle extension is expected to give design criteria for future applications which include atmospheric temperature, atmospheric winds and velocity vector orientation. Baffle operation goes through a complete extension and retraction cycle whenever initiated. Operation of the probe during retraction is the primary mode.

The CCG outputs are as follows:

<u>DESIG</u>	<u>DESC.</u>	<u>BITS</u>	<u>FORMAT A</u>	<u>RATE</u>	<u>FORMAT C</u>	<u>RATE</u>
			<u>MF</u>		<u>MF</u>	
K205	Range	8	105	33	59	66
K206	Current	8	27,87	66	38,78,118	200
K207	HV	8	84	33	19	66
K208	Electronics Temp	8	17	33	99	66
K209	Baffle Status	8	81	33	79	66
K222	Gauge Temp.	4	65(4MSBS)	33	119(4MSBS)	66
K232	Gauge Open/Closed	1	21(Bit 2)	33	89(Bit 2)	66

3.3.2 Particle Flux Accumulator (PFA) - CRL 737

The PFA directly measures atmospheric neutral density and its spatial and temporal variations.

The PFA consists of a sensor, electronics unit and extendable baffle.

The sensor is an ionization gauge which measures internal gas pressure which can be related to ambient atmospheric density.

The baffle mechanism is expected to yield design criteria for future applications such as atmospheric temperature, winds and aspect relative to the velocity vector. The baffle will be fully extended, then retracted each time the baffle sequence is initiated. Primary data shall occur during retraction.

The PFA outputs are as follows:

DESIG	DESC.	BITS	FORMAT A	RATE	FORMAT C	RATE
			MF		MF	
K201	Density Data	8	67	33	28,68,108	200
K202	Electronics Temp.	8	91	33	44	66
K203	Sensor HV	8	101	33	84	66
K204	Baffle Status	8	111	33	10	66
K211	Range	8	57	33	11,71	133
K221	Sensor Temp.	4	106(4LSBS)	33	29(4LSBS)	66
K231	Gauge Open/Closed	1	21(Bit 1)	33	89 (Bit 2)	66

3.3.3 CCG/PFA Analysis Overview

Both of these instruments provide atmospheric neutral density measurements. Density determinations will result from the mapping of telemetry data into the current domain and from the current domain density parameters will be derived. A geophysical unit data base will be created which will contain the density parameters and selected magnetic, model and ephemeris data. Displays of density as a function of GMT with annotation for positional parameters will be produced.

3.3.4 Spectrometer Payload - CRL 726

The spectrometer has an ultraviolet unit and a vacuum ultraviolet unit. Photomultiplier tubes are used as detectors and both ranges are scanned simultaneously by diffraction gratings rotating on a shaft common to both units. Background intensity is obtained as a function of wavelength. Resolution and sensitivity are controlled by selecting one combination from a group

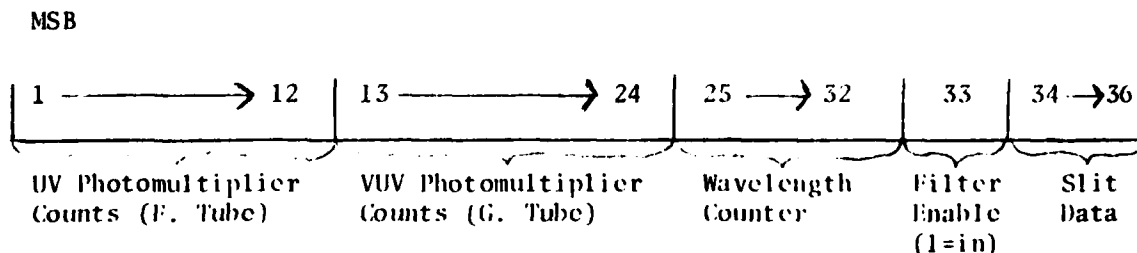
The range estimates and detectors are as follows:

<u>RANGE</u>	<u>WAVELENGTHS (Approx)</u>	<u>DETECTOR</u>
VUV	1070 → 1930A	G
UV	1610 → 2900A	F

A total range of 4000 steps is required to cover the spectrum. There is a 5 MS counting period at each step. This scanning occurs whenever the spectrometer is on. The filter was not included in the spectrometer as flown and all references to it should be disregarded.

<u>DESIG</u>	<u>DESC.</u>	<u>BITS</u>	<u>FORMAT A</u>		<u>FORMAT C</u>	
			<u>MF</u>	<u>RATE</u>	<u>MF</u>	<u>RATE</u>
K101	Spectrometer G. Tube Temp	8	11	33	8	66
K103	Spectrometer F. Tube HV	8	31	33	51	66
K104	Spectrometer G. Tube HV	8	41	33	48	66
K106	Spectrometer +5V Logic	8	7	33	41	66
K121	Spectrometer F. Tube Temp	4	66 (4MSB'S)	33	39 (4MSB'S)	66
K123	Spectrometer Power Supply Temp	4	106 (4MSB'S)	33	29 (4MSB'S)	66
K140-K144	Spectrometer Data	36	12,32, 52,72, 92,112	200	20,60, 100	2

K140 - The 36 bit serial-digital data is expressed as follows:



3.3.5 Spectrometer Analysis Overview

A preprocess data base for the spectrometer will be created. Key features of the preprocess file will be the accurate determination of wavelength and the structuring of records by scan. Ephemeris and magnetic parameters will also be tagged to the preprocess files. Thus, the preprocess file will provide structured data sets which allow for easy input to further analysis routines. Separate data bases will be created for format A and format C operations.

Outputs from the preprocess routine will include microfiche displays of averaged spectra; time histories of fixed wavelength data; and summed counts at sets of discrete wavelengths as well as over wavelength bands.

Zonal average spectra will be produced from a routine which will access the preprocess file. Basically, several sets of magnetic and ephemeris constraints will be applied to the satellite position and all spectra falling within the various constraint sets will be averaged. Thus, average spectra will be produced for zones defined to provide midday background, night tropical airglow, night aurora (north and south) and day aurora (north and south).

3.3.6 Photometer Payload

This instrument uses a photomultiplier as a detector over 4 broad wavelength ranges. The ranges are selectable. Field of view and associated sensitivity changes are provided by selecting one of four apertures. The photometer measures the intensity of the background and its spatial variation in a FOV approximating that required for missile detection applications. The counting period is 10ms. Any of the 4 wavelengths and 4 apertures can be commanded. There is also an automatic filter change mode. The aperture will normally be set small during daytime and large at night.

APPENDIX A
S3-1 Ion Density Gauge Data
Base Format

vector. The perpendicular position provides instrument bias information which must be removed from the total acceleration.

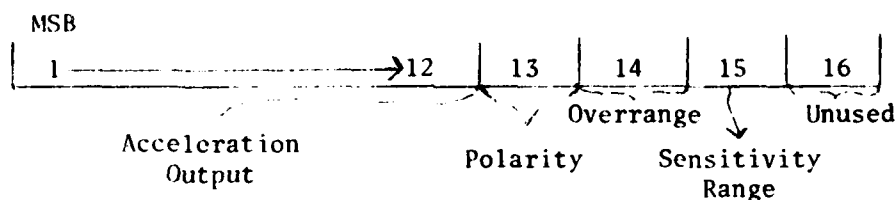
The ROCA will provide measurements down to $10^{-7}g$. The instrument has 2 ranges (A and B). The probe turns on in range A (for approximately 20 secs) to allow centering of the proof mass then switches to its normal operating range (range B). High accelerations will cause overranging which result in the automatic change to range A for 20 seconds. It will then automatically return to range B for 2 seconds. This procedure continues automatically whenever overranging occurs. Sample time for the instrument is 25 seconds. The sensitive axis will be rotated to a position perpendicular to the velocity vector at selected intervals.

The ROCA Telemetry Words are as follows:

DESIG	DESC.	BITS	FORMAT A	RATE	FORMAT C	RATE
			MF		MF	
K210	Temperature	8	37	33	90	66
K223	Position Status	4	65(4LSBS)	33	119(4LSBS)	66
K240- K241	Acceleration Output	16	25/26 Subcom 1*	4	69/70 Subcom 1(**)	4

(*) Subcom is 8 words; (**) Subcom is 16 words

The ROCA 16 bit digital readout is decoded as follows:



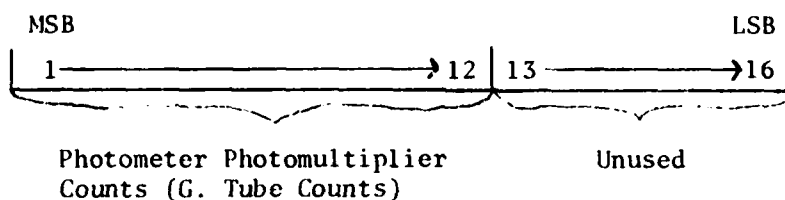
For the polarity bit, 0 = positive, 1 = negative if the polarity bit is negative, 4096 must be subtracted from the acceleration output and the sign changed to a negative.

The overrange bit is normally 0 but becomes 1 when the instrument is in overrange.

The sensitivity bit indicates instrument range: 0 = Range A; 1 = Range B.

DESIG	DESC.	BITS	FORMAT A	RATE	FORMAT C
			MF		MF
K102	Photometer HV	8	97	33	31
K105	Photometer +5V Logic	8	51	33	91
K107	Photometer Detector Temp	8	71	33	111
K122	Photometer Power Supply Temp	4	66(4LSBS)	33	39(4LSBS)
K150-K151	Photometer VUV Data	16	5,45,85	100	49,109
K160-K161	Photometer Aperture/Filter Status	16	82Subcom 24	1	42Subcom 24

K150 - The 16 bit serial-digital readout is expressed as follows:



3.3.7 Photometer Analysis Overview

A preprocess data base for the photometer payload will be produced. This data base will be the prime input to further analysis routines. The inputs to the preprocess routine will consist primarily of the agency tape and the B&L/GSF file. In addition to the data base creation, the preprocess routine will produce average radiance listings and plots, a monitor synopsis, ephemeris and magnetic positional parameters and annotation for selected geophysical indices such as Kp and $F_{10.7}$ cm solar flux.

As with the spectrometer, separate data bases will be created for the format A and format C payload operations.

3.3.8 Rotating Calibration Accelerometer (ROCA) Payload

The ROCA is a single axis electrostatic accelerometer which may be rotated 90° (parallel or perpendicular to the velocity vector). The instrument measured aerodynamic drag accelerations which are directly proportional to atmospheric density. Normal operating position is parallel to the velocity

Data Base Storage: Ion Density Gauge

Header Record

0.1	Word Count (35)
0.2	Group Count (1)
1	Orbit No.
2	Month of orbit
3	Day of orbit
4	Year of orbit (last two digits of 19xx)
5	K_p for orbit
6	$F_{10.7}$ cm flux for orbit
7	Start time of orbit (GMT sec)
8	End time of orbit (GMT sec)
9	Start time of vehicle in sun
10	End time of vehicle in sun
11	Start time of vehicle in shade
12	End time of vehicle in shade
13	Perigee time (GMT sec)
14	Perigee altitude (km)
15	Perigee longitude (+E)
16	Perigee latitude
17	Local time of perigee (sec)
18	Electronics temperature (average)
19	Gauge temperature (representative value)
20	TGE (calculated T_g)

Data Base Storage: Ion Density Gauge (Cont.)

21	a_0	} Coefficients to least square fit for downleg where $\log \rho = \sum_{i=0}^4 a_i z^i - 15$ $\rho = \text{density}; z = \text{altitude } z \leq 350 \text{ km}$
22	a_1	
23	a_2	
24	a_3	
25	a_4	
26	b_0	} Coefficients for up leg data fit Coefficients for up leg data fit $\log \rho = \sum_{i=0}^4 b_i z^i - 15$ $z \leq 350 \text{ km}$
27	b_1	
28	b_2	
29	b_3	
30	b_4	
31	Gauge Number {value = 4 for -4, -6, value = 5 for -5, -7}	
32	Eccentricity	
33	Inclination	
34	$F_{10.7}$ flux (3 month average)	
35	Vacant	

Data Records - Ion Density Gauge Data Base

- 0.1 Word Count (21)
 - 0.2 Group Count (24)
 - 1 Time (ram) (GMT sec)
 - 2 Altitude (km)
 - 3 Longitude (+E)
 - 4 Latitude (Geodetic)
 - 5 Magnetic latitude
 - 6 Local time (seconds)
 - 7 I (current at 40° going into ram)
 - 8 Pg (pressure at 40° going into ram)
 - 9 R (S, D, α) (R factor at 40° going into ram)
 - 10 I (current at 40° going out of ram)
 - 11 Pg (pressure at 40° going out of ram)
 - 12 R (S, D, α) (R factor at 40° out of ram)
 - 13 Pressure into ram (from fit)
 - 14 Pressure out of ram (from fit)
 - 15 Average pressure (average of 13, 14 above)
 - 16 Measured density ρ
 - 17 Model density (J '71)
 - 18 Model temperature (J '71)
 - 19 Model pressure (J '71)
 - 20 High Voltage
 - 21 Vacant
- Words 1-21 repeat 23 times

APPENDIX B
S3-1 MESA Accelerometer
Data Base Format

MESA Accelerometer Data Base

Header Record:

0.1	No. of words in header record (45)
0.2	Integer (1)
1	Satellite Name
2	Month of year at start of pass
3	Day of month at start of pass
4	Year (last 2 digits of 19xx)
5	Time at start of pass (GMT sec)
6	Time at end of pass (GMT sec)
7	Time of perigee (GMT sec)
8	Altitude at perigee (km)
9	Geocentric longitude at perigee (Degrees, +E)
10	Geodetic latitude at perigee
11	Local time of perigee (sec)
12	Start time of vehicle in sun (neg N/A)
13	End time of vehicle in sun (neg N/A)
14	Start time of vehicle in shade (neg N/A)
15	End time of vehicle in shade (neg N/A)
16	Start time of vehicle in sun ₂ (neg N/A)
17	End time of vehicle in sun ₂ (neg N/A)
18	Start time of vehicle in shade ₂ (neg N/A)
19	End time of vehicle in shade ₂ (neg N/A)
20	F _{10.7} cm solar flux
21	$\bar{F}$ (3 month average)
22	K _p
23	Orbit Number
24	a ₀
25	a ₁
26	a ₂
27	a ₃
28	a ₄

Downleg data coefficients to fit

$$15 + \log \rho = \sum_{i=0}^4 a_i z^i$$

= density, z - altitude

MESA Accelerometer Data Base

29	b ₀	Upleg data - coefficients to fit $15 + \log \rho = \sum_{i=0}^4 b_i z^i$
30	b ₁	
31	b ₂	
32	b ₃	
33	b ₄	
34	T ₁	Constants used in bias correcting data
35	C ₁	
36	T ₂	
37	T ₂	Vacant
38	}	
39		
40		
41		
42		
43		
44		
45		

MESA Accelerometer Output Data Base - Data Records

Output values are for ram points only

0.1	Number of words in a group (20)
0.2	Number of groups in a logical record (25)
1	Time (GMT seconds)
2	Altitude
3	Geodetic latitude
4	Geocentric longitude
5	Geomagnetic latitude
6	Geomagnetic longitude
7	Local time (sec)
8	Drag
9	ρ calculated
10	ρ model
11	Ratio (ρ meas/ ρ model)
12	Attack Angle
13	L-Shell
14	Orbit normal angle
15	Temperature and bias corrected counts
16	Drag coefficient
17	Geocentric latitude
18	Vacant
19	Vacant
20	Vacant

The ram point outputs for the full pass comprise the first part of the MESA data base.

