IBM

OS/VS VSAM
System Programming

Student Materials

Second Edition (January, 1978)

OS/VS VSAM FOR SYSTEM PROGRAMMERS [A3754]

Duration: Four days **Tuition:** $565

Audience: Personnel performing the functions of VSAM system programming, implementation and design.

Recommended Background: Knowledge of IBM direct access devices and VSAM coding. Attendees should have a knowledge of the various data set formats supported by VSAM and how they are defined. They should also understand the various methods of accessing data and have a familiarity with the basic functions of VSAM Access Method Services. This knowledge may have been obtained by completion of the course DASD Data Management (H3720) or VSAM Coding (A3750) or VSAM ISP's or equivalent experience.

Prerequisite Test: Yes

Course Abstract: This course is intended to build upon the students' knowledge of VSAM to a level at which they, as system programmers can efficiently install and implement VSAM. The student should become familiar with the VSAM catalog structure and use, and be able to define and maintain the Master and User catalogs. In addition to defining a data set, the student should become familiar with defining Alternate Indexes and Paths and how to access the data using Alternate Indexes. The student should become knowledgeable in catalog and data set recovery, including the use of the catalog recovery area. The student should be able to fully utilize VSAM Access Method Services and be able to select those VSAM options and processing techniques which will provide for proper utilization of VSAM. They will be given a functional overview of VSAM control blocks and be able to design a VSAM data set for better utilization of space, portability and performance. How to protect catalogs and data sets will also be covered. Throughout the course suggested standards for using VSAM will be presented to assist easier implementation and use of VSAM. This course is for those using OS/MVS, OS/VS2 Release 1, and OS/VS1

Course Objectives: Upon completion of this course the student should be able to:

1. Create and maintain Master and User Catalogs.
2. Calculate space required for Catalogs and Data Sets.
3. Cite catalog and data set recovery methods and techniques.
4. State the relationships between define options and their effect on optimization including the impact of control interval and control area sizes.
5. Interpet an Access Method Services print listing of a VSAM catalog.
6. Identify those factors and standards necessary to successfully install and use VSAM.
7. Utilize the security and integrity features of VSAM.
8. State the requirements necessary to properly utilize the sharing capabilities of VSAM between. Jobs, Systems, and Subtasks.
9. State the differences of VSAM in MVS.
10. Define and use Alternate Index capability.

Course Topics:

VSAM Catalogs
Recovering VSAM Catalogs and Data Sets
VSAM Data Set Optimization Considerations
Security and Integrity
Special Processing
VSAM Sharing
Access Methods Services - throughout the course where appropriate.
MVS Considerations
Alternate Indexes

Computer Exercises: To provide the student with experience in: (1) Defining and accessing a data set with Alternate Indexes and Paths, (2) recovery of a data set, using Acess Method Services.

VSAM OBJECTIVES

IMPROVED PERFORMANCE

SINGLE ACCESS METHOD FOR PROCESSING MODES

CROSS SYSTEM COMPATIBILITY (DOS-OS)

NEW DATA ORGANIZATION

SIMPLE TO USE JCL

ALL DATA SETS MUST BE CATALOGED

IMPROVED RELIABILITY

VSAM SUPPORTED BY VS PROGRAM PRODUCTS (DOS/OS)

CONVERSION WITH ISAM INTERFACE

VSAM FEATURES AND BENEFITS

- DATA SECURITY
- DATA INTEGRITY
  - PHYSICAL RECORD MOVEMENT MINIMIZED
  - SOFTWARE EOF
- DEVICE INDEPENDENCE WITH CI/CA TYPE OF DATA STRUCTURE
- DECREASED FILE REORGANIZATION
- ERROR RETURN CODES INSTEAD OF ABENDS
- TYPES OF ACCESS
  - KEY
  - ADDRESS – (RBA)
  - CONTROL INTERVAL – CI (RBA)
  - RELATIVE RECORD NUMBER
- DATA PORTABILITY BETWEEN SYSTEMS
  - OS/VS – DOS/VS

