.Date: June 22, 1987
.To: Swami Reddy
.From: Kristin Wortman
.Subject: Response to request received from Bob McGuire on 6/16/87

1.0 Imp Project Tape Library Breakdown

The following is a breakdown of the tapes currently in the tape library for IMP-6.

- 16 MATR
- 6 FLUX
- 6 LOWG
- 8 SMCT
- 25 Compressed PHA and CNTS

The following is a breakdown of the tapes currently in the tape library for IMP-7.

- 27 MATR
- 10 FLUX
- 11 LOWG
- 19 SMCT
- 11 FLEX
- 41 Compressed PHA and CNTS

The following is a breakdown of the tapes currently in the tape library for IMP-8.

- 80 MATR
- 18 FLEX
- 19 FLUX
- 25 LOWG
- 42 SMCT
- 38 VLET
- 10 EDR
- 62 Compressed PHA and CNTS
- 3 IMP proton flux
- 38 ENCY
- 3 cosmic ray bkups.
- 4 LIBMAN bkups.

1.1 Helios Project Tape Library Breakdown

The following is a breakdown of the tapes currently in the tape library for Helios-A.

- 80 CEDR
- 13 PHAS
- 10 RATE
- 8 DRS
- 40 FLUX (1600)
- 11 FLUX (6250)

The following is a breakdown of the tapes currently in the tape library for Helios-B.

- 100 CEDR
- 29 PHAS
- 13 RATE
- 8 DRS
- 22 FLUX (1600)
- 6 FLUX (6250)

162 Helios-A primary data base tapes and 178 Helios-B primary data base tapes currently occupy tape slots in the tape library.

1.2 Pioneer Project Tape Library Breakdown

The following is a breakdown of the tapes currently in the tape library for Pioneer-10.

- 16 PENC
- 51 PHAS
- 51 RATE
- 8 DRS
- 57 FLUX(1600)
- 15 FLUX(6250)
- 10 EDR slots
- 5 plot request tapes
- 2 BIT2ON tapes
- 1 flux bkup.
- 2 Trajectory
- 2 MAG
- 4 NSSDC summary

The following is a breakdown of the tapes currently in the tape library for Pioneer-11.

- 51 PHAS

- 51 RATE
- 8 DRS
- 51 FLUX(1600)
- 14 FLUX(6250)
- 4 PGJUPENC (jupiter encounter)
- 4 PGSATENC (saturn encounter)

407 total slots for Pioneer-10 and Pioneer-11 are needed currently in the tape library. In the near future, slots will be needed to meet the requirements of the expanding catalog.

1.3 Voyager Tape Library slot breakdown

The following is a breakdown of the tapes currently in the tape library for Voyager-1.

- 42 LIB
- 62 ENCY
- 25 WORK
- 13 Trajectory
- 10 EDR
- 4 LIBMAN bkups.
- 3 cosmic ray bkups.
- 6 analysis work

The following is a breakdown of the tapes currently in the tape library for Voyager-2.

- 50 LIB
- 64 ENCY
- 25 WORK
- 13 Trajectory
- 10 EDR
- 10 plot tapes
- 10 CIT tapes

337 total tapes are in the tape library slots for Voyager-1 and Voyager-2. 20 slots are being used to do tape copy work and expanded the expanding Voyager catalogs.

1.4 ISEE-3 Tape Library slot breakdown

The following is a breakdown of the tapes currently in the tape library for ISEE-3.

- 5 LIB (50 are in bld2., no slots to move)
- 50 ENCY
- 16 WORK

- 2 Magnetic Field
- 25 EDR
- 3 cosmic ray bkups.
- 4LIBMAN bkups.

The following is a breakdown of the tapes currently in the tape library for ISEE-3 datapool.

- 4 LIB
- 22 ENCY
- 10 WORK

141 ISEE-3 and Datapool tapes are in the tape library. Approximately 50 LIB originals for ISEE-3 need to be placed in the library as soon as slots are available.

1.5 Miscellaneous Tape Library slots

- 2 LIBMAN backups for SB#HP
- 2 Cosmic Ray bkups.

4 total tapes are in the SE library for miscellaneous backups.

Preliminary

PC FLUX PROGRAM DESIGN

September 21st, 1989

Kristin Wortman STX

Table of Contents

1.0 Introduction

The cosmic ray group has requested programs in the C programming language to generate FLUX verses and a directory on the PC computers. The program is to be used for all cosmic ray experiments. The response tables to be generated will be large and require a utility program to create a table lookup directory file. The directory will enhance access to the reponse table records when processing user requests in the FLUX program.

1.1 Background

The pulse height analysis (PHA) data is available for ISEE for use by the PC computer. The PHA data and response tables, except for IMP, currently reside on the IBM 3081 mainframe computer system. The PHA data and response tables for the other experiments will need to be generated on the IBM and reformatted for the PC following the defined format specifications. The format definitions are the standard specifications used by the Low-Energy-Particle Group Graphic Analysis Package, written by Dr. D. Reames.

1.2 Objective

The purpose of this program is to generate flux verses on the PC computer using response tables generated on the IBM mainframe. The programs will be used for the cosmic ray experiments. In order to meet this specification, all the PHA and response files must be in a defined format when extracted from the IBM mainframe data bases. The output file generated by this program is to be compatiable for input to the Low-Energy-Particle Group Graphic Analysis Package.

1.3 Limitations of this Document

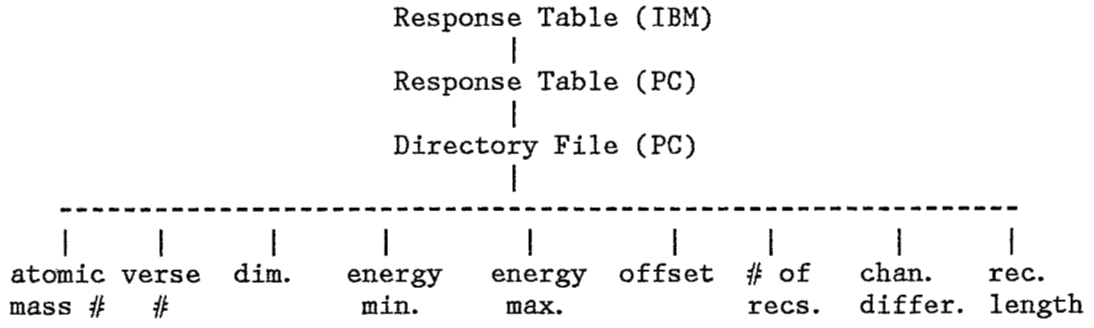
This document is limited to discussing the requirements necessary for accessing input data files and generating a FLUX output file. Information on the detectors and the PHA data is available in other documentation.

2.0 Logical Data Flow Diagram

2.1 Directory Creation Program

The directory file for each experiment will be generated when the initial creation or update of the response table occurs on the IBM mainframe. The directory file will be built on the PC and stored with the response table.

The following diagram displays the flow of data from the IBM to the PC and the directory file creation:

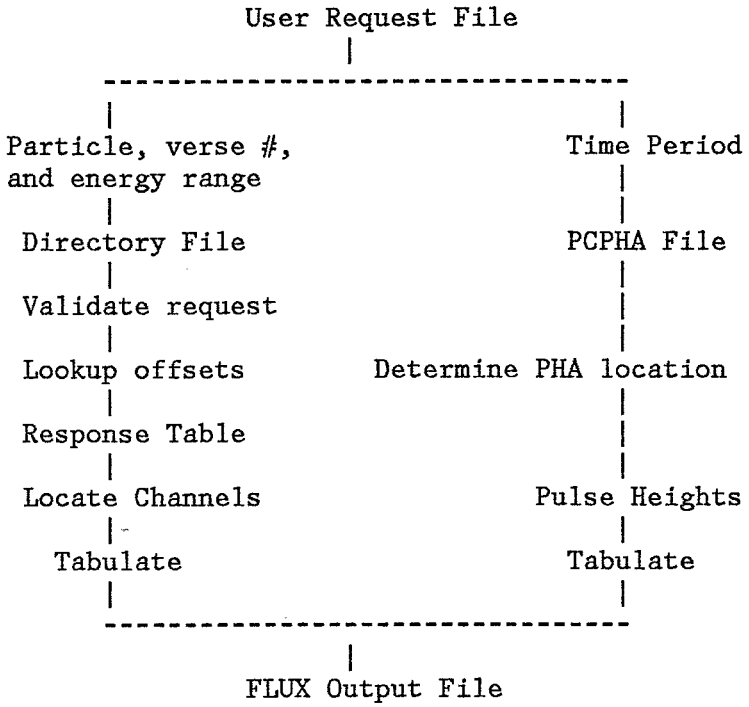


2.2 FLUX Program

The FLUX program will perform table lookup for the requested particle, mode, and energy range using the offset, the channel difference, and the number of records fields obtained from the directory file. The directory file will be accessed to validate the user requests and determine the response table offsets to perform fast, efficient table access. The Flux program will access the response table at the offsets and obtain the associated channel data. The PHA data corresponding to the specified time

periods will be accessed by using existing routines and the pulse heights will be tabulated. The counts will be written to an output FLUX verse file to be used for the input file to the Low-Energy-Particle Group Graphic Analysis Package.

The following diagram shows the files and data relationships:



3.0 Response Table Generation

3.1 Format

The response tables are currently available on the IBM 3081 mainframe computer for all experiments, except IMP. The following format is required for all response tables generated on the IBM for the PC environment.

3.1.1 Header Record

The standard PC header record contains ASCII information describing the expected binary data format and verse desciptions. Each verse will be proceeded by a table description verse that will contain information on the dimension of the table, the atomic number, the atomic mass, and the minimum and maximum energy. The following example describes the format of the standard header record requirements:

```
BINARY   CREATED 1989 AUG  25 00:01:00 ;
ISEE-3 Response Table     ;
#0 RATE
  I   0     3        Dimension
  I   0    65      Atomic mass
  I   0    30    Atomic number
  F   0  3000   Minimum energy
  F   0  3000   Maximum energy
#5  RATE    ICH1ASTHI   HET  1 A-STOP  HIGH GAIN
  U2        0    4096         A1
  U2        0    4096         A2
  U2        0    4096         C123
  U         0    4096         A1 + A2
  F         0     100         Energy
  F         0     100         Geometry
  ...    (one for each verse type)
#END
```

The following indicate the format descriptors for the PC data fields:

Descriptor	Explanation
T	Time (long, 32 bit, integer)
T2	Begin and end time
I	Single integer (16 bit)
I2	Integer value and error (2*16 bit)
L	Long integer (32 bit)
F	Single float value (32 bit)
U	Unsigned integer (16 bit)
U2	Minimum and maximum values unsigned integers (2*16 bit)

3.1.2 Data Record

The data record is a binary data file, defined for the PC environment. The following formats should be used for each record generation of specified verse type on the IBM mainframe.

The verse type 0 format for the IBM follows:

Offset	Length	Description	Type
0	2	Verse type no.	I
2	2	Table dimension	I
4	2	Atomic mass	I
6	2	Atomic number	I
8	4	minimum energy	F
12	4	maximum energy	F

The verse type 5-22 format for the IBM follows:

Offset	Length	Description	Type
0	2	Verse type no.	I
2	2	A1 minimum	I
4	2	A1 maximum	I
6	2	A2 minimum	I
8	2	A2 maximum	I
10	2	C123 minimum	I
12	2	C123 maximum	I
14	2	A1 + A2	I
16	4	Energy	F
20	4	Geometry	F

The number of bytes per record will be determined by the ASCII header information. The record format will provide information on the mode (verse #), energy limits for each detector, energy, and geometry factors.

4.0 Directory Program

The directory file will be created by a seperate program when a new response table has been initially generated or updated on the IBM for the PC. The directory file will reside on the same disk as the response table for each experiment. The directory file will be loaded into RAM on the PC whenever the FLUX program is executed. The FLUX program will use the directory to match requested particle, mode, energy ranges, and offset of the first data record. The ASCII header record will contain information on the satellite name, and creation date. The directory data records will be used for user request validation and displaying assistance messages to the user.

4.1 Header Record Format

A header record example follows showing the format for the directory file.

```
BINARY Created 1989 SEPT 15 00:00:00      ;
ISEE-3 Directory File                     ;
#0 RATE
 I    0    65    Atomic Mass
 I    5    22    Verse No.
 I    0     3    Dimension
 F    0  3000    Min. Energy
 F    0  3000    Max. Energy
 U    0     8    Difference
 I    0    99    Record Length
 I    0  9999    NO. of Records
```

4.2 Binary Record Format

An example of the binary record format for verse type 0 follows.

Offset	Length	Description	Type
0	2	Verse no.	I
2	2	Atomic Mass	I
4	2	Verse no.	I
6	2	Dimension	I
10	4	Min. energy	F
14	4	Max. energy	F
18	2	Channel difference	U
20	2	Record length	I
22	2	# of records	I
24	4	Offset of 1st rec.	L

4.3 *Program Algorithm*

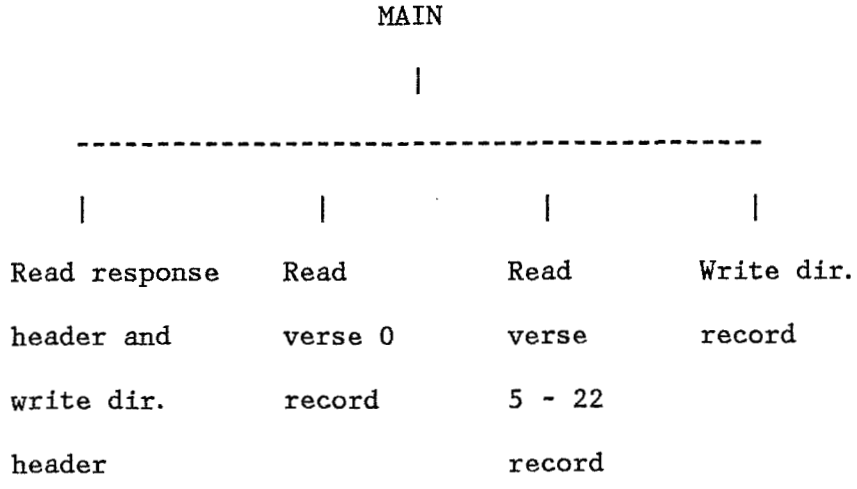
The following algorithm is designed to read the reponse table and generate a directory file to be stored with the associated response table. The directory file will be used for table lookup by the FLUX program, the preliminary algorithm follows.

```
Read header record of response table til end (#END)
Create directory file header record
Set write_record flag to FALSE
While not EOF do
 BEGIN block
  Read verse# (2 bytes)
  IF (verse# = 0)
   THEN: IF (write_record flag = TRUE)
         THEN: # records field = counter
               Set counter = 0
               Write record to file
               Set write_record flag to FALSE
         ELSE: CONTINUE
    Read rest of record (verse 0)
    Create directory record
    Store atomic mass, dimension, min. and max. energy
    Read first record
    Store offset, and record length
    Increment counter
   ELSE: IF (verse# .GE. 5) AND (verse# .LE. 22)
         THEN: Set write_record flag to TRUE
               Read rest of record
               Calculate and store channel difference
               Increment counter by 1
         ELSE: Write error message "Invalid Verse Type"
END block
```

The program to generate the directory file will scan the response table records for the table description verse number, 0. When this verse is reached a directory record will be built. The verse 5-22 records will be read to calculate the channel difference, determine the offset of the first record, and to be counted. The number of records and channel difference fields will be entered at the end of the scan for that particle and mode type. The directory record will then be written to an output file.

4.4 Module Structure

The module structure is defined below:



5.0 FLUX program

5.1 User Request File

The user request file will consist of ASCII data records describing the satellite, particle, mode, and requested energy ranges.

5.1.1 User Request File Example

The verse type description preceeds each particle and energy range request. The following example displays a user request format for one time period and one mode type.

```
ASCII  CREATED 1989 SEPT 03 00:00:10        ;
ISEE-3 FLUX Request File      ;
#0 TIME
  T2           89/01/01   89/02/01
#5 PHA   ICH1ASTHI  HET 1   A-STOP  HIGH GAIN
; TYPE     EMIN    EMAX   PARTICLE
   I       1.90    2.82   C12
   I       3.96    7.08   C12
   I       1.90    2.81   N14
  ...  ...(for each particle mode)
```

5.2 FLUX Program Specifications

The FLUX program will read the user request file and access the appropriate directory file for the specified satellite. The directory file will be accessed and searched for the corresponding offsets, channel differences and number of records for the requested particle, mode, and energy range. The user requests will be verified at this time. If the information is incorrect, the user will be notified with an appropriate error message. The program will locate the response table records at the offset and store the time period, and channel data for each request. After the request file has been processed and the data has been located and stored from the response table, the corresponding pulse heights will be located in the PCPHA file.

The PCPHA file will be accessed using existing routines, that will read the binary data format. The pulse heights occurring in the requested channels will be counted using the stored response table information. The FLUX program will output a FLUX verse data file.

5.3 *FLUX Output File*

The FLUX program will output a file that will contain FLUX verse data in the following format:

Offset	Length	Description
0	2	Verse type no.
2	4	Rate count
6	4	Rate live time
10	4	# PHA events on matrix
14	2	# counts box 1
16	2	# counts box 2
18	2	# counts box 3
...	2	... (each box defined)

The fields in the FLUX file will be created from the following data:

- verse type no. - verse type on request file and response table data
- rate count - PCPHA field
- live time - PCPHA field
- #PHA events on matrix - PCPHA field, ((#bytes in rest of verse-8)/8)
- # counts per box - tabulated pulse heights, response table data and PCPHA file.

The counts in each box corresponds to a single request from the user request file.

5.4 *FLUX Program Algorithm*

The following defines a preliminary general algorithm for the FLUX program.

```
Read user request file
Locate satellite directory file and response table
While not EOF
 BEGIN Block
  Read and store time period requested
  While (energy range request)
   BEGIN Block
    Read energy range and particle
    Lookup directory file
    Search for energy range
    Read and store the first record offset
   END Block    (inner while loop)
 END Block      (outer while loop)
While offsets
 Begin block
  Postion to offset in response table
  Search for channels in range
  Store channel record data
 End block
Write header record in FLUX verse file
Locate PCPHA file
While time period
 BEGIN Block
  Find time period in PCPHA file
  Read and store rate and live time
  Calculate # of PHA events on matrix
  While requests
   BEGIN Block
    Determine pulse heights
    Count pulse heights
   END Block (inner while loop)
  Output records of counts to file
 END Block (outer while loop)
```

6.0 Testing

Testing will be done using the existing ISEE PCPHA data file and the response tables that will be generated on the IBM. The FLUX program results should match the ISEE FLUX verses that were generated for the PC using the FLUXPLOT program on the IBM 3081 mainframe.

Pam Schuster

Swami,

Please review and, if you have no additions/comments pass on to Nancy L. ASAP.

This is the response to her memo of Aug 26

August 26, 1988

TO: SAR/Swami Reddy

FROM: 664/Head, Data Management and Programming Office

SUBJECT: Building 1 Tape Library Study

The Building 1 Tape Library is being reorganized due to conversion of magnetic tape reels to tape cartridges. The Code 660 portion of the tape library currently includes 3120 reels. The new allocation includes 2880 cartridges and 780 reels. Code 660 cartridge slots range from 106240 through 109119. Currently only slots 106240 through 106719 are available for use.

I am requesting that SAR develop a plan (which must subsequently be approved by GSFC cognizant scientists and managers) for organizing the new allocation. SAR will then be responsible for implementing the approved conversion from reel to cartridge tapes.

The deliverables I recommend for this study include:

1. A list of the current library usage, by project, and by tape type within each project, including x-ray and gamma-ray tapes. (Nancy Smith may already have started this exercise.)
2. A status for each tape type above. Should these tapes remain in Building 1? Should they be copied to cartridge tape, or remain on reels? Etc.
3. A proposed layout for the new cartridge and reel slots, by project and tape type within projects. Allocations for an individual project should be contiguous, if possible.
4. A proposed order of projects to be converted from reel to cartridges. Possibly Helios or Pioneer should be converted last. And since only 480 cartridge slots are currently available, some thought should be given to what project should be converted first.
5. A list of questions/concerns, which need to be resolved before decisions can be made, should be compiled as this exercise progresses. In particular, if there are concerns that software, data base catalogs or JCL may have to be changed to handle the new cartridges, those concerns should be itemized here.

