

PROMPT GAMMA RAY SPECTRA FROM PRODUCTS FORMED
IN THE SPONTANEOUS FISSION OF ^{252}Cf

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ABSTRACT

We present information on how to obtain and use a magnetic tape on which is recorded gamma ray spectral information in coincidence with the prompt fission of ^{252}Cf . This data is supplied so that interested users may have access to a large number and variety of gamma ray spectra sorted according to fragment mass intervals. The information was recorded in three and four parameter experiments in which two fragment kinetic energies were measured in coincidence with gamma rays and K x-rays.

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I. INTRODUCTION

We have performed three and four parameter coincidence measurements on the gamma ray and K x-ray emission of prompt products (0 - 100 nsec) formed in the spontaneous fission of ^{252}Cf (see Fig. 1). These data have been analyzed to determine ground state bands in even-even fission products,¹⁻³ as well as information on the mass and charge distribution in fission⁴ and on the primary fragment angular momentum.⁵ We are currently in the process of assigning transitions to specific odd A and odd-odd nuclei. In the course of these experiments we have recorded $\sim 2 \times 10^8$ multiparameter coincidence events. It is therefore impossible to publish in detail all the experimental information. We therefore propose to make available, on request, the experimental data (on magnetic tape) to any individuals who would find it useful.

The purpose of this report is to present a compilation of data necessary for utilizing the experimental information present on the magnetic tape. The tape contains gamma ray spectra for selected mass intervals (in one case also Z intervals). The masses are calculated from the measured kinetic energies of the fragments and are based on the predetermined mass dependent neutron emission distributions.⁶ The mass calculational procedure is outlined below in Section II. Section III contains the general description of the tape which we will provide. The tape will be sent to the requester so that he will be able to make a copy for himself and return the original to us.

II. Mass Calculation

Multiparameter events of the form $(F_1, F_2, \gamma_1, \gamma_2, M)$ were recorded in chronological order on magnetic tapes. F_1, F_2 refer to fission fragment pulse heights of the two coincident fission fragments. γ_1 and γ_2 refer to pulse heights from two photon detectors. M designates a marker dimension which contained a classification of the event type. For a typical three parameter experiment (i.e. with only one photon detector) each magnetic tape contained approximately 10^6 events of the type $F_1 F_2 \gamma$ (γ being γ_1 or γ_2) and 10^5 binary fission coincidences, without a photon (i.e. $F_1 F_2$). The binary fission events were taken by recording one out of every fifty or a hundred binary events throughout the experiment. Each dimension was analyzed in a 4096 channel ADC. The binary fission events were also used for stabilization of the gain by maintaining the center position of the light fragment peak at a fixed channel (1664). Upon the completion of the experiment the binary events were used for calibration, by finding the first moments between the 3/4 points of the two fission peaks. These are defined here as P_L and P_H for the light and heavy fragments respectively.

Sorting of the $F_1 F_2 \gamma$ events to obtain gamma ray spectra as a function of mass interval was performed by generating a mass table for all pulse height combinations of the fission fragments. The table was based on the fission fragment energy calibration described previously and was constructed for each data tape in the manner similar to that described by Watson.⁷

The mass table was constructed as a 100 x 100 matrix. In each fission dimension the 8 most significant bits (256 channels) out of a total of 12 bits were considered for the table. By restricting the fragment spectrum to 8 bits (256 channels) the centroid of the light fission peak (F_L) was maintained, by digital stabilization, in channel 104. The value of P_H was usually at channel

75. The 10,000 positions in the table were obtained from the matrix of channels 31 to 130 for both F_1 and F_2 . This range included more than 98% of all the fission events. The mass in each location of the table was calculated by first obtaining a rough energy calibration:

$$E = a \cdot x + b \quad (1)$$

x is the channel number and a and b are constants

$$a = 24.40 / (P_L - P_H)$$

$$b = 103.77 - a \cdot P_L$$

Conservation of momentum leads to:

$$M_{1p} = \frac{252}{(1 + E_{1p}/E_{2p})} \quad (2)$$

$$M_{2p} = 252 - M_{1p}$$

M_i and E_i denote mass in a.m.u. and energy in MeV of the i -th fragment. The subscript p denotes pre-neutron emission quantities. At the first stage E_{1p} and E_{2p} were approximated by E_1 and E_2 (post neutron emission energies) in equation 2 and M_{1p} was derived. Also the total kinetic energy E_T was approximated by $E_T = E_{1p} + E_{2p} \approx E_1 + E_2$. (3)

The values of M_{1p} and M_{2p} were then corrected for the average number of emitted neutrons ($\bar{\nu}$) by using the tabulated experimental results of $\bar{\nu}(M, E_T)$ of Bowman et al.⁶ The original table was stored in the memory of the computer and the specific values of $\bar{\nu}(M, E_T)$ were found by linear interpolation within the table.

The neutron correction takes the form

$$M_1 = M_{1p} - \bar{\nu}_1(M_{1p}, E_T); \quad M_2 = M_{2p} - \bar{\nu}_2(M_{2p}, E_T) \quad (4)$$

Using the final masses M_1 and M_2 the Schmitt mass dependent energy calibration⁸ was evaluated.

$$E_i = (24.0203 + 0.03574 M_i) \frac{x}{P_L - P_H} \quad (5)$$

$$- (24.0203 + 0.03574 M_i) \frac{P_L}{P_L - P_H}$$

$$+ -.1370 M_i + 89.6083$$

The values of E_{ip} were then calculated

$$E_{ip} = E_i(1 + \nu_i/M_i) \quad (6)$$

The new values of E_{1p} and E_{2p} were entered into equation (2) for continuation of the iterative process. This was repeated until the mass values resulting from two consecutive iterations differed by less than 0.05%. In a few rare instances no convergence was achieved due to fluctuations within the neutron correction tables. In such cases the calculation was stopped after the 20th iteration.

The mass table was generated from the calibration points P_L and P_H

before the analysis of each magnetic tape of data. With the table in the memory the events of the type F_1, F_2, γ were read from the tape. Each of the values of F_1 and F_2 which consisted of 12 bits was separated into two numbers. The 8 most significant bits formed the numbers X_1' and X_2' and the 4 least significant bits formed the numbers R_1 and R_2 . To use the mass table we define $X_1 = X_1' - 30$; $X_2 = X_2' - 30$. The mass value corresponding to channels F_1, F_2 were then inferred by interpolation from the 100 x 100 mass table

$$M(F_1, F_2) = M(X_1, X_2) + R_1 [M(X_1 + 1, X_2) - M(X_1, X_2)] \frac{1}{16} \quad (7)$$

$$+ R_2 [M(X_1, X_2 + 1) - M(X_1, X_2)] \frac{1}{16}$$

After finding the mass of each event the gamma ray was placed in the gamma ray spectrum corresponding to the appropriate mass interval.

The analysis of the events in the sorting program was done in integer mode to save time. The mass table was prepared in units of a.m.u. x 256 and all the division operations were done by shifting bits. In this way one magnetic tape containing about 10^6 (F_1, F_2, γ) events was sorted into 38 gamma ray spectra corresponding to 38 mass intervals. This required a time of about 5 minutes in the CDC 6600 computer.

The mass resolution of the experiment was inferred directly from the appearance of a specific gamma ray line in several adjacent mass intervals. In this experiment it was 4-7 a.m.u. (FWHM) and depended on the mass of the specific fragment. An example of the mass dispersion for a single isotope is shown in Fig. 2.

It should be emphasized that the mass calculations are only approximate. This is because the neutron corrections which are applied to the data are determined from measurements of average values. When applying these average corrections to specific nuclei it is possible to introduce errors as large as 1 - 1.5 a.m.u. Though the absolute value of the mass so determined may be wrong, the general trends of the mass distribution will be correct (i.e. lighter isotopes will appear with mass centroids having lower values than heavy isotopes). The only accurate way of determining the true mass is by establishing the systematics of the distributions. In practice this means using our established transitions in even-even nuclei as reference points where the true mass values are known. It is then possible by interpolation to establish the true mass associated with other transitions.

