SGP MEMO NO. 22

To: Anyone interested

From: R.T.Duquet

Subject: Pipeline Software

Date: August 2nd, 1982

Two pieces of software intended for the pipeline have recently reached the point where:

a- they can be used

b- they contain numerous larvae (immature bugs) that have not been identified because the programs have not been exercised under a wide enough variety of circumstances

c- they can be improved most efficiently by obtaining user reaction to experience with existing versions.

One component of the software in question is a database generator (called DBFILL) which is more-or-less equivalent to TAPE-FILLER on the DEC10 in that it will create a pipeline-format database from selected information contained in an archive (Modcomp) tape. The other component is a general purpose utility program (called DBUTIL) which will let you inspect, save, restore, verify and generally play around with an existing pipeline-format database.

Both programs deal with either CONTINUUM or SPECTRAL LINE observations, the later being read from Version 7 tapes (the version that has been in use since April Fool's day of this year). Both programs are meant to run on the SORTER machine; both contain fairly extensive HELP text that is available to the user at run time. A copy of the HELP text has been included in the following pages.

On the following pages you will also find some notes on the overall structure of a pipeline-format database. It is accompanied by a listing of the DCL files which define (and give names to) the components of the database structure.

At any time the latest version of these two programs may be found in the SORTER machine in user area [364,13]. A backup copy of the latest version is periodically transfered to the same user area on the MAPPER and GRIDER machines.

Pipeline-format Databases - An overview

At the topmost level the pipeline-format databases are represented by entries in a Catalogue. Many types of files in use at the VLA are called Catalogues; in the context of pipeline-format databases the term refers to the general purpose file structure originally developed for the VLA by Al Braun. By convention, the name of the Catalogue file is a four-digit user number (leading zeroes are required) and .CAT is the required extension. A new empty Catalogue will be created automatically by the program DBFILL for any user who does not already own one. (DBUTIL will also create a new empty Catalogue upon user request.)

Each database that contains CONTINUUM observations is represented by a single catalogue entry; by contrast, databases that contain SPECTRAL LINE observations usually require multiple catalogue entries. The exact number of catalogue entries required a given SPECTRAL LINE database depends upon the number of channels that have been observed; at the present time, data for each group of 8 channels is stored in a separate file and requires a separate catalogue entry. The number 8 is rather arbitrary and might be changed at some future time.

Unlike databases in the DEC10, each file in a pipeline-format database will contain visibility data for only one source. Each source (and each calibrator) will therefore require a separate entry in the user's Catalogue.

The information contained in each Catalogue entry is listed elsewhere. For now we merely point out that while the length of an entry was set to one half of a disk sector (for the sake of efficiency) the number of words actually used is rather less than that at the present time. Some use for the extra space will undoubtedly be found at a later time.

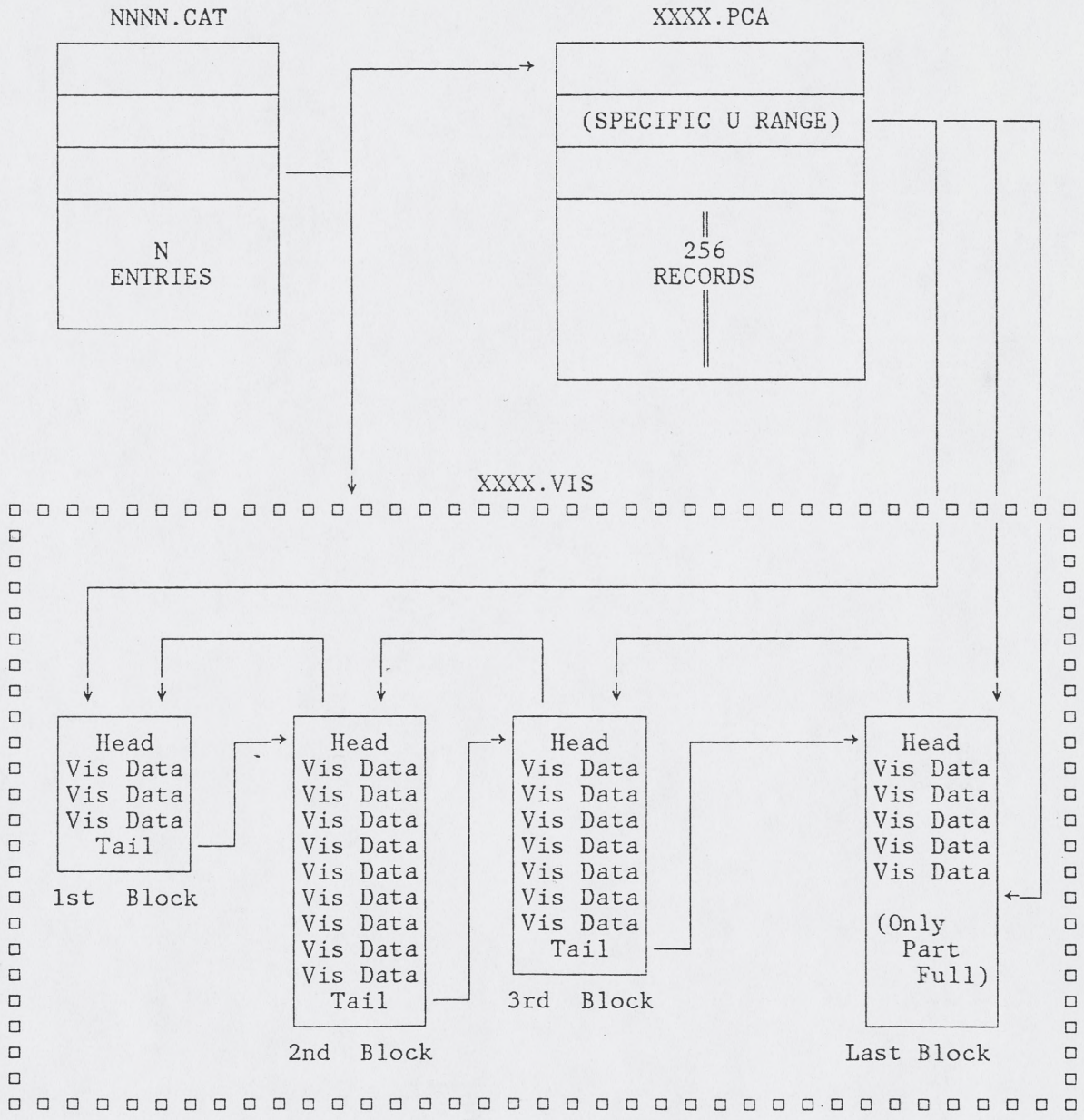
Each Catalogue entry points to a file in which observations are stored. (The pointer is a system-generated file identifier but the file name is also retained for the convenience of the user.) This file is organized as a set of pigeonholes, each containing data for a given range of absolute value of "U". Within a pigeon-hole, the order in which data is stored is entirely random! Any apparent order to the data within a pigeonhole is merely an accidental by-product of the way the file was created.