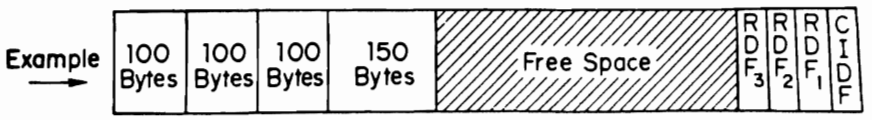
REVIEW OF VSAM DATA ORGANIZATION

THREE TYPES OF DATA SETS

- KSDS KEY SEQUENTIAL DATA SET
  - 2 SEPARATE VSAM COMPONENTS DATA AND INDEX ACCESS BY KEY OR ADDRESS
  - DISTRIBUTED FREE SPACE CI AND CA
  - RECORDS ARE PHYSICALLY MOVED AND DELETED
- ESDS ENTRY SEQUENCE DATA SET
  - DATA COMPONENT ONLY NO KEYS OR INDEX
  - ACCESS BY ADDRESS
  - ADDITIONS ADDED TO END OF THE DATA SET
  - RECORDS ARE NOT MOVED OR DELETED
- RELATIVE RECORD DATA SET
  - FIXED LENGTH RECORDS ONLY
  - VIEWED AS A STRING OF SLOTS
  - ACCESS IS BY RELATIVE RECORD NUMBER
  - ADDITIONS ARE TO EMPTY SLOTS
  - DELETIONS MARK A SLOT AS EMPTY
  - RECORDS ARE NOT MOVED
  - NO FREE SPACE
  - EACH CI CONTAINS THE SAME NUMBER OF SLOTS

Control Interval

- Unit of transmission between virtual storage and DASD.
- Length is system-determined.
  User can request a specific length.



CONTROL AREA SIZE

IF ALLOCATION IS BY:

CYL:	TRACKS PER CYL
TRACKS:	MIN (PRIMARY,SECONDARY)
RECORDS:	MIN (PRIMARY,SECONDARY)

CONTROL INTERVAL SIZE

- DATA COMPONENT

  UP TO 8K – MULTIPLE OF 512
  OVER 8K – MULTIPLE OF 2048
  MAXIMUM – 32768

- INDEX COMPONENT

  512, 1024, 2048, 4096 (3330 AND 3340 ONLY)

CI/PHYSICAL BLOCK RELATIONSHIPS

- PHYSICAL BLOCK SIZES VSAM USES:
  512, 1024, 2048, 4096

  4096 IS INVALID FOR 2314

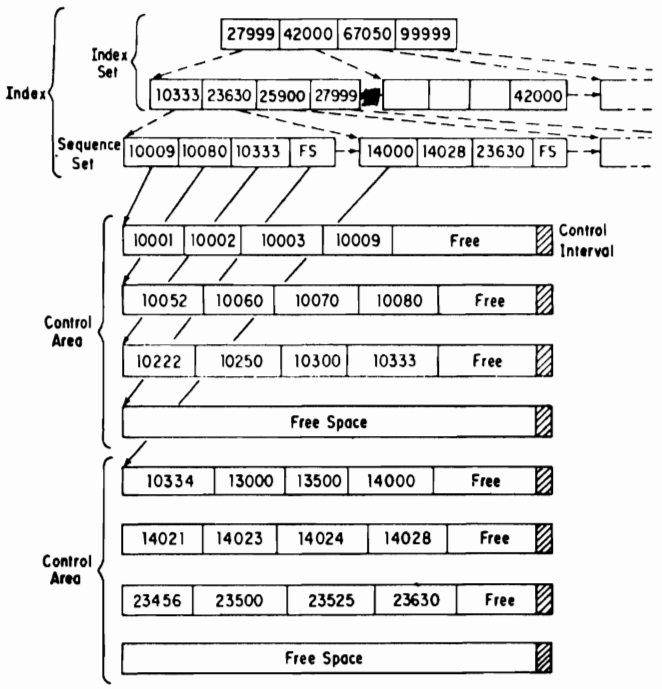
CONTROL INTERVAL SIZE	PHYSICAL BLOCK SIZE	NUMBER OF BLOCKS/CI
1024	1024	1
2048	2048	1
3072	1024	3
3584	512	7
4096	4096	1
	2048	2 (2314)
6144	2048	3