The second part of the data base is made up of points from the curve fit in 2 km intervals between 250 km and perigee. Perigee point is added.

The two portions of the file are separated by IND = 1, JGRP = 1, DATA = 0.0.

For the fitted data

0.1	Word Count (10)
0.2	Group Count (50)
1	GMT
2	ALT
3	Geodetic latitude
4	Geocentric longitude
5	Geomagnetic latitude
6	Geomagnetic longitude
7	ρ (from fit)
8	ρ model
9	Ratio
10	Local time

APPENDIX C
S3-1 MSI
Data Base Format

MSI Data Base - Header Record

0.1	Word Count (20)
0.2	Group Count (1)
1	Experiment (MSI)
2	Orbit Number
3	Month of Year
4	Day of month of orbit
5	Year (last two digits of 19xx)
6	Start time of orbit (GMT-sec)
7	End time of orbit (GMT-sec)
8	Start time of vehicle in sun-GMT sec (<0→N/A)
9	End time of vehicle in sun-GMT sec (<0→N/A)
10	Start time of vehicle in shade - GMT sec (<0→N/A)
11	End time of vehicle in shade - GMT sec (<0→N/A)
12	$\bar{R}$ (average R for orbit)
13	GMT (sec) of perigee
14	Altitude (km) of perigee
15	Longitude (+E) of perigee
16	Latitude of perigee
17	Local time of perigee (sec)
18	$\bar{T}$ (average sphere temp for orbit)
19	Vacant
20	Vacant

MSI Data Base Data Records

0.1	Word Count (50)
0.2	Group Count (10)
1	Time (GMT sec) ram
2	Altitude (km)
3	Geodetic latitude
4	Longitude
5	Invariant latitude
6	L-shell
7	Geomagnetic latitude
8	Magnetic local time (sec)
9	Velocity (km/sec)
10	I_{14} (current for mass 14)
11	α_{14} (attack angle of current for amu 14; + into ram, - out of ram)
12	I_{16}
13	α_{16}
14	I_{18}
15	α_{18}
16	I_{28}
17	α_{28}
18	I_{30}
19	α_{30}
20	I_{32}
21	α_{32}
22	I_{34}
23	α_{34}
24	I_{40}
25	α_{40}

MSI Data Base - Data Records (Cont.)

26	I_{44}
27	α_4
28	N_{16}
29	N_{28}
30	N_{40}
31	N_{14}
32	$N_T (N_T + \sum N_i)$
33	$\rho (\rho = k \sum N_i M_i)$
34	Time (sit mode 70° into ram) (T_{+70})
35	Altitude
36	α at T_{+70}
37	I_{28+70}
38	N_{28+70}
39	Time (sit - ram) (T_R)
40	Alt at T_R
41	α at T_R
42	$I_{28 \text{ ram}}$
43	$N_{28 \text{ ram}}$
44	Time (sit mode - 70° out of ram) (T_{-70})
45	Alt at T_{-70}
46	α at T_{-70}
47	I_{28-70}
48	N_{28-70}
49	Vacant
50	Vacant

APPENDIX D
S3-1 MSIV NH
Data Base Format

MSIV Neutral High (NH)

Header Record

0.1	Word Count (38)
0.2	Group Count (1)
1	Experiment (MSIV - NH)
2	Orbit Number
3	Month of year of orbit
4	Day of month of orbit
5	Year (last two digits of 19xx)
6	Start time of orbit (GMT sec)
7	End time of orbit (GMT sec)
8	Start time of vehicle in sun (<0 = >N/A)
9	End time of vehicle in sun (<0 = >N/A)
10	Start time of vehicle in shade (<0 = >N/A)
11	End time of vehicle in shade (<0 = >N/A)
12	GMT of perigee (sec)
13	Altitude of perigee (km)
14	Longitude (+E) of perigee
15	Geodetic latitude of perigee
16	Geomagnetic latitude of perigee
17	Invariant latitude of perigee
18	Local time of perigee
19	Magnetic local time of perigee
20	Corrected magnetic local time of perigee

MSIV Neutral High (NH) (Cont.)

21	Commutator 1	}	From first 8 frames of data in the pass
22	Commutator 2		
23	Commutator 3		
24	Commutator 4		
25	Commutator 5		
26	Commutator 6		
27	Commutator 7		
28	Commutator 8		
29	Commutator 1	}	From last 8 frames of data in the pass
30	Commutator 2		
31	Commutator 3		
32	Commutator 4		
33	Commutator 5		
34	Commutator 6		
35	Commutator 7		
36	Commutator 8		
37	Vacant		

Data Records - MSIV Neutral High Data Base

0.1	Word Count (72)
0.2	Group Count) (≤ 7)
1	GMT at point closest to ram (sec)
2	Altitude
3	Geodetic
4	Longitude (+E)
5	Invariant latitude
6	L-shell
7	Geomagnetic latitude
8	Magnetic local time
9	Corrected magnetic local time
10	Velocity (km/sec)
11	Pitch Angle
12	T ₁ ram
13	T ₁ ram
14	T ₁ wake
15	I ₁ wake
16	T ₂ ram
17	I ₂ ram
18	T ₂ wake
19	I ₂ wake
20	T ₄ ram
21	I ₄ ram
22	T ₄ wake
23	I ₄ wake
24	T ₁₄ ram
25	I ₁₄ ram
26	T ₁₄ wake
27	I ₁₄ wake
28	T ₁₆ ram
29	I ₁₆ ram
30	T ₁₆ wake
31	I ₁₆ wake

Data Records - MSIV Neutral High Data Base (Cont.)

32	T ₂₈ ram
33	I ₂₈ ram
34	T ₂₈ wake
35	I ₂₈ wake
36	T ₃₀ ram
37	I ₃₀ ram
38	~~T₃₀~~ wake
39	I ₃₀ wake
40	T ₃₂ ram
41	I ₃₂ ram
42	T ₃₂ wake
43	I ₃₂ wake
44	T ₄₀ ram
45	I ₄₀ ram
46	T ₄₀ wake
47	I ₄₀ wake
48	T ₄₄ ram
49	I ₄₄ ram
50	T ₄₄ wake
51	I ₄₄ wake
52	α_1 of ram I ₁ (+ = into ram; - = away from ram)
53	α_2 of ram I ₂ (+ = into ram; - = away from ram)
54	α_4 of ram I ₄ (+ = into ram; - = away from ram)
55	α_{14} of ram I ₁₄ (+ = into ram; - = away from ram)
56	α_{16} of ram I ₁₆ (+ = into ram; - = away from ram)
57	α_{28} of ram I ₂₈ (+ = into ram; - = away from ram)
58	α_{30} of ram I ₃₀ (+ = into ram; - = away from ram)
59	α_{32} of ram I ₃₂ (+ = into ram; - = away from ram)
60	α_{40} of ram I ₄₀ (+ = into ram; - = away from ram)
61	α_{44} of ram I ₄₄ (+ = into ram; - = away from ram)

Data Records - MSIV Neutral High Data Base (Cont.)

62	Ratio monitor 4
63	Ratio monitor 5
64	Ratio monitor 6
65	Ratio monitor 7
66	Ratio monitor 8
67	Beam monitor ₃
68	Beam monitor ₄
69	High Voltage Monitor
70	Vacant
71	Vacant
72	Vacant

APPENDIX E

S3-1 MSIV Ions
Data Base Format

MSIV Ion Data Base Header Record

0.1	Word Count (23)	
0.2	Group Count (1)	
1	Experiment (MSIV)	
2	Orbit Number	
3	Month of year of orbit	
4	Day of month of orbit	
5	Year (last 2 digits of 19xx)	
6	Start time of orbit (GMT-sec)	
7	End time of orbit (GMT-sec)	
8	Start time of vehicle in sun (<0→N/A)	
9	End time of vehicle in sun (<0→N/A)	
10	Start time of vehicle in shade (<0→N/A)	
11	End time of vehicle in shade (<0→N/A)	
12	GMT of perigee (sec)	
13	Altitude of perigee (km)	
14	Longitude (+E) of perigee	
15	Geodetic latitude of perigee	
16	Geomagnetic latitude of perigee	
17	Invariant latitude of perigee	
18	Local time of perigee	
19	Magnetic local time of perigee	
20	Corrected magnetic local time of perigee	
21	Commutator ₁	
22	Commutator ₂	
23	Commutator ₃	
24	Commutator ₄	from first 8 frames of data in pass
25	Commutator ₅	
26	Commutator ₆	
27	Commutator ₇	
28	Commutator ₈	

MSIV Ion Data Base Header Record (Cont.)

29	Commutator ₁	
30	Commutator ₂	
31	Commutator ₃	
32	Commutator ₄	From last 8 frames
33	Commutator ₅	of data in pass
34	Commutator ₆	
35	Commutator ₇	
36	Commutator ₈	
37	Vacant	
38	Vacant	

MSIV Ion Data Base Data Records

- 0.1 Word Count (39)
- 0.2 Group Count (13)
 - 1 Time of start of selected frame (GMT seconds)
 - 2 Altitude (km)
 - 3 Geodetic latitude
 - 4 Geomagnetic latitude
 - 5 Invariant latitude
 - 6 L-Shell
 - 7 Longitude (+E)
 - 8 Magnetic local time (sec)
 - 9 Corrected magnetic local time (sec)
 - 10 Local time (sec)
 - 11 I_{14} (corrected to ram)
 - 12 I_{16} (corrected to ram)
 - 13 I_{28} (corrected to ram)
 - 14 I_{30} (corrected to ram)
 - 15 I_{32} (corrected to ram)
 - 16 α_{14} at time of I_{14} (α = attack angle)
 - 17 α_{16} at time of I_{16}
 - 18 α_{28} at time of I_{28}
 - 19 α_{30} at time of I_{30}
 - 20 α_{32} at time of I_{32}
 - 21 β_{14} at time of I_{14} (β = pitch angle)
 - 22 β_{16} at time of I_{16}
 - 23 β_{28} at time of I_{28}
 - 24 β_{30} at time of I_{30}
 - 25 β_{32} at time of I_{32}

MSIV Ion Data Base Data Records (Cont.)

- 26 ΣI_i (where I_i are corrected currents)
- 27 RA_1 (where RA has been translated to ram)
- 28 α_{RA1}
- 29 RA_2 (translated to ram)
- 30 α_{RA2}
- 31 RA_3 (translated to ram)
- 32 α_{RA5}
- 33 TI_1
- 34 TI_2
- 35 TI_3
- 36 TI_4
- 37 Beam Monitor₁
- 38 Beam Monitor₂
- 39 High Voltage Monitor

APPENDIX F

S3-1

B&L File Format

B&L - File Header Record

0.1	Word Count	
0.2	Group Count (1)	
1	Satellite name	A
2	Modified Julian date at start of pass	F
3	Month of year at start of pass	F
4	Day of month at start of pass	F
5	Year (last two digits of 19xx)	F
6,7	Coefficients used in mag. field calculations	A
8	Epoch year of coefficients	F
9	Date coefficients initially updated to	F
10	Start time of pass (GMT) seconds	F
11	End time of pass (GMT) seconds	F
12	Time increment (seconds)	F
13	Indicator for magfield package 0. = INVAR/FIELDG, 1. = SHELLG/FELDG	F
14	Error value for INVAR	F
15	Semi-major axis (km)	F
16	Eccentricity	F
17	Inclination	F
18	Right ascension of ascending node	F
19	Argument of perigee	F
20	Time of perigee (GMT) sec - neg → N/A	F
21	Altitude of perigee (km)	F

B&L - Header Record (Cont.)

