DATA SET CATALOG #11

Explorer 18 Energetic Particles

63-046A-05A 2 tapes

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1. INTRODUCTION:

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

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

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

2. ERRATA/CHANGE LOG:

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

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

Version	Date	Person	Page	Description of Change
01				
02				

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

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

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

4. CATALOG MATERIALS:

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

b. Core Catalog Materials

IMP-A

GM TUBE & ION CHAMBER COUNTS, DATA

63-046A-05A

THIS DATA SET HAS BEEN RESTORED. THERE WERE ORIGINALLY TWO 7-TRACK, 800 BPI TAPES, WRITTEN IN BCD. THERE IS ONE RESTORED TAPE, WRITTEN IN EBCDIC. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON AN IBM 360 COMPUTER. THE DR AND DS NUMBER ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR003337	DS003337	D000077	1-1262	11/28/63 - 04/21/64
		D000078	1263-2177	02/23/64 - 03/26/65

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EXPLORER 18 - ENERGETIC PARTICLES

63-046A-05A

Information on the time spans of the Tapes:

D-00077 & C-00029 (dupe)
D-00078 & C-00030 (dupe)

D-00077 has a start time of Nov. 27, 1963 and an end time of May 30, 1964 on its tape label.

D-00078 has no start time or end time on its label.

Actual listings of the tapes show:

D-00077 Nov. 28, 1963 - April 21, 1964
D-00078 Feb. 23, 1964 - March 26, 1965

as the start and end times.

Launch data was Nov. 26, 1963 and significant data was obtained until May 1965. Eleven minutes of data was obtained on May 10, 1965.

II. DESCRIPTION OF THE DATA FORMAT ON MAGNETIC TAPES SUPPLIED TO THE NATIONAL SPACE SCIENCE DATA CENTER

The magnetic tapes submitted to the National Space Science Data Center contain all the data from the University of California experiments on the IMP-1, 2 and 3 spacecraft. They were generated by stacking many short data tapes received from Goddard Space Flight Center on a few 2400 foot reels. The stacked tapes were written on an IBM 360/40 system. They contain external BCD characters written in 7 track mode in even parity at 800 char/in density.

The first file on each stacked tape is a one record file which serves as an index to that tape. The physical record (gap to gap) is 1032 characters long and consists of 86 twelve character logical records. There is one index entry for each of the GSFC short reels stacked on the larger tape. The entries are in the following format:

Chars	
1-6	GSFC reel number
7-9	Number of files contained on the GSFC tape
10-12	Blank

Following the index file is the stacked experiment data copied from the GSFC reels. The data is in the same file by file format as it appeared on the original tapes except that a 12-character field has been prefixed to each record to identify it to UC programs using these tapes. The individual records are 1032 characters (including prefix field) and are formatted as follows:

Chars	
1-6	The GSFC reel number on which this record originally appeared

7-9 The file number within that GSFC reel

10-12 The record number within the above file

13-1032 The experimental data in its original format (see separate tape format sheet)

The last file on each of the GSFC tapes is a one record file with the twelve character identification field (i.e., Satellite No., Month, Day, etc.) set to nines. This file has also been copied onto the stacked tape. Thus the first record of the following file on the stacked tape will have a different GSFC reel number and a file number of 1 in the prefix field. Two end of file marks will follow the last valid data file on the stacked tape.

The following is a description of the three non-numeric characters which can occur in the data and their significance.

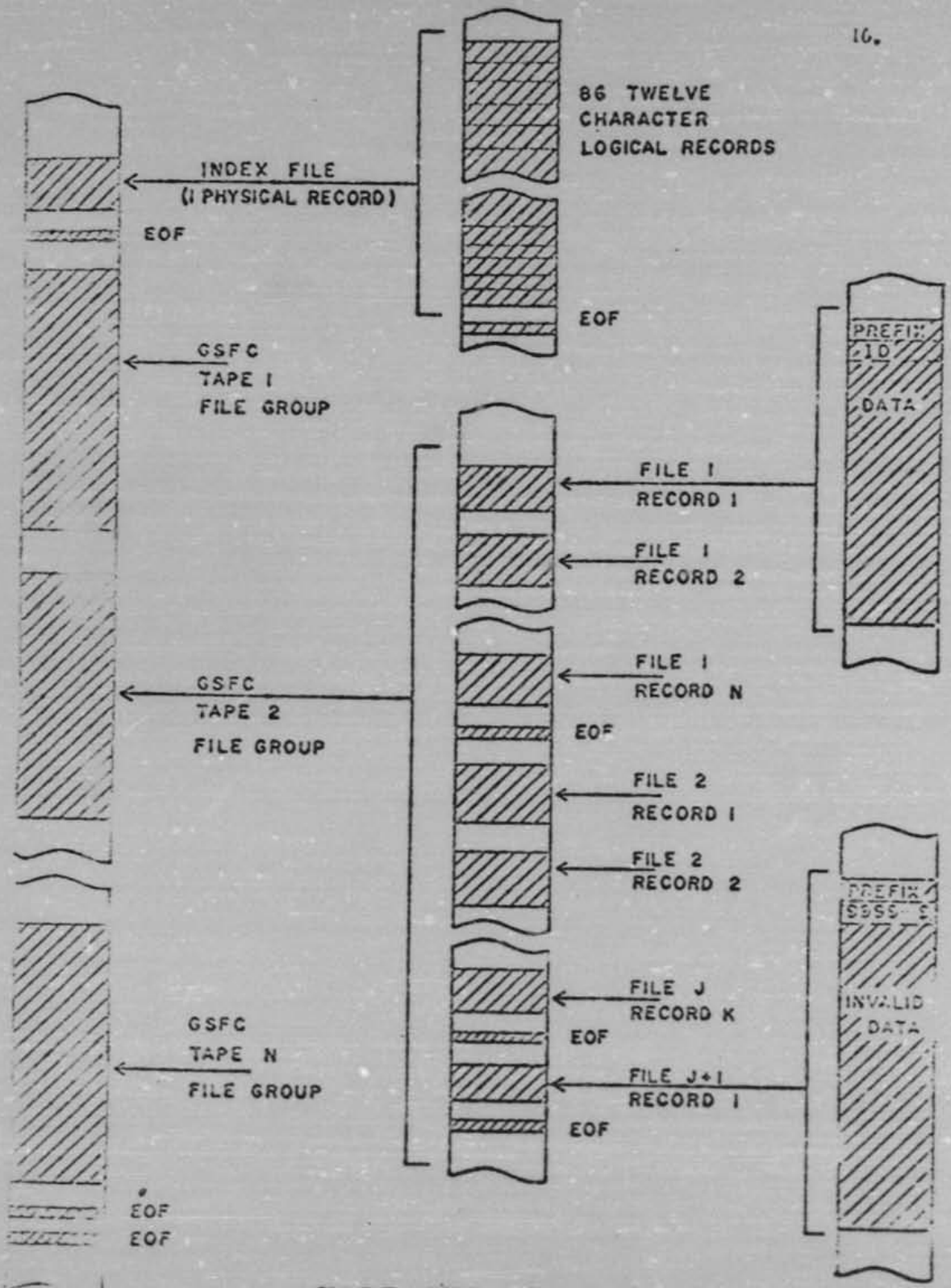
(1) "@" represents a system error

(2) "=" represents missing data

(3) ":" represents loss of synchronization

The "@" and "=" symbols appear only in the data. The ":" can appear anywhere in the sequence. Once a colon is present, no other character but a colon can follow. As a result the frame length computation may be in error; however, the sequence count is correct and may be used to fill in missing time.

Time gaps appear as a result of the loss of synchronization or in the absence of a signal in which case the "=" symbol is generated.



TAPE STRUCTURE

Figure 8

IMP-1 Stacked Data Tape Format

Item	Tape Chars	Significance	
1	1-6	Original GSFC reel number	
2	7-9	File number within GSFC reel	Prefix field
3	10-12	Record number within above file	
4	13-14	Satellite number	
5	15-16	Month of analog tape generation	
6	17-18	Day of analog tape generation	ID field
7	19	Year of analog tape generation	
8	20-21	Station number	
9	22-24	Analog tape number	
10	25-27	Universal time - day	
11	28-29	Universal time - hours	
12	30-31	Universal time - minutes	
13	32-36	Universal time - milliseconds	
14	37-41	Sequence counter	
15	42	Frame time in seconds	
16	43-45	Frame time in milliseconds	
17	46	Sequence ID	Data field
18	47	ET flag 1	
19	48-52	F1 data - background counter	
20	53	ET flag 2	
21	54-58	F4 data - Beta counter	
22	59	ET flag 3	
23	60-64	F9 data - background counter if sequence ID is different from 1. Ion chamber read-out if sequence ID equals 1	
24	65	ET flag 4	
25	66-70	F12 data - Beta counter	
26	71-74	OA. data, AZANG	
27	75-76	OA. data, PS	
28	77-80	OA. data, SPIN	

Repeat items 10-28 seventeen times

Note 1: Items 19, 23 and 21, 25 are decimal integers representing the counts from accumulators 5 and 6 respectively. The raw count rates B_R and BKD_R may be calculated as follows:

$$B_R = \frac{4 \times B}{39.36} \quad , \quad BKD_R = \frac{4 \times BKD}{39.36}$$

where

B = the value of item 21 or 25

BKD = the value of item 19 or item 23 when sequence ID is different from 1

The Ion Chamber rate is calculated as follows:

$$IC_c = \frac{32767 - IC}{327.68}$$

where

IC = the value of item 23 when sequence ID equals 1.

All rates are in pulses per second.

Note 2: Items 26, 27, 28 are raw optical aspect data. Items 26 and 28 are given as decimal integers. Item 27 is given as an octal integer. The spin period, polar solar angle and the azmuthal angle may be found as follows:

A. Spin period (in seconds) = SPIN/200

B. Polar solar angle, B, (the spin axis, spacecraft, sun angle) is found directly from Table II using the value of item 27, PS.

C. Azmuthal angle, ψ°, (the sun, spacecraft, optical sensor angle) as a particular sequence is calculated by:

$$\psi^{\circ} = -f(B) + \left[\frac{\left(To,o - T_{4,0} - \frac{AZANG}{200} \right)}{\frac{SPIN}{200}} \times 360^{\circ} \right]$$

where AZANG is the value of item 26

SPIN is the value of item 28

$T_{4,0}$ is the time of frame 4, channel 0

f(B) is the correction factor found from Table "I

To,o is the time of frame 0, channel 0.

EXP. 18 IMP 1 CHARGED PARTICLE EXPERIMENT

Figure (1)
Page 1 of 1

BCD TAPE FORMAT

63-01A-05b

Symbol	Format	Description
1-6		Sequence counter
7-8		Station number
9-11		Universal time - day
12-13		Universal time - hours
14-15		Universal time - minutes
16-20		Universal time - milliseconds
21		Frame time in seconds
22-24		Frame time in milliseconds
25		Sequence ID
26		ET1
27-31		F1 data - background counter
32		ET2
33-37		F4 data - Beta counter
38		ET3
39-43		F9 data - background counter if Sequence ID is $\neq 1$, Ion chamber readout if Sequence ID = 1,
44		ET4
45-49		F12 data counter
50-53		Azimuthal angle
54-55		Polar solar angle
56-59		Spin period
60		Blank

DATA USERS' NOTE

NSSDC 67-38

EXPLORER 18 (1963 46A)

ENERGETIC PARTICLES EXPERIMENT

AUGUST 1967

NATIONAL SPACE SCIENCE DATA CENTER

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

DATA USERS' NOTE
NSSDC 67-38

EXPLORER 18 (1963 46A)
ENERGETIC PARTICLES EXPERIMENT

EXPERIMENTERS
K. A. Anderson
H. K. Harris

AUGUST 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 18 (1963 46A) energetic particles 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).