PHYSICAL BLOCK – DASD CAPACITY

BLOCKSIZE	2314		3330		3340		3350		3330 COMP. ON 3350	
	RECDS PER TRK	& UTIL	RECDS PER TRK	& UTIL	RECDS PER TRK	& UTIL	RECDS PER TRK	& UTIL	RECDS PER TRK	& UTIL
512	11	77	20	79	12	74	27	72	20	79
1024	6	84	11	86	7	86	15	80	11	86
2048	3	84	6	94	3	74	8	86	6	94
4096	1 which is why VSAM doesn't use it!	56	3	94	2	98	4	86	3	94

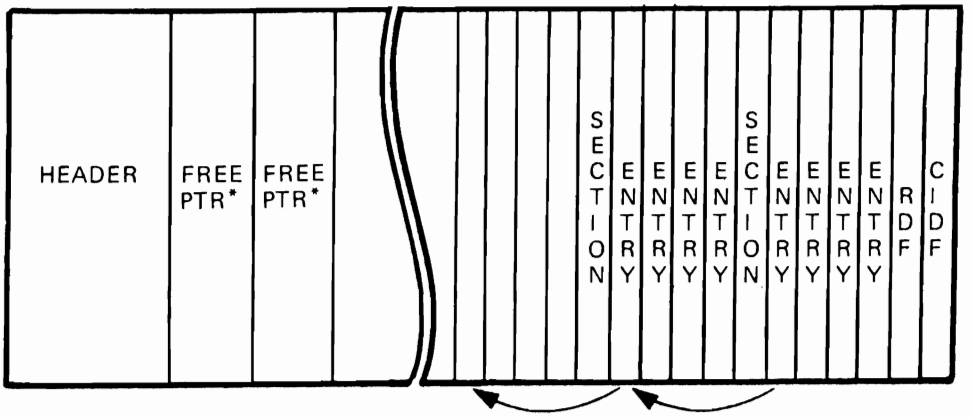
H.1.9

Index Structure



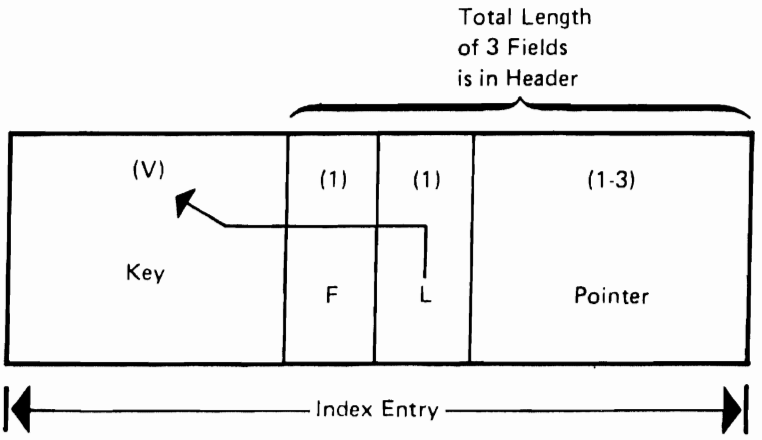
H.1.10

INDEX RECORD FORMAT



*EXISTS ONLY IN SEQUENCE SET RECORDS

INDEX ENTRY



# OF INDEX ENTRIES	PER CI SIZE
58	512
120	1024
248	2048
502	4096

VSAM FEATURES AND BENEFITS

ACCESS METHOD SERVICES

CHARACTERISTICS

DATA SET UTILITY

INTERFACE TO VSAM AND THE CATALOG

INVOKED BY

JCL

TSO TERMINAL

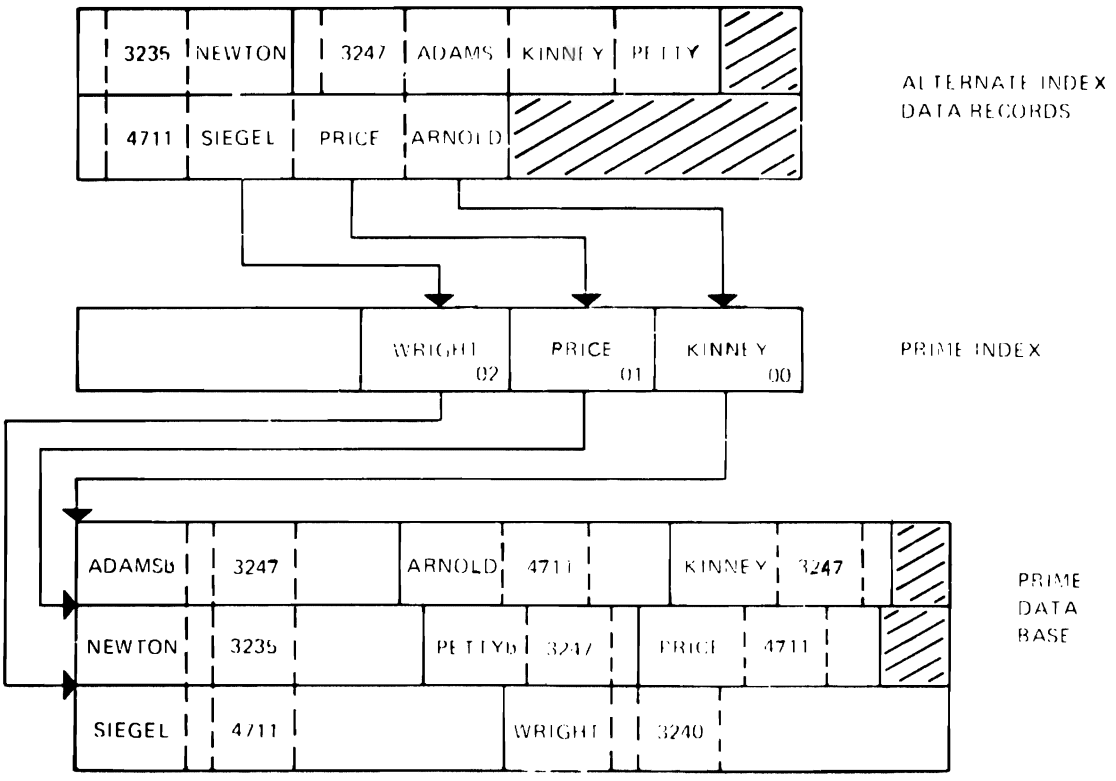
The following is a coding example of invoking Access Method Services within the program. This example is a LISTCAT ALL command.

```
//STEP1  EXEC   ASMFCLG
//ASM.SYSIN DD  *
CSECT    START
         SAVE   (14,12)
         BALR   12,0
         USING  *,12
         LA     11,SAVE
         ST     13,SAVE+4
         ST     11,8(13)
         LR     13,11
         LINK   EP=IDCAMS,PARAM=(OPTION,DDNAME,PAGE,IOLIST),VL=1
         L      13,SAVE+4
         RETURN (14,12),RC=0