At the present time every data file is divided into 256 pigeonholes. This number is arbitrary and may be changed at some time in the future. Since the largest anticipated value of "U" is 131072 in units of 32 ns. each pigeonhole currently spans 512 units. For each data file there is an auxiliary file of the same name but with the extension .PCA (the data file extension is .VIS).

The auxiliary file, called a Pigeonhole Control Area, is NOT an index file in the sense that the term has come to acquire at the VLA but it serves a similar purpose. Since there is no order to the data within a pigeonhole, the PCA cannot contain information about scan number or flags. The PCA is primarily a set of pointers to the pigeonhole starting and ending locations within the data file. The PCA also identifies the range of U values covered by each pigeonhole and contains a count of the total number of visibility records in each pigeonhole. The exact content of each PCA record will be described later.

A pigeonhole in a VIS file is NOT necessarily a single contiguous region of that file. Pigeonholes generally consist of multiple blocks joined together into a doubly-linked list. Even within a given pigeonhole, the size of each block will usually differ from the size of every other block. To accomodate this very flexible organization each block begins with a header that says how many visibility records it has room for and points to its predecessor (if any) in the list. The forward pointer (if any) is found at the end of the block. A further description of each pigeonhole block is shown later.

Schematic Representation of a Pipeline-format Database



All blocks are part of the XXXX.VIS file

The following has been copied directly from the CATDEF.DCL file

---

```
CD

C     Entries in the Pipeline-format database Catalogue (July 20 1982)

      INTEGER*2 CATLEN                      ! The length currently USED
      PARAMETER (CATLEN=232)

      LOGICAL*1  CATREC(256)                ! Reserves the actual length


      INTEGER*2  CATBAK                     ! Pointer to predecessor
      EQUIVALENCE (CATBAK,CATREC(1))

      INTEGER*2  CATFOR                     ! Pointer to succesor
      EQUIVALENCE (CATFOR,CATREC(3))

      LOGICAL*1  CATQUE                     ! Queue number
      EQUIVALENCE (CATQUE,CATREC(5))        ! 2 = Active; 1 = Unused

      LOGICAL*1  CATPRI                     ! Priority (not used)
      EQUIVALENCE (CATPRI,CATREC(6))

      INTEGER*2  CATOID                     ! Owner ID (user number)
      EQUIVALENCE (CATOID,CATREC(7))

      INTEGER*2  CATFRM(2)                  ! Format identifiers
      EQUIVALENCE (CATFRM(1),CATREC(9))     ! (One for Modcomp, one for DEC)

      INTEGER*2  CATNCH                     ! Number of channels
      EQUIVALENCE (CATNCH,CATREC(13))       ! (4 for CONTINUUM)

      INTEGER*2 CATSUB                      !Subarray used in observing
      EQUIVALENCE (CATSUB,CATREC(15))

      LOGICAL*1 CATSOU(8)                   ! Source name
      EQUIVALENCE (CATSOU(1),CATREC(17))

      INTEGER*2 CATQUA                      ! Source qualifier
      EQUIVALENCE (CATQUA,CATREC(25))

      LOGICAL*1 CATMOD(4)                   ! Mode, Calcode, Submode
      EQUIVALENCE (CATMOD(1),CATREC(27))

      INTEGER*2 CATGC                       ! Gain code
      EQUIVALENCE (CATGC,CATREC(31))

      INTEGER*2 CATAVG                      ! Averaging Time
      EQUIVALENCE (CATAVG,CATREC(33))       ! (Units of 10 seconds)
```

```
REAL*8 CATPOS(4)                    ! Source Position
EQUIVALENCE (CATPOS,CATREC(35))     ! 1950 RA,Dec  Current RA,Dec

INTEGER*4 CATSTD                    ! Start Date (MJAD)
EQUIVALENCE (CATSTD,CATREC(67))

REAL*4    CATSTT                    ! Start time
EQUIVALENCE (CATSTT,CATREC(71))     ! (Seconds since midnight)

INTEGER*4 CATDAT                    ! Transit Date
EQUIVALENCE (CATDAT,CATREC(75))

REAL*4    CATTIM                    ! Transit time
EQUIVALENCE (CATTIM,CATREC(79))

INTEGER*4 CATSPD                    ! Stop Date
