732

IMP-J

1-MIN AVERAGED MAG. VCTS

73-078A-01L

Table of Contents

1. Introduction

2. Errata/Change Log

3. LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM

4. Catalog Materials

    a. Associated Documents

    b. Core Catalog Materials

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents To find associated documents you will need to know the document ID number and then click here. http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

REQ. AGENT	ACQ. AGENT
CMW	JHK

IMP-J

1-MIN AVERAGED MAG. VCTS

73-078A-01L SPMS-00422

This data set consists of 14 magnetic tapes.

These tapes, blocked 100 logical records/physical record, are 9 track, 6250 bpi, ASCII, created on a VAX computer. Each file on tape contains data for a month.

The backup is a 3480 cartridge. D and C numbers and time span are as follows:

D#	C#	FILES	TIME SPAN
D-101582	C-031130	6	07/18/91 - 12/31/91
D-104084	C-031224	12	01/02/92 - 12/30/92
D-107639	C-031503	12	01/02/93 - 12/31/93
D-108018	C-031741	6	01/01/94 - 06/30/94
D-108211	C-031958	2	01/01/95 - 03/01/95
D-108385	C-032454	4	02/28/95 - 06/30/95
D-108852	C-032898	4	06/30/95 - 10/31/95
D-108853	C-032899	4	10/31/95 - 03/01/96
D-108854	C-032900	4	03/01/96 - 06/01/96
D-108870	C-032906	4	06/01/96 - 10/01/96
D-108871	C-032907	3	09/30/96 - 12/31/96
D-108931	C-032976	9	01/01/97 - 09/30/97
D-108966	C-032982	3	09/30/97 - 12/31/98
D-109017	C-033017	22	01/01/98 - 10/31/99
D-109134	C-033112	8	11/01/99 - 06/10/00

01-June-1994

IMP-J
73-078A-01L
1.024 MINUTE AVERAGES
Based on 15.36 second averages

The IMP-J 1-minute average data are in ASCII format produced on a DEC VAX computer.

Note: The time given in calendar day (Jan. 1 = Day 1) beginning with 1992 data. Pre-1992 data is in Decimal Day, where Jan 1 = Decimal Day 0.

Note: Record length = 209 bytes, Blocksize = 20900 bytes

	ITEM	FORMAT UNITS	NOTES
1	Year	I3	(2 digit year)
2	Time	F10.5	(floating point time = day.fraction)
3	Month	A4	(ex. Jan)
4	Day of month	I3	
5	F1	F7.2 nanotesla	(avg. of field magnitude)
6	F2*	F7.2 nanotesla	(field magnitude)
7	X	F7.2 nanotesla	(GSE coord.)
8	Y	F7.2 nanotesla	(GSE coord.)
9	Z	F7.2 nanotesla	(GSE coord.)
10	Y	F7.2 nanotesla	(GSM coord.)
11	Z	F7.2 nanotesla	(GSM coord.)
12	RMS(X)	F9.2 nanotesla	
13	RMS(Y)	F9.2 nanotesla	
14	RMS(Z)	F9.2 nanotesla	
15	RMS	F9.2 nanotesla	
16	space	1X	
17	PHI	F7.2 degrees	(GSE coord.)
18	THETA	F7.2 degrees	(GSE coord.)
19	PHI	F7.2 degrees	(GSM coord.)
20	THETA	F7.2 degrees	(GSM coord.)
21	SCXE	E11.3 km	(S/C position GSE coord.- X)
22	SCYE	E11.3 km	(S/C position GSE coord.- Y)
23	SCZE	E11.3 km	(S/C position GSE coord.- Z)
24	SCYM	E11.3 km	(S/C position GSM coord.- Y)
25	SCZM	E11.3 km	(S/C position GSM coord.- Z)
26	R	E11.3 km	(radial distance)
27	NP	I3	(number of points in average)**
28	Mode	I2	(bit rate: 0=low,1=high)
29	DQF	I2	(data quality flag)
30	Gap	I2	(data gap flag)

* F2 is Pythagorean mean of component average

** NP represents the aggregate number of 1.28 second averages in the 15.36 second averages that are used to develop the 1.024 minute averages and RMS's

Richard S. Kennon GSFC Greenbelt, MD Code 694
Phone: (301) 286-3045
Internet: U4RSK@LEPVAX.GSFC.NASA.GOV

11/15/93

IMP-8
PRELIMINARY 1.024 MINUTE AVERAGES

Gap Flag (item # 29) is in error in 1991 (July 18 through end of year) and 1992 datasets. The gap flag is turned on (set to 2) for all records, whether a gap exists or not.

There is another error in the flag for missing values for RMS(items #12-#15). The flag should be 99999.0 . However, the output statement rounded this value to 1.0E+05 (100000.) .

This data will be replaced.

R. S. Kennon 6-3045

02/01/94

A NOTE IN REFERENCE TO IMP-J (73-078A-01L)

PLEASE NOTE THE LATER '91 DATA IS FINE IN MOST REGARDS, EXCEPT THAT THE PI HAD INCORRECTLY USED A WRONG BZ ZERO OFFSET, WHICH MUST BE REMOVED BEFORE USING THESE DATA. THE DATA ARE BEING REPROCESSED WITH THE CORRECTION AND WITH OTHER IMPROVEMENTS. BUT IF YOU DO YOUR OWN CORRECTING, YOU SHOULD NOT FEEL THE NEED TO BE HELD UP FOR THE NEW PROCESSING. LET ME BE CLEAR ABOUT THE OFFSET AND ITS SIGN. IF ONE DOES AN ANALYSIS, HE WILL SEE THAT THE FIELD IS OFF BY A BZ OF (-) 0.59 nT. SO 0.59 MUST BE ADDED TO THE DATA TO CORRECT IT. [BY THE WAY, TELL CHRIS THIS WAS NOT A DRIFT (THEY ARE VERY SMALL); IT WAS A BAD JUDGEMENT!] BEST WISHES, AND KEEP IN TOUCH WITH US IN THE USE OF THESE DATA. THANKS. RON LEPPING PS. ALMOST FORGOT: THE START OF THE BAD ZERO PERIOD IS 18 JULY '91 AND IT ENDS AT THE LAST MINUTE OF THE YEAR.

RON LEPPING

MEMO

Date: June 8, 1993

To: Users of IMP-8 magnetic field data

From: Ron Lepping/IMP-8 Magnetometer PI, NASA-GSFC, Code 695, SPAN address LEPVAX::U5RPL, phone: (301) 286 5413

Re: IMP-8 magnetic field data: Notification of day-count designation change

As all or most of you know, our IMP-8 magnetic field data since launch has been labeled according to a Decimal Day scheme, where Jan 1 = Decimal Day 0, instead of the more common Day-of-Year (DOY) scheme, where Jan 1 = DOY 1. Since our data have been, and are being, processed within the International Solar-Terrestrial Physics (ISTP) program since late 1992 as so-called Key Parameters where the DOY designation is used, we will now convert our in-house processed data (i.e., on LEPVAX/GSFC) to a DOY time base, starting for that data occurring at the first instant of year 1992. Obviously, we wish to avoid the uncomfortable position of having two identical magnetic field data sets possessing two different day-count designations, arising because of the two different sources. All future data products (tapes, electronic-mail files, paper plots, etc.) will reflect this change. And as soon as we are able to make the modification, most of these products will also contain Month and Day-of-Month with the hope that the chance of future day-count errors is reduced by this redundancy. If we should reprocess any data for periods earlier than the first instant of 1992, for any reason, we will retain the Decimal Day designation for such data.

We are sorry for any inconvenience that this may cause you or your teams. As Joe King (IMP-8 Project Scientist) commented recently, "Maybe we can say with pride, at the end of the IMP mission, that the magnetic field day-count change took place about half way through the mission!"