INROUT   SAVE   (14,12)              I/O ROUTINE
         BALR   10,0
         USING  *,10
         ST     13,SVAE2+4
         LA     11,SAVE2
         ST     11,8(13)
         LR     13,11
         L      3,4(1)               REG3 - PTR I/O FLAGS
         SR     4,4
         IC     4,0(3)               REG4 - CODE INDICATING OPERATION
         C      4,=F'8'              TEST CODE 8 - GET
         BNE    OPENCLOS
SW       NOP    END
         MVI    SW+1,X'F0'           SET SWITCH FOR SECOND GET
         L      6,8(1)               REG6 - PTR I/O INFORMATION
         MVC    0(4,6),=A(COMMAND)   PTR RECORD TO I/O INFO
         MVC    4(4,6),=F'80'        RECORD LENGTH TO I/O INFO
         L      13,SAVE2+4
         RETURN (14,12),RC=0
END      L      13,SAVE2+4            SECOND TIME - END OF DATA
         RETURN (14,12),RC=4
OPENCLOS L      13,SAVE2+4           RETURN IF OPEN/CLOSE
         RETURN (14,12),RC=0
SAVE     DC     18F'0'
SVAE2    DC     18F'0'
OPTION   DC     H'0'
DDNAME   DC     H'0'
PAGE     DC     H'0'
IOLIST   DC     F'1'
         DC     A(DDCARD)
         DC     A(INROUT)
         DC     F'0'
COMMAND  DC     CL80'LISTC ALL'
DDCARD   DC     CL10'DDSYSIN'
         END
//GO.SYSPRINT DD SYSOUT=A
//GO.STEPCAT DD DSN=OSVS.VSAMUCAT,DISP=SHR
//GO.SYSUDUMP DD SYSOUT=A
```