22	Longitude of perigee (+E)
23	Latitude of Perigee (geodetic)
24	Local time of perigee - seconds
25	Time of apogee (neg → no apogee)
26	Altitude of apogee (km)
27	Longitude of apogee (+E)
28	Latitude of apogee (geodetic)
29	Local time of apogee - seconds
30	Start time of vehicle in sun ₁ (neg → N/A)
31	End time of vehicle in sun ₁ (neg → N/A)
32	Start time of vehicle in shade ₁ (neg → N/A)
33	End time of vehicle in shade ₁ (neg → N/A)
34	Start time of vehicle in sun ₂ (neg → N/A)
35	End time of vehicle in sun ₂ (neg → N/A)
36	Start time of vehicle in shade ₂ (neg → N/A)
37	End time of vehicle in shade ₂ (neg → N/A)
38	Longitude at start of pass
39	Longitude at end of pass
40	Latitude (geodetic) at start of pass
41	Latitude (geodetic) at end of pass
42	Altitude at start of pass
43	Altitude at end of pass
44	Rev no.
45-50	Vacant

B&L - File Data Records

0.1	Word count
0.2	Group count
1	Modified Julian Date
2	Calendar month
3	Calendar day
4	Calendar year
5	Hour of day
6	Minute of hour
7	Second of minute
8	GMT in seconds
9	x coordinate of position vector (km)
10	y coordinate of position vector (km)
11	z coordinate of position vector (km)
12	x coordinate of velocity vector (km/sec)
13	y coordinate of velocity vector (km/sec)
14	z coordinate of velocity vector (km/sec)
15	Satellite altitude (km)
16	Distance of satellite from center of earth (km)
17	Satellite velocity (km/sec)
18	Geocentric latitude ($\pm 90^\circ$)
19	Geodetic latitude ($\pm 90^\circ$)
20	Satellite longitude (+E)
21	Geomagnetic local time (seconds)
22	Local time (seconds)

B&L - File Data Records (Cont.)

23	x coordinate of magnetic field (geodetic) in gamma's
24	y coordinate of magnetic field (geodetic) in gamma's
25	z coordinate of magnetic field (geodetic) in gamma's
26	Geomagnetic coordinate - B
27	Geomagnetic coordinate - L
28	Geomagnetic latitude
29	Geomagnetic longitude
30	Magnetic inclination
31	Magnetic declination
32	Invariant latitude
33	Corrected geomagnetic latitude
34	Corrected geomagnetic longitude
35	Local corrected magnetic time
36	Solar zenith angle
37	Solar longitude
38	Solar right ascension
39	Solar declination
40	Mean anomaly
41-50	Vacant

APPENDIX G
S3-1 GSF Format

(GSF) Geophysical Support File Header Record

CDC	FORMAT	DESCRIPTION
0.1	I	Word count
0.2	I	Group count
1	A	Satellite name
2	F	Modified Julian date
3	F	Month of year at start of pass
4	F	Day of month at start of pass
5	F	Year of month at start of pass
6	F	Time at start of pass-GMT (Sec)
7	F	Time at end of pass-GMT (Sec)
8	F	Time increment
9	F	Semi Major axis at start of pass
10	F	Eccentricity at start of pass
11	F	Inclination at start of pass
12	F	Right ascension of ascending node
13	F	Argument of perigee
14	F	Time of perigee-GMT Sec (neg → N/A)
15	F	Altitude of perigee (km)
16	F	Longitude of perigee (+E)
17	F	Latitude (geodetic) of perigee
18	F	Local time of perigee (Sec)
19	F	Time of apogee-GMT Sec (neg → N/A)
20	F	Altitude of apogee (km)
21	F	Longitude of apogee (+E)

(GSF) Geophysical Support File Header Record (Cont.)

CDC	FORMAT	DESCRIPTION
22	F	Latitude of apogee (geodetic)
23	F	Local time of apogee (sec)
24	F	Start time of vehicle in sun ₁ (neg → N/A)
25	F	End time of vehicle in sun ₁ (neg → N/A)
26	F	Start time of vehicle in shade ₁ (neg → N/A)
27	F	End time of vehicle in shade ₁ (neg → N/A)
28	F	Start time of vehicle in sun ₂ (neg → N/A)
29	F	End time of vehicle in sun ₂ (neg → N/A)
30	F	Start time of vehicle in shade ₂ (neg → N/A)
31	F	End time of vehicle in shade ₂ (neg → N/A)
32	F	F10.7 cm solar flux ($F_{10.7}$)
33	F	F (3 month average)
34	F	K_p value
35	F	A_p value
36	F	Longitude (+E) at start of pass
37	F	Longitude (+E) at end of pass
38	F	Latitude (geodetic) at start of pass
39	F	Latitude (geodetic) at end of pass
40	F	Altitude at start of pass
41	F	Altitude at end of pass
42	F	Rev no. (f)
43-50	F	Vacant

Geophysical Support File Data Records

WORD NO.	FORMAT	DESCRIPTION
0.1	I	Word count
0.2	I	Group count
1	F	GMT (seconds)
2	F	Satellite altitude (km)
3	F	Geocentric latitude ($\pm 90^\circ$)
4	F	Geodetic latitude ($\pm 90^\circ$)
5	F	Longitude (+E)
6	F	Local time (seconds)
7	F	Geomagnetic latitude
8	F	Geomagnetic longitude
9	F	Model pressure
10	F	Model temperature (temp at altitude)
11	F	Model density - N_2 (molecular N)
12	F	Model density - O_2 (molecular oxygen)
13	F	Model density - O (atomic oxygen)
14	F	Model density - (gm/cm^3)
15	F	Exospheric temperature
16	F	Model density - H_e (Helium)
17	F	Model density - A_T (Argon)
18	F	Model density - H (Hydrogen)
19-25	Vacant	

APPENDIX II
S5-1 Data Base Summary Listing
(Sample)

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APPENDIX I

S3-2 User File Formats

HEADER RECORD FOR DATA FILES OF VEHICLE S3-2

<u>CDC Word</u>	<u>Information</u>	<u>Format</u>
0.1	Word count (30)	I
0.2	Group count (1)	I
1	Vehicle (S3-2)	A
2	Experiment	A
3	Analog tape number	A
4	Orbit number	F
5	Date of orbit xx/xx/xx	A
6	Date STF tape generated (xx/xx/xy)	A
7	Date of creation of user file (xx/xx/xx)	A
8	Start time of data (GMT-SECS)	F
9	Starting altitude (km)	F
10	Code for starting altitude $\left\{ \begin{array}{l} 1. = \text{increasing} \\ 0. = \text{decreasing} \end{array} \right.$	F
11	Starting latitude	F
12	Code for starting latitude $\left\{ \begin{array}{l} 1. = \text{increasing} \\ 0. = \text{decreasing} \end{array} \right.$	F
13	End time of data (GMT-seconds)	F
14	Altitude at end of data	F
15	Latitude at end of data	F
16	Julian day (from STF)	I
17	$\left. \begin{array}{l} \text{STW1} \\ \text{GMT1} \\ \text{DGMT} \\ \text{DSTW} \end{array} \right\} \begin{array}{l} \text{To calculate GMT from STW} \\ \text{GMT} = [\text{GMT1} + (\text{STW}-\text{STW1}) \text{ DGMT/DSTW}]/1000 \end{array}$	I
18		
19		
20		
21	Inclination of orbital plane	F
22	Right ascension of ascending node	F
23	Average counts for 21-2-4 (for counts > 3)	F
24	Average counts for 21-4-4 (for counts > 3)	F
25	Mode monitor for 22-7 MSIV	F
26	$\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \text{Vacant}$	
27		
28		
29		
30		

ION DENSITY GAUGE DATA RECORDS (S3-2)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2-6	1-60	21-2-1	Range ₁₋₅
5	7-11	1-60	21-2-1	Range 6-10
6	12-16	1-60	21-2-1	Range 11-15
7	17	1-12	21-2-1	Range ₁₆
	18-21	13-60	21-2-2	Gauge Current ₁₋₄
8	22-26	1-60	21-2-2	Gauge Current ₅₋₉
9	27-31	1-60	21-2-2	Gauge Current ₁₀₋₁₄
10	32-33	1-24	21-2-2	Gauge Current ₁₅₋₁₆
	34	25-36	21-2-3	High Voltage
	35-36	37-60	21-4-1	Gauge Current ₁₋₂
11	37-41	1-60	21-4-1	Gauge Current ₃₋₇
12	42-46	1-60	21-4-1	Gauge Current ₈₋₁₂
13	47-51	1-60	21-4-1	Gauge Current ₁₃₋₁₇
14	52-56	1-60	21-4-1	Gauge Current ₁₈₋₂₂
15	57-61	1-60	21-4-1	Gauge Current ₂₃₋₂₇
16	62-66	1-60	21-4-1	Gauge Current ₂₈₋₃₂
17	67-71	1-60	21-4-1	Gauge Current ₃₃₋₃₇
18	72-76	1-60	21-4-1	Gauge Current ₃₈₋₄₂
19	77-81	1-60	21-4-1	Gauge Current ₄₃₋₄₇
20	82-86	1-60	21-4-1	Gauge Current ₄₈₋₅₂
21	87-91	1-60	21-4-1	Gauge Current ₅₃₋₅₇
22	92-96	1-60	21-4-1	Gauge Current ₅₈₋₆₂
23	97,98	1-24	21-4-1	Gauge Current ₆₃₋₆₄
	99-101	25-60	21-4-2	Range ₁₋₃
24	102-106	1-60	21-4-2	Range ₄₋₈
25	107-111	1-60	21-4-2	Range ₉₋₁₃
26	112,114	1-36	21-4-2	Range ₁₄₋₁₆
	115,116	37-60	21-4-3	Filament Emission ₁₋₂

ION DENSITY GAUGE DATA RECORDS (S3-2) (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
27	117-121	1-60	21-4-3	Filament Emission ₃₋₇
28	122	1-12	21-4-3	Filament Emission ₈
	123	13-24	21-2-4	Electronic Temperature
	124	25-36	21-2-5	Gauge Temperature
	125	37-48	21-4-4	Electrometer Temperature
	126	49-60	21-4-5	Gauge Temperature
29	127	1-12	21-4-6	Gauge Open/Close

Words 3-29 repeat 17 times within a record (i.e., 18 seconds per
record)

ATTITUDE/VEHICLE HISTORY (S3-2)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2	1-60	A12	Earth Sensor Crossing Time (GMT)
5	3	1-60	A16	Sun Sensor - sun in FDV (GMT)
6	4	1-60	T15	Timer output zero time (GMT)
7	5-8	1-48	A1	P-Axis low ₁₋₄
	9	49-60	A2	P-Axis high ₁
	10-12	1-36	A2	P-Axis high ₂₋₄
8	13-14	37-60	A3	Q-Axis low ₁₋₂
	15-16	1-24	A3	Q-Axis low ₃₋₄
	17-19	25-60	A4	Q-Axis high ₁₋₃
10	20	1-12	A4	Q-Axis high ₄
	21-24	13-60	A5	R-Axis low ₁₋₄
11	25-28	1-48	A6	R-Axis high ₁₋₄
	29	49-60	A7	Magnetometer bias
	30	1-12	A8	Spin Coil Current
12	31	13-24	A17	Sun Sensor - solar aspect angle
	32	25-26	A18	Precession coil REG #1 magnitude
	33	37-48	A19	Precession coil REG #2 magnitude
	34	49-60	A27	Solar Aspect Angle - Fine #1
13	35	1-12	A28	Solar Aspect Angle - Fine #2
	36-39	13-60	T2,T3,T1	Command Word Replica
14	40	1-12	T8	Transmitter Temperature
	41	13-24	T9	Processor cal. low level
	42	25-36	T10	Processor cal. mid level
	43	37-48	T11	Processor cal. high level
	44	49-60	E1	Shunt limiter current
	45	1-12	E2	Battery current
15	46	13-24	E3	Main bus current
	47	25-36	E4	Main bus voltage ₁
	48-49	37-60	E4	Main bus voltage ₂₋₃

ALTITUDE/VEHICLE HISTORY (S3-2) (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
16	50-54	1-60	E4	Main bus voltage ₄₋₈
17	55-59	1-60	E4	Main bus voltage ₉₋₁₃
18	60-62	1-36	E4	Main bus voltage ₁₄₋₁₅
	63	37-48	E5	Battery Temperature
	64	49-60	E6	Battery state of charge
19	65	1-12	E7	Solar array PNL A804 temp.
	66	13-24	E8	Solar array PNL A805 temp.
	67	25-36	S1	Temperature No. 1
	68	37-48	S2	Temperature No. 2
	69	49-60	S3	Temperature No. 3
20	70	1	E9	Volt. limiter control state enabled
		2	A9	Precession coil timed polarity
		3	A10	Spin coil spin up/down
		4	A11	Precession coil high/low select
		5-6	A13	Earth Sensor polarity
		7	A22	Precession coil on/off
		8	A23	1/4 orbit torqueing selection
		9	A24	1/4 orbit torqueing selection
		10	A25	II & IV positive
		11	A26	I & III positive

Words 3-20 repeat 27 times per record (i.e., 28 seconds per record)

S3-2 EXPERIMENT 226-1-226-7 DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	1	1-60		Word Count
2	2	1-60		Group Count
3	5	1-60		STW (28 bits-right adjusted)
4	4	1-12	26-7-1	E-Field 12 ₁ (X1)
	5-8	13-60	26-7-1	E-Field 12 ₂₋₅
5	9-13	1-60	26-7-1	E-Field 12 ₆₋₁₀
6	14-18	1-60	26-7-1	E-Field 12 ₁₁₋₁₅
7	19-23	1-60	26-7-1	E-Field 12 ₁₆₋₂₀
8	24-28	1-60	26-7-1	E-Field 12 ₂₁₋₂₅
9	29-33	1-60	26-7-1	E-Field 12 ₂₆₋₃₀
10	34-38	1-60	26-7-1	E-Field 12 ₃₁₋₃₅
11	39-43	1-60	26-7-1	E-Field 12 ₃₆₋₄₀
12	44-48	1-60	26-7-1	E-Field 12 ₄₁₋₄₅
13	49-53	1-60	26-7-1	E-Field 12 ₄₆₋₅₀
14	54-58	1-60	26-7-1	E-Field 12 ₅₁₋₅₅
15	59-63	1-60	26-7-1	E-Field 12 ₅₆₋₆₀
16	64-67	1-48	26-7-1	E-Field 12 ₆₁₋₆₄
	68	49-60	26-7-2	E-Field 34 ₁ (X1)
17	69-73	1-60	26-7-2	E-Field 34 ₂₋₆
18	74-78	1-60	26-7-2	E-Field 34 ₇₋₁₁
19	79-83	1-60	26-7-2	E-Field 34 ₁₂₋₁₆
20	84-88	1-60	26-7-2	E-Field 34 ₁₇₋₂₁
21	89-93	1-60	26-7-2	E-Field 34 ₂₂₋₂₆
22	94-98	1-60	26-7-2	E-Field 34 ₂₇₋₃₁
23	99	1-12	26-7-2	E-Field 34 ₃₂
	100-103	13-60	26-7-3	E-Field 56 ₁₋₄ (X1)
24	104-108	1-60	26-7-3	E-Field 56 ₅₋₉
25	109-113	1-60	26-7-3	E-Field 56 ₁₀₋₁₄
26	114-118	1-60	26-7-3	E-Field 56 ₁₅₋₁₉
27	119-123	1-60	26-7-3	E-Field 56 ₂₀₋₂₄
28	124-128	1-60	26-7-3	E-Field 56 ₂₅₋₂₉
29	129-131	1-36	26-7-3	E-Field 56 ₃₀₋₃₂
	132-133	37-60	26-7-4	E-Field 12 ₁₋₂ (X10)