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BACKGROUND

The Explorer 18 (1963 46A) energetic particles experiment was designed by researchers at the University of California to measure absolute fluxes of geomagnetically trapped particles and to continue the mapping of the outer boundary of geomagnetic trapping over a certain range of sun-earth-satellite angles. This experiment was one of seven (see Figure 1) carried aboard the Explorer 18 (1963 46A) satellite.

FIGURE 1
EXPLORER 18 EXPERIMENTS

No.	Experiment	Investigator(s)	Affiliation
01	Retarding Potential	G. P. Serbu	GSFC*
		E. Maier	GSFC*
02	Magnetic Fields	N. Ness	GSFC*
03	Solar and Galactic Protons (Cosmic-Ray)	J. A. Simpson	University of Chicago
		C. Y. Fan	University of Chicago
		G. Gloeckler	University of Chicago
04	Cosmic-Ray	F. B. McDonald	GSFC*
		G. Ludwig	GSFC*
		V. Balasubrahmanyan	GSFC*
		T. L. Cline	GSFC*
05	Energetic Particles	K. A. Anderson	University of California
		H. K. Harris	University of California
06	Ames Plasma Probe	J. H. Wolfe	ARC**
		R. W. Silva	ARC**
07	Plasma Probe	H. S. Bridge	MIT***
		A. Egidi	MIT***
		A. Lazarus	MIT***

*Goddard Space Flight Center.
**Ames Research Center.
***Massachusetts Institute of Technology.

The Explorer 18 satellite, also known as IMP 1, was launched from Cape Canaveral (Cape Kennedy), Florida, on November 27, 1963, at 0230 UT. The satellite achieved an initial apogee of 197 616 km (geocentric) and a perigee altitude of 192 km. IMP 1 had an initial period of ~ 93.5 hr, an inclination to the earth's equator of 33.3 deg, and an eccentricity of 0.937. The spacecraft was spin stabilized at an initial rate of 22.3 rpm with an initial satellite spin-axis sun angle of 111 deg, measured by the spacecraft optical aspect sensor.[1,2]

EXPERIMENTERS

*K. A. Anderson - University of California
*H. K. Harris - University of California

EXPERIMENT

Instrumentation and Measurements

Three energetic particle detectors were used for this experiment - two Geiger-Mueller tubes and an ionization chamber radiation monitor.

Two Lionel-Anton type 213 Geiger-Mueller tubes were used to detect fluxes of electrons with energy > 45 kev. One tube (GM1) was directed toward an .008-in. gold foil designed to scatter electrons into the detector's mica window. The second tube (GM2) served as a background detector. Both tubes had a total shielding of 3.09 gm/cm^2, including epoxy, eccofoam, stainless steel, and 2.8 gm/cm^2 of copper. GM1 had a mica end window with a density thickness of 1.7 ± .3 mg/cm^2. This shielding and the energy loss due to backscattering set the low-energy limit of 45 kev for electrons detected through the aperture. The gold foil was directly accessible to the space environment through the satellite skin. The acceptance cone for electrons was about 60 deg full angle. In order to enter the detector's mica window, particles had to be scattered through the approximately 114-deg scatter angle, an occurrence which was highly improbable for heavier particles. The arrangement was based on the assumption that electrons over a wide energy range would scatter back into the counter window with moderately high efficiency, and that protons would lose most or all of their energy before traversing enough matter to undergo a large angle scattering.[1,3]

The ionization chamber was a 3-in. diameter aluminum sphere filled with argon gas at a pressure of 7 atm. The chamber was used in conjunction with

*Address: Space Sciences Laboratory, University of California, Berkeley, California, 94720.

a Neher type electrometer. Any radiation with sufficient energy to penetrate the ionization chamber wall ionized the argon gas, and the negative charge thereby formed was collected on the positively charged platinum-coated rod in the center of the chamber. A tungsten fiber, located near the base of the collector rod, was attracted to the collector when the voltage between the collector rod and the fiber reached a critical value V_c. The accumulated electric charge (negative) of the collector rod then flowed through the fiber, yielding a pulse at the ionization chamber terminal. The charge per pulse for a typical chamber is 3×10^{-10} coulombs.

The ionization chamber had a shielding of 0.43 gm/cm^2 provided by the aluminum wall of the chamber and 2 cm of eccofoam.[3]

Calibration. The effectiveness of the Geiger-Mueller detector (GM1) was directly confirmed using a beam of 4-Mev protons from a cyclotron. Only an upper limit to the efficiency for detecting protons either directly or indirectly by X-ray excitation could be obtained. This upper limit was 0.1%. Additional verification of the effectiveness of discrimination came from the fact that, during the flight of Explorer 18, fluxes of low-energy protons were encountered by other experiments using proton detectors, but at these times the electron counter showed no observable increases in its directional scatter response. The electron scatter efficiency was about 13 ± 2% in the geometry employed (although only 7% of the electrons which scattered from the gold foil actually reached the active portion of the GM tube), and was constant over a wide range of energy. This result was obtained by means of a beta-ray spectrometer that was used to make measurements with a variable-energy electron beam. The device was thus a nonweighting spectrum integrator.[1]

The minimum electron energy to which the counter responded was determined by two factors. It was known from previous experiments that the Geiger-tube window transmits electrons into the active volume with a 30% efficiency at 40 kev. The energy loss in the gold foil as the electron backscatters is 5 kev or less for the lowest energy electron entering the counter based upon β-particle spectrometer measurements. The counter thus has a threshold energy of approximately 45 kev. This counter could, therefore, be compared with type 213 counters aboard satellites such as Explorers 12 and 14. The 5-kev difference in threshold is probably negligible, considering the errors present in determining geometry factors and window thickness and in making dead-time corrections.[1]

The absolute flux of electrons > 45 kev incident on the scatter geometry is given by

$$J_0 = \frac{4\pi}{\epsilon G_1} R_t = \frac{4\pi}{\epsilon G_1} \frac{R}{1 - \tau R}$$

In this expression, the flux has been assumed to be isotropic over 4π ster. G_1 is the telescope factor of the opening from the gold foil into free space. The numerical value is 2.5×10^{-2} cm^2 ster. The quantity ϵ is the fraction of electrons incident on the gold foil from the entrance geometry that reaches the active volume of the Geiger tube; this fraction is 7×10^{-2}. R is the apparent rate of the detector as determined from the accumulated counts in the scalers. τ is the dead time of the Geiger tube; its value is 100 μsec. The omnidirectional electron flux is thus

$$J_o = 7000\, R_t \text{ cm}^{-2} \text{ sec}^{-1}$$

One precaution is necessary. For counting rates less than about 10 sec^{-1}, the cosmic-ray background rate must be subtracted before using the above conversion factor. For the Geiger counter used in this experiment, the cosmic-ray background rate varied from 0.9 sec^{-1} early in the satellite's lifetime to about 1.4 sec^{-1} during the more quiet solar periods.[1]

The calibration of the ionization chamber was based on the absorption of energy in units of roentgens per hour. The dynamic range of a typical chamber is 10^{-3} pulses per second (2 mr/hr) to 7 pulses per second (approximately 100 r/hr), although its response to radiation begins to depart from linearity at about 0.4 pulses per second (approximately 1 r/hr). Absolute calibration of pulse rate vs radiation level in roentgens per hour has been obtained with +2% accuracy. A typical calibration curve is shown in Figure 2.[3]

Telemetry

The Explorer 18 telemetry system used a hybrid, time-multiplexed, pulse-frequency modulation (PFM) encoding technique. The basic telemetry format consisted of 256 channels arranged 16 channels in a frame, with 16 frames in a sequence. One sequence was required to sample all experiments and required 81.92 sec. The 256 channels making up a sequence were commutated samples of data in the form of an audio frequency.[4]

Signal processing for both of the Geiger tubes was nearly identical, the exception being an electronic switch in the GM2 channel. Outputs from the detectors were fed to pulse shapers, which drove divide-by-four stages. The divide-by-four stage output of GM1 was fed to a buffer stage, whereas the divide-by-four stage output of GM2 went first to an electronic switch and then to a buffer stage. The buffer stages provided transformer-isolated drive to

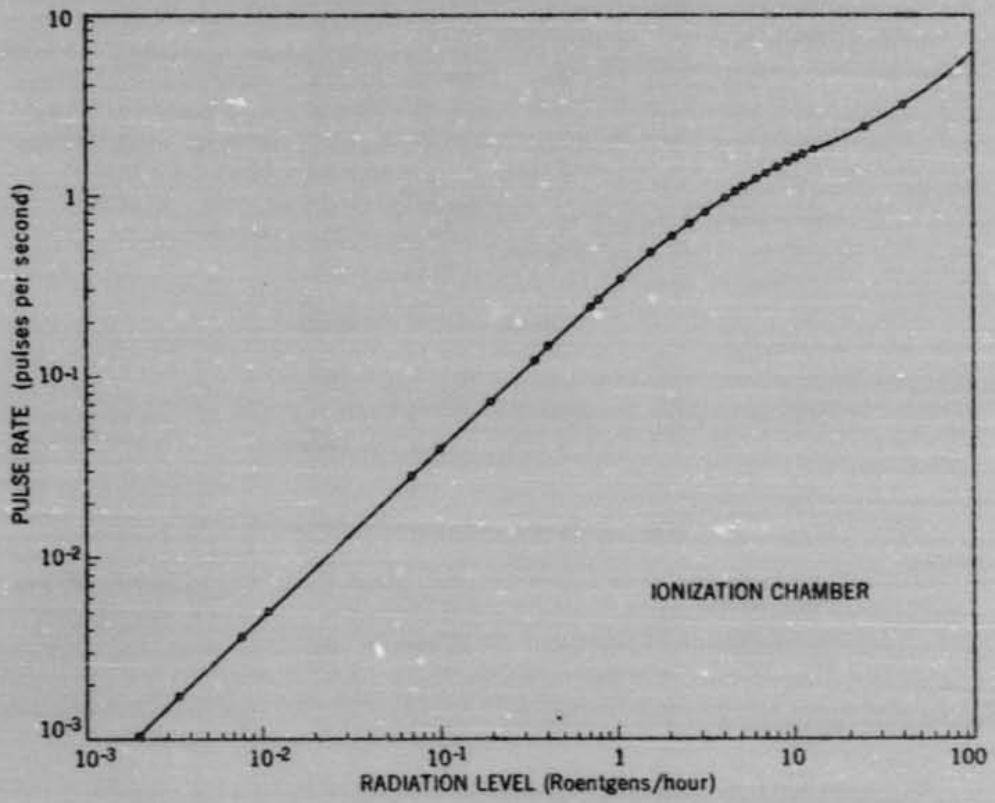

Figure 2. Ionization Chamber Calibration Curve

the 2^{15} accumulators (GM1 tc accumulator #6, GM2 to accumulator #5) in the Explorer 18 encoder. These accumulators were read out twice per telemetry sequence (every 40.96 sec) and were reset after each readout. The readout of each accumulator required 1.6 sec; No. 6 read out 15.36 sec after No. 5.

Synchronization (timing) information was fed to the experiment via four lines to identify the 1.6-sec readout positions in the telemetry format of both accumulators, No. 5 and No. 6. The third line identified the first readout position of No. 5 in each sequence, and the fourth line identified the occurrence of sequence 4. From these four lines, the experiment derived the necessary timing information to operate the two electronic switches and the clock.