ALTERNATE INDEXES

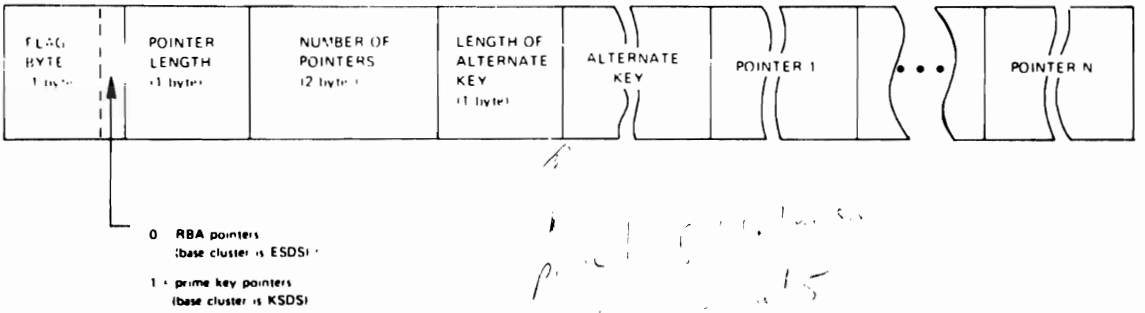
- ABILITY TO ACCESS A KSDS BY A KEY OTHER THAN THE PRIME KEY
  EXAMPLE: PAYROLL FILE BY NAME, EMPLOYEE SERIAL NUMBER, OR DEPARTMENT NUMBER
- ABILITY TO ACCESS AN ESDS BY KEY
- ABILITY TO INDEX ON A NON-UNIQUE KEY FIELD
- ABILITY TO HAVE MULTIPLE PATHS TO A DATA SET

