#113 A/NH

1 MIN. AVG. B FIELD ON TAPE
68-014A-14F

68-014A-14B & E are on microfilm

OGO 5

4.608 SECOND AVERAGE B FIELD

68-014A-14C

THIS DATA SET HAS BEEN RESTORED. ORIGINALLY THERE WERE FIVE 9-TRACK, 1600 BPI TAPES WRITTEN IN BINARY. THERE ARE TWO RESTORED TAPES. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON AN IBM 360 COMPUTER AND WERE RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR002632	DS002632	D029194	1-25	03/05/68 - 05/08/68
		D029195	26-50	05/08/68 - 07/12/68
DR002631	DS002631	D029196	1-25	07/12/68 - 09/14/68
		D029248	26-50	09/14/68 - 11/18/68
		D029249	51-70	11/18/68 - 01/10/69

REQ. AGENT	RAND NO.	ACQ. AGENT
CAW	RC7558	DJH

OGO-5

4.608 SECOND AVERAGED B FIELD
68-014A-14C

This data set consists of merged OGO-5 tapes (each having 15 files and being standard label previously before the merging onto new tape) each containing 25 files of non-standard label data. The tapes are 9 track, 1600, binary, with odd parity.

D#	C#	FILES	TIME SPAN
D-29194	C-18795	25	03/05/68 - 05/08/68
D-29195	C-18796	25	05/21/68 - 07/12/68
D-29196	C-18797	25	07/12/68 - 09/15/68
D-29248	C-18940	25	09/15/68 - 11/19/68
D-29249	C-18941	20	11/19/68 - 01/10/69

*NOTE: The last tape processed may not have 25 files on it due to lack of more data.

SSC184

OGO-5

SSC184 is a 9 track, ~~1600~~ 6250 BPI, unlabelled, IBM 360/computer binary tape. The tape contains one file having orbits 1 - 305. The DCB parameters are: RECFM=VBS, LRECL=1228, BLKSIZE=6144, DEN=3.

Tape parameters:

IORBIT = Orbit number (Integer)

IBTST = Bishop time of first point in record (Integer) (see attached for definition)

XGSM = X GSM coordinate of satellite at start of record in Re (Real)

YGSM = Y GSM coordinate of satellite at start of record in Re (Real)

ZGSM = Z GSM coordinate of satellite at start of record in Re (Real)

RE = Radial distance of satellite from the center of the earth in earth radii (Real)

BXGSM = X GSM component of the field in gammas (Real)

BYGSM = Y GSM component of the field in gammas (Real)

BZGSM = Z GSM component of the field in gammas (Real)

BTGSM = Total field magnitude (obtained by averaging instantaneous values) (Real)

IQUAL = Quality indicator as explained in attachment (Integer)

NOTE: BXGSM, BYGSM, BZGSM,BTGSM and IQUAL are arrays of 60 elements each

BTRMS= Total field rms deviation in gammas

IQUAL= Quality indicator

The quality indicator IQUAL is the sum of two numbers, 1000 times NUMPTS + ICHL. NUMPTS is the number of data points used in the average and ICHL is a flag indicating the status of heater, calibrate signal and ladder step corrections during the averaging interval.

ICHL may be thought of as a binary number with seven bits: X_o, X_1, X_2, $X_3 \ldots X_6$.

If X_o equals 1, then sometime during the averaging interval a heater correction was required but the exact interval for applying this correction could not be found.

If X_2 equals 1, then sometime during the averaging interval a heater correction was applied.

If X_3 equals 1, then a calibration signal correction was made.

If X_4 equals 1, then at least one correction for a medium ladder step on the Z axis was made.

If X_5 equals 1, then at least one correction for a medium ladder step on the Y axis was made.

If X_6 equals 1, then at least one correction for a medium ladder step on the X axis was made.

We note that X_2 is not used, and that this seven bit binary number actually appears in IQUAL as a three digit decimal number.

```
      SUBROUTINE CONBT ( T, BT )
C ***********************************************************************
C *  'BISHOP TIME' CONVERSION SUBROUTINE FOR OGO-5. BT IS DEFINED AS THE *
C *  NUMBER OF TENTHS OF A SECOND SINCE THE START OF YEAR 1966, THAT IS, *
C *  BT = 0 AT YR 66 DAY 1 HR 0 ETC., AND THE TIME UNIT IS 1/10 SEC.     *
C *      CALL CONBT( T, BT )  CONVERTS T ARRAY TO BT.                    *
C *      CALL BTCON ( BT, T)  CONVERTS BT TO T ARRAY.                    *
C *  THE T ARRAY IS DEFINED AS FOLLOWS:                                  *
C *      T(1) = YEAR (66-71)                T(5) = HOUR (0-23)           *
C *      T(2) = DAY OF YEAR (1-366)         T(6) = MINUTE (0-59)         *
C *      T(3) = MONTH (1-12)                T(7) = SECOND (0-59)         *
C *      T(4) = DAY OF MONTH (1-31)         T(8) = MILLISECOND (0-999)   *
C *  WHEN CONVERTING TO BT, T(3) AND T(4) ARE USED ONLY IF T(2) = 0.     *
C *  OTHERWISE T(3) AND T(4) ARE IGNORED.  WHEN CONVERTING FROM BT, ALL  *
C *  EIGHT ENTRIES OF THE T ARRAY ARE COMPUTED.                          *
C *  THE SUBROUTINE FAILS AFTER FEB. 28, 1972 AND BISHOP TIME            *
C *  OVERFLOWS THE 360 WORD LATER THAT YEAR.                             *
C *                                   PROGRAMMER - NEAL CLINE  JAN. 1968 *
C ***********************************************************************
      INTEGER  T(8), BT,   M(13)
     *  / 0, 31, 59, 90, 120, 151, 181, 212, 243, 273, 304, 334, 365 /
      N = ( T(1) - 66 ) * 365
      IF ( T(1) .GT. 68 )  N = N + 1
      IF ( T(2) .NE. 0 )  GO TO 10
          N = N + M(T(3)) + T(4) - 1
          IF ( T(3) .GT. 2 .AND. T(1) .EQ. 68 )  N = N + 1
          GO TO 20
   10 N = N + T(2) - 1
   20 BT = N*864000 + T(5)*36000 + T(6)*600 + T(7)*10 + T(8)/100
      RETURN
      ENTRY BTCON ( BT, T )
      N = BT / 864000
      IF ( N - 1095 ) 50, 30, 40
   30     T(1) = 68
          T(2) = 366
          GO TO 60
   40     N = N - 1
   50     T(1) = N/365 + 66
          T(2) = MOD( N, 365 ) + 1
   60 N = T(2)
      IF ( T(1) .NE. 68 )  GO TO 90
          IF ( N - 60 ) 90, 70, 80
   70         T(3) = 2
              T(4) = 29
              GO TO 120
   80         N = N - 1
   90 DO 100  K = 2, 13
          IF ( N .LE. M(K) )  GO TO 110
  100     CONTINUE
  110 T(3) = K - 1
      T(4) = N - M(K-1)
  120 T(5) = MOD( BT/36000, 24 )
      T(6) = MOD( BT/600, 60 )
      T(7) = MOD( BT/10, 60 )
      T(8) = MOD( BT, 10 ) * 100
      RETURN
      END
```

Appendix

Bishop time is the name of the unit of time used for the majority of the processing of the OGO-5 and ATS-1 fluxgate magnetometer data at UCLA. It is defined as the number of tenths of seconds since the start of the year 1966, that is, Bishop time equals zero, at 0000 U.T. on January 1, 1966. The advantage of using Bishop time is that one single 360 word can be used to cover a period of six years. Six years is longer than the life-expectancy of most satellites. The disadvantage is that this time word cannot be used to provide timing for the high telemetry rate data of OGO-5. This problem does not arise for the data discussed in this report because the highest sample rate given on these tapes is one point every 4.608 seconds.

On the next page is the listing of a subroutine to convert from Bishop time to ordinary Universal time and vice versa. The entry point BTCON converts from Bishop time while the entry point CONBT converts to Bishop time.

```
                C PROGRAM READS TAPE SSC184 AND PRINTS OUT FIRST 50 RECORDS          BKF00160
                C                                                                    BKF00180
0001                  INTEGER NORB,NBT,T(8)/8*0/,IQL(60)                             BKF00200
0002                  REAL C(4),B(60,4)                                              BKF00220
0003                  DO 10 NREC=1,50                                                BKF00240
0004                  READ(1) NORB,NBT,C,B,IQL                                       BKF00260
0005                  CALL BTCON(NBT,T)                                              BKF00280
0006                  WRITE(6,2000) T,NORB,C,B(1,1),B(1,2),B(1,3),B(1,4),IQL(1)      BKF00300
0007             2000 FORMAT(1X,8I4,1X,I4,1X,8F10.3,1X,I8)                           BKF00320
0008                  DO 20 I=1,8                                                    BKF00340
0009               20 T(I)=0                                                         BKF00360
0010               10 CONTINUE                                                       BKF00380
0011                  STOP                                                           BKF00400
0012                  END                                                            BKF00420
```

B12880-000A
DLO-T
HCK-P

500015-000

68-0121A-12A
68-0121A-12B
68-0121A-12C
68-0121A-12D
68-0121A-12E
68-0121A-12F
68-0121A-12

PRODUCTION PROCESSING OF THE DATA OBTAINED BY THE UCLA OGO-5 FLUXGATE MAGNETOMETER

Christopher T. Russell
Institute of Geophysics and Planetary Physics
University of California, Los Angeles

Publication No. 905

March 1971

Bishop Time

IBT BX BY BZ BT IQUAL
UT
1X, I14, 2X, I10, 5X, 4(G15.5, 5X), I15)
YYDDDHHMMSSMSS

Introduction

In designing the production processing plan for the UCLA OGO-5 fluxgate magnetometer data, it was decided to process the entire input data stream to provide a complete data base from which to undertake further studies. It was hoped that this data base could provide the criteria for data selection not only for the OGO-5 magnetometer experimenters but for other experimenters as well. With this in mind a series of plots were designed to describe the character of the data: to allow one to recognize different regions and to distinguish different regimes within these regions; to locate the boundaries of these regions; and to determine which time intervals were candidates for further analysis. At the same time it was recognized that such summary data could also be used as an analytical tool itself, so therefore these data were also stored on magnetic tape as well as plotted on microfilm plots. A useful summary plot, of course, maintains a constant time scale, and contains all the data in time sequence. So too, the summary data tapes become convenient because they have a fixed data rate and are time ordered, a feature not present in the original OGO-5 data. Needless to say, the summary tapes contain average data only and studies requiring high resolution data require recourse to the original data tapes.