EQUIVALENCE (CATSPD,CATREC(83))

REAL*4    CATSPT                    ! Stop time
EQUIVALENCE (CATSPT,CATREC(87))

REAL*4    CATVEL                    ! Reserved for line velocity
EQUIVALENCE (CATVEL,CATREC(91))

REAL*8 CATFLO(4)                    ! Signed sum of LO's
EQUIVALENCE (CATFLO,CATREC(95))

REAL*4    CATFRQ(4)                 ! Band centers
EQUIVALENCE (CATFRQ,CATREC(127))

REAL*4    CATBW(4)                  ! Band widths
EQUIVALENCE (CATBW,CATREC(143))

INTEGER*2 CATWMX                    ! Maximum W value
EQUIVALENCE (CATWMX,CATREC(159))    ! (In 4ns units)

INTEGER*4    CATUMX                 ! Maximum U value
EQUIVALENCE (CATUMX,CATREC(161))    ! (In 32ns units)

INTEGER*4    CATVMX                 ! Maximum V value
EQUIVALENCE (CATVMX,CATREC(165))    ! (In 32ns units)

INTEGER*2 CATCMX                    ! Maximum correlator value
EQUIVALENCE (CATCMX,CATREC(169))

INTEGER*2 CATPLN                    ! Length of a PCA record
EQUIVALENCE (CATPLN,CATREC(171))    ! (Currently 24 bytes)

INTEGER*2 CATPN                     ! Number of Pigeonholes
EQUIVALENCE (CATPN,CATREC(173))     ! (Currently always 256)

INTEGER*2 CATVLN                    ! Length of a VIS record
EQUIVALENCE (CATVLN,CATREC(175))    ! 32 bytes for CONT; 64 for LINE
```

```
      LOGICAL*1 CATDEV(4)                    ! Logical Name of storage unit
      EQUIVALENCE (CATDEV,CATREC(177))

      LOGICAL*1 CATFNM(8)                    ! Name of VIS and PCA files
      EQUIVALENCE (CATFNM,CATREC(179))

      INTEGER*4 CATEOF                       ! Last byte address used in file
      EQUIVALENCE (CATEOF,CATREC(187))

      LOGICAL*1 CATNSG                       ! In a multi-file database
      EQUIVALENCE (CATNSG,CATREC(191))       ! the total number of files

      LOGICAL*1 CATSEG                       ! In a multi-file database
      EQUIVALENCE (CATSEG,CATREC(192))       ! the sequence # of this file

      LOGICAL*1 CATFNO(8)                    ! In a multi-file database
      EQUIVALENCE (CATFNO,CATREC(193))       ! names the file with CH 0

      LOGICAL*1 CATBWC(4)                    ! Band width code
      EQUIVALENCE (CATBWC,CATREC(201))

      LOGICAL*1 CATFID(6,4)                  ! System-generated file ID's
      EQUIVALENCE (CATFID,CATREC(205))       ! for rapid access to PCA & VIS

      REAL*4       CATSCN                    ! Scan identifier
      EQUIVALENCE (CATSCN,CATREC(229))       !  (used in DBFILL temporarily)
CE
```

The follcwing has been copied directly from the PCADEF.DCL file

---

```
CD

C    Definition of Pigeonhole Control Area records used in the

C                    Pipeline-format database

C                          (July 20 1982)

      INTEGER*2 PCALEN                      ! This value is stored in the
      PARAMETER (PCALEN=24)                 ! Catalogue entry

      LOGICAL*1 PCAREC(PCALEN)              ! Reserves the required buffer


      INTEGER*4 PCANNN                      ! The total number of records
      EQUIVALENCE    (PCANNN,PCAREC(1))     ! in the pigeonhole

      INTEGER*2 PCANTB                      ! Size of the last block in
      EQUIVALENCE    (PCANTB,PCAREC(5))     ! terms on number of VIS records

      INTEGER*2 PCANBL                      ! Actual number of VIS records
      EQUIVALENCE    (PCANBL,PCAREC(7))     ! in the last block

      INTEGER*4 PCAFIR                      ! Byte address of first block
      EQUIVALENCE    (PCAFIR,PCAREC(9))     ! in this pigeon hole

      INTEGER*4 PCALAS                      ! Byte address of the last block
      EQUIVALENCE    (PCALAS,PCAREC(13))    ! in this pigeon hole

      INTEGER*4 PCATIS                      ! Byte address of next VIS rec
      EQUIVALENCE    (PCATIS,PCAREC(17))    ! to be placed in last block

      INTEGER*2 PCAUMN                      ! Min U value for this PH
      EQUIVALENCE    (PCAUMN,PCAREC(21))    ! (Units of 32 ns)

      INTEGER*2 PCAUMX                      ! Max U value for this PH
      EQUIVALENCE    (PCAUMX,PCAREC(23))    ! (Units of 32 ns)

CE
```

