TABLE OF CONTENTS

1. INTRODUCTION
2. CHANGE LOG
3. LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM
    a. URL to S/C “Remarks” field
    b. URL to S/C “Materials” field
    c. URL to Experiment “Remarks” field
    d. URL to Experiment “Materials” field
    e. URL to Data Set “Remarks” field
    f. URL to Data Set “Materials” field
    g. Items e and f for additional data sets from this experiment, if needed
    h. Items c thru g for additional experiments from this spacecraft, if needed
    i. Items a thru h for additional spacecraft, if needed
4. CATALOG MATERIALS.

1. Introduction:

The documentation for this data set was originally on paper kept in NSSDC's Data Set Catalogs (DSCs). The offline tape datasets have now been migrated from the original magnetic tape to magnetic disk (starting in mid-2004). Accordingly, statements in the format descriptions that address such tape relevant factors as blocking and but density are no longer applicable. The paper documentation in the Data Set Catalogs have been scanned and made into digital images of the pages, the collected into a single PDF file for each Data Set Catalog.

The inventory information in these DSCs is current as of July 1, 2004. But this inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system, and the user should go to that interface (JIN) if further information existing in the DSCs is now not needed for locating data files, but we did not go to the trouble of removing that inventory information.

2. CHANGE LOG

Version	Date	Person	Page	Description of Change
01				

3. LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:
[NOTE: ANY OF THE INFORMATION FIELDS MIGHT BE BLANK.]
[THE "MATERIALS FOR DISTRIBUTION" FIELD IS HERE CALLED JUST "MATERIALS"]

"Remarks" for spacecraft SCNAME1":
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1977-102A--remark--

"Materials" for spacecraft SCNAME1":
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1977-102A--mat--

"Remarks" for SCNAME1 experiment EXNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1977-102A&ex=09--remark--

"Materials" for SCNAME experiment EXNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1977-102&ex=09--mat--

"Remarks" for EXNAME1 data set DSNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00677--remark--

"Materials" for EXNAME1 data set DSNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00677--mat--

"Remarks" for EXNAME1 data set DSNAME2:
http://nssdc.gsfc.nasa,gov/database/MasterCatalog?ds=SPHE-00677--remark--

"Materials" for EXNAME1 data set DSNAME2:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00677--mat--

"Remarks" for EXNAME1 data set DSNAME3:

"Materials" for EXNAME1 data set DSNAME3:

"Remarks" for SCNAME1 experiment EXNAME2:

"Materials" for SCNAME1 experiment EXNAME2:

"Remarks" for EXNAME2 data set DSNAME1:
"Materials" for EXNAME2 data set DSNAME1:

"Remarks" for EXNAME2 data set DSNAME2:
"Materials" for EXNAME2 data set DSNAME2:

“Remarks” for spacecraft SCNAME2”:
http://nssdc.gsfc.nasa.gov/database/MaterCatalog?sc=1978-079A--??--

“Materials” for spacecraft SCNAME2:
http://nssdc.gsfc.nasa.gov/database/MaterCatalog?sc=1978-079A--??--

“Remarks” for SCNAME2 experiment EXNAME1:
http://nssdc.gsfc.nasa.gov/database/MaterCatalog?sc=1978-079A&ex=03--??--

“Materials” for SCNAME2 experiment EXNAME1”
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1978-079A&ex=03--??--

“Remarks” for EXNAME1 data set DSNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE--00011--remark--

“Materials” for EXNAME1 data set DSNAME1:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE--00011--remark--

“Remarks” for EXNAME1 data set DSNAME2:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00014--remark--

“Materials” for EXNAME1 data set DSNAME2:
http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00014--remark--

“Remarks” for EXNAME1 data set DSNAME3:

“Materials” for EXNAME1 data set DSNAME3:

“Remarks” for SCNAME2 experiment EXNAME2:

“Materials” for SCNAME2 experiment EXNAME2:

“Remarks” for EXNAME2 data set DSNAME1:

“Materials” for EXNAME2 data set DSNAME1:

“Remarks” for EXNAME2 data set DSNAME2:

“Materials” for EXNAME2 data set DSNAME2:

“Remarks” for data set DSNAME3:

“Materials” for EXNAME data set DSNAME3:

“Remarks” for SCNAME2 experiment EXNAME3:

“Materials” for SCNAME2 experiment EXNAME3:

“Remarks” for EXNAME3 data set DSNAME1:

“Materials” for EXNAME3 data set DSNAME1:

“Remarks” for EXNAME3 data set DSNAME2:

“Materials” for EXNAME3 data set DSNAME2:

=-=-= -
=-=-= -

ALTERNATE OPTION:

For SCNAME2:

“Remarks” for EXNAME1 data set DSNAME2:

http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00014--remark--

“Materials” for EXNAME1 data set DSNAME2:

http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=SPHE-00014--mat--

can be shown as

“Remarks” for EXNAME1 data set DSNAME2:

http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=78-079A-03C--remark--

“Materials” for EXNAME1 data set DSNAME2:

http://nssdc.gsfc.nasa.gov/database/MasterCatalog?ds=78-079A-03C--mat--

=-=-= -
=-=-= -

4. CATALOG MATERIALS:

DATA SET CATALOG # 5

Explorer 11 - Gamma Ray Telescope

61-013A-01A 2 Tapes (D-0002, D0003)

EXPLORER 11

ASPECT & OBSERCE TIME GAMMA EVENTS

61-013A-01A

THIS DATA SET HAS BEEN RESTORED. ORIGINALLY THERE WERE TWO 7-TRACK, 556 BPI TAPES WRITTEN IN BINARY. THERE IS ONE RESTORED TAPE, WHICH WAS PACKED DURING THE RESTORATION PROCESS. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON AN IBM 7094 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR004217	DS004217	D000002	1	04/27/61 - 11/17/61
		D000003	2	04/27/61 - 11/17/61

EXPLORER 11 (1961 NU 1)
GAMMA RAY TELESCOPE EXPERIMENT

TABLE OF CONTENTS

Data Users' Note	1
Program for listing tape (80 physical records)	2
Output from Program	3
Partial Dump of D-00002	4

DATA USERS' NOTE

NSSDC 67-25

EXPLORER 11 (1961 NU 1)

GAMMA-RAY TELESCOPE EXPERIMENT

MAY 1967

NATIONAL SPACE SCIENCE DATA CENTER

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

DATA USERS' NOTE
NSSDC 67-25

EXPLORER 11 (1961 NU 1)
GAMMA-RAY TELESCOPE EXPERIMENT

EXPERIMENTERS
W. L. Kraushaar
G. W. Clark

MAY 1967

FOREWORD

This Data Users' Note is specifically designed to help potential data users decide if they can make use of the data obtained in the Explorer 11 (1961 Nu 1) gamma-ray telescope experiment. Once a data user decides that he requires the data, it will serve as the unifying element - the key - in the actual use of the data available at the National Space Science Data Center (NSSDC). To achieve these goals, the Note briefly describes the experiment, including the instrumentation and measurements, the telemetry, and the operational experience. All available details are then provided on the actual reduction techniques and format of recorded data. For those desiring more details, names and addresses of the experimenters are provided to facilitate direct contact. As a further aid, detailed references (and bibliography) are also included. When available, NASA accession numbers* are given. The primary purpose of these references is to identify the sources containing complete information concerning the subject under discussion. Most of these references are physically available at NSSDC - those that are not are readily obtainable.

Inquiries concerning the availability of data should be directed to:

National Space Science Data Center
Goddard Space Flight Center
Greenbelt, Maryland 20771
Area Code 301 982-6695

*For example, N64-2243 is an accession number for an article reported in the *Scientific and Technical Aerospace Reports* (STAR), and A63-5921 refers to an entry in the *International Aerospace Abstracts* (IAA).

CONTENTS

	Page
BACKGROUND	1
EXPERIMENTERS	1
EXPERIMENT	
Instrumentation and Measurements	2
Telemetry	4
Operational Experience	7
DATA	
Reduction Techniques	8
Timespan of Data	11
Format of Available Data	11
REFERENCES	13
BIBLIOGRAPHY	15

LIST OF FIGURES

Figure		
1	Explorer 11 Experiment	1
2	Gamma-Ray Telescope	3
3	Detection Efficiency in Forward Direction	5
4	Angular Response as Measured at Two Gamma-Ray Energies	6
5	Data Words	10

EXPLORER 11 (1961 NU 1)
GAMMA-RAY TELESCOPE EXPERIMENT

BACKGROUND

The Explorer 11 (1961 Nu 1) gamma-ray telescope experiment was designed by researchers at the Massachusetts Institute of Technology primarily to detect cosmic gamma rays > 50 Mev.