Often times, the orbital position of the satellite rather than some character of the data dictates selecting a region for study. In order to be able to use orbital criteria, a series of orbit plots were also produced in several coordinate systems.

To obtain the most general overview of the data it was decided to make one minute averages of the data. These were plotted five hours to a page or microfilm frame. These plots, however, do not give the precise timing that is necessary for selecting intervals to study for certain phenomena such as the bow shock and magnetopause and thus another plot was made of the data using 4.608 second averages. This interval was dictated in part by the sample rate of the spacecraft. It represents 4, 32, or 256 individual vector measurements depending on telemetry bit rate. The 4.6 second averages were plotted with 20 minutes per page.

Both the one minute averages and the 4.6 second averages were plotted in the spacecraft coordinate system which is a quasi-inertial system but which is a function of orbit position and time of year. In this way the processing of the data would be independent of the receipt of orbit data and any instrument anomalies would maintain their character, e.g., relative size in the various vector components. However, since certain phenomena are more easily recognized in one coordinate system than another, the one minute averages were also converted to both geocentric solar magnetosphere (GSM) and geocentric solar ecliptic (GSE) coordinates and plotted. Thus there are three

plots of the one minute averages: in spacecraft coordinates, in GSM coordinates and in GSE coordinates.

The OGO-5 spacecraft can transmit data at any one of three telemetry rates: 1, 8 or 64 kilobits per second. At the same time it can store data at 1 kilobit/sec for later transmission. Thus there can be two original data tapes for any one time interval at two different sample rates. In performing the data reduction, the highest data rate data has always been used in preference to the lowest data rate.

Needless to say processing all the data is relatively expensive, although highly valuable, and thus the amount of magnetic field data processed is a function of funding. The orbital data is much less expensive because there are much fewer data points per unit time. Thus orbital data processing is usually far ahead of the magnetic field data processing.

Printouts of all one minute average data and of many of the orbital parameters from the orbit tapes have been produced. It is not intended to send these to the National Space Science Data Center (NSSDC) since these printouts can be duplicated from the tapes.

Finally some remarks about data presentation. All data, on plots and on tapes are presented as vector components and total field. Such data can be more easily transformed and manipulated than data presented as magnitudes and angles and in general is as easy to interpret. Data presented as angles

can be confusing if the angle is near one of its limits (say 90° or -90°) when it flips back and forth in response to small fluctuations.

In the sections to follow, we shall briefly describe the instrument, discuss the data processing procedure, and then describe the formats of the resulting plots and tapes. The description of the production of orbital plots has been given elsewhere[1], and will not be repeated in this report.

[1]Russell, C.T., OGO-5 orbital plots generated by the UCLA Fluxgate Magnetometer Group, Publication No. 792, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, 1969.

2. The Instrument

The UCLA fluxgate magnetometer was designed to provide an accurate triaxial vector measurement of the magnetic field from perigee at low altitudes to apogee in the interplanetary medium. Each of the three orthogonal sensors has a dynamic range of $\pm 64{,}000$ gammas and in low fields can resolve field changes of 1/8th of a gamma. This was accomplished with a basic magnetometer that measures ± 16 gammas and a set of coils that provide fields to null out the field at the basic magnetometer to within $\pm 16\gamma$. The currents for these coils are provided in 64 steps of 16γ and 128 steps of 1024γ.. This is accomplished as follows: If a field of greater than $+16\gamma$ or less than -16γ reaches the basic magnetometer, this field is reduced in steps of 16γ until the field at the basic magnetometer is within its operating range. When all available 16γ steps have been applied (64 possible) a field of 1024γ is applied and 63 of the 16γ steps are removed. This stepping procedure has a cycle rate of 500 hz which is far above the magnetometer sampling rates.

The measured field consists then of three quantities: the number of 1024γ nulling fields applied, the number of 16γ nulling fields and the output of the basic magnetometer from +16 to -16γ digitized in 256 parts, each $1/8\gamma$. The sum of these three quantities for each independent axis gives the measured vector field.

The basic magnetometer is operated as a closed loop magnetometer with a frequency response that is flat to 150 hz and then rolls off at 20 db per decade above 150 hz. The three possible OGO-5 telemetry rates, 1, 8 and 64 kilobits per second, correspond to Nyquist frequencies of .43, 3.5 and 27.8 hz for the instrument. Since meaningful wave studies can be performed only if no signals above the Nyquist frequency reach the telemetry system, the output of the basic magnetometer enters a bit rate dependent filter before being digitally sampled. This critically damped fourth order filter has 8 db attenuation at half the Nyquist frequency, 20 db attenuation at the Nyquist frequency and 40 db attenuation at twice the Nyquist frequency.

The satellite can simultaneously transmit data to earth (real time data) and store data on the spacecraft on magnetic tape for later transmission (playback data). These data can be sampled at different rates: playback data is always sampled at 1 kilobit per second whereas the real time data has three possible rates. Thus, the instrument has actually two outputs, each with its independent filter depending on the sampling rate of the digitization unit to which the signal is routed.

The absolute accuracy of the measured field depends on many factors: the sensitivity of the magnetometer, the size of spacecraft fields and the possibility of drifts in the zero levels of the magnetometer. This magnetometer is the most sensitive fluxgate magnetometer ever flown on a spacecraft and is separated from the main body of the spacecraft by a

twenty foot boom. However, there are other nearby experiments and this was a newly designed magnetometer. Comparing with the Goddard magnetometers on board which are on a similar boom restricted only to magnetometers, it was found that there was a slow drift from orbit to orbit of the apparent zero levels of the UCLA magnetometer. The Goddard magnetometers consist of a Rb vapor magnetometer and a fluxgate magnetometer both of which have been flown before on OGO-1 and OGO-3 and which provide consistent fields when compared. Data from these magnetometers, graciously supplied by the experimenters have been used to determine the zero level for each OGO-5 orbit. However, in view of the slow drift of the zero levels the absolute value of any one component may be in error from one to two gammas. On the other hand the rate of drift is exceedingly slow compared to the time scales of physical processes such as waves, discontinuities, etc. Thus changes in the field components can be accurately measured to the digitization window of the experiment, 1/8 gamma.

In order to check the calibration of the instrument, a calibration signal is applied to each sensor approximately every 40 minutes (actually every 39 minutes 19.296 seconds). The calibrate signal is 64 data points long, where the number of points is counted at the real time data rate if the satellite is transmitting real time data and at the data storage rate if it isn't. Four bias fields of 8, 32, -8 and -32 gammas are applied to each sensor and each is applied for 16 consecutive

data points. The effect of these bias signals is removed in all data processing.

The unit housing the sensors has a heater which has a magnetic field when it is turned on. This heater bias field is approximately 8 gammas on the X and Y axes and 0.5 gammas on the Z-axis. This bias is also removed from all processed data.

3. General Remarks on Data Reduction

In processing a section of data the first step is to determine the sensor offsets. This is done by comparing with simultaneous measurements of the GSFC fluxgate magnetometer. (The GSFC data is corrected for its offsets with values determined from the Rubidium magnetometer data by the GSFC magnetometer group.) This is usually done once per orbit.

When the data enters the computer program, besides converting from voltages to gammas, the program corrects for three effects. The first effect is due to the heater bias. The program finds the heater signature by checking a heater on/off word which is sampled at 1/128th of the data rate and then looks for the expected heater on or off signature in the interval of 128 points bracketed by the change in the heater on/off word. This can fail if the data were very active, if there are data gaps or if the heater came on or went off at or near the end of a file of data (a file of data is defined by a continuous sequence of data on the original data tapes).

The second effect is that of the calibrate signal. The calibrate signal is much easier to identify than the heater signature. However, the occurrence of a calibration signal is not flagged by the instrument. Therefore, it is continuously searched for. It can be missed for the same reasons as the heater signature.

The third effect is the occurrence of transients whenever the medium ladder steps. Since the instrument obeys the Nyquist sampling criterion by having filters to remove signals above half the Nyquist frequency any step change in the data decays with a time constant which for this instrument equals six data points. The filters are applied only to the fine output of the magnetometer. Thus when an additional nulling field is applied to the sensor by the medium ladder (the medium ladder is the array of sixty-four 16 gamma steps that can be applied to each sensor) there is a transient 6 data points in duration. Various schemes have been applied to remove this transient depending in part on the nature of the data.

After these corrections the data is plotted, printed or averaged as required.

4. The Roadmaps. (One Minute Averages)

a) Data Processing

In generating the Roadmap plots all data is processed and averaged, both real time and playback. This data is then stored on a disk pack by orbit in two data sets one for real time data and one for playback data. Then these two data sets are scanned taking data in time sequence from the real time set until a gap is found in the data. Then playback data is searched to try to fill this gap. When this gap is filled or if it cannot be filled the real time data is again read until the next gap and then the process repeats. The end result is a tape with an orbit's data in time sequence containing averages formed from the highest possible telemetry rate. The data from this tape is then printed and microfilm plotted. There are no missing times on these tapes. When data is not available for a particular time it is flagged with a value of 100000.

At the same time, as the Roadmap tape is being created which contains one minute averages, the 4.608 second averages are created. Thus the 4.608 second averages are also in time sequence for one orbit with priority given to the highest telemetry rate data. These tapes are not printed or plotted at UCLA but are sent to H. West at the Lawrence Radiation Laboratory, Livermore, California where they are microfilm plotted. These magnetic tapes are also continuous in time with missing data flagged with values of 100000.

The one minute averages are centered on each minute. The points in this interval are scanned for obvious bad points, the bad points are rejected and the good points are summed and then the total is divided by the number of good points. The number of good points is also saved. We note that this process is performed for each of the three vector components and the total field. The total field calculated is the average of the instantaneous field magnitudes.

In order to retain information on the high frequency end of the spectrum, rms deviations are also calculated for each of the vector components and the total field. We note that the rms deviation of the total field depends somewhat on the accuracy of the offsets used. Thus reliance on the accuracy of the calculation of the rms deviation of the total field should be avoided in low fields. The deviations of the vector components, however, is independent of offset errors.