III. General Tape Description

The tape contains 6 files of gamma ray data followed by an extra end of file mark. The 6 files are then repeated and an additional end of file mark follows the last gamma ray spectrum. The tape contains binary data which is written in an odd parity mode at a density of 800 bits per inch. Table 1 presents the general file structure of the tape. Table 2 presents the general format for the spectra and also the identification written in the first word of each spectrum. Table 3 contains a complete Scelm of the tape and Table 4 is an octal dump of the first spectrum in file 1.

To utilize the presented spectra it is necessary to know the energy and efficiency calibrations for each detector. These are given below along with relevant data of each experiment.

HR Experiment (files 1,8)

The HR experiment was a three parameter measurement of gamma rays in coincidence with fission fragment kinetic energies. The gamma ray detector was a 1 cm^3 Ge(Li) detector with resolution of 1 keV at 122 keV. The detector was located in position r_2 (see Fig. 1). An example of the gamma ray spectra recorded in this experiment is shown in Fig. 3. Table 5 presents the energy and efficiency calibration data for the HR experiment. To find the energy of any channel a linear interpolation between values presented in the table will give adequate results ($\pm .1$ keV). To determine the yield of any gamma ray it is necessary to divide the number of counts in the photopeak by an interpolated number extracted from the table. (Since the photopeak efficiency of the detector is essentially a decreasing exponential function of energy it is probably best to use a logarithmic interpolation procedure). The divided number then represents the yield of the gamma ray in %/fission. In our analysis of photopeak

yields we have used a computer code called SAMPO written by Routti and Prussin.⁹ Within the accuracy of the efficiency determination ($\sim \pm 15\%$) the results are probably independent of the particular method used to analyze the photopeak intensities but there will likely be slight variations in determined yields dependent on the method chosen for analysis.

As an example of the use of Table 5 suppose that a photopeak has its centroid at channel 2407.83 and has area above the background of 7970 counts. The energy of this gamma ray transition is

$$E = \left(\frac{2407.83 - 2338.63}{2498.04 - 2338.63} \right) (249.73 \text{ keV} - 233.89 \text{ keV}) + 233.89 \text{ keV}$$

$$E = 240.77 \text{ keV}$$

The number of counts necessary for a 1%/fission yield at 240.77 keV is:

$$N_{1\%} = \exp \left[\left(\frac{240.77 - 234.}{242. - 234.} \right) * \left(\ln \frac{6900}{7500} \right) + \ln (7500) \right]$$

$$N_{1\%} = 6989.$$

Therefore the yield of the measured gamma ray is:

$$Y = \frac{7970}{6989} = 1.14\%/\text{fission}.$$

G6 Experiment (files 1.9)

Two three parameter measurements were recorded in the same experiment. These are the data labeled 'G6' and 'Coax'. In the G6 experiment a 6 cm³ Ge(Li) gamma ray detector was located in position γ_1 . Table 6 presents the energy and efficiency calibration data for the G6 experiment. The efficiency calibration is for gamma rays emitted from fragments stopped in detector F_1 . Transitions occurring in fragments flying toward detector F_2 are Doppler shifted and broadened (due to the fairly large solid angle for fragment detection) and

are usually not resolvable into discrete lines. However, transitions occurring in fragments which have stopped in detector F_2 (these are transitions which occur at times greater than ~ 0.8 ns after fission) are non-Doppler shifted and appear as sharp gamma ray lines. The mass interval labelling the spectrum is based on fragments stopping in detector F_1 and therefore transitions from fragments stopped in detector F_2 are associated with the complementary masses. Deciding if a transition is from the mass interval on which the sort was performed or from a complementary mass can easily be resolved by observing the same transition in the HR, or Coax experiments. In these experiments the gamma ray detector was located behind fragment detector F_1 . Therefore, from geometry considerations, gamma ray fragments stopped in detector F_1 will always be observed with more intensity than those stopped in F_2 even if the transition lifetime is long compared with the transit time between the two detectors. This removes the ambiguity of the analysis and insures that the transition is assigned to the correct mass interval.

GX Experiment (files 3,10)

The data recorded in the GX experiment represents the gamma ray portion of three and four parameter measurements in which gamma rays and K x-rays were recorded. The gamma ray detector had a 6 cm^3 volume and was located in position γ_1 . Table 7 presents the energy and efficiency calibration data for the experiment. As in the G6 experiment the efficiency calibration is for fragments stopped in detector F_1 .

COAX Experiment (files 4,11)

The data presented in the COAX file were recorded in the same experiment as the 'G6' data. The COAX data were taken with a 35 cm^3 coaxially drifted Ge(Li)

detector located in position γ_2 . Table 8 presents the energy and photopeak efficiency calibration for transitions from fragments stopped in detector F_1 .

HRF2 Experiment (files 5, 12)

This experiment is the same data that is presented in the HR experiment but in this case the data has been sorted into mass intervals relative to the fragment stopping in fragment detector F_2 . This means, for example, in the first spectrum of this file the mass interval 87-89 is relative to fragments within this mass interval stopping in detector F_2 . The sorting is performed in this manner so that transition lifetime information can be extracted from the γ -ray intensity measurements. By observing, over the same mass intervals, the intensity of a specific gamma ray in the HR and HRF2 experiments and knowing the velocity of the fragment and the geometry of the detectors it is possible to estimate the transition life time from a two point decay curve. Since the fragment detectors are separated by ~ 8 mm and fission fragments have velocities of ~ 1 cm/ns it is possible to obtain transition lifetime information over a region of about 0.2-2. nsec. Transition lifetimes which we have extracted utilizing this technique are presented in Ref. 1-3.

The energy calibration for the HRF2 data is the same as the HR energy calibration presented in Table 5. There is no efficiency calibration data available since the observed yield of the gamma ray is dependent on the transition lifetime

Z Experiment (files 6, 13)

This experiment presents gamma ray data obtained in a four parameter experiment in which two fragment energies were recorded in coincidence with gamma rays and K x-rays. The fragment energies were used in the standard way to

identify fragment masses. The K x-rays were used for identifying the atomic numbers of the fragments. The gamma ray data were recorded using the detector in the GX experiment. The energy calibration is the same as presented in Table 7.

In this file there are 27 spectra. Each spectrum is labeled with an atomic number. These atomic numbers were established by placing windows on the appropriate interval containing the $K\alpha$ x-rays of each element. The energy resolution of the Si(Li) detector used for the K-x-ray measurements was ~ 0.7 keV at 14 keV. The resolution was this poor because, for the sake of detection efficiency, a large surface area detector was used (2 cm^2). Even at this resolution it is possible to separate the x-rays of adjacent elements reasonably well. Each spectrum in this file has, in addition to a window on the K-x-ray energy interval, an additional window on a mass interval. The mass interval window was chosen to be 12 a.m.u. wide and centered on the most probable mass (A_p) for each value of Z .⁴ The atomic number of the fragment with which the transition is associated can be extracted from these data but the mass of the transition should be obtained from one of the sets of three dimensional data presented above.

It should be remembered that there are two fragments associated with each fission and it is therefore possible to have x-rays in coincidence with γ -rays from complementary fragments. It is easy to resolve this ambiguity by observing whether the transition is predominately seen with a light or heavy fragment mass in one of the three parameter experiments.

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Table 1. File identification.

File	Experimental Designation	Detector	Position (Fig.1)	Resolution	Usuable Energy Range of Data (keV)	Number of Spectra
1	HR	1 cm ³ Ge(Li)	r_2	~1 keV at 122keV	40-400	41
2	G6	6 cm ³ Ge(Li)	r_1	1.6 keV at 279keV	60-1400	41
3	GX	6 cm ³ Ge(Li)	r_1	1.6 keV at 279keV	60-1400	41
4	COAX	35 cm ³ Ge(Li)	r_2	2.5 keV at 279keV	150-1900	41
5	HRF2	1 cm ³ Ge(Li)	r_2	~1 keV at 122keV	40-400	41
6	X	6 cm ³ Ge(Li)	r_1	1.6 keV at 279keV	60-1400	27
7	(Blank)					
8-13	repeat of files 1-6 respectively.					
14	(Blank)					

Table 2. General tape information.