This experiment (see Figure 1) was carried aboard the Explorer 11 (1961 Nu 1) satellite, previously known as S-15, which was launched on April 27, 1961, from Cape Canaveral (Cape Kennedy), Florida. Explorer 11 achieved an orbit with an apogee of 1786 km, a perigee of 486 km, a period of 108.1 min, and an inclination of 28.9 deg. In addition to detecting gamma rays, Explorer 11 was designed to map their direction with emphasis on the plane of the galaxy, the galactic center, the sun, and other known radio noise sources; to relate the measurements to the cosmic-ray flux density and the density of interstellar matter; and to measure the high-energy gamma-ray albedo of the earth's atmosphere. The satellite was spin-stabilized at launch and maintained a large fraction of its initial angular momentum throughout its useful lifetime.[1, 2]

The gamma-ray detector was mounted within an aluminum housing; located outside were solar cells that provided battery-charging power. The fourth-stage solid-fuel rocket motor remained attached to the instrument in orbit.[3]

FIGURE 1
EXPLORER 11 EXPERIMENT

No.	Experiment	Investigator(s)	Affiliation
01	Gamma-Ray Telescope	W. Kraushaar G. Clark	MIT MIT

NOTE: Charged particle data were obtained by G. Garmire (MIT) by using the counting rates normally telemetered.

EXPERIMENTERS

W. L. Kraushaar* - Massachusetts Institute of Technology
G. W. Clark** - Massachusetts Institute of Technology

*Present location: University of Wisconsin, Madison, Wisconsin.
**Address: Laboratory for Nuclear Science, Massachusetts Institute of Technology, Cambridge, Massachusetts.

EXPERIMENT

Instrumentation and Measurements

Explorer 11 was constructed so that its stable motion was an end-over-end tumble about the transverse principal axis which had the largest moment of inertia. The gamma-ray telescope assembly was mounted so that its axis of sensitivity, which was parallel to the long axis of the satellite, would rotate in the plane of tumble. The orientation of this axis in space was determined to approximately 5 deg by means of optical aspect detectors and the use of the known radiation pattern of the vehicle antenna.[3, 8]

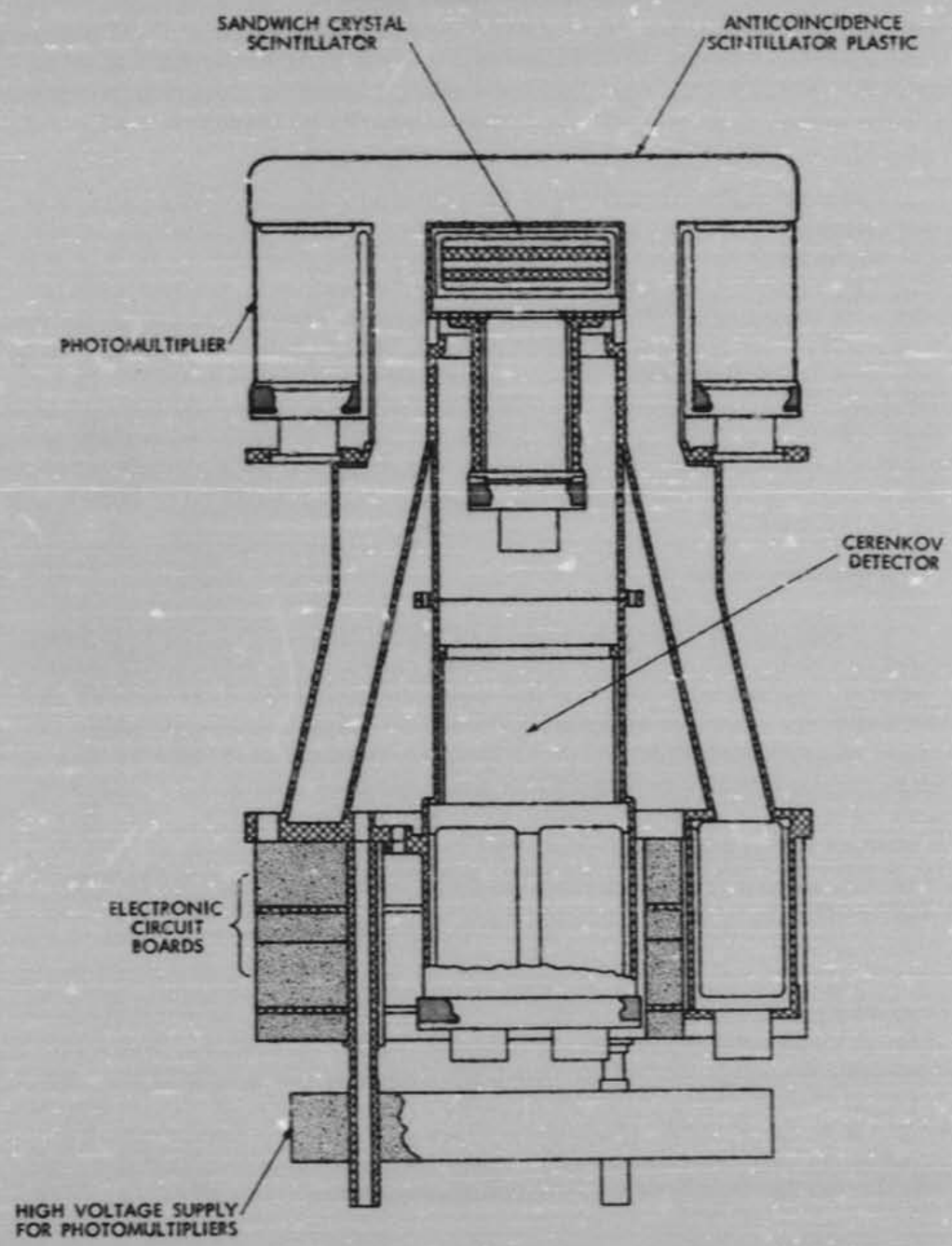
The gamma-ray telescope, which is illustrated schematically in Figure 2, consisted of an anticoincidence plastic scintillation counter roughly 1500 cm^2 in area, a sandwich crystal scintillator 7.6 cm in diameter and 3 cm thick, and a cylindrical lucite Cerenkov detector approximately 7.6 cm in diameter and 7.6 cm thick. The sandwich of scintillating crystals was viewed by one photomultiplier, and the Cerenkov detector was viewed by two photomultipliers. These instruments, operating with the anticoincidence shield, permitted the identification of events caused by gamma rays and neutrons within a specified conical field of view (15-deg half angle).[3]

The anticoincidence shield scintillated when it was traversed by charged particles, but did not react to traversals by gamma rays or neutrons. The sandwich detectors served to convert the incident gamma rays into electron pairs and to detect the occurrence of this event. The Cerenkov detector reacted only to high-speed charged particles arriving from a forward direction.[2]

The "signature" of a high-energy gamma ray was thus $SC\bar{A}$; i.e., coincident pulses from the scintillator (S) and the Cerenkov detector (C) with no pulse from the anticoincidence shield (A). High-energy neutrons could forge this signature by causing nuclear interactions in the scintillator, which would produce fast particles that traversed the Cerenkov detector. A means, therefore, had to be provided to discriminate against them.