The following has been copied directly from the VISDEF.DCL file

---

```
C     Definition of each visibility record (July 20 1982)

      INTEGER*2 VISLEN                    ! Defined in terms of number of
      PARAMETER (VISLEN=CHPERV*4+16)      ! channels per VIS rec (now 8)

      LOGICAL*1  VISREC(VISLEN)           ! Reserves buffer space


      INTEGER*4 VISU                      ! U value (in 32ns units)
      EQUIVALENCE (VISU,VISREC(1))

      INTEGER*4 VISV                      ! V value (in 32ns units)
      EQUIVALENCE (VISV,VISREC(5))

      INTEGER*2 VISW                      ! W value (in 4ns units)
      EQUIVALENCE (VISW,VISREC(9))

      INTEGER*2 VISTM                     ! Time
      EQUIVALENCE (VISTM,VISREC(11))      ! (Secs since midnight)/2

      INTEGER*2 VISBL                     ! Base line code
      EQUIVALENCE (VISBL,VISREC(13))      ! Avg time, ANT1, ANT2

      INTEGER*2 VISFLG                    ! Flags
      EQUIVALENCE (VISFLG,VISREC(15))

      INTEGER*2 VISDAT(CHPERV*2)          ! Correlator readings (Re, Im)
      EQUIVALENCE (VISDAT(1),VISREC(17))
```

The following has been copied directly from the VISDEF.DCL file

---

```
CD

C    Definition of the header for each Pigeonhole block (July 20 1982)

     INTEGER*2 PHLEN                 ! This is the header length
     PARAMETER (PHLEN=8)

     LOGICAL*1  PHREC(PHLEN)         ! Reserves buffer space


     INTEGER*2 PHPCA                 ! Pigeonhole of which this is part
     EQUIVALENCE (PHPCA,PHREC(1))    ! (Pigeonholes numbered from ZERO)

     INTEGER*2 PHNREC                ! Number of VIS records in this block
     EQUIVALENCE (PHNREC,PHREC(3)) ! (Max capacity - not number used)

     INTEGER*4 PHPRE                 ! Byte pointer to previous block
     EQUIVALENCE (PHPRE,PHREC(5))    ! (Zero if this is the first block)

CE
```

Note: The byte pointer to the next pigeonhole block follows the visibility data.

How to use the DBFILL Program

(Notes taken from the HELP file available in the program)

This program is designed to create a pipeline-format database on a PDP-11 from an Archive tape written by the Modcomp (or from a copy created by ARCOPY).

The program expects that the user has previously mounted the input tape on a PDP-11 drive and has selected the appropriate density. In the case of SPECTRAL-LINE data, the program also expects that the "PHASE 2" module, called DBFIL2.TSK has been installed (so that it can be started automatically when required by PHASE 1).

The program asks the user to identify a Catalogue by supplying a 4-digit user-number (leading zeroes must be typed in by the user). If no such catalogue exists the program will create one (and will notify the user of this action). If, during the course of creating a database, the Catalogue becomes full the program will automatically expand it (in increments of 5 entries).

After the user's Catalogue has been identified, the program displays the default values of the data selection criteria and gives the user an opportunity to modify those values.

To change a given criterion the user must type a 3-letter identifier followed by the new criterion value.

The default option for tape positioning prior to reading is NO MOTION. The alternative option is to have the tape rewound to the load point. To select the REWIND option type REW followed by the letter Y. To return to the default option type REW followed by the letter N or a blank.

Dates are specified as two-digit triplets representing DA MO YR in THAT order. The elements may be contiguous or they may be separated by spaces, by colons, or by slashes.
For example: 110582 11 05 82 11/05/82 11:05:82 are all equivalent.

Time is specified as a two-digit triplet representing HR MN SC. The elements may be contiguous or separated by spaces, colons or slashes.
For example: 212130 21 21 30 21/21/30 21:21:30 are all equivalent.

To specify an observer for whom data is to be selected you must type the identifier OID followed by a 4-digit number e.g. OID 0030. To restore this criterion to the default option (ANY observer) type OID followed by an asterick.

To specify a subarray for which data is to be selected you must type the identifier SUB followed by a 1-digit number e.g. SUB 1. To restore this criterion to the default option (ALL subarrays) type SUB followed by an asterick.

The data copied from the tape is compared to databases (if any) for which there already exist entries in the Catalogue. The program decides automatically whether the data being read should be appended to an existing database or should form a new one.

In order to be appended to an existing database the newly-read data must agree with it in the following respects:

Source Name	Source Qualifier	Meridian Crossing Date
Band Width	Sum of LO Frequencies	Observing Mode and Submode

When the observations for a given database are recorded on two (or more) Modcomp tapes, this program must be run separately for each tape but the observations will be properly concatenated into a single database.

NOTE: In order to prevent accidental duplication of data the program will IGNORE observations made earlier than the time of the latest observation already present in a database. Such automatic rejection will occur regardless of the selection criteria specified by the user. A practical consequence is that NO data will be read from Modcomp tapes processed in the wrong order.