	Format of each spectrum
Number of 60 bit words	- 4112 (eight 512 word records and one 16 word record)
1st Word	- Spectrum identification (see below)
2nd Word	- Contains the number 4.
Words 3-4098	- Gamma ray channels 1 - 4096.
Words 4099 - 4112	- Contain the number 0.

Spectra Identification for Files 1 - 5 (8-12).

Spectrum	Identification (1st Word)	Mass interval
1	8700089	87-89
2	8900091	89-91
7	9900101	99-101
8	10100103	101-103
9	10300105	103-105
38	16100163	161-163
39	8700163	87-163 (all mass intervals)
40	8700123	87-123 (light mass intervals)
41	12300163	123-163 (heavy mass intervals)

Spectra Identification for File 6 (13)

Spectrum	Identification (1st Word)	Z	Mass Interval ^{a)}
1	37	37	86 - 98
2	38	38	89 - 101
13	49	49	117 - 129
14	10050	50	122 - 134
15	10051	51	125 - 1137
26	10062	62	152 - 164
27	10063	63	155 - 167

a) The mass interval is for each Z the most probable mass value of the chain (A_p) \pm 6 a.m.u. (A_p values are in ref. 4).

Table 3. Complete Scelm of Magnetic Tape. (a)

(a) Due to core limitations in the computer on which the Scelm was performed a full record (512 60 bit words) is recorded in the listing as 463 words and 5 characters.

*** GENERAL SCHEM ***
** (CDC) **

TAPE-BUFFER SIZE IS 0463 60-BIT WORDS AND 5 6-BIT CHARACTERS

NOISE RECORD LIMIT IS 018 CHARACTERS

REC'D FILE

1	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	1 TO 8	INCLUSIVE
2	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	9 TO 9	INCLUSIVE
3	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	10 TO 17	INCLUSIVE
4	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	18 TO 18	INCLUSIVE
5	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	19 TO 26	INCLUSIVE
6	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	27 TO 27	INCLUSIVE
7	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	28 TO 35	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	36 TO 36	INCLUSIVE
9	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	37 TO 44	INCLUSIVE
10	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	45 TO 45	INCLUSIVE
11	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	46 TO 53	INCLUSIVE
12	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	54 TO 54	INCLUSIVE
13	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	55 TO 62	INCLUSIVE
14	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	63 TO 63	INCLUSIVE
15	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	64 TO 71	INCLUSIVE
16	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	72 TO 72	INCLUSIVE
17	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	73 TO 80	INCLUSIVE
18	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	81 TO 81	INCLUSIVE
19	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	82 TO 89	INCLUSIVE
20	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	90 TO 90	INCLUSIVE
21	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	91 TO 98	INCLUSIVE
22	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	99 TO 99	INCLUSIVE
23	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	100 TO 107	INCLUSIVE
24	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	108 TO 108	INCLUSIVE
25	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	109 TO 116	INCLUSIVE
26	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	117 TO 117	INCLUSIVE
27	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	118 TO 125	INCLUSIVE
28	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	126 TO 126	INCLUSIVE
29	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	127 TO 134	INCLUSIVE
30	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	135 TO 135	INCLUSIVE
31	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	136 TO 143	INCLUSIVE
32	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	144 TO 144	INCLUSIVE
33	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	145 TO 152	INCLUSIVE
34	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	153 TO 153	INCLUSIVE
35	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	154 TO 161	INCLUSIVE
36	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	162 TO 162	INCLUSIVE
37	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	163 TO 170	INCLUSIVE
38	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	171 TO 171	INCLUSIVE
39	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	172 TO 179	INCLUSIVE
40	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	180 TO 180	INCLUSIVE
41	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	181 TO 188	INCLUSIVE
42	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	189 TO 189	INCLUSIVE
43	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	190 TO 197	INCLUSIVE
44	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	198 TO 198	INCLUSIVE
45	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	199 TO 206	INCLUSIVE
46	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	207 TO 207	INCLUSIVE
47	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	208 TO 215	INCLUSIVE
48	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	216 TO 216	INCLUSIVE
49	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	217 TO 224	INCLUSIVE
50	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	225 TO 225	INCLUSIVE
51	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	226 TO 233	INCLUSIVE
52	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	234 TO 234	INCLUSIVE
53	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	235 TO 242	INCLUSIVE
54	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	243 TO 243	INCLUSIVE
55	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	244 TO 251	INCLUSIVE
56	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	252 TO 252	INCLUSIVE
57	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1, RECORDS	253 TO 260	INCLUSIVE
58	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1, RECORDS	261 TO 261	INCLUSIVE

8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	262 TO	269	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	270 TO	270	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	271 TO	278	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	279 TO	279	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	280 TO	287	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	288 TO	288	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	289 TO	296	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	297 TO	297	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	298 TO	305	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	306 TO	306	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	307 TO	314	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	315 TO	315	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	316 TO	323	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	324 TO	324	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	325 TO	332	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	333 TO	333	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	334 TO	341	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	342 TO	342	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	343 TO	350	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	351 TO	351	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	352 TO	359	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	360 TO	360	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	1,	RECORDS	361 TO	368	INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	1,	RECORDS	369 TO	369	INCLUSIVE

SUMMARY

369 GOOD BINARY RECORDS OF LENGTH 0016 WORDS
 THE ABOVE INCLUDES
 IN FILE 1, RECORDS 1 TO 369 INCLUSIVE

TO 0463 WORDS AND 5 CHARACTERS
 328 N.I.N(N) RECORDS

END-OF-FILE 1

0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	262 TO	269 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	270 TO	270 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	271 TO	278 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	279 TO	279 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	280 TO	287 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	288 TO	288 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	289 TO	296 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	297 TO	297 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	298 TO	305 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	306 TO	306 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	307 TO	314 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	315 TO	315 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	316 TO	323 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	324 TO	324 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	325 TO	332 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	333 TO	333 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	334 TO	341 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	342 TO	342 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	343 TO	350 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	351 TO	351 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	352 TO	359 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	360 TO	360 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	2, RECORDS	361 TO	368 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	2, RECORDS	369 TO	369 INCLUSIVE

SUMMARY

369 GOOD BINARY RECORDS OF LENGTH 0016 WORDS
 THE ABOVE INCLUDES
 IN FILE 2, RECORDS 1 TO 369 INCLUSIVE

TO 0463 WORDS AND 5 CHARACTERS
 328 N.I.N(W) RECORDS

END-OF-FILE 2

BEGIN FILE 3

8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	1 TO	8 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	9 TO	9 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	10 TO	17 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	18 TO	18 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	19 TO	26 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	27 TO	27 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	28 TO	35 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	36 TO	36 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	37 TO	44 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	45 TO	45 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	46 TO	53 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	54 TO	54 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	55 TO	62 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	63 TO	63 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	64 TO	71 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	72 TO	72 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	73 TO	80 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	81 TO	81 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	82 TO	89 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	90 TO	90 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	91 TO	98 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	99 TO	99 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	100 TO	107 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	108 TO	108 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	3, RECORDS	109 TO	116 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	3, RECORDS	117 TO	117 INCLUSIVE

8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	253 TO	260 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	261 TO	261 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	262 TO	269 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	270 TO	270 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	271 TO	278 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	279 TO	279 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	280 TO	287 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	288 TO	288 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	289 TO	296 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	297 TO	297 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	298 TO	305 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	306 TO	306 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	307 TO	314 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	315 TO	315 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	316 TO	323 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	324 TO	324 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	325 TO	332 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	333 TO	333 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	334 TO	341 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	342 TO	342 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	343 TO	350 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	351 TO	351 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	352 TO	359 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	360 TO	360 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	4, RECORDS	361 TO	368 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	4, RECORDS	369 TO	369 INCLUSIVE