This was accomplished by making the scintillator a layer-like sandwich of alternating CsI (Tl) and NaI (Tl) phosphors. A neutron, when it interacts with either of these phosphors, will usually produce (in addition to minimum ionizing particles) several short-range, heavily ionizing particles. These would lose their energy in the sandwich layer where the interaction took place, which would, in turn, produce a correspondingly larger light pulse from one of the crystals. The two crystals had different fluorescent decay constants for their emission of light, and the output signal from the photomultiplier was accordingly

FIGURE 2
GAMMA-RAY TELESCOPE



separated electronically into fast and total components. Both of these components were telemetered. Events caused by gamma rays would produce pulses corresponding to approximately equal energy losses in the "fast" and "slow" phosphors, whereas neutron events would generally cause one pulse or the other to be especially large. Ground laboratory tests with artificial beams of neutrons and gamma rays provided criteria for distinguishing these characteristics.[2]

The solid-angle—area factor of the telescope was about 4.3 cm^2 ster, and was determined from the geometry and sea-level counting rate of mu mesons. The efficiency of the instrument was measured in an effectively monoenergetic (tagged) gamma-ray beam at the Synchrotron Laboratory of the California Institute of Technology. Efficiency was measured as a function of energy for the forward direction (see Figure 3) and as a function of angle at 105 and 405 Mev (see Figure 4). The results of these measurements have been folded with a gamma-ray spectrum typical of π^0-decay to yield an effective solid-angle—area factor of 1.0 ±0.3 cm^2 ster for the detector in the presence of an isotropic gamma-ray flux produced by cosmic rays. The large uncertainty is the result of the poor statistical accuracy of the measured efficiency of the instrument at large angles.[3]

Telemetry

A single scaling circuit in Explorer 11 permitted one detector to be monitored at a time. The scaler operated in two modes, with scale factors of 64 and 4096, respectively. The sandwich crystal scintillator was designated as channel 1, the Cerenkov detector as channel 2, and the coincidence pulses between the crystal scintillator and the Cerenkov detector as channel 3. The large plastic scintillator was divided into two regions, H and A, that were monitored separately and designated as channel 4 and channel 5, respectively. A command from a tracking station was required to change from one channel to another. The commands were given in an ordered sequence on a predetermined schedule.[1]

Gates that opened for 1 μsec when all coincidence and anticoincidence conditions had been met permitted signals to pass into the data conversion and transmission circuits. The subcarrier modulator was a simple frequency modulator that originated one of four frequencies depending upon whether the "fast" and "total" parts of the circuit were passing a pulse. If a pulse was received from the circuits of both these components, the subcarrier modulator originated a pulse at a frequency 6% above the center frequency (147 cps). A signal from the "total pulse only" portion resulted in a pulse 2% above center

FIGURE 3
DETECTION EFFICIENCY IN FORWARD DIRECTION

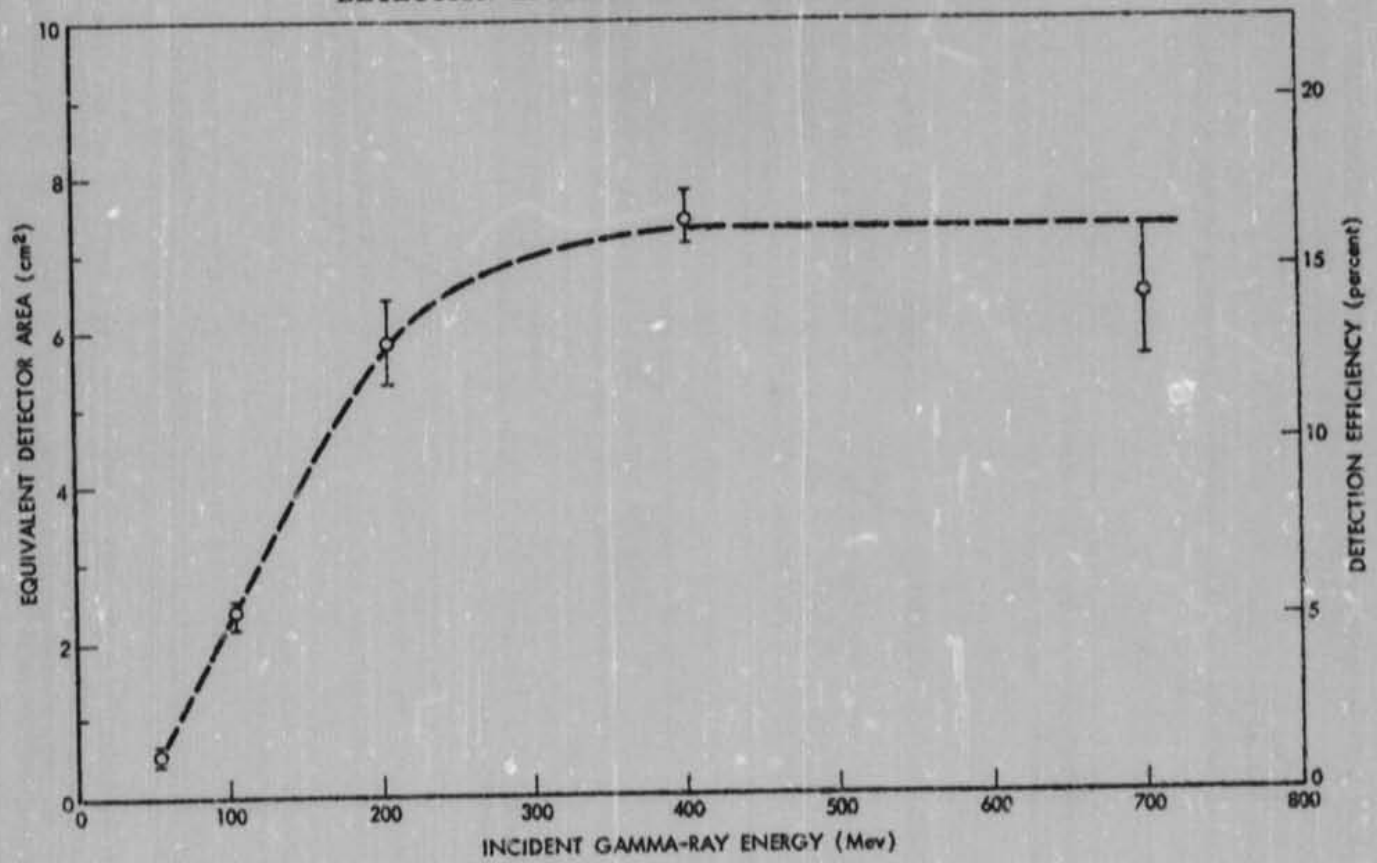
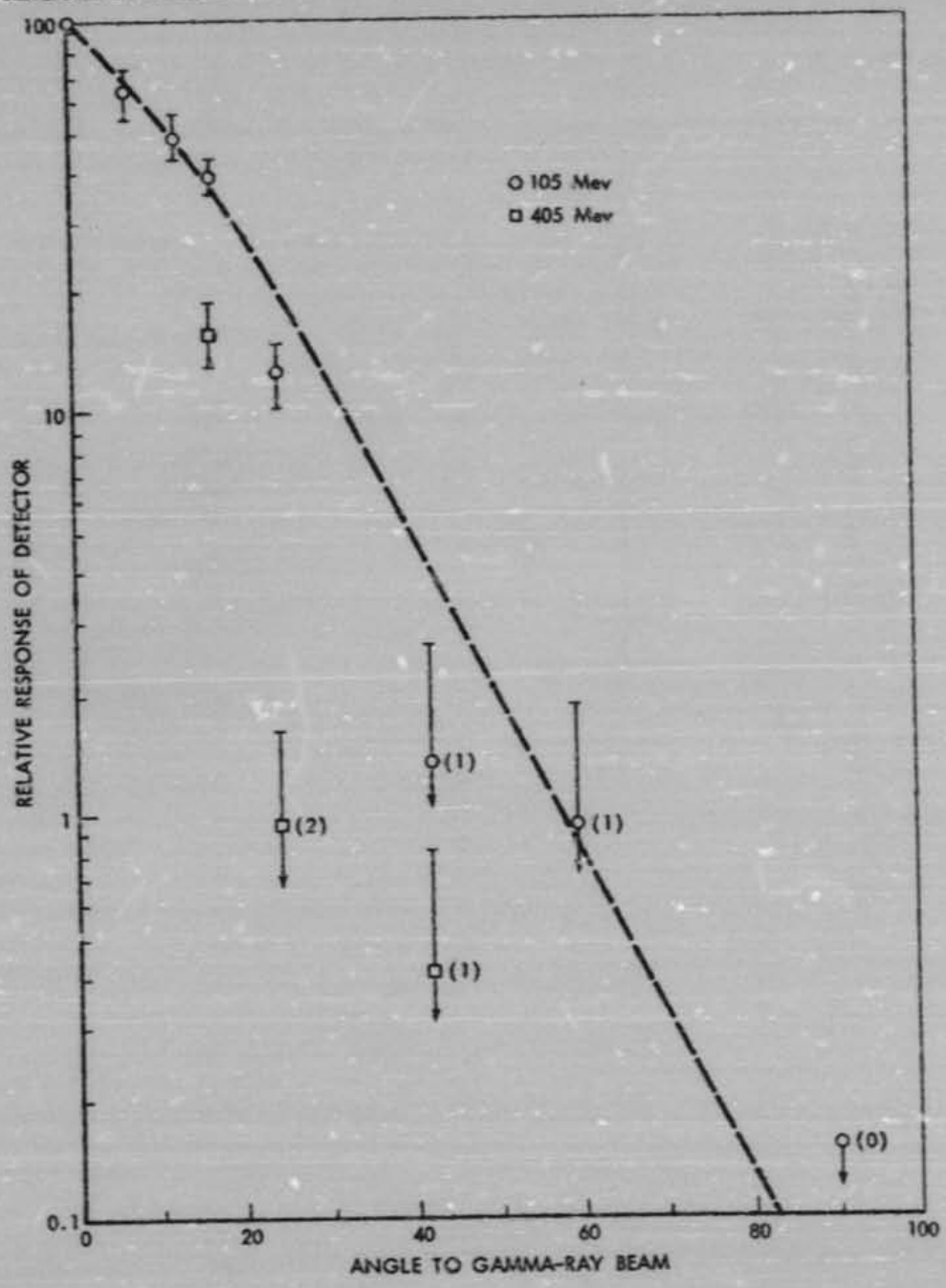


FIGURE 4
ANGULAR RESPONSE AS MEASURED AT TWO GAMMA-RAY ENERGIES



frequency. "Fast only" corresponded to -2% frequency modulation (2% below center frequency), and "no signal" was noted as a -6% pulse.[2]

The FM outputs from the data, aspect, housekeeping, and scaler input selector subsystems and the output of the reference oscillator were mixed in two mixing amplifiers.