In the Explorer 18 telemetry format, which was essentially composed of a cycle of four equal time intervals called sequences (each equal to 81.92 sec),

accumulators No. 5 and No. 6 were read out twice in each of the first three telemetry sequences. In sequence 4, these accumulators were not "seen" in the telemetry, although they were still accumulating for each 40.96 - 1.6 = 39.36-sec interval. The GM1 detector was thus "seen" by the No. 6 accumulator six times every four sequences, or $39.36/40.96 \times 6/8 \times 100\% = 72.1\%$ of real time. The GM2 detector readout was similar to that of GM1, the differences being that the second readout position of accumulator No. 5 in sequence 1 was occupied by ionization chamber information rather than GM2 count-rate data. GM2 was thus "seen" by the No. 5 accumulator five times every four sequences, or $39.36/40.96 \times 5/8 \times 100\% = 60.1\%$ of real time.[3]

Because of the normally slow pulse rate of the ionization chamber information, a 2^{15} accumulator was incorporated for temporary storage of the ionization chamber information. With this scheme, the probability of missing a random ion chamber pulse was reduced to $1.6/327.68 \times 100\% = 0.49\%$, and the ion chamber was "seen" during $326.08/327.68 \times 100\% = 99.5\%$ of real time.[3]

Operational Experience

The apogee of Explorer 18 was lower than planned and continued to decrease with time. Thus, on the day following launch (November 28, 1963), the apogee was measured at 197 615.8 km as compared with the nominal figure of 277 184 km. By January 16, 1964, it had decreased to 195 552.8 km. The experimenters were of the opinion, however, that the accomplishment of the scientific mission was not compromised by the lower apogee.[2]

The spacecraft functioned satisfactorily until May 30, 1964, when it began to turn off and turn on in a repetitive series. There was no further continuous operation until November 12, 1964, when the station at Mojave acquired and recorded the signal from Explorer 18 for about 6 hr. The satellite operated approximately 90% of the time from then until December 15, 1964. There were only intermittent periods of operation thereafter. Eleven min of data were obtained on May 10, 1965, and all attempts at further data acquisition were abandoned.[5]

Both the Geiger counters and the ionization chamber performed satisfactorily throughout the active lifetime of the satellite, which made about 100 passes through the radiation zone.[1]

DATA

Reduction Techniques

Data from this experiment were recorded on 37 data tapes, which GSFC delivered to the University of California for reduction and analysis. These 37 tapes were stacked to generate two magnetic tapes containing all of the experimental data. The stacked tapes were written on an IBM 360 system and contain BCD characters written on a 7-track tape in even-parity at a density of 800 bpi.[6]

Timespan of Data

Data from this experiment available at NSSDC cover the period of November 27, 1963, to May 30, 1964.

Format of Available Data

The first file on each of the two stacked tapes is a one-record file that serves as an index to that tape. Each of these physical records is 1032 characters long and consists of 86 twelve-character logical records. There is one index entry for each of the GSFC short reels stacked on the larger tape. Tape 1 contains 20 entries; tape 2 contains 17 entries. The remaining index entries are blank. The entries are in the following format:

Characters	Description
n + 1-n + 6	GSFC reel number
n + 7-n + 9	Number of files contained on the GSFC tape
n + 10-n + 12	Blank

where n = 0, . . . , 19; and n = 0, . . . , 16 respectively.

The stacked experiment data copied from the GSFC reels follows the index file. The data are in the same file-by-file format as appeared on the original tapes, except that a 12-character field has been prefixed to each record in order to identify it to the University of California programs using these tapes. The individual physical records are 1032 characters and include 24 characters for prefix and identification fields and 18 repetitions of a 56-character data field. The governing format for each physical record is given in Figure 3. The ET flags are explained in the following paragraphs.

FIGURE 3
EXPLORER 18 STACKED DATA TAPE FORMAT

Item	Tape Characters	Significance	
1	1-6	Original GSFC reel number	
2	7-9	File number within GSFC reel	Prefix field
3	10-12	Record number within above file	
4	13-14	Satellite number	
5	15-16	Month of analog tape generation	
6	17-18	Day of analog tape generation	ID field
7	19	Year of analog tape generation	
8	20-21	Station number	
9	22-24	Analog tape number	
10	25-27	Universal time - day	
11	28-29	Universal time - hours	
12	30-31	Universal time - minutes	
13	32-36	Universal time - milliseconds	
14	37-41	Sequence counter	
15	42	Frame time in seconds	Data field
16	43-45	Frame time in milliseconds	
17	46	Sequence ID	
18	47	ET flag 1 see page 12	
19	48-52	F1 data - background counter*	
20	53	ET flag 2 see page 12	
21	54-58	F4 data - Beta counter*	
22	59	ET flag 3 see page 12	
23	60-64	F9 data - background counter if sequence ID is different from 1; ion chamber readout if sequence ID equals 1*	
24	65	ET flag 4 see page 12	
25	66-70	F12 data - Beta counter*	
26	71-74	Azimuthal angle (AZANG)**	
27	75-76	Polar solar angle (PS)**	
28	77-80	Spin period (SPIN)**	
Then repeat items 10-28 for 17 more times.			

* Items 19, 23 and 21, 25 are decimal integers representing the counts from accumulators 5 and 6, respectively. The raw count rates β_R and BKD_R may be

FIGURE 3 (Cont'd)

calculated as follows:

$$\beta_R = \frac{4 \times B}{39.36} \qquad BKD_R = \frac{4 \times BKD}{39.36}$$

where

β = the value of item 21 or 25
BKD = the value of item 19 or item 23 when sequence ID is different from 1

The Ion Chamber rate is calculated as follows:

$$IC_c = \frac{32767 - IC}{327.68}$$

where

IC = the value of item 23 when sequence ID equals 1. All rates are in pulses/second.

** Items 26, 27, 28 are raw optical aspect data. Items 26 and 28 are given as decimal integers. Item 27 is given as an octal integer. The spin period, polar solar angle and the azimuthal angle may be found as follows:

A. Spin period (in seconds) = SPIN/200

B. Polar solar angle, B, (the spin axis, spacecraft, sun angle) is found directly from Figure 4 using the value of item 27, PS.

C. Aximuthal angle, ψ°, (the sun, spacecraft, optical sensor angle) as a particular sequence is calculated by:

$$\psi^\circ = -f(B) + \frac{\left(T_{0.0} - T_{4.0} - \frac{AZANG}{200}\right)}{\frac{SPIN}{200}} \times 360^\circ$$

FIGURE 3 (Cont'd)

where AZANG is the value of item 26.

SPIN is the value of item 28.

T4, 0 is the time of frame 4, channel 0.

f(B) is the correction factor found from Figure 4.

To, o is the time of frame 0, channel 0.

The last file on each of the GSFC tapes is a one-record file with the 12-character identification field (i.e., satellite number, month, day, etc.) set to nines. This file has also been copied onto the stacked tape. Thus the first record of the following file on the stacked tape will have a different GSFC reel number and a file number of 1 in the prefix field. Two end-of-file (EOF) marks will follow the last valid data file on the stacked tape.

The three non-numeric characters that can occur in the data, and their significance, are as follows:

"@" represents a system error
"=" represents missing data
":" represents loss of synchronization

The "@" and "=" symbols appear only in the data; the ":" symbol can appear anywhere in the sequence. Once a colon is present, no other character but a colon can follow. As a result, the frame-length computation may be in error; however, the sequence count is correct and may be used to fill in missing time.

Time gaps appear as a result of the loss of synchronization or in the absence of a signal, in which case the "=" symbol is generated.[6]

SIGNIFICANCE OF ET FLAGS

The following is a complete description of ET flags as presented in reference 7 and refers to the processing the data underwent before being sent to the experimenters.

Even ET FLAGS mean that all program checks were made. Odd ET FLAGS mean that data were processed without some important checks, and the satellite clock reading could be in error.

FIGURE 4

IMP 1
OPTICAL ASPECT SENSOR CALIBRATION

PS Octal	B	f(B)	PS Octal	B	f(B)
40	0° 10'	-		94° 18'	
41	1° 24'	-	21	96° 10'	1.52°
43	4° 42'	-	23	99° 10'	1.54°
42	5° 10'	-	22	99° 50'	1.55°
46	11° 04'	17.25°	26	105° 54'	1.55°
47	12° 0'	8.70°	27	107° 50'	1.65°
45	17° 02'	8.00°	25	110° 59'	1.67°
44	18° 12'	5.85°	24	113° 08'	1.70°
54	22° 52'	5.45°	34	117° 56'	1.76°
55	24° 36'	4.40°	35	120° 08'	1.80°
57	28° 53'	4.12°	37	123° 01'	1.95°
56	29° 44'	3.48°	36	124° 56'	2.07°
52	34° 42'	3.42°	32	129° 51'	2.18°
53	36° 16'	2.90°	33	132° 08'	2.40°
51	40° 14'	2.80°	31	134° 56'	2.52°
50	41° 40'	2.60°	30	137° 31'	2.70°
70	46° 42'	2.56°	10	141° 39'	2.88°
71	48° 36'	2.22°	11	143° 52'	3.18°
73	52° 08'	2.17°	13	146° 46'	3.45°
72	52° 56'	2.00°	12	147° 22'	3.75°
76	58° 50'	1.96°	16	152° 44'	3.80°
77	60° 26'	1.88°	17	156° 0'	4.72°
75	64° 14'	1.80°	15	159° 16'	5.40°
74	65° 32'	1.76°	14	161° 16'	5.95°
64	70° 58'	1.72°	04	163° 36'	6.65°
65	72° 55'	1.65°	05	168° 04'	7.80°
67	76° 18'	1.60°	07	169° 44'	10.1°
66	77° 04'	1.56°	06	173° 0'	11.60°
62	82° 56'	1.54°	02	175° 44'	16.60°
63	84° 30'	1.50°	03	180° 0'	22.50°
61	87° 14'	1.50°	01		-
60	90° 30'	1.50°			
20		1.50°			

It should be noted that an ET FLAG of ∅ means that everything is probably good, and 4 means that, because of noise, NSFUDG was guessed. (NSFUDG is defined in the next section.) ET FLAGS will be even provided that the following was done;

1. The analog line was continuously checked through the program and five consecutive bad normal sequences never appeared with line errors. If random buffer (in the telemetry system) errors occurred, data for the suspect frame or frames in the sequence were "at" signal out.

2. CDNSFUDG was checked by means independent of most of the past history of the satellite. NSFUDG is thus probably correct. (CDNSFUDG is defined in the next section.)

3. The insert of station ID (DAY, MONTH, AND YEAR) by the analog line operator was checked, and the day, month, and year were correct as determined by the program.

One should thus be wary of odd ET FLAGS and have a high degree of confidence in even ET FLAGS.

Some necessary definitions are as follows:

NSFUDG = the five-character decimal number that the experimenter receives to indicate the sequence count. This number goes from 00000 to 99999 in about 90 days. Each normal telemetry sequence will thus be tagged with a unique number over a 3-mo period. The ET FLAG will indicate how good this number is. If the flag is ∅, it means that this number is thought to be excellent. If the flag is ODD, the number could be fine, but there is a good possibility that it is incorrect.