Nancy Laubenthal

Nancy Laubenthal

cc: Eunice Eng/664
Nand Lal/664
John McGovern/RMS/664
Bob McGuire/633
Pam Schuster/SAR/664
Nancy Smith/664
Tycho von Rosenvinge/661
Kristin Wortman/SAR/664

XRKNW.REPORT.TEXT (MAIN)

CARTRIDGE CONVERSION PROCESS

September 16, 1988

Kristin Wortman, SAR

Table of Contents

1.0 Introduction

1.1 Background

The NSESCC computer facility located in building 1 at Goddard Space Flight Center, Greenbelt, MD, has purchased an IBM 3480 Magnetic Tape Subsystem. Code 664 will need to convert a large percentage of the existing tape reels to cartridges. The total amount of tape cartridge slots that will be available to code 664 library in the near future will be 2880. At the present we have 480 tape cartridge slots available to begin the conversion process. 780 tape reel slots will be retained for the code 664 library and will be allocated where needed. As the tape conversion proceeds, more floor space will become available for tape cartridge racks.

1.2 Objective

The purpose of this study was to analyze the requirements, questions, and slot allocations for the cartridge conversion. This report gathered various information on all the projects involved and organized it so that it could be fully discussed. Tape statistics for each cosmic ray project are provided and appropriate contiguous slot allocations have been assigned.

2.0 Pioneer Tape Conversion Issues

2.1 Current Primary Data Base Tapes

The following table indicates the current primary Pioneer tapes that are necessary for the production and maintenance of the data base. The Pioneer data base is expected to expand in the near future.

Tape	Type	Pioneer-F	Pioneer-G	Reel	Cartridge
RATE	1600	41	48		X
PHA	1600	36	39		X
* Flux	1600	56	53	X	
6250	6250	14	14		X
PENC	6250	13	0		X
EDR	1600	15	15	X	
DRS	6250	8	8		X
Traj.	6250	1	1		X
CR bk.	6250	2	2		X
LIBMAN	6250	2	2		X
Subtotal		188	182	139	231
Expand 2 yrs.		13	13	12	14
Total 2 yrs.		201	195	151	245
Expand 10 yrs.		65	65	60	70
Total 10 yrs.		253	247	199	301

* Tapes may be removed from library.

The expansion tapes were calculated for the next two and ten years based on current tape usage for each production tape type. Refer to the following example.

Tape Type	Tape(s) per Year	Tapes 2 yrs.	Tapes 10 yrs.
RATE	.5	1.0	5.0
PHA	1.0	2.0	10.0
Flux	3.0	6.0	30.0
6250	1.0	2.0	10.0
PENC	1.0	2.0	10.0
Total	6.5	13.0	65.0

2.2 *Current Production Problems*

The Pioneer DRS catalog needs expansion of the volume numbers assigned to the RATE and PHA block of tapes. The necessary contiguous volume numbers are currently assigned to other tapes in the Pioneer system. The reduction of the PHA and RATE tapes by 4 or 5 1600 bpi tapes to one cartridge will allow the volume numbers to be released to the DRS catalog for reuse. This will also reduce the number of primary data base tape slots required by the Pioneer production system. The utility program for the required DRS catalog maintenance has been written. The PIODRP program will need to be reviewed to determine if modifications are necessary.

The FLXDBG program currently writes to PENC, Pioneer-10, and 6250, Pioneer-11. Evaluation of the current program to reprocess earlier data would be necessary. The reduction in the data base would be significant and maintenance would be simplified. The following example reflects this reduction.

Tape	Type	Pioneer-F	Pioneer-G	Reel	Cartridge
RATE	6250	10	12		X
PHA	6250	9	10		X
* Flux	6250	14	13	X	
6250	6250	14	14		X
PENC	6250	13	0		X
EDR	1600	15	15	X	
DRS	6250	8	8		X
Traj.	6250	1	1		X
CR bk.	6250	2	2		X
LIBMAN	6250	2	2		X
Subtotal		88	77	57	108
Expand 2 yrs.		6	6	8	4
Total 2 yrs.		94	83	65	112
Expand 10 yrs.		17	17	16	18
Total 10 yrs.		105	94	73	126

* Tapes may be removed from library.

These numbers are based on a 4:1 reduction, in some cases the present tapes are not fully utilized and the reduction could be 5:1. The reduction in the primary tapes would result in reducing the number of backups that are stored. If the corresponding backups are converted to tape cartridges the Tape Staging and Storage Center (TSSC) costs would also be reduced.

The expansion of the Pioneer data base was based on the usage of each tape type per year for the next two and ten years. In this case, the reduction of the DRS 1600 bpi PHA and RATE and the 1600 bpi Flux tapes has been incorporated.

Tape Type	Tape(s) per Year	2 yrs. Reduc.	10 yrs. Reduc.
RATE	.5	1.0	1.5
PHA	1.0	1.0	2.5
Flux	3.0	1.5	7.5
6250	1.0	1.0	2.5
PENC	1.0	1.0	2.5
Total	6.5	5.5	16.5

3.0 Helios Tape Conversion Issues

The following table indicates the current breakdown of the Helios primary data base that is currently in the tape library. No expansion of the data base is predicted.

Tape	Type	Helios-A	Helios-B	Reel	Cartridge
RATE	1600	10	13		X
PHA	1600	13	29		X
* Flux	1600	43	22	X	
6250	6250	11	6		X
CEDR	6250	81	101		X
DRS	6250	8	8		X
CR bk.	6250	2	2		X
LIBMAN	6250	2	2		X
Expand.	6250	0	0		
Total		170	183	65	288

* Tapes may be removed from library.

Notice the PHA, RATE, and Flux tapes are 1600 bpi, density of 3. Transferring 4 1600 bpi tapes to 1 cartridge will reduce the primary Helios data base and simplify maintenance. The required utility program for the DRS catalog maintainence has been written. The HELDRP and the FLXDBG programs need to be reviewed to determine if modifications are necessary.

Tape	Type	Helios-A	Helios-B	Reel	Cartridge
RATE	1600	3	4		X
PHA	1600	3	7		X
* Flux	1600	10	7	X	
6250	6250	11	6		X
CEDR	6250	81	101		X
DRS	6250	8	8		X
CR bk.	6250	2	2		X
LIBMAN	6250	2	2		X
Expand.	6250	0	0		
Total		120	137	17	240

* Tapes may be removed from library.

These numbers are based on a 4:1 reduction, in some cases the present tapes are not fully utilized and the reduction could be 5:1. The reduction in the primary tapes would result in reducing the number of backups that are stored. If the corresponding backups are converted to tape cartridges the TSSC costs would also be reduced.

4.0 Voyager Tape Conversion Analysis

The following table shows the breakdown of tapes needed in the tape library for the Voyager production system. The Voyager data base is predicted to continue to expand.

Tape	Type	Voyager-1	Voyager-2	Reel	Cartridge
LIB	6250	38	51		X
ENCY	6250	40	52		X
TRAJ	1600	13	12		X
WORK	6250	25	25		X
EDR	6250	15	15	X	
CR bkp	6250	2	2		X
LIBMAN	6250	2	2		X
Expand	6250	43	43		X
Subtotal		178	202	30	350
Expand 2 yrs.		10	10	0	20
Total 2 yrs		188	212	30	370
Expand 10 yrs.		25	25	0	50
Total 10 yrs.		203	227	30	400

The Voyager data base was evaluated based on the current tape usage for each tape type and the following example displays the expansion expected for the next two and ten year periods.

Tape Type	Tape(s) per Year	Tapes 2 yrs.	Tapes 10 yrs.
LIB	.5	1.0	5.0
ENCY	1.0	2.0	10.0
TRAJ	1.0	2.0	10.0
Total	2.5	5.0	25.0

4.1 Voyager Program Modifications

The Voyager utility programs that assign and remove volume serial numbers for ENCY and WORK tapes will need to be studied to determine the impact of the new six digit slot number assignments. The corresponding CLIST will need to be changed to reference the new Tape Library System (TLS), specifying TLSUP2.

5.0 ISEE-3 Tape Conversion Analysis

The following table shows the breakdown of tapes needed in the tape library for the ISEE production system.

Tape	Type	ISEE-3	Datapool	Reel	Cartridge
LIB	6250	56	4		X
ENCY	6250	50	2		X
WORK	6250	25	5	X	
EDR	6250	10	5	X	
CR Bkp	6250	4	0		X
LIBMAN	6250	4	0		X
Subtotal		149	16	45	120
Expand	2 yrs.	5	0	0	5
Total	2 yrs	154	16	45	125
Expand	10 yrs.	25	0	0	25
Total	10 yrs.	174	16	45	145

The ISEE data base was evaluated based on the current tape usage for each tape type and the following example displays the expansion expected for the next two and ten years.

Tape Type	Tape(s) per Year	Tapes 2 yrs.	Tapes 10 yrs.
LIB	1.5	3.0	15.0
ENCY	1.0	2.0	10.0
Total	2.5	5.0	25.0

5.1 ISEE Program Modifications

The ISEE utility programs that assign and remove volume serial numbers for ENCY tapes will need to be studied to determine the impact of the new six digit slot number assignments. The corresponding CLIST will need to be changed to reference the new Tape Library System (TLS), specifying TLSUP2.

6.0 IMP Tape Conversion Analysis

The following table shows the breakdown of tapes needed in the tape library for the IMP production system.

Tape	Type	IMP-8	IMP-7	IMP-6	Reel	Cartridge
LOWG	6250	27	11	6		X
MATR	6250	67	19	11		X
SMCT	6250	45	19	8		X
VLET	6250	41	0	0		X
FLEX	6250	24	11	0		X
FLUX	6250	23	10	6		X
CPHA	6250	32	25	13		X
CCNT	6250	42	17	12		X
CNTS	6250	25	0	0	X	
PHAS	6250	25	0	0	X	
ENCY	6250	30	0	0	X	
PFLX	6250	3	0	0	X	
4060	6250	1	0	0	X	
DECOM	1600	10	0	0	X	
CR Bkp	6250	4	0	0		X
LIBMAN	6250	4	0	0		X
Subtotal		403	112	56	94	477
Expand 2 yrs.		39	0	0	0	39
Total 2 yrs		442	112	56	94	516
Expand 10 yrs.		195	0	0	0	195
Total 10 yrs.		598	112	56	94	672

The IMP data base was evaluated based on the current tape usage for each tape type and the following example displays the expansion expected for the next two and ten years.

Tape Type	Tape(s) per Year	Tapes 2 yrs.	Tapes 10 yrs.
LOWG	1.8	3.6	18.0
MATR	4.5	9.0	45.0
SMCT	3.0	6.0	30.0
FLUX	1.5	3.0	15.0
VLET	2.2	4.4	22.0
FLEX	1.5	3.0	15.0
CCNTS	2.5	5.0	25.0
CPHAS	2.5	5.0	25.0
Total	19.5	39.0	195.0

7.0 Total Project Allocations

The proposed project allocations for the code 664 library, based on the 2880 cartridge slots and 750 reel slots for the next two years. Ten year predictions are also calculated based on past tape usage for each cosmic ray project.

	2 Years Expansion		10 years Expansion	
Project ID	Cartridge Slots	Reel Slots	Cartridge Slots	Reel Slots
Total	2880	780	2880	780
SB#HP	4	4	4	4
SB#HL	288	65 *	290	65 *
SB#PR	245	151 *	301	199 *
SB#IC	125	45	145	45
SB#VG	370	30	400	30
SB#IM	516	94	672	94
SBJHS	428	50	428	50
SBSSH	110	?	110	?
SB#HB	130	?	130	?
SCDJT	30	10	30	10
SCRCH	8	4	8	4
SB#EG	500	100	500	100
SE2NL	37	5	37	5
SB#LG	7	?	7	?
XRKAW	10	10	10	10
Total	2808	568 *	3072	616 *
Remain.	72	212	-192	164 **

* Tapes may be removed from library.
** Maybe we could exchange 1 rack of reels for cartridges.

8.0 Proposed Project Order

The Voyager and ISEE projects could be started with the current 480 tape cartridge allocation. The IMP project could be started as the additional tape cartridge slots become available in the tape library. The Pioneer and Helios projects could be started depending on the decision of the 1600 bpi tape reduction and the time needed to review the programs involved. After the cosmic ray projects have been assigned slots, the other projects could begin conversion as the slots become available. The following order has the corresponding slot number range that could be assigned to each group. The total slot number range is 106240 through 109119.

1. XRKAW (10 - copying and testing), 106240 - 106249

2. SB#HP (4 - Cosmic Ray - general), 106250 - 106253

3. SB#VG (370 - Voyager-1 and Voyager-2), 106254 - 106623

4. SB#IC (125 - ISEE-3 and Datapool), 106624 - 106748

5. SB#IM (516 - IMP-8, IMP-7, and IMP-6), 106749 - 107264

6. SB#PR (245 - Pioneer-F and Pioneer-G), 107265 - 107509

7. SB#HL (288 - Helios-A and Helios-B), 107510 - 107797

8. SB#EG,SCDJT,SCRCH (538 - High Energy Gamma Ray), 107798 - 108335

9. SBSSH,SBJHS,SB#HB (668 - X Ray), 108336 - 109003

10. SB#LG (7 - Low Energy Gamma Ray) 109004 - 109010

11. SE2NL (37 - Nand Lal), 109011 - 109047

12. Empty (72 - to be assigned), 109048 - 109119

9.0 Tape Conversion Questions

The following list was compiled concerning various questions on the tape conversion process.

- Do we want to transfer the backups to cartridges?

- Can we bypass the operating system to allow mounting the same volume numbers on different unit types?

- Which project(s) will begin the tape conversion process with the current tape cartridges and tape library slots available?

- Who will do the tape conversion process for the projects? (ie.. temporary help)

- Who will oversee the tape conversion process and slot allocation?

- Do we want to investigate the reduction in the 1600 bpi tapes for Pioneer and Helios before tape conversion process?

- Have we ordered the necessary equipment? (ie.. additional racks, carts, carrying cases, labels, extra cartridges)

- Do we have proper storage facilities for backups? (ie..temperature, humidity, dust factor, smoke)

- What storage facility, packing procedure, and cost per year are

available for cartridges?

- What recertification procedure do we use for tape cartridges?

10.0 Additional Preparation

The tape conversion process will involve various changes to JCL, CLIST, and regular processing procedures. The following is a list of some of the items to be considered.

1. Appropriate JCL changes will need to be made to reflect the correct unit types for the production processing.

2. A change in the LABEL procedure must be used for cartridges.

3. The tape cartridge programs, FATS and FATAR will need to be learned and used.

4. Users will need to keep track of which data resides on reels and cartridges.

5. The new Tape Library System(TLS) will need to be used, TLSUP2. This will involve changing various CLISTs that access the current TLS for log and removal of tapes. This is done for ISEE and Voyager projects.

6. Updates to the cosmic ray Tape Inventory System will need to be made to reflect the changes in creation date for future copying efforts.

7. The Pioneer and Helios programs mentioned before will need to researched before 1600 tape reduction could be performed.

8. All users of the data bases need to be informed of the changes.

IMP DATA BASE COMPRESSION

PREPROCESSOR FOR COMPRESSION (PRECOM) - PROGRAM DOCUMENTATION

**** Preliminary *****

B.S. Reddy

Science Applications research

May 31, 1984

CONTENTS

IMP DATA BASE COMPRESSION

PREPROCESSOR FOR COMPRESSION (PRECOM) - PROGRAM DOCUMENTATION

1.0 INTRODUCTION

The objective in developing a preprocessor for compression (PRECOM) program is to provide a simple proceedure to update the JCL file while submitting jobs for compression. Depending on the satellite and type of data there can be potentially 21 different JCL files. PRECOM program has been developed to avoid possible confusion and manual errors in submitting the compression jobs.

2.0 SCOPE

The PRECOM program is intended to run interactively. The preprocessor contains essentially two parts:

a. A FORTRAN program (PRECOM) to access a JCL file internally or externally and to update the JCL via menu driven interactive input.

b. An associated CLIST will enable the program to run interactively and will allow option to submit a batch job. Also, The CLIST will have capability to allocate a new JCL file if necessary.

3.0 PRECOM - Program design:

PRECOM program has been designed to run interactively on IBM 3081 under MVS/TSO operating system.

Programming language - FORTRAN 77 (VS FORTRAN)

The program essentially contains five subroutines. Table 1 shows a list of the subroutines and their functions.

Routine name	Purpose
PRECOM	Main program PRECOM to prepare JCL file
GETJCL	Fetch a JCL template internally or from old JCL file
SETJCL	Setup new JCL parameters depending on input
OPTION	Read special options for compress program This is a revised version of OPTION from COMPRESS
TPDATA	Provides old IMP tape DCB information This is a revised version of TPDATA from COMPRESS

METHOD:

The program PRECOM reads a standard JCL file internally from GETJCL routine or externally from a specified JCL file. A listing of the JCL used internally is shown below:

Standard JCL used by PRECOM

```
//XRBSRA   JOB (SB016,BF3,100),COMPRESS,CLASS=A,TIME=(5,00),
//  NOTIFY=XRBSR,MSGCLASS=A
//* TRIAL RUN TO RUN COMPRESS PROGRAM    (APRIL 18,1984)
/*JOBPARM QUEUE=FETCH
//STEP1 EXEC PGM=MAIN,REGION=450K
//STEPLIB DD DSN=SB#IM.COMPRESS.LOAD,DISP=SHR
//GO.FT03F001 DD UNIT=(2400-9,,DEFER),DISP=(OLD,KEEP),
// LABEL=(1,SL,,IN),VOL=SER=JCNT,DSN=IMPJ
//GO.FT04F001 DD UNIT=(6250,,DEFER),DISP=(NEW,KEEP),
// LABEL=(1,SL,,OUT),DCB=(DEN=4,LRECL=1192,BLKSIZE=32592,
// RECFM=VB),VOL=SER=KCNT,DSN=IMPJ
//GO.SYSUDUMP DD SYSOUT=A
//NEWCAT DD   DSN=SB#IM.CORRCAT8,DISP=OLD
//OLDCAT DD   DSN=SB#IM.DEX52CAT.DATA,DISP=SHR
//FT06F001 DD SYSOUT=A
//FT05F001 DD *
IMP8  CNTS  NEWCAT     50  60   0          0          0
NOREPROCESS NOSKIP SEQUENCE
```

The user provides data related to Job card and for the COMPRESS program interactively. The program obtains the data set names of catalogs and DCBs internally and substitutes them in appropriate places. A revised JCL will be displayed for review by the user. If the user is satisfied, the job may be submitted immediately or he/she may edit the file before submission. Next section provides information related to user input.

4.0 USER INTERFACE via CLIST:

The program PRECOM is intended to execute interactively via a CLIST. There are five different steps to follow. Steps 1 and 5 are essentially under CLIST control, while steps 2, 3 and 4 are processed by PRECOM program. A user may provide data for all five steps only during the first use of this program. For subsequent submissions, only steps 3 and 5 would be relevant.

(1) - JCL file name

The user will be prompted to provide a JCL file name. The data analyst may provide (a) a new data set name if this is the first time, or (b) an earlier used JCL file name.

In case (a) where a new data set name has been provided the data set will be allocated and a copy of a standard JCL will be obta ined from GETJCL routine.

In case (b) GETJCL routine will read the old JCL file and the program will proceed to next step.

(2) - Job card

The PRECOM program will begin execution. The program will display the default padrameters of Job card and the user may change any or all or none of those parameters. The user may hit return in any position of the record.

(3) - Compress data (Satellite, reel #, etc.)

The User will be prompted for satellite name, reel sequence number and other input data as outlined in the COMPRESS program. (Input card #1 for COMPRESS program). PRECOM will display the default or current parameters. The user may change only those required fields.

NOTE: Numbers must be entered as right adjusted.