S5-2 EXPERIMENT 226-1>226-7 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
30	134-138	1-60		E-Field 12 ₃ -7
31	139-143	1-60		E-Field 12 ₈ -12
32	144-148	1-60		E-Field 12 ₁₃ -17
33	149-153	1-60		E-Field 12 ₁₈ -22
34	154-158	1-60	26-7-4	E-Field 12 ₂₃ -27 (X10)
35	159-163	1-60	26-7-4	E-Field 12 ₂₈ -32
36	164-168	1-60	26-7-5	E-Field 34 ₁ -5 (X10)
37	169-173	1-60	26-7-5	E-Field 34 ₆ -10
38	174-178	1-60	26-7-5	E-Field 34 ₁₁ -15
39	179-183	1-60	26-7-5	E-Field 34 ₁₆ -20
40	184-188	1-60	26-7-5	E-Field 34 ₂₁ -25
41	189-193	1-60	26-7-5	E-Field 34 ₂₆ -30
42	194-195	1-24	26-7-5	E-Field 34 ₃₁ -32
	196-198	25-60	26-7-6	E-Field 56 ₁ -3 (X10)
43	199-203	1-60	26-7-6	E-Field 56 ₄ -8
44	204-208	1-60	26-7-6	E-Field 56 ₉ -13
45	209-213	1-60	26-7-6	E-Field 56 ₁₄ -18
46	214-218	1-60	26-7-6	E-Field 56 ₁₉ -23
47	219-223	1-60	26-7-6	E-Field 56 ₂₄ -28
48	224-227	1-48	26-7-6	E-Field 56 ₂₉ -32
	228	49-60	26-7-19	Length-1
49	229	1-12	26-7-20	Length-2
	230	13-24	26-7-21	Length-3
	231	25-36	26-7-22	Length-4
	232	37-48	26-7-23	Length-5
	233	49-60	26-7-24	Length-6
50	234	1-12	26-7-25	Limit-1
	235	13-24	26-7-26	Limit-2
	236	25-36	26-7-27	Limit-3
	237	37-48	26-7-28	Limit-4
	238	49-60	26-7-29	Limit-5
51	239	1-12	26-7-30	Limit-6
	240-243	13-60	A1	P Axis-Lo ₁ -4

S3-2 EXPERIMENT 226-1 & 226-7 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
52	244-247	1-48	A2	P Axis-Hi ₁₋₄
	248	49-60	A3	Q Axis-Lo ₁
53	249-251	1-36	A3	Q Axis-Lo ₂₋₄
	252-253	37-60	A4	Q Axis Hi ₁₋₂
54	254-255	1-24	A4	Q Axis Hi ₃₋₄
	256-258	25-60	A5	R Axis Lo ₁₋₃
55	259	1-12		R Axis Lo ₄
	260-263	13-60	A6	R-Axis Hi ₁₋₄
56	264	1-12	A7	Magnetometer Bias
56	265	13-24	ANSC5 ₄	
	266	25-36	ANSC9 ₂	
	267	37-48	ANSC9 ₁₀	
	268	49-60		Vacant - Zero Fill

Words 3-56 repeat 8 times per record (i.e., 9 seconds of data per record)

<u>ANSC5₄ Words</u>	<u>ANSC9₂ Words</u>	<u>ANSC9₁₀ Words</u>
26-7-11	21-4-5	26-7-13
26-7-12	21-4-6	26-7-14
24-4-1	34-10	26-7-15
24-4-2	26-7-7	26-7-16
24-4-3	26-7-8	26-7-17
24-4-4	23-2	26-7-18
24-4-5	23-3	
24-4-6	23-4	
24-4-7	24-2-1	
24-4-8	24-2-2	
24-4-9	24-2-3	
24-4-10	24-2-4	
24-5-1	24-2-5	
24-5-2	24-2-6	
24-5-3	26-7-9	
24-5-4	26-7-10	

SS-2 EXPERIMENT 224-1 DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count (37)
2	0.2	1-60		Group Count (<13)
3	1	1-60		STW
4	2-3	1-24	24-2-11	Proton Flux Measurement ₁
	4-5	24-48	24-2-11	Proton Flux Measurement ₂
	6	49-60	24-2-11	Proton Flux Measurement
5	7	1-12	24-2-11	Proton Flux Measurement ₃
	8-11	13-60	24-2-11	Proton Flux Measurement ₄₋₅
6	72-15	1-48	24-2-11	Proton Flux Measurement ₆₋₇
	16	49-60		
7	17	1-12	24-2-11	Proton Flux Measurement ₈
	18-21	13-60	24-2-11	Proton Flux Measurement ₉₋₁₀
8	22-25	1-48	24-2-11	Proton Flux Measurement ₁₁₋₁₂
	26	49-60	24-4-11	200m LLTH
9	27	1-12	24-4-12	200m ULTH
	28	13-24	24-4-13	750 LLTH
	29	25-36	24-4-14	750 ULTH
	30	37-60		
10	32-34	1-36	24-4-15	Proton & Alpha Particle Fluxes Measure.
	35-36	37-60	24-5-21	Digital No. 1 ₁
11	37-38	1-24		
	39-41	25-60	24-5-21	Digital No. 1 ₂
12	42	1-12		
	43-46	13-60	24-5-21	Digital No. 1 ₃
13	47-50	1-48	24-5-21	Digital No. 1 ₄
		49-60		
14	51-54	1-36	24-5-21	Digital No. 1 ₅
	55-56	37-60		
15	57-58	1-24	24-5-21	Digital No. 1 ₆
	59-61	25-60		
16	62	1-12	24-5-21	Digital No. 1 ₇
	63-66	13-60	24-5-21	Digital No. 1 ₈

S3-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
17	67-70	1-48	24-5-21	Digital No. 1 ₉
	71	49-60		
18	72-74	1-36	24-5-21	Digital No. 1 ₁₀
	75-76	37-60		
19	77-78	1-24	24-5-21	Digital No. 1 ₁₁
	89-81	25-69		
20	82	1-12	24-5-21	Digital No. 1 ₁₂
	83-86	13-60		
21	87-90	1-48	24-5-21	Digital No. 1 ₁₄
	91	49-60		
22	92-84	1-36	24-5-21	Digital No. 1 ₁₅
	95-96	37-60		
23	97-98	1-24	24-5-21	Digital No. 1 ₁₆
	99-100	25-48	24-5-22	Digital No. 2 ₁
		49-60		
24	101-102	1-12	24-5-22	Digital No. 2 ₂
	103-106	13-60	24-5-22	Digital No. 2 ₃₋₄
25	107-110	1-48	24-5-22	Digital No. 2 ₅₋₆
		49-60		
26	111-112	1-12	24-5-22	Digital No. 2 ₇
	113-116	13-60	24-5-22	Digital No. 2 ₈₋₉
27	117-118	1-24	24-5-22	Digital No. 2 ₁₀
	119-121	25-60	A1	P-Axis Low ₁₋₃
28	122	1-12	A1	P-Axis Low ₄
	123-126	13-60	A2	P-Axis High ₁₋₄
29	127-130	1-48	A3	Q-Axis Low ₁₋₄
	131	49-60	A4	Q-Axis High ₁
30	132-134	1-36	A4	Q-Axis High ₂₋₄
	135-136	37-60	A5	R-Axis Low ₁₋₂
31	137-138	1-24	A5	R-Axis Low ₃₋₄
	139-141	25-60	A6	R-Axis High ₁₋₃
32	142	1-12	A6	R-Axis High ₄
	143	13-24	A7	Magnetometer Bias

SS-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
	144	25-36	24-2-1	+100 v Det. Mon.
	145	37-48	24-2-2	+15 v Preamp. Mon.
	146	49-60	24-2-3	+5 v Mon.
33	147	1-12	24-2-4	+2.5 v Mon.
	148	13-24	24-2-5	+1.0 v Mon.
	149	25-36	24-2-6	-2.5 v Mon.
	150	37-48	24-4-1	5.0 v Ref.
	151	49-60	24-4-2	2.5 v Ref.
34	152	1-12	24-4-3	0.0 v Ref.
	153	13-24	24-4-4	28 v Mon.
	154	25-36	24-4-5	+15 v Mon.
	155	37-48	24-4-6	+5v Mon.
	156	49-60	24-4-7	-5v Mon.
35	157	1-12	24-4-8	Bias Mon.
	158	13-24	24-4-9	Elec. Temp.
	159	25-36	24-4-10	Detector Temp.
	160	37-48	24-5-1	Magnetometer No. 1
	161	49-60	24-5-2	Magnetometer No. 2
36	162	1-12	24-5-3	Magnetometer No. 3
	163	13-24	24-5-4	Magnetometer No. 4
	164	25-36	24-5-5	Magnetometer No. 5
	165	37-48	24-5-6	Magnetometer No. 6
	166	49-60	24-5-7	Magnetometer No. 7
37	167	1-12	24-5-8	Magnetometer No. 8
	168	13-24	24-5-9	Magnetometer No. 9
	169	25-36	24-5-10	Magnetometer No. 10
	170	37-48	24-5-11	Magnetometer No. 11
	171	49-60	24-5-12	Magnetometer No. 12
38	172	1-12	24-5-13	Magnetometer No. 13
	173	13-24	24-5-14	Magnetometer No. 14
	174	25-36	24-5-15	Magnetometer No. 15
	175	37-48	24-5-16	Magnetometer No. 16
	176	49-60	24-5-17	Magnetometer No. 17

S3-2 EXPERIMENT 224-1 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
39	177	1-12	24-5-18	Magnetometer No. 18
	178	13-24	24-5-19	Magnetometer No. 19
	179	25-36	24-5-20	Magnetometer No. 20
	180-181	37-60		Vacant

Words (3-39) repeat 12 times within a record (i.e., 13 seconds per record)

S3-2 EXPERIMENT 219-1, -2, -3, -3A DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Information</u>
1	1	1-60		Word Count
2	2	1-60		Group Count
3	3	1-60		Satellite Clock (at SC 0)
4	4	1-12	19-3-13	ES ₁
4	5	13-24		ES ₂
4	6	25-36		ES ₃
4	7	37-48		ES ₄
4	8	49-60		ES ₅
5,6	9-18	1-60		ES ₆ - ES ₁₅
7	19	1-12		ES ₁₆
7	20	13-24	19-3-14	Range A ₁
7	21	25-36		Range A ₂
7	22	37-48		Range A ₃
7	23	49-60		Range A ₄
8-12	24-48	1-60		Range A ₅ - A ₂₉
13	49-51	1-36		Range A ₃₀ - A ₃₂
13	52	37-48	19-3-15	Range B ₁
13	53	49-60		Range B ₂
14-19	54-83	1-60		Range B ₃ - B ₃₂
20-25	84-113	1-60	19-3-17	R24 ₁ - R24 ₃₀
26	114	1-12		R24 ₃₁
26	115	13-24		R24 ₃₂
26	116-118	25-60	19-3-16	R68 ₁ - R68 ₃
27-31	119-143	1-60		R68 ₄ - R68 ₂₈
32	144-147	1-48		R68 ₂₉ - R68 ₃₂
32	148	49-60	19-3-11	R21 ₁
33-35	149-163	1-60		R21 ₂ - R21 ₁₆
36-38	164-178	1-60	19-3-12	R23 ₁ - R23 ₁₅
39	179	1-12		R23 ₁₆
39	180-183	13-60	19-3-9	R65 ₁ - R65 ₄
40-41	184-193	1-60		R65 ₅ - R65 ₁₄

S3-2 EXPERIMENT 219-1, -2, -3, -3A DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Information</u>
42	194-195	1-24		R65 ₁₅ - R65 ₁₆
42	196-198	25-60	19-3-10	R67 ₁ - R67 ₃
43-44	199-208	1-60		R67 ₄ - R67 ₁₃
45	209-211	1-36		R67 ₁₄ - R67 ₁₆
45	212-213	37-60	19-3-5	I1 ₁ - I1 ₂
46-47	214-223	1-60		I1 ₃ - I1 ₁₂
48	224-227	1-48		I1 ₁₃ - I1 ₁₆
48	228	49-60	19-3-6	I2 ₁
49-51	229-243	1-60		I2 ₂ - I2 ₁₆
52-54	244-258	1-60	19-3-7	I3 ₁ - I3 ₁₅
55	259	1-12		I3 ₁₆
55	260-263	13-60	19-3-8	I4 ₁ - I4 ₄
56-57	264-273	1-60		I4 ₅ - I4 ₁₄
58	274-275	1-24		I4 ₁₅ - I4 ₁₆
58	276-278	25-60	19-3-1	I5 ₁ - I5 ₃
59-60	279-288	1-60		I5 ₄ - I5 ₁₃
61	289-291	1-36		I5 ₁₄ - I5 ₁₆
61	292-293	37-60	19-3-2	I6 ₁ - I6 ₂
62-63	294-303	1-60		I6 ₃ - I6 ₁₂
64	304-307	1-48		I6 ₁₃ - I6 ₁₆
64	308	49-60	19-3-3	I7 ₁
65-67	309-323	1-60		I7 ₂ - I7 ₁₆
68-70	324-338	1-60	19-3-4	I8 ₁ - I8 ₁₅
71	339	1-12		I8 ₁₆
71	340-343	13-60	19-3-22	T12 ₁ - T12 ₄
72	344-347	1-48		T12 ₅ - T12 ₈
72	348	49-60		ANSSC1