RNS = the sequence rate in seconds for sequence. (The nominal value is 81.92 sec/seq.) The program for the Master Data Tape (MDT) obtains this value in two ways for each pass. Both values represent the integrated value over the entire pass. The time that appears on the experimenter's tape is obtained from the values of RNS and NSFUDG, and not from the station time appearing on the analog tape. Thus it is extremely important that the significance of the ET FLAG is understood because it directly implies the quality of recorded time. The ET FLAG also gives valuable information as to the quality of the line operation and the data. If the flag is ∅, the line and satellite are working well and the signal is probably clean. An ET FLAG of 1 means the same, but the time may be wrong; in fact, it may be so wrong as to have the wrong year.

DNS = the decimal equivalent of the satellite clock value. No fudge factors are involved in this number; its value covers the range of 00000 to 32767.

CNSNOW = the computed value of NS now. When the program initializes a file using the satellite clock CNSNOW ≡ DNS, from this point on CNSNOW is incremented by "1" each sequence. Thus, if there are no "gaps" in the data, CNSNOW should always equal DNS. In the presence of noise, when DNS may not be obtained, CNSNOW is used to determine NSFUDG with an ET FLAG of 4. Whenever CNSNOW ≠ DNS, records are stored by the program for 10 consecutive normal sequences, and a decision is made as to what happened (e.g., there was a gap in the data; the satellite went into undervoltage, thus starting the satellite clock off in a different place; the odometer flipped; etc.). When this decision can be made, the program goes back and makes the change (CNSNOW ≡ DNS), and the process continues.

GOOD UPDATE: When CNSNOW = DNS

BAD UPDATE: When CNSNOW ≠ DNS

CDNSFUDG = the value fed into the computer by a card that gives the fudge factor required to make NSFUDG (the 90-day function) from DNS (a 30-day function at best, e.g., if no undervoltages occur in the satellite). It is emphasized that it is most important to check CDNSFUDG independent of most of the past history of the satellite.

BASIC EQUATION:

$$NSFUDG = DNS\ k + CNSNOW\ (1-k) + CDNSFUDG$$

where k = 1 if the signal is good enough to get DNS and if DNS = CNSNOW

(ET FLG = 0 or 2) or 1 or 3

k = ∅ if the signal is too noisy to obtain DNS or if the signal is clean but DNS ≠ CNSNOW (ET FLG = 4, 6, or 8) or 5, 7, or 9

ESTO: This is essentially a "filter" and is the heart of the program. As soon as a bad update occurs [e.g., on ET FLAG of 6 (or 7) or 8 (or 9)], information is stored in the program while the MDT is produced. If a good update does not occur in 10 consecutive normal sequences (noise is not counted as a good update, of course), it is assumed that ESTO's have occurred; the program stops putting out the MDT and analyzes what happened during the 10 ESTO's. The most likely event to occur is a "noise gap" in

which the analog line found six noisy sequences and stopped processing until it could again obtain telemetry data synchronization. The program determines that this has happened by a process of elimination. First it checks that the 10 ESTO's make sense (are in order); if they do not, it reinitializes. Then it determines that the mode did not change (if it is too noisy, it reinitializes). Then it determines that the odometer did not flip (if it did, it computes a new CDNSFUDG and continues). If none of the above occurred, it determines that the satellite did not go into undervoltage. (If it did go into undervoltage, a process occurs in which new cards are punched.) During any of the re-initializations, it is necessary to check for a code change. If the 10 ESTO's are fairly clean, the odometer did not flip, and no satellite undervoltage occurred, the program commences to close the noise gap. If it does this correctly (i.e., the gap station time is equal to the gap by the satellite clock), the program rewinds the tape to the first ESTO, computes a new CNSNOW, and again starts to process.

The experiment will have the ET FLAG of 6 or 8 changed to a $\not{0}$.

The foregoing gives a qualitative indication of what the ET FLAG means. To sum up, an odd ET FLAG means that the time may be wrong (incorrect CDNSFUDG) and/or the MDT was made at the request of the analog line, without checking for line errors.

An ET FLAG of $\not{0}$ (or 1) means that the satellite is probably working correctly and that the signal is clean, since both clock readouts were clean and equal to each other. In addition, there was a good update (DNS = CNSNOW) and DNS was used to compute NSFUDG.

An ET FLAG of 2 (or 3) means that the satellite is probably working well, but noise or line errors have perturbed one of the clock readings. The clock reading that was clean, however, caused a good update (DNS = CNSNOW) and DNS was used to compute NSFUDG.

An ET FLAG of 4 (or 5) means that both clock readings were perturbed by noise or line errors so that the update could not be checked. It was necessary to use CNSNOW to compute NSFUDG.

IMPORTANT NOTE: Any time an ET FLAG of 4 occurs and the first non-4 following it is a $\not{0}$ or 2, the guess for NSFUDG was probably correct for the 4. If the first non-4 following it is a 6, 8, or 9, something drastic happened that the program could not analyze, so that time for the sequences with a 4 was probably incorrect. It is hoped that 4's will be followed by $\not{0}$ or 2 most of the time because this means that the program successfully closed a

"noise gap." If the 4's are followed by a 9, it means that the program completely gave up and reinitialized at the record with the ET FLAG of 9. If the 4's are followed by a 6 or 8, the two most likely events are: (1) the end of the tape was near so the program could not get 10 consecutive sequences with bad updates and gave up, or (2) some mysterious event occurred that gave a bad update for a few sequences and then straightened itself out again.

An ET FLAG of 6 (or 7) means that one of the clock readings was clean, but it caused a bad update (DNSNOW $\neq$ DNS). This would start ESTO, and NSFUDG was computed from CNSNOW.

An ET FLAG of 8 (or 9) means that both of the clock readings were clean and equal to each other; there was a bad update, however, since CNSNOW $\neq$ DNS. This event would start ESTO. After 10 ESTO's, the program can usually determine what happened (ODOMETER FLIP OR NOISE GAP) and update CNSNOW so that the experimenter will receive an ET FLAG of $\not{9}$ because the program had backspaced and closed the gap correctly. The ET FLAG will signify that this occurred.[6,7]

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D-00077

BCD list of first 3 files

Start Time -

day - 331 · Nov. 28

hr. - 03

min. - 49

yr. - '63

1009 08A000 1008 01H000 1022 02 000 1045 05A000 1087 07 000 1065 05E000 110A 06E0
8000 1272A07H000 1363A06F000 1312 07 000

07 000 1065 05E006 110A 06E000 1C20 07A000 18 REC 1, LENGTH 1032

FILE-#1

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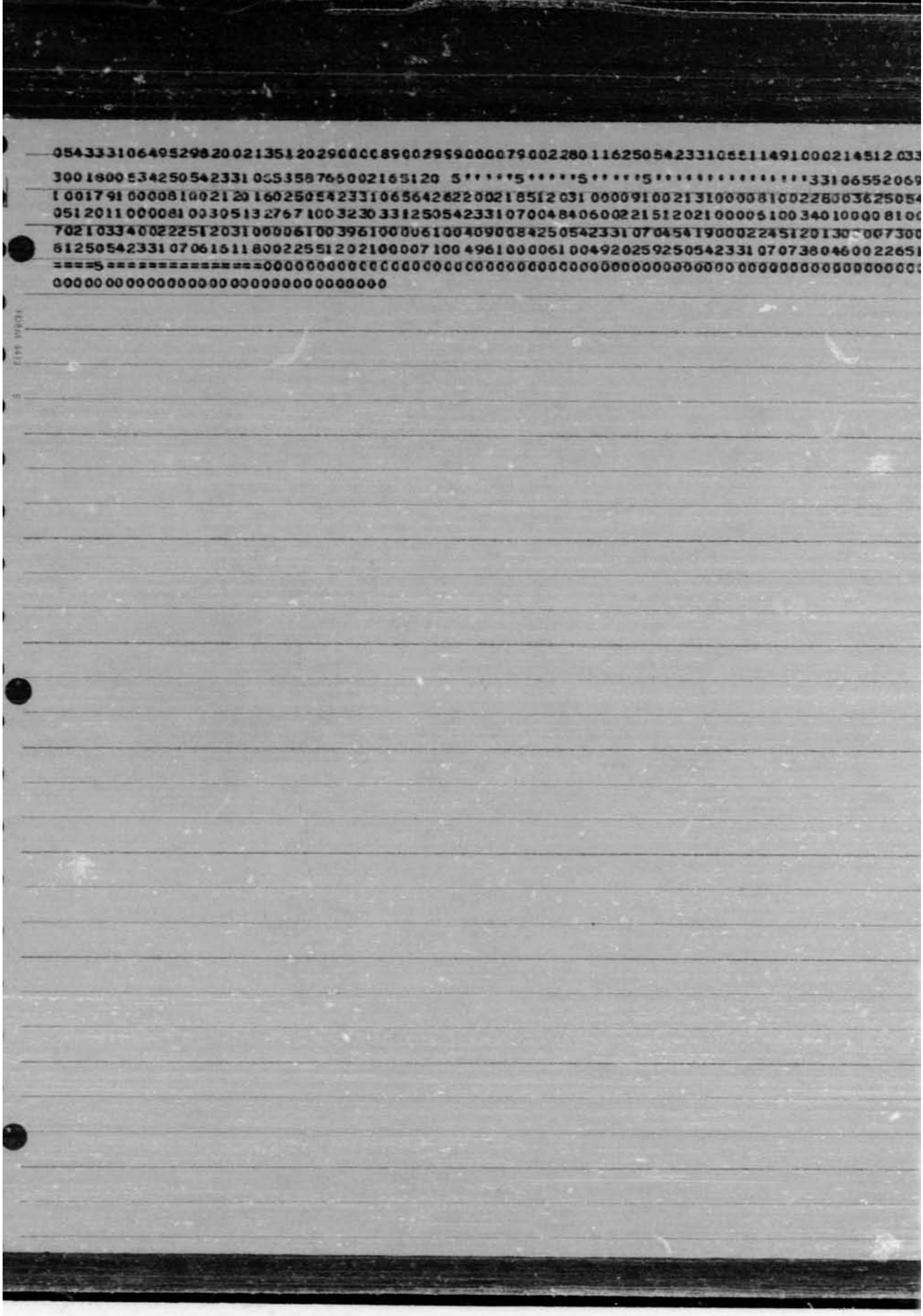