NSSDC will hold its IMP-8 MAG data in adherence to the Decimal Day and DOY conventions described above, with the 1/1/92 shift in conventions. Exception to this is OMNI where all data, IMP-8 MAG included, use DOY throughout. Joe King 6/24/94

B# 54204-000A

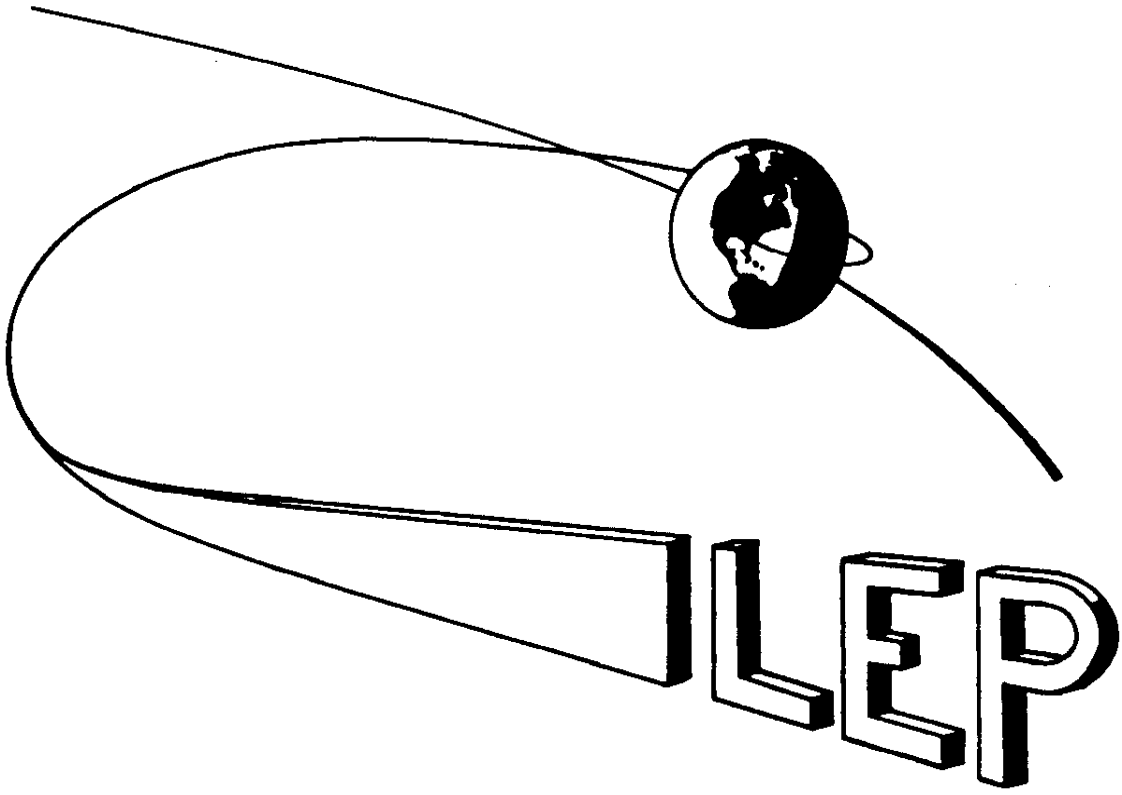
NASA

IMP-8 SOLAR WIND MAGNETIC FIELD AND PLASMA DATA IN SUPPORT OF ULYSSES - JUPITER ENCOUNTER: 13-31 JANUARY 1992

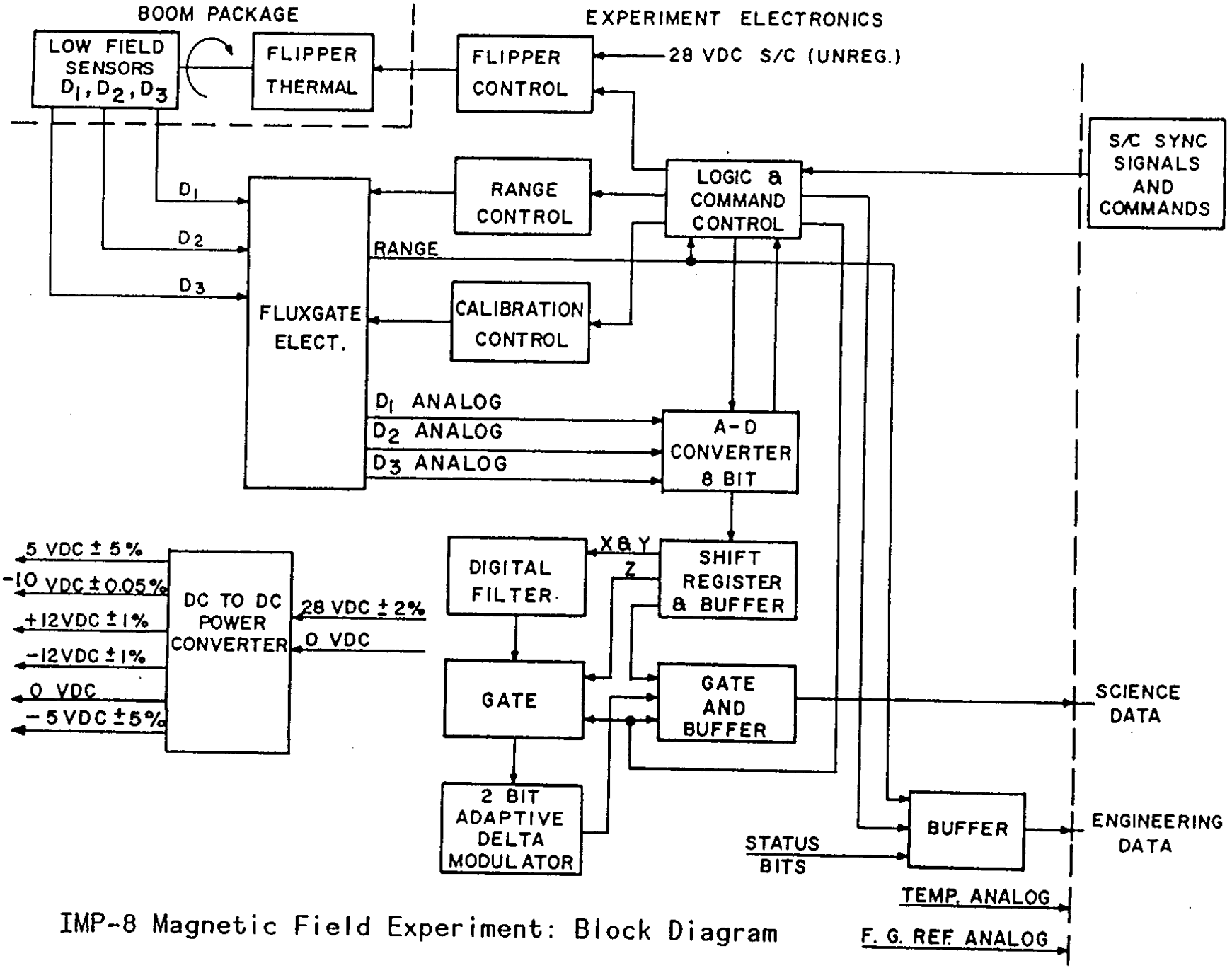
R. P. LEPPING, A. J. LAZARUS, L. J. MORIARTY, P. MILLIGAN,
R. S. KENNON, R. E. McGUIRE, AND W. H. MISH