(4) - Special options for compression

The program will display the default options used in the earlier run. The user may simply hit RETURN or he/she must enter ALL the options. There is no format to be followed, but the op-

tions must start from column 1 and they may be seperated by one or two blanks.

Note: If you enter conflicting options the PRECOM will terminate the job here. The following special options are available.

REPROCESS / NOREPROCESS	Facility to reprocess an old IMP tape that has already been compressed.
SKIP / NOSKIP	To skip compressing a tape on an I/O error or not. IOUT = 2 in step 3 will ignore NOSKIP. Also, see note below.
SEQUENCE / NOSEQUENCE	Facility to maintain reel sequence continuity.

NOTE: Valid combination of 'skip'and 'sequence' are SKIP NOSEQUENCE and NOSKIP SEQUENCE.

Also, the users may note that SKIP and SEQUENCE are interrelated parameters, but SKIP and IOCHK in the previous card are independent (see COMPRESS user's guide for details).

(5) - Submitting JCL for run

The user will be promped to review the JCL and decide if he/she would like to submit the JCL for run. If the user decides to not to submit the JCL for run the program will return control to the user.

Routine submission of jobs:

For routine submission of jobs for compression the user is expected to change minimum number of input parameters, such as, satellite name and beginning and end reel sequence numbers. All other relevant parameters regarding the data set names for the correspondence catalog, IMP old catalog and tape DCBs will be automatically updated by the PRECOM program.

5.0 DATA SETS

SB#IM.PRECOM.SOURCE - FORTRAN source
SB#IM.LIB.CLIST(PRECOM) - CLIST file

6.0 PROGRAM REBUILD PROCEEDURE

The member $BUILD in SB#IM.PRECOM.SOURCE has the relevant JCL to rebuild a new load module from FORTRAN source.

No other libraries are required to link this program.

NOTE: It is important to note that the number of JCL statements used to create the JCL file as well as their parameter positions are predefined in the program. Any attempt to redefine the JCL statements or extend the statements should be done with extreme care or else the results are unpredicatable.

APPENDIX

A.1 Listing of JCL for compile and link steps

```
//XRPASP JOB (SB016,BF3,2),PRECOM,MSGCLASS=U,TIME=(0,30),CLASS=O
//* THIS JCL IS USED TO RECREATE PRECOM MODULE (MAY 10,1984)
/*JOBPARM QUEUE=FETCH
// EXEC FORTRANV
//SYSIN DD DSN=SB#IM.PRECOM.SOURCE(MAIN),DISP=SHR
//       DD DSN=SB#IM.PRECOM.SOURCE(GETJCL),DISP=SHR
//       DD DSN=SB#IM.PRECOM.SOURCE(SETJCL),DISP=SHR
//       DD DSN=SB#IM.PRECOM.SOURCE(OPTION),DISP=SHR
//      DD DSN=SB#IM.PRECOM.SOURCE(TPDATA),DISP=SHR
//    EXEC LINKV
//LINK.SYSLIB  DD DSN=SYS2.CMDLIB,DISP=SHR
//SYSLMOD DD DSN=SB#IM.PRECOM.LOAD,UNIT=SYSDA,DISP=OLD
//LINK.OBJECT DD *
   ENTRY PRECOM
   NAME PRECOM(R)
// EXEC NOTIFYTS
```

A.2

Listing of CLIST file used for interactive execution:

'SB#IM.LIB.CLIST(PRECOM)'

```
 ------------------------------------------------------------------
 PROC 1 JCLFILE
 TERM LINES(20)
 ALLOC F(INATR) DUMMY REUS
 FREE ATTR(INATR)
 ATTR INATR BLKSIZE(80) LRECL(80) RECFM(F) DSORG(PS)
 SRCHDS &JCLFILE NOMSG
 IF &LASTCC ¬=0 THEN DO
   WRITE DATASET  &JCLFILE  NOT AVAILABLE
   WRITE WILL BE ALLOCATED NOW
  ALLOCATE F(FT02F001) DA(&JCLFILE)  NEW USING(INATR)  SP(1 1)  T
REUSE
 OPENFILE FT02F001 OUTPUT
   SET &FT02F001 = &STR( A BLANK LINE TO INITIATE THE FILE)
   PUTFILE FT02F001
 CLOSFILE FT02F001
 FREE DA(&JCLFILE)
 END
 ALLOC F(JCLFILE) DA(&JCLFILE) SHR
 ALLOC F(FT06F001) DA(*)
 ALLOC F(FT05F001) DA(*)
 WRITE
 WRITE
 WRITE  YOU SHOULD NOT NORMALLY CHANGE ANY PARAMETER VALUES
 WRITE  THAT THIS PROGRAM DOES NOT ASK YOU TO RESPOND TO.
 WRITE
 WRITE  THERE ARE SOME PARAMETERS NOT INTENDED FOR NORMAL USE
 WRITE  WHICH WILL APPEAR ON INPUT DATA CARD NUMBER ONE
 WRITE
 CALL 'SB#IM.PRECOM.LOAD(PRECOM)'
 WRITE
 WRITE  DO YOU WANT TO SUBMIT THE JOB? (Y OR N):
 READ &REPLY
 IF &REPLY = Y THEN DO
   SUBMIT &JCLFILE
   END
 ELSE
   WRITE
   WRITE  WILL YOU BE EDITING THE JCL FILE? (Y OR N)
   READ &REPLY
   IF &REPLY = Y THEN DO
     WRITE
     WRITE YOU SHOULD NOT NORMALLY NEED TO EDIT THE JCL FILE
     WRITE IF EDITING: YOU CANNOT CHANGE THE I/O EXCP ESTIMATE
```

```
     WRITE              TO BE A 2 OR 1 DIGIT NUMBER
     WRITE
     WRITE              YOU CANNOT CHANGE THE  JCL LINE ORDER,  OR
ADD
     WRITE              OR DELETE ANY LINES FROM THE FILE, IF YOU
     WRITE              INTEND TO USE IT AGAIN WITH THE PRECOM
     WRITE              PROGRAM
     WRITE
     WRITE YOU MAY EDIT &JCLFILE  AND SUBMIT
    END
 END
 SHOW ALL
 STATUS
 FREE F(JCLFILE)
 ------------------------------------------------------------------
```

A.3 Sample Run #1

```
ex 'sb#im.lib.clist(precom)'
ENTER POSITIONAL PARAMETER JCLFILE -
newfile
DATASET  NEWFILE  NOT AVAILABLE
WILL BE ALLOCATED NOW


 YOU SHOULD NOT NORMALLY CHANGE ANY PARAMETER VALUES
 THAT THIS PROGRAM DOES NOT ASK YOU TO RESPOND TO.

 THERE ARE SOME PARAMETERS NOT INTENDED FOR NORMAL USE
 WHICH WILL APPEAR ON INPUT DATA CARD NUMBER ONE

****************************************
*                                      *
*  PROGRAM TO SUBMIT IMP COMPRESSION   *
*             BATCH JOB                *
*                                      *
*   VERSION: 1.1          MAY   1984   *
****************************************
 ANSWER ONLY THOSE FIELDS YOU WANT TO CHANGE
 (DEFAULT VALUES WILL BE USED FOR OTHERS)

***>
 TYPE IN A COMPLETE WORD, DO NOT "ALTER" AS IN
 THE QED EDIT COMMAND "ALTER"

 JOB CARD:
USER ID   JOB CLASS  TIME   FETCH
 XXXXX        X      XXXX    XXX
 XTBSR        A     (5,00)   YES          <DEFAULT VALUES
              d      9,00    yes
              D      9,00    YES
SATELLITE    TAPE     REEL SEQUENCE #S    IOCHK
   NAME      TYPE     START    STOP       PARAM
   XXXX      XXXX      XXXX    XXXX        XXXX
   IMP8      CNTS        50      60           0  <CURRENT VALUES
   imp7      phas        12      14
   IMP7      PHAS        12      14
 **** INPUT PARAMETERS FOR COMPRESS PROGRAM ****
 SATELLITE  NAME: IMP7
 TAPE TYPE:       PHAS
 START REEL SEQUENCE NUMBER:   12
 END   REEL SEQUENCE NUMBER:   14
 PARAMETER  IOCHK               0
```

```
 ********* OTHER OPTIONS **********
 PROGRAM WILL STOP IF AN I/O ERROR OCCURS
 CURRENT SPECIAL OPTIONS:
NOREPROCESS NOSKIP SEQUENCE
 ENTER NEW OPTIONS (ALL) OR RETURN TO USE OLD
reprocess noskip sequence
 SPECIAL OPTIONS: REPROCESS NOSKIP SEQUENCE
 ACCEPT REPROCESSING OF OLD TAPE VOLUMES
 TERMINATE JOB IF INPUT TAPE HAS I/O ERROR
 MAINTAIN REEL SEQUENCE # CONTINUITY
-------------------------------------------------------------------
 DO YOU WANT TO REVIEW JCL FILE (Y/N) ?
y
//XRBSRA   JOB (SB016,BF3,100),COMPRESS,CLASS=D,TIME=(9,00),
//  NOTIFY=XRBSR,MSGCLASS=A
//* TRIAL RUN TO RUN COMPRESS PROGRAM     (APRIL 18,1984)
/*JOBPARM QUEUE=FETCH
//STEP1 EXEC PGM=MAIN,REGION=450K
//STEPLIB DD DSN=SB#IM.COMPRESS.LOAD,DISP=SHR
//GO.FT03F001 DD UNIT=(2400-9,,DEFER),DISP=(OLD,KEEP),
// LABEL=(1,SL,,IN),VOL=SER=JCNT,DSN=IMPH
//GO.FT04F001 DD UNIT=(6250,,DEFER),DISP=(NEW,KEEP),
// LABEL=(1,SL,,OUT),DCB=(DEN=4,LRECL=1508,BLKSIZE=32592,
// RECFM=VB),VOL=SER=KCNT,DSN=IMPH
//GO.SYSUDUMP DD SYSOUT=A
//NEWCAT DD   DSN=SB#IM.CORRCAT7,DISP=OLD
//OLDCAT DD   DSN=SB#IM.DEX32CAT.DATA,DISP=SHR
//FT06F001 DD SYSOUT=A
//FT05F001 DD *
IMP7  PHAS  NEWCAT      12  14   0          0          0
REPROCESS NOSKIP SEQUENCE
-------------------------------------------------------------------
IS JCL OK? (Y/N):
***>
y
 NEW JCL FILE IS READY

 DO YOU WANT TO SUBMIT THE JOB? (Y OR N):
n

 WILL YOU BE EDITING THE JCL FILE? (Y OR N)
y

YOU SHOULD NOT NORMALLY NEED TO EDIT THE JCL FILE
IF EDITING: YOU CANNOT CHANGE THE I/O EXCP ESTIMATE
            TO BE A 2 OR 1 DIGIT NUMBER

            YOU CANNOT CHANGE THE JCL LINE ORDER, OR ADD
            OR DELETE ANY LINES FROM THE FILE, IF YOU
            INTEND TO USE IT AGAIN WITH THE PRECOM
            PROGRAM

YOU MAY EDIT NEWFILE  AND SUBMIT
READY
```

A.4 Sample Run #2

```
ex 'sb#im.lib.clist(precom)'
ENTER POSITIONAL PARAMETER JCLFILE -
newfile


 YOU SHOULD NOT NORMALLY CHANGE ANY PARAMETER VALUES
 THAT THIS PROGRAM DOES NOT ASK YOU TO RESPOND TO.

 THERE ARE SOME PARAMETERS NOT INTENDED FOR NORMAL USE
 WHICH WILL APPEAR ON INPUT DATA CARD NUMBER ONE

****************************************
*                                      *
*  PROGRAM TO SUBMIT IMP COMPRESSION   *
*              BATCH JOB               *
*                                      *
*   VERSION: 1.1          MAY   1984   *
****************************************
 ANSWER ONLY THOSE FIELDS YOU WANT TO CHANGE
 (DEFAULT VALUES WILL BE USED FOR OTHERS)

 TYPE IN A COMPLETE WORD, DO NOT "ALTER" AS IN
 THE QED EDIT COMMAND "ALTER"
***>

 JOB CARD:
USER ID   JOB CLASS  TIME   FETCH
 XXXXX        X      XXXX    XXX
 XRBSR        D     (9,00)   YES          <DEFAULT VALUES

SATELLITE     TAPE      REEL SEQUENCE #S     IOCHK
   NAME       TYPE      START    STOP        PARAM
   XXXX       XXXX       XXXX    XXXX         XXXX
   IMP7       PHAS         12      14            0  <CURRENT VALUES
                           15      16
                           15      16
 **** INPUT PARAMETERS FOR COMPRESS PROGRAM ****
 SATELLITE  NAME: IMP7
 TAPE TYPE:       PHAS
 START REEL SEQUENCE NUMBER:   15
 END   REEL SEQUENCE NUMBER:   16
 PARAMETER  IOCHK               0
```

```
 ********* OTHER OPTIONS **********
 PROGRAM WILL STOP IF AN I/O ERROR OCCURS
 CURRENT SPECIAL OPTIONS:
REPROCESS NOSKIP SEQUENCE
 ENTER NEW OPTIONS (ALL) OR RETURN TO USE OLD
                                                    2
 SPECIAL OPTIONS:
 ACCEPT REPROCESSING OF OLD TAPE VOLUMES
 TERMINATE JOB IF INPUT TAPE HAS I/O ERROR
 MAINTAIN REEL SEQUENCE # CONTINUITY
-------------------------------------------------------------------------
 DO YOU WANT TO REVIEW JCL FILE (Y/N) ?
n
-------------------------------------------------------------------------
IS JCL OK? (Y/N):
Y
 NEW JCL FILE IS READY

 DO YOU WANT TO SUBMIT THE JOB? (Y OR N):
n

 WILL YOU BE EDITING THE JCL FILE? (Y OR N)
n
READY
```

Eunice K. Eng
February 6, 1984

I M P Data Compression Review
Notes of Meeting
Jan. 30, 1984

1. Review of the compression program

   A. Progress

   The program COMPRESS has been written and tested. Few problems exist. Currently a compressed tape can have multiple data types. The program will be modified to place only one type of data on one output tape. This implies that the compression catalog must keep track of multiple output compressed tapes by type . Each satellite has its own catalog.

   B. User Input Options

   At program submission time the user will specify the satellite name (IMP-6, IMP-7, or IMP-8), the tape type (CNTS, PHA, MATR, etc.) and, as decided at this meeting, the reel sequence number. The reel sequence number specifies the data to be compressed.

   C. I/O Error Handling

   The compress program will stop processing the current tape type when an I/O error is detected. The user, at that time, will be given the opportunity to attempt to recover the data. The program will have an option to continue processing with a different tape type (or perhaps a different satellite).

2. Utility Program COMUTL

The compression catalog utility routine COMUTL has been coded and tested and used.

M.S.

3. Compression Catalog Interface Subroutine READCT

Subroutine READCT has been coded but not throughly tested.

4. Pseudo FTIO Routines

The pseudo FTIO routines have not been formally designed. The ATR has been remiss in not holding a design review and formally starting the pseudo FTIO effort.

SAR has developed an ASSEMBLY routine which will return the number of calling arguments passed to the 'to be called' pseudo FTIO routines.

A University of Maryland (UM) contractor will be responsible for delivering the pseudo FTIO routines.

5. Relinking Analysis Routines Which will Use Compressed Tapes

A UM contractor will assist in the relinking of IMP analysis programs which will be using the compressed tapes. The UM contractor will instruct on the procedure for aliasing CSECT names to avoid linking subroutines with the same name.

The decision of the desired time table and the order in which the IMP programs and IMP satellites will be affected by the compession process was tabled until point 6 below has been resolved.

6. Compression Catalog Completeness Discussion

Two fields will be added to the Compression Catalog, 1) the date the input tape was compresed, and 2) the date the input tape was last modified as noted in the IMP Catalogs.

There was concern within the group that the Compression Catalog did not retain enough information in the case of a production failure or in the case of a redo of data that has already been compressed.

The group must decide whether the system, the software and the procedures, will handle a potential problem a committee member can propose. The group will meet again on

February 8, 1984
10:00 A.M.
X-Ray Conference Room

to make a decision. Information needed and those responsibile for them are as follows:

1) SAR will write a scenerio of the worse case.
2) SAR will write a discussion on where the Compression Catalog fails and what additional information will be useful.
3) SAR will write a prelimary procedures guide for general use and for the special case when a reprocess is required.

Note: A reprocess is required in two circumstances. 1) When a compressed tape becomes unreadable. 2) When data is to be recovered using a different process (program and/or procedure). When a reprocess is required, the data base will be recreated using the 'old' procedures.

cc: Pam
Swami
Nand
Bob McGuire

A STUDY OF ALTERNATIVES FOR REDUCING IMP TAPE SLOT REQUIREMENTS

PREPARED FOR

GODDARD SPACE FLIGHT CENTER

BY

COMPUTER SCIENCES CORPORATION

PREPARED BY:

DATE

APPROVED BY:

DATE

DEPARTMENT MANAGER

DATE

SECTION MANAGER

June 19, 1981

Semi-final Draft

TABLE OF CONTENTS

Tables ...

OBJECTIVE OF THE STUDY

The proposed SACC computer systems upgrade will require more floor space than is currently available. To free needed floor space the number of magnetic tape library racks will be reduced.

The total IMP-6,7,and 8 tape slots may need to be reduced by at least one-third. Currently there are 1085 slots allocated to the IMP libraries. After the reduction, IMP would be allowed 723 slots for all work needs.

The purpose of this study is to present alternative plans for this reduction, along with cost estimates and time estimates for implementation.

BACKGROUND INFORMATION

A summary of the current slot allocations within the IMP-6,7 and 8 cosmic ray tape libraries is given in TABLE 1. Most of the production database tapes were created at density = 1600 BPI. The physical characteristics of these tapes are presented in Appendix A, along with TAPESCAN information on some representative volumes. (Quiet time and flare periods, and some random time periods were selected for TAPESCAN to discover typical tape lengths for the number of data blocks present.)

Most production and analysis programs access these tapes through the TAPE CATALOGS. These catalogs are disk datasets which are formatted in such a way that each tape volume-serial has an individual entry. The individual entries contain several words of data storage, such as data coverage times, number of data records present, date processed, etc..

TABLE 2 lists the tape types required for each of the major production and analysis programs in the IMP systems.

These programs have hard-coded into them certain assumptions about the quantity of data on the various tape types. For example, the DATABASE GENERATOR programs which create CNTS and PHAS tape types, reformat 5 intervals of data into one physical tape file. The PHA SUMMARIZER programs, which create MATR and LOWG tape types, process one interval of data from a CNTS or PHAS tape into one physical tape file of a MATR or LOWG tape; for IMP-8 a MATR tape is assumed to hold a maximum of 20 files, and a LOWG tape a maximum of 50 files of data.

The TAPE CATALOG word structure is also limited by the various assumptions about the quantity of data on the different tape types. The catalog format has 2 full words set aside for indicating when intervals of data have been processed. One bit, on

or off, is used to indicate that an interval of data had been processed (whether fully or partially). One of these words can have up to 30 bits set as intervals of data are processed. Consequently, within the current tape catalog format, one tape entry could hold information on a maximum of 60 intervals of data. The FLUX (and FLEX) tapes utilize all available space in the catalog entry, as they have 60 files of data per tape.

Analysis programs use the interval bits, along with the tape type reel sequence numbers, to determine if required data is actually on a given tape.

Production programs use the interval bits to determine if data is being reprocessed or newly processed.

Table &&1: &*(11

Current Slot Usage Allocations

Tape Type	IMP: 6	7	8 (to 1980 end)
ENCY	0/316<1>	27/367 (3) <2>	126/426 (3) <3>
PHAS	63	110 (5)	132 (5)
CNTS	63	110 (5)	132 (5)
LOWG	6	11 (50)	14 (50)
MATR	11	19 (30)	33 (20)
SMCT	8	19 (30)	22 (30)
FLUX	6	10 (60)	12 (60)
VLET	--	--	17 (40)
Totals	157	306	488
Parentheses indicate the number of intervals contained on that tape.			