Words 3-72 repeat 6 times within a record (i.e., 7 seconds per record)

S3-2 PIEZOELECTRIC ACCELEROMETER DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMF
4	2-5	1-48	34-1	X2 Signal ₁₋₄
	6	49-60	34-2	X3 Signal
5	7	1-12	34-3	X1 Signal
	8	13-24	34-4	Y3 Signal
	9	25-36	34-5	Y2 Signal
	10	37-48	34-6	Y1 Signal
	11	49-60	34-7	Z3 Signal
6	12	1-12	34-8	Z2 Signal
	13	13-24	34-9	Z1 Signal
	14	25-36	34-10	Temperature Monitor
		37-60		Vacant

Words 3-6 repeat 126 times within a record (i.e., 127 seconds per record)

MSIV DATA RECORDS - S3-2

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60	T4	Satellite Time Word
4	2-5	1-48	22-15	Spectra ₁₋₂
4		49-60		
5	6-7	1-12	22-15	Spectra ₃
	8-11	13-60	22-15	Spectra ₄₋₅
6	12-15	1-48	22-15	Spectra ₆₋₇
6		49-60		
7	16-17	1-12	22-15	Spectra ₈
	18-21	13-60	22-15	Spectra ₉₋₁₀
8	22-25	1-48	22-15	Spectra ₁₁₋₁₂
8		49-60		
9	26-27	1-12	22-15	Spectra ₁₃
	28-31	13-60	22-15	Spectra ₁₄₋₁₅
10	32-35	1-48	22-15	Spectra ₁₆₋₁₇
10		49-60		
11	36-37	1-12	22-15	Spectra ₁₈
	38-41	13-60	22-15	Spectra ₁₉₋₂₀
12	42-45	1-48	22-15	Spectra ₂₁₋₂₂
12		49-60		
13	46-47	1-12	22-15	Spectra ₂₃
	48-51	13-60	22-15	Spectra ₂₄₋₂₅
14	52-55	1-48	22-15	Spectra ₂₆₋₂₇
14		49-60		
15	56-59	1-12	22-15	Spectra ₂₈
	58-61	13-60	22-15	Spectra ₂₉₋₃₀
16	62-65	1-48	22-15	Spectra ₃₁₋₃₂
16		49-60		
17	66-67	1-12	22-15	Spectra ₃₃
	68-71	13-60	22-15	Spectra ₃₄₋₃₅
18	72-75	1-48	22-15	Spectra ₃₆₋₃₇

MS IV DATA RECORDS - S3-2 (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
18		49-60		
19	76-77	1-12	22-15	Spectra38
	78-81	13-60	22-15	Spectra39-40
20	82-85	1-48	22-15	Spectra41-42
20		49-60		
21	86-87	1-12	22-15	Spectra43
	88-91	13-60	22-15	Spectra44-45
22	92-95	1-48	22-15	Spectra46-47
22		49-60		
23	96-97	1-12	22-15	Spectra48
	98-101	13-60	22-15	Spectra49-50
24	102-105	1-48	22-15	Spectra51-52
24		49-60		
25	106-107	1-12	22-15	Spectra53
	108-111	13-60	22-15	Spectra54-55
26	112-115	1-48	22-15	Spectra56-57
26		49-60		
27	116-117	1-12	22-15	Spectra58
	118-121	13-60	22-15	Spectra59-60
28	122-125	1-48	22-15	Spectra61-62
28		49-60		
29	126-127	1-12	22-15	Spectra63
	128-129	13-36	22-15	Spectra64
	130-131	37-60	22-1	RF1-2
30	132-136	1-60	22-1	RF3-7
31	137-141	1-60	22-1	RF8-12
32	142-146	1-60	22-1	RF13-17
33	147-151	1-60	22-1	RF18-22
34	152-156	1-60	22-1	RF23-27
35	157-161	1-60	22-1	RF28-32
36	162-166	1-60	22-1	RF33-37
37	167-171	1-60	22-1	RF38-42
38	172-176	1-60	22-1	RF43-47
39	177-181	1-60	22-1	RF48-52

MSIV DATA RECORDS - S3-2 (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
40	182-186	1-60	22-1	RF ₅₃₋₅₇
41	187-191	1-60	22-1	RF ₅₈₋₆₂
42	192-193	1-24	22-1	RF ₆₃₋₆₄
	194-196	25-60	22-4	VR ₁₋₃
43	197-201	1-60	22-4	VR ₄₋₈
44	202-206	1-60	22-3	Ratio ₁₋₅
45	207-209	1-36	22-3	Ratio ₆₋₈
	210-211	37-60	22-5	DC ₁₋₂
46	212-216	1-60	22-5	DC ₃₋₇
47	217	1-12	22-5	DC ₈
	218-221	13-60	22-2	Beam ₁₋₄
48	222	1-12	22-6	Commutator
	223	13-24	22-7	Mode Monitor
	224-225	25-48	22-8	HV Monitor ₁₋₂
	226	49-60		Vacant

Words 3-48 repeat 11 times within a record (i.e., 11 seconds per record)

SS-2 FLUXGATE DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2	1-60	T15	T15
5	3-7	1-60	26-10-1	X-Axis Magnetometer ₁₋₅
6	8-12	1-60	26-10-1	X-Axis Magnetometer ₆₋₁₀
7	13-17	1-60	26-10-1	X-Axis Magnetometer ₁₁₋₁₅
8	18-22	1-60	26-10-1	X-Axis Magnetometer ₁₆₋₂₀
9	23-27	1-60	26-10-1	X-Axis Magnetometer ₂₁₋₂₅
10	28-32	1-60	26-10-1	X-Axis Magnetometer ₂₆₋₃₀
11	33-34	1-24	26-10-1	X-Axis Magnetometer ₃₁₋₃₂
	35-37	25-60	26-10-2	Y-Axis Magnetometer ₁₋₃
12	38-42	1-60	26-10-2	Y-Axis Magnetometer ₄₋₈
13	43-47	1-60	26-10-2	Y-Axis Magnetometer ₉₋₁₃
14	48-52	1-60	26-10-2	Y-Axis Magnetometer ₁₄₋₁₈
15	53-57	1-60	26-10-2	Y-Axis Magnetometer ₁₉₋₂₃
16	58-62	1-60	26-10-2	Y-Axis Magnetometer ₂₄₋₂₈
17	63-66	1-48	26-10-2	Y-Axis Magnetometer ₂₉₋₃₂
	67	49-60	26-10-3	Z-Axis Magnetometer ₁
18	68-72	1-60	26-10-3	Z-Axis Magnetometer ₂₋₆
19	73-77	1-60	26-10-3	Z-Axis Magnetometer ₇₋₁₁
20	78-82	1-60	26-10-3	Z-Axis Magnetometer ₁₂₋₁₆
21	83-87	1-60	26-10-3	Z-Axis Magnetometer ₁₇₋₂₁
22	88-92	1-60	26-10-3	Z-Axis Magnetometer ₂₂₋₂₆
23	93-97	1-60	26-10-3	Z-Axis Magnetometer ₂₇₋₃₁
24	98	1-12	26-10-3	Z-Axis Magnetometer ₃₂
	99-102	13-60	26-10-4	Z-Axis Range Switch Fine ₁₋₄
25	103-107	1-60	26-10-4	Z-Axis Range Switch Fine ₅₋₉
26	108-112	1-60	26-10-4	Z-Axis Range Switch Fine ₁₀₋₁₄
27	113-114	1-24	26-10-4	Z-Axis Range Switch Fine ₁₅₋₁₆
	115-117	25-60	26-10-5	Y-Axis Range Switch Fine ₁₋₃
28	118-122	1-60	26-10-5	Y-Axis Range Switch Fine ₄₋₈

S3-2 FLUXGATE DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
29	123-127	1-60	26-10-5	Y-Axis Range Switch Fine ₉₋₁₃
30	128-130	1-36	26-10-5	Y-Axis Range Switch Fine ₁₄₋₁₆
	131-132	37-60	26-10-6	Z-Axis Range Switch Fine ₁₋₂
31	133-137	1-60	26-10-6	Z-Axis Range Switch Fine ₃₋₇
32	138-142	1-60	26-10-6	Z-Axis Range Switch Fine ₈₋₁₂
33	143-146	1-48	26-10-6	Z-Axis Range Switch Fine ₁₃₋₁₆
	147	49-60	26-10-7	X-Axis Range Switch Course ₁
34	148	1-12	26-10-7	X-Axis Range Switch Course ₂
	149-150	13-36	26-10-8	Y-Axis Range Switch Course ₁₋₂
	151-152	37-60	26-10-9	Z-Axis Range Switch Course ₁₋₂
35	153	1-12	26-10-10	Sensor Temperature
	154	13-24	26-10-11	Electronics Temperature
	155	25-36	26-10-12	Range Switch Temperature
	156-157	37-60	A1	P-Axis Low ₁₋₂
36	158-159	1-24	A1	P-Axis Low ₃₋₄
	160-162	25-60	A2	P-Axis High ₁₋₃
37	163	1-12	A2	P-Axis High ₄
	164-167	13-60	A3	Q-Axis Low ₁₋₄
38	168-171	1-48	A4	Q-Axis High ₁₋₄
	172	49-60	A5	R-Axis Low ₁
39	173-175	1-36	A5	R-Axis Low ₂₋₄
	176-177	37-60	A6	R-Axis High ₁₋₂
40	178-179	1-24	A6	R-Axis High ₃₋₄
	180	25-36	A7	Magnetometer Bias
	181	37-48	A8	Spin Coil Current
	182	49-60	A18	Precession Coil Reg #1 Magnitude
41	183	1-12	A19	Precession Coil Reg #2 Magnitude
		13	A9	Precession Coil Timed Polarity
		14	A10	Spin Coil Spin Up/Down
		15	A11	Precession Coil High/Low Select
		16	A22	Precession Coil On/Off
		17	A23	1/4 Orbit Torqueing Selection
		18	A24	1/4 Orbit Torqueing Selection
		19-60		Vacant

Words 3-41 repeat 12 times per record. 13 seconds of data per record. (NCHN=182)

S3-2 ESA DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word Count
2	0.2	1-60		Group Count
3	1	1-60		GMT
4	2-3	1-24	26-11-1	+5v Monitor ₁₋₂
	4-5	25-48	26-11-2	+15v Monitor ₁₋₂
	6	49-60	26-11-3	-5v Monitor ₁
5	7	1-12	26-11-3	-5v Monitor ₂
	8-11	13-60	26-11-4	+10v Ref. Monitor ₁₋₄
6	12	1-12	26-11-5	+28v Monitor
	13	13-24	26-11-6	Temperature Monitor
	14-16	25-60	26-11-7	+3kv Monitor ₁₋₃
7	17-21	1-60	26-11-7	+3kv Monitor ₄₋₈
8	22-26	1-60	26-11-8	+3kv Input Current Monitor ₁₋₅
9	27-29	1-36	26-11-8	+3kv Input Current Monitor ₆₋₈
	30-31	37-60	26-11-9	-10kv Input Current Monitor ₁₋₂
10	32-36	1-60	26-11-9	-10kv Input Current Monitor ₃₋₇
11	37	1-12	26-11-9	-10kv Input Current Monitor ₈
	38-41	13-60	26-11-10	-10kv Ref. Input Monitor ₁₋₄
12	42-45	1-48	26-11-10	-10kv Ref. Input Monitor ₅₋₈
	46	49-60	26-11-11	Electron Counter ₁
13	47	1-12		
	48-51	13-60	26-11-11	Electron Counter ₂₋₃
14	52-55	1-48	26-11-11	Electron Counter ₄₋₅
	56	49-60	26-11-11	Electron Counter ₆
15	57	1-12		
	58-61	13-60	26-11-11	Electron Counter ₇₋₈
16	62-65	1-48	26-11-11	Electron Counter ₉₋₁₀
	66	49-60	26-11-11	Electron Counter ₁₁
17	67	1-12		
	68-71	13-60	26-11-11	Electron Counter ₁₂₋₁₃
18	72-75	1-48	26-11-11	Electron Counter ₁₄₋₁₅
	76	49-60	26-11-11	Electron Counter ₁₆
19	77	1-12		

S3-2 ESA DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
	78-81	13-60	26-11-11	Electron Counter17-18
20	82-85	1-48	26-11-11	Electron Counter19-20
	86	49-60	26-11-11	Electron Counter21
21	87	1-12		
	88-91	13-60	26-11-11	Electron Counter22-23
22	92-95	1-48	26-11-11	Electron Counter24-25
	96	49-60	26-11-11	Electron Counter26
23	97	1-12		
	98-101	13-60	26-11-11	Electron Counter27-28
24	102-105	1-48	26-11-11	Electron Counter29-30
	106	49-60	26-11-11	Electron Counter31
25	107	1-12		
	108-111	13-60	26-11-11	Electron Counter32-33
26	112-115	1-48	26-11-11	Electron Counter34-35
	116	49-60	26-11-11	Electron Counter36
27	117	1-12		
	118-121	13-60	26-11-11	Electron Counter37-38
28	122-125	1-48	26-11-11	Electron Counter39-40
	126	49-60	26-11-11	Electron Counter41
29	127	1-12		
	128-131	13-60	26-11-11	Electron Counter42-43
30	132-135	1-48	26-11-11	Electron Counter44-45
	136	49-60	26-11-11	Electron Counter46
31	137	1-12		
	138-141	13-60	26-11-11	Electron Counter47-48
32	142-145	1-48	26-11-11	Electron Counter49-50
	146	49-60	26-11-11	Electron Counter51
33	147	1-12		
	148-151	13-60	26-11-11	Electron Counter52-53
34	152-155	1-48	26-11-11	Electron Counter54-55
	156	49-60	26-11-11	Electron Counter56
35	157	1-12		
	158-161	13-60	26-11-11	Electron Counter57-58