DECEMBER 25,1992

LABORATORY FOR EXTRATERRESTRIAL PHYSICS



National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771



IMP-8 Magnetic Field Experiment: Block Diagram

FIGURE A-4

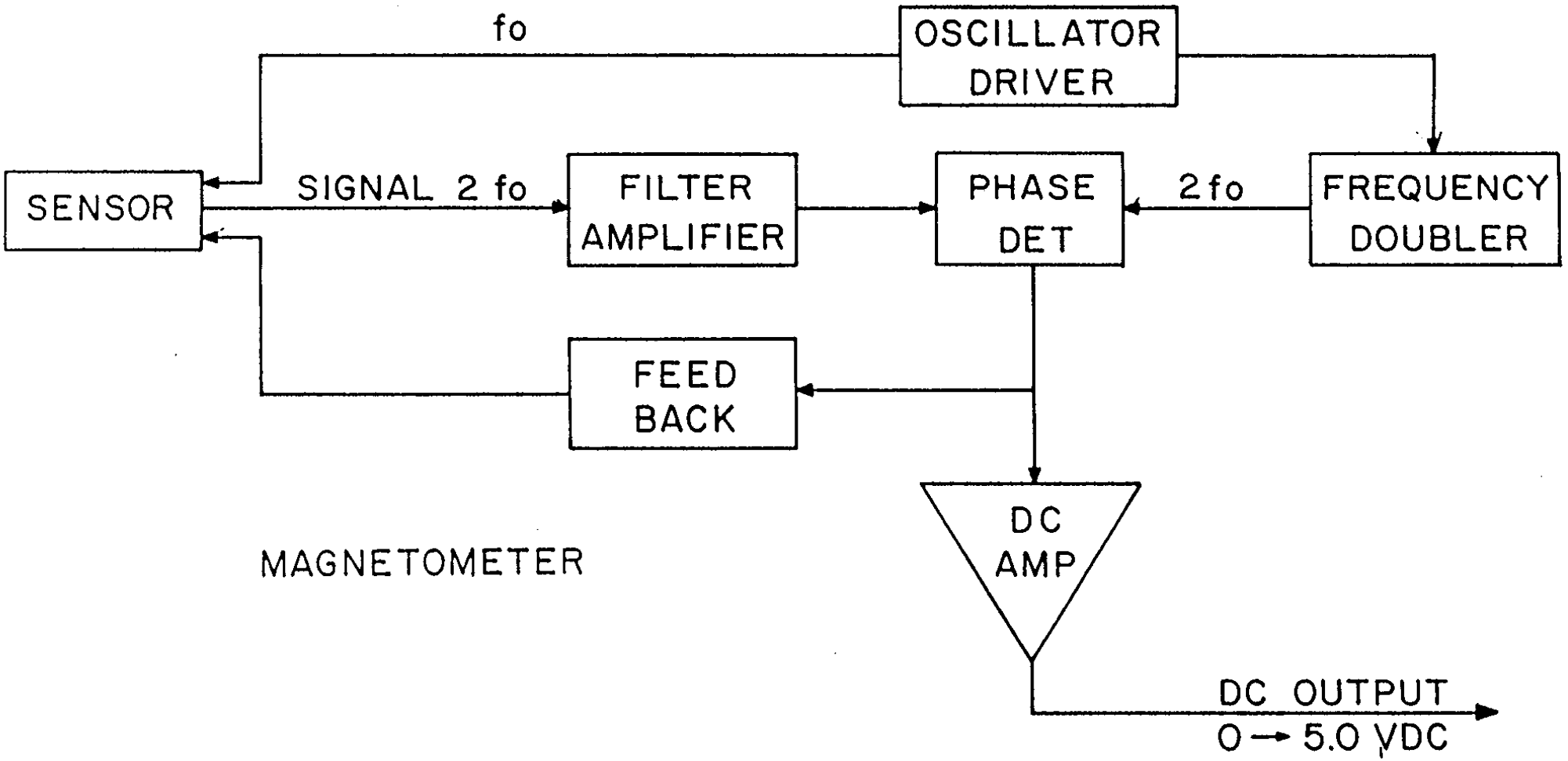
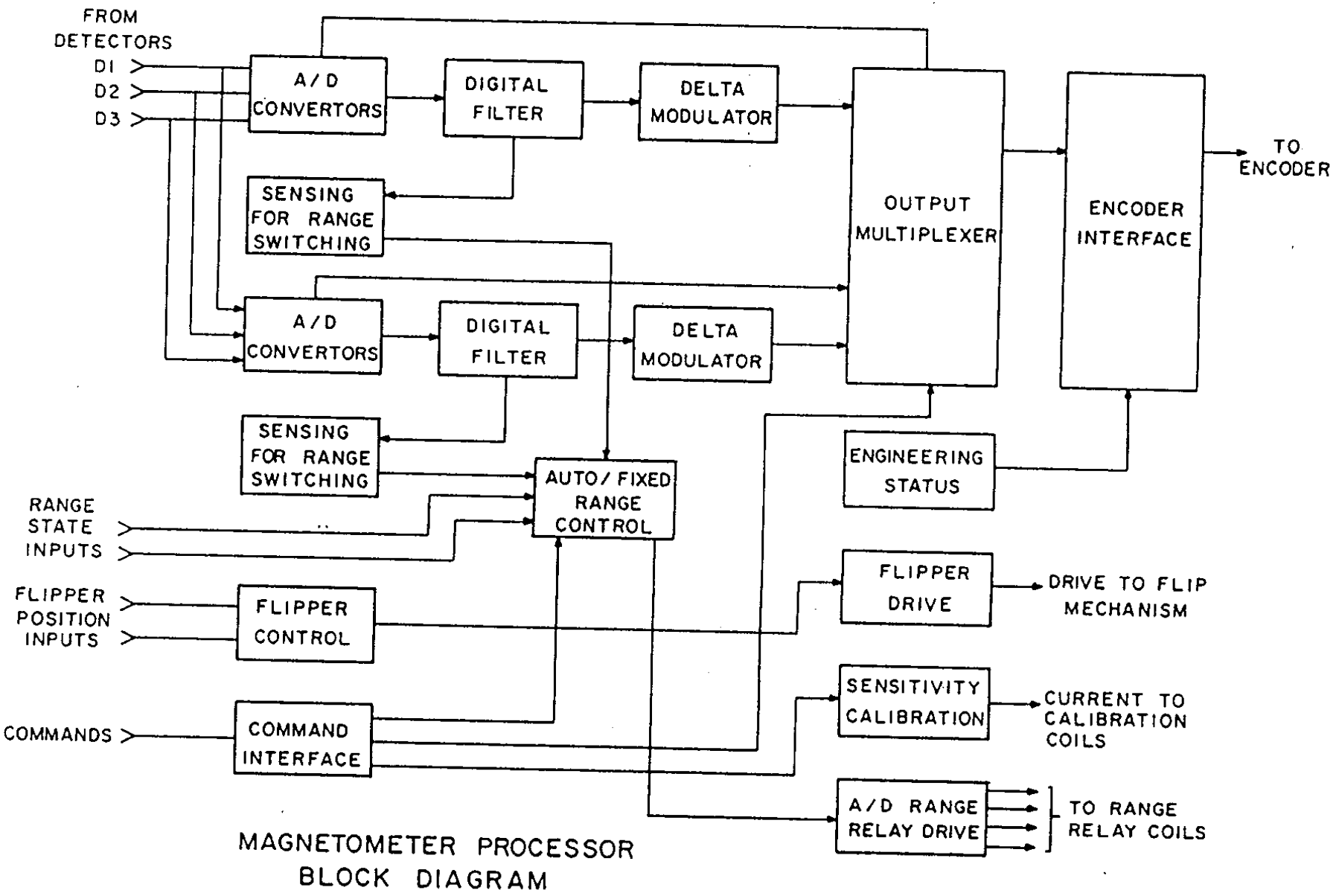


FIGURE A-5 Electronics Block Diagram



MAGNETOMETER PROCESSOR
BLOCK DIAGRAM

FIGURE A-6

APPENDIX A

The magnetic field experiment on the IMP-8 spacecraft (See Figure A-1) utilizes a tri-axial fluxgate [saturable inductor] magnetometer (see Ness, 1970). See Scearce et al. (1992) for a complete description of the experiment. The instrument originally had three, automatically determined, ranges, ±12 nT, ±36 nT, and ±108 nT, full scale. Because of a range-change circuit failure occurring in early July 1975, the experiment was commanded into a fixed ±36 nT range on July 11 at 1255:09 UT and has been in that range ever since. The measurements are A-to-D converted onboard, to an 8-bit resolution, yielding ±0.14 nT quantization sensitivity, which is larger than the intrinsic sensor noise level of 0.025 nT RMS. The data from the two-bit (per component) adaptive delta modulator, incorporated into the instrument, and applied to the intrinsic sample rate of 25 vectors/s, was never utilized, and hence the rate of the full (8-bit) vector words, which occur every 320 ms, represents the effective sample period of the instrument. The sampling rate is synchronized to the spacecraft clock; the basic spacecraft clock frequency is 6.4 kHz. The sensor unit is mounted on the end of a boom approximately 4 m from the center of the spacecraft.

Figures A-2 and A-3 show pictures of the magnetometer board and data processing unit, respectively, and a list of experiment specifications are provided in Table I. These units are mounted on the instrument shelf of the spacecraft, which is passively thermally controlled to the range of -30°C to 50°C. The sensor unit (on the boom) is also passively thermally controlled, but to a range of -50°C to 50°C. Figure A-4 shows the functional block diagram of the experiment. Originally planned magnetic field science objectives were listed by Ness (1966) and those objectives for the IMP-8 mission, as a whole, appear in a GSFC document entitled "Interplanetary Monitoring Platform, IMP-J."

TECHNICAL DESCRIPTION OF INSTRUMENT

FLUXGATE MAGNETOMETER

The fluxgate magnetometer is a tri-axial instrument developed and manufactured by Schonstedt Instrument Company (Figure A-2). All fluxgate magnetometers have in common a ferromagnetic core(s) which is excited by driving, or gating, a magnetic field generated by current in a coil which contains the core. The magnetic flux induced in the core by the gating field is modified by an external magnetic field which generates even

harmonics on the output winding whose amplitude depends on the magnitude of the external field.

The Heliflux sensor is a cross between a parallel and orthogonal gated core; see Schonstedt (1961). When the AC current is applied to the primary winding, the magnetizing field has components both parallel and transverse to the core strips. The entire core is cylindrically saturated by the gating field to minimize the remanent magnetization, or core memory. The secondary winding is wound around the core, perpendicular to the primary winding. Thus, the coupling between the gating field and core output is minimized by the physical orientation of the gating and output windings. (See Schonstedt, 1961, for detailed construction.)

The electronics unit is comprised of a single oscillator-driver, and a preamplifier, phase detector, voltage bias and output driver for each channel (Figure A-5). Since the output channels are the same, only one channel will be discussed. The oscillator generates an AC signal of 24 kHz which is power amplified and fed through the primary windings of the sensors to cyclically drive the magnetic cores of the sensors into saturation. The presence of an external magnetic field along the axis of the sensor results in the generation of even harmonics in the secondary winding of the sensor. The amplitude of the second-harmonic voltage is proportional to the magnitude of the magnetic field and the phase depends upon the direction of the magnetic field when the direction is reversed. The second-harmonic signal is amplified by a tuned amplifier. The tuned pre-amplifier is temperature compensated.

The excitation signal is doubled. This reference signal is then applied to the gate of an FET and it gates the amplified second harmonic signal. The gated signal is integrated to form the DC output. With no signal, the phase detector is set to 2.5 VDC. The DC output is isolated by a DC amplifier.