The rms deviations are not strictly rms deviations in the usual definition of the term, but are actually the rms amplitude of waves in a band of frequencies from 0.07 Hz (15 second period) to the Nyquist frequency which is a function of the telemetry rate. To calculate this amplitude, the input data stream, across averaging intervals, was filtered with a two stage high pass recursive filter. The amplitude response of this filter is shown in figure 1. The output of this filter was squared and summed over each minute and divided by the number of points and then its square root was taken.

NO. 340R-L35 DIETZGEN GRAPH PAPER
LOGARITHMIC
3 CYCLES X 5 CYCLES
EUGENE DIETZGEN CO.
MADE IN U. S. A.

FREQUENCY RESPONSE OF TWO STAGE HIGH PASS FILTER USED IN RMS DEVIATIONS IN ROAD MAPS

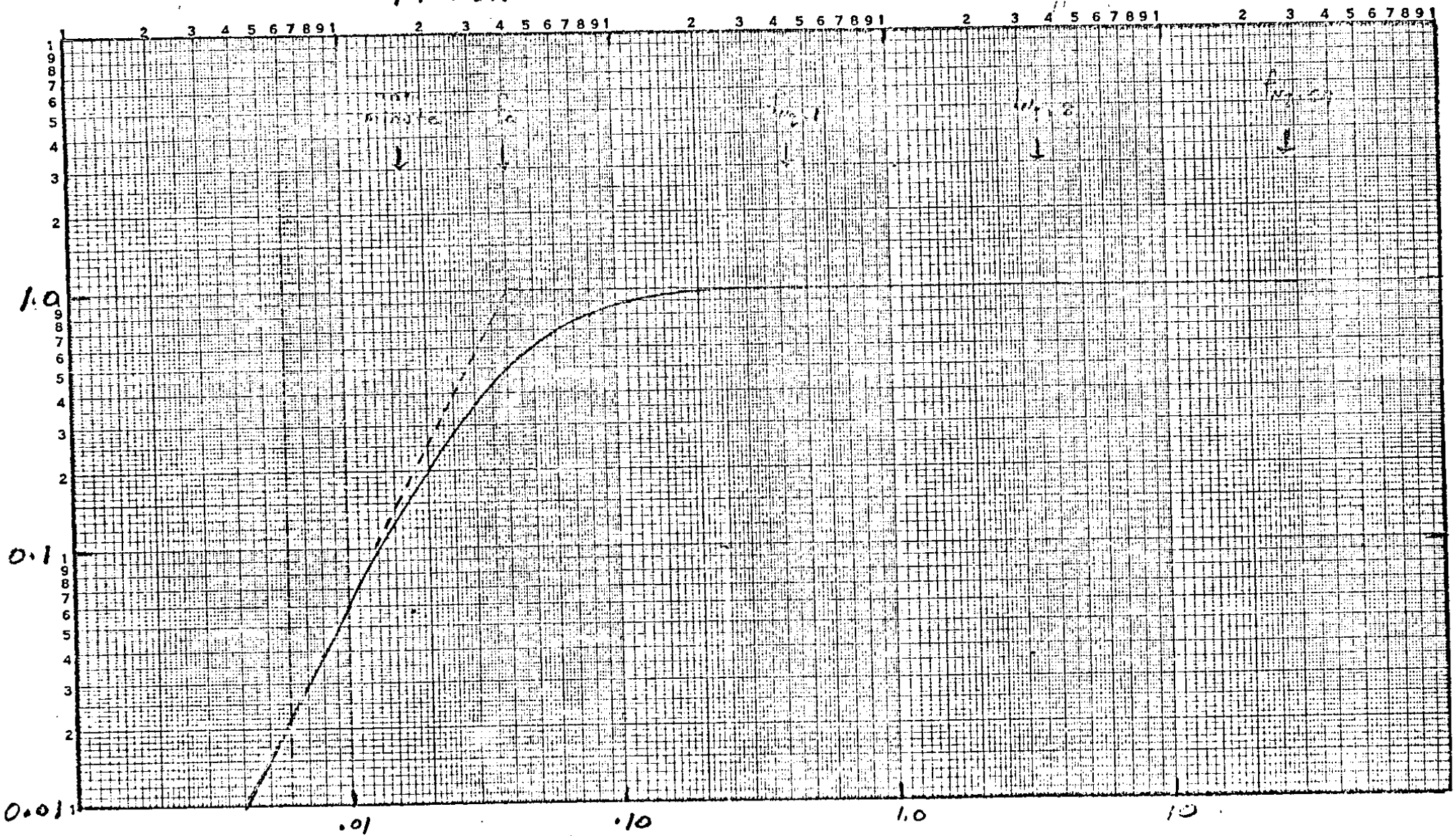


Figure 1

We note that this rms deviation is very insensitive to field gradients whereas the usual rms deviation responds readily to field gradients. However, as all deviations it is very sensitive to bad data and sharp spikes in the rms deviations are probably due to telemetry errors.

b) Microfilm Plots in Spacecraft Coordinates

Each microfilm frame contains five hours of data, so that 13 pages are required to plot an orbit. However, we have plotted two frames for each five hour interval: one containing the vector field data and one containing the rms deviation data. Thus there are 26 frames for every orbit. These are numbered in the lower right-hand corner of every plot. (There are two pages 1, two pages 2, etc.). The data corresponding to the first time on the page and the orbit number are plotted in the upper right-hand corner of each page. Also, each page of data in spacecraft coordinates has the heading "Body Coordinates".

The format of the plot of the rms deviations remains fixed throughout the orbit. Figure 2 shows a typical frame of the rms deviation page. The top axis labelled "KBS" indicates the telemetry bit rate. However, since this is derived by counting the number of points in a one minute average it provides more information than just this. If data quality is poor and points have to be discarded, then this quantity will deviate from a straight line. Furthermore, data missing between files on the original data tapes for intervals less than one minute will show

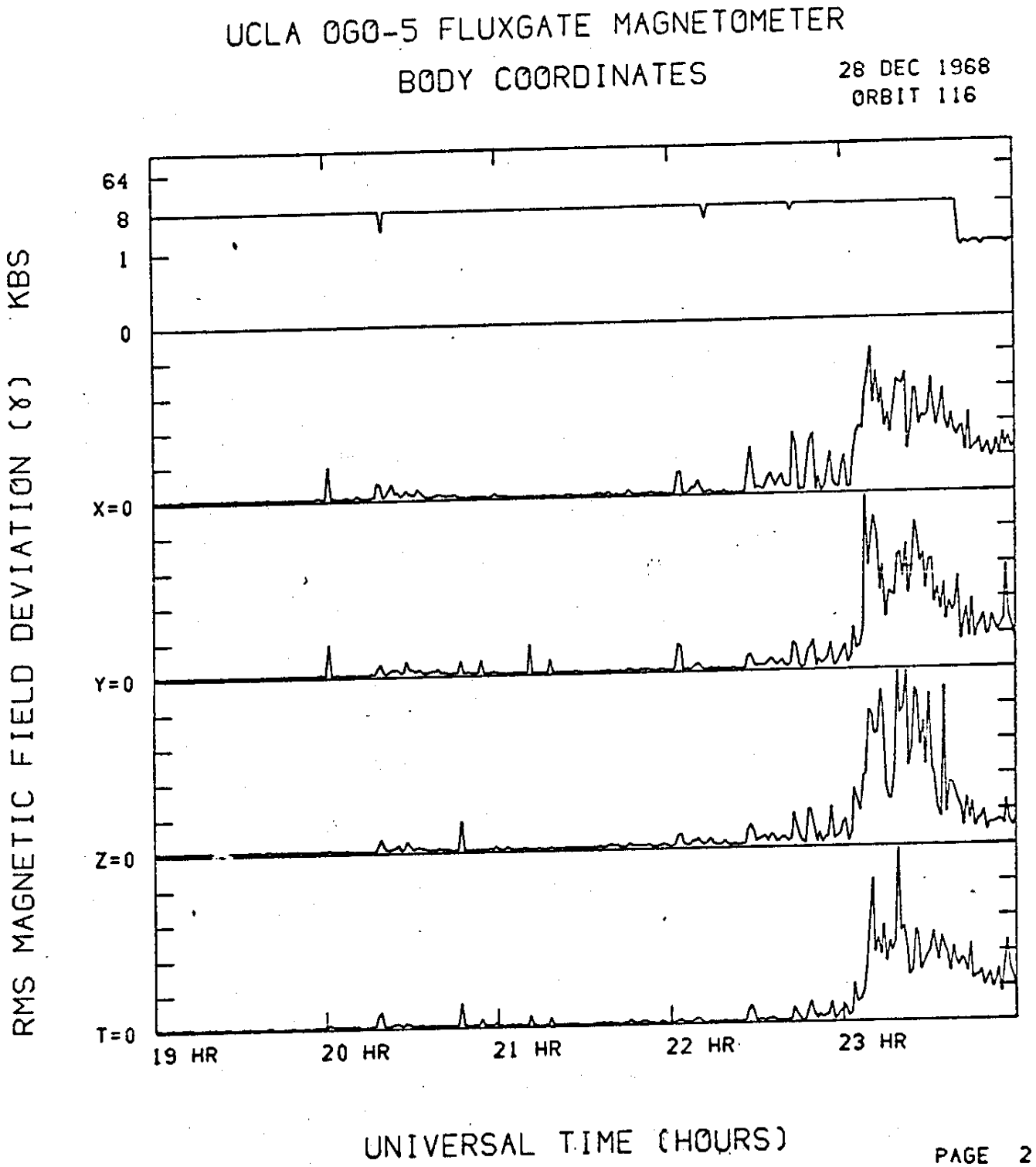

UCLA OGO-5 FLUXGATE MAGNETOMETER
BODY COORDINATES
28 DEC 1968
ORBIT 116
RMS MAGNETIC FIELD DEVIATION (γ)
KBS
64
8
1
0
X=0
Y=0
Z=0
T=0
19 HR
20 HR
21 HR
22 HR
23 HR
UNIVERSAL TIME (HOURS)

Fig. 2

Data quality indicators

up as a downwards spike on this plot. We note that this quantity is plotted on a log scale.