How to use the DBUTIL Program

(Notes taken from the HELP file available in the program)

DBUTIL is a general-purpose ('utility') program which is intended to serve databases in the VLA pipeline. Its functions include:

1- Listing the contents of an ARCHIVE tape

2- Saving a Database by copying it onto a tape

3- Checking a SAVE tape against a Database

4- Restoring a Database from a SAVE tape

5- Deleting a Database entry from a Catalogue

6- Printing selected data from a Database

7- Verifying the structural integrity of Databases

8- Validating Database elements

9- Creating and expanding a Catalogue

10- Altering the contents of a Catalogue entry

11- Altering the contents of a PCA record

12- Altering the contents of a VIS record

The data bases are assumed to be entries in a standard Catalogue file.

FEATURES 10, 11 AND 12 HAVE NOT YET BEEN IMPLIMENTED AT THIS TIME

The information on this page is the first panel presented to the user when a request for HELP is typed. On the reverse side of this page you will find a sample of the output that appears on the terminal when the program is first started. On the following pages you will find information on the various options that the program offers at each stage of its execution.

When the program starts it presents the following "menu" to the user.

```
************************  At this point the options are  ************************
   SELECT A USER'S      SCAN A      HARD      SEEK       NORMAL
     CATALOGUE          TAPE        COPY      HELP       EXIT
  (Enter User Number)    (T)         (C)       (H)        (Q)
 Please select one of the above:
```

The "hard copy" option places all terminal output from the program in a file that is spooled to the DEC-10 at the conclusion of the program. (That option was used to create the sample output contained in these notes.)

When the user enters a 4-digit number, the Catalogue so identified is scanned and a 1-line summary is displayed for each active entry. After the summary is presented the user is offered another menu from which to select an appropriate activity.

Summary of Catalogue 1234.CAT

Ent	Source	Qual	Mode	Chan	Center	Date	Records	Filename	Part
1	3C286	0	2A B	8	1.3926 GHz	02/07/82	2.2 K	AAAB	1/ 8
2	3C286	0	2A B	8	1.3934 GHz	02/07/82	2.2 K	AAAC	2/ 8
3	3C286	0	2A B	8	1.3941 GHz	02/07/82	2.2 K	AAAD	3/ 8
4	3C286	0	2A B	8	1.3949 GHz	02/07/82	2.2 K	AAAE	4/ 8
5	3C286	0	2A B	8	1.3957 GHz	02/07/82	2.2 K	AAAF	5/ 8
6	3C286	0	2A B	8	1.3965 GHz	02/07/82	2.2 K	AAB0	6/ 8
7	3C286	0	2A B	8	1.3973 GHz	02/07/82	2.2 K	AAB1	7/ 8
8	3C286	0	2A B	8	1.3980 GHz	02/07/82	2.2 K	AAB2	8/ 8

8 active entries out of 15 possible

```
************************  At this point the options are  ************************
   SELECT A DB FOR      ENLARGE      RESTORE A      SEEK       NORMAL
   FURTHER OPTIONS      THE CAT      SAVED DB       HELP       EXIT
  (Enter DB Number)       (E)          (R)          (H)        (Q)
 Please select one of the above:
```

In the sample output shown above the user has identified the catalogue 1234 which contains 8 entries, one for each portion of a SPECTRAL LINE data base. Since they refer to portions of the same database the entries are all quite similar except for the portion number, the center frequency and the name of the VIS and PCA files in which the data is to be found. Incidentally, the number of VIS records reported for each entry is merely an estimate.

If the user's response to the menu is the number of an active Catalogue entry, detailed information on that entry will be displayed before the user is asked what action (if any) should be undertaken involving that entry. (For a sample of the detailed information presented turn to page 18.)

DELETING AN ENTRY FROM A CATALOGUE

1- Give a user number and check the list of Catalogue entries

2- Select the database to be deleted by typing its entry number

3- You will be shown a detailed description of the database characteristics followed by a set of options

4- If you want to delete that database you should select option D

5- You will be asked to verify that selection. Answer Y

6- After the database has been deleted you will be shown the Catalogue summary (as revised)

7- You will then have an opportunity to delete other entries

NOTE THAT THIS ONLY DELETES AN ENTRY IN THE .CAT FILE
IT DOES NOT DELETE THE ACTUAL .PCA OR .VIS FILES

TO CREATE A NEW (EMPTY) CATALOGUE

1- If no Catalogue exists for the user number that you specify you will be asked whether or not you want to create a new one.

2- If you reply affirmatively a new, empty, Catalogue will be created and you will be able to use it immediately.

TO EXPAND A CATALOGUE (BY ADDING EMPTY ENTRIES)

1- Give the user number and, from the list of Catalogue entries, check that this is the Catalogue you intend to expand.

2- Select the EXPAND option by typing the letter 'E'

3- A new display of the Catalogue entries will show that the number of unused entries has been increased (by 10).

4- You may repeat this process as often as you wish in order to make the Catalogue as large as it needs be.