H.2.1

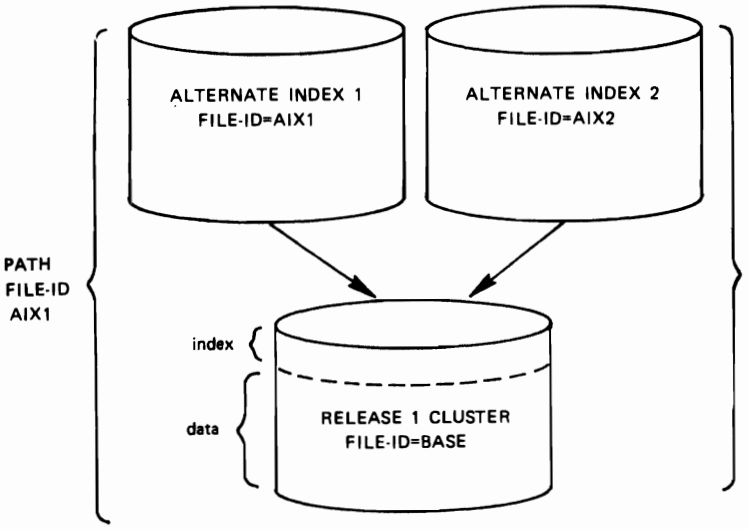


H.2.2

ALTERNATE INDEX RECORD FORMAT

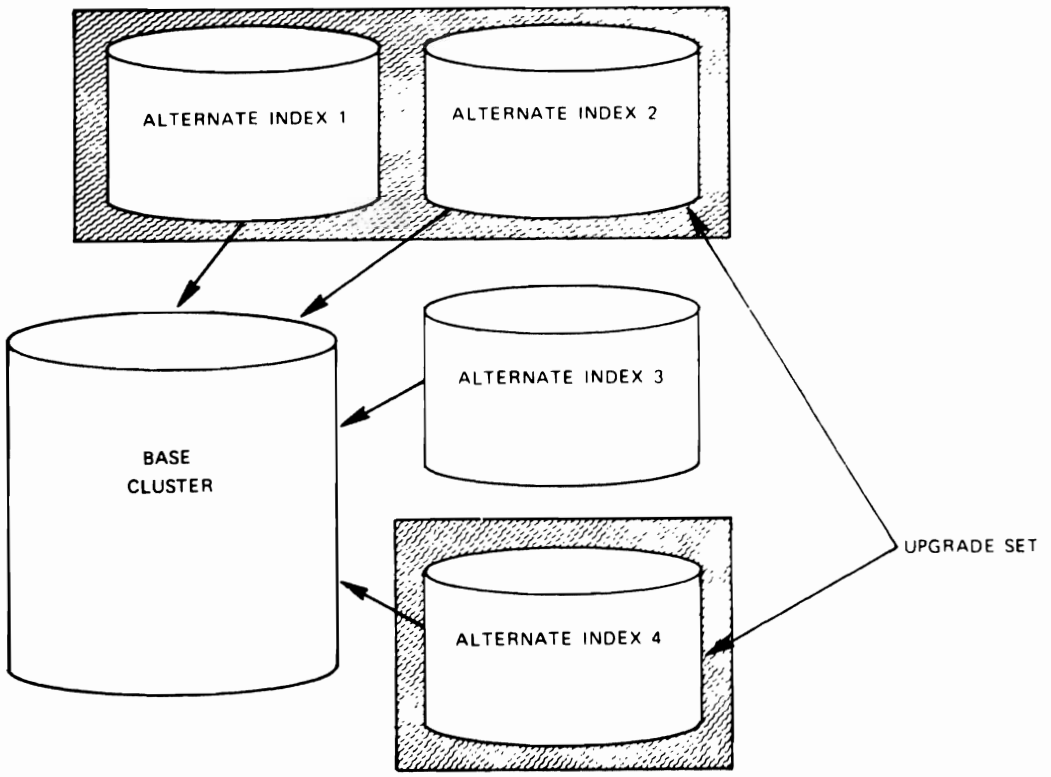


PATH CONCEPT



- PATH IS VEHICLE FOR ACCESS VIA ALTERNATE KEY
- PATH CONSISTS OF BASE CLUSTER AND, OPTIONALLY, AN ALTERNATE INDEX
- MULTIPLE PATHS FOR SAME ALTERNATE INDEX OR FOR BASE CLUSTER

THE UPGRADE SET



H.2.5

AUTOMATIC UPGRADE

- FOR MEMBERS OF UPGRADE SET
- IF BASE CLUSTER OPENED DIRECTLY OR VIA **UPDATE** PATH
- NEW POINTERS ARE ADDED TO END OF POINTER SET OF ALTERNATE INDEX RECORD (ARRIVAL-TIME ORDER)
- ALTERNATE KEYS EXCEPT THE KEY OF REFERENCE MAY BE CHANGED
- UPDATES OR INSERTS FAIL IF THEY PRODUCE A NON-UNIQUE KEY FOR A **UNIQUEKEY** MEMBER OF THE UPGRADE SET

H.2.6

STEPS FOR LOADING AN ALTERNATE INDEX

1. DEFINE THE ALTERNATE INDEX
2. EXTRACT ALTERNATE KEYS & POINTERS
3. ORDER KEYS & POINTERS BY ALTERNATE KEY SEQUENCE
4. BUILD ALTERNATE INDEX RECORDS
5. BUILD ALTERNATE INDEX AS A KSDS