The next four quantities from top to bottom are the rms deviations B_X, B_Y, B_Z and in the total field. The scale is one gamma per division and is linear. The plots saturate at five gammas. The deviations are usually quite accurate but errors may occur. These usually take the form of isolated spikes. On occasion isolated spikes every 40 minutes can occur. These are caused by incompletely correcting for the calibrate signal or missing it completely. Another possible error is an increase in general noise level due to poor quality data. This can be recognized by the deviation of the bit rate word from a straight line. Although most bad points are rejected from the averages and the rms deviations a few always get through and this raises the power in the fluctuations. Spikes occurring on only one axis or on both the X and Y axes and not the Z axis are especially suspicious, such as the ones at 2000 UT and 2105 UT on figure 2.

Figure 3 shows an rms deviation frame through perigee (Perigee is at 1641 UT). We see that data near perigee can be very noisy. This is not real. From 1500 to 1600 and from 1700 to 1800 we see a general rise and then fall of the noise level. This is due to boom vibrations. The sharp increase (and decreases) near 1600 and the sharp decrease in the deviations near 1700 are caused by the switching on and off of the routine for correcting for instrument transients. This is done because we cannot accurately correct for transients when the instrument

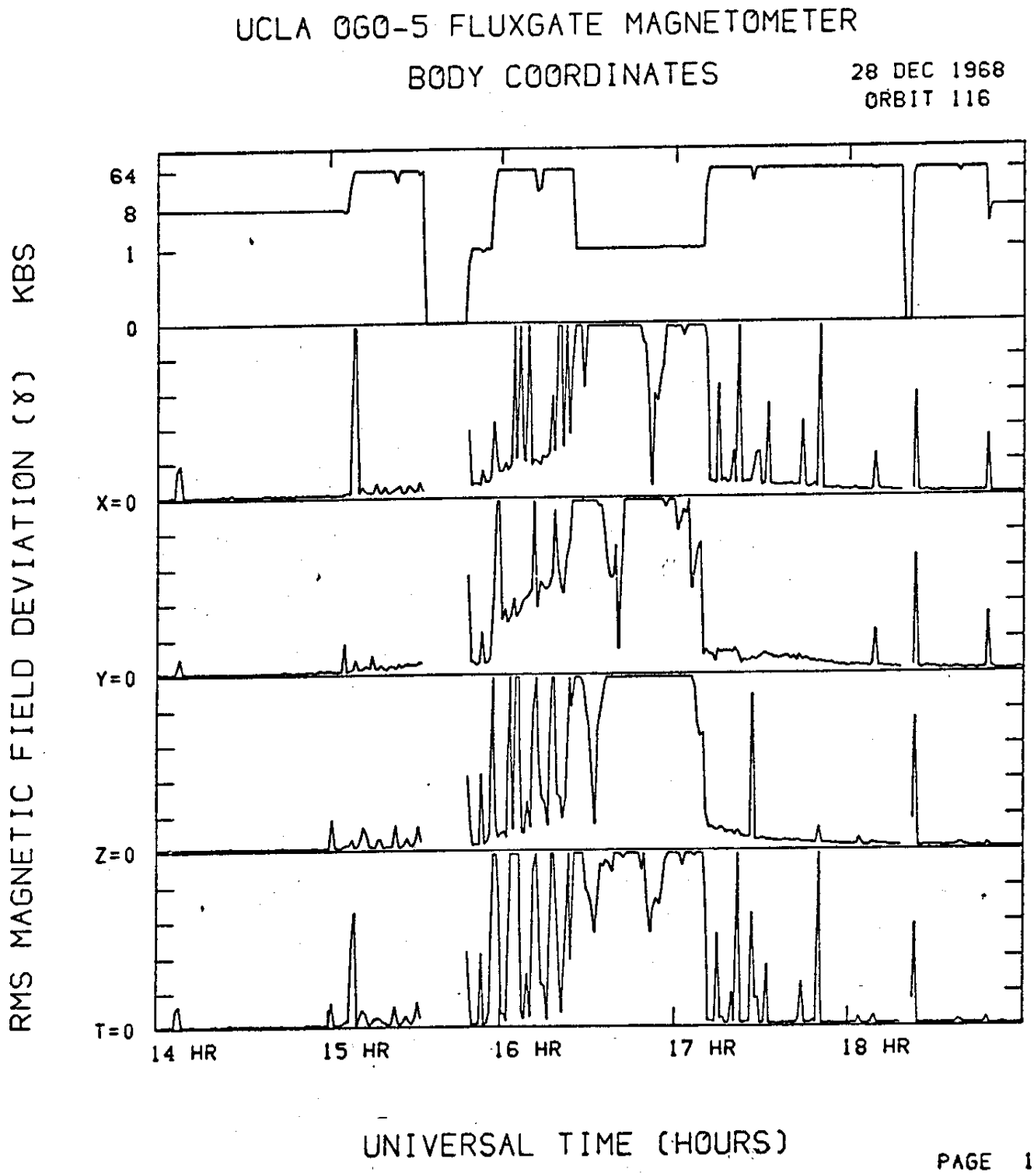

UCLA OGO-5 FLUXGATE MAGNETOMETER
BODY COORDINATES
28 DEC 1968
ORBIT 116
RMS MAGNETIC FIELD DEVIATION (γ)
KBS
64
8
1
0
X=0
Y=0
Z=0
T=0
14 HR
15 HR
16 HR
17 HR
18 HR
UNIVERSAL TIME (HOURS)
PAGE 1

Fig. 3

steps too rapidly. The point where we stop correcting depends both on the telemetry rate and the field strength.

Figure 4 shows the plot of the three components of the field and the magnitude of the field corresponding to the deviations in figure 2. Horizontal lines give the zeroes for each component. These can move about to maximize the amount of data on a page. The zero for the total field is the bottom of the plot. The scale is linear and is 10 gammas per division.

Figure 5 shows the field through perigee for the same interval shown in figure 3. The vertical scale is logarithmic with positive values plotted in the upper half of the plot and negative values in the lower half. This is the only logarithmic plot per orbit.

c) Microfilm Plots in Geocentric Solar Ecliptic (GSE) Coordinates

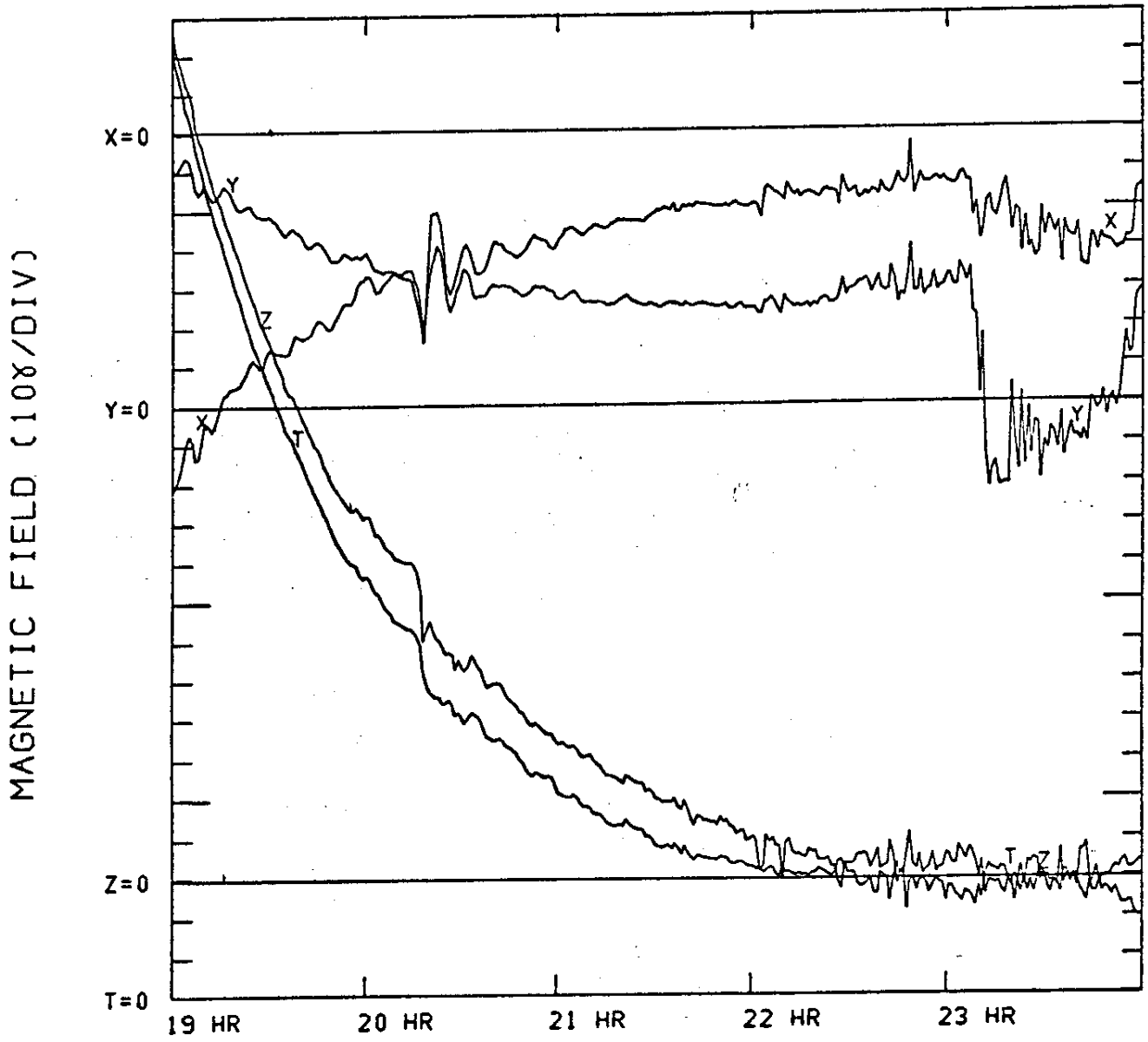
The microfilm plots in GSE coordinates contain only the field data because the rms deviations cannot be rotated. To transform the data to GSE the orbit tape supplied by GSFC has been used. The data on this tape is every minute. Errors in the positional and orientation data as well as in the magnetic field data can affect the data in the GSE plot.