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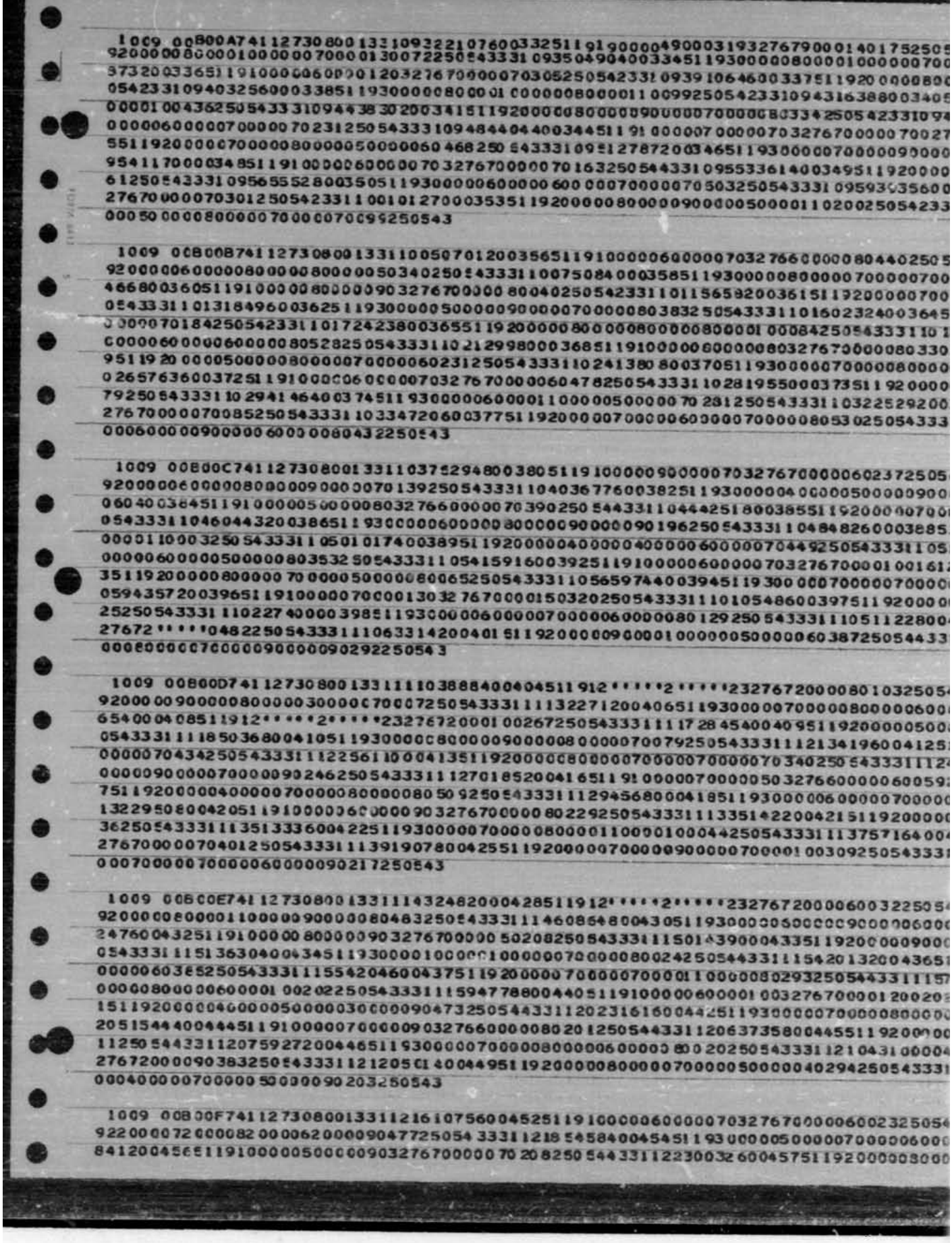

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1292505433311105112280040051191200006200007 3
0000500000603872505443311107550560040251193 0

***232767200008010325054333111120079800405511   REC    4, LENGTH  1032
1930000070000080000060000070456250543331111 0
2845400409511920000050000090000060000080173 5
5054333111213419600412511910000060000080327 7
7000007034025054333111241802400414511930000 9
7000005032766000006005925054333111282376600 1
1851193000006000007000006000011041525054333 1
1133514220042151192000008000007000006000008 1
0442505433311137571640042451191000008000008 3
0000700001003092505433311140409920042651193 0

***232767200006003225054333111444673400429511   REC    5, LENGTH  1032
1930000060000090000060000090391250543331114 5
1439000433511920000090000070000070000070117 5
5054433111542013200436511910000060000040327 7
1000008029325054433111570396000438511930000 5
6000010032767000012002025054333112010970200 4
4251193000007000008000008000008038225054433 1
1206373580044551192000008000009000007000008 1
0202505433311210431000044851 1912*****2***** 3
0000500000402942505433311213269280045051193 0

0070327670000060023250543331123267000453511   REC    6, LENGTH  1032
1930000050000070000060000090387250543331122 3
0032600457511920000080000100000040000080120 5
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0543331122422240004585119300000500000800000080000050030250543331122706068004600
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4125054433112404520800473511930000080000090000006000000800532505443311243290360
27670000070421250543331124450950004735119200000800000800060700000703332505433
00070000070000050000100245250544

1009 00800G7411273080013311248566920047651191000008000007032766000008007025O
920000080000100000070000070526250544331125140520004785119300000600000800000090
43480048051191000008000006032767000008026525054333112554626200481511920000050
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00000704612505433311301139180048551192000007000006000007000007037425054333113
0000080000600000802872505443311305196600048851191000005000007032767000009011
95119200000800000600000600000500282505433311308034880049051193200006200009200
310473160049251191 4==0=04=0=0=4=====40=0=1047=251==73311312092300049351 1924==
43=5==3=3311313311440049451193 20=0==2=0==7200005200007 02=52=1=3=331131614972 0
====4==============3311317368860049751 1922=====2=====2 000072000070427250 5433
000600000600000700000703422 50543

1009 00800H7411273080013311321426280050051191000006000007032767000607017125O
9200000900000500000500000900862505433311324264560050251193000006000007000006O
02840050451191400005 4=2===4'''''4''''''''''''''''''3311328321 95005055119200000600
05433311329541120050651193000008000010000008000007020425054333113323794000508
00000800352505433311333598540050951192200008200007200006 2=====049325054433113
4''''''4''''''4'''''''''''''''''''000000000000000000000000000000000000000000000000
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00000000000000000000000000000000000

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800532505443311243290360047251191000004000009030
800060700000703332505433311246128640047451193000
0000703276600000900702505443311250186060047751 1  REC  7. LENGTH 1032
511930000060000080000090000090439250543331125420
554626200481511920000050000110000060000070178250
125054333112595200400484511910000060000080327670
007000007037425054333113023583200486511930000050
050000070327670000090114250544331130641574004800
490511932000062000092000062======048525054333111
1131209230004935119240=00640=0=40====4=0=06=3
02=52=1=3=331131614972004965119140000640=====4=
2000072000070427250543331131858800004985119300
0000703276700000701712505433311323045420050151 1  REC  8. LENGTH 1032
119300006000007000006000008000025054433113271
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062=====049325054433113352176800510511934*****
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D-00077

BCD list of last 2 files

Stop Time -

DAY - 109 Apr. 21
hr. - 20
MIN. - 17
YR. - '64

1312 061 00A 74041 84550 12109 19442 85575 16105 11939 00017 90=55390001091042=1=461=7221
91200 01120541 32===252057
62155 16145 11930 00008 00721 60000 10010=062=26261=722109195240043516165119100000800912
=722109195401 95751617511920000080100610000090 10517=57261=72310919552387251618511 9
011680=44161=72310919580770051620511910000100128350====00 13316=16=61=7231091959291
41417840006941451 0==3=61=721109200051529516225119300000=0148970000090 35=10=62261=
45119100001004 0=650 ===201741 3=34=61=721109200457272516255119220001021780220001220
006191865162651 1930000110189610000130 19246==5761=722109200903014516285119100000900
2=61=721109201024929516295119220001424=43=20001324=631=36761=722109201146843516305
001304=36==24=61=722109201430672516325119100001601978 0===650193 78=7=161=722109201
00180 18962000020018592=55161=722

1312 061 00874 04184 55012 10920 17145 00516 34511 93200 01824 2=5120002124 1=44=42161=7231
91000 02501 55050 ==454034 0=2=14361=721109202120243516375119240002443 23=34000274125
21575 16366 11930 00027 01167 60000 27010 953=6=561=722109202525986516405119140004341=42
=721109202647900516415119200 00=301446=000072 0124=2=2==61=723109202809814516425119
20=252==526==722109203053643516445119140024=4021==4===1=4 0061 7=5=761=722109203215
400==3400 36540145==37261=722109203337472516465119320 0=5520179320070920=0=6=24561=
8511912 01 7572303=42==5=324001==7=661=72=109203743214516495119 24=====4=====4=====4
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
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000000000000000000000000000000000

0019910425=17461=722109194712386516125 11 REC 1. LENGTH 1032

516165119100008009124 0===5500953 9===161
1091955238725161851193000009011118000008
16=16=61=7231091959296155162151192400012
97000009035=10=62261=722109200335357516 2
9220001021780220001224 35=5=2=761=7221092
30145162851191000009046=200=====004=403=5
=722109201146843516305119300001604=46=00
019378=7=161=722109201552586516335119200

0021241=44=42161=723109201958329516365 11 REC 2. LENGTH 1032
0244323=3400027412552==1261=723109202 24
5164051191400043 41=4214===3=41=011=3276=
1092028098145164251193200 10=2103=220013=
17=5=761=722109203215557516455119240027 4
0320070920=0=6=24561=721109203621300516 4
024=====4=====4=====4=======00======0000
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File #1261

1312 07 00A99999999999910920172450051634511932000182 42=5120002124 1=44=42161=
9100002501559 50===540340=2=14361=7211 092021202435163751192400024 323=340002
215751638811930000270116760000270 10953=6=561=722109202525986516405119140004
=7211 09202647900516415119200 0=301446=000072 0124=2=2==61=723109202809814516
20=252==526==722109203053643516445119140024=4021==4===1=400617=5=761=722109
400==3400365401 45==37261=722109203337472516465119320 0=55 20 179 3200 70920=0=6=
2511912 01 7572303=42==5=324001==7=661=72=109203743214516495119 24=====4=====4==
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
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51200021241=44=42161=723109201950329516365 11 REC 1. LENGTH 1032
1924000244323=340002741255 2=1261=7231092022 4
2598651640511914000434 1=4214===3=41=011=3276=
1=723109202809814516425119320010=2103=220013=
4400617=5=761=722109203215557516455119240027 4
120179320070920=0=6=24561=721109203621300516 4
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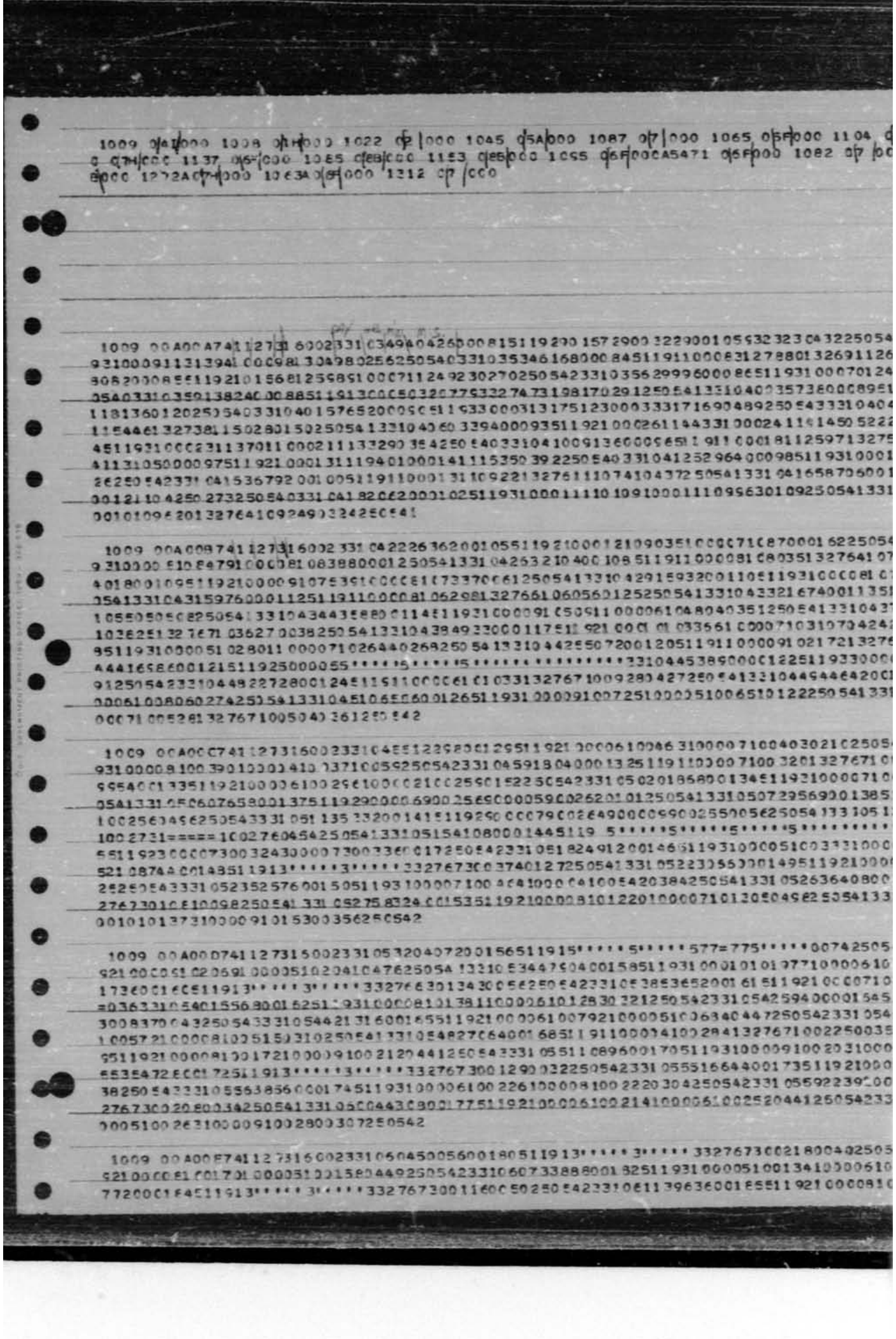
File = #1262