The sensitivity is controlled by the negative feedback, and the desired range is obtained by changing the feedback elements. The operating range is determined by 2 binary bits generated by two relays. The range is selected by range change commands generated in the Magnetometer Processor; 4 command lines are required (but see page A-1 [top]).

MAGNETOMETER PROCESSOR

The magnetometer processor in the magnetic field experiment (see Figure A-6) does the following:

1. Analog to Digital (A/D) conversion of the magnetic field signals.
2. Digital filtering of the magnetic field signals.
3. Delta modulation of the magnetic field signals. (This data stream was not used on-ground.)
4. Data multiplexing of the two processing systems, (one redundant), high and low bit rate data, and the combining of the absolute value words and delta modulation 2-bit words into a serial output bit stream.
5. Interfacing with the spacecraft data encoder.
6. Interfacing with the spacecraft for commands.
7. Automatic range switching, sensing, control and range relay drive.
8. Sensitivity calibration control and signal generation.
9. Mechanical flipper control and drive.
10. Monitoring of the engineering status.

The magnetometer processor is housed in a standard spacecraft wedge shaped unit 12-7/8 inches high (see Figure A-3). The processor electrical hardware is primarily low power TTL. The digital filter memory is dynamic MOS, where transistors are used for driving circuits. Monolithic integrated circuit operational amplifiers and field effect transistors are used in the A/D converters.

ANALOG TO DIGITAL CONVERTERS

Sampling of the data is done every forty milliseconds in synchronism with an encoder furnished signal. The data is stored in a sample-and-hold circuit until the internal timing of the magnetometer processor is ready to commence its sample cycle. All three axes are sampled simultaneously.

The analog to digital conversion is done by a double ramp (RC charge-discharge) A/D converter. The converter works by charging the RC circuit with the voltage to be

measured during a precise time period, discharging the circuit into a negative reference voltage, and then measuring the discharge time with a crystal controlled clock. Most component induced errors are canceled out due to charge and discharge of the same RC components.

There are three sample-and-hold circuits and three A/D converters (one per axis) per system. For the total of two systems there are six sample-and-hold circuits and A/D converters. The three A/D converters per system have been used to provide redundancy so that the system is not lost in the case of a single converter failure.

SYSTEM REDUNDANCY

Redundancy has been built into the processor and encoder to circumvent failures and/or minimize their impact. There are two main data handling systems (A or B) in the processor. Each system has a digital filter, a delta modulator, range sensing logic, and sets of A/D converters. A double set of encoders has also been provided in the spacecraft, and either of the two processor systems can work with either of the two encoder systems, so that proper operation can occur with any combination of failures of one processor system and/or one encoder system. Three A/D converters per system have been provided, for a total of 6 in the processor, in order to reduce the data loss if one A/D converter is lost.

RANGE SWITCHING LOGIC

The description of the range switching scheme and supporting electronics is described by Scearce et al., 1992. Since the instrument was commanded into the fixed ±36 nT range, as mentioned above, we do not discuss it further here.

OUTPUT MULTIPLEXER

The output multiplexer performs three basic functions:

1. Mixing of the X, Y, and Z absolute data words and delta modulation 2-bit words into a serial bit stream.
2. Selection of system A or system B data.
3. Selecting the proper number of samples for high and low bit rates.

All of these functions are performed for both the data, and for the clocks for the data.

TIMING

There are three timing standards for the experiment. Two are derived from crystal controlled clocks and the other is derived from the encoder timing signals. There are two separate and identical crystal controlled timing units, one per system (A or B). The experiment sampling is done in synchronism with a 40 millisecond encoder signal. The internal data processing within the experiment is done in synchronism with the crystal clocks.

Because the memory for the digital filter is dynamic, it is kept running all of the time. After sampling is done and the data stored in a sample-and-hold circuit, processing and A/D conversion of the data are held up until the MOS memory is in the proper position with respect to the processing timing. The data processing sequence is divided into 8 equal time periods and one variable time period. Period 0 is the variable time period between the time when the sample-and-hold takes the data and the time that the MOS memory is in its desired starting state. During periods 1 and 2 the previous sample of X-axis data is processed in the digital filter. In time period 2 the A/D charge takes place. The A/D discharge (for all axes) takes place during time periods 3, 4, 5, and 6. In time period 3 the X-axis data which has been processed by the digital filter is processed by the delta modulator. During time periods 3 and 4 the Y-axis data is processed by the digital filter; this data is also from the previous sample time. In time period 5 the filtered Y-axis data is processed in the delta modulator. In time period 7 the Z-axis data from the previous sample is processed by the delta modulator. In time period 8 of every eighth sample period the Z-axis is separately processed for both high and low bit rates.

REFERENCES

Interplanetary Monitoring Platform, IMP-J, NASA/GSFC publication.

Mish, W. H., and R. P. Lepping, Magnetic field experiment data processing systems: Explorers 47 and 50, NASA/GSFC, X-694-76-158, August 1976.

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Schonstedt, E. O., Saturable measuring device and magnetic core therefor, U.S. Patent 2916696 (December 1959) and U.S. Patent 2981885 (April 1961).

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Tsurutani, B., Results for Ulysses' Jupiter flyby, EOS, Transactions of AGU, 73, p. 114, March 17, 1992.

APPENDIX

TABLES

I Magnetic Field Experiment Specifications
II IMP-8 Initial Sensitivity Calibration

FIGURES

A-1 IMP-8 Spacecraft
A-2 Magnetometer electronics unit
A-3 Data processing unit
A-4 IMP-8 magnetic field experiment: block diagram
A-5 Electronics block diagram
A-6 Magnetometer processor: block diagram

TABLE I

MAGNETIC FIELD EXPERIMENT SPECIFICATIONS

Weight	
Electronics	5.5 lb
Sensor	1.25 lb
Power	
Electronics	5 W
Thermally oscillating Actuator (10 min every 46 hours)	5 W
Thermal Calibration	
Electronics	-40°C to +60°C
Sensor	-75°C to +75°C
Zero drift/year	±1 nT
Linearity	±1%
Resolution (Sensitivity)	±0.05 nT

TABLE II

IMP-8 INITIAL SENSITIVITY CALIBRATION

Range*	Counts/nT		
	D1	D2	D3
±12 nT	10.1	10.2	10.0
±36 nT	3.39	3.37	3.34
±108	0.927	0.923	0.930

*Since July 11, 1975 the instrument has been fixed in the ±36 nT range (see text).

