DATA SET CATALOG #81

Explorer 15, Proton / Elect. Scint.
62-059A-05A 18 tapes

[illegible]

DCS Computer, [illegible], Binary, 1 f[illegible]

D#	C#	DENSITY	START TIME	STOP TIME
D-00004	C-[illegible]	556	10/28/62	11/02/62
D-00005	C-[illegible]	800	11/02/62	11/07/62
D-00006	[illegible]	800	11/07/62	11/12/62
D-00007	C-[illegible]	800	11/12/62	11/17/62
D-00008	C-[illegible]	800	11/18/62	11/21/62
D-00009	C-[illegible]	800	11/23/62	11/28/62
D-00010	C-03981	800	11/28/62	12/03/62
D-00011	C-03982	800	12/03/62	12/09/62
D-00012	C-03983	556	12/09/62	12/14/62
D-00013	C-03984	556	12/14/62	12/19/62
D-00014	C-03985	800	12/19/62	12/25/62
D-00015	C-03986	556	12/25/62	12/30/62
D-00016	C-03987	800	12/30/62	01/04/63
D-00017	C-03988	800	01/04/63	01/09/63
D-00018	C-03989	800	01/09/63	01/15/63
D-00019	C-03990	800	01/15/63	01/20/63
D-00020	C-03991	800	01/20/63	01/25/63
D-00021	C-03992	556	01/25/63	01/27/63

NOTE: The following tapes were duped on Bob Johnson's dupe and compare program removing parity errors. Below are the tapes that were run against this program and the records that were disregarded.

D#	DISREGARDED RECORDS
D-00011	311
D-00014	185,295,309
D-00019	12

1962 Bk 2
Cyclone 15
Ion Electron Exp(OS)
S01956
TAPES
D00004 - D00021

SDA PROGRAM SYSTEM

S-3B MERGE Program

R. O. Gormley

1.0 INTRODUCTION

1.1 Purpose: The purpose of the S-3B MERGE program is to:

1. Find and extract all usable data from the S-3B data tapes output by the 1410 File Sort Program.

2. Merge identification, orbit and sun information, and time corrections with the data extracted,

3. Perform quality control checks on the merged data, and

4. Output the merged data in a form usable to the experimenters.

2.0 PROGRAM INFORMATION

2.1 Definition of Terms

Primary Input Tapes - Data tapes containing files which will be either processed or skipped in the order in which they are contained on the tapes.

Secondary Input Tape - Data tape containing selected files which will be processed in place of, or between, specified files on the primary input tapes, if desired.

Batch - The output data contained on one output tape. The size of a batch is input to the program as the number of primary input tapes to be processed per each output tape.

Print File - On DCS - The first file of information listed on the printer. On stand-alone 7094 - that information which is written on the on-line printer.

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BCD Listing File - On DCS - The second file of information listed on the printer. On stand-alone 7094 - that BCD information which is written on tape for off-line listing.

Data Block - 256 time continuous frames of data from one complete 16 position wheel revolution.

Frame 0 - Imaginary frame whose time is one frame period before the first frame of the data block.

2.2 Program Description

The program first reads a parameter card to determine the total number of primary input tapes to be processed this run (NPRIM), whether a secondary input tape is to be used or not (ISEC), the number of primary input tapes to be processed per batch (IBCHSZ), and the month, day, and year of this run of the MERGE program (IRUNMO, IRUNDY, and IRUNYR). See section 3.1.1 for detailed description and format. After the setting of constants and the rewinding of tapes used, the first file control card is read and its contents are listed in the print file. The file control card contains a code, integer day time correction, and fraction of day time correction for each of five files (ICODE(I), IDYCOR(I), DYFRAC(I), I = 1,5). See section 3.1.1 for detailed description and format. The code specifies either to process or skip a file from the primary or secondary input tapes, or it specifies that the processing from the present primary input tape is complete. If a file is to be skipped, a message is written in the BCD listing file and the file is skipped by means of a call to the SKPFIL subroutine. The program then looks at the next ICODE entry and continues. If the processing of the present primary input tape is complete, a message is written in the BCD listing file and the program switches to the alternate primary drive and starts a new set of file control cards if more tapes are to be processed. If the batch size has been reached, the program ends the present output tape and switches to the alternate output drive. If the code specifies thatthe next file is to be processed either from the primary or secondary input tapes, the program enters the file processing section.