The output of one amplifier was fed to a low-power, phase-modulated transmitter that operated continuously at 108.06 Mc/s with a power output of 20-25 mw. The output of this transmitter was monitored by the ground stations for tracking purposes.

The output of the second mixing amplifier was fed to a tape recorder that recorded at 1/4 ips and played back at approximately 12 ips. The tape recorder required 0.5-watt power while recording and approximately 0.7-watt for playback. On command, the tape recorder fed a higher power (125-mw), phase-modulated transmitter. The signal from this transmitter was applied to a circular loop antenna configuration.[2]

The Minitrack ground stations were used for tracking and control. Four of these stations (Fort Myers, Florida; Quito, Ecuador; Lima, Peru; and Antofagasta, Chile), in addition to tracking the satellite and receiving data transmitted over the low-power channel, were designated as command stations. The other stations used were Santiago, Chile; South Point, Hawaii; Johannesburg, South Africa; and Woomera, Australia. The four command stations are so located that one of them was able to interrogate the high-power channel each orbit.[2, 5]

Operational Experience

One portion of the telemetry system failed shortly after launch, leaving only one of the two pulse-height data channels operating. The amount of data available, however, was sufficient to eliminate neutron interactions as a likely source of background.[3]

Because the onboard tape recorder failed to work properly, the experimental data obtained were recorded directly by the Minitrack stations, the Green Mountain station of the George C. Marshall Space Flight Center, and the South Point station of the Pacific Missile Range.[1]

For a period of about 15 days following launch, the opening angle of the cone of motion remained quite small, as the satellite maintained its initial 5-rps spin rate about its long axis. During this period, small magnetic torques caused precession and decreased somewhat the angular momentum. The cone of motion opened rapidly on May 16, 1961. By May 19, the satellite had for all practical purposes reached its intended stable motion—an end-over-end tumble about the transverse principal axis having the largest moment of inertia. In 7 months, the initial tumble period of 12 sec increased to approximately 15 sec. The angular momentum vector during this period precessed about 10 deg/day. This precession permitted the detector to scan not just a plane but the entire celestial sphere.[3, 6]

At apogee (1786 km) Explorer 11 was quite deep in the inner radiation zone. The high particle flux in this region jammed the electronics and restricted the usefulness of the data to just a fraction of each orbit.

The satellite operated continuously until about August 5, 1961, when the power supply system deteriorated, and the spacecraft no longer functioned reliably while it was in the earth's shadow. After somewhat sporadic operation until the end of October and during November, the instrument was turned off on December 6, 1961.[3, 7]

DATA

Reduction Techniques

Of the total of about 7 months that the instrument was turned on and working in orbit, only 141 hr, or 3%, have been culled as useful observing time. During these 141 hr, 1012 events were accepted as gamma rays by the circuit logic. Several pertinent quantities were computed for each detected event. In addition, for purposes of such further analysis as evaluating apparent gamma-ray intensities from different parts of the sky, random events were generated at such a rate that their total number is about 25 times the total number of real events.[3, 7]

The tapes obtained from the tracking stations were delivered to GSFC for processing.[3] The five-channel composite satellite transmission was separated back into five channels through the use of filters. Frequency variations of the outputs of these filters were converted to voltage amplitudes by discriminators.

The outputs of the discriminators, along with the outputs of some of the other channels, were displayed on a multichannel oscilloscope.[2] A moving 35-mm film recorded the oscilloscope indications, displaying six different channels of information:

1. Intensity of received radio signal
2. Temperatures at several points on the instrument package and voltages of the different power supplies
3. The scaler
4. Aspect sensors
5. Time that data were recorded (UT)
6. Gamma-ray pulses or charged-particle pulses through the telescope when the anticoincidence requirement was removed.[5]

The data from each orbit were processed through this system in a little over 2 min; the rate of the recording camera film was 200 in./min. Approximately 36 ft of film were thus expended for the data presentation of each 100-min orbit. Final analysis, which included the plotting of such phenomena as gamma-ray events vs celestial position, was conducted by the experimenters.[2]

Satellite position is listed in an ephemeris giving the geographical longitude, latitude, and altitude of Explorer 11 for each minute of time. Ephemerides have been supplied by both GSFC and the Marshall Space Flight Center, based upon separate observations and, hence, separate orbital elements. These ephemerides provide a means of determining the accuracy of the satellite's position as a function of time. The variance between these two ephemerides covers a range of approximately 10 min of arc in latitude and longitude and about 6 km in altitude.[5]

For each event time, the following quantities were calculated by the Moore-Agogino (MA) program: RA, DEC, *GLONG, **GLAT, ***ERA, †EDEC,

*Galactic longitude.
**Galactic latitude.
***Earth's right ascension as seen from the satellite (E).
†Earth's declination as seen from the satellite (E).

HOR, ODE, RASUN, DECS, ODS, LONG, LAT, and ALP (see Figure 5 for definitions).

FIGURE 5
DATA WORDS

Data Word*	Definition
Z	Local hour angle of Greenwich (= 15 T, T is UT in hours; Z = 99999 is used as a control word for the last entry)
RA	Right ascension of satellite axis (0)
DEC	Declination of satellite axis (0)
RASUN	Right ascension of sun (S)
DECS	Declination of sun (S)
LONG, LAT	Coordinate directions of 0 in a solar-based coordinate system, the polar axis of which is the line from the satellite to the north ecliptic pole. LAT = +90 deg corresponds to this line; LONG is the longitude about this axis; the vector toward the sun is (0, 0).
HOR	Angle between earth's center, satellite, and horizon (= 180 deg when satellite is pointing outward radially)
ODE	Angle between 0 and E
ODS	Angle between 0 and S
ALP	ODE-HOR

*All data words are floating point.

ERA and EDEC can be reconstructed from the tapes as follows: The day (in 1961) is calculated from the position of the sun along the ecliptic, and the time during that day is determined by Z. This time is used with the orbital elements of the satellite (updated every 2 days by GSFC) to calculate ERA and EDEC.

In addition, other quantities were calculated for checking program consistency, or specialized hypotheses, for convenience or because they were vestiges of earlier modifications of a complicated FAP program.

The "on time intervals" were justified by the McCarthy (MC) program, and event times were generated according to a Poisson distribution, taking into account the fraction of the interval lost because of noise bursts. The justified "on time intervals" and random events were run through the MA program.

The output of the MA program, for final analysis, was a binary tape, which was examined by the Clark-Higbie (CH) program (essentially a sorting routine). For example, all events at a given geomagnetic altitude range, above a given angle to the horizon, and in a certain galactic sector could be counted and compared with the number of random events satisfying the same criteria. Since the generation rate of the latter is known, an intensity can be derived immediately.

Timespan of Data

Data on this experiment are available at NSSDC for the period of April 27 to November 17, 1961.

Format of Available Data

The data available at NSSDC consist of one digital tape of real events and one digital tape of random events. These tapes were prepared by an IBM 7094 in binary FORTRAN format at 556-bpi density.

The physical records of both tapes contain 1 count word and 23 logical records of 11 floating point data words each, making a total of 254 binary words per physical record. The 11 data words are defined in Figure 5.

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Kraushaar, W. L., G. W. Clark, M. Agogino, G. Garmire, H. Helmken, and P. Higbie, "Cosmic Gamma Ray Results from Explorer XI," Massachusetts Institute of Technology. N64-18432, NASA CR-53590.