Figures 6 and 7 show the data in figures 5 and 4 rotated into GSE. The format is identical with the exception that the hourly GSE coordinates of the satellite have been printed at the top of each page. The distances are in earth radii. There are 13 frames per orbit.

UCLA OGO-5 FLUXGATE MAGNETOMETER

BODY COORDINATES

28 DEC 1968
ORBIT 116



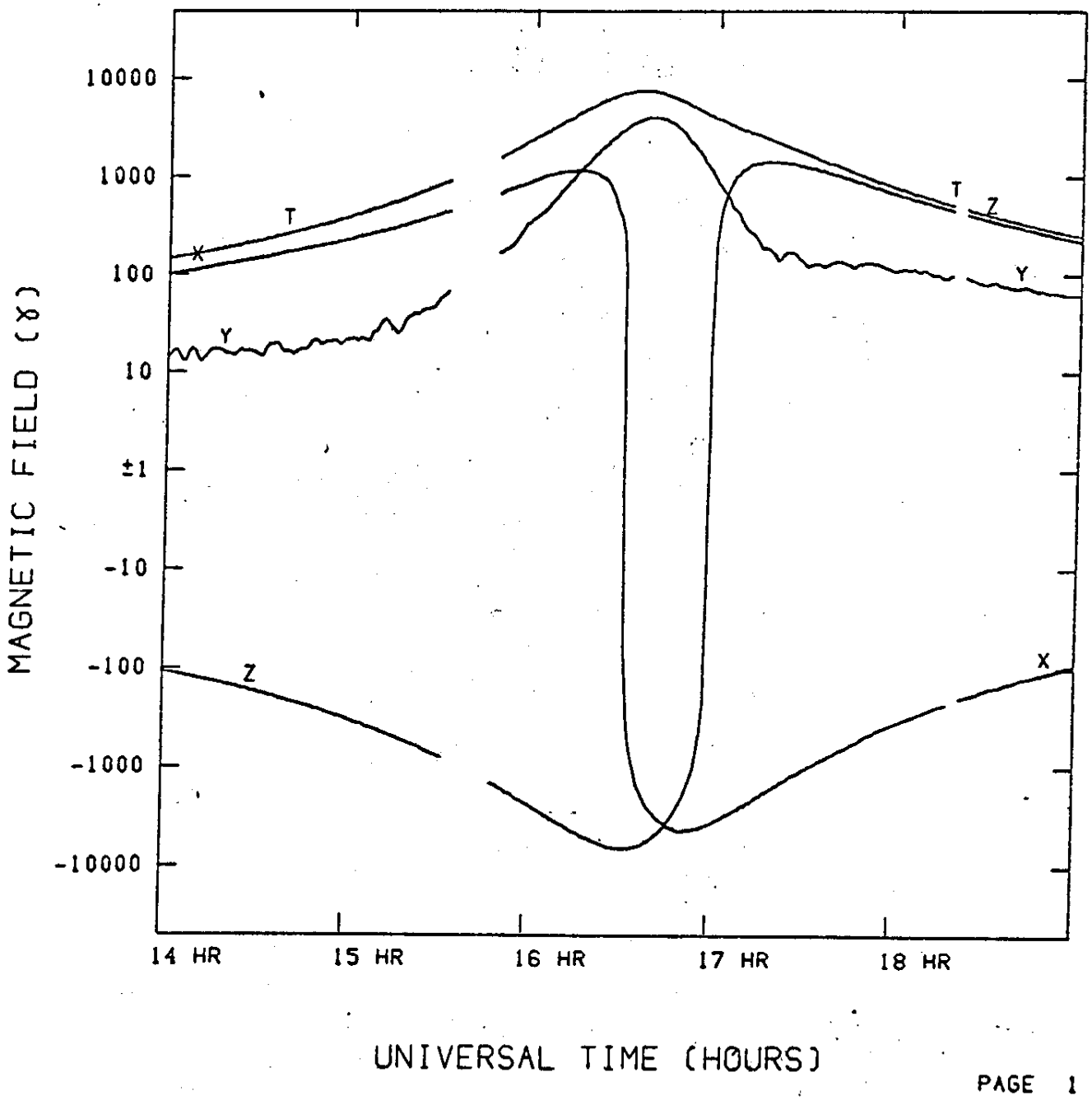
UNIVERSAL TIME (HOURS)

Fig. 4

UCLA OGO-5 FLUXGATE MAGNETOMETER

BODY COORDINATES

28 DEC 1968
ORBIT 116



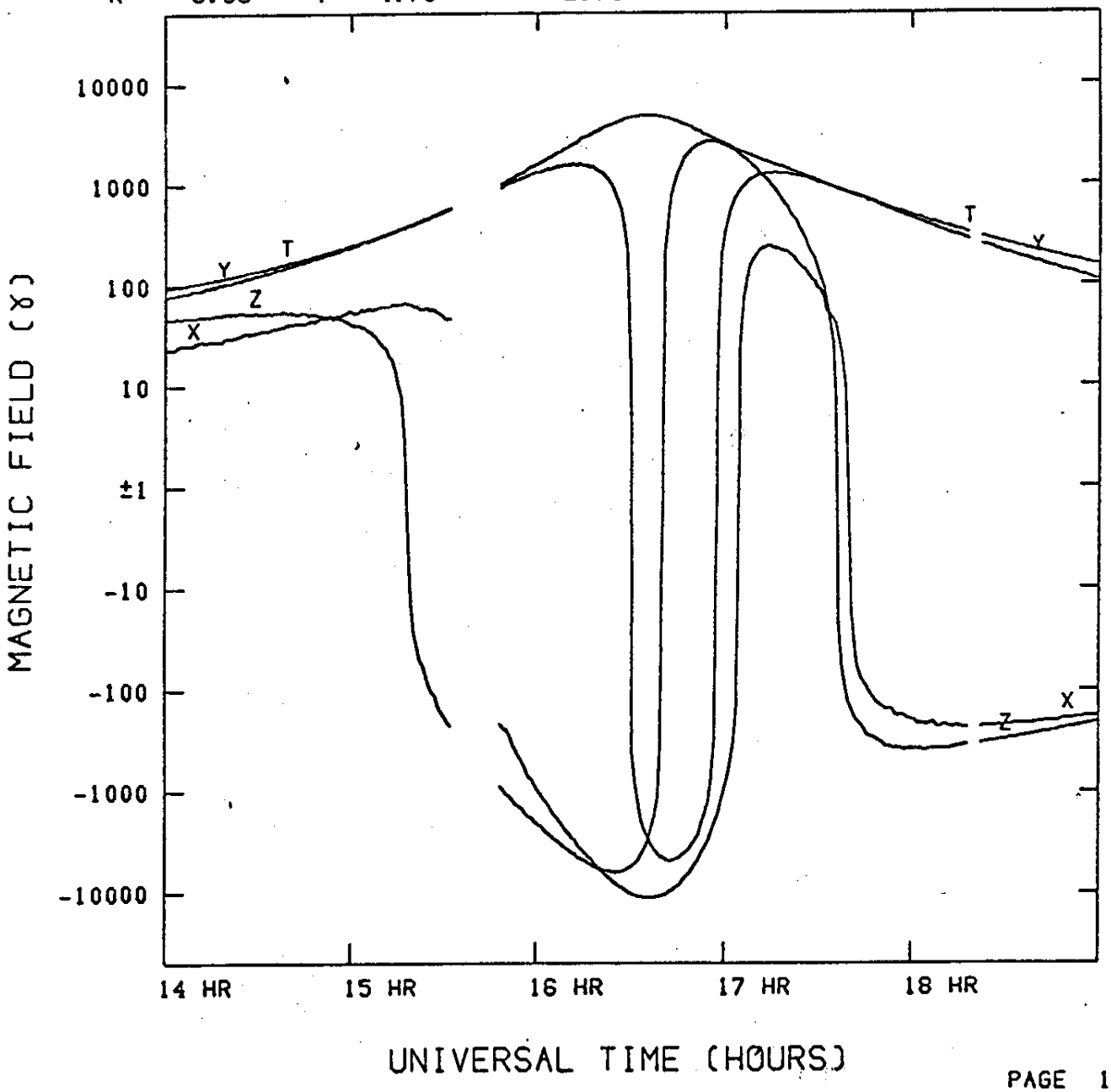
PAGE 1

Fig. 5

ORBIT 116 UCLA OGO-5 FLUXGATE MAGNETOMETER 28 DEC 1968

GSE COORDINATES

X	3.10	1.53	-0.31	-1.23	0.08	RE
Y	5.61	3.99	1.58	-1.67	-2.65	RE
Z	-1.41	-2.03	-2.18	-0.03	2.99	RE
R	6.56	4.73	2.71	2.07	3.100	RE