7/18/91 - 12/31/91
D-101582

ASCII LIST OF IMP

FILE 1 RECORD 1 20900 BYTES

91 198.27449 jul 18 12.59 12.56 3.49 -8.07 8.98 -5.26 10.86 99999.00 99999.00 99999.00 99999.00 293.37 45.63 303.53 59.
85 -1.465E+05 -1.506E+05 -1.127E+05 -1.759E+05 -6.651E+04 2.384E+05 5 1 0 0 91 198.27520 jul 18 13.19 13.15 4.67 -7.98 9.35
-5.07 11.20 0.77 0.10 0.53 0.94 300.33 45.33 312.67 58.41 -1.465E+05 -1.506E+05 -1.127E+05 -1.759E+05 -6.651E+
04 2.384E+05 22 1 2 0 91 198.27591 jul 18 13.64 13.58 5.21 -8.65 9.09 -5.76 11.15 1.13 0.52 1.29 1.79 301
.06 42.02 312.11 55.15 -1.465E+05 -1.507E+05 -1.127E+05 -1.760E+05 -6.634E+04 2.384E+05 35 1 0 0 91 198.27662 jul 18 14.47 14.4
3 6.66 -8.60 9.48 -5.61 11.50 1.59 0.16 1.77 2.39 307.73 41.05 319.87 52.87 -1.464E+05 -1.508E+05 -1.126E+
05 -1.762E+05 -6.601E+04 2.384E+05 5 1 2 0 91 198.27734 jul 18 15.43 15.24 6.59 -9.81 9.63 -6.71 12.00 0.79 2.03
1.09 2.43 303.88 39.19 314.49 51.93 -1.464E+05 -1.508E+05 -1.126E+05 -1.762E+05 -6.601E+04 2.384E+05 33 1 0 0 91 198.278
05 jul 18 12.72 12.62 2.20 -8.90 8.67 -6.09 10.83 1.45 0.45 0.38 1.57 283.91 43.42 289.88 59.11 -1.462E+
05 -1.508E+05 -1.126E+05 -1.764E+05 -6.568E+04 2.384E+05 48 1 0 0 91 198.27876 jul 18 12.60 12.56 1.43 -9.53 8.05 -6.88 10
.41 0.78 0.49 0.62 1.11 278.54 39.85 281.76 55.98 -1.462E+05 -1.509E+05 -1.126E+05 -1.765E+05 -6.552E+04 2.384E+
05 48 1 0 0 91 198.27947 jul 18 14.15 14.03 2.67 -10.87 8.47 -8.03 11.20 1.35 1.15 1.06 2.06 283.78 37.13
288.36 52.92 -1.462E+05 -1.509E+05 -1.126E+05 -1.765E+05 -6.552E+04 2.384E+05 48 1 0 0 91 198.28018 jul 18 16.04 15.98 6.29 -1
0.23 10.54 -6.81 13.02 0.71 0.28 0.60 0.97 301.60 41.28 312.74 54.53 -1.461E+05 -1.509E+05 -1.126E+05 -1.766E+
05 -6.535E+04 2.384E+05 37 1 2 0 91 198.28089 jul 18 16.44 16.38 6.32 -10.68 10.70 -7.19 13.30 0.06 0.29 0.54
0.61 300.61 40.76 311.31 54.25 -1.460E+05 -1.510E+05 -1.126E+05 -1.768E+05 -6.503E+04 2.384E+05 34 1 0 0 91 198.28160 jul 18
15.64 15.61 5.82 -10.04 10.44 -6.65 12.87 0.50 0.34 0.34 0.69 300.10 41.98 311.20 55.53 -1.460E+05 -1.511E+
05 -1.126E+05 -1.769E+05 -6.486E+04 2.383E+05 48 1 0 0 91 198.28231 jul 18 16.13 16.02 6.42 -10.45 10.31 -7.07 12.87 0.7
4 0.43 0.30 0.90 301.56 40.07 312.25 53.43 -1.460E+05 -1.511E+05 -1.126E+05 -1.769E+05 -6.486E+04 2.383E+05 48 1 0 0
91 198.28302 jul 18 16.50 16.23 10.09 -8.18 9.73 -5.04 11.67 2.30 2.11 0.32 3.14 320.96 36.83 333.44 45.
97 -1.459E+05 -1.511E+05 -1.126E+05 -1.770E+05 -6.470E+04 2.383E+05 48 1 0 0 91 198.28374 jul 18 15.13 15.07 7.41 -9.06 9.49
-5.95 11.70 1.08 0.60 0.43 1.31 309.26 39.02 321.24 50.91 -1.458E+05 -1.512E+05 -1.125E+05 -1.772E+05 -6.437E+
04 2.383E+05 40 1 0 0 91 198.28445 jul 18 13.75 13.53 5.50 -8.11 9.33 -5.08 11.27 1.99 1.43 0.85 2.60 304
.15 43.61 317.29 56.42 -1.458E+05 -1.513E+05 -1.125E+05 -1.773E+05 -6.421E+04 2.383E+05 27 1 0 0 91 198.28516 jul 18 12.95 12.8
5 3.43 -8.21 9.27 -5.18 11.25 1.09 0.73 0.56 1.43 292.68 46.17 303.54 61.10 -1.458E+05 -1.513E+05 -1.125E+
05 -1.773E+05 -6.421E+04 2.383E+05 43 1 0 0 91 198.28587 jul 18 12.78 12.75 2.40 -8.98 8.72 -6.06 10.95 0.65 0.29
0.72 1.01 284.94 43.17 291.56 59.24 -1.456E+05 -1.514E+05 -1.125E+05 -1.775E+05 -6.389E+04 2.383E+05 20 1 0 0 91 198.286
58 jul 18 11.72 11.67 1.24 -7.95 8.45 -5.15 10.40 0.78 0.64 0.28 1.05 278.87 46.38 283.55 63.00 -1.456E+
05 -1.514E+05 -1.125E+05 -1.775E+05 -6.372E+04 2.383E+05 48 1 0 0 91 198.28729 jul 18 10.77 10.70 0.65 -7.29 7.80 -4.71 9
.59 1.25 0.36 0.32 1.34 275.11 46.83 277.89 63.64 -1.455E+05 -1.515E+05 -1.125E+05 -1.776E+05 -6.356E+04 2.383E+
05 46 1 0 0 91 198.28800 jul 18 11.00 10.90 1.94 -5.68 9.11 -2.76 10.37 1.50 0.11 0.99 1.80 288.85 56.63
305.02 71.97 -1.455E+05 -1.515E+05 -1.125E+05 -1.776E+05 -6.356E+04 2.383E+05 16 1 2 0 91 198.28871 jul 18 10.66 10.56 2.58 -
5.53 8.62 -2.76 9.86 1.06 0.53 1.37 1.81 295.01 54.73 313.02 69.03 -1.454E+05 -1.515E+05 -1.125E+05 -1.778E+
05 -6.324E+04 2.383E+05 12 1 2 0 91 198.28942 jul 18 8.88 8.52 2.78 -5.95 5.44 -4.08 6.95 0.36 0.50 2.44
2.52 295.02 39.66 304.19 54.59 -1.454E+05 -1.515E+05 -1.125E+05 -1.778E+05 -6.324E+04 2.383E+05 48 1 0 0 91 198.29014 jul 18
10.88 10.78 4.23 -6.90 7.12 -4.49 8.84 0.30 0.18 0.57 0.67 301.54 41.37 313.32 55.09 -1.453E+05 -1.516E+
05 -1.125E+05 -1.780E+05 -6.292E+04 2.382E+05 15 1 0 0 91 198.29085 jul 18 13.13 13.04 5.25 -6.68 9.90 -3.46 11.42 1.4
7 0.26 0.57 1.60 308.15 49.37 326.56 61.18 -1.453E+05 -1.517E+05 -1.125E+05 -1.781E+05 -6.275E+04 2.382E+05 38 1 0 0
91 198.29156 jul 18 14.23 13.99 3.42 -8.28 10.74 -4.73 12.71 0.62 1.54 1.57 2.29 292.43 50.16 305.86 65.
34 -1.453E+05 -1.517E+05 -1.125E+05 -1.781E+05 -6.275E+04 2.382E+05 40 1 0 0 91 198.29227 jul 18 12.14 11.79 -5.50 -9.86 3.40
-8.41 6.17 2.08 0.55 2.42 3.23 240.87 16.75 236.83 31.57 -1.451E+05 -1.518E+05 -1.124E+05 -1.783E+05 -6.243E+
04 2.382E+05 30 1 0 0 91 198.29298 jul 18 12.10 12.03 -4.60 -10.78 2.69 -9.49 5.78 0.47 0.82 1.53 1.80 246
.88 12.93 244.13 28.71 -1.451E+05 -1.518E+05 -1.124E+05 -1.784E+05 -6.227E+04 2.382E+05 20 1 0 0 91 198.29369 jul 18 12.62 12.4
9 -2.61 -11.61 3.81 -9.95 7.09 0.74 0.75 1.85 2.13 257.35 17.76 255.32 34.60 -1.450E+05 -1.519E+05 -1.124E+
05 -1.785E+05 -6.211E+04 2.382E+05 25 1 0 0 91 198.29440 jul 18 14.06 14.03 -1.83 -12.87 5.29 -10.70 8.89 0.48 0.24
0.52 0.75 261.89 22.13 260.28 39.33 -1.450E+05 -1.519E+05 -1.124E+05 -1.785E+05 -6.211E+04 2.382E+05 29 1 0 0 91 198.295
11 jul 18 16.83 16.78 2.92 -12.64 10.65 -8.87 13.95 0.68 0.48 0.81 1.16 283.02 39.37 288.24 56.20 -1.449E+
05 -1.520E+05 -1.124E+05 -1.786E+05 -6.179E+04 2.382E+05 35 1 2 0 91 198.29582 jul 18 14.71 14.71 2.48 -11.53 8.79 -8.37 11
.84 99999.00 99999.00 99999.00 99999.00 282.14 36.68 286.52 53.61 -1.449E+05 -1.520E+05 -1.124E+05 -1.787E+05 -6.164E+04 2.382E+
05 4 1 2 0 91 198.29725 jul 18 18.23 18.20 3.48 -12.27 12.99 -7.76 16.09 0.85 0.57 0.07 1.03 285.82 45.52
294.12 62.14 -1.449E+05 -1.520E+05 -1.124E+05 -1.787E+05 -6.164E+04 2.382E+05 11 1 0 2 91 198.29796 jul 18 17.59 17.56 4.90 -1
1.32 12.50 -7.01 15.34 0.27 0.38 0.57 0.74 293.39 45.38 304.95 60.88 -1.447E+05 -1.522E+05 -1.124E+05 -1.791E+
05 -6.100E+04 2.381E+05 31 1 0 0 91 198.29867 jul 18 17.68 17.67 4.58 -11.56 12.55 -7.21 15.47 0.51 0.43 0.42
0.79 291.62 45.26 302.45 61.09 -1.447E+05 -1.522E+05 -1.124E+05 -1.791E+05 -6.100E+04 2.381E+05 35 1 0 0 91 198.30080 jul 18
17.15 17.14 3.89 -11.77 11.84 -7.58 14.87 0.36 0.19 0.09 0.42 288.31 43.69 297.17 60.17 -1.446E+05 -1.522E+

```
05 -1.123E+05 -1.792E+05 -6.084E+04  2.381E+05 37 1 0 2 91 198.30222 jul 18  15.64  15.59   4.13 -10.33  10.92  -6.50  13.55     0.3
6     2.17     0.19     2.20  291.79  44.45 302.43  60.39 -1.444E+05 -1.524E+05 -1.123E+05 -1.794E+05 -6.037E+04  2.381E+05 12 1 0 2