1000 1065 05F000 1104 05F000 1020 07A000 18 REC 1, LENGTH 1032
A5471 05F000 1082 07 1000 1261 05E000 1235 07

dupe of
D-00077

2290010593232304322505413310351023400008291 1 REC 2, LENGTH 1032
911000631278801326911269370444250542331033550
9996000865119310007012403610156212317200962E
0541331040035738000895119210004111887510004 3
3171690489250543331040441480000925119110003 0
1144331000241141450522250541331040725306000 9
6511911000181125971327541123130018250540331 0
4125296400098511931000131261 2=100016111211 02
372505413310416587060010151192100009110637 10
0011109963010925054133104210444800104511911 0

351000071087000162250541331042348276001065 11 REC 3, LENGTH 1032
911000081080351327641077870221250541331042 75
1593200110511931000081071541000061069200442 25
0541331043321674001135119210000810574510000 5
5104804035125054133104372741600116511911000 7
1033661000071031070424250542331044011244001 1
2051191100009102172132766101971049925054133 10
0445389000012251193300008301493300004301433 01
4272505413310449446420012551192100009100852 10
0005100651012225054133104535038400128511911 0

6310000710040302102505413310456342120013051 1 REC 4, LENGTH 1032
1911000071003201327671003040301250542331050 03
0186800134511931000071002511000071002550004 25
0541331050729569001385119310000810024910000 7
9900255005625054133105125724800142511931000 07
*5*****5*****5**************3310517029960014
66119310000510037931000081003280414250542331 0
0522305500014951192100007100375100007100434 05
3842505413310526364080015251191 3*****3*****33
0000710130504982505413310529202400018451193 10

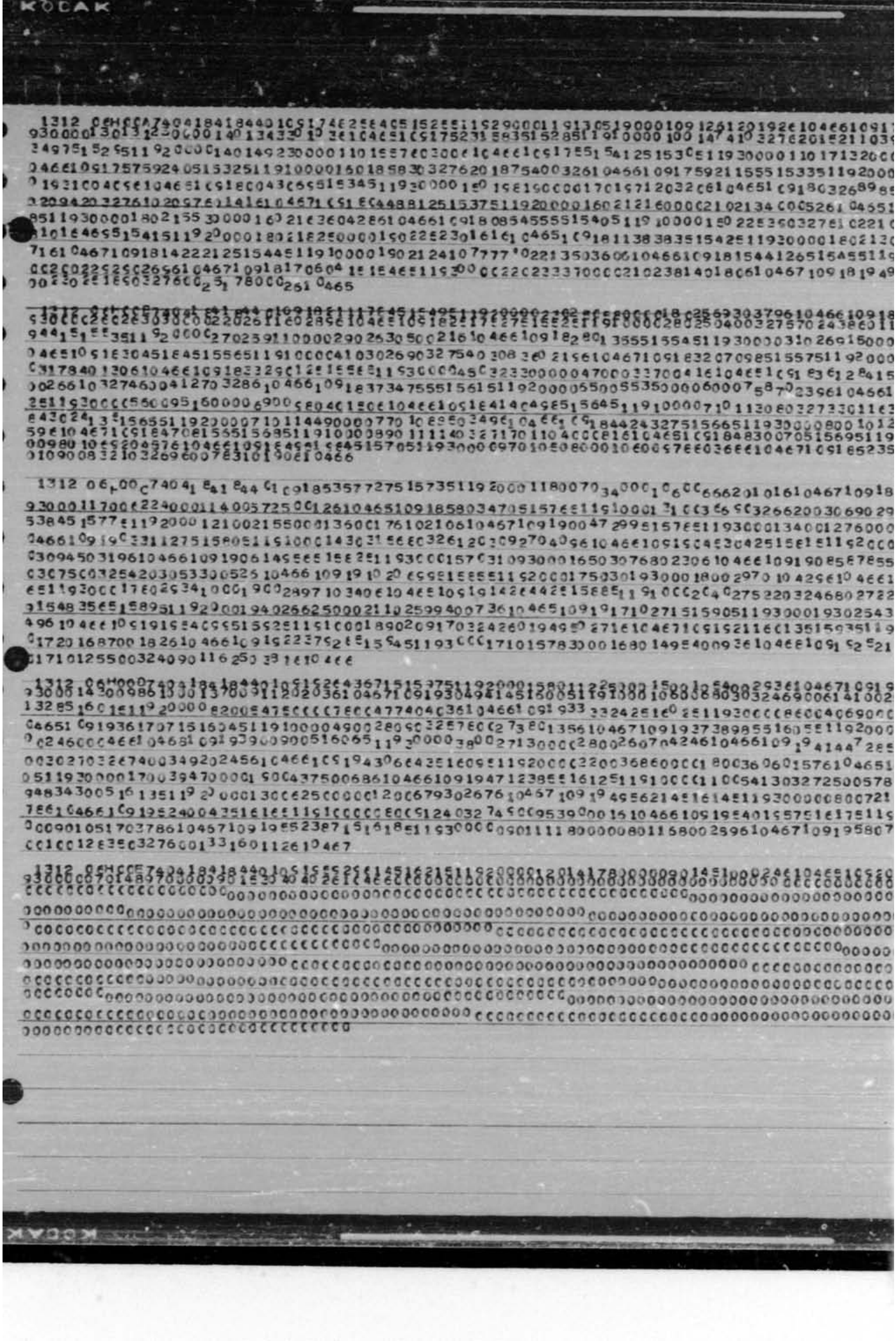
577=775**0074250542331053325988001575 11 REC 5, LENGTH 1032
1931000101019771000061018230335250542331053 73
8365200161511921000071025 0=100007101442=713 25
5054233105425940000164511913*****3*****332767
5100634044725054233105454323200166511931000 08
4100284132767100225003525054233105494898000 16
7051193100009100203100008100197030525054333 10
0555166440017351192100006100153100007100196 04
3042505423310559223920017651191 3*****3*****33
0000610025204412505423310602062240017851193 10

***33276730021800402505423310606119720018151 1 REC 6, LENGTH 1032
1931000051001341000061001460315250543331061 01
3963600185511921000081001141000051001290460 25

C-00029
dupe of
D-00877

BCD list of last
3 files

Stop Time -
day - 109 - Apr. 21
hr. - 20
min. - 17
yr. - '64



REC 1, LENGTH 1032

REC 2, LENGTH 1032

REC 3, LENGTH 1032

REC 4, LENGTH 1032

REC 5, LENGTH 1032

FILE - #1260

$09^{d} - 20^{h} - 17^{m} - 14500^{m}$

↓

4-18-64

REC 1. LENGTH 1032

FILE - #1261

REC 2. LENGTH 1032

- 4500 me.

1312 C7 00A5555559999991C92017145005 16 34511932000 1E242=51200021241=44=42161=72310
9100CC25C155050===540340=2=14361=7211 C9202120243516375119240002443 23=34000274125E2
215751635511930000270116760000270109 E3=6=561=7221C92025255E651640511914000434 1=421
=7211 C9202647900516415119200006=301446=0CCC720124=2=2==61=72310920280951451642511 93
20=252==526==7221 C9203053643516445119140C24=4C21==4===1=400617=5=761=7221092032215
400==34003654014 5==37261=7221C92033374725164651193200=5529179320070920=0=6=24561=7
5511912017572303=42==5=324001==7=661=72=10520374321451649511924=====4=====4=====4=
000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000

$109^{d} - 20^{h} - 17^{m} - 14500^{ms}$

REC 1 • LENGTH 1032

FILE - # 1262

7M - 14500 mo,

D-00078

BCD list of first 3 files.