Slots Allocated in TLS

IMP-6	180 slots	62640-62759;62400-63459
IMP-7	335 slots	60180-60239;60000-60119;68120-68239; 18976-19010
IMP-8	500 slots	60840-60919;60960-61079;65140-65439
	70 slots	allocated for production work such as backups,plot tapes,IFCOM processing.

Total database tapes in slots as of the end of 1980 data production:	951
Blank • Special	64
Working Slots	70

<1>All IMP-6 ENCY tapes have been removed = 316 tapes.
<2>All IMP-7 ENCY tapes have been removed through catalog record 12 = 340 tapes.
<3>All IMP-8 ENCY tapes have been removed through catalog record 11 = 300 tapes.

Table &&1: &*(11

Programs,Tape Usage,Core Requirements

Database Generation Programs

Core	Program Name	Input Tape(s)	Output Tape(s)
250K	Database Generator	ENCY	PHAS,CNTS
325K	PHA Summarizor	PHAS	MATR,LOWG
325K	TIMSUM	PHAS	MATR,LOWG
200K	Intermediate Flux	PHAS	FLUX
200K	Intermediate Flex	PHAS	FLEX
200K	Count Summary	CNTS	SMCT
300K	VLET Summary (IMP-8)	CNTS	VLET
200K	PFLUX (IMP-8)	PHAS	King Data Center Tapes

Database Analysis Programs

300K	Analimp	PHAS,MATR, LOWG	
300K	Anisotropy	CNTS,SMCT	
300K	High Gain Plot	MATR	
250K	Low Gain Plot	LOWG	
250K	Fluxplot	FLUX	PDP11/70
250K	Flexplot	FLEX	PDP11/70
300K	Rateplot	CNTS,SMCT	PDP11/70
300K	Vletplot(IMP-8)	VLET	
150K	Electron Flux	PHAS	

GENERAL COMMENTS ON THE CURRENT SLOT ALLOCATIONS

- Recall that tape estimates are assuming completed 1980 data production.

From the slot usage summary, TABLE 1, the following can be seen:

1. The total slot allocations for IMP-6,7,and 8 is 1085 slots.
2. Of these 1085 about 951 hold production database tapes, including some 153 encyclopedia (ENCY) tapes.
3. 64 slots are allocated for Blank or special tapes. Special tapes are created in non-standard production runs. These runs may be submitted by GSFC scientists.
4. 70 slots are allocated for DECOM tapes, plot tapes, backup tapes, and other general working requirements.

We need to free up at least 362 slots, if SACC requests a reduction of one-third.

Note that the sum of all ENCY tapes currently in slots, plus all Blank and special tapes, plus all work slots, is 287.

ENCY tapes are not usually needed after they have been used in the production of CNTS and PHAS tapes. Some thought needs to be given to minimizing the slot requirement for special tapes and production working slots.

If 45 BLNK and special slots were kept, and 15 production working slots, 217 slots of the 362 needed could be immediately freed. (217 = 153 ENCY + 9 BLNK&special + 55 working) But 145 more slots would still need to be given up, and those would have to come from the other production database tapes.

In addition, allowance must be made for the growth of the IMP-8 database. That satellite is projected to be kept on thru 1983. Projections for IMP-8 slot requirements at density = 1600 BPI are given in TABLE 3.

An alternative way of summarizing the slot allocations is as follows:

As of the end of 1980 data production, there will be 798 production tapes, not including ENCY tapes, for the 3 IMP satellites. If only production database tapes (excluding all ENCY) were used in the 723 available slots, we would currently not be able to house about 75 of those tapes. Since we must plan to allocate slots for work and special needs, even more database tape slots need to be freed. And, if we allow for continuing IMP-8 database growth, about 50 slots per year must additionally be freed.

Referring to TABLE 1 again, it can be seen that the CNTS and PHAS tapes constitute most of the databases. They represent 75% of the databases (not including ENCY tapes).

To free slots, these tapes can be either removed or condensed onto a density = 6250 BPI database. The extent of the need for removal or condensing is discussed in the following pages.

For the purposes of this study, PHAS and CNTS will sometimes be referred to as low level tapes, MATR, LCWG, etc., as high level tapes.

Table &&1: &*(11

IMP-8 Growth-Tape Usage at Density = 1600 BPI

	intervals/tape	tapes/year @91.25 intervals/year
PHAS	5	18.25
CNTS	5	18.25
LOWG	50	1.83
MATR	20	4.56
SMCT	30	3.04
FLUX	60	1.52
VLET	40	2.28

(rounds to about 53 tape slots per year)

IMP-8 Projected Slot Requirements through 1985
Assuming completed 1980 data production:

(interval 756-101+1 = 656 intervals of data coverage)

tape/ type	int/ tape	1980	1981	1982	1983	1984	1985
PHAS	5	132	150	168	187	205	223
CNTS	5	132	150	168	187	205	223
LOWG	50	14	15	17	19	21	23
MATR	20	33	38	42	47	52	56
SMCT	30	22	25	28	32	35	38
FLUX	60	12	14	15	17	19	20
VLET	40	17	19	21	24	26	28

Includes data coverage into interval number:	1980	1981	1982	1983	1984	1985
	757	849	939	1031	1122	1213

Total high Level Tapes	1980	1981	1982	1983	1984	1985
	98	111	123	139	153	165

POSSIBLE OPTIONS IN MEETING SLOT REDUCTION REQUIREMENTS.

General categories for reduction

There are two general categories for the government to consider:

1. Move and store some part of the tape databases.

2. Condense some part of the current density = 1600 BPI data onto a density = 6250 BPI database.

Factors to be weighed in determining reduction method

In studying the above options, the following factors need to be considered:

1. Allowance must be made for IMP-8 database growth.

2. What tapes in the database are frequently used? What are the tape requirements for special studies which occur?

3. What is the slot and storage requirement?

4. What is the impact on various IMP programs if reprogramming is necessary?

5. What is the impact on production and analysis run times and core requirements; is there any database down time?

6. If new utility programs are needed, what is their projected cost and development time?

7. What is the documentation impact? (JCL, user-guides, etc.)

SPECIFIC OPTIONS WITHIN THE GENERAL CATEGORIES

1. Move and store some part of the tape databases

   A. Slot allocation impact
      i. Move IMP-6 ?
      ii. Move CNTS or PHAS only?
      iii. Move CNTS or PHAS from before 1975, or some other time portion on the databases?

   B. Program impact and other impact

   C. General comments about removal procedures

2. Condense some part of the databases

   A. Slot allocation impact
      i. Condense CNTS or PHAS only?
      ii. Condense both CNTS and PHAS?
      iii. Condense all tape types, excluding ENCY?

   B. Program impact and other impact

   C. General comments about condense procedures

   D. Solution proposed by Dr. Nand Lal

Option 1. Move some part of the database

Recall that the slot allocation needed to house IMP data thru 1980 data production will be 798 slots. If we allow about 60 slots for Blank, special, and working requirements we must remove 135 database tapes immediately to reduce our slot allocation to 723. Allowing for 3 more years of IMP-8 database growth will require 151 more slots (see TABLE 3).

- immediate reduction implies removal of 135 database tapes.
- long range growth of IMP-8 requires removal of 151 database tapes; more if IMP-8 is kept on longer.

Thus the minimum storage requirement would be about 284 tapes, if IMP-8 is off at the end of 1983.

This storage would be

286 / (512 IMP-8 • 279 IMP-7 + 157 IMP-6) =

286 / 948 = 30 %

of the database which does not include any ENCY tapes.

1.A Slot allocation impact.:

The slot allocation impact from the various removal options is given below.

1.A.i Move IMP-6 only:

The IMP-6 database is rarely used by GSFC scientists. It contains 157 production database tapes (excluding ENCY tapes). Removing the whole database would enable IMP to meet its initial slot reduction need.

The IMP slot allocations would then be:

639 database production tape slots (all IMP-7,8; no IMP-6)
60 special, blank, working slots
24 spare slots, which world be used up by IMP-8 growth in about 1/2 year. (That would correspond to half of the 1981 data, when completely processed.)

If IMP-8 is kept turned on, very soon additional database tapes would need to be removed, and they would of necessity come from the IMP-7 or IMP-8 databases.

1.A.ii Move CNTS or PHAS only:

The tape types CNTS and PHAS comprise the majority of the tape libraries, with equal numbers of each tape type (see TABLE 1).

Removal of either all CNTS or all PHAS would give the following slot availability:

(removal through 1980 data production for IMP-8)

IMP-6	63	CNTS or PHAS
IMP-7	110	CNTS or PHAS
IMP-8	132	CNTS or PHAS
	305	total

Slot allocation status if all CNTS or PHAS were removed:

491	database tapes (excluding ENCY)
60	special, blank, working slots
172	spare for IMP-8 growth

This option would more than allow for expected IMP-8 growth through 1983 data production.

It should be noted that CNTS or PHAS could be removed only as their slots were required for IMP-8 growth.

1.A.iii Keep some portion of CNTS and/or PHAS:

Another alternative to option 1.A.ii would be to keep some maximum number of years of the most current data. In this case, a schedule of tape removal might be as the example given below.

To meet the initial need for reduction about 135 database tapes would have to be removed, as has been established above. This would mean removing data from before 1975, as illustrated below in TABLE 4. GSFC scientists could select removal of other tapes than this example, of course.

Table &&1: &*(11

Example Tape Removal + Storage Plan to Maintain About 663 Database Tape Slots

* Remove 135 tapes from the projected database size at the end of 1980 data production. (798 tapes excluding FNCY)
* Assume about 60 of those tapes are making space for work slots, blank tapes and special tapes.
* Assume about 663 slots for database tapes.
* Remove tapes in 4 steps, allowing for IMP-8 database growth thru the end of 1983.

Catalog Coverage Times				Intervals
IMP-6	3/13/71	-	10/02/74	1 - 313
IMP-7	9/25/72	-	10/01/78	1 - 550
IMP-8	10/30/73	-		101 -

Start with 2 options:

1.) remove all data from before 1975 in the CNTS tape type (= 125 tapes)

2.) remove all CNTS and PHAS from IMP-6 (= 126 tapes)

Step-1:

Initial Tape Removal Assuming Completed 1980 Production

	Option 1			Option 2		
	IMP-6	IMP-7	IMP-8	IMP-6	IMP-7	IMP-8
PHAS	63	110	132	--	110	132
CNTS	--	69/110	111/132	--	110	132
LCWG	6	11	14	6	11	14
MATR	11	19	33	11	19	33
SMCT	8	19	22	8	19	22
FLUX	6	10	12	6	10	12
VLET	--	--	17	--	--	17
Total slots	94 +	238 +	341 = 673	31 +	279 +	362 = 672
	125 tapes stored: CNTS tapes data from before 1975			126 tapes stored: All IMP-6 PHAS + CNTS stored		

Example Tape Removal + Storage Plan

Step-2

Database Production thru 1981 Data

	Option 1			Option 2		
	IMP-6	IMP-7	IMP-8	IMP-6	IMP-7	IMP-8
PHAS	7/63	110	150	--	110	150
CNTS	--	69/110	129/150	--	69/150	129/150
LOWG	6	11	15	6	11	15
MATR	11	19	38	8	19	38
SMCT	8	19	25	8	19	25
FLUX	6	10	14	6	10	14
VLET	--	--	19	--	--	19
Total slots	38 +	238 +	390 = 666	31 +	238 +	390 = 659
	181 tapes stored; additionally, 56/63 IMP-6 PHAS stored			188 tapes stored; IMP-7 and-8 CNTS data from before 1975 is stored		

Step 3

Database Production thru 1982 Data

	IMP-6	IMP-7	IMP-8
PHAS	--	70/110	147/168
CNTS	--	69/110	147/168
LOWG	6	11	17
MATR	11	19	42
SMCT	8	19	28
FLUX	6	10	15
VLET	--	--	21
Total slots	31 +	198 +	417 = 646
	249 tapes stored: All IMP-6 CNTS,PHAS; IMP-7,8 data from before 1975 in CNTS, PHAS.		

Step-4

Database Production thru 1983 Data

	IMP-6	IMP-7	IMP-8
PHAS	--	60/110	156/187
CNTS	--	59/110	156/187
LONG	6	11	19
MATR	11	19	47
SPCT	8	19	32
FLUX	6	10	17
VLET	--	--	24
total slots	31 +	178 +	451 =660

289 tapes stored; all IMP-6 CNTS and PHAS stored. IMP-7, IMP-8 CNTS, PHAS data from before 6/20/75 stored.

1.B Impact on programs, analysis, other:

1.B.i Should CNTS or PHAS be removed:

For these removal and storage options, it is not clear-cut as to whether CNTS or PHAS should be chosen, if only one type is selected. Over the past year and a half all of the major categories of programs have been used for IMP-8, and all of the analysis type for IMP-7. Analysis program usage has tended to be 'in spurts' for most programs.

The TIMSUM programs are run often. The INTERMEDIATE FLUX programs which generate the new FLEX tape databases have been run often for IMP-7 and 8. These programs have looked at intervals scattered throughout the whole database ranges. They use PHAS tapes as input. In the latter part of last year a special study was done which required CNTS tapes in the creation of special VLET data time periods. That study covered about 7 months of data.

- Government scientists need to determine which of the databases is less needed, if any of the removal options are selected.

1.B.ii Analysis program impact:

Any tapes removed would need to be stored in a convenient location, in case they were needed.

Government scientists would need to know in advance if any of the stored tapes would be needed in analysis jobs. Personnel would be needed to maintain a tape storage system, receive tape requests, allocate slots in TLS, and physically place tapes in building 1.

If large blocks of data coverage times were required in an analysis run, slot availability might be limited, if the time period of interest included many stored tapes.

1.B.iii New utility programs needed:

Some utility programs could be written to help facilitate determination of tape needs for the different programs, and to keep a record of stored tapes. These would be TSO foreground executing programs.

1.B.iv Overall Impact:

The overall impact of tape removal and storage is summarized below:

1. A tape removal schedule must be created.

2. Additional utility programs will be needed:

   a) Keep a record of stored tapes; add to or delete from it
   b) Determine what stored tapes may be required for a given program and time period.
   c) Search TLS to see if tapes are there; assign and remove TLS numbers to needed tapes (this could be done by hand using TLSUPDTE)

3. Storage requirements

   a) 1/2 of one full size tape rack (528 slots/rack type) will be needed. (store 135 + 151 = 286 tapes; which is the maximum if IMP-8 is turned off after 1983)
   b) An INDEX for stored tapes
   c) requisition forms for tape movement

4. Personnell needed

   a) A librarian for stored tapes, whose duty would be to upkeep the utility lists, TLS allocations, and to move tapes.
   b) A maintainance programmer.

5. Equipment needed

a) a tape cart

b) a computer terminal

6. Cost estimates for programming & removal portions

a) foreground utilities

Program/CLIST for maintainance of storage list

design 1 week

code &

test 1 week

Program/CLIST search by Program type and run time request for needed tapes.

design 3 weeks

code &

test 3 weeks

b) tape movement

See 1.C for time estimates in initial removal

1.C General comments on removal procedures:

A pre-requisite for the removal options is that adequate space be provided by GSFC/LHEA for storing tapes on center so that they may be labelled and available for use if needed. There will be no changes needed to any existing programs or the tape catalogs themselves if any of these options is chosen.

Description of proposed work:

1. The above mentioned storage area will be prepared for accomodating the tapes which are being removed. This involves:
   a) moving all of the IMP-7 and 8 ENCY tapes and the tape cabinets which are now in building 6 room W-2 to this storage area. These ENCY tapes will then be placed in tape cabinets in ascending order as they appear in the tape catalogs.
   b) the remaining tape cabinets will need to be cleaned up and in some cases repaired. They will then be positioned in the best way suited to the space provided

2. Any tapes to be removed will be placed in the storage area cabinets in ascending time order by tape type as they appear in their respective catalogs. This will allow for easy access to the tapes as most programs request blocks of input by time. A record will be kept of all removed tapes.

3. The high level tapes will then be physically moved into contiguous slots.

4. All tapes in these catalogs will then be removed from TLS and the high level tapes will be re-assigned and titled according to the experiment and tape type.

5. A block of empty slots will be allocated for storing the needed low level tapes for all experiments.

6. The remaining empty slots will then be given to the SE tape librarian Mr. H. Domchick.

7. A general request form will be developed for recalling tapes from storage when needed and returning them to storage.

The schedule for accomplishing this operation is as follows:

1. To orgainize the storage area and move ENCY tapes and cabinets will require about 3 man-days.

2. To relocate tapes to be left in allowed slots, and reassign blocks of tapes in TLS , will require about 4 man-days.

It should be noted that the database will be unavailable during the relocation and re-assignment in TIS of tapes left in slots in building 1.

Option 2. Condense Optiens

These options of the slct reduction possibilities involve rewriting some part of the current 1600 BPI database onto a new 6250 BPI database.

In considering this option tapescans were done to estimate how full typical tapes currently are. It was noted that a three to one condense to 6250 BPI was possible for the SMCT tape examples of IMP-8. Calculations were done for PHAS tapes to show that without reblocking the data, a 3:1 condense to 6250 BPI was about the best that could be expected. See Appendix E. Reblocking, preserving density = 1600 BPI, allows about 19 % more data to be added to a PHAS tape. When reblocking is done, it is possible to get a 4:1 condense to 6250 BPI.

For comparison, the following slot projections are done for both a 3:1 and a 4:1 condense to 6250 BPI for PHAS and/or CNTS tapes.

2.A Slot allocation impact:

The affect on slot allocations for the various condense options is described below.

2.A.i Condense CNTS or PHAS only:

Slot Allocation Impact
Condense CNTS or PHAS Only
(den=4 means density=6250 BPI)

IMP-8

Slot Requirements
CNTS or PHAS

	den=4 (3:1) PHAS or CNTS			den=4 (4:1) PHAS or CNTS		
1980	44	132	176	33	152	165
81	50	150	200	38	150	188
82	56	168	224	42	168	210
83	63	187	250	47	187	234
84	67	205	272	52	205	257
85	75	223	298	56	223	279

Total Slots Needed:
High Level and Total from above

	High Level	CNTS+ PHAS	Total	High Level	CNTS+ PHAS	Total
1980	97	176	273	97	165	262
81	110	200	310	110	188	298
82	122	224	346	122	210	332
83	138	250	388	138	234	372
84	152	272	424	152	257	409
85	164	298	462	164	279	443

IMP-7 Slots needed (den=4 means density=6250 BPI)

den = 4(3:1) CNTS or PHAS 110 + 110/3 + 59 = 206

den = 4(4:1) CNTS or PHAS 110 + 110/4 + 59 = 197

IMP-6 Slots needed

den = 4(3:1) CNTS or PHAS 63 + 63/3 + 31 = 115

den = 4(4:1) CNTS or PHAS 63 + 63/4 + 31 = 110

Total Slot Requirement for Production tapes only

	den = 4(3:1)	den = 4(4:1)
1980	594	569
81	631	605
82	667	639
83	709	679
84	745	716
85	783	750

If a maximum of 663 slots are allowed for database tapes, by the end of 1982 we will start to need slots allocated to 'special + working' tapes. Therefcre,we must condense PHAS also.

2.A.ii Condense CNTS and PHAS both:

Condense CNTS and PHAS - Slot Allocation Impact

IMP-8

Slot Requirements den = 4(3:1) den = 4(4:1)

	CNTS + PHAS	HIGH = Total Level	CNTS+ PHAS	High = Total Level
1980	88 +	97 = 185	66 +	97 = 163
81	100	110 210	76	110 186
82	112	122 234	84	122 206
83	126	138 264	94	138 232
84	134	152 286	104	152 256
85	150	164 314	112	164 276

IMP-7

3:1 den 4 2 * (110/3) + 59 = 133

4:1 den 4 2 * (110/4) + 59 = 115

IMP-6

3:1 den 4 2 * (63/3) + 31 = 73

4:1 den 4 2 * (63/4) + 31 = 63

Total Slot Requirement

	3:1 den=4	4:1 den=4
1980	391	341
81	416	364
82	440	384
83	470	410
84	492	434
85	520	454

If a maximum of 663 slots are allowed for database tapes, this option is more than sufficient in allowing for IMP-8 database growth.