Kraushaar, W. L., G. W. Clark, G. Garmire, H. Helmken, P. Higbie, and M. Agogino, "Explorer XI Experiment on Cosmic Gamma Rays," Astrophys. J., 141, No. 3, 845-863, Apr. 1, 1965.

Naumann, R. J., S. A. Fields, and R. L. Holland, "Analysis of Explorer 11 Orientation," J. Geophys. Res., 67, No. 9, 3619-3623, Aug. 1962.

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MAIN                                                    02/14
EXTERNAL FORMULA NUMBER   -   SOURCE STATEMENT   -   INTERNAL FO

      REAL  LONG, LAT
      DIMENSION  Z (23), RA (23), DEC (23), RASUN (23), DECS (23),
     1LONG (23),  LAT (23),  HOR (23), ODE (23), ODS (23), ALP (23)
   10 FORMAT((1H , 11( F7.2, 4X )))
   20 FORMAT(1H1,4X,1HZ,10X,2HRA,9X,3HDEC,8X,4HLONG,7X,3HLAT,7X,5HRASUN,
     16X,4HDECS,8X,3HHOR,8X,3HODE,6X,3HODS,8X,3HALP)
      DO 80  K = 1,30
   90 WRITE ( 3,20)
      READ (5) (Z(I),RA(I),DEC(I),LONG(I),LAT(I),RASUN(I),DECS(I),HOR(I)
     1,ODE(I),ODS(I),ALP(I), I=1,23)
      WRITE(3,10) (Z(I),RA(I),DEC(I),LONG(I),LAT(I),RASUN(I),DECS(I),
     1HOR(I),ODE(I),ODS(I),ALP(I), I=1,23)
   80 CONTINUE
  100 STOP
      END
```

PROGRAM USED TO LIST 30 PHYSICAL REC

INPUT ON UNIT A-5 OUTPUT ON UNIT A-

2

INTERNAL FORMULA NUMBER(S)

3),
(23)

,SHRASUN,

,1 ,2
,3 ,4

I),HCR(I)

,5 ,6 ,7 ,8 ,9

CS(I),

,10 ,11 ,12 ,13 ,14
,15 ,16
,17
,18

ICAL RECORDS OF TAPE

UNIT A-3

Z	RA	DEC	LONG	LAT	RASUN	DECS
340.96	169.27	-27.29	128.14	-29.11	51.52	18.75
214.56	62.05	28.05	8.92	6.92	54.14	19.37
252.87	172.08	-1.53	116.68	-4.56	54.35	19.42
351.02	15.55	3.13	-41.28	-3.25	54.51	19.45
7.95	155.09	12.35	95.17	2.76	54.56	19.46
37.69	170.82	-4.56	116.44	-7.83	54.68	19.48
96.29	23.26	11.64	-31.28	1.76	54.80	19.52
96.40	7.58	-6.55	-52.76	-9.03	54.80	19.52
311.98	62.28	36.82	9.59	15.48	55.40	19.65
166.61	-102.04	-56.98	-156.11	-33.81	55.99	19.78
17.86	103.59	37.17	42.33	14.20	56.58	19.90
46.05	156.83	-5.51	101.79	-14.13	56.66	19.92
48.55	-50.58	-38.24	-117.08	-19.01	56.66	19.92
213.62	-66.64	-46.93	-131.97	-24.83	57.12	20.01
265.93	-146.72	-49.41	169.74	-33.64	57.27	20.05
322.54	-99.56	-62.93	-156.24	-29.65	57.42	20.08
339.45	175.48	-29.88	129.27	-28.95	57.47	20.09
335.83	30.67	38.37	-17.33	24.19	57.47	20.09
340.95	168.06	-22.96	119.11	-25.71	57.47	20.09
350.84	-31.74	-14.14	-94.12	-1.19	57.50	20.09
350.74	24.11	35.72	-23.77	23.77	57.50	20.09
10.52	160.26	-14.73	107.97	-21.31	57.56	20.10
304.06	131.21	20.00	67.74	1.82	58.37	20.27

SUN	DECS	HOR	ODE	ODS	ALP
52	18.75	60.50	36.59	122.63	-23.91
14	19.37	64.78	104.90	11.29	40.13
35	19.42	68.16	99.21	116.59	31.05
51	19.45	61.94	65.99	41.38	-15.95
56	19.46	59.51	19.55	95.16	-39.96
68	19.48	65.05	54.74	116.17	-10.31
80	19.52	67.05	86.78	31.33	19.73
80	19.52	66.91	74.37	53.29	7.46
40	19.65	67.53	112.34	18.19	44.81
99	19.78	68.20	78.88	139.40	10.68
58	19.90	60.73	72.40	44.23	11.67
66	19.92	66.82	89.40	101.41	22.58
66	19.92	67.45	83.28	115.45	15.83
12	20.01	67.10	52.36	127.35	-14.74
27	20.05	68.22	85.29	144.96	17.07
42	20.08	65.76	65.53	142.66	-0.22
47	20.09	56.04	48.90	123.61	-7.14
47	20.09	56.65	108.08	29.49	51.43
47	20.09	58.64	47.21	115.99	-11.43
50	20.09	64.29	8.42	94.12	-55.86
50	20.09	63.47	71.06	33.15	7.58
56	20.10	63.84	70.98	106.69	7.14
37	20.27	56.81	33.61	67.75	-23.20

Z	RA	DEC	LONG	LAT	PASUN	DECS
304.26	167.89	-21.07	117.16	-24.07	58.37	20.27
358.63	170.52	-23.62	120.68	-25.31	58.52	20.30
359.20	140.83	9.61	79.48	-5.46	58.53	20.30
0.61	55.74	49.55	4.75	29.34	58.53	20.30
56.75	-116.41	-48.07	-170.22	-26.33	58.69	20.33
85.39	-28.36	14.13	-81.77	24.05	58.77	20.35
302.12	-24.73	17.86	-77.18	26.11	59.37	20.47
302.85	-70.30	-29.38	-134.28	-7.05	59.37	20.47
323.75	136.79	2.54	76.92	-13.42	59.43	20.48
0.00	-20.58	21.87	-71.48	28.14	59.53	20.50
1.00	-48.92	-9.01	-110.60	8.82	59.53	20.50
75.53	-44.20	7.43	-101.23	23.24	59.74	20.54
322.43	-63.56	-13.58	-126.61	7.57	60.43	20.67
323.57	-18.57	30.78	-65.80	35.34	60.43	20.67
10.55	-123.50	-44.83	-178.10	-24.25	60.57	20.69
66.44	83.05	33.73	21.34	10.37	60.72	20.72
67.29	-50.11	10.80	-107.17	28.19	60.72	20.72
1.70	-63.39	5.10	-123.84	25.89	61.55	20.87
56.97	133.61	-22.24	80.29	-37.91	61.70	20.90
58.00	-55.60	13.41	-113.23	32.19	61.71	20.90
165.59	-153.77	-47.92	159.35	-34.24	62.01	20.96
166.01	171.52	-43.74	129.98	-42.58	62.01	20.96
332.12	-21.87	40.62	-64.42	45.22	62.48	21.04

T	PASUA	DECS	HOR	CDE	ODS	ALP
7	58.37	20.27	57.15	43.25	114.62	-13.91
1	58.52	20.30	58.13	48.77	117.44	-9.36
6	58.53	20.30	58.82	43.20	79.52	-15.63
4	58.53	20.30	61.67	96.79	29.73	35.12
3	58.69	20.33	65.86	73.52	151.99	7.66
5	58.77	20.35	67.94	62.13	82.51	-5.81
1	59.37	20.47	68.22	56.06	78.53	-12.16
5	59.37	20.47	68.11	34.25	133.85	-33.86
2	59.43	20.46	59.63	59.16	77.27	-0.47
4	59.53	20.50	63.56	40.34	73.76	-23.22
2	59.53	20.50	61.50	36.69	110.35	-24.80
4	59.74	20.54	66.86	60.59	100.33	-6.27
7	60.43	20.67	66.67	14.05	126.25	-52.62
4	60.43	20.67	64.69	50.25	70.49	-14.44
5	60.57	20.69	63.00	72.65	155.64	9.65
7	60.72	20.72	66.50	127.28	23.64	60.78
9	60.72	20.72	67.60	42.73	105.10	-24.87
9	61.55	20.87	63.01	68.80	120.09	5.79
1	61.70	20.90	65.48	118.29	82.32	52.81
9	61.71	20.90	67.10	41.04	109.52	-26.06
4	62.01	20.96	66.45	76.56	140.64	10.11
8	62.01	20.96	67.07	98.59	118.20	31.52
2	62.48	21.04	66.06	61.96	72.33	-4.11

Z	RA	DEC	LONG	LAT	RASUN	DECS
351.55	107.81	-43.65	126.32	-43.94	62.53	21.05
352.27	-99.35	-23.85	-163.06	-0.63	62.53	21.05
47.37	-147.22	-45.60	162.42	-30.28	62.69	21.08
47.78	-66.34	-11.50	-150.99	11.55	62.69	21.08
321.33	-171.19	-44.94	143.20	-37.19	63.46	21.21
37.37	-79.80	5.18	-144.04	28.27	63.67	21.24
37.64	-107.75	-21.14	-172.11	1.35	63.67	21.24
311.34	-155.92	-43.38	153.13	-30.77	64.44	21.37
341.02	-86.90	5.08	-152.88	28.54	64.53	21.38
342.17	-48.82	34.39	-98.76	49.96	64.53	21.38
0.15	-115.18	-21.49	-180.00	-0.01	64.58	21.39
1.69	-109.99	-17.16	-175.60	5.02	64.58	21.39
56.64	-26.13	42.38	-69.14	48.41	64.74	21.42
57.44	-34.12	31.55	-106.95	49.04	64.74	21.42
302.01	-15.36	44.21	-58.69	45.66	65.43	21.53
302.55	-62.70	20.08	-120.74	46.17	65.43	21.53
302.81	-4.41	44.97	-49.04	42.06	65.43	21.53
303.98	-48.52	34.53	-99.17	49.99	65.44	21.53
332.90	-53.02	32.17	-106.03	49.28	65.52	21.54
351.06	52.90	22.21	-11.37	2.99	65.57	21.55
128.47	-66.30	30.87	-123.98	51.62	65.96	21.61
291.80	-51.02	38.23	-100.55	54.19	66.42	21.68
294.35	-84.77	24.59	-151.02	47.96	66.43	21.68

DECS	HOR	CDE	ODS	ALP
21.05	60.32	81.38	115.21	21.06
21.05	61.82	61.50	163.04	-0.32
21.08	64.07	69.86	145.37	5.79
21.08	64.88	40.86	148.98	-24.02
21.21	68.21	94.43	129.59	26.22
21.24	61.71	55.69	135.50	-6.02