 91 198.30294 jul 18  15.36  15.33   3.84 -11.22   9.71  -7.69  12.70     0.34     0.12     0.40     0.54  288.88  39.33 296.53  55.
92 -1.444E+05 -1.524E+05 -1.123E+05 -1.794E+05 -6.037E+04  2.381E+05 33 1 0 0 91 198.30365 jul 18  16.06  16.00   3.43 -12.33   9.60
  -8.76  12.94     1.15     0.36     0.39     1.26  285.53  36.89 291.35  53.97 -1.443E+05 -1.525E+05 -1.123E+05 -1.797E+05 -5.990E+
04  2.381E+05 38 1 0 0 91 198.30436 jul 18  16.06  16.02   4.10 -12.19   9.55  -8.64  12.86     0.79     0.64     0.28     1.06  288
.58  36.59 295.39  53.38 -1.442E+05 -1.526E+05 -1.123E+05 -1.798E+05 -5.975E+04  2.381E+05 34 1 0 0 91 198.30507 jul 18  15.73  15.7
1   4.54 -11.68   9.47  -8.17  12.63     0.52     0.85     0.33     1.05  291.24  37.10 299.06  53.50 -1.441E+05 -1.527E+05 -1.123E+
05 -1.799E+05 -5.944E+04  2.381E+05 48 1 0 0 91 198.30578 jul 18  15.45  15.42   4.58 -11.16   9.60  -7.62  12.59     0.57     0.56
    0.52     0.95  292.33  38.52 301.01  54.76 -1.441E+05 -1.527E+05 -1.123E+05 -1.799E+05 -5.944E+04  2.381E+05 42 1 0 0 91 198.306
49 jul 18  12.22  12.20   3.32  -9.60   6.75  -7.02   9.41     1.51     1.63     1.09     2.48  289.07  33.60 295.31  50.47 -1.440E+
05 -1.527E+05 -1.122E+05 -1.800E+05 -5.928E+04  2.380E+05  6 1 2 0 91 198.30720 jul 18  10.01  10.01   4.93  -6.45   5.84  -4.31   7
.57     0.00     0.28     0.00     0.28  307.38  35.75 318.86  49.13 -1.439E+05 -1.528E+05 -1.122E+05 -1.802E+05 -5.897E+04  2.380E+
05 11 1 0 0 91 198.30791 jul 18  11.87  11.82   5.83  -7.06   7.47  -4.37   9.31     1.35     2.00     2.60     3.55  309.52  39.21
323.14  51.96 -1.439E+05 -1.528E+05 -1.122E+05 -1.802E+05 -5.897E+04  2.380E+05 28 1 0 0 91 198.30862 jul 18  15.12  15.07   6.21  -
8.18  11.03  -4.31  13.04     0.35     0.77     0.04     0.84  307.24  47.06 325.28  59.89 -1.438E+05 -1.529E+05 -1.122E+05 -1.803E+
05 -5.866E+04  2.380E+05  8 1 0 0 91 198.30934 jul 18  14.52  14.50   4.84  -9.64   9.69  -6.11  12.23     0.68     0.30     0.67
   1.00  296.65  41.94 308.37  57.49 -1.438E+05 -1.529E+05 -1.122E+05 -1.803E+05 -5.866E+04  2.380E+05 23 1 0 0 91 198.31076 jul 18
13.27  13.27   3.94  -9.87   7.94  -6.85  10.65     0.05     0.24     0.55     0.60  291.74  36.78 299.86  53.43 -1.438E+05 -1.529E+
05 -1.122E+05 -1.804E+05 -5.851E+04  2.380E+05 13 1 0 2 91 198.31147 jul 18  12.31  12.30   2.70  -9.64   7.14  -6.89   9.82     0.2
5     0.18     0.18     0.36  285.66  35.51 291.42  53.01 -1.436E+05 -1.531E+05 -1.122E+05 -1.807E+05 -5.805E+04  2.380E+05 19 1 2 0
 91 198.31218 jul 18  13.31  13.23   0.66 -11.18   7.04  -8.37  10.22     0.62     1.79     0.62     2.00  273.39  32.15 274.52  50.
61 -1.436E+05 -1.531E+05 -1.122E+05 -1.807E+05 -5.805E+04  2.380E+05 24 1 0 0 91 198.31289 jul 18  11.64  11.63  -0.01  -9.85   6.18
  -7.38   8.98     0.57     0.58     0.13     0.82  269.94  32.09 269.91  50.59 -1.435E+05 -1.532E+05 -1.121E+05 -1.808E+05 -5.775E+
04  2.380E+05  8 1 0 0 91 198.31360 jul 18  12.72  12.62   2.29 -10.71   6.27  -8.16   9.35     0.67     0.29     0.48     0.88  282
.08  29.77 285.70  47.83 -1.435E+05 -1.532E+05 -1.121E+05 -1.808E+05 -5.775E+04  2.380E+05 31 1 0 0 91 198.31431 jul 18  14.21  14.1
8   1.24 -11.51   8.19  -8.29  11.44     0.21     0.01     0.44     0.49  276.13  35.29 278.48  53.77 -1.434E+05 -1.533E+05 -1.121E+
05 -1.810E+05 -5.744E+04  2.379E+05 25 1 0 0 91 198.31502 jul 18  11.62  11.61   1.08  -8.71   7.59  -5.83   9.98     0.24     1.22
    0.99     1.59  277.05  40.86 280.48  59.28 -1.433E+05 -1.533E+05 -1.121E+05 -1.811E+05 -5.729E+04  2.379E+05 10 1 0 0 91 198.315
74 jul 18  13.62  13.58   1.22 -10.63   8.37  -7.39  11.33     0.51     0.66     0.54     0.99  276.53  38.02 279.36  56.55 -1.433E+
05 -1.533E+05 -1.121E+05 -1.811E+05 -5.729E+04  2.379E+05 30 1 0 0 91 198.31645 jul 18  14.31  14.28   1.04 -10.38   9.75  -6.71  12
.57     0.58     0.52     0.81     1.12  275.73  43.06 278.82  61.62 -1.432E+05 -1.534E+05 -1.121E+05 -1.812E+05 -5.699E+04  2.379E+
05 22 1 0 0 91 198.31716 jul 18  13.95  13.92   1.86 -10.42   9.03  -6.96  11.91     0.77     0.65     0.44     1.10  280.11  40.47
284.95  58.83 -1.432E+05 -1.534E+05 -1.121E+05 -1.812E+05 -5.699E+04  2.379E+05 45 1 0 0 91 198.31787 jul 18  13.96  13.92   1.42  -1
0.29   9.27  -6.75  12.10     0.76     0.23     0.38     0.88  277.87  41.74 281.89  60.30 -1.431E+05 -1.535E+05 -1.121E+05 -1.814E+
05 -5.669E+04  2.379E+05 37 1 0 0 91 198.31858 jul 18  13.51  13.50   0.93 -10.32   8.65  -6.97  11.52     0.19     0.55     0.26
   0.63  275.18  39.86 277.64  58.61 -1.431E+05 -1.535E+05 -1.121E+05 -1.815E+05 -5.654E+04  2.379E+05 47 1 0 0 91 198.31929 jul 18
14.30  14.28   1.16 -10.69   9.39  -7.08  12.35     0.60     0.25     0.32     0.73  276.17  41.13 279.28  59.83 -1.430E+05 -1.536E+
05 -1.121E+05 -1.816E+05 -5.639E+04  2.379E+05 21 1 0 0 91 198.32000 jul 18  14.97  14.94   1.37 -11.34   9.62  -7.60  12.78     0.9
3     0.26     0.17     0.98  276.91  40.11 280.24  58.85 -1.430E+05 -1.536E+05 -1.121E+05 -1.816E+05 -5.639E+04  2.379E+05 43 1 0 0
 91 198.32071 jul 18  13.65  13.63   1.48 -10.25   8.86  -6.81  11.71     0.33     0.52     0.53     0.81  278.22  40.56 282.27  59.
26 -1.429E+05 -1.537E+05 -1.120E+05 -1.817E+05 -5.610E+04  2.379E+05 48 1 0 0 91 198.32142 jul 18  14.09  14.07   1.70 -10.51   9.20
  -6.94  12.12     0.37     0.47     0.49     0.77  279.21  40.84 283.80  59.49 -1.428E+05 -1.537E+05 -1.120E+05 -1.818E+05 -5.595E+
04  2.379E+05 40 1 0 0 91 198.32214 jul 18  13.53  13.51   1.35 -10.32   8.61  -6.95  11.50     0.49     0.60     0.67     1.02  277
.47  39.61 281.01  58.39 -1.428E+05 -1.538E+05 -1.120E+05 -1.819E+05 -5.580E+04  2.379E+05 29 1 0 0 91 198.32285 jul 18  14.32  14.3
1   2.46 -10.22   9.70  -6.49  12.51     0.38     0.09     0.15     0.42  283.54  42.70 290.78  61.00 -1.428E+05 -1.538E+05 -1.120E+
05 -1.819E+05 -5.580E+04  2.379E+05 27 1 0 0 91 198.32356 jul 18  15.38  15.37   2.34 -10.96  10.52  -6.91  13.53     0.52     0.63
    0.18     0.84  282.04  43.18 288.69  61.67 -1.427E+05 -1.539E+05 -1.120E+05 -1.820E+05 -5.551E+04  2.378E+05  9 1 0 0 91 198.324
27 jul 18  15.12  15.10   2.86 -10.64  10.33  -6.67  13.25     0.25     0.28     0.51     0.63  285.05  43.15 293.22  61.29 -1.426E+
05 -1.539E+05 -1.120E+05 -1.821E+05 -5.536E+04  2.378E+05  9 1 0 0 91 198.32498 jul 18  14.55  14.54   3.56 -10.09   9.84  -6.29  12
.61     0.12     0.33     0.38     0.52  289.43  42.62 299.51  60.20 -1.426E+05 -1.539E+05 -1.120E+05 -1.821E+05 -5.536E+04  2.378E+
05 12 1 0 0 91 198.32569 jul 18  15.59  15.55   4.33 -10.29  10.83  -6.13  13.62     0.54     0.31     0.68     0.93  292.80  44.14
305.18  61.15 -1.425E+05 -1.540E+05 -1.120E+05 -1.823E+05 -5.507E+04  2.378E+05 24 1 2 0 91 198.32640 jul 18  16.11  16.08   4.88 -1