THERE IS NO FACILITY FOR DECREASING THE SIZE OF A CATALOGUE

```
 Entry number   3   In Catalogue 1234.CAT
==========================================
Observ   Source  Qual  Sub      RA(50)     Dec(50)     Chans  File name
 330   3C286        0   1    13 28 50.  30 45 59.       8       AAAD

       Start Date/Time       Crossing Date/Time       Stop Date/Time
      02/07/82   0:16:50    02/07/82   1:28:53    02/07/82   0:31: 0

  Mode   Submode      Gain   Avg   Max W   Max U  Max V   Max C      Velocity
  2A B                  4     3    11604  114384 104917       0

     Band Center (Hz)     Band Width (MHz)        Sum of LOs
       1394139008.            6.2500          1392185899.9529
       1394139008.            6.2500          1392185899.9529
       1394139008.            6.2500          1392185899.9529
       1394139008.            6.2500          1392185899.9529

 PCA Length     Num PH      Bytes Corr Data     Cat EOF      DB Line 0   Segment
    24            256              48           314734          AAAB       3/ 8
************************** At this point the options are **************************
  DISPLAY PCA     SAVE     DELETE     PRINT     ZAP CAT    SEEK   GO BACK   QUIT
    SUMMARY     THE DB   THE DB      DATA      ENTRY      HELP   1 LEVEL    NOW
      (CR)        (S)      (D)        (P)       (Z)        (H)      (B)      (Q)
 Please select one of the above:
```

SAVING A DATABASE ON TAPE

Before starting this program you should have done the following:

1- Loaded a blank tape on the tape drive

2- Initialized that tape

3- MOUNTed the tape

If you have already done those things then

1- Give a user number and check the list of Catalogue entries

2- Select the database to be saved by typing its entry number

3- You will be shown a description of the database characteristics then a set of options

4- If you want to save that database you should select option S

5- You will be kept informed of the progress of the operation

NOTE THAT THIS ONLY COPIES A DATABASE, IT NEITHER VERIFIES THE TAPE NOR DELETES THE CATALOGUE ENTRY

6- After the tape has been written you will be asked if you wish to check the tape by reading it back and comparing it with the database.

COMPARING A TAPE FILE WITH A DATABASE

After you have SAVED a database on tape you will be asked if you wish to verify it. If so, just type the letter Y.

In other circumstances you must have loaded and MOUNTed the tape, then:

1- Give a user number and check the list of Catalogue entries

2- Select the database to be verified by typing its entry number

3- You will be shown a description of the database characteristics

4- You should then select the option V.

5- You will be kept informed of the progress of the operation,

RESTORING A DATABASE THAT HAD BEEN SAVED ON TAPE

Before starting this program you should have done the following:

1- Loaded the proper tape on the tape drive

2- MOUNTed the tape

If you have already done those things then

1- Give a user number.

2- Select the option R.

3- You will be shown a description of the database on tape and the name under which it will be restored.
(If a database already exists with the same name as that of the database on the tape a new non-conflicting name will be generated automatically.)

4- You can then decide whether or not to restore that database.

5- If so, you will be kept informed of the progress of the operation

PRINTING SELECTED VIS RECORDS

1- Give the user number and check the list of Catalogue entries

2- Select a database by typing its entry number

3- You will be given a description of the database characteristics

4- From the options offered, select P.

5- You will be shown the selection parameters and their default values. (The string of nines effectively passes ALL values i.e. no selection)

Data will be selected according to the following criteria:

Selection Parameter		Lower Limit		Upper Limit
U Value	UMIN	-99999999	UMAX	99999999
V Value	VMIN	-99999999	VMAX	99999999
Baseline	ANT1	-99999999	ANT2	99999999
Pigeon Hole	PH1	-99999999	PH2	99999999
Record #	REC1	-99999999	REC2	99999999

6- You will also be shown instructions on how to alter these values)

(NOTE: In the case of baselines the parameters ANT1 and ANT2 are NOT really lower and upper limits to antenna numbers; they are explicit antennae to be selected for. For example if either one or the other (but not both) of ANT1 or ANT2 is not all 9's then all baselines that include that antenna will be selected. If both ANT1 and ANT2 are specified only that specific baseline will be selected.)

Data will be selected according to the following criteria:

Selection Parameter		Lower Limit		Upper Limit
U Value	UMIN	-999999999	UMAX	999999999
V Value	VMIN	-999999999	VMAX	999999999
Baseline	ANT1	-999999999	ANT2	999999999
Pigeon Hole	PH1	8	PH2	8
Record #	REC1	-999999999	REC2	999999999
Time	TIM1	-999999999	TIM2	999999999

Printout of Database AAAB.VIS by program DBUTIL

Record	U	V	W	Time	Avg	Ant1	Ant2	Flags
Working on Pigeon Hole 8								
1	-4050	-42446	3040	00:23:20	3	4	5	00000000
2	-3997	-42450	3056	00:23:50	3	4	5	00000000
3	-3944	-42455	3072	00:24:20	3	4	5	00000000
4	-3891	-42459	3072	00:24:50	3	4	5	00000000
5	-3598	-22977	1184	00:16:50	3	16	25	11111111
6	-3794	-21774	992	00:16:50	3	5	24	11111111
7	-3764	-21779	992	00:17:20	3	5	24	11111111
8	-3738	-21783	992	00:17:50	3	5	24	10010000
9	-3711	-21788	1008	00:18:20	3	5	24	00000000
10	-3685	-21792	1024	00:18:50	3	5	24	00000000
11	-3659	-21796	1024	00:19:20	3	5	24	00000000
12	-3633	-21800	1024	00:19:50	3	5	24	00000000
13	-3607	-21804	1024	00:20:20	3	5	24	00000000
14	3649	-72813	8864	00:28:00	3	9	24	11111111
15	3746	-72809	8848	00:28:30	3	9	24	00000000
16	3844	-72804	8848	00:29:00	3	9	24	00000000
17	4069	28237	-1488	00:29:00	3	1	25	00000000
18	3942	-72800	8832	00:29:30	3	9	24	00000000
19	4035	28241	-1472	00:29:30	3	1	25	00000000
20	4040	-72796	8832	00:30:00	3	9	24	00000000
21	4001	28246	-1488	00:30:00	3	1	25	00000000
22	3966	28250	-1504	00:30:30	3	1	25	00000000
23	3932	28255	-1504	00:31:00	3	1	25	00000000

EXAMINING THE DISTRIBUTION OF DATA WITHION PIGEON HOLES

1- Give the user number and check the list of Catalogue entries

2- Select a database by typing its entry number

3- After you have been shown the database characteristics
press CR to see a summary of the PCA file.
You will be shown a summary of the pigeonhole characteristics
with the data organized into groups of pigeonholes.