DEFINING AN ALTERNATE INDEX

```
ACCESS METHOD SERVICES
DEFINE  ALTERNATEINDEX
          (RELATE (entryname [/password] )
          [UPGRADE | NOUPGRADE]
          [UNIQUEKEY | NONUNIQUEKEY]          SAME AS FOR KSDS CLUSTER LEVEL,
            •                                 BUT YOU CANNOT SPECIFY
            • <-------------------------      INDEXED, { SPANNED|NONSPANNED } .
            •                                 KEYS APPLIES TO ALTERNATE KEY.
          )
        [DATA
          ( [UNIQUEKEY | NONUNIQUEKEY]
            •                                 SAME AS FOR KSDS DATA LEVEL,
            • <-------------------------      BUT YOU CANNOT SPECIFY { SPANNED|
            •                                 NONSPANNED } . KEYS APPLIES TO
                                              ALTERNATE KEY.
          )
        ]
        [INDEX
            •
            • <-------------------------      SAME AS FOR KSDS INDEX LEVEL
            •
        ]
```

DEFINE ALTERNATE INDEX

```
DEFINE  ALTERNATEINDEX   (NAME (DEPT.NUMBER.AIX.PAYROLL) -
                         RELATE (PAYROLL/MASTERPW) -
                         VOLUMES (AIX001 AIX002) -
                         UPGRADE) -
        DATA             (NAME (DEPT.NUMBER.DATA) -
                         CYLINDERS (5 5) -
                         RECORDSIZE (200 4046) -
                         KEYS (7 65) -
                         NONUNIQUEKEY) -
        INDEX            (NAME (DEPT.NUMBER.INDEX) -
                         IMBED -
                         CYLINDERS (2 1))
```


DEFINING A PATH

ACCESS METHOD SERVICES

```
DEFINE PATH   (NAME (name)
              PATHENTRY (entryname[/password])
              [MODEL (entryname[/password]
                     [catname[/password] [dname]])]
              [FILE (dname)]
              [UPDATE | NOUPDATE]
              [protection parameters]
              )
              [CATALOG(catname[/password] [dname])]
```

DEFINE PATH

```
DEFINE  PATH  (NAME (DEPT.NUMBER.PATH.PAYROLL) -
               PATHENTRY (DEPT.NUMBER.AIX.PAYROLL) -
               UPDATE)
```


LOADING ALTERNATE INDEXES

```
ACCESS METHOD SERVICES
    BLDINDEX  INFILE (dname [/password])
              OUTFILE (dname [/password]...)
              [EXTERNALSORT | INTERNALSORT]
              [WORKFILES (dname1 dname2)]
              [CATALOG (catname [/password])]
```

DEFAULT WORKFILES: IDCUT1 , IDCUT2

BLDINDEX

```
BLDINDEX    INFILE (base cluster name/master password)
            OUTFILE (alternate index name) -
            WORKFILES (sortwrk1 sortwrk2)
```


PROCESSING AN ALTERNATE INDEX AS A KSDS

```
            OPEN      ACB1
            .
            .
            .
            .
ACB1        ACB       DDNAME=DD1
            .
            .
//DD1       DD        DSNAME = alternate index name, DISP = SHR
-------------------------------------------------------------------------
            OPEN      ACB2
            .
            .
            .
            .
ACB2        ACB       DDNAME   DD2,MACRF   (AIX,OUT,RST)
            .
            .
//DD2       DD        DSNAME = path name, DISP = SHR

-------------------------------------------------------------------------
```

PROCESSING ON A PATH LEVEL

```
                OPEN        ACB1
                .
                .
                .
                .
ACB1            ACB         DDNAME=DD1, MACRF=OUT
                .
                .
                .
DD1             DD          DSN= path name, DISP=SHR
```