SUMMARY
 369 GOOD BINARY RECORDS OF LENGTH 0016 WORDS TO 0463 WORDS AND 5 CHARACTERS
 THE ABOVE INCLUDES 378 N.I.(M) RECORDS
 IN FILE 4, RECORDS 1 TO 369 INCLUSIVE

END-OF-FILE 4

8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	1 TO	8 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	9 TO	9 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	10 TO	17 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	18 TO	18 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	19 TO	26 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	27 TO	27 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	28 TO	35 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	36 TO	36 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	37 TO	44 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	45 TO	45 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	46 TO	53 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	54 TO	54 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	55 TO	62 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	63 TO	63 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	64 TO	71 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	72 TO	72 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	73 TO	80 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	81 TO	81 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	82 TO	89 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	90 TO	90 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	91 TO	98 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	99 TO	99 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	100 TO	107 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	5, RECORDS	108 TO	108 INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE	5, RECORDS	109 TO	116 INCLUSIVE

1 GOOD BINARY RECORDS OF LENGTH 0016 WORDS
8 GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS
1 GOOD BINARY RECORDS OF LENGTH 0016 WORDS

IN FILE 6, RECORDS 234 TO 234 INCLUSIVE
IN FILE 6, RECORDS 235 TO 242 INCLUSIVE
IN FILE 6, RECORDS 243 TO 243 INCLUSIVE

SUMMARY

243 GOOD BINARY RECORDS OF LENGTH 0016 WORDS
THE ABOVE INCLUDES
IN FILE 6, RECORDS 1 TO 243 INCLUSIVE

TO 0463 WORDS AND 5 CHARACTERS
216 N.I.N(W) RECORDS

END-OF-FILE 6

BEGIN FILE 7

END-OF-FILE 7

EMPTY FILE - POSSIBLE END-OF-RUN

SUMMARY

369 GOOD BINARY RECORDS OF LENGTH 0016 WORDS
 THE ABOVE INCLUDES
 IN FILE 11, RECORDS 1 TO 369 INCLUSIVE

TO 0463 WORDS AND 5 CHARACTERS
 329 N.I.N(W) RECORDS

END-OF-FILE 11

BEGIN FILE 12

8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 1 TO 8 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 9 TO 9 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 10 TO 17 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 18 TO 18 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 19 TO 26 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 27 TO 27 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 28 TO 35 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 36 TO 36 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 37 TO 44 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 45 TO 45 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 46 TO 53 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 54 TO 54 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 55 TO 62 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 63 TO 63 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 64 TO 71 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 72 TO 72 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 73 TO 80 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 81 TO 81 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 82 TO 89 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 90 TO 90 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 91 TO 98 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 99 TO 99 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 100 TO 107 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 108 TO 108 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 109 TO 116 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 117 TO 117 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 118 TO 125 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 126 TO 126 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 127 TO 134 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 135 TO 135 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 136 TO 143 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 144 TO 144 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 145 TO 152 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 153 TO 153 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 154 TO 161 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 162 TO 162 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 163 TO 170 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 171 TO 171 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 172 TO 179 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 180 TO 180 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 181 TO 188 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 189 TO 189 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 190 TO 197 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 198 TO 198 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 199 TO 206 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 207 TO 207 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 208 TO 215 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 216 TO 216 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 217 TO 224 INCLUSIVE
1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE 12, RECORDS 225 TO 225 INCLUSIVE
0	GOOD BINARY RECORDS OF LENGTH 0463 WORDS AND 5 CHARACTERS	IN FILE 12, RECORDS 226 TO 233 INCLUSIVE

1	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	234	TO	234	INCLUSIVE
2	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	235	TO	242	INCLUSIVE
3	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	243	TO	243	INCLUSIVE
4	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	244	TO	251	INCLUSIVE
5	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	252	TO	252	INCLUSIVE
6	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	253	TO	260	INCLUSIVE
7	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	261	TO	261	INCLUSIVE
8	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	262	TO	269	INCLUSIVE
9	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	270	TO	270	INCLUSIVE
10	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	271	TO	278	INCLUSIVE
11	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	279	TO	279	INCLUSIVE
12	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	280	TO	287	INCLUSIVE
13	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	288	TO	288	INCLUSIVE
14	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	289	TO	296	INCLUSIVE
15	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	297	TO	297	INCLUSIVE
16	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	298	TO	305	INCLUSIVE
17	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	306	TO	306	INCLUSIVE
18	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	307	TO	314	INCLUSIVE
19	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	315	TO	315	INCLUSIVE
20	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	316	TO	323	INCLUSIVE
21	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	324	TO	324	INCLUSIVE
22	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	325	TO	332	INCLUSIVE
23	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	333	TO	333	INCLUSIVE
24	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	334	TO	341	INCLUSIVE
25	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	342	TO	342	INCLUSIVE
26	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	343	TO	350	INCLUSIVE
27	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	351	TO	351	INCLUSIVE
28	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	352	TO	359	INCLUSIVE
29	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	360	TO	360	INCLUSIVE
30	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	12	RECORDS	361	TO	368	INCLUSIVE
31	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	12	RECORDS	369	TO	369	INCLUSIVE

SUMMARY
 369 GOOD BINARY RECORDS OF LENGTH 0016 WORDS TO 0463 WORDS AND 5 CHARACTERS
 IN FILE 12, RECORDS 1 TO 369 INCLUSIVE
 328 N.I.(NH) RECORDS

END-OF-FILE 12

13	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	1	TO	8	INCLUSIVE
14	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	9	TO	9	INCLUSIVE
15	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	10	TO	17	INCLUSIVE
16	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	18	TO	18	INCLUSIVE
17	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	19	TO	26	INCLUSIVE
18	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	27	TO	27	INCLUSIVE
19	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	28	TO	35	INCLUSIVE
20	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	36	TO	36	INCLUSIVE
21	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	37	TO	44	INCLUSIVE
22	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	45	TO	45	INCLUSIVE
23	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	46	TO	53	INCLUSIVE
24	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	54	TO	54	INCLUSIVE
25	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	55	TO	62	INCLUSIVE
26	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	63	TO	63	INCLUSIVE
27	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	64	TO	71	INCLUSIVE
28	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	72	TO	72	INCLUSIVE
29	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	73	TO	80	INCLUSIVE
30	GOOD BINARY RECORDS OF LENGTH 0463 WORDS	IN FILE	13	RECORDS	81	TO	81	INCLUSIVE
31	GOOD BINARY RECORDS OF LENGTH 0016 WORDS	IN FILE	13	RECORDS	82	TO	89	INCLUSIVE

1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 90 TO 90	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 91 TO 98	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 99 TO 99	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 100 TO 107	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 108 TO 108	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 109 TO 116	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 117 TO 117	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 118 TO 125	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 126 TO 126	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 127 TO 134	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 135 TO 135	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 136 TO 143	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 144 TO 144	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 145 TO 152	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 153 TO 153	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 154 TO 161	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 162 TO 162	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 163 TO 170	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 171 TO 171	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 172 TO 179	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 180 TO 180	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 181 TO 188	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 189 TO 189	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 190 TO 197	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 198 TO 198	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 199 TO 206	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 207 TO 207	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 208 TO 215	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 216 TO 216	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 217 TO 224	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 225 TO 225	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 226 TO 233	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 234 TO 234	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0463 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 235 TO 242	INCLUSIVE
1	GOOD	BINARY	RECORDS OF LENGTH 0016 WORDS	AND 5 CHARACTERS	IN FILE 13	RECORDS 243 TO 243	INCLUSIVE

SUMMARY

243 GOOD BINARY RECORDS OF LENGTH 0016 WORDS TO 0463 WORDS AND 5 CHARACTERS
 THE ABOVE INCLUDES 216 N.I.H.M.I RECORDS

14 FILE 13, RECORDS 1 TO 243 INCLUSIVE

END-OF-FILE 13

BEGIN FILE 14

END-OF-FILE 14

EMPTY FILE - POSSIBLE END-OF-RUN

BEGIN FILE 15

FILE 15 RECORD

6 CHARACTERS

SUMMARY

1 'MISC' RECORDS OF LENGTH 6 CHARACTERS
THE ABOVE INCLUDES 1 N.I.(NIN) RECORDS
IN FILE 15, RECCROS 1 TO 1 INCLUSIVE

END-OF-FILE 15

BEGIN FILE 16

END-OF-FILE 16

EMPTY FILE - POSSIBLE END-OF-RUN

BEGIN FILE 17

Table 4. Tape Dump of First 10 Records^(a)

(a) The computer listing has four words per line. Each word is written as 20 octal characters. The four characters on the far left of each page give the word count in decimal and the four characters to the right of this give the word count in octal.