4- Select a group of Pigeon Holes by typing the group number

5- You will be shown the characteristics of each pigeonhole
in the group.

Pigeon Hole Control File by Groups

Group	Records	U Min	U Max
1	589	-4	8188
2	178	8188	16380
3	84	16380	24572
4	62	24572	32764
5	213	32764	40956
6	334	40956	49148
7	183	49148	57340
8	152	57340	65532
9	139	65532	73724
10	27	73724	81916
11	12	81916	90108
12	52	90108	98300
13	54	98300	106492
14	27	106492	114684
15	0	114684	122876
16	0	122876	131068

********** At this point the options are **********

SELECT A GROUP	SEEK HELP	GO BACK 1 LEVEL	QUIT NOW
(Enter Num)	(H)	(B)	(Q)

Please select one of the above:

Pigeon Hole	Total Recs	In Last Block	Max In Last Blk	First Block	Last Block	End Of Hole	U Min	U Max
1	6	3	3	200034	227534	227764	-4	508
2	7	7	7	227770	227770	230520	508	1020
3	70	25	25	1000	230524	233014	1020	1532
4	85	10	10	4454	233020	233770	1532	2044
5	11	8	8	12470	233774	234604	2044	2556
6	49	12	12	12724	234610	235720	2556	3068
7	80	12	12	15600	235724	237034	3068	3580
8	23	10	10	23314	237040	240010	3580	4092
9	44	15	15	24510	240014	241344	4092	4604
10	50	10	10	26644	241350	242320	4604	5116
11	36	7	7	31660	242324	243054	5116	5628
12	25	7	7	34374	243060	243610	5628	6140
13	41	2	2	35730	205250	205420	6140	6652
14	18	5	5	41464	243614	244204	6652	7164
15	12	2	2	42600	244210	244360	7164	7676
16	32	3	3	43554	205520	205750	7676	8188

********** At this point the options are **********

VALIDATE LINKS	DISPLAY THE DATA	ZAP PCA FIELD	ZAP VIS RECORD	SEEK HELP	GO BACK 1 LEVEL	QUIT NOW
(L)	(D)	(Z)	(V)	(H)	(B)	(Q)

$ Please select one of the above:

EXAMINING THE LINKS BETWEEN PIGEON HOLE BLOCKS

1- Give the user number and check the list of Catalogue entries

2- Select a database by typing its entry number

3- After you have been shown the database characteristics
press CR to see a summary of the PCA file.
You will be shown a summary of the pigeonhole characteristics
with the data organized into groups of pigeonholes.

4- Select a group of Pigeon Holes by typing the group number

5- You will be shown the characteristics of each pigeonhole
in the group.

6- Select the option L to trace the links that join blocks in
a pigeonhole.

7- You will then be asked the pigeonholer number to which that
selection applies.

8- At various points you will need to hit the CR key to continue.

9- At the end of the display you will be able to repeat for
another pigeonhole.

```
BLOCK=     1000   PCA=    2   NREC=    38   PRE=        0   NEXT=    200270
BLOCK=   200270   PCA=    2   NREC=     7   PRE=     1000   NEXT=    230524
BLOCK=   230524   PCA=    2   NREC=    25   PRE=   200270   NEXT=         0

 End of forward trace; Now starting backward trace

 Last Block is     230524
BLOCK=   230524   PCA=    2   NREC=    25   PRE=   200270
BLOCK=   200270   PCA=    2   NREC=     7   PRE=     1000
BLOCK=     1000   PCA=    2   NREC=    38   PRE=        0

 End of trace.  Strike RETURN to proceed
```

EXAMINING THE DATA IN VIS RECORDS

1- Give the user number and check the list of Catalogue entries

2- Select a database by typing its entry number

3- After you have been shown the database characteristics press CR to see a summary of the PCA file.

4- Select a group of Pigeon Holes by typing the group number

5- You will be shown the characteristics of each pigeonhole in the group.

6- Select the option D to display the first few (descriptor) words of each VIS rec

7- You will then be asked the pigeonhole number to which that selection applies.

8- At various points you will need to hit the CR key to continue.