The file processing section reads the file I.D. record from the tape and writes its contents in the BCD listing file. The sun right ascension and declination are obtained once per file by taking the start time of the first data block found, adding 30 minutes and then calling the MELOS subroutine. (See Appendix A for MELOS subroutine description.) The orbit number is also calculated once per file using the time of the first data block. (See Appendix B for Orbit Number Equation.) Both the sun right ascension and declination and the orbit number are written in the BCD listing file at the beginning of processing each data file.

The basic unit of data processed within the file is the data block. In order to qualify as a data block, the following conditions must be met:

1. There must be 256 time continuous frames. The program will pad up to 10 frames at any given time break. In order to be time continuous, the time difference between frames must be within 10 percent of the expected frame period. The expected frame period is set at the start of the program and is updated during the run if it consistently differs by more than 1.5 percent from the actual frame period.

2. The data must be in sync, i.e., the Channel 2 readings for the 256 frames must continuously conform to the 16 frame high-low sync pattern for the satellite. Short deviations from the sync pattern are accepted within the 256 frames provided the high-low pattern is present at both the start and end of the data block.

3. The data block must be wheel position continuous, i.e., the legal wheel positions present must show no evidence of sticking or skipping. Consequently, the last legal wheel position must show its correct relationship to the first legal wheel position for a correct revolution to exist. Any of the 16 wheel positions may be the first in the block as long as the above requirements are met. The wheel position is calculated using PP7 of Channel 13 (see Appendix B for Wheel Position Equation).

The MRGSNC subroutine fills the data blocks according to the above conditions. Any time that data is discarded due to failure to meet these qualifications, a line is written in the BCD listing file stating the number of frames discarded and the cause. A running total of good and bad frames per file is kept and a summary and percentage recovery is written at the end of each file. Upon successful filling of a data block, the MRGSNC subroutine also calculates the average frame period of the block, the wheel position-frame 0, the quasi-clock reading-frame 0, and the quasi-clock frame count (of 240)-frame 0.

Upon returning from MRGSNC, the main program computes the start time of frame 0 making sure that the day count is relative to the launch year. It then calls the ROLCAL subroutine to obtain the coefficients for the fraction of roll after see sun equation. ROLCAL keeps a count of the number of see-suns which occurred in the block, insures that a sufficient number are present, and fits those present to a straight line to obtain the desired coefficients. If the RMS of the fit is not less than that expected for sufficient accuracy, ROLCAL attempts to discard those points which differ from

the fit by more than two standard deviations and repeat the process until a legal RMS is obtained or the number of see-suns is less than the number required. If a successful fit is acquired, ROLCAL returns the coefficients for the equation, the RMS of the fit, the number of see-suns used, and the most common N2-N3 value in the form ((N2+1).10)+(N3+1). If the fit is not successful, the coefficients, RMS, and the common N2-N3 variables are set to dummy values. The count of the actual number of see-suns which occurred in the data block and an array containing the time of each see-sun (in eighths of a frame from the start of the data block) are stored for output as part of the binary record.

The program then calls the ADORBT subroutine to obtain the coefficients for the second degree polynomial equations to be used to calculate various orbital data (See section 3.2.2 and Appendix C for detailed information on the orbital parameters returned). The ADORBT also returns a flag = 1 for good orbital data or = 2 for unsuccessful return. The flag is saved to be written out both on tape and in the DCD listing file.