CDC 6600 TAPE DUMP

FILE NO 1 RECCRD NO 1 5120 CHARACTERS. SUMMARY

Table with 25 columns of numerical data, likely representing file and record numbers. The data is organized in a grid-like structure with some rows appearing to be grouped or separated by dashed lines.

-30-

3484	0744	03090	00000	00000	00044	00000	00000	00000	00044	00000	00000	00000	00035	00000	00000	00000	00042
3486	0750	00000	00000	00000	00046	00000	00000	00000	00044	00000	00000	00000	00043	00000	00000	00000	00043
0492	0754	00000	00000	00000	00043	00000	00000	00000	00042	00000	00000	00000	00032	00000	00000	00000	00043
0496	0760	00000	00000	00000	00043	00000	00000	00000	00035	00000	00000	00000	00031	00000	00000	00000	00044
0500	0764	00000	00000	00000	00022	00000	00000	00000	00024	00000	00000	00000	00021	00000	00000	00000	00017
0524	0770	00000	00000	00000	00021	00000	00000	00000	00014	00000	00000	00000	00023	00000	00000	00000	00014
0538	0774	00000	00000	00000	00011	00000	00000	00000	00014	00000	00000	00000	00021	00000	00000	00000	00024

FILE NO 1 RECORD NO 2 5120 CHARACTERS. BINARY

0000	0000	00000	00000	00000	00034	00000	00000	00000	00023	00000	00000	00000	00032	00000	00000	00000	00017
0004	0004	00000	00000	00000	00022	00000	00000	00000	00027	00000	00000	00000	00023	00000	00000	00000	00017
0008	0010	00000	00000	00000	00014	00000	00000	00000	00013	00000	00000	00000	00020	00000	00000	00000	00024
0012	0014	00000	00000	00000	00017	00000	00000	00000	00021	00000	00000	00000	00024	00000	00000	00000	00025
0016	0020	00000	00000	00000	00015	00000	00000	00000	00016	00000	00000	00000	00014	00000	00000	00000	00011
0020	0024	00000	00000	00000	00013	00000	00000	00000	00013	00000	00000	00000	00013	00000	00000	00000	00017
0024	0030	00000	00000	00000	00013	00000	00000	00000	00013	00000	00000	00000	00013	00000	00000	00000	00025
0028	0034	00000	00000	00000	00007	00000	00000	00000	00007	00000	00000	00000	00021	00000	00000	00000	00021
0032	0040	00000	00000	00000	00021	00000	00000	00000	00024	00000	00000	00000	00014	00000	00000	00000	00012
0036	0044	00000	00000	00000	00013	00000	00000	00000	00017	00000	00000	00000	00014	00000	00000	00000	00020
0040	0050	00000	00000	00000	00012	00000	00000	00000	00020	00000	00000	00000	00023	00000	00000	00000	00015
0044	0054	00000	00000	00000	00017	00000	00000	00000	00015	00000	00000	00000	00026	00000	00000	00000	00016
0048	0060	00000	00000	00000	00017	00000	00000	00000	00026	00000	00000	00000	00023	00000	00000	00000	00021
0052	0064	00000	00000	00000	00020	00000	00000	00000	00015	00000	00000	00000	00013	00000	00000	00000	00023
0056	0070	00000	00000	00000	00013	00000	00000	00000	00023	00000	00000	00000	00021	00000	00000	00000	00025
0060	0074	00000	00000	00000	00022	00000	00000	00000	00012	00000	00000	00000	00024	00000	00000	00000	00012
0064	0100	00000	00000	00000	00013	00000	00000	00000	00020	00000	00000	00000	00013	00000	00000	00000	00020
0068	0104	00000	00000	00000	00014	00000	00000	00000	00015	00000	00000	00000	00017	00000	00000	00000	00016
0072	0110	00000	00000	00000	00017	00000	00000	00000	00022	00000	00000	00000	00023	00000	00000	00000	00017
0076	0114	00000	00000	00000	00012	00000	00000	00000	00012	00000	00000	00000	00021	00000	00000	00000	00021
0080	0120	00000	00000	00000	00014	00000	00000	00000	00013	00000	00000	00000	00021	00000	00000	00000	00023
0084	0124	00000	00000	00000	00015	00000	00000	00000	00013	00000	00000	00000	00020	00000	00000	00000	00013
0088	0130	00000	00000	00000	00017	00000	00000	00000	00022	00000	00000	00000	00017	00000	00000	00000	00016
0092	0136	00000	00000	00000	00013	00000	00000	00000	00015	00000	00000	00000	00012	00000	00000	00000	00020
0096	0140	00000	00000	00000	00026	00000	00000	00000	00021	00000	00000	00000	00012	00000	00000	00000	00014
0100	0144	00000	00000	00000	00007	00000	00000	00000	00024	00000	00000	00000	00022	00000	00000	00000	00033
0104	0150	00000	00000	00000	00015	00000	00000	00000	00012	00000	00000	00000	00016	00000	00000	00000	00022
0108	0154	00000	00000	00000	00021	00000	00000	00000	00014	00000	00000	00000	00015	00000	00000	00000	00017
0112	0160	00000	00000	00000	00011	00000	00000	00000	00021	00000	00000	00000	00014	00000	00000	00000	00010
0116	0164	00000	00000	00000	00017	00000	00000	00000	00011	00000	00000	00000	00016	00000	00000	00000	00016
0120	0170	00000	00000	00000	00014	00000	00000	00000	00014	00000	00000	00000	00014	00000	00000	00000	00021
0124	0174	00000	00000	00000	00022	00000	00000	00000	00017	00000	00000	00000	00013	00000	00000	00000	00017
0128	0200	00000	00000	00000	00020	00000	00000	00000	00013	00000	00000	00000	00020	00000	00000	00000	00023
0132	0204	00000	00000	00000	00027	00000	00000	00000	00021	00000	00000	00000	00022	00000	00000	00000	00036
0136	0210	00000	00000	00000	00034	00000	00000	00000	00037	00000	00000	00000	00040	00000	00000	00000	00040
0140	0214	00000	00000	00000	00027	00000	00000	00000	00037	00000	00000	00000	00024	00000	00000	00000	00015
0144	0220	00000	00000	00000	00013	00000	00000	00000	00022	00000	00000	00000	00025	00000	00000	00000	00022
0148	0224	00000	00000	00000	00016	00000	00000	00000	00013	00000	00000	00000	00016	00000	00000	00000	00017
0152	0230	00000	00000	00000	00025	00000	00000	00000	00026	00000	00000	00000	00017	00000	00000	00000	00015
0156	0234	00000	00000	00000	00022	00000	00000	00000	00022	00000	00000	00000	00017	00000	00000	00000	00024
0160	0240	00000	00000	00000	00014	00000	00000	00000	00016	00000	00000	00000	00015	00000	00000	00000	00017
0164	0244	00000	00000	00000	00013	00000	00000	00000	00016	00000	00000	00000	00015	00000	00000	00000	00012
0168	0250	00000	00000	00000	00010	00000	00000	00000	00013	00000	00000	00000	00021	00000	00000	00000	00025
0172	0254	00000	00000	00000	00011	00000	00000	00000	00013	00000	00000	00000	00025	00000	00000	00000	00027
0176	0260	00000	00000	00000	00024	00000	00000	00000	00015	00000	00000	00000	00016	00000	00000	00000	00011
0180	0264	00000	00000	00000	00013	00000	00000	00000	00022	00000	00000	00000	00022	00000	00000	00000	00023
0184	0270	00000	00000	00000	00021	00000	00000	00000	00022	00000	00000	00000	00020	00000	00000	00000	00031
0188	0274	00000	00000	00000	00024	00000	00000	00000	00025	00000	00000	00000	00026	00000	00000	00000	00031
0192	0300	00000	00000	00000	00031	00000	00000	00000	00025	00000	00000	00000	00024	00000	00000	00000	00027