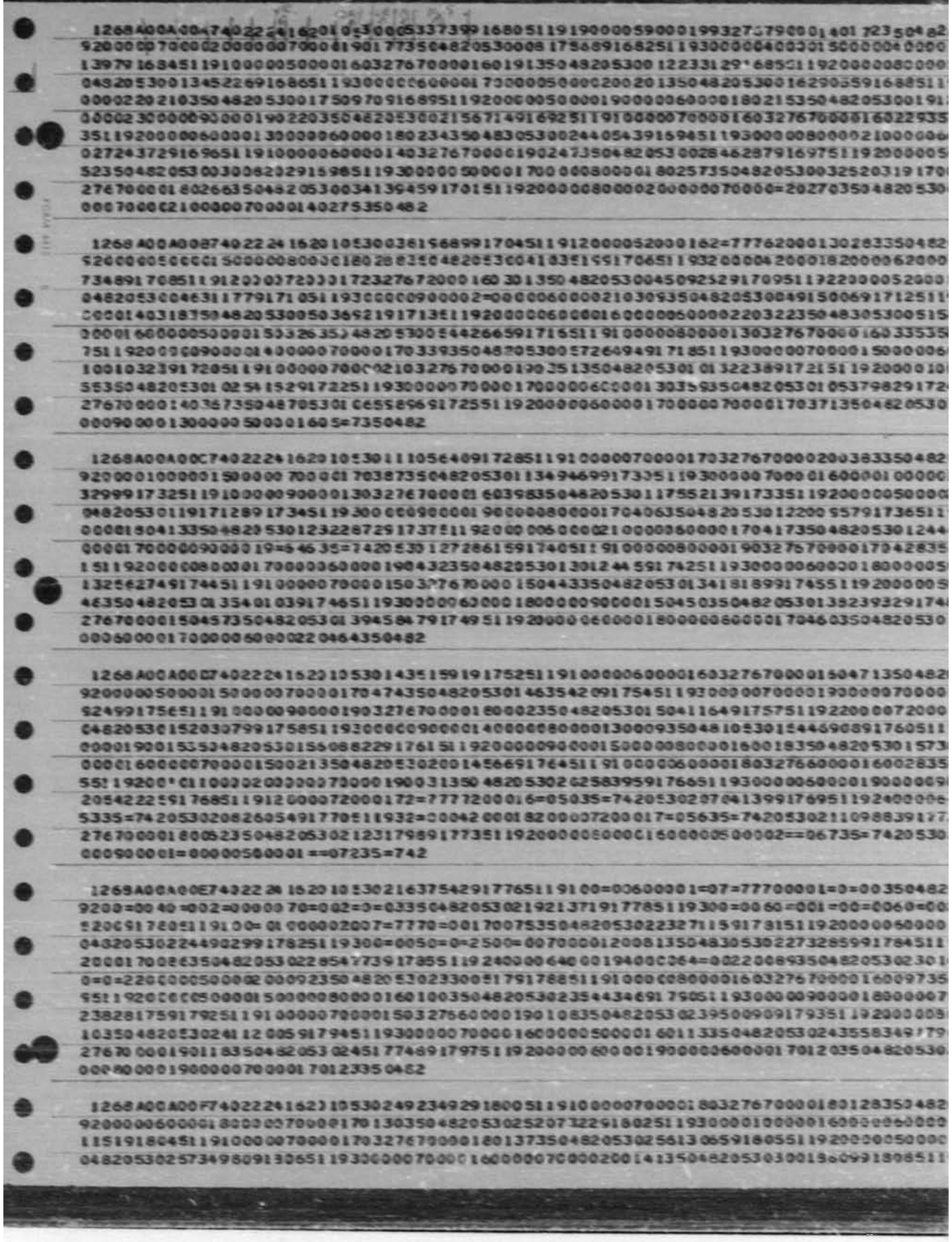
Start Time -

day - 53 - Feb. 23
hr. - 00
min. - 05
yr. - '64

1268A061000 1350 07D000 1355 C7C000 1163 06 000 1375 06H000 1383 07B000 1392 06B00
0 04HC00B8760 05E000 8750 05H000B8728 07A000B8610 08 000A9914 07 000 1413 00B000 2
B000

HOOO 1383 078000 1392 068000 5421 041000 552 REC 1. LENGTH 1032
A9914 07 000 1413 008000 267380080008259 00

File #1



```
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930000040005015000004000016018050482053001 10
33129'685911920000080000160000090000190196 35
048205300162905591688511910000060000130327 67
000018021535048205300191288591690511930000 09
000016032767000016022935048205300231862991 69
4511930000080000210000060000180238350482053 0
028462879169751192000005060001500000500001 302
573504820530032520319170051191000006090001 703
00070000=20270350482053003535860917025119300
```