21.24	62.28	48.34	172.01	-13.94
21.37	68.07	77.27	140.00	9.20
21.38	66.71	54.93	141.47	-11.78
21.38	64.68	67.53	95.66	2.85
21.39	58.98	59.00	180.00	0.02
21.39	62.10	41.28	173.37	-20.82
21.42	84.05	80.47	76.36	16.43
21.42	65.58	52.35	101.06	-13.23
21.53	67.70	78.11	68.74	10.40
21.53	68.12	37.56	110.77	-30.55
21.53	68.23	82.53	60.91	14.30
21.53	68.01	53.81	95.92	-14.20
21.54	65.46	66.29	100.41	0.83
21.55	58.53	127.47	11.76	68.94
21.61	63.34	50.85	110.35	-12.49
21.68	65.80	57.93	96.19	-7.87
21.68	68.30	46.91	125.93	-21.39

Z	HA	DEC	LONG	LAT	RASUN	DECS
22.05	37.93	-41.88	-155.42	-52.62	170.90	3.94
25.16	69.93	-8.49	-116.94	-29.83	170.90	3.93
50.46	25.26	-45.37	-174.83	-53.78	170.96	3.91
51.65	-77.20	-39.33	110.14	-16.29	170.97	3.91
53.09	-29.80	-57.44	138.60	-41.77	170.97	3.90
80.31	52.93	-27.66	-129.35	-45.02	171.04	3.82
81.99	32.28	-45.64	-164.70	-53.57	171.04	3.87
82.10	82.80	16.78	-87.10	-8.55	171.04	3.87
43.16	-137.05	23.00	40.60	37.48	171.85	3.53
43.68	69.91	24.33	-98.35	2.10	171.85	3.53
83.80	-129.68	10.55	53.47	28.01	171.95	3.49
99.00	88.74	45.49	-82.20	21.99	171.99	3.47
99.76	55.65	-0.29	-117.81	-19.54	171.99	3.47
171.90	35.05	-1.79	-119.22	-20.81	172.17	3.39
162.99	7[illegible]	37.80	-93.58	14.83	173.05	3.02
152.26	-169.20	42.64	3.14	46.10	173.93	2.64
160.34	110.26	64.06	-71.77	41.38	174.00	2.61
59.02	29.04	-12.45	-151.38	-22.97	174.70	2.31
100.02	41.53	20.85	-128.79	4.55	174.70	2.31
141.40	168.44	54.25	-40.25	52.31	174.88	2.24
200.72	-11.93	-64.39	139.32	-52.31	174.95	2.21
88.64	63.66	65.93	-99.67	43.66	175.58	1.94
88.66	25.01	-5.18	-153.36	-14.74	175.58	1.94

SUN	DECS	HOR	ODE	ODS	ALP
90	3.94	62.96	93.43	123.50	30.47
90	3.93	58.66	74.52	104.64	15.86
96	3.91	62.11	88.53	126.04	26.41
97	3.91	59.28	95.54	109.30	36.25
97	3.90	57.00	93.05	124.01	36.05
04	3.88	56.64	65.15	116.62	8.51
94	3.87	54.20	68.78	124.94	14.58
04	3.87	54.07	39.59	87.12	-14.47
15	3.53	58.88	115.23	53.08	56.35
35	3.53	57.90	53.17	99.34	-4.73
95	3.49	56.32	75.94	58.30	19.62
99	3.47	55.73	51.94	82.77	-3.80
99	3.47	54.66	27.33	116.08	-27.32
17	3.39	68.21	147.84	117.15	79.63
95	3.02	68.18	135.83	93.46	67.65
93	2.64	66.34	62.71	46.19	-3.63
10	2.61	68.14	105.61	76.43	37.47
70	2.31	56.20	30.20	143.91	-25.99
70	2.31	54.74	10.05	128.61	-44.69
38	2.24	67.68	84.88	62.19	17.20
95	2.20	67.68	95.44	117.62	27.76
18	1.94	58.88	52.85	96.98	-5.03
38	1.94	58.85	27.48	149.81	-31.37

Z	RA	DEC	LONG	LAT	RASUN	DECS
247.75	31.84	17.47	-139.91	4.28	175.98	1.77
78.84	20.00	10.46	-153.63	1.84	176.46	1.56
143.78	-150.71	-77.01	70.94	-58.19	177.55	1.10
200.59	13.89	63.11	-139.79	42.59	177.70	1.04
200.97	14.07	56.75	-136.41	45.36	177.70	1.04
314.82	-177.49	55.46	-27.94	49.97	180.00	0.14
315.03	-33.07	50.16	179.03	57.52	180.00	0.14
344.05	-22.25	21.61	168.73	28.56	180.00	0.11
344.49	-38.21	57.46	-175.60	64.92	180.00	0.11
11.93	-100.61	76.92	-77.08	79.10	180.00	0.08
12.00	-17.50	2.18	164.92	8.91	180.00	0.08
12.83	-17.40	1.74	164.84	8.46	180.00	0.07
239.35	55.58	-18.94	-137.72	-37.50	-175.15	-2.12
268.11	57.65	-19.40	-135.23	-37.53	-175.07	-2.15
286.18	28.34	-12.49	-164.95	-22.53	-174.12	-2.56
286.57	54.00	-9.73	-137.56	-28.23	-174.12	-2.56
316.13	100.78	-0.28	-84.78	-23.34	-174.04	-2.60
318.17	-58.53	-4.40	116.18	15.59	-174.04	-2.60
6.72	60.70	-8.66	-130.19	-28.81	-173.91	-2.65
7.07	-88.16	2.33	86.37	25.82	-173.91	-2.65
219.55	-145.60	5.01	23.09	17.73	-173.38	-2.88
247.36	18.03	-5.74	-172.98	-12.39	-173.31	-2.91
277.79	116.35	2.58	-69.55	-18.40	-173.23	-2.94

RASUN	DECS	HOR	ODE	ODS	ALP
175.98	1.77	64.86	53.53	139.73	-11.33
176.46	1.56	60.63	16.27	153.57	-44.36
177.55	1.10	66.47	92.75	80.09	26.28
177.70	1.04	68.00	58.58	124.21	-9.42
177.70	1.04	67.71	54.53	120.59	-13.18
180.00	0.14	66.11	67.24	55.37	1.13
180.00	0.14	66.43	58.57	122.48	-7.86
180.00	0.11	68.20	37.69	149.47	-30.51
180.00	0.11	68.15	31.24	115.00	-36.91
180.00	0.08	67.94	53.98	87.58	-13.97
180.00	0.08	67.89	38.01	162.54	-29.88
180.00	0.07	67.04	29.09	162.69	-37.94
-175.15	-2.12	65.58	60.18	125.94	-5.40
-175.07	-2.15	62.11	35.67	124.27	-26.44
-174.12	-2.56	62.20	4.13	153.13	-58.07
-174.12	-2.56	61.40	23.52	130.56	-37.87
-174.04	-2.60	56.55	42.86	85.21	-13.69
-174.04	-2.60	56.50	117.81	115.15	61.31
-173.91	-2.65	63.21	41.00	124.44	-22.21
-173.91	-2.65	62.47	112.21	85.83	49.75
-173.38	-2.88	68.05	119.62	28.81	51.57
-173.31	-2.91	67.38	32.65	165.80	-34.73
-173.23	-2.94	61.14	83.09	70.64	21.95

Z	RA	DEC	LONG	LAT	RASUN	DECS
278.11	104.82	1.44	-81.49	-21.24	-173.23	-2.94
306.37	-73.71	-1.59	99.98	20.93	-173.16	-2.97
331.74	39.75	-4.69	-151.80	-19.21	-173.09	-3.00
331.79	2.24	-6.00	172.12	-6.39	-173.09	-3.00
331.98	-18.95	-5.64	152.83	2.22	-173.09	-3.00
26.61	71.16	-2.04	-118.44	-24.19	-172.95	-3.06
268.45	31.85	5.36	-156.84	-7.12	-172.34	-3.32
268.50	-14.72	-0.66	157.83	5.20	-172.34	-3.32
268.77	63.69	7.69	-125.01	-13.42	-172.34	-3.32
269.21	-23.47	-1.88	149.22	7.40	-172.34	-3.32
269.54	47.76	6.78	-141.16	-10.66	-172.34	-3.32
286.39	-156.26	-4.46	15.19	5.09	-172.30	-3.34
287.04	-122.94	-7.37	48.06	12.37	-172.29	-3.34
287.29	-142.45	-5.92	28.70	8.46	-172.29	-3.34
287.63	-58.67	-6.02	113.79	14.03	-172.29	-3.34
288.06	-116.37	-7.68	54.67	13.39	-172.29	-3.34
320.82	-32.42	-3.07	140.20	9.46	-172.21	-3.38
351.19	-25.72	-2.18	146.77	7.93	-172.13	-3.41
351.21	65.20	7.74	-123.92	-13.60	-172.13	-3.41
8.63	11.39	17.28	-172.37	11.37	-171.18	-3.82
8.70	34.75	12.79	-152.90	-1.07	-171.18	-3.82
9.27	-17.52	18.97	162.08	24.30	-171.18	-3.82
249.19	102.66	-16.42	-84.54	-39.23	-170.57	-4.08

1) Events /day (days) +179] RA
-179]

2) Events /20° ALP Real
Artificial
Real / Artificial

UN	DECS	HOR	ODE	ODS	ALP
3	-2.94	60.49	67.94	82.07	7.45
6	-2.97	58.05	125.00	99.31	66.95
9	-3.00	61.28	13.23	146.33	-48.05
9	-3.00	61.16	33.47	169.87	-27.69
9	-3.00	60.77	56.08	152.74	-4.70
5	-3.06	59.55	31.26	115.75	-28.29
4	-3.32	62.08	22.50	155.83	-39.58
4	-3.32	61.96	48.71	157.26	-13.25
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4	-3.32	60.51	66.15	148.42	5.65
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9	-3.34	62.82	45.13	49.24	-17.69
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3	-3.41	58.61	81.71	145.94	23.11
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8	-3.82	59.90	57.07	166.33	-2.83
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Corrected Format

360
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322

6
20) 132
120

79] RASUN
79]

ual
Artificial X100

FILE 0001 REC 0001 CH 1524

Partial Dump
D-0002

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FILE 0001 REC 0002 CH 1524