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3444	0674	00000	00000	00000	00015	00000	00000	00000	00017	00000	00000	00000	00022	00000	00000	00000	00024
3448	0700	00000	00000	00000	00011	00000	00000	00000	00016	00000	00000	00000	00014	00000	00000	00000	00014
0492	0704	00000	00000	00000	00015	00000	00000	00000	00020	00000	00000	00000	00015	00000	00000	00000	00014
0496	0710	00000	00000	00000	00014	00000	00000	00000	00020	00000	00000	00000	00024	00000	00000	00000	00007
3460	0714	00000	00000	00000	00013	00000	00000	00000	00024	00000	00000	00000	00017	00000	00000	00000	00017
3464	0720	00000	00000	00000	00015	00000	00000	00000	00024	00000	00000	00000	00030	00000	00000	00000	00016
3468	0724	00000	00000	00000	00020	00000	00000	00000	00013	00000	00000	00000	00023	00000	00000	00000	00014
0472	0730	00000	00000	00000	00017	00000	00000	00000	00015	00000	00000	00000	00016	00000	00000	00000	00017
3476	0734	00000	00000	00000	00015	00000	00000	00000	00006	00000	00000	00000	00012	00000	00000	00000	00017
3480	0740	00000	00000	00000	00020	00000	00000	00000	00021	00000	00000	00000	00020	00000	00000	00000	00016
0484	1744	00000	00000	00000	00013	00000	00000	00000	00012	00000	00000	00000	00020	00000	00000	00000	00014
0488	0752	00000	00000	00000	00023	00000	00000	00000	00030	00000	00000	00000	00024	00000	00000	00000	00021
0492	0754	00000	00000	00000	00016	00000	00000	00000	00023	00000	00000	00000	00015	00000	00000	00000	00022
3496	0760	00000	00000	00000	00030	00000	00000	00000	00022	00000	00000	00000	00014	00000	00000	00000	00024
0300	0764	00000	00000	00000	00026	00000	00000	00000	00026	00000	00000	00000	00026	00000	00000	00000	00022
0504	0770	00000	00000	00000	00022	00000	00000	00000	00027	00000	00000	00000	00023	00000	00000	00000	00021
0508	0774	00000	00000	00000	00014	00000	00000	00000	00016	00000	00000	00000	00023	00000	00000	00000	00016

FILE NO 1 RECORD NO 3 5120 CHARACTERS. BINARY

0000	0000	00000	00000	00000	00022	00000	00000	00000	00025	00000	00000	00000	00031	00000	00000	00000	00031
0004	0004	00000	00000	00000	00026	00000	00000	00000	00023	00000	00000	00000	00034	00000	00000	00000	00030
0008	0010	00000	00000	00000	00016	00000	00000	00000	00016	00000	00000	00000	00032	00000	00000	00000	00027
0012	0014	00000	00000	00000	00017	00000	00000	00000	00014	00000	00000	00000	00023	00000	00000	00000	00022
0016	0020	00000	00000	00000	00015	00000	00000	00000	00017	00000	00000	00000	00023	00000	00000	00000	00023
0020	0024	00000	00000	00000	00020	00000	00000	00000	00022	00000	00000	00000	00023	00000	00000	00000	00024
0024	0030	00000	00000	00000	00026	00000	00000	00000	00017	00000	00000	00000	00023	00000	00000	00000	00016
0028	0034	00000	00000	00000	00020	00000	00000	00000	00027	00000	00000	00000	00016	00000	00000	00000	00015
0032	0040	00000	00000	00000	00016	00000	00000	00000	00016	00000	00000	00000	00012	00000	00000	00000	00021
0036	0044	00000	00000	00000	00030	00000	00000	00000	00015	00000	00000	00000	00015	00000	00000	00000	00022
0040	0050	00000	00000	00000	00026	00000	00000	00000	00037	00000	00000	00000	00023	00000	00000	00000	00027
0044	0054	00000	00000	00000	00017	00000	00000	00000	00021	00000	00000	00000	00016	00000	00000	00000	00020
0048	0060	00000	00000	00000	00026	00000	00000	00000	00022	00000	00000	00000	00013	00000	00000	00000	00024
0052	0064	00000	00000	00000	00023	00000	00000	00000	00016	00000	00000	00000	00016	00000	00000	00000	00025
0056	0070	00000	00000	00000	00023	00000	00000	00000	00035	00000	00000	00000	00040	00000	00000	00000	00021
0060	0074	00000	00000	00000	00045	00000	00000	00000	00047	00000	00000	00000	00045	00000	00000	00000	00047
0064	0100	00000	00000	00000	00035	00000	00000	00000	00036	00000	00000	00000	00052	00000	00000	00000	00022
0068	0104	00000	00000	00000	00020	00000	00000	00000	00022	00000	00000	00000	00024	00000	00000	00000	00013
0072	0110	00000	00000	00000	00021	00000	00000	00000	00023	00000	00000	00000	00022	00000	00000	00000	00026
0076	0114	00000	00000	00000	00017	00000	00000	00000	00030	00000	00000	00000	00035	00000	00000	00000	00021
0080	0120	00000	00000	00000	00022	00000	00000	00000	00031	00000	00000	00000	00021	00000	00000	00000	00023
0084	0124	00000	00000	00000	00024	00000	00000	00000	00032	00000	00000	00000	00022	00000	00000	00000	00025
0088	0130	00000	00000	00000	00022	00000	00000	00000	00024	00000	00000	00000	00024	00000	00000	00000	00032
0092	0134	00000	00000	00000	00020	00000	00000	00000	00022	00000	00000	00000	00025	00000	00000	00000	00022
0096	0140	00000	00000	00000	00023	00000	00000	00000	00015	00000	00000	00000	00012	00000	00000	00000	00020
0100	0144	00000	00000	00000	00020	00000	00000	00000	00015	00000	00000	00000	00023	00000	00000	00000	00012
0104	0150	00000	00000	00000	00021	00000	00000	00000	00022	00000	00000	00000	00016	00000	00000	00000	00021
0108	0154	00000	00000	00000	00016	00000	00000	00000	00014	00000	00000	00000	00032	00000	00000	00000	00046
0112	0160	00000	00000	00000	00042	00000	00000	00000	00025	00000	00000	00000	00024	00000	00000	00000	00023
0116	0164	00000	00000	00000	00027	00000	00000	00000	00026	00000	00000	00000	00021	00000	00000	00000	00016
0120	0170	00000	00000	00000	00025	00000	00000	00000	00022	00000	00000	00000	00020	00000	00000	00000	00012
0124	0174	00000	00000	00000	00016	00000	00000	00000	00017	00000	00000	00000	00013	00000	00000	00000	00016
0128	0200	00000	00000	00000	00014	00000	00000	00000	00017	00000	00000	00000	00020	00000	00000	00000	00016
0132	0204	00000	00000	00000	00026	00000	00000	00000	00013	00000	00000	00000	00021	00000	00000	00000	00023
0136	0210	00000	00000	00000	00017	00000	00000	00000	00016	00000	00000	00000	00014	00000	00000	00000	00017
0140	0214	00000	00000	00000	00023	00000	00000	00000	00014	00000	00000	00000	00015	00000	00000	00000	00020
0144	0220	00000	00000	00000	00011	00000	00000	00000	00014	00000	00000	00000	00021	00000	00000	00000	00011
0148	0224	00000	00000	00000	00020	00000	00000	00000	00025	00000	00000	00000	00022	00000	00000	00000	00026
0152	0230	00000	00000	00000	00020	00000	00000	00000	00020	00000	00000	00000	00017	00000	00000	00000	00017