PAGE 1

Fig. 6

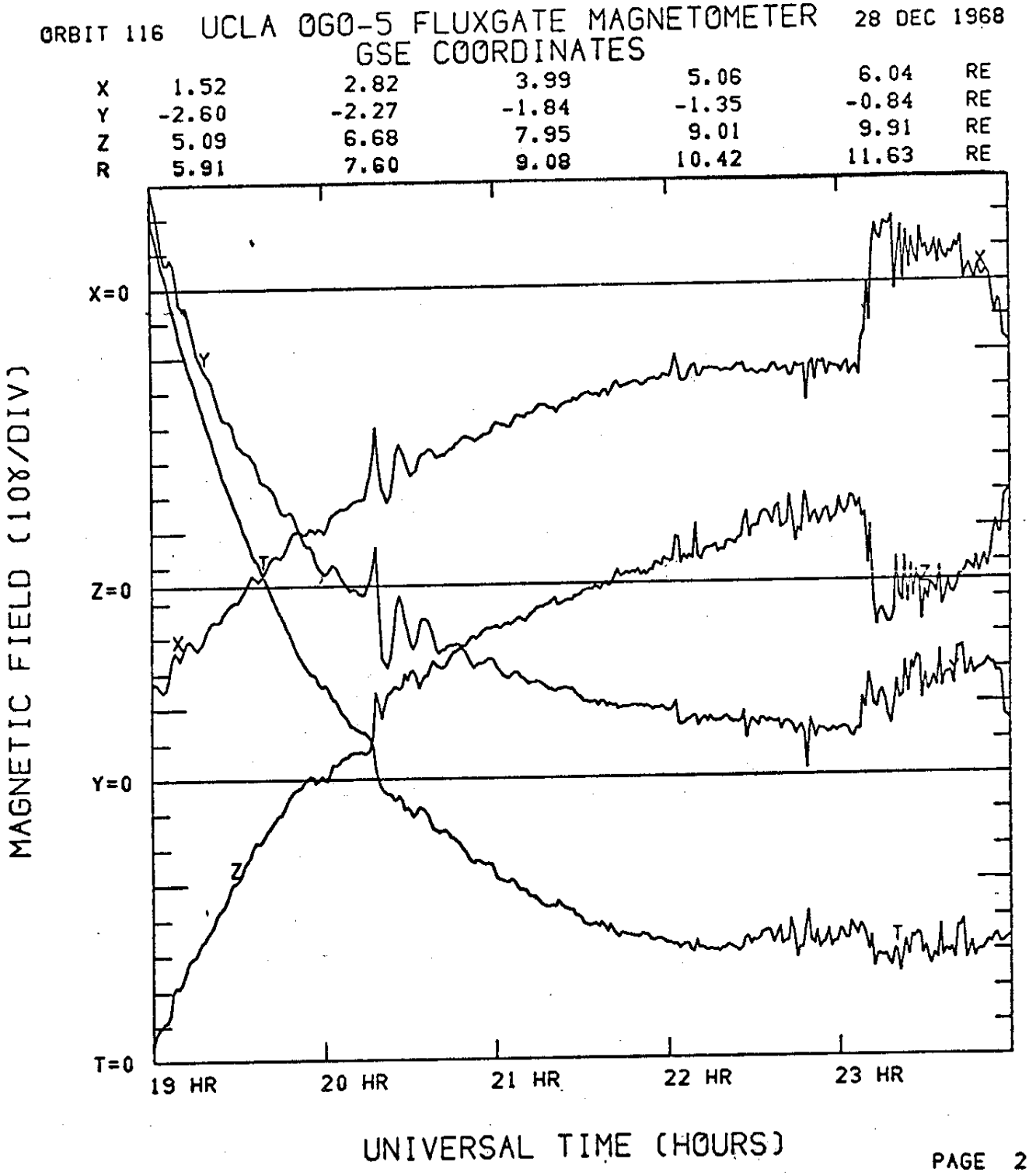

ORBIT 116 UCLA OGO-5 FLUXGATE MAGNETOMETER 28 DEC 1968
GSE COORDINATES
X 1.52 2.82 3.99 5.06 6.04 RE
Y -2.60 -2.27 -1.84 -1.35 -0.84 RE
Z 5.09 6.68 7.95 9.01 9.91 RE
R 5.91 7.60 9.08 10.42 11.63 RE
X=0
Z=0
Y=0
T=0
MAGNETIC FIELD (10γ/DIV)
19 HR
20 HR
21 HR
22 HR
23 HR
UNIVERSAL TIME (HOURS)

Fig. 7

d) Microfilm Plots in Geocentric Solar Magnetospheric (GSM) Coordinates

These plots are identical to the GSE plots except that the field and the position are given in the GSM system.

e) Magnetic Tapes in Spacecraft Coordinates

These tapes are 9 track, 800 BPI standard labelled binary tapes. They have 5 files per tape, each file corresponding to one orbit. These files usually overlap in time just before perigee. The JCL used to create the tape is

```
//GO.FT10F001 DD DISP=(NEW,KEEP),DSN=BDY001,
// UNIT=2400,LABEL=(1,SL,,OUT),VOL=SER=IG0005,
// DCB=(RECFM=V,LRECL=5128,BLKSIZE=5132)
```

The binary records are written by the Fortran statement:

```
WRITE(10) NREC, (IBT(I), BX(I), BY(I), BZ(I),
BT(I), BXRMS(I), BYRMS(I), BZRMS(I), BTRMS(I),
IQUAL(I), I=1, 128)
```

where

NREC=128

IBT=Bishop time (defined in Appendix)

BX= X component of the field in gammas

BY= Y component of the field in gammas

BZ= Z component of the field in gammas

BT= total field in gammas (obtained by averaging instantaneous values)

BXRMS= X rms deviation in gammas

BYRMS= Y rms deviation in gammas

BZRMS= Z rms deviation in gammas

BTRMS= Total field rms deviation in gammas

IQUAL= Quality indicator

The quality indicator IQUAL is the sum of two numbers, 1000 times NUMPTS + ICHL. NUMPTS is the number of data points used in the average and ICHL is a flag indicating the status of heater, calibrate signal and ladder step corrections during the averaging interval.

ICHL may be thought of as a binary number with seven bits: X_o, X_1, X_2, $X_3 \ldots X_6$.

If X_o equals 1, then sometime during the averaging interval a heater correction was required but the exact interval for applying this correction could not be found.

If X_2 equals 1, then sometime during the averaging interval a heater correction was applied.

If X_3 equals 1, then a calibration signal correction was made.

If X_4 equals 1, then at least one correction for a medium ladder step on the Z axis was made.

If X_5 equals 1, then at least one correction for a medium ladder step on the Y axis was made.

If X_6 equals 1, then at least one correction for a medium ladder step on the X axis was made.

We note that X_2 is not used, and that this seven bit binary number actually appears in IQUAL as a three digit decimal number.

f) Magnetic Tapes in GSE Coordinates

These tapes are 9 track, 800 BPI, standard labelled binary tapes. They have 5 files per tape, each file corresponding to one orbit. These files usually overlap in time just before perigee. The JCL used to create the tape is:

```
//GO.FT10F001 DD DISP=(NEW,KEEP),DSN=GSE001,
// UNIT=2400,LABEL=(1,SL,,OUT),VOL=SER=IG0006,
// DCB=(RECFM=V,(LRECL=1228,BLKSIZE=1232))
```

The binary records are written by the Fortran statement:

```
WRITE(10)IORBIT,IBTST,XGSE,YGSE,ZGSE,RE,
BXE,BYE,BZE,BTE,IQUAL
```

where: BXE,BYE,BZE,BTE and IQUAL are arrays of 60 elements each and

IORBIT = Orbit number

IBTST = Bishop time of first point in record (Bishop time is defined in appendix)

XGSE = XGSE coordinate of satellite at start of record in Re

YGSE = YGSE coordinate of satellite at start of record in Re

ZGSE = ZGSE coordinate of satellite at start of record in Re

RE = Radial distance of satellite from the center of the earth in earth radii

BXE = X GSE component of the field in gammas

BYE = Y GSE component of the field in gammas

BZE = Z GSE component of the field in gammas

BTE = Total field magnitude (obtained by averaging instantaneous values)

IQUAL = Quality indicator as explained in previous section.

g) Magnetic Tapes in GSM Coordinates

Format identical to GSE tapes except that field and positional data are in GSM coordinates.

4.608 Second Averages

a) Data Processing

The data processing for the 4.608 second averages is performed at the same time as the one minute averages and is completely analogous to the one minute average processing except that no rms deviations are produced.

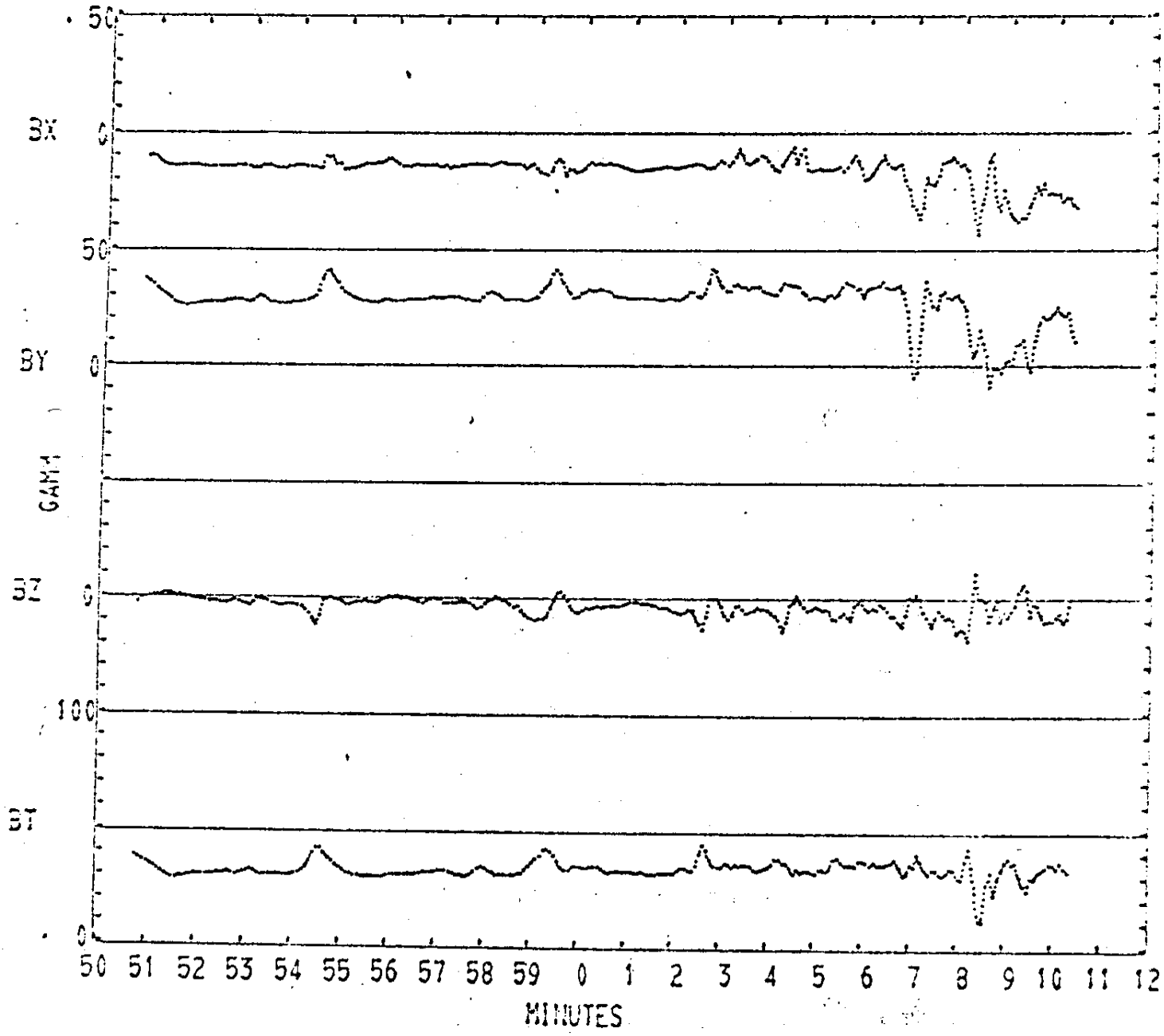
b) Microfilm Plots in Spacecraft Coordinates

The microfilm plots of the 4.608 averages are produced at the Lawrance Radiation Laboratory, Livermore under the supervision of H.I. West, Jr. The plots are in spacecraft coordinates only and cover 20 minutes of data per frame. Thus there are approximately 180 frames per orbit. The scale on the plots is linear. The usual scale for the plots is 10 gammas per division but near perigee this scale is increased to 100 or 1000 gammas per division as necessary to keep the data on scale.