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FILE 0001 REC 0002 CH 1824

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206432620457	607403751674	205660277313	610440764410	604704444242
606531605667	210512642103	210455555452	606550574266	606507341426
206714231773	207415270006	206761611710	204601530104	210512742073
606461616775	610440763024	604704454132	206713326427	206650060102
605513655105	203452231717	207762720316	204615621643	610440714036
207757127127	605660771763	210547720501	605616044174	205703632450
604705001702	206732074567	206635453342	207751764141	603744212250
606671125040	604641440726	610440663716	604705173204	207407331233

FILE 0001 REC 0002 CH 1524

1441	207426521505	206701334265	202747412500	210570467354
1489	610440683436	604705175052	207406454504	206732226350

FILE 0001 REC 0003 CH 1524

0001	000375000001	210600453412	210455730476	605546102333
0049	206716025206	207415502200	206761064775	204464674750
0097	607451130570	610440647571	604705273622	206712215111
0145	210464330615	606403714331	606571116211	606475531430
0193	206723626416	206762537555	211405611130	202422357414
0241	604707267117	206746713043	206607535735	207573573220
0289	606422743532	606742301767	610440346307	604707273640
0337	211406164717	604565216111	606523565627	207702035275
0385	205645701115	207662051246	606433441751	211411066471
0433	610440335764	604707350234	207414353155	206757061264
0481	206517777642	210422026660	206607210025	610440334124
0529	202414170140	211412211301	604776432725	605600102414
0577	207420371617	207445041321	207722410531	203511172040
0625	605630041530	610436655413	604717652647	206734270216
0673	605723575703	203435240015	207715515500	204754441745
0721	207711662031	604741017760	210571523473	606446276611
0769	604731600371	206725552061	206535543474	207666667314
0817	207362134126	606766660044	610434730504	604731605755
0865	210660421366	606455210553	203637320453	207653566153
0913	205775556151	207647310530	605673004333	210663113402
0961	610434511200	604732435714	206761547155	206612526100
1009	604575244202	207617521706	202615735021	610434610126
1057	605443517422	210752517266	606507672252	606546304127
1105	205776005550	206755771261	207535352201	602400305560
1153	602431031046	610434227220	604734766100	207416731070
1201	210432743543	204476723313	607476354351	603473346113
1249	207476502015	604652655004	207661323471	606514777677
1297	604741443373	207400232640	210454446143	207522663415
1345	207674253525	206607427666	610431021773	604755335501
1393	210704153054	605564532241	206750253055	210501601532
1441	207424451444	207720560456	204407506240	206743213733
1489	613427546141	604764024452	207420476632	206570552011

FILE 0001 REC 0004 CH 1524

0001	000375000001	207535441205	207667535123	206502367627
0049	207420513211	205745651457	207715552446	605455301572
0097	206741056676	610427426675	604754632341	207415446057
0145	207557207564	206504074156	607723632556	205441375533
0193	207716015651	606636242536	207544424364	606610377337
0241	604754643315	207412111107	207760643127	207602437632
0289	607557043176	605651045447	610427312432	604765421022
0337	210443307171	207756112173	201635721315	607605412167
0385	205717257747	207604106156	606405475323	210443623140
0433	610427164511	604766266064	206752002034	206462627346
0481	206931516334	607711015071	204644361150	610427163003
0529	604644143024	210516266471	606434227112	206573112142
0577	207417220662	207447246131	207673554152	203600525160
0625	206510561013	610427065116	604766754701	207420544633
0673	207613343325	205724014222	607764437050	203577315015
0721	207763523264	606675232070	210613134115	207457430470
0769	604757601043	207407261705	206474744526	210413154722
0817	610456714031	206462644304	610426742064	604767602700
0865	211422774453	606642242050	205657057663	207601070662
0913	207562162215	207571712137	205616526764	207471233224
0961	610425470645	604776157115	207420576474	207707240077
1009	606454312021	206606226505	604702312024	610425466346
1057	207535564047	210417577765	210400425322	605675645720
1105	206774055111	206603370372	207524746635	604742322474
1153	604557162651	610425125472	605400132531	207417651314
1201	204536054427	206677356400	210534026447	206555514017

2500	210570467354	210525647030	206620531536	607430412006	206514155001
1504	206732226350	207454744254	603627026400		
0476	606546102333	606511475625	606634351310	610440650366	604705267661
1775	204464674750	210601074120	207757566162	607453612153	204711331111
3622	206712215111	207614414524	207463017672	206516614137	210633727703
5211	606475531430	610440602370	604705601247	206713211763	207736764660
1130	202422357414	607414652614	207615416225	606722612103	610440347213
6735	207573573220	604574664430	211406052522	210448607423	606660343776
4307	604707273640	206754065364	207645657177	207407434303	206537451012
3627	207702035275	606420214313	610440345767	604707275755	206756402420
1751	211411056471	605632601103	205777335705	210410764643	206471466360
8155	206757061264	207746117047	603516450460	211411604716	605703135314
0025	610440334124	604707361703	207417166116	207427471721	207732667023
2725	605600102414	207727022231	604772755135	610440332573	604707371326
0531	203511172040	210614272342	605650263421	606474137274	207625756366
2647	206734270216	205512632261	207621107143	606466753065	210710233557
3500	204754441745	610436531720	604720537133	207406011436	206623617100
4473	606446276611	205535324015	207710344357	206422011271	610434731545
4474	207666667314	604740031724	210572332015	606477022556	606400243052
5034	604731605755	206733465221	205635701473	207561655310	606414524363
0453	207653566153	205503472236	610434614714	604732413122	206734271242
1333	210663113402	606445322013	205574457037	207714264122	206440016377
7155	206612526100	207670121072	604633504264	210663725244	506465043452
1021	610434610126	604732443345	206770046105	206546176274	207617457716
2252	606546304127	207534032220	605666637626	610434473417	604733254621
7201	602400305563	211457757267	210432500037	204634500073	607502560051
3100	207416731670	206724475463	207502600723	604444722364	211460267710
7351	603473346113	610434225130	604734773627	207419243245	206657733311
4471	606614777677	606622602775	207516647277	606403656707	610433312234
1143	207522663415	207550661446	210544041546	606543440226	206427370464
7773	604755335501	207417076723	207624722142	207636435736	206413446436
0055	210501601532	206761002460	610430612377	604756577056	206747201440
7240	206743213733	207746754574	203765007020	607621416630	604605675555
1632	206570552011	207620472253	605521047126		