0376	0570	00000	00000	00000	01142	00000	00000	00000	01215	00000	00000	00000	01334	00000	00000	00000	01402
0380	0574	00000	00000	00000	01460	00000	00000	00000	01561	00000	00000	00000	01650	00000	00000	00000	01634
0384	0600	00000	00000	00000	01712	00000	00000	00000	01606	00000	00000	00000	01564	00000	00000	00000	01543
0388	0604	00000	00000	00000	01376	00000	00000	00000	01462	00000	00000	00000	01416	00000	00000	00000	01426
0392	0610	00000	00000	00000	01431	00000	00000	00000	01420	00000	00000	00000	01406	00000	00000	00000	01466
0396	0614	00000	00000	00000	01406	00000	00000	00000	01514	00000	00000	00000	01313	00000	00000	00000	01336
0400	0620	00000	00000	00000	01216	00000	00000	00000	01122	00000	00000	00000	01107	00000	00000	00000	00763
0404	0624	00000	00000	00000	00755	00000	00000	00000	00724	00000	00000	00000	00715	00000	00000	00000	00646
0408	0630	00000	00000	00000	00673	00000	00000	00000	00657	00000	00000	00000	00642	00000	00000	00000	00531
0412	0634	00000	00000	00000	00553	00000	00000	00000	00527	00000	00000	00000	00526	00000	00000	00000	00437
0416	0640	00000	00000	00000	00424	00000	00000	00000	00427	00000	00000	00000	00357	00000	00000	00000	00340
0420	0644	00000	00000	00000	00311	00000	00000	00000	00310	00000	00000	00000	00306	00000	00000	00000	00264
0424	0650	00000	00000	00000	00310	00000	00000	00000	00303	00000	00000	00000	00333	00000	00000	00000	00323
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FILE NO 1 RECORD NO 11 5120 CHARACTERS. BINARY

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0088	0130	00000	00000	00000	00055	00000	00000	00000	00054	00000	00000	00000	00057	00000	00000	00000	00061

Table 5. Energy and photopeak efficiency calibration for HR experiment.

Energy Calibration					
Channel	Energy (keV)	Channel	Energy (keV)	Channel	Energy (keV)
713.93	71.55	1763.48	177.05	2690.40	268.89
1048.46	105.24	2038.04	204.11	2969.70	296.58
1210.20	121.57	2081.28	208.37	2994.60	299.16
1359.79	136.66	2142.59	214.49	3281.40	327.82
1463.58	147.12	2179.93	218.10	3747.01	378.72
1524.48	153.27	2284.36	228.49	3780.91	385.23
1711.72	171.33	2338.63	233.89	3855.30	413.86
1739.47	174.37	2498.04	249.73	3864.88	418.73

Photopeak Efficiency Calibration					
Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield
30.0	1.48×10^5	116.	3.70×10^4	225.	8.35×10^3
47.0	1.48×10^5	121.	3.42×10^4	234.	7.50×10^3
52.0	1.33×10^5	125.	3.15×10^4	242.	6.90×10^3
60.0	1.10×10^5	130.	2.89×10^4	251.	6.25×10^3
70.0	8.85×10^4	136.	2.68×10^4	262.	5.70×10^3
72.5	8.45×10^4	141.	2.48×10^4	274.	5.20×10^3
75.8	7.90×10^4	146.	2.30×10^4	284.	4.72×10^3
78.5	7.45×10^4	152.	2.10×10^4	294.	4.28×10^3
81.5	7.00×10^4	158.	1.93×10^4	308.	3.86×10^3
84.8	6.60×10^4	164.	1.75×10^4	319.	3.51×10^3
88.3	6.15×10^4	171.	1.61×10^4	331.	3.21×10^3
92.0	5.70×10^4	177.	1.48×10^4	345.	2.59×10^3
95.7	5.30×10^4	185.	1.33×10^4	358.	2.45×10^3
99.5	4.90×10^4	192.	1.23×10^4	372.	2.31×10^3
103.0	4.56×10^4	199.	1.11×10^4	388.	2.21×10^3
107.0	4.35×10^4	206.	1.02×10^4	405.	1.96×10^3
111.0	3.98×10^4	216.	9.25×10^3		

Table 6. Energy and photopeak efficiency calibration for G6 experiment.

Energy Calibration					
Channel	Energy (keV)	Channel	Energy (keV)	Channel	Energy (keV)
276.9	99.6	768.5	277.6	2832.3	1015.1
288.3	103.8	996.0	359.7	3279.3	1173.2
580.7	209.8	1171.4	423.1	3532.0	1279.2
631.7	228.2	1634.8	589.6	3709.7	1332.5

Photopeak Efficiency Calibration ^{a)}					
Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield
60.	4864.	190.	3174.	580.	389.
70.	5888.	200.	2892.	600.	376.
80.	6528.	220.	2406.	650.	333.
90.	6912.	240.	1997.	700.	297.
100.	6784.	260.	1638.	750.	269.
110.	6400.	280.	1357.	800.	241.
120.	6144.	300.	1203.	850.	218.
130.	5708.	340.	947.	900.	194.
140.	5325.	380.	806.	1000.	161.
150.	4838.	420.	678.	1100.	138.
160.	4378.	460.	576.	1200.	118.
170.	3917.	500.	491.	1300.	105.
180.	3584.	540.	433.		

a) These absolute efficiencies are not as well determined as the HR experimental efficiencies. For best absolute accuracy a photopeak should be normalized to the HR results and then use these efficiencies as relative standards.

Table 7. Energy and photopeak efficiency calibration for GX experiment.

Energy Calibration					
Channel	Energy (keV)	Channel	Energy (keV)	Channel	Energy (keV)
315.1	104.0	613.2	211.6	1660.0	589.0
502.8	171.7	949.7	332.9	2287.2	815.4
519.4	199.4	1024.0	359.7	3568.2	1279.5

Photopeak Efficiency Calibration a)

Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield
60.	42670.	190.	27840.	580.	3412.
70.	51650.	200.	25370.	600.	3298.
80.	57260.	220.	21100.	650.	2921.
90.	60630.	240.	17520.	700.	2605.
100.	59510.	260.	14370.	750.	2359.
110.	56140.	280.	11900.	800.	2114.
120.	53890.	300.	10550.	850.	1912.
130.	50070.	340.	8307.	900.	1701.
140.	46710.	380.	7070.	1000.	1412.
150.	42440.	420.	5947.	1100.	1210.
160.	38400.	460.	5050.	1200.	1035.
170.	34300.	500.	4307.	1300.	921.
180.	31440.	540.	3798.		

a) See note on Table 6.

Table 8. Energy and Photopeak Efficiency Calibration for COAX Experiment.