Figure 8 shows a sample of these plots, for the period of the magnetopause crossing shown in the previous figures (2, 4 and 6). The header at the top of each page indentifies the time interval. The orbit number, year, month, day of month, day of year, day from launch and the times of the first and last plotted points on the page are given here. At the bottom of the page is information obtained from the orbit tape. The field given, here, in spacecraft coordinates is that predicted by the reference field only. Also given are the predicted L value, and magnetic latitude, the radial distance to the

OGO V	ORBIT	YEAR	MONTH	DATE	Y DAY	L DAY	HOUR	MINUTES	SECONDS	RECORD	PAGE
INIT.	116	68	DEC	28	363	299	22	50	48.192	55	2[illegible]
FINAL							23	10	23.232	56	

MAGNETOMETER 1 191



ATT-ORB	BX	BY	BZ	B	L	MAG LAT	R	PHI	THETA
INIT.	-6.4	16.3	22.3	28.3	15.90	32.17	11.45	351.1	58.6
FINAL	-5.7	15.1	19.6	25.3	16.03	31.03	11.83	353.1	56.2

Fig. 8

satellite and the solar ecliptic longitude and latitude of the satellite.

Occasional errors do appear on these plots and we have not redone these plots to correct them. Some of these errors have been mentioned before: bad telemetry, missed heater corrections and missed calibrate signals, (or incorrectly compensated calibrate signals). Bad telemetry usually shows up as isolated spikes. Missed heater corrections appear as a short duration increase or decrease of 8 gammas on both X and Y axes and no discernible change in Z. Missed calibration signals appear on all three axes. Incorrectly compensated calibrations may only appear on one axis but its 4 steps are usually recognizable. Plotting errors can also occur on these plots. These usually result in missing data, or incomplete plots. Also the zero levels on the plots and tapes for orbits 1-37 may be slightly different due to reprocessing of the tape when better offsets were determined. When differences are noted, the tape contains the correct values.

d) Magnetic Tapes

These tapes are 9 track standard labelled binary tapes. They have 5 files per tape, each file corresponding to one orbit. These files usually overlap in time just before perigee. The JCL used to create the tape is:

```
//GO.FTIOF001 DD DISP=(NEW,KEEP),DSN=PNT00I,UNIT=2400,
// LABEL=(1,SL,,OUT),VOL=SER=IG0012,
// DCB=(RECFM=V,LRECL=3080,BLKSIZE=3084)
```

The binary records are written by the Fortran statement.

```
WRITE(10)NREC,(IBT(I),BX(I),BY(I),BZ(I),BT(I),IQUAL(I),
I=1,128)
```

where NREC = 128

IBT = Bishop time of data (see appendix)

BX = X spacecraft component of the field in gammas

BY = Y spacecraft component of the field in gammas

BZ = Z spacecraft component of the field in gammas

BT = total field in gammas

IQUAL = Quality indicator as explained in a previous section

Appendix

Bishop time is the name of the unit of time used for the majority of the processing of the OGO-5 and ATS-1 fluxgate magnetometer data at UCLA. It is defined as the number of tenths of seconds since the start of the year 1966, that is, Bishop time equals zero, at 0000 U.T. on January 1, 1966. The advantage of using Bishop time is that one single 360 word can be used to cover a period of six years. Six years is longer than the life-expectancy of most satellites. The disadvantage is that this time word cannot be used to provide timing for the high telemetry rate data of OGO-5. This problem does not arise for the data discussed in this report because the highest sample rate given on these tapes is one point every 4.608 seconds.

On the next page is the listing of a subroutine to convert from Bishop time to ordinary Universal time and vice versa. The entry point BTCON converts from Bishop time while the entry point CONBT converts to Bishop time.

```
      SUBROUTINE CONBT ( T, BT )
C ***********************************************************************
C *  'BISHOP TIME' CONVERSION SUBROUTINE FOR OGO-5. BT IS DEFINED AS THE  *
C *  NUMBER OF TENTHS OF A SECOND SINCE THE START OF YEAR 1966, THAT IS,  *
C *  BT = 0 AT YR 66 DAY 1 HR 0 ETC., AND THE TIME UNIT IS 1/10 SEC.      *
C *      CALL CONBT( T, BT )  CONVERTS T ARRAY TO BT.                     *
C *      CALL BTCON ( BT, T)  CONVERTS BT TO T ARRAY.                     *
C *  THE T ARRAY IS DEFINED AS FOLLOWS:                                   *
C *      T(1) = YEAR (66-71)                T(5) = HOUR (0-23)            *
C *      T(2) = DAY OF YEAR (1-366)         T(6) = MINUTE (0-59)          *
C *      T(3) = MONTH (1-12)                T(7) = SECOND (0-59)          *
C *      T(4) = DAY OF MONTH (1-31)         T(8) = MILLISECOND (0-999)    *
C *  WHEN CONVERTING TO BT, T(3) AND T(4) ARE USED ONLY IF T(2) = 0.      *
C *  OTHERWISE T(3) AND T(4) ARE IGNORED.  WHEN CONVERTING FROM BT, ALL   *
C *  EIGHT ENTRIES OF THE T ARRAY ARE COMPUTED.                           *
C *  THE SUBROUTINE FAILS AFTER FEB. 28, 1972 AND BISHOP TIME             *
C *  OVERFLOWS THE 360, WORD LATER THAT YEAR.                             *
C *                                  PROGRAMMER - NEAL CLINE  JAN. 1968   *
C ***********************************************************************
      INTEGER  T(8), BT,   M(13)
     * / 0, 31, 59, 90, 120, 151, 181, 212, 243, 273, 304, 334, 365 /
      N = ( T(1) - 66 ) * 365
      IF ( T(1) .GT. 68 )  N = N + 1
      IF ( T(2) .NE. 0 )  GO TO 10
          N = N + M(T(3)) + T(4) - 1
          IF ( T(3) .GT. 2 .AND. T(1) .EQ. 68 )  N = N + 1
          GO TO 20
   10 N = N + T(2) - 1
   20 BT = N*864000 + T(5)*36000 + T(6)*600 + T(7)*10 + T(8)/100
      RETURN
      ENTRY BTCON ( BT, T )
      N = BT / 864000
      IF ( N - 1095 ) 50, 30, 40
   30     T(1) = 68
          T(2) = 366
          GO TO 60
   40     N = N - 1
   50     T(1) = N/365 + 66
          T(2) = MOD( N, 365 ) + 1
   60 N = T(2)
      IF ( T(1) .NE. 68 )  GO TO 90
          IF ( N - 60 ) 90, 70, 80
   70         T(3) = 2
              T(4) = 29
              GO TO 120
   80         N = N - 1
   90 DO 100  K = 2, 13
          IF ( N .LE. M(K) )  GO TO 110
  100     CONTINUE
  110 T(3) = K - 1
      T(4) = N - M(K-1)
  120 T(5) = MOD( BT/36000, 24 )
      T(6) = MOD( BT/600, 60 )
      T(7) = MOD( BT/10, 60 )
      T(8) = MOD( BT, 10 ) * 100
      RETURN
      END
```