File #2

```
162=77762000130283350482053003941604917055 11  REC    2. LENGTH  1032
932000042800182000062000130292350482053004 34
925291709511922000052000152000052000140305 35
048205300491500691712511910000050000160327 67
000022032235048305300515883591714511930000 06
000013032767000016033535048205300560457991 71
851193000007000015000006000019034335048205 30
101322389172151192000010000017000005000019 03
593504820530105379829172451191000000*00001 703
000700001703713504820530108218119172651193 00
```

```
170327670000200383350482053011227555917295 11  REC    3. LENGTH  1032
930000070000160000100000160391350482053011 63
521391733511920000050000021000008000015040 235
048205301220095791736511910000090000190327 66
000017041735048205301244478691738511930000 08
000019032767000017042835048205301285053091 74
251193000006000018000005000015043635048205 30
134181899174551192000005000017000008000017 04
503504820530138239329174851191000007000017 03
000800001704603504820530141077629175051193 00
```

```
160327670000160471350482053014513505917535 11  REC    4. LENGTH  1032
930000070000190000070000130477350482053014 91
116491757511922000072000182=6==02000170005 35
048105301544690891760511910000080000150327 67
000016000183504820530157307379176251193000 09
000018032766000016002835048205302013648191 76
651193000006000019000009000016003435048205 30
207041399176951192400006400019400005400018=0
5635=74205302110988391772511910000070000170 3
000500002==0673S=74205302135371291774511930 0
```

```
1=07=77700001=0=00350482053021759456917775 11  REC    5. LENGTH  1032
9300=0060=001=00=0060=00210=0635048205302220
711591781511920000060000140000070=00230076 35
048305302273285991784511912000102000192327 67
4=00220089350482053023016688917806511930000 08
000016032767000016009735048205302342243291 78
051193000009000018000007000018010335048105 30
239500909179351192000008000016000004000016 01
133504820530243558349179651191000006000019 03
000600001701203504820530246396639179851193 00
```

```
180327670000180128350482053025045407918015 11  REC    6. LENGTH  1032
930000100000160000060000150132350482053025 45
306591805511920000050000170000050000200139 35
048205303001986099180851191000009000018032 767
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0000220146350482053030140724918055119200000800001100001000001701483504820530303
0600016000009000017015035048205303054646891812511910000060000150327670000150155 3
351192000007000019000008000017015735048205303083029791814511930000080000140000 0
311141269181651191000007000016032767000022016335048205303123604191817511920000 0
65350482053031357955918185119300000500001800006000017016735048205303164178591 8
27662000160171350482053031803699918215119200000700001800000700001801733504820 53
000800002000006000015017535048 2

1268A00A00G7402224162010530322094439182451191000009000022032767000015017935048
92000007000017000006000015018135048205303245327291826511930000060000150000070 00
71029182851191200006200017232767200015018635048205303285901691829511920000070 00
04820530330209319163051193000008000017000007000019019035048205303330476091832 51
00001801933504820530334266759183351192000008000017000005000018019535048205303 35
00002200000500001801973504810530338324189183651191000007000025032767000019020 03
75119200000600002400000700002103202350481053034116248918385119300000500001500 000
34400077918405119100000700002003276700002102063504820530345219929184151192000 00
08350482053034643906918425119300000600001800000800002002093504820530349277359 18
====2========435====0000000000000000000000000000000000000000000000000000000000 00
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000001701483504820530303026389181051193000007
600001503276700001501553504820530307083829181
145119300000800001400000800001801593504820530
03123604191817511920000070000170000090000180 1
167350482053031641785918205119120000820001323
000070000180173350482053031925614918225119300
```

```
022032767000015017935048205303233135891825511   REC      7, LENGTH  1032
193000060000150000070000150182350482053032 73
590169182951192000070000160000070000140188 35
504820530333047609183251191000006000017032767
500001801953504820530335485899183451193000006
700002503276700001902003504820530339543391 83
385119300000500001500000500001502033504820530
034521992918415119200000600002000000600002302
209350482053034927735918445119120000720002 32=
000000000000000000000000000000000000000000000
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```
1268A00B00A7403294162670890003425022965051193900007900022900009900022043023046708 90
9100000500002203276700002103402304670890007482452965351192000007000018000008000002002
016029654511930000950000200000070000230251230466089001153988296565119100001100002203
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0007000019000007000023032823046 7
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FILE #3

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96655119220009620001820000820002302222304670890
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00021000007000022028323046708900391227329676511   REC    2. LENGTH  1032
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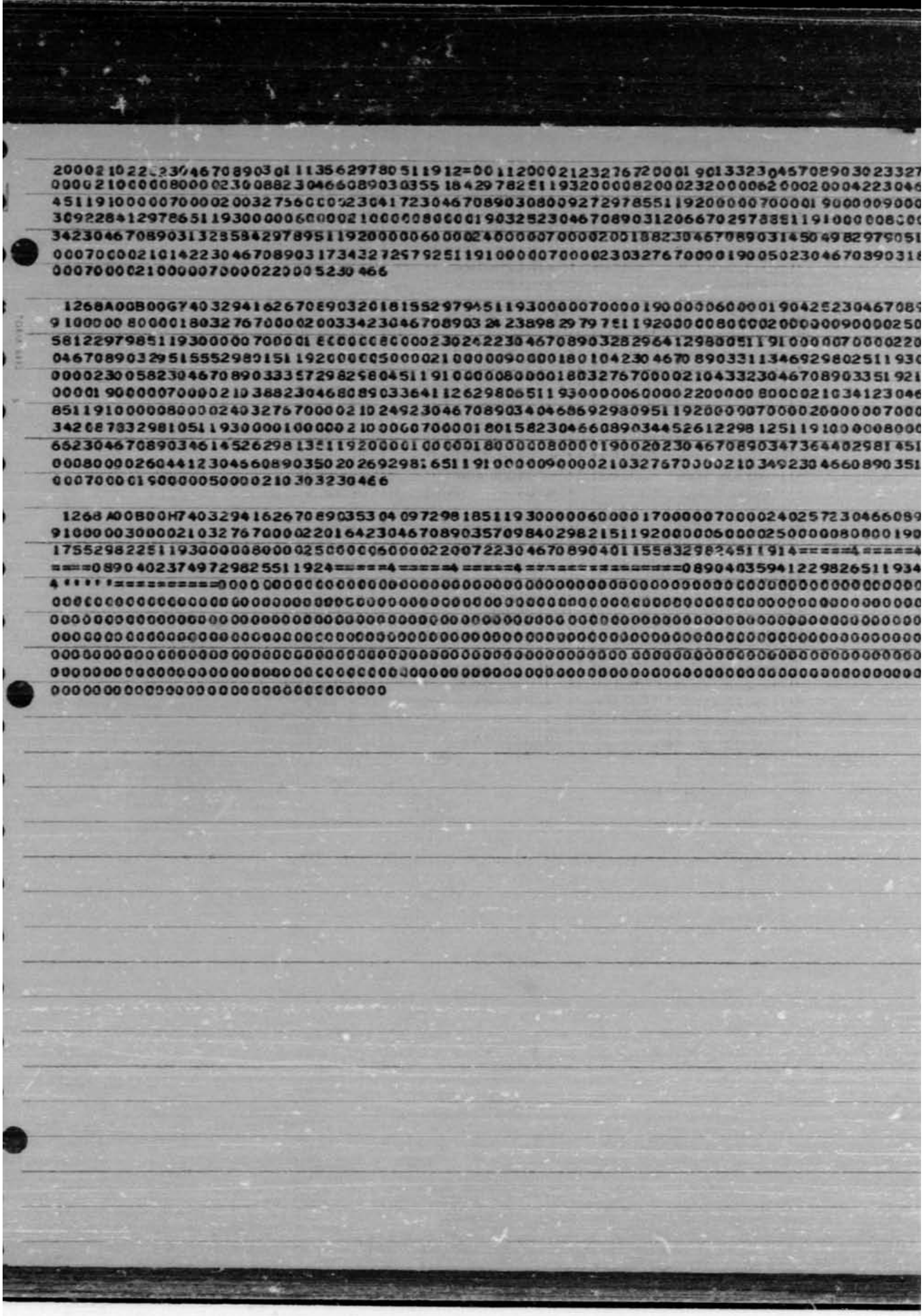

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=====089040359412298265119 34====4=====4***** 
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D-00078

BCD list of last 3 files

Stop Time -

day - 84 - March 26
hr. - 15
min. - 59
yr. - '65

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18027651251191100007100018132766100019002235059234715284371776513511921000071000191
0592347153005632765145119 35=====5=====5''''5================0000000000000000000000000
00000000 0000000000000000000000000000000000000000000000000 0000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000 00000000000000000000000000000000000000000000000000 000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000 000000000000000000000000000000000000000000000000000000 0000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000
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671000180462350592347152316058765095 11 REC 1. LENGTH 1032
061000191000071000160242350592347152 72
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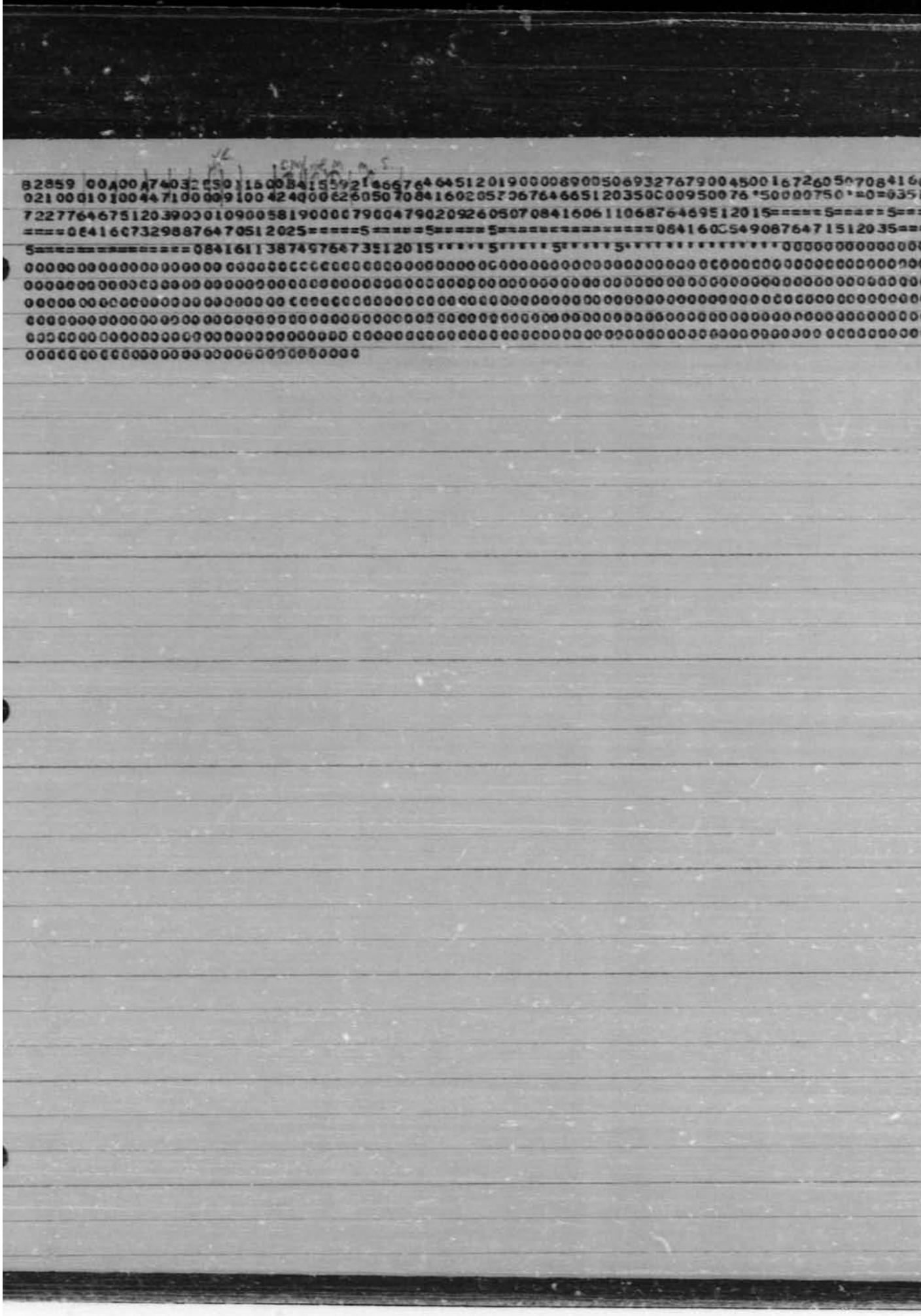
FILE #913



)32767900450016726050708416004338676465512 REC 1. LENGTH 1032
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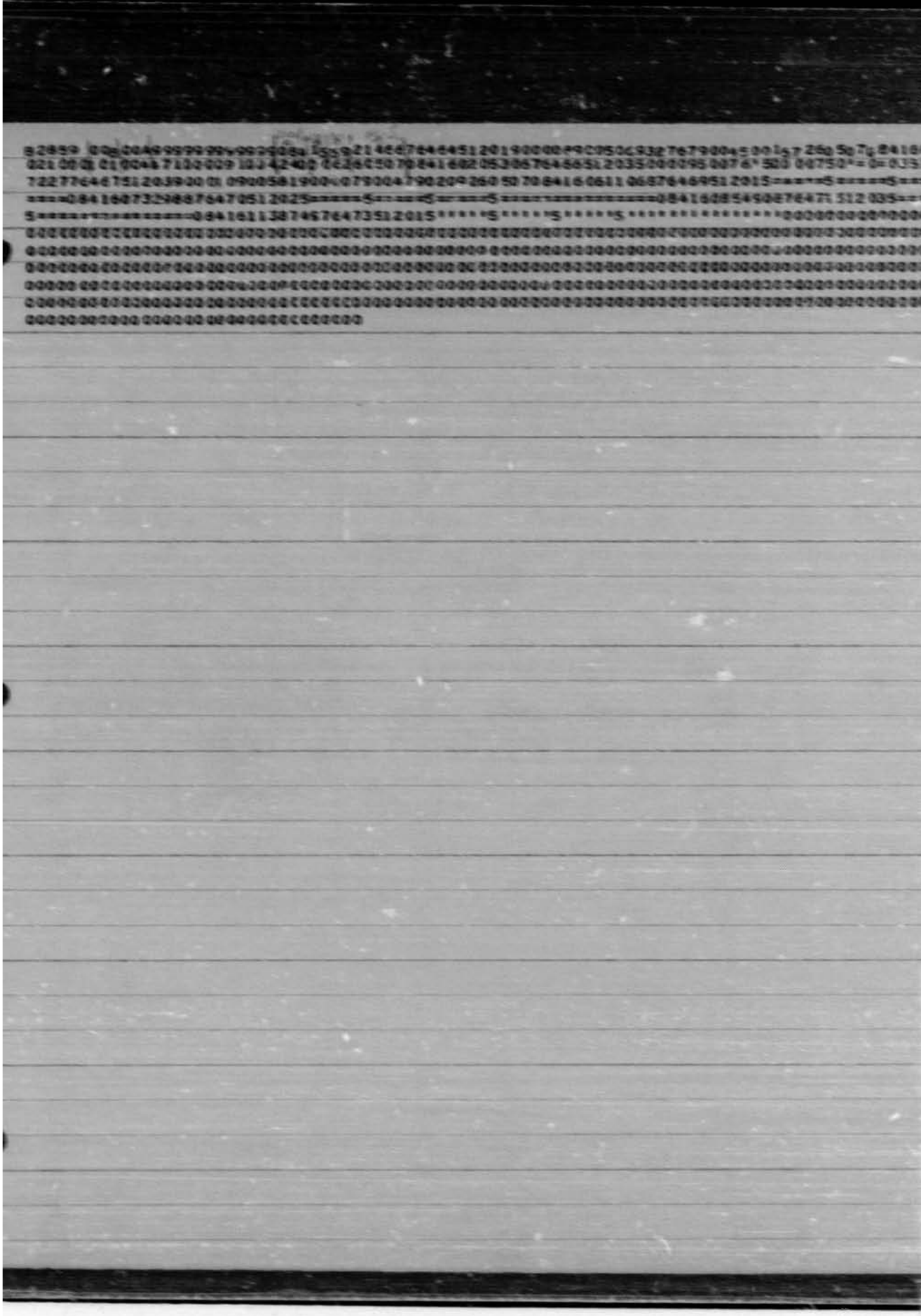
FILE #914



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11 0587646951 2015=====5=====5=====5==========
=====0841608549087647 1 512 035=====5=====5=====
15'''''''''''''''''0000000000000000000000000000
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F.L.C. #915

9

12684 061000 1350 [illegible] 1355 [illegible] 1163 06 000 1375 064000 1343 078000 13
3 04H0CCE8760 05E000 8753 [illegible] 8728 07 0008E610 08 000A9914 07 000 1413 0
8000

69
74
73
60
68
72
62
69
68
55
58
70
80
70
2
2
912

915

File 1 C-00030 11

75 06H000 1383 078000 1392 068000 8421 041000 552 REC 1. LENGTH 1032
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dupe of
D-00078

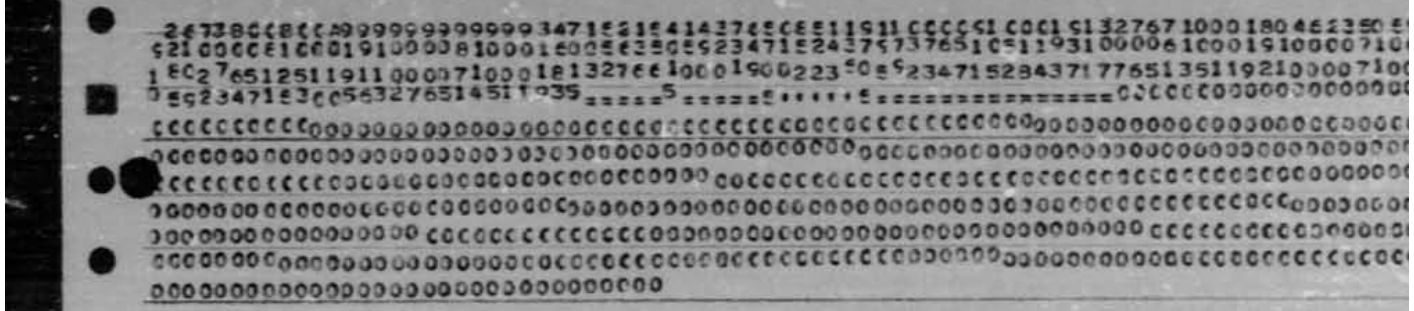
915

dlb

C-00030
dupe of
D-00078

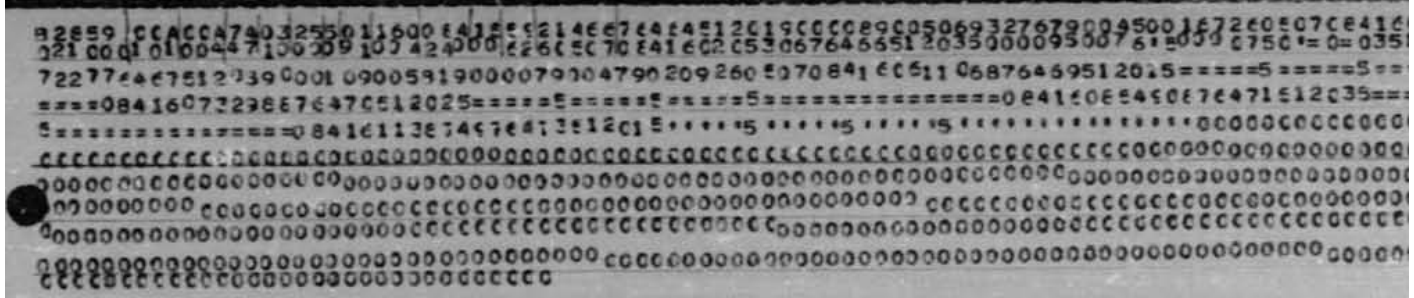
BCD list of last
3 files

Stop Time -
DAY - 84 Mar. 26
hr. - 15
MIN. - 59
YR. - '65



REC 1, LENGTH 1032

FILE - * 913



$34^{d} - 15^{h} - 59^{m} - 21466^{mel}$

3-25-65

REC 1. LENGTH 1033

FILE. #914

$84^{d} - 15^{h} - 59^{m.} = 21466$ mo

REC 1. LENGTH 1032

File - #915

-2146 md.