DATA SET CATALOG #107

OGO 2 & 4
COSMIC RAY TELESCOPE PROTON

65-081A-08A	1 tape
67-073A-09A	2 tapes

65-081A-08A

This data set consits of one 556 BPI, BINARY, 7-track tape with one file made by a 1604. The tape is formatted by orbits. Each orbit has a sequence of records as written in the format.

D#	C#	START	STOP
D-04743	C-02601	10/15/65	10/24/65

67-073A-09A

This data set consits of two 556 BPI, BINARY, 7-track tapes with one file on each tape. The tapes are formatted by orbits with each orbit having 9 different records as written in the format.

D-04744	C-02599	07/30/67	08/14/67
D-04902	C-02600	08/14/67	08/27/67

65-081A-08A
67-073A-09A

EXPERIMENT 5009 DATA BANK

DOCUMENTATION

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I. EXPERIMENT DESCRIPTION

A. Measurement

This cosmic ray telescope experiment has been designed to measure the differential energy spectra of protons, helium nuclei and heavier nuclei up to a charge $Z = 10$ within the range 50 to 2000 Mev per nucleon. In addition we monitor all charged particle radiation capable of penetrating 0.96 gm/cm^2. This material covers the first element of the detector and is composed primarily of aluminum and magnesium.

B. Geometry

The actual geometry of the detector is shown in Figure 1. The first element is a disk of NE102 plastic scintillator and will be referred to as the S or singles detector. The second element is a combination of an NE102 wafer optically coupled to a cherenkov radiator, and will be referred to as the C&S detector. Pertinent dimensions and materials are listed in Table 1a. These two elements are coupled with a 70 nanosecond coincidence to form the telescope. Figure 2 shows the telescope mounted on the inside of the -Z door and looking 30° from the vertical in the -Y direction.

C. Output Data Formats

The output from each detector is pulse height analyzed into a nine bit word, provided a coincidence has occurred. This comprises one telescope event. The 9 bit singles rate word is obtained from the alternate bits of an 18 bit scaler.

However on OGO-D, bits 8 and 9 are used to signify a current limiting condition which will be described later. In Normal Mode we obtain two pulse height readouts and one singles rate readout for every main frame, which is every 288 milliseconds at a spacecraft data rate of 4 kilobits per second. In the Flex Format modes we obtain only pulse height information. Table 1b gives the approximate sampling rates for the different modes.

XI. ANOMALIES

A. OGO-C

The radiation belts are often seen with sufficient intensity to cause permanent damage to the photomultiplier tubes if their high voltage supplies were held at the normal values. Both photomultipliers were current limited through reduction of the high voltage supplies when the current rose to a preset value. Data obtained during these periods is not usable.

An increase in the noise level on the spacecraft after launch caused our singles rate to be a multiple of the 2461 cps sync rate, except during eclipse periods.

B. OGO-D

The current limiting condition was handled differently on OGO-D. When the current reached the preset value, the high voltage was dropped to zero and bits 8 or 9 of the singles word were set to one. Bit 8 was used for the C&S detector and bit 9 for the S detector. These changes make the current limiting periods much easier to identify on OGO-D.

The resolution of the C&S detector deteriorated after launch - probably due to partial separation of an optical interface. This results in a reduced efficiency for detecting protons greater than about 200 Mev, with the worst case near the cherenkov threshold of 320 Mev.

III. DATA HANDLING

The first pass through the data is quite comprehensive and involves a merging of the three types of data - Real time, Playback, and Attitude. The merging is done on a time basis with priority given to Real time over Playback. Both telescope and singles rates are computed at an interval which is predetermined. The usual averaging times are ~ 18 seconds for singles rates and ~ 37 seconds for telescope rates. Errors are calculated for each rate. A compressed tape is written which contains the pulse height and time for each telescope event, the singles and telescope rates, errors and times, and selected attitude parameters from the attitude orbit tape.

A plot tape containing singles and telescope rates as a function of time is also generated. Additional scales include McIlwain's L parameter, geographic latitude, longitude at the equatorial crossing, and altitude.

IV. COMPRESSED DATA TAPE FORMAT

A. Organization

The compressed tapes are written in binary (cdd) parity at 556 Bpi by a Control Data 1604 computer. The word length is 48 bits; however, some future tapes may be written with 60 bit word lengths. The basic format of these tapes is cyclic on an orbital basis with the start of an orbit defined as a maximum in McIlwain's L parameter. For each orbit the following sequence of records is written:

	Type	Number/Orbit	Word Length
1	PHA	one or more	515
2	LABEL	one	39
3	Telescope Rates	one	variable
4	Telescope Errors	one	variable
5	Telescope Times	one	variable
6	Singles Rates	zero or one	variable
7	Singles Errors	zero or one	variable
8	Singles Times	zero or one	variable
9	Attitude	one	$1420 \leq$ Length ≤ 1457

(1) PHA Record Format: Integer Data

These records contain the telescope pulse height analysis events and their associated times.

Word Number	Description
1	Record Word Length
2	BCD charactors - Hollerith Label is: 8 H PHA..... [illegible] blank