9- At the end of the display you will be able to repeat for another pigeonhole

TO SEE ACTUAL CORRELATOR VALUES YOU MUST USE THE PRINT FEATURE

```
 PH BLOCK      23314   PCA=    7   NREC=       13   PRE=        0

 Enter 'X' to quit or just RETURN to display

 Record      U        V       W       Time    Avg Ant1 Ant2      Flags
    1     -4050   -42446    3040   00:23:20     3    4    5   00000000
    2     -3997   -42450    3056   00:23:50     3    4    5   00000000
    3     -3944   -42455    3072   00:24:20     3    4    5   00000000
    4     -3891   -42459    3072   00:24:50     3    4    5   00000000
    5     -3598   -22977    1184   00:16:50     3   16   25   11111111
    6     -3794   -21774     992   00:16:50     3    5   24   11111111
    7     -3764   -21779     992   00:17:20     3    5   24   11111111
    8     -3738   -21783     992   00:17:50     3    5   24   10010000
    9     -3711   -21788    1008   00:18:20     3    5   24   00000000
   10     -3685   -21792    1024   00:18:50     3    5   24   00000000
   11     -3659   -21796    1024   00:19:20     3    5   24   00000000
   12     -3633   -21800    1024   00:19:50     3    5   24   00000000
   13     -3607   -21804    1024   00:20:20     3    5   24   00000000
NEXT BLOCK IS AT      237040
 PH BLOCK     237040   PCA=    7   NREC=       10   PRE=    23314

 Enter 'X' to quit or just RETURN to display

 Record      U        V       W       Time    Avg Ant1 Ant2      Flags
    1      3649   -72813    8864   00:28:00     3    9   24   11111111
    2      3746   -72809    8848   00:28:30     3    9   24   00000000
    3      3844   -72804    8848   00:29:00     3    9   24   00000000
    4      4069    28237   -1488   00:29:00     3    1   25   00000000
    5      3942   -72800    8832   00:29:30     3    9   24   00000000
    6      4035    28241   -1472   00:29:30     3    1   25   00000000
    7      4040   -72796    8832   00:30:00     3    9   24   00000000
    8      4001    28246   -1488   00:30:00     3    1   25   00000000
    9      3966    28250   -1504   00:30:30     3    1   25   00000000
   10      3932    28255   -1504   00:31:00     3    1   25   00000000
NEXT BLOCK IS AT           0
No more records expected in this Pigeon Hole
```

LISTING THE CONTENTS OF AN ARCHIVE TAPE

1- Before you try to list the contents of a tape you should mount that tape on the tape drive. (This does NOT mean that you should use the operating system "MOUNT" command.)

2- When the first set of options is presented select tape listing by typing the letter 'T'

3- You will be shown the selection parameters and their default values. The selection parameters allow you to pick out specific parts of the tape for listing; the default values list the entire tape. You will be shown instructions on how to alter these values

4- Information about the tape will be displayed on the terminal. At the same time, the information will be placed in a file that will be spooled automatically to the DEC10 printer. You do NOT need to have selected the "hard copy" option (in the first menu) to get this printed output!

The following page shows a sample of the printed output obtained from listing the contents of an actual archive tape. In this case the user accepted the default selection criteria which list the entire tape. Only the first page of output is shown.

The listing starts out by displaying the tape labels that were found. (Tapes created by the ARCOPY program do not have these labels.) The program also prints any trailer labels that it finds.

The output consists of two columns. The one on the left is printed whenever a new scan is encountered on the tape; the one on the right whenever a scan is terminated. The data reported for each new scan is:

a- The subarray number
b- The source name
c- The date and time
d- Whether the data was Continuum or Spectral-line (C or L)
e- The observer's ID number.

The data reported at the conclusion of each scan is:

a- The number of logical records in the scan
b- A repeat of the source name
c- A repeat of the subarray number.

In the example two subarrays were used. One scan of subarray 2 (observing 3C84) contains 101 records which were taken while subarray 1 (first observing 1328+307 then 1123+264) recorded 7 short scans.

```
Tape label: VOL1V495                                    D%M.NRAO/VLA 1
Tape label: HDR1VLASYNC.NEW      V495  00010001000100 82182 99365 000000MODCOMP
Tape label: HDR2D0000000000                                    00

  1  1328+307  01/07/82  21:14:40  C   31
  2  3C84      01/07/82  21:15:50  C   64
                                                 16 Records for 1328+307      1
  1  1328+307  01/07/82  21:17:50  C   31
                                                 14 Records for 1328+307      1
  1  1328+307  01/07/82  21:20:40  C   31
                                                  9 Records for 1328+307      1
  1  1328+307  01/07/82  21:22:40  C   31
                                                  9 Records for 1328+307      1
  1  1123+264  01/07/82  21:26: 0  C   31
                                                 16 Records for 1123+264      1
  1  1123+264  01/07/82  21:29: 0  C   31
                                                 16 Records for 1123+264      1
  1  1123+264  01/07/82  21:32: 0  C   31
                                                101 Records for 3C84          2
  2  3C84      01/07/82  21:34:30  C   64
                                                 16 Records for 1123+264      1
  1  1156+295  01/07/82  21:35:10  C   31
                                                 21 Records for 1156+295      1
  1  1156+295  01/07/82  21:39: 0  C   31
                                                 16 Records for 1156+295      1
  1  1156+295  01/07/82  21:42: 0  C   31
                                                 22 Records for 1156+295      1
  1  1156+295  01/07/82  21:46: 0  C   31
                                                 76 Records for 3C84          2
  2  3C84      01/07/82  21:47:30  C   64
                                                 23 Records for 1156+295      1
  1  1219+285  01/07/82  21:50:20  C   31
                                                 20 Records for 1219+285      1
  1  1219+285  01/07/82  21:54: 0  C   31
                                                  5 Records for 1219+285      1
```