S3-2 ESA DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
36	162-165	1-48	26-11-11	Electron Counter ₅₉₋₆₀
	166	49-60	26-11-11	Electron Counter ₆₁
37	167	1-12		
	168-171	13-60	26-11-11	Electron Counter ₆₂₋₆₃
38	172-173	1-24	26-11-11	Electron Counter ₆₄
	174-176	25-60		Vacant

Words 3-38 are repeated 13 times within a record (i.e., 14 seconds per record)

APPENDIX J

S3-2 ESA Data Base Format

ESA PREPROCESS FILE HEADER RECORD

0.1 Word Count (56)
 0.2 Group Count (1)
 1 Satellite Name (bbbbbb S3-2)
 2 Experiment Name (bbbbbbb ESA)
 3 Orbit Number
 4 Month of year at orbit
 5 Day of month of orbit
 6 Year of orbit (last 2 digits of 19xx)
 7 Start time at data base (GMT-SEC)
 8 End time of data base (GMT-SEC)
 9 Longitude at start (+E)
 10 Longitude at end (+E)
 11 Latitude (geocentric) at start
 12 Latitude (geocentric) at end
 13 Magnetic latitude at start
 14 Magnetic latitude at end
 15 Invariant latitude at start
 16 Invariant latitude at end
 17 Repeat 7-16 for a maximum of four time intervals
 :
 :
 46 DGMT from STF
 48 DSTW from STF
 49 Start time of vehicle in sun₁ (neg. → N/A)
 50 End time of vehicle in sun₁ (neg. → N/A)
 51 Start time of vehicle in shade₁ (neg. → N/A)
 52 End time of vehicle in shade₂ (neg. → N/A)
 53 Start time of vehicle in sun₂ (neg. → N/A)
 54 End time of vehicle in sun₂ (neg. → N/A)

ESA PREPROCESS FILE DATA RECORDS

Data is grouped in two second increments

0.1	Word Count (59)
0.2	Group Count (≤ 8)
1	GMT (at first 00g level)
2	Altitude (km)
3	Longitude (+E)
4	Geocentric latitude
5	Geomagnetic latitude
6	Invariant latitude
7	Magnetic field (total field)
8	L-Shell
9	Local time (seconds)
10	Magnetic local time
11-15	Magnetic pitch angle (in .4 second increments).

Counts output is stored as follows: The 10 LSB's contain counts; Bit 11 = overflow (0 = normal, 1 = overflow); MSB (Bit 12) = 0 normally, = 1 if dummy filled where dropout occurred.

<u>Word</u>	<u>Bits</u>	
16	1-12	Counts at 00g ↑
	13-24	Counts at 00g ↑
	25-36	Counts at 01g ↑
	37-48	Counts at 01g ↑
	49-60	Counts at 02g ↑
17	1-12	Counts at 02g ↑
	⋮	
28	1-12	Counts at 36g ↑
	13-24	Counts at 36g ↓
	25-36	Counts at 37g ↑
	37-48	Counts at 37g ↑
	49-60	Counts at 37g ↓
29	1-12	Counts at 37g ↓
	13-24	Counts at 36g ↓

ESA PREPROCESS FILE DATA RECORDS (Cont.)

Word	Bits	
29	25-36	Counts at 36g ↓
Cont.	37-48	Counts at 35g ↓
	49-60	Counts at 35g ↓
⋮		
41	1-12	Counts at 01g ↓
	13-24	Counts at 00g ↓
	25-36	Counts at 00g ↓

For monitor storage, MSB=1 if data is dummy filled because of dropout

41	37-48	+5v Monitor ₁
	49-60	+5v Monitor ₂
42	1-12	+15v Monitor ₁
	13-24	+15v Monitor ₂
	25-36	-5v Monitor ₁
	37-48	-5v Monitor ₂
	49-60	+10v Reference Monitor ₁
43	1-12	+10v Reference Monitor ₂
	13-24	+10v Reference Monitor ₃
	25-36	+10v Reference Monitor ₄
	37-48	+28v Monitor ₁
	49-60	Temperature Monitor ₁
44	1-12	+3kv Monitor ₁
	13-24	+3kv Monitor ₂
	25-60	+3kv Monitor ₃₋₅
45	1-12	+3kv Monitor ₆
	13-36	+3kv Monitor _{7,8}
	37-48	+3kv Input Current Monitor ₁
	49-60	+3kv Input Current Monitor ₂
46	1-60	+3kv Input Current Monitor ₃₋₇
47	1-12	+3kv Input Current Monitor ₈
	13-60	-10kv Input Current Monitor ₁₋₄
48	1-48	-10kv Input Current Monitor ₅₋₈
	49-60	-10kv Reference Input Monitor ₁

ESA PREPROCESS FILE DATA RECORDS (Cont.)

<u>Word</u>	<u>Bits</u>	
49	1-60	-10kv Reference Input Monitor ₂₋₆
50	1-24	-10kv Reference Input Monitor ₇₋₈
	25-48	+5v Monitor ₃₋₄
	49-60	+15v Monitor ₃
51	1-12	+15v Monitor ₄
	13-36	=5v Monitor ₃₋₄
	37-60	+10v Reference Monitor ₅₋₆
52	1-24	+10v Reference Monitor ₇₋₈
	25-36	+28v Monitor ₂
	37-48	Temperature Monitor ₂
	49-60	+3kv Monitor ₉
53	1-60	+3kv Monitor ₁₀₋₁₄
54	1-24	+3kv Monitor ₁₅₋₁₆
	36-60	+3kv Input Current Monitor ₉₋₁₁
55	1-60	+3kv Input Current Monitor ₁₂₋₁₆
56	1-60	-10kv Input Current Monitor ₁₄₋₁₆
	37-60	-10kv Reference Input Monitor ₉₋₁₀
58	1-60	-10kv Reference Input Monitor ₁₁₋₁₅
59	1-12	-10kv Reference Input Monitor ₁₆
	13-60	Vacant

APPENDIX K
S3-2 Fluxgate Magnetometer
Data Base Format

FLUXGATE PREPROCESS FILE HEADER RECORD

<u>CDC Word</u>	<u>Information</u>	<u>Format</u>
0.1	Word Count (30)	I
0.2	Group Count (1)	I
1	Vehicle (S3-2)	A
2	Experiment	A
3	Analog Tape Number	A
4	Orbit Number	F
5	Date of Orbit xx/xx/xx	A
6	Date STF Tape Generated (xx/xx/xx)	A
7	Date of Creation of User File (xx/xx/xx)	A
8	Start Time of Data (GMT-SECS)	F
7	Starting Altitude (km)	F
10	Code for Starting Altitude { 1. = increasing 0. = decreasing	F
11	Starting Latitude	F
12	Code for Starting Latitude { 1. = increasing 0. = decreasing	F
13	End Time of Data (GMT-seconds)	F
14	Altitude at End of Data	F
15	Latitude at End of Data	F
16	Julian Day (from STF)	I
17	STW1	I
18	GMT1	I
19	DGMT	I
20	DSTW	I
21	Inclination of Orbital Plane	F
22	Right Ascension of Ascending Node	F
23	Average Counts for 21-2-4 (for counts > 3)	F
24	Average Counts for 21-4-4 (for counts > 3)	F
25	Mode Monitor for 22-7	F
26	} Vacant	
27		
28		
29		
30		

FLUXGATE PREPROCESS DATA RECORDS

0.1	Word count (129)
0.2	Group count (≤ 3)
1	GMT (GMT at start of data frame)
2	x-Field ₁ (γ 's)
3	y-Field ₁ (γ 's)
4	z-Field ₁ (γ 's)
5	x-Field ₂ (γ 's)
6	y-Field ₂ (γ 's)
7	z-Field ₂ (γ 's)
:	:
95	x-Field ₃₂ (γ 's)
96	y-Field ₃₂ (γ 's)
97	z-Field ₃₂ (γ 's)
98	Bits 1-10 = x _{coarse} Integer +3 for x ₁ readout 11-20 = x _{fine} Integer +15 for x ₁ readout 21-30 = y _{coarse} Integer +3 for y ₁ readout 31-40 = y _{fine} Integer +15 for y ₁ readout 41-50 = z _{coarse} Integer +3 for z ₁ readout 51-60 = z _{fine} Integer +15 for z ₁ readout
99	Bits 1-10 = x _{coarse} Integer +3 for x ₂ readout : :
129	Bits 51-60 = z _{fine} Integer +15 for z ₃₂ readout

APPENDIX 1.

S3-2 MSIV Data Base Format

S3-2 MSIV Ion Data Base Header Record

0.1	Word Count (45)	
0.2	Group Count (1)	
1	S32IONDATA	
2	Orbit No.	
3	Month of Year	
4	Day of month	
5	Year (last 2 digits of 19xx)	
6	Start time of orbit (GMT-sec)	
7	End time of orbit (GMT-sec)	
8	Start time of vehicle in sun (neg N/A)	
9	End time of vehicle in sun (neg N/A)	
10	Start time of vehicle in shade (neg N/A)	
11	End time of vehicle in shade (neg N/A)	
12	GMT (perigee)	
13	Perigee alt (km)	
14	Perigee longitude (+E)	
15	Perigee geodetic latitude	
16	Perigee geomagnetic latitude	
17	Perigee invariant latitude	
18	Perigee local time	
19	Magnetic local time (Perigee)	
20	Perigee Corrected magnetic local time	
21	Commutator 1	} From first 8 frames of data in the pass
22	Commutator 2	
23	Commutator 3	
24	Commutator 4	
25	Commutator 5	
26	Commutator 6	
27	Commutator 7	
28	Commutator 8	

S3-2 MSIV Ion Data Base Header Record (Cont.)

29	Commutator 1	
30	Commutator 2	
31	Commutator 3	From last 8 frames of data in the pass
32	Commutator 4	
33	Commutator 5	
34	Commutator 6	
35	Commutator 7	
36	Commutator 8	
37	Mode monitor voltage of perigee	
38	Solar zenith angle at perigee	
39	Magnetic inclination of perigee	
40	Modified dip coordinate of perigee	
41	Code: 1.= Ions only orbit, 2.= Ion/TH	
42-45	(Vacant)	

S3-2 MSTV Ion Data Base - Data Records

0.1	Word Count
0.2	Group Count (11)
1	Time at start of selected frame (GMT - sec)
2	Altitude (km)
3	Geodetic Latitude
4	Geomagnetic Latitude
5	Corrected geomagnetic latitude
6	Invariant latitude
7	r -shell
8	Longitude (+E)
9	Magnetic local time
10	Corrected magnetic local time
11	Local time
12	Solar Zenith Angle
13	Modified dip latitude
14	I_{14}
15	I_{30}
16	I_{28}
17	I_{16}
18	I_1 (set = -1. if orbit is Ion/NH)
19	I_4 (set = -1. if orbit is Ion/NH)
20	α_{14} at time of I_{14} (α = attack angle)
21	α_{30}
22	α_{28}
23	α_{16}
24	α_1
25	α_4
26	β_{14} (β = magnetic pitch) at time of I_{14}
27	β_{30}
28	β_{28}
29	β_{16}
30	β_1
31	β_4
32	γI_i ($i=14,30,28,16,1,4$ for ion only, $i=14,30,28,16$)

S3-2 MSIV Ion Data Base - Data Records (cont.)

33	RA_1	(Translated to ram)	
34	$^{\alpha}RA_1$		
35	RA_2	(Translated to ram)	
36	$^{\alpha}RA_2$		
37	RA_3	(Translated to ram)	
38	$^{\alpha}RA_3$		
39	TI_1	(TI = total ions - Not translated to ram)	
40	TI_2		
41	TI_3		
42	TI_4		
43	Beam monitor ₁	The first 2 of the 4 beam monitor readouts per sec.	
44	Beam monitor ₂		
45	High Voltage monitor ₁	The first of the 2 readouts per sec.	
46	Vacant		

Data words represented by 1-46 will appear a maximum of 11 times per record.

S3-2 MSJV III Data Base Header Record

0.1	Word Count	
0.2	Group Count (1)	
1	S32NIDATA	
2	Orbit No.	
3	Month of year	
4	Day of month	
5	Year (last two digits of 19xx)	
6	Start time of orbit (GMT-sec)	
7	End time of orbit (GMT-sec)	
8	Start time of vehicle in sun (neg → N/A)	
9	End time of vehicle in sun (neg → N/A)	
10	Start time of vehicle in shade (neg → N/A)	
11	End time of vehicle in shade (neg → N/A)	
12	GMT (perigee)	
13	Perigee alt (km)	
14	Perigee longitude (+E)	
15	Perigee geodetic latitude	
16	Perigee geomagnetic latitude	
17	Perigee invariant latitude	
18	Perigee local time	
19	Perigee magnetic local time	
20	Perigee corrected magnetic local time	
21	Commutator 1	
22	Commutator 2	
23	Commutator 3	From first 8 frames of data in the pass.
24	Commutator 4	
25	Commutator 5	
26	Commutator 6	
27	Commutator 7	
28	Commutator 8	

S3-2 MSIV NH Data Base Header Record (cont.)