7123	206502367627	607723254220	205436342370	610427431763	604764613134
8445	605455301572	207541746304	606411217770	206654271710	210427672660
2341	207415446057	207532430553	207701356116	205463712360	207542212154
1556	205441375533	610427426512	604764633424	207415152306	204760310266
3364	606610377337	205555370446	207612401422	206472421367	610427425026
8127	207602437632	206715264040	207716003301	207771267326	604403214234
1432	604755421022	207415422723	206566314733	207556305450	605511261626
7315	607605412167	605435343367	610427165152	604766263246	206755225307
8323	210443623140	210400522572	604730100425	607536217175	606403236432
1034	206462627346	207537676072	605556325154	210444743653	207701235474
9150	610427163003	604766276066	206740441742	206587411135	207706226243
8112	206573112142	210404207054	206702247551	610427070362	604766734506
9152	203600525160	210520550410	606576331770	206416365032	207646150040
8701	207420544633	207613072640	207620254420	205751530024	210521521363
1050	203577315015	610427063633	604766763364	207417727733	204612126767
8115	207457430470	206647334326	610435401012	205736407724	610426742363
9526	210413154722	605543376150	210613337771	206742106607	206737517250
8064	604767602700	207406346375	206634117012	210413010144	604702767700
8663	207601070662	206541250706	610426437366	604771654666	207416434420
9764	207471233224	606677400710	205510511505	207543430141	206471031467
9474	207707240077	207544350660	206555103006	207474521014	607534012116
8024	610425466346	604776172476	207417077753	210526332011	206622233300
9322	605675646720	607514746360	606546677144	610425225505	604777601535
8635	604742322474	210474711635	207604122134	204563204672	607773265043
8531	207417651314	206432616066	207767647654	606404704542	210476337444
9447	206555514017	610425123327	605400140047	207420625451	206653041372

FILE 0001 REC 0004 CH 1524

1249	210413522676	604732046540	210476350406	207461555574	20
1297	605400140077	207420625123	203701572522	210436470022	60
1345	610444452534	204661544350	210424660357	605400747115	20
1393	211441174117	605502126343	206623700343	210443617555	20
1441	206527511510	207740410546	604474173174	211446230574	20
1489	610424323740	605401766445	207420620624	202600077717	21

FILE 0001 REC 0005 CH 1524

0001	000375000001	211502666310	207570632370	204760633373	6
0049	207414332542	205413465562	210403463576	606623032413	20
0097	603543656042	610423642500	605403315223	207420240722	20
0145	604220167301	206645766710	210463511255	206633562347	51
0193	207757651337	200545620000	207426016360	207715215745	6
0241	605403610561	207420534106	206651447764	207625404465	6
0289	610505376363	205751665161	610423522261	605403613551	2
0337	207430075325	207675467641	604454305054	607667114371	6
0385	206515613525	207653406777	605643355432	207431064011	2
0433	610423521325	605403615714	207417007123	206653224765	2
0481	603672327133	607701254212	605716137735	610423264152	6
0529	606416113160	210544356731	207756740237	605736126605	6
0577	207417165065	206767446013	207544700773	603457041370	2
0625	205727253527	610422714514	605405444004	207406430030	2
0673	207716402056	605550341364	607627533437	606530720176	6
0721	207612624410	605433601104	210727567352	210447433502	6
0769	605405746220	206755262117	206661731075	207417471747	6
0817	610406511441	605512513250	610422234454	605406755363	2
0865	211525551124	207707054603	605512342464	607644205560	6
0913	206535240761	207624701737	605544543362	206737031420	2
0961	610421555226	605410261060	207420343533	206606630306	2
1009	603446645500	607762650731	605673605304	610421437412	6
1057	605734352440	207535413035	207402106477	206406344274	6
1105	207420622130	205433535152	210465501577	606623565573	2
1153	606521762636	610421435646	605410551654	207420416557	2
1201	210404002562	606426017111	607475134461	606624465437	6
1249	207515011463	603405222630	207721160456	606457205253	2
1297	605411047214	207412431711	207676243077	207655450366	2
1345	207755546556	206643327252	610421310353	605411057764	2
1393	207727316351	210521221060	606615401671	605725164424	6
1441	207421445344	206666460521	203441653020	221606476000	2
1489	610424323740	605401766445	207420620624	202600077717	1

207461555574	206432551134	610442277576	204613664463	610425123314
210436470022	606751272763	210661215515	207454467535	206443302141
605400747115	207400064732	206662607432	210437722312	604465611150
210443617555	206645061751	610434342235	605401724214	206746550347
211446230574	207504016405	205761253410	610434034613	203764677032
202600077717	210432535553	607404616625		

204760630373	610404404660	603772452537	610424202635	605402270046
606623032413	206515613712	207561454516	205436567337	610410420210
207420240722	205564116657	210410032626	606546432314	207425115471
206633562347	610423524156	605403607173	207420624136	207423453236
207715215745	604733740712	607640106013	606435562025	610423523465
207625404465	604737101140	207427631455	206624465647	206622514232
605403613551	207417752212	206457010644	210442366616	605741627340
607667114371	605760700126	610423522071	605403614201	207417603161
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206653224765	210431320347	604712745304	207766070230	207666606517
610423264152	605404401754	207410551712	206403210444	207665640070
605736126605	607543120376	606600713613	610423036135	605405144003
603457041370	210635563471	206461673126	206561774173	610533217707
207406430030	207441426773	210453614114	203657757060	210725705074
606530720176	610422574525	605405740052	206774465420	206556564756
210447433502	606541034011	606637672244	606642266261	610422572015
207417471747	603733310220	211471437774	207566764464	202544120570
605406755363	207416101053	205642322054	210400260575	606513031100
607644205560	606515320277	610422114253	605407251067	207407651265
206737031420	205405620341	206624235571	210530226307	206474247331
206606630306	210427432244	605464135740	207534404172	207616755567
610421437412	605410545717	207420556176	206463147154	207741103745
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606623565573	207536705726	207711787115	605526161114	607641031347
207420416557	206665566525	207622104625	604655233144	207543063115
606624455437	610421432644	605410560640	207415245264	206771770265
606457205253	206515214344	207735524170	206643336447	610421314156
207655450366	205547422354	207726361362	606430572164	206527431531
605411057764	207401237746	207743634652	207666302243	206704771610
605725164424	606504623315	610421307631	605411061405	206776725406
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