0.63  11.04  -6.39  13.93     0.71     0.37     0.09     0.81  294.65  43.33 307.36  60.01 -1.424E+05 -1.541E+05 -1.119E+05 -1.824E+
05 -5.478E+04  2.378E+05 13 1 0 0 91 198.32711 jul 18  15.86  15.82   5.83 -10.38  10.42  -6.35  13.27     0.93     0.40     0.48
   1.12  299.31  41.18 312.54  56.98 -1.424E+05 -1.541E+05 -1.119E+05 -1.824E+05 -5.478E+04  2.378E+05 44 1 0 0 91 198.32782 jul 18
16.01  15.98   6.83 -10.08  10.35  -6.07  13.11     0.43     0.19     0.59     0.75  304.14  40.36 318.39  55.11 -1.423E+05 -1.541E+
05 -1.119E+05 -1.825E+05 -5.464E+04  2.378E+05 25 1 0 0 91 198.32854 jul 18  16.17  16.14   7.75  -9.78  10.24  -5.83  12.91     0.7
0     0.33     0.37     0.85  308.38  39.37 323.06  53.09 -1.422E+05 -1.542E+05 -1.119E+05 -1.826E+05 -5.435E+04  2.378E+05 43 1 0 0
 91 198.32925 jul 18  16.22  16.20   8.03  -9.29  10.55  -5.25  13.05     0.52     0.24     0.13     0.59  310.84  40.67 326.82  53.
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65 -1.422E+05 -1.542E+05 -1.119E+05 -1.826E+05 -5.435E+04  2.378E+05 38 1 0 0 91 198.32996 jul 18  16.17  16.14   5.66 -10.00  11.34
  -5.65  14.02     0.74     0.49     0.29     0.93  299.48  44.61 315.02  60.30 -1.422E+05 -1.543E+05 -1.119E+05 -1.827E+05 -5.420E+
04  2.378E+05 17 1 0 0 91 198.33067 jul 18  15.23  15.22   5.80  -9.21  10.64  -5.12  13.11     0.41     0.36     0.53     0.76  302
.19  44.37 318.56  59.47 -1.421E+05 -1.543E+05 -1.119E+05 -1.828E+05 -5.406E+04  2.378E+05  7 1 0 0 91 198.33138 jul 18  15.05  14.9
7   6.55  -8.39  10.53  -4.38  12.73     1.17     0.72     0.25     1.40  308.00  44.70 326.24  58.24 -1.420E+05 -1.544E+05 -1.119E+
05 -1.829E+05 -5.378E+04  2.377E+05 22 1 0 0 91 198.33209 jul 18  15.70  15.60   7.82  -9.50   9.60  -5.73  12.23     1.39     0.90
    0.84     1.86  309.46  37.98 323.76  51.60 -1.420E+05 -1.544E+05 -1.119E+05 -1.829E+05 -5.378E+04  2.377E+05 18 1 0 0 91 198.332
80 jul 18  13.81  13.79   6.09  -8.65   8.86  -5.16  11.25     0.50     0.10     0.34     0.61  305.15  39.96 319.70  54.65 -1.419E+
05 -1.544E+05 -1.119E+05 -1.830E+05 -5.363E+04  2.377E+05 15 1 0 0 91 198.33351 jul 18  13.85  13.82   5.82  -8.70   9.03  -5.15  11
.43     0.75     0.51     0.13     0.91  303.78  40.80 318.47  55.79 -1.418E+05 -1.545E+05 -1.118E+05 -1.832E+05 -5.335E+04  2.377E+
05 18 1 0 0 91 198.33422 jul 18  13.95  13.91   6.15  -8.70   8.93  -5.19  11.34     0.78     0.52     0.25     0.97  305.26  39.96
319.88  54.64 -1.418E+05 -1.545E+05 -1.118E+05 -1.832E+05 -5.335E+04  2.377E+05 35 1 0 0 91 198.33494 jul 18  14.90  14.88   7.31  -
8.62   9.67  -4.85  12.02     0.45     0.46     0.49     0.80  310.29  40.55 326.46  53.88 -1.418E+05 -1.546E+05 -1.118E+05 -1.832E+
05 -5.321E+04  2.377E+05 34 1 2 0 91 198.33565 jul 18  14.54  14.51   7.05  -8.24   9.63  -4.49  11.86     0.67     0.24     0.52
    0.88  310.52  41.61 327.47  54.82 -1.417E+05 -1.547E+05 -1.118E+05 -1.834E+05 -5.293E+04  2.377E+05 39 1 0 0 91 198.33636 jul 18
14.78  14.75   7.30  -7.89  10.11  -4.00  12.18     0.60     0.37     0.22     0.75  312.80  43.23 331.30  55.65 -1.416E+05 -1.547E+
05 -1.118E+05 -1.834E+05 -5.279E+04  2.377E+05 37 1 0 0 91 198.33707 jul 18  15.54  15.48   7.43  -8.37  10.69  -4.24  12.90     1.2
6     0.39     0.59     1.45  311.58  43.67 330.27  56.44 -1.416E+05 -1.547E+05 -1.118E+05 -1.834E+05 -5.279E+04  2.377E+05 27 1 0 0
 91 198.33778 jul 18  15.97  15.91   8.53  -8.81  10.13  -4.83  12.53     0.85     0.66     0.43     1.16  314.08  39.56 330.46  51.
95 -1.415E+05 -1.548E+05 -1.118E+05 -1.836E+05 -5.252E+04  2.377E+05 44 1 0 0 91 198.33849 jul 18  16.08  16.06   9.65  -8.57   9.56
  -4.80  11.91     0.33     0.43     0.58     0.79  318.41  36.54 333.56  47.85 -1.414E+05 -1.549E+05 -1.118E+05 -1.837E+05 -5.238E+
04  2.377E+05 22 1 0 0 91 198.33920 jul 18  15.30  15.25   8.63  -7.90   9.79  -4.09  11.90     0.68     0.44     0.19     0.84  317
.50  39.91 334.66  51.26 -1.414E+05 -1.549E+05 -1.118E+05 -1.837E+05 -5.238E+04  2.377E+05 32 1 0 0 91 198.33991 jul 18  15.56  15.5
2   8.30  -7.72  10.60  -3.63  12.60     0.23     0.77     0.60     1.00  317.04  43.07 336.35  54.29 -1.413E+05 -1.549E+05 -1.118E+
05 -1.838E+05 -5.210E+04  2.376E+05 30 1 2 0 91 198.34062 jul 18  16.44  16.38   9.19  -9.02  10.13  -5.01  12.60     0.32     0.36
    0.34     0.59  315.55  38.19 331.43  50.29 -1.413E+05 -1.550E+05 -1.117E+05 -1.839E+05 -5.197E+04  2.376E+05 19 1 0 0 91 198.341
34 jul 18  16.41  16.35   7.59  -8.04  12.04  -3.43  14.07     0.84     1.11     0.62     1.53  313.35  47.43 335.69  59.37 -1.413E+
05 -1.550E+05 -1.117E+05 -1.839E+05 -5.197E+04  2.376E+05 31 1 0 0 91 198.34205 jul 18  14.95  14.89   7.66  -8.87   9.19  -5.17  11
.68     1.37     0.69     0.39     1.58  310.80  38.09 325.96  51.65 -1.412E+05 -1.550E+05 -1.117E+05 -1.839E+05 -5.183E+04  2.376E+
05 37 1 0 0 91 198.34276 jul 18  15.76  15.71   8.76  -9.03   9.41  -5.24  11.94     1.32     0.97     0.37     1.68  314.13  36.79
329.13  49.48 -1.411E+05 -1.551E+05 -1.117E+05 -1.841E+05 -5.156E+04  2.376E+05 46 1 0 0 91 198.34347 jul 18  12.65  12.53   4.82  -
7.69   8.63  -4.25  10.76     0.41     1.52     1.01     1.87  302.07  43.57 318.61  59.15 -1.410E+05 -1.552E+05 -1.117E+05 -1.841E+
05 -5.142E+04  2.376E+05 39 1 0 0 91 198.34418 jul 18  13.58  13.53   4.84  -9.44   8.39  -5.97  11.13     1.03     0.23     0.56
   1.20  297.13  38.34 309.04  55.39 -1.410E+05 -1.552E+05 -1.117E+05 -1.841E+05 -5.142E+04  2.376E+05 48 1 0 0 91 198.34489 jul 18
13.91  13.90   6.13  -7.89   9.66  -4.05  11.79     0.22     0.41     0.43     0.63  307.86  44.05 326.52  58.07 -1.410E+05 -1.552E+
05 -1.117E+05 -1.842E+05 -5.129E+04  2.376E+05 26 1 0 0 91 198.34560 jul 18  13.84  13.80   5.93  -8.25   9.34  -4.50  11.62     0.9
3     0.25     1.06     1.43  305.69  42.59 322.78  57.35 -1.409E+05 -1.553E+05 -1.117E+05 -1.844E+05 -5.102E+04  2.376E+05 40 1 0 0
 91 198.34631 jul 18  13.35  13.31   4.99  -8.55   8.90  -4.93  11.31     0.92     0.37     0.74     1.24  300.29  41.97 315.35  58.
19 -1.408E+05 -1.554E+05 -1.117E+05 -1.844E+05 -5.089E+04  2.376E+05 17 1 2 0 91 198.34702 jul 18  14.09  14.04   4.91  -9.40   9.20
  -5.62  11.90     0.90     0.17     0.60     1.10  297.57  40.94 311.16  57.91 -1.408E+05 -1.554E+05 -1.117E+05 -1.844E+05 -5.089E+
04  2.376E+05 30 1 0 0 91 198.34774 jul 18  14.52  14.47   5.34  -9.75   9.26  -5.92  12.08     0.57     0.71     0.65     1.12  298
.69  39.79 312.05  56.58 -1.407E+05 -1.554E+05 -1.116E+05 -1.846E+05 -5.062E+04  2.375E+05 16 1 2 0 91 198.34845 jul 18  15.15  15.1
2   5.79 -10.19   9.55  -6.22  12.50     0.46     0.24     0.17     0.55  299.58  39.17 312.92  55.81 -1.407E+05 -1.555E+05 -1.116E+
05 -1.846E+05 -5.049E+04  2.375E+05 41 1 0 0
```