29	Commutator 1	
30	Commutator 2	
31	Commutator 3	From last 8 frames of data in the pass.
32	Commutator 4	
33	Commutator 5	
34	Commutator 6	
35	Commutator 7	
36	Commutator 8	
37	Mode monitor voltage at perigee	
38	Solar zenith angle at perigee	
39	Magnetic inclination of perigee	
40	Modified dip coordinate of perigee	
41	(Vacant,	
42-45	(Vacant)	

S3-2 MSIV NH Data Base - Data Records

0.1	Word Count (60)
0.2	Group Count (≤ 8)
1	GMT at point closest to ram (sec)
2	Altitude (km)
3	Geodetic latitude
4	Geomagnetic latitude
5	Corrected geomagnetic latitude
6	Invariant latitude
7	L-shell
8	Longitude (+E)
9	Magnetic local time
10	Corrected magnetic local time
11	Local time
12	Solar Zenith angle
13	Modified dip latitude
14	T_1 ram
15	I_1 ram
16	I_1 wake
17	T_4 ram
18	I_4 ram
19	I_4 wake
20	T_7 ram
21	I_7 ram
22	I_7 wake
23	T_{14} ram
24	I_{14} ram
25	I_{14} wake
26	T_{30} ram
27	I_{30} ram
28	I_{30} wake
29	T_{28} ram
30	I_{28} ram
31	I_{28} wake
32	T_{16} ram
33	I_{16} ram

AD-A097 748 BOSTON COLL CHESTNUT HILL MA SPACE DATA ANALYSIS LAB F/G 9/2
DATA ANALYSIS SYSTEMS AND DATA BASE DEVELOPMENT FOR THE S3 SATE--ETC(U)
JAN 80 D E DELOREY; P N PRUNEAU F19628-76-C-0190
UNCLASSIFIED BC-SDAL-80-2 AFGL-TR-80-0006 NL

END
DATE
FILMED
3-8/1
DTIC

S3-2 MSIV NH Data Base - Data Records (Cont.)

34	I ₁₆	wake
35	T ₃₈	ram
36	I ₃₈	ram
37	I ₃₈	wake
38	T _{41.5}	ram
39	I _{41.5}	ram
40	I _{41.5}	wake
41	α_1	(attack angle - amu 1, +=into ram; -=out of ram)
42	α_4	(attack angle - amu 4, +=into ram; -=out of ram)
43	α_7	(attack angle - amu 7, +=into ram; -=out of ram)
44	α_{14}	(attack angle - amu 14, +=into ram; -=out of ram)
45	α_{30}	(attack angle - amu 30, +=into ram; -=out of ram)
46	α_{28}	(attack angle - amu 28, +=into ram; -=out of ram)
47	α_{16}	(attack angle - amu 16, +=into ram; -=out of ram)
48	α_{38}	(attack angle - amu 38, +=into ram; -=out of ram)
49	$\alpha_{41.5}$	(attack angle - amu 41.5, +=into ram; -=out of ram)
50	RA ₄	
51	RA ₅	
52	RA ₆	
53	RA ₇	
54	RA ₈	
55	Beam Monitor ₃	
56	Beam Monitor ₄	
57	High Voltage Monitor ₂	
58, 59, 60	Vacant	

APPENDIX M

S3-2 IDG Data Base Format

S3-2 IDG Data Base - Header Record

Header Record

0.1	Word count (37)	I
0.2	Group count (1)	I
1	Orbit No.	F
2	Month of Orbit	F
3	Day of Orbit	F
4	Year of orbit (last two digits of 19xx)	F
5	K_p for orbit (6.7 hr lag)	F
6	F10.7 cm flux for orbit	F
7	Start time of orbit (GMT sec)	F
8	End time of orbit (GMT sec)	F
9	Start time of vehicle in sun	F
10	End time of vehicle in sun	F
11	Start time of vehicle in shade	F
12	End time of vehicle in shade	F
13	Perigee time (GMT sec)	F
14	Perigee latitude (km)	F
15	Perigee longitude (+E)	F
16	Perigee latitude	F
17	Local time of perigee (sec)	F
18	Electronics temperature (average)	F
19	Gauge temperature (representative value)	F
20	Vacant	F
21	$\left. \begin{matrix} a_0 \\ a_1 \\ a_2 \\ a_3 \\ a_4 \end{matrix} \right\} \begin{matrix} \text{Coefficients to least square fit for downleg} \\ \text{data where} \\ \log p = \sum_{i=0}^4 a_i z^i - 16 \\ p = \text{density, } a = \text{altitude, } z \leq 370 \text{ km} \end{matrix}$	
22		
23		
24		
25		

S3-2 IDG Data Base - Header Record (Cont.)

26	b_0	$\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} \begin{array}{l} \text{Coefficients for upleg data fit} \\ \\ \text{Log } p = \sum_{i=0}^4 b_i z^i - 16 \\ \\ z \leq 350 \text{ km} \end{array}$
27	b_1	
28	b_2	
29	b_3	
30	b_4	
31	SATb S3-2bb	
32	Eccentricity	
33	Inclination	
34	F10.7 flux (3 month average)	
35	Magnetic local time of perigee	
36	L-shell of perigee	
37	(Vacant)	

S3-2 IDG Data Base - Data Records

0.1	Word count (23)	I
0.2	Group count (<22)	I
1	Time (ram) GMT sec.	F
2	Altitude (km)	F
3	Longitude (+E)	F
4	Latitude (Geodetic)	F
5	Magnetic latitude	F
6	Local time (seconds)	F
7	I (current at 40° going into ram)	I
8	P_g (pressure at 40° going into ram)	F
9	$R(s,D,\alpha)$ (R factor at 40° going into ram)	F
10	I (Current at 40° going out of ram)	
11	P_g (pressure at 40° going out of ram)	
12	$R(s,D,\alpha)$ (R factor at 40° out of ram)	
13	Pressure into ram (from fit)	
14	Pressure out of ram (from fit)	
15	Average pressure (average of 13,14 above)	
16	Measured density	
17	Model density (J 71)	
18	Model temperature (J 71)	
19	Model pressure (J 71)	
20	High Voltage	
21	Probable mass (M)	
22	P_g at wake	
23	(Vacant)	

APPENDIX N
S3-3 User File Formats

HEADER RECORD FOR DATA FILES OF VEHICLE (S3-3)

<u>CDC Word</u>	<u>Information</u>	<u>Format</u>
0.1	Word Count (30)	I
0.2	Group Count (1)	I
1	Vehicle (S3-3)	R
2	Experiment	R
3	Analog Tape Number	R
4	Orbit Number	F
5	Date of orbit xx/xx/xx	R
6	Date STF tape generated xx/xx/xx	R
7	Date of creation of user file xx/xx/xx	R
8	Start time of data (GMT-SECS)	F
9	Starting altitude (km)	F
10	Code for starting altitude {1. = increasing 0. = decreasing	F
11	Starting latitude	F
12	Code for starting latitude {1. = increasing 0. = decreasing	F
13	End time of data (GMT-SECS)	F
14	Altitude at end of data	F
15	Latitude at end of data	F
16	Julian Day (from STF)	I
17	STW1 } To calculate GMT from STW	I
18	GMT1 } GMT = [GMT1 + (DTW-STW1)DGMT/DSTW]/1000 .	I
19	DGMT }	I
20	DSTW }	I
21	Inclination of orbital plane	F
22	Right ascension of ascending node	F
23	} Vacant	
24		
25		
26		
27		
28		
29		
30		

S3-3 EXPERIMENT 214 DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word count (25)
2	0.2	1-60		Group count (<20)
3	1	1-60		STW
4	2-6	1-60	14-2-8	Digital Data - Proton Flux ₁₋₅
5	7-11	1-60	14-2-8	Digital Data - Proton Flux ₆₋₁₀
6	12-16	1-60	14-2-8	Digital Data - Proton Flux ₁₁₋₁₅
7	17-21	1-60	14-2-8	Digital Data - Proton Flux ₁₆₋₂₀
8	22-26	1-60	14-2-8	Digital Data - Proton Flux ₂₁₋₂₅
9	27-31	1-60	14-2-8	Digital Data - Proton Flux ₂₆₋₃₀
10	32-33	1-24	14-2-8	Digital Data - Proton Flux ₃₁₋₃₂
	34-36	25-60	14-4-7	Digital Data - Proton Flux ₁₋₃
11	37-41	1-60	14-4-7	Digital Data - Proton Flux ₄₋₈
12	42-46	1-60	14-4-7	Digital Data - Proton Flux ₉₋₁₃
13	47-51	1-60	14-4-7	Digital Data - Proton Flux ₁₄₋₁₈
14	52-56	1-60	14-4-7	Digital Data - Proton Flux ₁₉₋₂₃
15	57-61	1-60	14-4-7	Digital Data - Proton Flux ₂₄₋₂₈
16	62-65	1-48	14-4-7	Digital Data - Proton Flux ₂₉₋₃₂
	66	49-60	14-6-11	Low-level threshold
17	67	1-12	14-6-12	Upper level threshold
	68	13-24	14-6-13	Low level threshold
	69	25-36	14-6-14	Upper level threshold
	70-71	37-60	14-6-15	Measures Proton & Alpha Particle Flux
18	72-74	1-36	14-6-15	
	75-76	37-60	A1	
19	77-78	1-24	A1	P-axis low ₁₋₂
	79-81	25-60	A2	P-axis low ₃₋₄
20	82	1-12	A2	P-axis high ₁₋₃
	83-86	13-60	A3	P-axis high ₄
21	87-90	1-48	A4	Q-axis low ₁₋₄
	91	49-60	A5	Q-axis high ₁₋₄
22	92-94	1-36	A5	R-axis low ₁
	95-96	37-60	A6	R-axis low ₂₋₄
				R-axis high ₁₋₂

S3-3 EXPERIMENT 214 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
23	97-98	1-24	A6	R-axis high ₃₋₄
	99	25-36	A7	Magnetometer bias
	100	37-48	14-2-1	-200 v Det. Mon.
	101	49-60	14-2-2	+10 v Preamp. Mon.
24	102	1-12	14-2-3	Elect. Temp.
	103	13-24	14-2-4	+2.5 v Mon.
	104	25-36	14-2-5	Detector Temp.
	105	37-48	14-2-6	-2.5 v Mon.
	106	49-60	14-4-1	-200 v Mon.
	107	1-12	14-4-2	+10 v Power Mon.
25	108	13-24	14-4-3	Electronics Temp.
	109	25-36	14-4-4	+2.5 v Monitor
	110	37-48	14-4-5	Detector Mon.
	111	49-60	14-4-6	-2.5 v Monitor
	112	1-12	14-6-1	5.0 v Ref.
26	113	1-12	14-6-2	2.5 v Ref.
	114	13-24	14-6-3	0.0 v Ref.
	115	25-36	14-6-4	28 v Mon.
	116	37-48	14-6-5	+15 v Mon.
	117	49-60	14-6-6	+5 v Mon.
	118	1-12	14-6-7	-5 v Mon.
27	119	13-24	14-6-8	Bias Mon.
	120	25-36	14-6-4	Elec. Temp.
	121	37-48	14-6-10	Det. Temp.

Words 3-27 are repeated 19 times within a record, (i.e., 20 seconds per record)

5.3.3 EXPERIMENT 2.15 DATA RECORDS

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
1	0.1	1-60		Word count
2	0.2	1-60		Group count
3	1	1-60		STW
4	2-6	1-60	15-2-1	Current from Sensor #2 ₁₋₅
5	7-11	1-60	15-2-1	Current from Sensor #2 ₆₋₁₀
6	12-16	1-60	15-2-1	Current from Sensor #2 ₁₁₋₁₅
7	17-21	1-60	15-2-1	Current from Sensor #2 ₁₆₋₂₀
8	22-26	1-60	15-2-1	Current from Sensor #2 ₂₁₋₂₅
9	27-31	1-60	15-2-1	Current from Sensor #2 ₂₆₋₃₀
10	32-33	1-24	15-2-1	Current from Sensor #2 ₃₁₋₃₂
	34-36	25-60	15-2-2	Sum and Difference Ratio ₁₋₃
11	37-41	1-60	15-2-2	Sum and Difference Ratio ₄₋₈
12	42-46	1-60	15-2-2	Sum and Difference Ratio ₉₋₁₃
13	47-51	1-60	15-2-2	Sum and Difference Ratio ₁₄₋₁₈
14	52-56	1-60	15-2-2	Sum and Difference Ratio ₁₉₋₂₃
15	57-61	1-60	15-2-2	Sum and Difference Ratio ₂₄₋₂₈
16	62-65	1-48	15-2-2	Sum and Difference Ratio ₂₉₋₃₂
	66	49-60	15-2-3	Current from Sensor #4 ₁
17	67-71	1-60	15-2-3	Current from Sensor #4 ₂₋₆
18	72-76	1-60	15-2-3	Current from Sensor #4 ₇₋₁₁
19	77-81	1-60	15-2-3	Current from Sensor #4 ₁₂₋₁₆
20	82-86	1-60	15-2-3	Current from Sensor #4 ₁₇₋₂₁
21	87-91	1-60	15-2-3	Current from Sensor #4 ₂₂₋₂₆
22	92-96	1-60	15-2-3	Current from Sensor #4 ₂₇₋₃₁
23	97	1-12	15-2-3	Current from Sensor #4 ₃₂
	48-101	13-60	15-2-4	Sum and Difference Ratio ₁₋₄
24	102-406	1-60	15-2-4	Sum and Difference Ratio ₅₋₉
25	107-111	1-60	15-2-4	Sum and Difference Ratio ₁₀₋₁₄
26	112-116	1-60	15-2-4	Sum and Difference Ratio ₁₅₋₁₉
27	117-121	1-60	15-2-4	Sum and Difference Ratio ₂₀₋₂₄
28	122-126	1-60	15-2-4	Sum and Difference Ratio ₂₅₋₂₉
29	127-129	1-36	15-2-4	Sum and Difference Ratio ₃₀₋₃₂
	130-131	37-60	15-2-5	Electrons ₁₋₂