2.A.iii Condense all tape types:

This option is not recommended. Recall from the section on Background information that the IMP system catalogs are set up to accept data storage for a maximum of 60 files of data per tape-where one file is usually synonomous with one interval of data. We would need at least 4 more full words of storage for bits indicating that intervals have been processed, assuming the basic IMP systems philosophy was preserved. Condensing the higher level tapes would require modifying the current catalog structure, and would have a great impact on reprogramming time. All programs would be affected, including maintainance and utility programs. (see TABLE 2 for a list of major programs)

2.B Impact of condense of CNTS and PHAS:

2.B.i Impact on existing programs:

Since all programs requiring CNTS and PHAS tapes have hard-coded assumptions about the amount of data on them, those programs would need to be modified to accomodate the new databases.

The following programs would be affected:

PRODUCTION PROGRAMS:

	INPUT	OUTPUT
DATABASE GENERATOR		CNTS,PHAS
TIMSUM	PHAS	
PHA SUMMARIZOR	PHAS	
INTERMEDIATE FLUX	PHAS	
COUNT SUMMARY	CNTS	
VLET SUMMARY	CNTS	
PFLUX (KING DATA CENTER)	PHAS	
(ELECTRON FLUX	PHAS)	

ANALYSIS PROGRAMS:

ANALIMP	PHAS
RATEPLOT	CNTS
ANISOTROPY	CNTS

Dump programs for CNTS and PHAS tapes would need to be modified to allow for a multi-file tape structure in locating data (see below).

2.B.ii I/O impact: retlocking impact:

Fread and I/O time impact in running programs from a condense would be negligible if the basic structure of 5 intervals per physical file could be preserved.

In production runs, the only impact would come in the DATABASE GENERATOR runs where some part of an existing tape must be copied to a new tape which the program is processing. This effect should be minimal since most data is processed in time order sequentially and is usually add-on data.

If reblocking data was done to achieve a 4:1 condense of PHAS and/or CNTS tapes, core requirements for running programs using the tapes would go up a maximum of about 27K to 29K bytes for each tape type used:

approximate current blocksizes: 3500-4700 bytes
maximum reblocking size is about: 32000 bytes

The maximum reblocking is not needed for CNTS and PHAS (see Appendix B) to achieve a 4:1 condense, but if it was used, this would adversely affect the daytime running on the 360/75 of the ANALIMP, ANISOTROPY, RATPRICT, and TIMSUM programs (see TABLE 2).

The minimum needed blocksize to do a 4:1 condense would be about 9500 bytes for IMP-8 PHAS tapes. This is a blocking factor of 6 logical records to 1 physical block, and should be larger, for safety. 10K bytes would need to be added to core requirements for each tape type.

If reblocking were done, there would be a corresponding reduction in the tape read and write operations. The magnitude of this effect would be about, for example, 10 : 1, if a block was increased from 3200 bytes to 32000 bytes.

2.B.iii New programs required:

The new programming required to carry out condense for PHAS and/or CNTS would be as follows:

1. The database condense program

2. A tape entry transfer program, for transfering the

higher level tape entries (MATR, LOWG, SHCT, VLET, FLUX, etc.) into the new tape catalogs. (this might be achieved by a modification of the IMP MAINTCAT program which would allow access to the catalog volume-serial designations)

2.B.iv Documentation updates:

Documentation and JCL updates would be required to reflect density and/or reblocking changes, and any relevant program changes. (JCL exists in SOURCE datasets as well as in the maintainance dataset 'SEIMP.LIB.CNTL')

2.B.v Overall Impact:

The overall impact of tape condense and storage is summarized below:

1. A tape condense schedule must be created.

2. Additional utility programs will be needed:

   a) A database condense program is needed which interfaces with both the old and new tape catalogs.
   b) A tape entry transfer program as mentioned above.

3. Storage requirements

   a) just over one full size tape rack will be needed if these tapes are to be preserved. (528 slots/rack type (if the whole CNTS and PHAS den=1600 database is process this would be 132+110+63 = 305 CNTS or PHAS; 610 tapes both types thru 1980 data production)
   b) An INDEX for stored tapes
   c) requisition forms for tape movement

4. Personnell needed

   a) A senior datatech to set up tape and job assignments
   b) A datatech to run jobs, carry out tape TLS assignments, and move tapes.
   c) A programmer.

5. Equipment needed

   a) 202 new tapes if both CNTS and PHAS are condensed (tapes certified at 6250 BPI)
   a) a tape cart
   b) a computer terminal

6. Cost estimates for programming and condense portions

Programming estimates are for 1 programmer familiar with basic IMP systems.

a) database condense program

design	3 weeks	(assuming catalog interfacing)
code	2 weeks	
test	2 weeks	

b) tape entry transfer program

design	1 week	(may be mod. of MAINTCAT)
code &		
test	1 week	

c) program modifications for IMP-8 only

DATABASE PRODUCTION : 7 major programs of 2.B.i

design	25 days
code &	
test	28 days

DATABASE ANALYSIS : 3 major programs of 2.B.i

design	8 days
code &	
test	12 days

DATABASE UTILITIES : dump and list type
code &
test 1 day each

IMP-6 and 7 are similar to each other and to IMP-8 for most programs. They should require less design time than IMP-8, once basic methods are decided on. Code and testing time may be about the same, however.

d) condense procedure

Time estimates are for the limited slot availability case.

A. select slot allocations
allow 1 day per IMP

B. assign/reassign slots • tape movement involved
allow 3 days per IMP per tape type for IMP-7,8
allow 1 day per tape type for IMP-6

C. select new vol-sers, allocate & write new BLNK catalogs
allow 2 days for all

D. condense jobs
allow 5 jobs per day involving:
i. label & place tapes; enter tapes in TLS
ii. edit JCL and submit jobs (see 2C.i for job time estimates) →
iii. obtain catalog list & verify job executions
iv. submit TAPESCANS (est. h00h01 per scan)
v. remove 6250 tape temporarily
about 101 jobs for CNTS, 101 jobs for PHAS => 42 days
for mechanics of condense in a limited slot environment

E. After condense, switch databases physically and in TLS
allow 1 day each for TLS changes
allow 3 days for tape movement and packaging of 1600 BPI
allow 1 day for movement of 6250 tapes into slots
i. remove 1600 BPI tapes from TLS and slots
ii. assign 6250 BPI tapes to TLS and place

The total time from A + B + C above is 19 days, from D above is 42 days and from E above is 6 days, giving a total of 67 days in a limited slot availability environment.

2.C General comments on the Condense Options:

The goverment must decide:

1. The extent of database condensing ; PHAS? CNTS? other?

2. The preferred order of tape condensing ; PHAS or CNTS first? current data or early data first? IMP-8 first?

3. Which programs should be modified first ; IMP-8 production or analysis? IMP-6 or IMP-7 ? What is the order of priority in modifying the majcr programs?

The government should in any long term plan, allow for the possibility of reprocessing parts of the IMP-6 and IMP-7 databases. CSC has currently been working on a datagap problem which existed not only in IMP-8, but also in IMP-7. If the IMP MED gain factors are ever readjusted, the FLUX databases may need to be regenerated. As finegain factors are added, FLUX intervals must be reprocessed.

If condensing can be done before the time the slots actually must be given up, it would be possible to construct the new databases and tape catalogs with the old system entirely available.

If the condense is not done before the slot reduction must take place, a portion of the old database would be unavailable, i.e. those slots being used for the condense operation, as well as those required for work and special needs, in addition to ones which would have to be removed to meet the initial reduction requirement. In that case, the mechanics of performing the many jobs required would be hindered greatly. (see the somewhat expanded condense procedure below)

2.C.i Steps in a condense procedure:

The following steps would be needed for a condense:

1. Design, code and test the condense program

2. Design, code and test a program to access volume-serial names for transfer of higher level tape entries to the new catalogs.

3. Do the condense as follows:

    1. select all final slot allocations prior to any work

    2. where possible assign (reassign current tapes) slots to facilitate tape movement; use blocks of tape types

    3. select new catalog tape vol-sers for IMP-6,7,and 8

    4. allocate and write new BLNK catalogs

    5. label and place new tapes (101 * 2 = 202 new tapes for all IMPs)

    6. divide IMP-8 into about 43 jobs if a 3:1 condense is done (43 * 2 jobs for both CNTS and PHAS)
        a) allocate tapes in TLS
        b) submit by deck or terminal
            i. estimate h01h04 per job on 360/75 (= 64.5/193.5 CPU/IO for ONE tape type)
            ii. these jobs must be run DISP=OLD for the new catalogs
        c) list the catalog and verify each new entry verify job printouts as all good
        d) TAPESCAN new tape and save

Repeat 5 and 6 for IMP-7 : 37 jobs for ONE tape type =
55.5/166.5

IMP-6 : 21 jobs =
31.5/94.5

Estimate condense time to be
151.5/454.5 for ONE tape type
rounds to about 6 hours CPU and 16 hours I/O for BOTH CNTS and PRAS on the 360/75

4. Finally, modify programs according to government priority

2-D Dr. Nand Lal proposed solution:

APPENDIX A

TAPESCAN SURVEY

TAPESCAN SURVEY
typical results

IMP-8

						den	length	data blks
ENCY	E05078	FB	2812	8436	1 file	3	19'	39
PHAS	E02766	FB	1552	4656	1 file	3	2000'	6741
CNTS	E02777	FB	1188	3564	1 file	3	1523'	6348
MATR	E02917	F	7280	7280	20 files	3	1668'	3875
LOWG	E00729	FB	356	5340	50 files	3	1157'	3527
SMCT	E02745	FB	1332	5328	30 files	3	992'	3021
SMCT	E05051				30 files	4	306'	2990
VLET	E04615	F	7280	7280	40 files	3	89'	257
FLUX	E00760	FB	588	5880	60 files	4	648'	5917

IMP-7

ENCY								
PHAS	E04518	FB	1504	4512	1 file	3	1337'	4622
CNTS	E04519	FB	1188	3564	1 file	3	1109'	4622
MATR	E04874	F	7280	7280	30 files	3	1695'	3949
LOWG	E03662	FB	328	4920	50 files	3	558'	1825
SMCT	E04838	FB	2460	4920	30 files	4	548'	5832
FLUX	E04963	FB	520	5200	60 files	3	1849'	5736

APPENDIX B

Reblocking Calculations (1 file per tape)

Background Info on Tape Lengths

For label=SL tapes of one file, the tape length is equal to the sum of the following:

volume label record	80 bytes
header record 1	80 bytes
header record 2	80 bytes
tapemark 1	3.75"

(data block + IRG) * (#data blocks)

tapemark 2	3.75"
EOF1 first trailer record	80 bytes
EOF2 end of volume (second trailer)	80 bytes
tapemark 3	3.75"
tapemark 4 EOV1	3.75"

Inter-record gaps occur between each block and are

.651" for den=1600 BPI
.300" for den=6250 BPI

for 9 track tapes. The length of a block = blocksize/density in BPI.

-----continued

PART A.

Reblock data, maintaining density=1600 BPI

An IMP-8 PHAS tape was TAPESCANned with the following results:

length = 2000' 4"

data blocks = (6741-5) = 6736

The blocksize was 4656 bytes with a blocking factor of 3:1 (3 logical records per physical record) at density=1600 BPI. The calculated length of this tape would be:

(4656/1600 + .651) * 6736 + 4(3.75") + 5(80/1600 + .651)=

24005.401" =

2000.45'

The maximum reblocking would allow about 32000 bytes per block. If a 21:1 blocking factor was used on the above data,963 blocks would be required for the 20208 logical records. The length of the reblocked tape would be:

(32592/1600 + .651)*963 + 4(3.75) + 5(80/1600 + .651) = 1686.93'

Thus,313.52 feet more tape would be available for more reblocked data. This length represents 178.97 blocks of data,or about 3758 more logical records.

Then about 20208 + 3758 = 23966 logical records could be fit into the same length (2000.4') if the data were reblocked.

This is 100 * (3758/20208) = 18.6% more data.

If PHAS tapes were to have 1 more interval per tape added,so that there were 6 intervals per tape, the maximum allowed reblocking would still not safely allow us to put that extra interval on the tapes.

PART B. Condense data to 6250 BPI

For the purposes of comparison, assume that the length of a tape is about equal to

ND * (blksize/BPI + IRG) = L

where

ND = the number of data blocks
BLKSIZE = the blocksize of the data blocks
BPI = the density in bytes per inch
IRG = the inter-record gap for the density

and assume that a desired tape length is 2000 feet. The following calculations show the number of logical records that can be put into about 2000 feet of tape under different conditions of density and blocking factors:

PHAS tapes for IMP-8 are the example

1) ND = 2000(12)/(4656/1600+.651)

ND = 6739 data blocks

For the case of 4656 bytes per block, we have a 3:1 blocking factor. The number of logical records present is 20217.

2) ND = 2000(12)/(4656/6250+.3)

= 22967 data blocks

= 68901 logical records

Comparison of 1) and 2) shows that a 3:1 condense to 6250 BPI is what could safely be done, if the 4656 byte blocksize is preserved, for the IMP-8 PHAS tapes.

Using the approximate blocksize from PART A.,

3) ND = 2000'(12)/(32592/1600+.651)

= 1142 data blocks

= 23961 logical records 21:1 blocking factor

about 2000 feet of tape.

4) ND = 2000'(12)/(32592/6250+.3)

= 4352 data blocks at 21:1 blocking factor

= 91392 logical records

Comparison of 1) and 4) shows that reblocking to about the maximum allowed, gives better than a 4:1 condense to 6250 BPI. It can be seen that the maximum blocksize allowed would not be needed to achieve a 4:1 condense to 6250 BPI. Can we find the minimum blocking factor which will just allow a 4:1 condense? This would be advisable, as we should minimize tape buffer space, for the sake of daytime program running.

PART C.

Finding the Minimum Blocking Factor which will allow a 4:1 Condense to 6250 BPI

Given that an IMP-8 PHAS tape has a typical size of 20217 logical records in 2000 feet of tape, find the minimum blocking factor (BLOCKSIZE) for a 4:1 condense. The logical records are 1552 bytes.

We do not know

1) the blocksize of the data, or
2) the blocking factor

in the approximate length equation:

$$L = ND * (BLKSIZE/BPI + IRG) \qquad 1$$

Rewrite this as

$$L = (4*20217)/B \text{ lrecs/block} * (A \text{ Blk}/6250 \text{ BPI} + .3") \qquad 2$$

we know that

B logical recs/block = A blocksize/1552 bytes per block

Substituting 2 in 1 and solving for B, the blocking factor:

24000" = (80868 lrecs/B lrecs/blk)(B(1552)/6250 BPI + .3")

collecting terms

B = -80868(.3)(6250)/(80868)(1552) - 24000(6250)

= 6.19

Truncate to 6 logical records per block and test this with the length formula:

80868 lrecs/6 lrecs/blk = 13478 data blocks

BLKSIZE = 9312 bytes

L = 2010.4 feet approximately

Finally, what is the length difference between a 21:1 blocking factor and a 6:1 blocking factor?

80868/21 = 3851 blocks

L = (32592/6250 + .3) * 3851

= 1769.76"

Thus, this difference is 240.64'. It should be noted that this difference is simply the difference in the number of data blocks at a 21:1 blocking factor, and the number at 6:1, times the inter-record gap for 6250 BPI:

80868 logical records

at 21:1 = 3851 blocks

at 6:1 = 13478 blocks

13478 - 3851 = 9627 blocks difference

9627 * .3" per IRG = 240.67'

We save delta BLOCKS * IRG by increasing the blocking factor.

APPENDIX C

PART A.

Typical Production Run Times for IMP-8

This table contains typical run times. Data gap rerun data is explicitly given for 4 intervals for comparison.

Program name (360/75)	Add-on type runs CPU/IO (360/75)		Re-run data CPU/IO
Data Processing System	2.59/8.23	(one DECON)	
Database Generator	1.48/1.31	(one interval)	
	.76/ .76	(int 475)	2.77/4.54
	1.26/1.07	(int 476)	2.44/5.00
	.89/ .82	(int 484)	2.12/3.66
	.93/ .76	(int 485)	2.10/4.25
PHA Summarizor	4.58/3.93	(one interval)	
	2.60/2.94	(475)	8.64/12.22
	4.23/4.28	(476)	6.60/9.20
	.96/1.54	(485)	5.47/7.52
Count Summary	Single interval data was unavailable for multiple intervals:		
	10.87/2.47	(711-719)	
	3.53/1.11	(726-728)	
	25.61/5.14	(661-688)	
	unavailable directly	(475-476)	3.86/2.98
	unavailable directly	(484-485)	2.93/2.66
VLET Summary	.32/1.34	(one interval)	
	.16/1.39	(475)	.54/1.90
	.16/ .67	(476)	.34/1.12
	.34/1.13	(484)	.50/1.67
	.24/1.18	(485)	.49/1.83
Intermediate Flux	Single interval numbers not available:		
	56.02/19.17	(616-647)	
	2.67/1.35	(679-680)	
	4.06/1.52	(714-715)	
	16.55/2.45	(481-490)	
		re-run for finegains	
	unavailable as double intervals;	(548-549)	4.85/3.37
		(472-473)	6.89/3.76
		(493-494)	6.13/3.36
		(511-512)	5.91/2.97

From the preceding summary, it can be seen that:

CPU bound programs are:	Count Summary Intermediate Flux
IO bound programs are:	Data Processing System VLET Summary
about equal CPU and IO:	Database Generator PHA Summary

Reblocking data in a condense procedure would make a difference in the IO bound programs and in the equal CPU and IO programs, reducing the IO time. Part B., below, lists typical block lengths for IMP-8 for density=1600 and 6250.

PART B.

FREAD IO Impact vs. Density

Sizes of (data blocks + inter-records gaps)
for IMP-8

tape type	blocksize	block length at 1600		length read per FREAD FREAD 6250/ FREAD 1600
PHAS	4656	3.561"	1.045"	3.408/1
CNTS	3564	2.8785"	.87024	3.308/1
LOWG	5340	3.9885"	1.1544"	3.455/1
MATR	7280	5.201"	1.4648"	3.551/1
VLET	7280	5.201"	1.4648"	3.551/1
FLUX	5880	4.326"	1.2408	3.486/1

Requirements of a Cosmic Ray Data Base Inventory Catalog

Document Number 84-.-..

November 16, 1984 - Issue I.B

Kristin Wortman, S. A. R.
Eunice Eng, Code 664

NASA/GSFC

ABSTRACT

This document describes the requirements of a database inventory catalog system for the Cosmic Ray experiments.

CONTENTS

1.1 OVERVIEW

The critical data bases are presently stored on magnetic tapes for all Cosmic Ray experiments. Each project has a large number of volume serials assigned to primary and back-up levels of magnetic tapes. The current record keeping procedures are inadequate in providing the necessary information to maintain the large data bases.

The age of the magnetic tapes pose a threat to the readability of the active data bases. The data base user will need to replace an old tape with a copy on a newly manufactured tape. Therefore a means of tracking the manufacturer date of each tape will need to be established.

If a data base tape should be destroyed in production its back-up must be located. The backup is used to make a new original on a newly manufactured tape. Therefore, an original and all its backups will have to be cross-referenced and their locations known. A Cosmic Ray task requirement (10/84) is to keep two levels of backups for each primary (original) data base tape.

The purpose of the data base catalog is to organize and provide information about the magnetic tapes for each project. The advantage of a computerized catalog is 1) to be able to generate updated listings, 2) to be able to get sorted listings, 3) to be able to update the catalog easily and 4) to have a central location of the catalog, accessable to any user of the data base. There will be one catalog for each experiment. An experiment's data base catalog will, primarily, be used by a data technician responsible for that experiment.

1.2 HARDWARE REQUIREMENTS

The use of a personal computer (PC) with an established data base management software system has been proposed. The Laboratory for High Energy Astrophysics has PCs in some offices. The caost for a PC solution may be about $2000.00.