Energy Calibration					
Channel	Energy (keV)	Channel	Energy (keV)	Channel	Energy (keV)
396.9	199.3	513.0	258.5	1173.9	589.6
421.0	211.6	585.4	296.0	2348.5	1173.2
470.5	236.9	659.4	332.9	2667.5	1332.5
478.8	240.8	712.4	359.7		

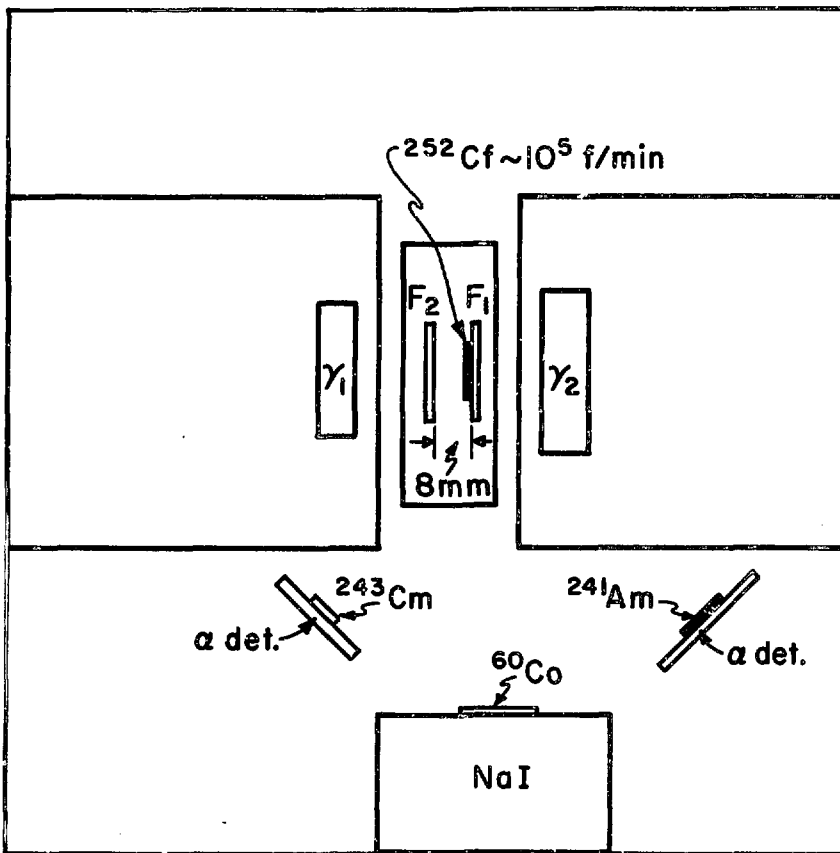
Photopeak Efficiency Calibration a)

Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield	Energy (keV)	Counts for 1%/Fission Yield
130.	24395.	380.	5474.	900.	1549.
150.	21420.	440.	4403.	950.	1481.
170.	16838.	460.	4165.	1000.	1374.
190.	14399.	480.	3927.	1100.	1190.
210.	12495.	500.	3689.	1200.	1053.
230.	11126.	540.	3320.	1300.	940.
250.	9995.	580.	2986.	1400.	845.
270.	8865.	600.	2856.	1500.	768.
290.	8032.	650.	2558.	1600.	708.
300.	7616.	700.	2350.	1700.	648.
320.	6961.	750.	2130.	1800.	601.
340.	6426.	800.	1909.	1900.	559.
360.	5890.	850.	1749.	2000.	523.

a) See note on Table 6.

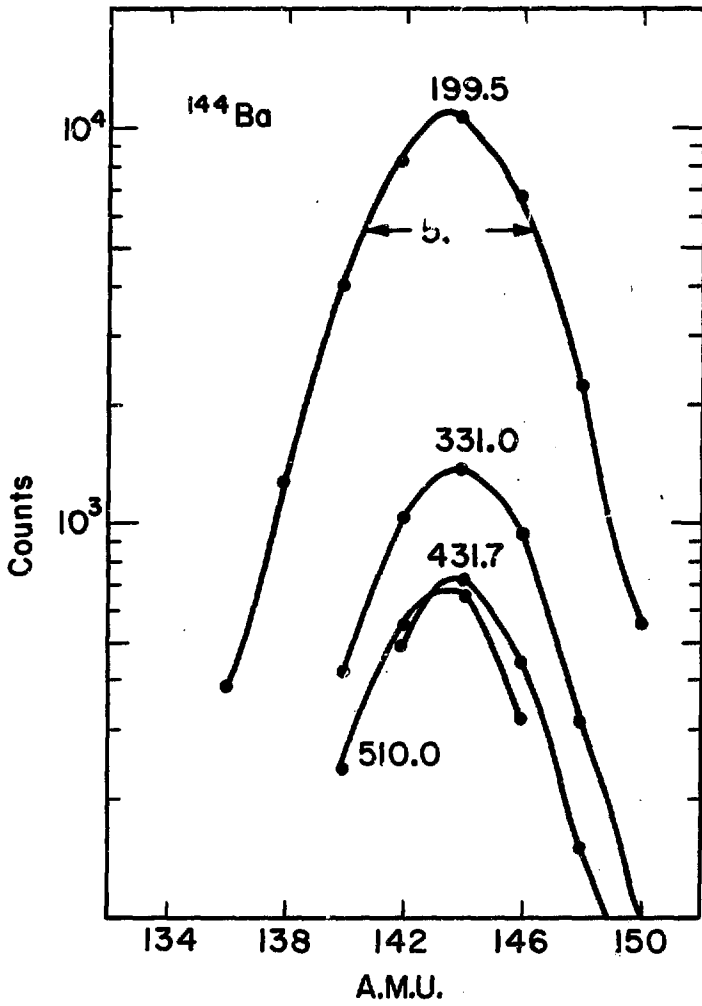
FIGURE CAPTIONS

- Fig. 1. General schematic representation of the detector configuration. Detectors F_1 (with electrodeposited ^{252}Cf) and F_2 measured kinetic energies of the fragments. Detectors γ_1 and γ_2 measured energies of γ -rays and/or x-rays. The sources and detectors indicated in the bottom of the figure were used for external stabilization of the photon detectors.
- Fig. 2. An example showing the mass resolution for four specific transitions associated with the isotope ^{144}Ba . Each point represents the intensity of the gamma ray observed in the mass interval indicated on the abscissa. The width of the distribution for this isotope is ~ 5.6 a.m.u. (FWHM). Depending on the mass with which the γ -ray is associated the width can vary from ~ 4 -7 a.m.u. It should be noted the centroid of this distribution is about $A = 143.5$ and not $A = 144$ even though these transitions are associated with the isotope ^{144}Ba (see text for discussion on this subject).
- Fig. 3. An example of portions of mass sorted gamma ray spectra recorded in the HR experiment. The top spectrum is for transition from fission products stopped in fragment detector F_1 having masses between 103-105 and the bottom spectrum is for the mass interval 105-107. The straight line is for energy calibration. Each spectrum is plotted twice with the top spectrum being equal to the bottom spectrum multiplied by 5.



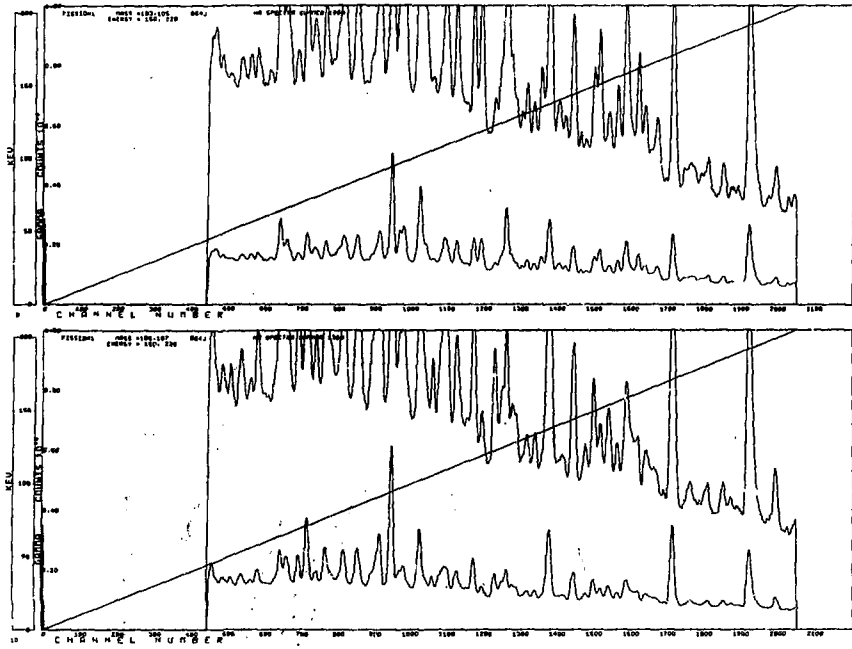
XBL703-2403

Fig. 1



XBL703-2398

Fig. 2



XBL 700-1785

Fig. 3