DATA SET CATALOG #112

Pioneer 6 Count Rate Data
65-105A-03A 10 tapes

Pioneer 7 Count Rate Data
66-045A-06A 8 tapes

65-105A-03A

PIONEER 6 COUNT

RATE DATA REDUCTION ON MAGNETIC TAPE

This data set consists of 10, 800 BPI, 7-track, BINARY tapes with one file of data on each. There are 500 logical records per physical record. Each logical record consists of 12 bytes. There are two different types of logical records; header records and data records. A header record can be identified by a 1-bit in the 72nd place where as the data record has a zero bit in the 72nd place.

D#	C#	START	STOP
D-05965	C-04916	3/03/66	6/30/66
D-05966	C-04917	7/05/66	~~12/30/69~~ 12/30/70 *
D-05967	C-04918	2/21/66	3/04/66
D-05968	C-04919	2/09/66	2/21/66
D-05969	C-04920	2/02/66	2/09/66
D-05970	C-04921	1/21/66	2/02/66
D-05971	C-04922	1/09/66	1/21/66
D-05972	C-04923	12/31/65	1/09/66
D-05973	C-04924	12/23/65	12/31/65
D-05974	C-04925	12/16/65	12/23/65

* 9/14/72 A replacement tape has been added to this data set (for D-5966) with updated information.

66-075A-06A

PIONEER 7 COUNT

RATE DATA REDUCTION ON MAGNETIC TAPE

800 BPI, 7-track, Binary, 1 file, IBM 7094

D#	C#	START	STOP
D-07072	C-05588	8/17/66	8/24/66
D-07073	C-05589	8/24/66	9/04/66
D-07074	C-05590	9/04/66	9/18/66
D-07075	C-05591	9/18/66	9/26/66
D-07076	C-05592	9/26/66	10/04/66
D-07077	C-05593	10/04/66	11/03/66
D-07078	C-05594	11/04/66	5/12/68 12/22/70 *
D-07079	C-05595	5/12/68	~~12/30/67~~

* 9/10/73 A replacement tape has been added to this data set (for D 7079) with updated information

counter (word 15), the D4 analog rate meter (word 35), the U. of C. instrument temperature (word 36) and the platform temperature (word 52). The science subcom (format E) contains the quadrant flag which identifies the quadrant (bit 1 of words 1 and 9) and the contents of the quadrant scaler (bits 2-6 of words 1 and 9).

III. DATA SUBMISSION TO NSSDC

A. Counting Rate Plot Submission

The data consists of microfilms of computer-generated plots of all counting rates available for both Pioneer 6 and 7 from the beginning of their missions through 3 January, 1969. Each plot for a particular rate covers one Bartels Solar rotation period. Time axis labels are in day of year. The averaging periods used were determined in such a way as to produce the greatest time resolution commensurate with a statistically significant sample. These periods are integers multiples of .01 days (14.4 minutes). This choice was made because the plotter's resolution is limited to .01 day.

Hand drawn additions to the computer-drawn real time data consist of manually-calculated rates from duty cycle storage data and annotations to the machine-drawn data where it is incorrect. Table 5 describes these additions.

B. Data Tape Submission

Data from both instruments from the beginning of their missions through 1968 is available on standard 7-track binary mode, IBM compatible digital magnetic recording tape. The information contains all telemetered information pertinent to the experiments with the exception of quadrant data (see description of angular sectoring). The data has been edited to the extent that doubtful information is flagged as such and unusable data is deleted.

The tapes contain physical records of 6000, 6-bit bytes in length. Each physical record consists of 500 logical records of 12 bytes each. Logical records are either header records or data records. A header logical record contains information on spacecraft operating format and mode as well as the engineering data from all or part of an engineering subcom sequence (64 spacecraft frames). A header logical record is followed by from 1 to 64 data records of the same engineering subcom sequence. During perfect data reception with no discernible data errors the header will precede the

Complete set of 64 data logical records for a given engineering subcom sequence. However, if there are errors in the data a header may appear more than once in a given engineering subcom sequence, and fewer than 64 data records will be presented for the engineering subcom sequence, the erroneous data being deleted. Each such header logical record will contain part or all of the engineering information it would contain if it were the single header associated with a perfectly received engineering subcom sequence. Therefore, in order to obtain all possible engineering information for a given engineering subcom sequence (which might not be the complete set available from a perfectly received sequence) all the headers associated with the sequence should be used. Usually a given header will contain only engineering data which is read out on frames appearing between it and the next header. The header format appears in Figure 7.

Each data logical record contains the U. of Chicago information from one frame of format A or B telemetry. Also included is the time of transmission of the first bit of that frame, corrected for transit time between the spacecraft and earth. The format of data logical records is shown in Figure 8.

Each tape terminates with the 'EOD' flag set in the last good data record. The rest of that physical record is filled to the standard length of 500 logical records. Following this physical record is a record 36 bytes in length consisting of 3 dummy header records, each with the 'ET' flag set. Following this are 3 file marks.

IV. DATA USAGE

A. Counting Rate Data

An average of a particular rate, R, may be found from the formula $R = CN/T$, where N = number of counts per state change of a bit and T = time required to produce C state changes in the selected bit. The bit selected is usually the lowest order bit which changes state in a time longer than the current readout (format A or B frame) period. The method breaks down when the highest order bit available is changing state approximately once each readout. When this bit changes state exactly once each readout the calculated rate will be a maximum. As the true rate increases above this value the highest order bit will change state more often than once each readout and the calculated rate will decrease, reaching zero when the highest order bit changes state exactly twice between readouts. When the true rate is greater than the calculated rate due to these unobserved state changes in the highest order bit the calculated rate is "saturated". Table 6 shows the maximum observable counting rate for each telemetry bit rate.

In calculating rate averages from U. of C. data one should determine the scale bit to use by checking for consistency between two successive scale bits. For example, if the 2^4 scale bit is changing state 20 times for each state change of the 2^9 scale bit, the 2^4 scale bit is clearly saturated; it should change state