The IBM 3081 does not currently have a data base management software system. This document, however, requires that the data base catalog reside on the IBM 3081 at the Scientific Computing Facility (SCF) and not on a PC for the following reasons:

- the IBM is more accessable by several users, simultaneously
- the IBM is locally supported by SCF

- the SCF facility has the hardware configuration necessary
  - magnetic disks, with automatic archival
  - listing devices
- the IBM is where the primary data bases are used and stored
- the IBM data base is better suited for automatic updates, in the future

The objective is not to create an extensive data base management system. The immediate objective is to establish the data base catalog by facilitating data entry. Software is needed to perform input data checking.

1.3 SOFTWARE REQUIREMENTS

Any new software developed will use IBM VS FORTRAN. Each routine is to have internal documentation consisting of a prologue (format must be approved) and inline comments.

The format of the catalog should be designed to accommodate a data base management system in IBM's future. Physically it has the following characteristics:

- fixed length records
- fixed fields (project independent) followed by variable fields (project dependent)

Space should be built into the fixed length records.

The catalog should also allow for varying amounts of data base data types, backup levels, and storage medium since these are project dependent or variable with time.

Catalog listings can be displayed in real time as well as in backgound.

1.4 FUNCTIONS

The following is a list of functions the catalog and its utility software will satisfy:

- list tapes by data type and year of manufacture, in time sequential order
- list tapes by data type and backup level

- list a tape, its location, and its backups
- identify a tape given the volume serial number
  - data type
  - year of manufacture
  - backup level
  - location
  - storage medium (if tape, density)
- Opt. identify a tape (or tapes) given a data type and a data time span

1.5 DELIVERABLES

The following is a list of deliverables:

- user's guide
- design document with data structures
- skeleton project catalog
- TSO CLIST or CMS CLIST library
- proposed procedure for backing up the catalogs

Cosmic Ray Tape Inventory System Specifications

Issue 1, Revision A

Revision Date: November 28, 1984

Document Number 84-.-..

Eunice Eng, NASA/GSFC, Code 664
Kristin Wortman, SAR

CONTENTS

1.0 OVERVIEW

The objective is to design a system to monitor the primary data bases and its back-ups. The system is to include a data base, the ability to update the data base, the ability to quiz the data base, and the ability to list the data base. The system should be applicable to all the currently active cosmic ray projects.

The tape inventory data base designed will be centrally located on the Science Computing Facility (SCF) IBM 3081 computer. The targeted user is the person who will perform the standard data production and data analysis. Each project will have its own data base.

2.0 HARDWARE REQUIREMENTS

- As specified in the requirements document, the cosmic ray database catalog will be accessable via the SCF's IBM 3081.

- In order for the catalog to be accessable in real-time and in background, the catalog will reside on a magnetic disk. (may be migrated to mass storage).

- The user should be able to get a printed listing of the project catalog.

- A block mode terminal would be desirable for faster user input, in the interactive mode of execution. ~~However, a method for obtaining user input on a non-block mode terminal should be available.~~ Perhaps this non-block mode method will also enable obtaining user entry in background execution.

future enhancement

3.0 LANGUAGE REQUIREMENTS

- Use the languages supported by SCF and IBM.
- Use the standard for each language. If non-standard features are used they should be well documented as to use and location of the use for maintainance purposes.

Which language are you using finally?

4.0 EXPECTED DATA BASE USE

The purpose of this catalog is to monitor the status health of the primary data bases for a given experiment. The catalog will help to identify which volumes need to be replaced and when the volumes should be replaced. When a volume has to be replaced, the user must know what back-ups exist and where the backups are located.

Therefore, the primary data base catalog is expected to answer the following questions.

- ~~When was a volume created?~~
- Where is the volume located?
- Media type of the volume?
- How old is the media?
- Does the volume have a back-up?
- How many levels of back-up does the volume have?
- Where are the back-ups of a given volume?
- When was a catalog entry last updated?

o allow field for TSSC Storage box number

5.0 USER INPUT

In the interactive mode, the system is to be 'user friendly'. At catalog creation time, the user will probably be an 'expert user'. However, under normal use, the user is more likely to be a casual user. Therefore the following would be desirable to help user input.

- The program should be identified to the user by program name, version number and version date. The catalog being updated should also be identified (if panels are used, on each panel).

- User options should be menu driven

- User input variables should have defaults, whenever appropriate

- The user should be prompted. Prompts should not be cryptic or ambiguous six-character, program variable names only.

- In the interactive mode: the user is notified of an input error and is reprompted for a correct response or given the option to terminate the last function requested.

- When an operation is successful, the user should be notified (i.e. Tape EP0001 deleted).

- The user should be able to verify the operation just executed.

6.0 OUTPUT

- An updated project catalog, if entries are added, deleted, disabled or otherwise updated.
- The user should be able to request ~~that no~~ a listing ~~be made~~ of the catalog, ~~if any listing is a product of a default option.~~
- The user should be able to get sorted listing. The user should be able to specify the sorted fields.
- The user should be able to specify and get short listing (i.e. encyclopedia tapes sorted by year of manufacture for all tapes manufactured before 1974).
- All printed output should identify ~~the program, the program version,~~ the version creation date, the catalog being updated and the date of execution.
- ~~Optional~~. Would the user want a session log ~~or perhaps a default printout~~ of all the entries created or updated for the date of execution? Use sort on catalog after session is done, on todays date

→ Results to terminal will be a future enhancement

→ listings will be identified by print date and project ID
Sorted dataset will be Fixed record length

7.0 DATA BASE CONTENTS

The database catalog should have fields for the following.

- Volume's volume serial number, a unique catalog entry ID.
- Date the entry was last updated (date of creation for new entry). This is a primative log device to indicate which blocks were updated together, mainly used as a maintanance device.
- Manufacture date, to determine the volume's age.
- Medium type, to help determine the life cycle of the volume.
- If magnetic tape, tape density, for backup and restore information.
- Data type, to classify information on the medium.
- Data location, to help locate the medium for access.
- ~~Hierarchy level, for backup and restore purposes.~~ primary or backup

The above is information that all project catalogs should have, at the minimum. Each project has some unique characteristics. Therefore, some catalogs can have more manditory fields than those listed above.

The catalog should allow for a comment field to provide a place to note any unusual circumstances for a given catalog entry. This feature makes the catalog a quasi process log.

- TSSC box number
- primary + backup entries must be cross referenced
- disable entry flag

8.0 DATA BASE ACCESS

The following is a list of the system functions.

8.1 CREATE A CATALOG.

Each project will have one catalog for all its primary data bases. PDS each satellite a PDS member.

8.2 ACCESS THE CATALOG.

The project catalog should be accessed by a simple command. If the user wishes access in interactive mode, the user should be logged on under the project ID.

Exclusive use per project
Insure one editor at a time for whole table where multiple Satellite PDS is involved

8.3 ADD ENTRIES TO THE CATALOG.

There are two types of entries that can be added to a catalog. The user can add a new primary tape or a new backup tape.

8.3.1 Adding a primary volume.

If the user is adding a new primary volume, the primary volume must be static, i.e. another project catalog will not relocate the primary volume's data on another volume. The primary volume's volume-serial number must be unique for the project.

minimal required for primary tape

User input:

- volume serial
- data type
- ~~hierarchial~~ tape level, primary or backup
- location
- manufacture date
- ~~if tape~~, tape density
  else media type

optional user input
TSSC box ID
Comments

Output:

- new primary entry
  - entry update date
  - volume serial
  - data type
  - ~~hierarchial~~ tape level, primary
  - location
  - manufacture date
  - ~~if tape~~, tape density or media

optional box #, comments

Error detection:

- If the volume serial is not unique, the user will be notified with a message or a code ~~and the user should be prompted with the following options:~~ + help message given
  - delete the old entry
  - disable the old entry with a comment
  - quit the session to rethink the situation

8.3.2 Adding a back-up volume.

The user can only add a new back-up level.

User input:

optional box # + comment

- volume serial of backup tape (required)
- volume serial of primary tape
- ~~hierarchial level, back-up level~~ tape level type (p or b)
- location
- manufacture date
- ~~if tape, tape~~ density or media
- data type

Output:

- new backup entry

- primary tape
- entry update date
- volume serial of backup tape
- ~~hierarchial level, back-up level~~ tape level
- location
- manufacture date
- ~~if tape,~~ tape density or media
- data type

opt. box id comments

- updated primary entry
  - updated entry update date
  - backup volume serial

Error Detection:

- If the backup volume serial is not unique, the user will be notified with a message or a code ~~and the user should be prompted with the following options:~~
  - delete the old entry
  - disable the old entry with a comment
  - quit the function to rethink the situation
- If the back-up level exists, the user will be notified with a message or a code. The designer can program one of the following:
  - demote the current backup levels to insert the new back-up at the given level
  - not allow an insertion of a backup
  - define backup levels without 'hierachy'
  - define a user procedure as opposed to designing a program procedure

If max # of allowed backups are added give a message, don't add.

8.4 EDIT A CATALOG ENTRY.

A catalog entry should be updated or edited when a volume's status changes.

In general, minimum user input is a VOL-SER

8.4.1 Editing a primary volume's entry.

A primary volume's entry would be edited, if the volume is replaced. Since another project catalog would reference the data by the same volume serial number the replacement volume must have the same volume serial. Therefore the information that would change is the update date and the manufacture date.

A primary entry may also be updated when the volume's location has been changed.

User input:

- volume serial of primary
- manufacture date, if different
- location, if different

Output:

- updated primary entry
  - updated entry update date
  - manufacture date, if updated
  - location, if updated

Error detection:

- If the volume serial does not exist, the user will be notified by message or code, the catalog will be unchanged, and the user will be prompted for the next function.

A primary volume's entry may also be edited if a new backup level is added. This function could have been initiated by the function to add a new backup level to a primary volume.

Input (from another function):

- volume serial of primary volume
- volume serial of backup volume
- backup level

Output:

- updated primary entry
  - entry update date
  - new backup level with backup volume

Error detection:

- If the volume serial of the primary volume does not exist, the user will be notified with a message or a code, the catalog will be unchanged, and the user will be prompted for the next function.
- If the back-up level exists, the user will be notified with a message or a code. The designer can program one of the following:
  - demote the current backup levels to insert the new back-up at the given level
  - not allow a insertion of a backup
  - define backup levels to not worry about 'a level hierachy'
  - define a user procedure as opposed to designing a program procedure

8.4.2 Editing a back-up entry.

A back-up entry may be edited when the backup location needs to be updated or when the back-up volume is replaced.

The back-up volume will be replaced by a new volume with the same volume serial ~~or another unique volume serial number~~.

User input:

- volume serial of old back-up volume
- ~~volume serial of replacement, if different~~
- manufacture date, if different
- location, if different

Output:

- updated backup entry
  - volume serial number, if different
  - entry update date
  - manufacture date, if different
  - location, if different

Error detection:

- If the old backup volume serial does not exist, the user is notified by message or code, the catalog is unchanged and the user is prompted for the next function.

- If the old backup volume serial does not happen to be a backup volume, the edit will be for a primary volume. The user will not be able to specify a different volume serial number for the replacement tape. Unless this is a special edit function, the user will have to observe that the entry to be edited is not a backup entry.

- If the backup volume serial is not unique, the user will be notified with a message or a code and the user should be prompted with the following options:
  - delete the old entry
  - disable the old entry with a comment
  - quit the function to rethink the situation

8.5 DELETE A CATALOG ENTRY

A catalog entry would be deleted when the volume serial it references is no longer active. Before deletion the record may have to be displayed and the deletion request may have to be verified.

User input:

- volume serial

Output:

- catalog with entry deleted

Error detection:

- If the volume serial does not exist in the catalog, the user is notified by message or code, the catalog is unchanged and the user is prompted for the next function.

8.6 DISABLE A CATALOG ENTRY

A catalog entry is disabled when its volume serial is duplicated. Only unique volume serials can exist actively at one

time. The user may want to use a disable instead of a delete when he or she is not certain about losing information on the 'old' volume serial at that moment. However, for record keeping purposes the uncertainty of deleting the catalog entry should be resolved quickly before the reason for the uncertainty is lost. The user can note the disable reason in a comment.

User input:

- volume serial — comment required, possible location change optional

Output:

- updated catalog entry
  - disable flag set
  - updated entry update date
  - disable comment

Error detection:

- If the volume serial does not exist in the catalog, the user is notified by message or code and ~~is prompted for the next function.~~

8.7 DISPLAY A CATALOG ENTRY

An entry will be displayed if the user requests to read information of a given tape. The display may help to locate backups if a volume needs to be restored.

User input:

- volume serial

Output:

- catalog entry listed on display device

Error detection.

- If the volume serial does not exist in the catalog, the user is notified by message or code, the catalog is unchanged and the user is prompted ~~for the next~~ function.

8.8 GET A SORTED LISTING

A hard copy of a sorted listing is helpful in identifying, in writing, all the tapes that have to be retired or demoted and moved as backups).

User input:

- first field or key on which to sort
- minor field(s) or key(s) on which to sort, the designer may want to limit the number of sort levels
- cut off date
- a flag to indicate if the list is for before or after the cut off date

Output:

- sorted listing on display device (CRT, disk or printer)

Error detection:

- If data cannot be found for the given time interval, the user is notified by message and prompted for the next function.

8.9 DEMOTE BACK-UP LEVELS (OPT.)

If all the backup level are of the same medium and density, then it is possible to demote the backup levels. However, demoting the backup levels require editing all associated backup entries and the primary entry. The editing may be worth the trouble if the user is assured that the best backups are the most available.

Backup tapes will be demoted when it is time to replace a 'good' backup tape. The user wants a newer version of the backup and at the same time the old backup remains a backup only at a lower level.

User input:

- backup volume serial
- primary volume serial
- hierarchial level, backup level
- backup manufacture date

- backup location
- if tape, tape density
- new locations for each demoted backup level

Output:

- new backup entry
  - entry update date
  - volume serial
  - hierarchial level, backup level
  - location
  - manufacture date
  - if tape, tape density
- updated primary entry
  - updated entry update date
  - backup volume serial
- updated backup entries
  - updated entry update date
  - updated hierarchial backup levels
  - locations, if different
- if backup list is full, one deleted or disabled backup entry
  - catalog with deleted entry OR
  - disabled catalog entry
    - updated entry update date
    - disable flag set

Error detection:

- If the primary volume serial does not exist, the user is notified by message, the catalog is unchanged, and the user is prompted for the next function.
- If the backup level does not exist, the function becomes one of adding a new backup level.

9.0 SYSTEM RESTRICTIONS

- The catalog is to contain only the static, active volumes of the primary data bases and their static backups.
- A replacement primary or backup tape must have the same volume serial number as the tape it is replacing. A primary tape is referenced in, at least, one other project catalog, therefore the volume serial number must be preserved.
- No existing production software system is expected to be rewritten to accomodate the data base catalog system (at this time 11/16/84 E. Eng).
- Whether primary volumes and/or backups can be demoted to lower level backups are a function of the projects and their backup procedures.

10.0 ERROR HANDLING

- If there is an I/O error while openning, reading or writing to the catalog, the process will probably stop automatically, if it does not stop automatically the program should stop the process. The catalog will probably have to be restored 1) by the SCF system's HSM incremental backup version, 2) by a user requested SCF HSM system backup version, or 3) by a private, project backup version.

11.0 DELIVERABLES

The following is a list of the expected deliverables.

1. Approved Design Document
   - System structure
   - Hardware configuration
   - Data flow chart
   - Module definitions
   - High level PDL
2. User's Guide
3. ~~Development Schedule~~
4. ~~Test schedule for major modules (or builds)~~
5. ~~Programmer's Maintenance Manual~~ Documentation
   - Design document
   - Test plan and data
   - Dataset locations
     - ~~Source Library, if any~~ ~~CLIST~~
     - ~~Load Library, if any~~
     - Job Control Language, if any (future, if background)
     - IBM Command Lists (CLISTS), if any
     - Any other libraries, ISPF, Panels, etc.
     - SCRIPT libraries for documentation, if any
6. Changes to project procedures guide

Create catalog is separate, in user guide

Thread Specifications to Design 1/31/85 E. Eng

Cosmic Ray Tape Inventory System Specifications

Issue II, Revision A
Revision Date: November 28, 1984
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Document Number 84-.-..

Eunice Eng, NASA/GSFC, Code 664
Kristin Wortman, SAR

PREFACE

This document is an interpretation of the Cosmic Ray Tape Inventory Requirements issued on November 16, 1984. The requirements document stated a need for a system which will keep track of the active primary data base of each existing cosmic ray project. The inventory system needs to track the medium, the age of the of the medium, and the location volumes of the primary data bases and their back-ups. This document will further specify what is the Cosmic Ray Tape Inventory Data Base and what information can be retrieved from the Cosmic Ray Inventory Data Base.

Note: First effort (11/19/84 E. Eng) will be concentrated on interactive execution for data entry, data editing and data listing.

CONTENTS

1.0 OVERVIEW

The objective is to design a system to monitor the primary data bases and its back-ups. The system is to include a data base, the ability to update the data base, the ability to quiz the data base, and the ability to list the data base. The system should be applicable to all the currently active cosmic ray projects.

The tape inventory data base designed will be centrally located on the Science Computing Facility (SCF) IBM 3081 computer. The targeted user is the person who will perform the standard data production and data analysis. Each satellite will have its own data base.

2.0 HARDWARE REQUIREMENTS

- As specified in the requirements document, the cosmic ray database catalog will be accessable via the SCF's IBM 3081. 1.5.1

- In order for the catalog to be accessable in real-time and in background, the catalog will reside on a magnetic disk. (may be migrated to mass storage). 1.5.1

- The user should be able to get a printed listing of the satellite catalog. 1.3

- A block mode terminal would be desirable for faster user input, in the interactive mode of execution. 1.5.1

- The design should consider background execution as a future enhencement. 1.7

3.0 LANGUAGE REQUIREMENTS

1.5.4
IBM TSO & SPF Dialog management services

- Use the languages supported by SCF and IBM.

- Use the standard for each language. If non-standard features are used they should be well documented as to use and location of the use for maintainance purposes.

Q:A should check

4.0 EXPECTED DATA BASE USE

The purpose of this catalog is to monitor the health of the primary data bases for a given experiment. The catalog will help to identify which volumes need to be replaced and when the volumes should be replaced. When a volume has to be replaced, the user must know what back-ups exist and where the back-ups are located.

Therefore, the primary data base catalog is expected to answer the following questions.

- Where is the volume located? 2.5.1
- What is the media type of the volume? 2.5.1 (type, density, ones for now)
- How old is the media? 2.5.1
- Does the volume have a back-up? 2.5.1
- How many levels of back-up does the volume have? 2.5.1
- Where are the back-ups of a given volume? 2.5.1
- When was a catalog entry last updated? 2.5.1
- What is the storage box identifier of the volume that has been sent to Tape Staging and Storage (TSS). 2.5.1

5.0 USER INPUT

In the interactive mode, the system is to be 'user friendly'. At catalog creation time, the user will probably be an 'expert user'. However, under normal use, the user is more likely to be a casual user. Therefore the following would be desirable to help user input.

- The system should be identified to the user by system name and by the name of the catalog being updated or listed.

IBM TSO PRINTOFF Facility

- User options should be menu driven

1.3, 2.3, 2.1 2.7.1

- User input variables should have defaults, whenever appropriate

1.3, 2.7.3.

- The user should be prompted. Prompts should not be cryptic or ambiguous six-character, program variable names only.

1.3, 2.5, 2.

- In the interactive mode: the user is notified of an input error and is reprompted for a correct response or given the option to terminate the last function requested.

2.7

6.0 OUTPUT

- An updated satellite catalog, if entries are added, deleted, disabled or edited. UG 1.3
- A catalog of fixed length records, blocked or unblocked, with fixed fields for sort manipulations. 1.3
- In the interactive mode, the system should verify the operation just completed. For example: if an entry has just been successfully deleted the user should be notified with a message (i.e. Tape EP0001 deleted). UG. 1.3
- The user should be able to get sorted listing. The user should be able to specify the sorted fields. 1.3 UG. 1.3
- All printed output should be identified by print date and satellite. TSO- Printoff Command
- The user should be able to get a listing of catalog updates for a given date. Sort feature
- The design should consider, that in the future, the user may want to specify and get short sorted listing on a terminal or from a printer (i.e. encyclopedia tapes sorted by year of manufacture for all tapes manufactured before 1974). Sort feature 1.7

7.0 DATA BASE CONTENTS

The database catalog should have fields for the following.