ASCII LIST OF IMP

FILE 1 RECORD 95 8569 BYTES

```
 91 211.57298 jul 31   6.32   5.90   3.94  -4.23  -1.16  -4.34   0.67     1.16     0.80     0.64     1.55  312.95 -11.32 312.25   6.
51 -7.332E+04 -1.964E+05 -7.545E+04 -2.101E+05  1.147E+04  2.228E+05 25 1 0 0 91 211.57369 jul 31   6.79   6.37   3.73  -4.99  -1.35
  -5.10   0.80     0.76     0.83     1.71     2.04  306.83 -12.23 306.19   7.17 -7.319E+04 -1.965E+05 -7.539E+04 -2.102E+05  1.126E+
04  2.228E+05 26 1 0 0 91 211.57440 jul 31   6.23   6.07   3.51  -4.95  -0.17  -4.59   1.86     0.72     0.23     0.79     1.09  305
.34  -1.60 307.40  17.85 -7.312E+04 -1.965E+05 -7.536E+04 -2.102E+05  1.116E+04  2.228E+05 33 1 2 0 91 211.57511 jul 31   6.84   6.5
```

RSIRS Materials for Distribution

#73-078A-01L

The following items should be sent to first time user of this data set. For 'advance' users who have gotten other IMP 8 magnetic field data (73-078A-01%), please do not send item 1. Also, items 3, 4 and 5 are subject to change with additional/reprocessed data.

1. 'Magnetic Field Experiment Data Processing Systems - Explorers 47 and 50,' W. H. Mish and R. P. Lepping (TRF B28041-000A). (First time User's only)
2. Format description, dated 6/1/94 (1 page)
3. Errata, dated 11/15/93 (1 page)
4. Note on corrections from Ron Lepping, dated 02/01/94 (1 page)
5. June 8, 1993 memo from Ron Lepping to users of IMP-8 magnetic field data, with annotation by Joe King (6/24/94)

(CYN for JHK, rev. 6/94)

6. Subset of NASA/LEP report on Ulysses at Jupiter (title page, A1-8, figures A4, 5 & 6) per JHK 2/6/96

Enclosed is B28041-000A on microfiche, plus a 3pg. abstract. Per CYN this should go out to first time user's only.

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MAGNETIC FIELD EXPERIMENT DATA PROCESSING SYSTEMS: EXPLORERS 47 AND 50

by

W.H. Mish and R.P. Lepping

Laboratory for Extraterrestrial Physics
Goddard Space Flight Center
Greenbelt, Maryland

August 1976

TABLE OF CONTENTS - Continued

APPENDICES

		Page
6.	Description of the 15.36 Second Summary Tape Produced by Phase II	93
7.	Description of the Hourly Average Cards Produced by Phase II	98
8.	Definitions of Parameters for 15.36 Second Averages	99
9.	Description of the 15.36 Second Plots Produced by Phase II	100
10.	Description of the Phase III Detail Tape	102
11.	Special Analysis Program Quantities	103
12.	Explorer 47 Flip State History	104

TABLES

1.	Spin Period and Sequence Period Defaults	3
2.	Automatic Range Switching Criteria	6
3.	Experiment Engineering Parameter Definitions	8
4.	Example of DM Reconstruction Scheme	31
5.	Adaptive Delta Modulated Truth Table	32
6.	X and Z Sample Shifts	35
7.	Sensitivities of Instruments	43
8.	Correction Amplitudes	43
9.	BETA and PHIZ for Angle Offset Corrections	48
10.	Filter and Scaling Coefficients	53
11.	Instrument Phase Shift as a Function of Range	58

FIGURES

1.	Phase I Flow Chart	21
2.	Explorer 47 Zero Level (Intercept) Spline Fits: $\pm$ 12γ Range	26
3.	Explorer 47 Zero Level (Intercept) Spline Fits: $\pm$ 36γ Range	27
4.	Rotation from Apparent to Payload Coordinates - Oblique View	38
5.	Rotation from Apparent to Payload Coordinates - Spin Plane View	40
6.	Explorer 47 Frequency Response Curve	45
7.	Explorer 50 Frequency Response Curve	46
8.	Spin Plane Angles	56
9.	Shift and Pivot Operation	60
10.	Block Diagram of Overall Processing System	74

MAGNETIC FIELD EXPERIMENT DATA PROCESSING SYSTEMS: EXPLORERS 47 AND 50

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ABSTRACT

This document describes the magnetic field experiment data processing systems for Explorers 47 and 50 that have been written to run on the GSFC, Sciences Directorate IBM 360 computers under IBM 360/OS release 21.7. It presents the overall scheme and rationale for these systems, defines the various programming levels, and describes the types and formats of output products. The program modules employed in the principal part of the system, Phase I, are explained in detail. The Phase I program converts the raw X, Y, Z sensor data as received on the experimenter tape into useful detail vector measurements and averages of the observed magnetic field in physical units. The other program Phases (ZERO, II, and III) are briefly described. These perform the following functions: ZERO provides calibration parameter values to Phase I, Phase II transforms the data from spacecraft coordinates to physically useful coordinate systems (solar ecliptic and solar magnetospheric) and produces hourly average cards, and Phase III yields detail data products in the form of plots and numerical listings. The combined system can provide data with the following time bases: detail (40 msec), 320 msec, 1.28 sec averages, 15.36 sec averages, multiples of 15.36 sec averages (by non-production program), and hourly averages. Data products in most cases are in the form of microfilm and magnetic tape. It is expected that this document will be of particular interest to scientists who use the Explorer 47 and/or 50 magnetic field data for the dual reasons of its providing (1) a description of the available forms of data and (2) a thorough explanation of how those data were produced. Also it might be of value as a guide to future programmers [illegible] of [illegible] similar data processing systems, especially [illegible] that are [illegible]