HF1

```
$JOB  13:03:25
$NOP DUMP OF X-379
$ASS IN MS4
$EXEC DPHEX BS
 INPUT TAPE ON MS4
 DATA INPUT     1 1 1
  FILE  1       RECORD  1        LENGTH   3184 BYTES
  (     0)  0C0C0000  0C080000  00000080  28E82B00  45186A00  45186A00  45186A00  45186A00  00000000  28E82B2E
  (    40)  45186A00  45186A00  45186A00  45186A00  00000000  28E82B5C  45186A00  45186A00  45186A00  45186A00
  (    80)  00000000  28E82B8A  45186A00  45186A00  45186A00  45186A00  00000000  28E82B88  45186A00  45186A00
  (   120)  45186A00  45186A00  00000000  28E82BE6  45186A00  45186A00  45186A00  45186A00  00000000  28E82C14
  (   160)  45186A00  45186A00  45186A00  45186A00  00000000  28E82C42  45186A00  45186A00  45186A00  45186A00
  (   200)  00000000  28E82C70  45186A00  45186A00  45186A00  45186A00  00000000  28E82C9E  45186A00  45186A00
  (   240)  45186A00  45186A00  00000000  28E82CCC  45186A00  45186A00  45186A00  45186A00  00000000  28E82CFA
  (   280)  45186A00  45186A00  45186A00  45186A00  00000000  28E82D28  45186A00  45186A00  45186A00  45186A00
  (   320)  00000000  28E82D57  45186A00  45186A00  45186A00  45186A00  00000000  28E82D85  45186A00  45186A00
  (   360)  45186A00  45186A00  00000000  28E82DB3  45186A00  45186A00  45186A00  45186A00  00000000  28E82DE1
  (   400)  45186A00  45186A00  45186A00  45186A00  00000000  28E82E0F  45186A00  45186A00  45186A00  45186A00
  (   440)  00000000  28E82E3D  45186A00  45186A00  45186A00  45186A00  00000000  28E82E6B  45186A00  45186A00
  (   480)  45186A00  45186A00  00000000  28E82E99  45186A00  45186A00  45186A00  45186A00  00000000  28E82EC7
  (   520)  45186A00  45186A00  45186A00  45186A00  00000000  28E82EF5  45186A00  45186A00  45186A00  45186A00
  (   560)  00000000  28E82F23  45186A00  45186A00  45186A00  45186A00  00000000  28E82F51  45186A00  45186A00
  (   600)  45186A00  45186A00  00000000  28E82F80  45186A00  45186A00  45186A00  45186A00  00000000  28E82FAE
  (   640)  45186A00  45186A00  45186A00  45186A00  00000000  28E82FDC  45186A00  45186A00  45186A00  45186A00
  (   680)  00000000  28E8300A  45186A00  45186A00  45186A00  45186A00  00000000  28E83038  45186A00  45186A00
  (   720)  45186A00  45186A00  00000000  28E83066  45186A00  45186A00  45186A00  45186A00  00000000  28E83094
  (   760)  45186A00  45186A00  45186A00  45186A00  00000000  28E830C2  45186A00  45186A00  45186A00  45186A00
  (   800)  00000000  28E830F0  45186A00  45186A00  45186A00  45186A00  00000000  28E8311E  45186A00  45186A00
  (   840)  45186A00  45186A00  00000000  28E8314C  45186A00  45186A00  45186A00  45186A00  00000000  28E8317A
  (   880)  45186A00  45186A00  45186A00  45186A00  00000000  28E831A8  45186A00  45186A00  45186A00  45186A00
  (   920)  00000000  28E831D7  45186A00  45186A00  45186A00  45186A00  00000000  28E83205  45186A00  45186A00
  (   960)  45186A00  45186A00  00000000  28E83233  45186A00  45186A00  45186A00  45186A00  00000000  28E83261
  (  1000)  45186A00  45186A00  45186A00  45186A00  00000000  28E8328F  45186A00  45186A00  45186A00  45186A00
  (  1040)  00000000  28E832BD  45186A00  45186A00  45186A00  45186A00  00000000  28E832EB  45186A00  45186A00
  (  1080)  45186A00  45186A00  00000000  28E83319  45186A00  45186A00  45186A00  45186A00  00000000  28E83347
  (  1120)  45186A00  45186A00  45186A00  45186A00  00000000  28E83375  45186A00  45186A00  45186A00  45186A00
  (  1160)  00000000  28E833A3  45186A00  45186A00  45186A00  45186A00  00000000  28E833D1  45186A00  45186A00
  (  1200)  45186A00  45186A00  00000000  28E83400  45186A00  45186A00  45186A00  45186A00  00000000  28E8342E
  (  1240)  45186A00  45186A00  45186A00  45186A00  00000000  28E8345C  45186A00  45186A00  45186A00  45186A00
  (  1280)  00000000  28E8348A  45186A00  45186A00  45186A00  45186A00  00000000  28E834B8  45186A00  45186A00
  (  1320)  45186A00  45186A00  00000000  28E834E6  45186A00  45186A00  45186A00  45186A00  00000000  28E83514
  (  1360)  45186A00  45186A00  45186A00  45186A00  00000000  28E83542  45186A00  45186A00  45186A00  45186A00
  (  1400)  00000000  28E83570  45186A00  45186A00  45186A00  45186A00  00000000  28E8359E  45186A00  45186A00
  (  1440)  45186A00  45186A00  00000000  28E835CC  45186A00  45186A00  45186A00  45186A00  00000000  28E835FA
  (  1480)  45186A00  45186A00  45186A00  45186A00  00000000  28E83628  45186A00  45186A00  45186A00  45186A00
  (  1520)  00000000  28E83657  45186A00  45186A00  45186A00  45186A00  00000000  28E83685  45186A00  45186A00
  (  1560)  45186A00  45186A00  00000000  28E836B3  45186A00  45186A00  45186A00  45186A00  00000000  28E836E1
  (  1600)  45186A00  45186A00  45186A00  45186A00  00000000  28E8370F  45186A00  45186A00  45186A00  45186A00
  (  1640)  00000000  28E8373D  45186A00  45186A00  45186A00  45186A00  00000000  28E8376B  45186A00  45186A00
  (  1680)  45186A00  45186A00  00000000  28E83799  45186A00  45186A00  45186A00  45186A00  00000000  28E837C7
  (  1720)  45186A00  45186A00  45186A00  45186A00  00000000  28E837F5  45186A00  45186A00  45186A00  45186A00
  (  1760)  00000000  28E83823  45186A00  45186A00  45186A00  45186A00  00000000  28E83851  45186A00  45186A00
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  (  1840)  45186A00  45186A00  45186A00  45186A00  00000000  28E838DC  45186A00  45186A00  45186A00  45186A00
  (  1880)  00000000  28E8390A  45186A00  45186A00  45186A00  45186A00  00000000  28E83938  45186A00  45186A00
  (  1920)  45186A00  45186A00  00000000  28E83966  45186A00  45186A00  45186A00  45186A00  00000000  28E83994
  (  1960)  45186A00  45186A00  45186A00  45186A00  00000000  28E839C2  45186A00  45186A00  45186A00  45186A00
  (  2000)  00000000  28E839F0  45186A00  45186A00  45186A00  45186A00  00000000  28E83A1E  45186A00  45186A00
  (  2040)  45186A00  45186A00  00000000  28E83A4C  45186A00  45186A00  45186A00  45186A00  00000000  28E83A7A
  (  2080)  45186A00  45186A00  45186A00  45186A00  00000000  28E83AA8  45186A00  45186A00  45186A00  45186A00
  (  2120)  00000000  28E83AD7  45186A00  45186A00  45186A00  45186A00  00000000  28E83B05  45186A00  45186A00
  (  2160)  45186A00  45186A00  00000000  28E83B33  45186A00  45186A00  45186A00  45186A00  00000000  28E83B61
  (  2200)  45186A00  45186A00  45186A00  45186A00  00000000  28E83B8F  45186A00  45186A00  45186A00  45186A00
  (  2240)  00000000  28E83BBD  45186A00  45186A00  45186A00  45186A00  00000000  28E83BEB  45186A00  45186A00
```

25 FILES

TIME = BISHOP TIME

060-S

03/05/68 – 05/08/68

D-29194

[28E82B00]

CONVERT TO DECIMAL AND THAT = 1/10 OF A SEC.

DIVIDE DECIMAL # BY 864,000 AND GIVES YOU # OF DAYS.

START FROM YR 66 AT DAY 1.

EXAMPLE: (535 DAYS WOULD BE

535
-365
170 DAY 170

WHICH IS 06/20/67

DATAFOLD FORMS, INC.—W

(2280)	45186A00	45186A00	00000000	28E83C19	45186A00	45186A00	45186A00	45186A00	00000000	28E83C47
(2320)	45186A00	45186A00	45186A00	45186A00	00000000	28E83C75	45186A00	45186A00	45186A00	45186A00
(2360)	00000000	28E83CA3	45186A00	45186A00	45186A00	45186A00	00000000	28E83CD1	45186A00	45186A00
(2400)	45186A00	45186A00	00000000	28E83D00	45186A00	45186A00	45186A00	45186A00	00000000	28E83D2E
(2440)	45186A00	45186A00	45186A00	45186A00	00000000	28E83D5C	45186A00	45186A00	45186A00	45186A00
(2480)	00000000	28E83D8A	45186A00	45186A00	45186A00	45186A00	00000000	28E83DB8	45186A00	45186A00
(2520)	45186A00	45186A00	00000000	28E83DE6	45186A00	45186A00	45186A00	45186A00	00000000	28E83E14
(2560)	45186A00	45186A00	45186A00	45186A00	00000000	28E83E42	45186A00	45186A00	45186A00	45186A00
(2600)	00000000	28E83E70	45186A00	45186A00	45186A00	45186A00	00000000	28E83E9E	45186A00	45186A00
(2640)	45186A00	45186A00	00000000	28E83ECC	45186A00	45186A00	45186A00	45186A00	00000000	28E83EFA
(2680)	45186A00	45186A00	45186A00	45186A00	00000000	28E83F28	45186A00	45186A00	45186A00	45186A00
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(80)	0003E810	28FFC005	C217C5E1	4310EB13	C28D584D	431324BF	0003E810	28FFC033	C215A60A	4310F65F
(120)	C28DA0E4	43132E4F	0003E810	28FFC061	C2137AA7	4311027F	C28E03E3	43133991	0003E810	28FFC08F
(160)	C2114BD5	4311086D	C28E783D	43134016	0003E437	28FFC0BD	C1F39880	431118DC	C28E9E9B	43134DFF
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(720)	C2962EE4	431441FE	0003E800	28FFC4E1	4220EC4C	4311DDDD	C296A958	43144CFB	0003E800	28FFC50F
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(960)	C29AB57E	4314B5D1	0003E800	28FFC6AE	42354B7F	43120C70	C29B198C	4314C18E	0003E800	28FFC6DC
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(1480)	4260B804	43122826	C2A45F07	4315B845	0003E800	28FFCAA3	4262A681	43122773	C2A4EDFB	4315C497
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DATAFOLD FORMS INC — W

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FILE    1      # OF DATA RECORDS    263      # SUCCESSFUL READS   263
       # PERMANENT READ ERRORS    0       # ZERO BYTE ERRORS   1       # SHORT RECORDS    0       # UNDEFINED ERRORS   0
          # OF RECORDS RETRIED    1       TOTAL # OF RETRIES   1
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$$
$AVF IN 24
$EXEC DPHEX BA

DATAFOLD FORMS, INC. — W

OGO-5

1 MIN. AVG. B FIELD ON TAPE

68-014A-14F

This tape is an addition to the data set. The format of the tape is 9 track, 1600 BPI, unlabelled, binary and was created on an IBM/360. The tape contains 1 file, with the file containing orbits 1 thru 305 (Date 3/05/68 - 5/05/70).

D#	C#	DATE
D-29053	C-18728	3/5/68 - 5/5/70

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5/05/70

3899 RECORDS IN FILE 1 OF TAPE

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IEF285I   VOL SER NOS= K3SCR3.
IEF285I   SYS77048.T090937.RV000.YZJRJTX4.S0000082      DELETED
IEF285I   VOL SER NOS= K3SCR3.
IEF285I   SYS77048.T090937.SV000.YZJRJTX4.R0000077      SYSOUT
IEF285I   VOL SER NOS= K3SCR4.
IEF285I   SYS77048.T090937.SV000.YZJRJTX4.R0000078      DELETED
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