- Volume's volume serial number, a unique catalog entry ID.
- Date the entry was last updated (date of creation for new entry). This is a primative log device to indicate which blocks were updated together, mainly used as a maintanance device.
- Manufacture date, to determine the volume's age.
- Medium type, to help determine the life cycle of the volume.
- If magnetic tape, tape density, for back-up and restore information.
- Data type, to classify information on the medium.
- Data location, to help locate the medium for access.
- Tape level to identify a primary or a back-up volume.
- The box identifier for a volume sent to Tape Staging and Storage.
- The primary volumes should be cross-referenced with its back-up volumes for relationship searching.
- The entry should have a disable flag. A disabled volume is in a stage between active and non-existant.

The above is information that all satellite catalogs should have, at the minimum. Each satellite may have some unique characteristics. Therefore, some catalogs can have more manditory fields than those listed above.

The catalog should allow for a comment field to provide a place to note any unusual circumstances for a given catalog entry. This feature makes the catalog a quasi process log.

8.0 DATA BASE ACCESS

The following is a list of the system functions.

8.1 CREATE A CATALOG.

Each satellite will have one catalog for all its primary data bases. 1.5.3

8.2 ACCESS THE CATALOG.

The satellite catalog should be accessed by a simple command. If the user wishes access in interactive mode, the user should be logged-on under the project ID. 1.6

While the satellite catalog is being updated, the user updater has exclusive use of the catalog. 2.4

8.3 ADD ENTRIES TO THE CATALOG.

There are two types of entries that can be added to a catalog. The user can add a new primary volume or a new back-up volume. 2.7.2

8.3.1 Adding a primary volume.

If the user is adding a new primary volume, the primary volume must be static, i.e. another catalog will not relocate the primary volume's data on another volume. The primary volume's volume-serial number must be unique for the satellite. 1.4

User input:

UC. 1.2.2

1. required

   - volume serial
   - data type
   - volume level, primary
   - location

- manufacture date ✓
- tape density or media type ✓

2. optional

- storage box ID, for Tape Staging and Storage(TSS) ✓
- comment ✓
- Cross-reference volume-serial

Output:

1. minimal

- new primary entry
  - entry update date
  - volume serial
  - data type
  - volume level, primary
  - location
  - manufacture date
  - tape density or media type

2. optional

- storage box ID (TSS)
- comment

Error detection:

- If the volume serial is not unique, the user will be notified with a message or a code and some form of help should be provided. 2.7.2.1 UC 1.10.3

8.3.2 Adding a back-up volume.

The user can only add a new back-up.

User input:

1. required UC. 1.2.2

- volume serial of back-up volume ✓

- volume serial of primary volume
- volume level, back-up
- volume location
- manufacture date
- tape density or media type
- data type

2. optional
   - storage box ID (TSS)
   - comment

Output:

1. minimal
   - new back-up entry
     - entry update date
     - volume serial of back-up
     - primary volume-serial
     - volume level, back-up
     - volume location
     - manufacture date
     - tape density or media type
     - data type
   - updated primary entry (or entries)
     - updated entry update date
     - back-up volume serial
2. optional on back-up entry
   - storage box ID (TSS)
   - comment

Error Detection:

- If the back-up volume serial is not unique, the user will be notified with a message or a code and some form of help should be provided.

- If a primary volume already has the maximum number of back-ups, The user is notified by message or code, the back-up entry is not added to the catalog, the primary entry is not updated, and some form of help should be provided.

8.4 EDIT A CATALOG ENTRY.

A catalog entry should be updated or edited when a volume's status changes. The user is allowed to edit MOST of the fields for a given entry.

User input to get the desired entry:

- volume's volume-serial number ✓

General Edit Output:

- updated entry displayed for user

- updated entry in the catalog

Error detection:

- If the volume serial does not exist, the user will be notified by message or code and some form of help should be provided.

8.4.1 Editing a primary volume's entry.

There are only two circumstances under which a primary volume's entry would be NORMALLY edited. The first circumstance is common and should be done automatically, this involves adding a back-up to or deleting a back-up from the primary volume's back-up list. The second circumstance, hopefully, does not occur often, it involves replacing a primary volume with a new copy of itself. All other primary volume editing would involve error correction and should be done with caution.

The automatic update of a primary entry when a back-up volume is added to or deleted from the catalog is discussed in sections 8.3 and 8.5 respectively.

When replacing a primary volume, the new copy of the primary volume must have the same volume serial. The primary volume

serial is preserved because other project catalogs reference the volume by the old volume-serial. Therefore the information that would normally change is the update date, the manufacture date and maybe a comment.

A primary entry may also be updated when the volume's location has been changed.

8.4.2 Editing a back-up entry.

A back-up entry would be commonly edited when the back-up location needs to be updated or when the back-up volume is replaced. Other edits would involve error correction and should be done with caution.

If the back-up volume is relocated to the TSS the storage box identifier should be entered.

When replacing a back-up volume the replacement should have the same volume-serial number.

8.5 DELETE A CATALOG ENTRY

A catalog entry should be deleted when the volume serial it references is no longer active. Before deletion the record should be displayed and the deletion request should be verified.

If a back-up entry is deleted, all primary entries it references should be updated. The primary entries should not list the deleted volume-serial as a back-up.

User input:

- volume serial

Output:

- catalog with entry deleted
- if back-up entry deleted, updated primary entry (or entries)
  - back-up volume-serial deleted from cross-reference list

Error detection:

- If the volume serial does not exist in the catalog, the user is notified by message or code and some form of help should be provided.

8.6 DISABLE A CATALOG ENTRY

A catalog entry is disabled when its volume serial is duplicated or when a volume is no longer active.

Only unique volume serials can exist actively at one time. The user may want to use a disable instead of a delete when he or she is not certain about losing information on the 'old' volume serial at that moment. However, for record keeping purposes the uncertainty of deleting the catalog entry should be resolved quickly before the reason for the uncertainty is lost. The user can note the disable reason in a comment.

User input:

1. required
    - volume serial
    - comment
2. optional
    - location

Output:

1. minimal
    - updated catalog entry
        - disable flag set
        - updated entry update date
        - disable comment
2. optional
    - location

Error detection:

- If the volume serial does not exist in the catalog, the user is notified by message or code and some form of help should be provided.

8.7 DISPLAY A CATALOG ENTRY

An entry will be displayed if the user requests information of a given volume. The display may help to locate back-ups if a volume needs to be restored.

User input:

- volume serial

U.G. 1.2.4

Output:

- catalog entry listed on display device

Error detection.

- If the volume serial does not exist in the catalog, the user is notified by message or code and help should be provided in some form.

U.G. 1.19.2

8.8 GET A SORTED LISTING

A hard copy of a sorted listing is helpful in identifying a volume, in writing.

User input:

- first field or key on which to sort

U.G. 1.2.4

- minor field(s) or key(s) on which to sort, the designer may want to limit the number of sort levels

Output:

- hard copy of a sorted listing with print date and satellite.

9.0 SYSTEM RESTRICTIONS

- The catalog is to contain only the static, active volumes of the primary data bases and their static back-ups.

- A replacement primary or back-up volume must have the same volume-serial number as the volume it is replacing. A primary volume is referenced in, at least, one other project catalog, therefore the volume serial number must be preserved.

- No existing production software system is expected to be rewritten to accomodate the data base catalog system (at this time 11/16/84 E. Eng).

10.0 ERROR HANDLING

- If there is an I/O error while openning, reading or writing to the catalog, the process will probably stop automatically, if it does not stop automatically the system should stop the process. The catalog will probably have to be restored 1) by the SCF system's HSM incremental back-up version, 2) by a user requested SCF HSM system back-up version, or 3) by a private, back-up version. The design should specify a desired method of backing-up the catalog and of restoring the catalog from a back-up. 1.5.2

11.0 DELIVERABLES

The following is a list of the expected deliverables.

1. Approved Design Document
    - System structure ✓
    - Hardware configuration ✓
    - Data flow chart not necessary
    - Module definitions ✓
    - High level PDL ✓
2. User's Guide preliminary
3. Program Documentation
    - Design document ✓
    - Test plan and data
    - Dataset locations
        - Source Library, if any Not applicable
        - Load Library, if any Not applicable
        - Job Control Language, if any Not applicable
        - IBM Command Lists (CLISTS), if any U.G. 1.7.1
        - Any other libraries, ISPF, Panels, etc. U.G. 1.7.2
        - SCRIPT libraries for documentation, if any XRKAW.DESIGN.TEXT
4. Changes to project procedures guide

Cosmic Ray Data Base Inventory Catalog
User's Guide
Issue I
Revision Date: June 12, 1985

Document Number 85-.-..

Kristin Wortman, SAR

CONTENTS

1.0 COSMIC RAY DATA BASE INVENTORY CATALOG USER'S GUIDE

1.1 PURPOSE

The Cosmic Ray data bases are stored on magnetic tapes, the inventory catalog will assist the data technician in record keeping and tracking these tapes. The magnetic tapes reliablity has been estimated at three years and the data technicians will need to copy these tapes in a systematic manner. This catalog will aid in this copying effort.

1.2 INPUT REQUIRED

1.2.1 Variables defined.

The following variables will be used to describe the contents of each entry in the inventory catalog.

VOLSER Key volume serial number.

D Key disable flag, default=F unless T is specified.

TYPE Description of the type of data on the tape, varies among projects.

LEVL The level of the tape, PRIM or BACK, primary or backup.

LOCA The location of the physical tape, BLD1, TSSC, BLD2, or BL22, building 1, Tape Staging and Storage Center, building 2 or building 22.

YEAR The four digit year when the tape was manufactured. If unknown, use 9999.

DENS The magnetic tape density, DEN3 or DEN4, density=3 or density=4.

SYSDAT The system date of modification of the table entry.

SYSTIM The system time of modification of the table entry.

BOX The associated TSSC box number.

VOLSR1 The first cross-reference volume serial number.

VOLSR2 The second cross-reference volume serial number.

VOLSR3 The third cross-reference volume serial number.

VOLSR4 The fourth cross-reference volume serial number.

VOLSR5 The fifth cross-reference volume serial number.

COMENT Comments user may enter in the table for an entry.

1.2.2 BEGIN function

Required input

- Project for which table to access or blank for user table creation.

1.2.3 ADD Function

Required input (primary tape):

- Table member name.
- Volume serial number
- Type of data on the tape
- Level of the tape (PRIM or BACK)
- Location of the tape (BLD1,BLD2, TSSC, or BL22)
- Manufacturer year of the tape (use 9999, if unknown)
- Density of the tape (DEN3 or DEN4, density=3 or density=4)

Optional input (primary tape):

- TSSC box identification number
- Comments
- Cross-reference volume serial numbers

NOTE: Cross-reference volume numbers for primary tapes should only be entered if the system is being manually updated due to disabling or deleting entries.

Required input (backup tape):

- Table member name

- Volume serial number
- Type of data on the tape
- Level of the tape (PRIM or BACK)
- Location of the tape (BLD1,BLD2,TSSC, or BL22)
- Manufacturer year of the tape (use 9999, if unknown)
- Density of the tape (DEN3 or DEN4, density=3 or density=4)
- Primary volume serial number

Optional input (backup tape):

- Comments
- TSSC identication box number

1.2.4 MODIFY Function

Required input:

- Table member name
- Volume serial number

Optional input:

- Type of data on the tape
- Level of the tape
- Location of the tape
- Manufacturer year of the tape
- Density
- TSSC identification box number
- Comments
- Cross-reference volume serial numbers

1.2.5 CREATE Function

Required input:

- The member name to be created in the allocated table.

1.2.6 DISABLE Function

Required input:

- Table member name
- Volume serial number

Optional input:

- Disable flag
- Comments

1.2.7 DELETE Function

Required input:

- Table member name
- Volume serial number
- Disable flag

1.2.8 Terminal LIST Function

Required input (terminal):

- Table member name
- Volume serial number

1.2.9 Sequencial Dataset Function

Required input:

- Table member name

1.3 OUTPUT GENERATED

- New table member created during the CREATE function.
- Updated table during the ADD, MODIFY, DISABLE, and DELETE functions.
- Terminal display of table entry or entries during the ADD, MODIFY, DISABLE, DELETE and LIST functions.
- Sequencial dataset for use with the system procedures, TSORT and PRINTOFF, from the LIST function.

1.4 RULES AND RESTRICTIONS

- The primary entries must be entered in the table before the backup entries can be entered.
- No entry will be added to the table unless all the required input has been entered.
- When disabling or deleting an entry the user is responsible for manually adjusting the cross-reference system.
- Unique volume numbers must exist in the table, unless one entry has been disabled.
- Disabled entries must have unique volume numbers among themselves.

1.5 ACCESS TO THE TAPE CATALOG INVENTORY SYSTEM

The tape catalog inventory system is accessable by the CLIST, SB#HP.LIB.CLIST(BEGIN).

1.6 SEQUENCE OF EXECUTION

1. Allocate the proper datasets and the appropriate table library.
2. Create the table member.
3. Add the primary tape entries.
4. Add the backup tape entries.
5. Modify any entry in the table.
6. Disable any entry in the table.
7. Delete any entry in the table.
8. Create a sequencial dataset for TSORT and PRINTOFF procedures.
9. List the table to the terminal (any time).

1.7 ERROR MESSAGES

- Entry for (volume serial number) does not exist in the table.
- Backup entry for (volume serial number) has been rejected, no primary tape (volume serial number) exists in the table.
- Warning you have deleted (volume serial number) which is a primary tape. Please refer to the user's guide for cross-reference maintenance required.
- You have disabled (volume serial number) in the table, please refer to the user's guide for cross-reference maintenance required.

1.8 REQUIRED ALLOCATIONS

1.8.1 CLIST libraries:

SB#HP.LIB.CLIST

SYS1.CLIST

1.8.2 PANEL libraries:

SB#HP.CRDB.PANELS

SYS2.ISR.LIBRARY.PANELS

SYS1.ISR.V1R1M0.ISRPLIB

SYS1.ISR.V1R1M0.ISPPLIB

1.8.3 Input Table libraries:

projectid.ISPTABL.TABLE or userid.ISPTABL.TABLE

SYS1.ISP.V1R1M0.ISPTLIB

K3MVS.ISR.LIBRARY.TABLES

SYS1.ISR.V1R1M0.ISRTLIB

1.8.4 Output Table libraries:

projectid.ISPTABL.TABLE or userid.ISPTABL.TABLE

1.9 CROSS-REFERENCE SYSTEM

The cross-reference system is setup when the backup entries are added to the table. The user is prompted for the associated primary volume serial number. The table is searched for the primary tape entry and modified with the backup volume number, which is entered into its cross-reference list. The backup entry will contain only the primary volume serial number.

When an entry for a primary or backup tape is modified, the CLIST will check the cross-reference section. If changes have been made to the cross-references, then the associated entries are updated.

When the DISABLE or DELETE functions have been performed on a table entry, the cross-references need to be updated by the user. The table contents should be checked carefully for all associated volume serial numbers, which appear in the table. The user must decide if other entries need to be updated or deleted. If a primary tape entry has been disabled/deleted and

not replaced the user should disable/delete the associated backup volume numbers from the table.

1.10 DISABLE FLAG

The disable flag should only be used when an entry is to be kept for future reference. The comment field should be utilized when the disable flag is set. The default value is set to F (false) and is always used for locating the entries in the table during the ADD, MODIFY, DISABLE and LIST functions. The user may change the disable flag in the DISABLE function only. Reference to the disabled entries in the table may be specified in the DELETE and LIST function, by specifying T (true) in the disable field on the panel.

When disabling entries in the table, the user must maintain the cross-reference system, if affected. Refer to the cross-reference section of this document.

1.11 PROBLEMS AND SOLUTIONS

1.11.1 Cross-reference Problems

Problem: The backup cross-reference is incorrect.

- Modify the backup entry with the correct primary volume number.

1.11.2 Non-existent entry in the table

Problem: Non-existent entry in the table when adding a backup entry.

- Add the primary volume number to the table.
- Re-enter the backup tape entry.

Problem: Non-existent entry during the MODIFY function.

- Add the entry to the table.

1.11.3 Entry exists in the table

Problem: The entry already exists in the table during an ADD function.

- Check for table entry, possible duplicate volume numbers used.
- Disable or delete the entry, if appropriate.

1.12 APPLICABLE DOCUMENTS

- Interactive System Productivity Facility, Dialog Management Services, publication number SC34-2088-1.

Cosmic Ray Data Base Inventory Catalog
Design Documentation
Issue I
Issue Date: January 30, 1985

Document Number 85-.-..

Kristin Wortman, SAR

CONTENTS

1.0 SYSTEM DOCUMENTATION

1.1 OVERVIEW

The Cosmic Ray critical data bases are stored on magnetic tapes, which have been determined to have a limited reliability of approximately three years. The data technicians responsible for each project will establish a procedure to update the aging magnetic tapes. The data base inventory catalog will aid in this procedure by tracking information about each tape in a systematic way. The information to be stored in the catalog for each magnetic tape will be: volume serial number, type of data on the tape, location, level of the tape (primary or backup), manufacturer year of the tape, density, TSSC information and the modification date and time.

The cross-reference system will link the primary tape with all its associated backups and vise versa. A disable feature will permit duplicate entries in case the user wishes to keep an old entry for reference, the comment field is available for any remarks.

The data base inventory catalog will be accessable through a simple IBM TSO CLIST command, which will invoke a choice of several SPF panels for easy entry.

1.2 CATALOG PURPOSE

The purpose of the data base inventory catalog is to store all the information for each project's data base tapes to aid in record keeping and data base maintenance. The main user will be the data technican responsible for each project.

1.3 INPUT/OUTPUT FORMATS

The input format consists of SPF panels, which are driven by a main menu, which prompts the user for various information depending on the action the user has chosen. The information consists of the volume serial numbers, the data type, TSSC (Tape Staging and Storage Center) information, location and level of the tape, modification date and time, density, and comments. Specific codes have been developed for several of the variables. These codes will be displayed to the user on all the input panels.

The current version of the table for each project is used for input when the table services are invoked after the SPF panel infomation has been received by the CLIST.

The updated version of the table for each project is the output created from the table services when using the ADD, MODIFY, DISABLE, and DELETE functions.

The output format consists of SPF panels and hardcopy listings which are used for displaying table entries. The hardcopy listings can be sorted by a particular field or in unsorted form. Messages generated by the CLISTs are displayed on a blank screen on the terminal and are called when an error or warning has been issued.

The LIST function creates a fixed format sequencial dataset, which is used by the TSORT procedure. This dataset will reside on a permanent disk after each update.

1.4 SYSTEM ASSUMPTIONS AND RESTRICTIONS

It is assumed the use of the data base inventory catalog will be primarily used for record keeping purposes and not directly with other catalogs or programs.

When building the table the user will enter the complete primary tape information before entering the backup tape entries.

It is assumed that the user has working knowledge of SPF and a full screen terminal.

Each project will have unique volume serial numbers in the table, unless the disable flag has been used in unusual circumstances.

1.5 SYSTEM MANAGEMENT

1.5.1 Hardware

The IBM 3081 computer will be used to store the data base inventory catalogs on system mounted disk packs. Block mode terminals are required to display the SPF panels.

1.5.2 Maintenace of the Catalogs

The data base inventory catalogs will be maintained under the Configuration Control Management System, and on the IBM 3081 HSM system.

1.5.3 Location of the Modules

The CLISTs, SPF panels, and table library for each project will be located by the project's profile identifier. The CLISTs will reside in the project's current CLIST library. The SPF panels will reside in a new panel library for each project. The table library will consist of a catalog member for each satellite under that project.

1.5.4 Language

The languages to be used in the coding will be IBM TSO CLIST commands, SPF panels, and Dialog Management Services functions.