There are two types of quality control checks performed on the data block. The first is performed only when the current data block was preceded by an adjacent data block, i.e., frame 256 of the previous block and frame 0 of the current block coincide. In this case two tests are performed, both of the same nature. The fraction of roll past see sun and McIlwain's L parameter are calculated for associated equations from the previous block. They are then compared to the corresponding values for frame 0 of the current block. The differences between the two sets of values are saved to be written both on tape as a part of the current data record and in the DCD listing file. If the two blocks are not adjacent, or if any conditions exist which would cause an invalid test, such as a bad orbit return for either block or dummy coefficients for the fraction of roll past see sun equations for either block, the differences are set to dummy values.

In the second type of quality check five values are calculated using only the data from the current data block. They are:

1. The average of the legal channel 15 - PP1 readings.

2. The RMS of the differences between the legal channel 15 - PP1 readings and their average.

3. The average of the legal channel 15 - PP13 readings.

4. The RMS of the differences between the legal channel 15 - PP13 readings and their average.

5. The number of illegal channel 15 readings in the complete data block.

These values are saved for output as part of the current data record on tape and in the BCD listing file.

At the completion of the quality checks the program actually writes the current data record on the tape and the one line of print for the data block in the BCD listing file. The program then loops back through the process of filling, testing, and writing out until the end of the file is reached. When the end of file is reached, the program looks at the next ICODE entry and continues until all the primary tapes have been processed.

3.0 INPUT AND OUTPUT SPECIFICATIONS

3.1 Input Specifications

3.1.1 Input Parameter Cards:

A. Card 1: Format (5I2, I4)

Col	Name	Description
1-2	NPRIM	Number of primary input tapes to be processed
3-4	ISEC	= 1, secondary input tape present ≠ 1, no secondary input tape this run
5-6	IBCHSZ	Batch size - number of primary input tapes/batch
7-8	IRUNMO	Month of year - this run
9-10	IRUNDY	Day of month - this run
11-14	IRUNYR	Year this run in form XXXX

B. Cards 2 through n, File Control Cards, 1 set/Primary Input Tape. Format (5(I1,I3,F10.9))

Each file control card contains an ICODE, IDYCOR and DYFRAC entry for each of five files. The card is read with the following statement:

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READ INPUT TAPE 2, 22,(ICODE(I), IDYCOR(I), DYFRAC(I),
I = 1, 5)
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where: 22 = Format statement number

ICODE(I) = 0, process next file from primary input tape

= 1, skip next file on primary input tape

= 2, process next file from secondary input tape

= 3, skip next file on secondary input tape

= 4, end processing present primary input tape

= 5, ignore this file control field

IDYCOR(I) = Integer day time correction to be added to the times in the file

DYFRAC(I) = Floating point fraction of day time correction to be added to the times in the file.

The file control cards are read as necessary until ICODE(I) = 4 for the present primary input tape. If another primary input tape is to be processed, the program starts a new set of file control cards.

3.1.2 Input Specifications Tape

The logical unit number and designation of the tapes input to the MERGE program are:

LOGICAL UNIT	DESIGNATION
14	Orbit Tape
15 ping	First Primary Input Data Tape
16 pong	Alternate Primary Input Data Tape
17	Secondary Input Data Tape, if used

The BCD input data tapes contain any number of files. Each file contains one I.D. record followed by any number of data records. All records on the tape are 224 words (1344 characters) long. After

the last data file there is a one record file in which all characters are "nines" to signify end-of-tape.

The I.D. record contains a 12 character string which is repeated throughout the record. The format of the 12 character string is:

Characters	Information Contained
1,2	satellite number
3, 4, 5	day count of year
6, 7	year (XX of 19XX)
8, 9	station number
10, 11, 12	analog tape number

Each data record contains a 42 character string/frame for each of 32 frames. The format of the 42 character string is:

Character	Information Contained
1, 2, 3	day of year
4, 5	hour of day
6, 7	minutes
8, 9	seconds
10, 11, 12	milliseconds
13 through 18	quasi-clock reading
19, 20, 21	channel 9
22, 23, 24	channel 10
25, 26, 27	channel 15
28, 29, 30	channel 0
31, 32, 33	channel 1
34, 35, 36	channel 2
37 through 42	not examined by program