S3-3 EXPERIMENT 215 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
30	132-136	1-60	15-2-5	Electrons ₄₋₈
31	137-141	1-60	15-2-5	Electrons ₉₋₁₃
32	142-146	1-60	15-2-5	Electrons ₁₄₋₁₈
33	147-151	1-60	15-2-5	Electrons ₁₉₋₂₃
34	152-156	1-60	15-2-5	Electrons ₂₄₋₂₈
35	157-161	1-60	15-2-5	Electrons ₂₉₋₃₃
36	162-166	1-60	15-2-5	Electrons ₃₄₋₃₈
37	167-171	1-60	15-2-5	Electrons ₃₉₋₄₃
38	172-176	1-60	15-2-5	Electrons ₄₄₋₄₈
39	177-181	1-60	15-2-5	Electrons ₄₉₋₅₃
40	182-186	1-60	15-2-5	Electrons ₅₄₋₅₈
41	187-191	1-60	15-2-5	Electrons ₅₉₋₆₃
42	192	1-12	15-2-5	Electrons ₆₄
	193-196	13-60	15-2-7	Current from Sensor #1 ₁₋₄
43	197-201	1-60	15-2-7	Current from Sensor #1 ₅₋₉
44	202-206	1-60	15-2-7	Current from Sensor #1 ₁₀₋₁₄
45	207-211	1-60	15-2-7	Current from Sensor #1 ₁₅₋₁₉
46	212-216	1-60	15-2-7	Current from Sensor #1 ₂₀₋₂₄
47	217-221	1-60	15-2-7	Current from Sensor #1 ₂₅₋₂₉
48	222-224	1-36	15-2-7	Current from Sensor #1 ₃₀₋₃₂
	225-226	37-60	15-2-8	Current from Sensor #3 ₁₋₂
49	227-231	1-60	15-2-8	Current from Sensor #3 ₃₋₇
50	232-236	1-60	15-2-8	Current from Sensor #3 ₈₋₁₂
51	237-241	1-60	15-2-8	Current from Sensor #3 ₁₃₋₁₇
52	242-246	1-60	15-2-8	Current from Sensor #3 ₁₈₋₂₂
53	247-251	1-60	15-2-8	Current from Sensor #3 ₂₃₋₂₇
54	252-256	1-60	15-2-8	Current from Sensor #3 ₂₈₋₃₂
55	257-261	1-60	15-2-9	Sum and Difference Ratio ₁₋₅
56	262-266	1-60	15-2-9	Sum and Difference Ratio ₆₋₁₀
57	267-271	1-60	15-2-9	Sum and Difference Ratio ₁₁₋₁₅
58	272-276	1-60	15-2-9	Sum and Difference Ratio ₁₆₋₂₀

S3-3 EXPERIMENT 215 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Word</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
59	277-281	1-60	15-2-9	Sum and Difference Ratio ₂₁₋₂₅
60	282-286	1-60	15-2-9	Sum and Difference Ratio ₂₆₋₃₀
61	287-291	1-60	15-2-9	Sum and Difference Ratio ₃₁₋₃₅
62	292-296	1-60	15-2-9	Sum and Difference Ratio ₃₆₋₄₀
63	297-301	1-60	15-2-9	Sum and Difference Ratio ₄₁₋₄₅
64	302-306	1-60	15-2-9	Sum and Difference Ratio ₄₆₋₅₀
65	307-311	1-60	15-2-9	Sum and Difference Ratio ₅₁₋₅₅
66	312-316	1-60	15-2-9	Sum and Difference Ratio ₅₆₋₆₀
67	317-321	1-60	15-2-9	Sum and Difference Ratio ₆₁₋₆₅
68	322-326	1-60	15-2-9	Sum and Difference Ratio ₆₆₋₇₀
69	327-331	1-60	15-2-9	Sum and Difference Ratio ₇₁₋₇₅
70	332-336	1-60	15-2-9	Sum and Difference Ratio ₇₆₋₈₀
71	337-341	1-60	15-2-9	Sum and Difference Ratio ₈₁₋₈₅
72	342-346	1-60	15-2-9	Sum and Difference Ratio ₈₆₋₉₀
73	347-351	1-60	15-2-9	Sum and Difference Ratio ₉₁₋₉₅
74	352-356	1-60	15-2-9	Sum and Difference Ratio ₉₆₋₁₀₀
75	357-361	1-60	15-2-9	Sum and Difference Ratio ₁₀₁₋₁₀₅
76	362-366	1-60	15-2-9	Sum and Difference Ratio ₁₀₆₋₁₁₀
77	367-371	1-60	15-2-9	Sum and Difference Ratio ₁₁₁₋₁₁₅
78	372-376	1-60	15-2-9	Sum and Difference Ratio ₁₁₆₋₁₂₀
79	377-381	1-60	15-2-9	Sum and Difference Ratio ₁₂₁₋₁₂₅
80	382-384	1-36	15-2-9	Sum and Difference Ratio ₁₂₆₋₁₂₈
	385-386	37-60	15-2-10	Range of 215-11-2
81	387-391	1-60	15-2-10	Range of 215-13-7
82	392-396	1-60	15-2-10	Range of 215-18-12
83	397-401	1-60	15-2-10	Range of 215-113-17
84	402-406	1-60	15-2-10	Range of 215-118-22
85	407-411	1-60	15-2-10	Range of 215-123-27
86	412-416	1-60	15-2-10	Range of 215-128-32
87	417-421	1-60	15-2-10	Range of 215-133-37
88	422-426	1-60	15-2-10	Range of 215-138-42
89	427-431	1-60	15-2-10	Range of 215-143-47

S3-3 EXPERIMENT 215 DATA RECORDS (Cont.)

<u>CDC Word</u>	<u>Data Words</u>	<u>Bits</u>	<u>Desig.</u>	<u>Description</u>
90	432-436	1-60	15-2-10	Range of 215-148-52
91	437-441	1-60	15-2-10	Range of 215-153-57
92	442-446	1-60	15-2-10	Range of 215-158-62
93	447-448	1-24	15-2-10	Range of 215-163-64
	449	25-36	15-2-11	Temp. of 215-1 package
	450	37-48	15-2-12	E.D. Amplifier Temp.
	451	49-60	15-2-13	Temp. of 215-2 package
94	452	1-12	15-2-14	Monitors Rate Probe

Words 3-94 are repeated 4 times within a record (i.e., 5 seconds per record)

APPENDIX O
S3-4 AGENCY TAPE FORMATS

FORMAT OF HEADER RECORD (Completely in EBCDIC)
FOR GRL 737 PFA/CCG TAPE

<u>BYTE NO.</u>	<u>DESCRIPTION</u>	<u>EXAMPLE</u>
1-4	Vehicle ID	S3-4
5-12	User ID	CRL 737
13-16	Data Format	32Kt or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	5-4000bb
33-40	Digital Tape # (User-specific)	5-5000bb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds Start of Data	034560
59-64	UT Seconds End of Data	035600
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL-737 PFA Event Counts	000256
85-90	CRL-737 CCG Event Counts	000412
91-170	Comments, Blank-Filled	CRL 737 PFA-and-CCG-Tape (left justified with trailing blanks)
171-180	Blanks	bbbbbbbbbb

FORMAT OF HEADER RECORD (Completely in EBCDIC Format)

FOR CRL 726 TAPE

<u>BYTE NO.</u>	<u>DESCRIPTION</u>	<u>EXAMPLE</u>
1-4	Vehicle ID	S3-4
5-12	User ID	CRL-726
13-16	Data Format	32Kb or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	S-4000bb
33-40	Digital Tape # (User Specific)	S-50000bb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds start of data	034560
59-64	UT Seconds end of data	035600
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL-726 Slit Mode Event Counts	000100
85-90	CRL-726 Filter Position Event Counts	000075
91-96	CRL-726 Aperture Position Event Counts	000082
97-176	Comments, Blank-Filled	CRL 726 Tape (left justified with trailing blanks)
177-180	Blanks	bbbb

FORMAT OF HEADER RECORD (Completely in EBCDIC Format)

FOR CRL 737 ROCA TAPE

<u>BYTE NO.</u>	<u>DESCRIPTION</u>	<u>EXAMPLE</u>
1-4	Vehicle ID	S3-4
5-12	User ID	CRL-737
13-16	Data Format	32Kb or 64Kb
17-24	Analog Tape #	COOK 0123
25-32	Digital Tape # (100%)	S-4000hb
33-40	Digital Tape # (User-specific)	S-5000hb
41-44	REV #	0123
45-48	Year	1977
49-52	Julian Day of Year	0246
53-58	UT Seconds start of data	034560
65-72	Data Rate MSEC/Frame	32.00140 or 16.00070
73-78	Scan Counts	000050
79-84	CRL 737 ROCA Event Counts	000094
85-164	Comments, Blank-Filled	CRL 737 ROCA Tape (left justified with trailing blanks)
165-180	Blanks	

FORMAT OF EVENT RECORD (Completely in EBCDIC)
FOR 100% TAPE AND ALL USER-SPECIFIC TAPES
BOTH FORMAT A AND C

Each logical event record consists of 20 bytes as follows:

<u>BYTES</u>	<u>INFORMATION</u>	<u>COMMENTS</u>
1-8	UTC time tag in MSEC	Range from 00000000 to 86399999
9-16	VST in 0.2 counts	Range from 000000.0 to 838860.6
17-18	Frame ID	Range from 01 to 32 or 64
19	Event Definition Number	Range from 01 to 07
20	Event Status Number	Range from 00 to 09, depending on event definition number

Each physical record on tape consists of 90 logical records,
for a total of 1800 bytes per physical record.

If the total number of logical records meaningful to the user is not
divisible by 90, then the last physical event record will have its
excess logical records at the end blank-filled.

The count of logical records meaningful to the user, plus the event-
specific counts, are all in the header record.

FORMAT OF SCAN RECORD (Completely in EBCDIC)
FOR 100% TAPE AND ALL USER-SPECIFIC TAPES,
BOTH FORMAT A AND C

Each logical scan record consists of 24bytes as follows:

<u>BYTES</u>	<u>INFORMATION</u>	<u>COMMENTS</u>
1-8	UTC time tag in MSEC	Range from 00000000 to 86399999
9-16	VST in 0.2 Counts	Range from 000000.0 to 838860.6
17-18	Frame ID	Range from 01 to 32 or 64
19-24	Sync Status	'Search', 'Verify', or 'block'

First logical record in first physical record should show Verify sync status.
Last meaningful logical record in last physical record should show Search sync status.

Each physical record on tape consists of: 75 logical records, for a total of 1800 bytes per physical record.

If the last physical scan record has fewer than 75 meaningful logical records (because the scan count, which shows the total number of logical records is not divisible by 75), the excess logical records at the end of the last physical record will be blank-filled.

The scan count (count of logical scan records) is in the header record.

Format for CRL 737 (ROCA)

TELEMETRY RECORDS (Format A and Format C)

<u>Byte #</u>	<u>Description</u>
1-4	GMT (milliseconds) (At start of mainframe containing SUBCOM 1)
5-7	H100-H123 (at SUBCOM 1)
8	MF ID (H002)
9	H901
10	H902
11	H210
12	K223
13-14	SUBCOM (MT 25 and MF 26)
15-17	H100-H123 (at SUBCOM 2)
18	MF ID (H002) _b
.	.
.	.
.	.
23-24	SUBCOM
25	H100-H123 (at SUBCOM 3)
.	.
.	.
.	.
315-317	H100-H123 (at SUBCOM 32)
318	MF ID (H002)
319	H901
320	H902
321	K210
322	K223
323-324	SUBCOM
325-328	GMT (milliseconds)
329-331	H100-H123 (SUBCOM 1 for Format A; SUBCOM 33 for Format CO)
.	.
.	.
.	.
647-648	SUBCOM
.	.
.	.
.	.
3239-3240	SUBCOM

By storing 10 groups of data represented as in bytes 1 through 324, 10 masterframes of Format A or 5 masterframes of Format C may be stored in each physical record.

Format for CRL 726 (Spectrometer/Photometer)

TELEMETRY RECORDS (Format A and Format C)

<u>Byte #</u>	<u>Description</u>
1-4	GMT (milliseconds) at start of mainframe containing SUBCOM 1
5-7	VCTW for mainframe containing SUBCOM 1
8	H002
9	H901
10	H902
11	K101
12	K103
13	K104
14	K106
15	K121
16	K123
17-21	K140-K144 (right adjusted)
22-26	K140-K144 (right adjusted)
27-31	K140-K144 (right adjusted)
32-36	K140-K144 for Format A; Dummy fill for Format C
37-41	K140-K144 for Format A; Dummy fill for Format C
42-46	K140-K144 for Format A; Dummy fill for Format C
47	K102
48	K105
49	K107
50	K122
51-52	K150-K151
53-54	K150-K151
55-56	K150-K151
57-58	SUBCOM from mainframe 1 (Format A = MF82/83; Format C = MF 42/43)
59-112	Repeat word order of bytes 5-58 for MF containing SUBCOM 2
.	.
.	.
.	.
1678-1732	Repeat word order of bytes 5-58 for MF containing SUBCOM 32
1733-1736	GMT (at MF containing SUBCOM 1 on Format A; SUBCOM 33 on Format C)
1737-1739	VCTW (at MF containing SUBCOM 1 on Format A; SUBCOM 33 on Format C)
.	.
.	.
.	.
3463-3464	SUBCOM (SUBCOM 32 for Format A; SUBCOM 64 for Format C)
3465	Vacant

Guideline Format for CRL 737 PFA/CCG

TELEMETRY RECORDS (Format A and Format C)

<u>Byte #</u>	<u>Description</u>
1-4	GMT (milliseconds) (GMT at start of mainframe containing SUBCOM 1)
5-7	VCTW (at SUBCOM 1)
8	H002
9	H901
10	H902
11	K205
12	K206
13	K206
14	Format A = Dummy Fill; Format C = K206
15	K207
16	K208
17	K209
18	K222 (Right Adjusted)
19	K201
20	Format A = Dummy Fill; Format C = K201
21	Format A = Dummy Fill; Format C = K201
22	K202
23	K203
24	K204
25	K211
26	Format A = Dummy Fill; Format C = K211
27	K221 (Right Adjusted)
28-29	SUBCOM, (Format A = MF 25/26; Format C = MF 69/70
30-31	SUBCOM, (Format A = MF 82/83; Format C = MF 42/43
32	One Fill

Repeat 5-32 up to 900 bytes for a logical record

Repeat 1-900 four times for physical record

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