1.5.5 Applicable Documents

IBM Interactive System Productivity Facility, Dialog Management Services, publication number SC34-2088-1.

1.6 ACCESS TO CATALOG

The access to the catalog will be initiated by CLISTs. The CLISTs will be available to the user when logged on under the appropriate project.

1.7 FUTURE CONSIDERATIONS

- The catalog will be available for updating by background execution.
- Short sorted listings will be available to the terminal and to hardcopy.

2.0 PROGRAM DOCUMENTATION

2.1 OVERVIEW

The data base inventory catalog will perform record keeping functions and cross-referencing for each Cosmic Ray experiment's data base. The input format is described in the Systems Documentation Section.

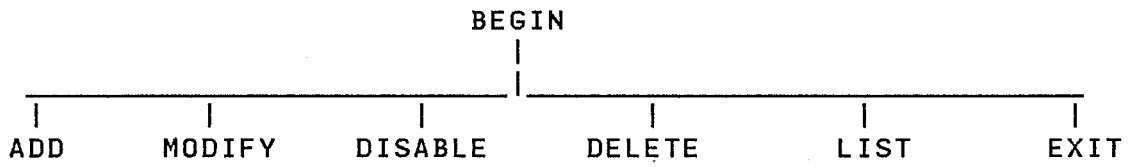
2.2 PROGRAMMER AND DATE

Kristin Wortman, SAR, 01/25/85.

2.3 STRUCTURE

The CLIST, BEGIN, calls the main menu, which invokes the selected function CLIST and calls the appropriate SPF panels. The selected CLIST updates the table with the action specified by the user.

CLIST Structure



2.4 MODULE DEFINITIONS

BEGIN Allocates the necessary SPF datasets, table libraries, panel libraries and CLIST libraries and assigns exclusive use of the table being updated. Calls the main selection menu, which is the main panel driver.

ADD Prepares the table for additions, calls the add input panel, checks the table for uniqueness of the

entry, and sets up the cross-references between the primary and backup tapes.

MODIFY Prompts the user for a volume serial number and locates the entry in the table and retrieves the entry for user modifications. Edits the table entry according to the user changes and checks the cross -reference system and makes appropriate modifications.

DISABLE Disables an entry in the table when requested by the user.

DELETE Deletes an entry from the table.

LIST To list entries in the table to the terminal or list the entire table to hardcopy in a sorted or unsorted form.

2.5 USER INPUT

The input required by each SPF panel will be displayed when the user initiates the requested function to be performed on the main selection menu. The user will be prompted for all required variables on each SPF panel. The optional variables for each SPF panel will also be displayed. Descriptions for all variables will appear on each panel. Certain fixed variables are to be used for level of the tape, location, disable flag, and density. The volume serial numbers, tape data types, comments and TSSC box numbers will vary among projects.

2.5.1 Variables defined.

The following variables will be used to describe the contents of each entry in the inventory catalog.

VOLSER Key volume serial number.

D Key disable flag, default=F unless T is specified.

TYPE Description of the type of data on the tape, varies among projects.

LEVL The level of the tape, PRIM or BACK, primary or backup.

LOCA The location of the physical tape, BLD1, TSSC, BLD2, or BL22, building 1, Tape Staging and Storage Center, building 2 or building 22.

YEAR The four digit year when the tape was manufactured. If unknown, use 9999.

DENS The magnetic tape density, DEN3 or DEN4, density=3 or density=4.

SYSDAT The system date of modification of the table entry.

SYSTIM The system time of modification of the table entry.

BOX The associated TSSC box number.

VOLSR1 The first cross-reference volume serial number.

VOLSR2 The second cross-reference volume serial number.

VOLSR3 The third cross-reference volume serial number.

VOLSR4 The fourth cross-reference volume serial number.

VOLSR5 The fifth cross-reference volume serial number.

COMENT Comments user may enter in the table. They will only be displayed when the user has specified option, (default=no).

2.6 ASSUMPTIONS AND RESTRICTIONS

The primary tape entries must exist in the table before backups entries can be entered.

No entry will be added to the table unless all the required information has been entered. When using the disable or delete function, the user is responsible for maintaining the cross-reference system.

2.7 MODULE DESCRIPTIONS

2.7.1 Function BEGIN

Allocate all the necessary datasets and display the main selection menu. Prompt and receive user selection and call the appropriate function.

2.7.1.1 Description

This is the main driver CLIST panel for the data base inventory system.

2.7.1.2 PDL

```
BEGIN
 Allocate all the necessary datasets
 Call main selection panel to display options for user response
 Read user selection
 DO CASE option
   CASE add
     Call the ADD CLIST
   CASE edit
     Call the EDIT CLIST
   CASE disable
     Call the DISABLE CLIST
   CASE delete
     Call the DELETE CLIST
   CASE list
     Call the LIST CLIST
   CASE exit
     Call the system EXIT CLIST
 END DO CASE
END
```

2.7.2 Function ADD

To add a new entry to the data base inventory catalog.

2.7.2.1 Description

This CLIST displays a panel prompting the user for minimal information of the new volume to be identified in the data base inventory catalog. The cross-reference system is created at this time, when the backup entries are added.

2.7.2.2 PDL

```
BEGIN
 Initialize the counter for save procedure to zero
 Open the table
 Call the add panel to prompt user for input information
 Read the user input from the panel
 REPEAT cursor positioning on the panel
 UNTIL all requested information is entered
 IF (tape is a backup and no cross references entered) THEN
   Call the add panel
   Position the cursor to first cross reference for input
 ELSE (the tape is a primary)
 ENDIF
 IF (the entry does exist) THEN
   Retrieve the entry
   Display the entry to the user with notice of existence
   Go to display options
 ELSE (the entry does not exist)
   IF (the entry is for a backup) THEN
     IF (the primary cross-reference(s) exist) THEN
       Add the entry to the table
       Add one to the counter
       REPEAT Adding the backup number to primary cross-reference(s)
         Add one to the counter
       UNTIL No more primary cross-references
       List entry in the table
     ELSE (Primary cross-references do not exist)
       Notify user of entry rejection and reason
     ENDIF
   ELSE (the tape is a primary)
     Add the entry to the table
     Add one to the counter
     List the entry
   ENDIF
 ENDIF
 IF (the counter is equal to ten) THEN
   Save the table without closing
   Reset the counter to zero
 ELSE (the save procedure counter is not equal to ten)
 ENDIF
 Display options for user (add another entry or end)
 Read user selection input
 IF (user wishes to add another entry) THEN
   Blank out all the variables
   Go back to the first call add panel
 ELSE (return to the main selection menu)
   Close and save the table
   Call the main selection panel
 ENDIF
END
```

2.7.3 Function MODIFY

To edit an entry in the table, add comments, cross-references, and make any other changes which may be necessary to the variables in the table entry. The cross-reference system will automatically be updated when changes are made to the cross-reference variables on an entry.

2.7.3.1 Description

The first edit panel prompts the user for the volume serial number to be edited. The entry to be edited is displayed on a second panel, where the user enters modifications. The cross-references will also be modified , when appropriate.

2.7.3.2 PDL

```
BEGIN
 Open the table
 Initialize the counter for save procedure to zero
 Call the edit panel to prompt the user for input
 Read the user input
 IF (the table entry exists) THEN
   Retrieve the entry from the table
   Display the entry on the edit panel
   Read the panel for user modifications
   Edit the table entry
   List the modified table entry
   Add one to the counter
   IF (cross-references were changed) THEN
     IF (backup entry) THEN
       DO
        IF (the primary tape exists in the table) THEN
          Change the primary cross-reference to the new backup
          volume number
          Add one to the counter
        ELSE (the primay tape does not exist)
          Notify user of non-existent
        ENDIF
       UNTIL all the cross-references have been changed
     ELSE (primary entry)
       DO
        IF (the backup entries exist in the table) THEN
          Change the primary cross-reference on the backup entry
          Add one to the counter
        ELSE (the backup entries do not exist in table) THEN
          Notify user of non-existence
        ENDIF
       UNTIL all the backup cross-references are changed
     ENDIF
   ELSE (no cross-references have been changed)
   ENDIF
 ELSE (the table entry does not exist)
   Notify user of non-existent entry in table
 ENDIF
 IF (the counter value equals ten) THEN
   Save the table without closing
   Reset the counter to zero
 ELSE (the save procedure counter is not equal to ten)
 ENDIF
 Display user options (edit another entry or end)
 Read option selected
 IF (the option selected is edit another entry) THEN
   Blank out the variables
   Go back to call edit panel
 ELSE (return to the main menu)
   Close the table and save
   Call the main selection panel
 ENDIF
END
```

2.7.4 Function

To disable an entry in the table.

2.7.4.1 Description

The first panel prompts the user for the volume serial number to be disabled. The entry will be retrieved from the table and displayed to the user, where the user has the option to disable the entry or cancel the request.

2.7.4.2 PDL

```
BEGIN
 Open table
 Initialize the save counter procedure to zero
 Call the disable panel for user input
 Read the volume serial number
 IF (the volume serial number exists in the table) THEN
   Retrieve the entry from the table
   Display the entry to the user
   Verify disabling
     IF (the option is to disable) THEN
       Disable the entry in the table
       Add one to the counter
       Notify user of cross-reference maintenance
     ELSE (do not disable the entry)
     ENDIF
 ELSE (entry does not exist in the table)
   Notify user of non-existence
 ENDIF
 IF (the save counter equals ten) THEN
   Save the table without closing
   Reset the counter to zero
 ELSE (save counter does not equal ten)
 ENDIF
 Display options to user (disable another entry or end)
 Read option
 IF (the option is to disable another entry) THEN
   Blank out all variables
   Go back to the call disable panel
 ELSE (the option is to end)
   Close the table and save
   Call the main selection menu
 ENDIF
END
```

2.7.5 Function

To delete an entry from the table permanently.

2.7.5.1 Description

The first delete panel prompts the user for the volume serial number to be deleted from the table. The entry will be displayed on the second delete panel, where the user has the option to review the entry and to cancel the request for deletion.

2.7.5.2 PDL

```
BEGIN
 Open the table
 Initialize the save procedure counter to zero
 Call the delete panel
 Read the panel entry
 IF (the entry exists in the table) THEN
   Retrieve the entry from the table
   Display the entry to the user
   Verify deletion
    IF (the option is to delete) THEN
      Delete the entry from the table
      Add one to the counter
      Notify user of cross-reference maintenance
    ELSE (do not delete the entry)
    ENDIF
 ELSE (the table entry does not exist)
   Notify user of non-existence
 ENDIF
IF (the save procedure counter equals ten) THEN
  Save the table without closing
  Reset the counter to zero
ELSE (the save counter is not equal to ten)
ENDIF
Display user option (delete another entry or end)
Read user input
ENDIF
IF (the user selects to delete another entry) THEN
  Blank out all the variables
  Go back to call delete panel
ELSE (return to the main selection menu)
  Close and save the table
  Call main selection panel
ENDIF
END
```

2.7.6 Function

To list the table in a sorted or unsorted form, to list individual entries, or to list cross-references of a volume serial. The user will have the option of hardcopy or terminal output.

2.7.6.1 Description

The list panel prompts the user for the type of listing.

2.7.6.2 PDL

```
BEGIN
 Open table
 Call list panel
 Read list panel option
 IF (the terminal output was selected) THEN
   Retrieve the entry from the table
   Call display panel
   Display entry to terminal
   IF (cross-reference information was requested) THEN
     REPEAT displaying the entry for each cross-reference
     UNTIL the end of cross-references is reached on the entry
   ELSE (no cross-references requested)
   ENDIF
   Display options (list another entry or end)
   Read user input
   IF (user selected to list another entry) THEN
     Blank out the variables
     Go to the list panel
   ELSE (return to the main selection menu)
     Close the table
     Call main selection panel
   ENDIF
 ELSE (hardcopy was requested)
   IF (the fixed format sequencial dataset exists) THEN
     Notify user
     IF (user requests to copy over it) THEN
       Delete the sequencial dataset
       Allocate a fixed format sequencial dataset
       REPEAT Read entry from the table
              Write entry in fixed format to sequencial dataset
       UNTIL End of data has been reached
     ELSE (use the current dataset)
     ENDIF
   ELSE (dataset does not exist)
     Allocate a fixed format sequencial dataset
     REPEAT Read entry from the table
            Write entry in fixed format to sequencial dataset
     UNTIL End of data is reached
   ENDIF
   IF (option was sorted output listing) THEN
     Call TSORT procedure and sort by requested variable
     PRINTOFF the output sorted dataset
   ELSE (sort not requested)
     PRINTOFF the fixed format sequencial dataset
   ENDIF
   Display options to user (continue listing or end)
   IF (user selected to continue listing) THEN
     Blank out the variables
     Go to call list panel
   ELSE (return to the main selection menu)
     Close the table and save
     Call main selection panel
   ENDIF
 ENDIF
END
```

Cosmic Ray Data Base Inventory Catalog
User's Guide
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Kristin Wortman, SAR

CONTENTS

1.0 COSMIC RAY DATA BASE INVENTORY CATALOG USER'S GUIDE

1.1 PURPOSE

The Cosmic Ray data bases are stored on magnetic tapes, the inventory catalog will assist the data technician in record keeping and tracking these tapes. The magnetic tapes reliablity has been estimated at three years and the data technicians will need to copy these tapes in a systematic manner. This catalog will aid in this copying effort.

1.2 INPUT REQUIRED

1.2.1 Variables defined.

The following variables will be used to describe the contents of each entry in the inventory catalog.

VOLSER Key volume serial number.

D Key disable flag, default=F unless T is specified.

TYPE Description of the type of data on the tape, varies among projects.

LEVL The level of the tape, PRIM or BACK, primary or backup.

LOCA The location of the physical tape, BLD1, TSSC, BLD2, or BL22, building 1, Tape Staging and Storage Center, building 2 or building 22.

YEAR The four digit year when the tape was manufactured. If unknown, use 9999.

DENS The magnetic tape density, DEN3 or DEN4, density=3 or density=4.

SYSDAT The system date of modification of the table entry.

SYSTIM The system time of modification of the table entry.

BOX The associated TSSC box number.

VOLSR1 The first cross-reference volume serial number.

VOLSR2 The second cross-reference volume serial number.

VOLSR3 The third cross-reference volume serial number.

VOLSR4 The fourth cross-reference volume serial number.

VOLSR5 The fifth cross-reference volume serial number.

COMENT Comments user may enter in the table. They will only be displayed when the user has specified option, (default=no).

1.2.2 ADD Function

Required input (primary tape):

Volume serial number

Type of data on the tape

Level of the tape (PRIM or BACK)

Location of the tape (BLD1,BLD2, TSSC, or BL22)

Manufacturer year of the tape (use 9999, if unknown)

Density of the tape (DEN3 or DEN4, density=3 or density=4)

Optional input (primary tape):

TSSC box identification number

Comments

Cross-reference volume serial numbers

NOTE: Cross-reference volume numbers for primary tapes should only be entered if the system is being manually updated due to disabling or deleting entries.

Required input (backup tape):

Volume serial number

Type of data on the tape

Level of the tape (PRIM or BACK)

Location of the tape (BLD1,BLD2,TSSC, or BL22)

Manufacturer year of the tape (use 9999, if unknown)

Density of the tape (DEN3 or DEN4, density=3 or density=4)

Primary volume serial number

Optional input (backup tape):

Comments

TSSC identication box number

1.2.3 MODIFY Function

Required input:

Volume serial number

Optional input:

Type of data on the tape

Level of the tape

Location of the tape

Manufacturer year of the tape

Density

TSSC identification box number

Comments

Cross-reference volume serial numbers

1.2.4 DISABLE Function

Required input:

Volume serial number

Optional input:

Disable flag

Comments

1.2.5 DELETE Function

Required input:

Volume serial number

Disable flag

1.2.6 LIST Function

Required input:

Type of listing (terminal or hardcopy)

Required input (terminal):

Volume serial number

Required input (hardcopy):

Sorted (field(s) to sort on)

Unsorted

Optional input (terminal):

Cross-references to be listed also

1.3 OUTPUT GENERATED

- Updated table during the ADD, MODIFY, DISABLE, and DELETE functions.
- Terminal display of table entry or entries during the ADD, MODIFY, DISABLE, DELETE and LIST functions.
- Hardcopy listings sorted or unsorted from the LIST function.

1.4 RULES AND RESTRICTIONS

- The primary entries must be entered in the table before the backup entries can be entered.

- No entry will be added to the table unless all the required input has been entered.
- When disabling or deleting an entry the user is responsible for manually adjusting the cross-reference system.
- Unique volume numbers must exist in the table, unless one entry has been disabled.
- Disabled entries must have unique volume numbers among themselves.

1.5 SEQUENCE OF EXECUTION

(use command BEGIN)

1. Create the table
2. Add the primary tape entries
3. Add the backup tape entries
4. Modify any entry in the table
5. Disable any entry in the table
6. Delete any entry in the table
7. List the table (any time)

1.6 ERROR MESSAGES

- Entry for (volume serial number) does not exist in the table.
- Backup entry for (volume serial number) has been rejected, no primary tape (volume serial number) exists in the table.
- Warning you have deleted (volume serial number) which is a primary tape. Please refer to the user's guide for cross-reference maintenance required.
- You have disabled (volume serial number) in the table, please refer to the user's guide for cross-reference maintenance required.

1.7 REQUIRED ALLOCATIONS

1.7.1 CLIST libraries:

projectid.LIB.CLIST

SYS1.CLIST

1.7.2 PANEL libraries:

projectid.CATALOG.PANELS

SYS2.ISR.LIBRARY.PANELS

SYS1.ISR.V1R1M0.ISRPLIB

SYS1.ISR.V1R1M0.ISPPLIB

1.7.3 Input Table libraries:

projectid.ISPTABL.TABLE

SYS1.ISP.V1R1M0.ISPTLIB

K3MVS.ISR.LIBRARY.TABLES

SYS1.ISR.V1R1M0.ISRTLIB

1.7.4 Output Table libraries:

projectid.ISPTABL.TABLE

1.8 CROSS-REFERENCE SYSTEM

The cross-reference system is setup when the backup entries are added to the table. The user is prompted for the associated primary volume serial number. The table is searched for the primary tape entry and modified with the backup volume number, which is entered into its cross-reference list. The backup entry will contain only the primary volume serial number.

When an entry for a primary or backup tape is modified, the CLIST will check the cross-reference section. If changes have

been made to the cross-references, then the associated entries are updated.

When the DISABLE or DELETE functions have been performed on a table entry, the cross-references need to be updated by the user. The table contents should be checked carefully for all associated volume serial numbers, which appear in the table. The user must decide if other entries need to be updated or deleted. If a primary tape entry has been disabled/deleted and not replaced the user should disable/delete the associated backup volume numbers from the table.

1.9 DISABLE FLAG

The disable flag should only be used when an entry is to be kept for future reference. The comment field should be utilized when the disable flag is set. The default value is set to F (false) and is always used for locating the entries in the table during the ADD, MODIFY, DISABLE and LIST functions. The user may change the disable flag in the DISABLE function only. Reference to the disabled entries in the table may be specified in the DELETE and LIST function, by specifying T (true) in the disable field on the panel.

When disabling entries in the table, the user must maintain the cross-reference system, if affected. Refer to the cross-reference section of this document.

1.10 PROBLEMS AND SOLUTIONS

1.10.1 Cross-reference Problems

Problem: The backup cross-reference is incorrect.

- Modify the backup entry with the correct primary volume number.

1.10.2 Non-existent entry in the table

Problem: Non-existent entry in the table when adding a backup entry.

- Add the primary volume number to the table.

- Re-enter the backup tape entry.

Problem: Non-existent entry during the MODIFY function.

- Add the entry to the table.

1.10.3 Entry exists in the table

Problem: The entry already exists in the table during an ADD function.

- Check for table entry, possible duplicate volume numbers used.
- Disable or delete the entry, if appropriate.

1.11 APPLICABLE DOCUMENTS

- Interactive System Productivity Facility, Dialog Management Services, publication number SC34-2088-1.