H.2.15

ACCESSING THROUGH A PATH

IF PATHENTRY IS ALTERNATE INDEX **THEN**

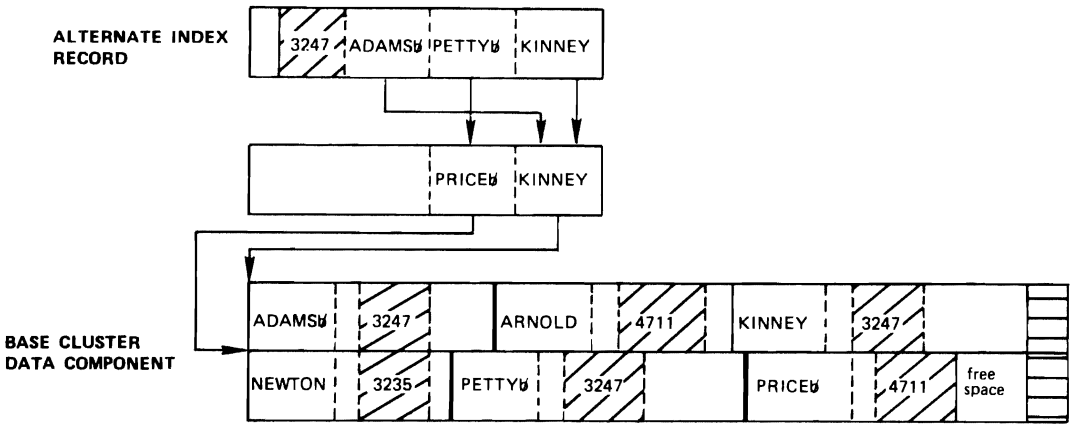
- KEYED PROCESSING AS FOR KSDS
- ALTERNATE KEY ASSOCIATED WITH PATHENTRY
  AIX IS KEY OF REFERENCE
- HOWEVER,
  - KEY OF REFERENCE AND PRIME KEY
    CANNOT BE CHANGED
  - LIMITATIONS IMPOSED BY BASE CLUSTER
    APPLY.
    NO ERASE IF BASE CLUSTER AN ESDS,
    NO UPDATE WITH LENGTH CHANGE IF
    BASE CLUSTER AN ESDS,
    INSERTS GO TO END OF ESDS.

IF PATHENTRY IS BASE CLUSTER **THEN**

- SAME AS FOR BASE CLUSTER

H.2.16

HANDLING OF NON-UNIQUE KEYS

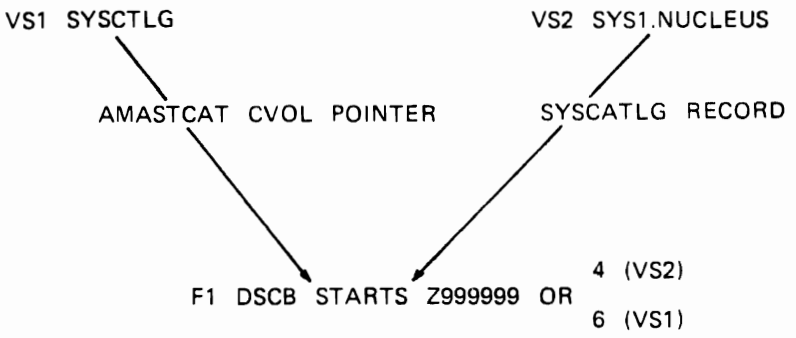


- POINT positions to first "non-unique" of alternate index record (ADAMSb)
- GET skip-sequential or direct retrieves first "non-unique" as indicated in alternate index record (ADAMSb)
- GET sequential retrieves "non-uniques" in order indicated in alternate index record (ADAMSb, PETTYb, KINNEY)

ALTERNATE INDEX RESTRICTIONS

- NO ALTERNATE INDEXES FOR RELATIVE RECORD DATA SETS
- FOR SPANNED RECORDS, ALL KEYS MUST BE WITHIN FIRST SEGMENT
- LENGTH OF ALTERNATE KEYS MUST NOT EXCEED 255
- BASE CLUSTER MUST NOT BE EMPTY FOR **BLDINDEX**
- UPGRADE DONE ONLY FOR NON-EMPTY ALTERNATE INDEXES
- No

LOCATING MASTER CATALOG

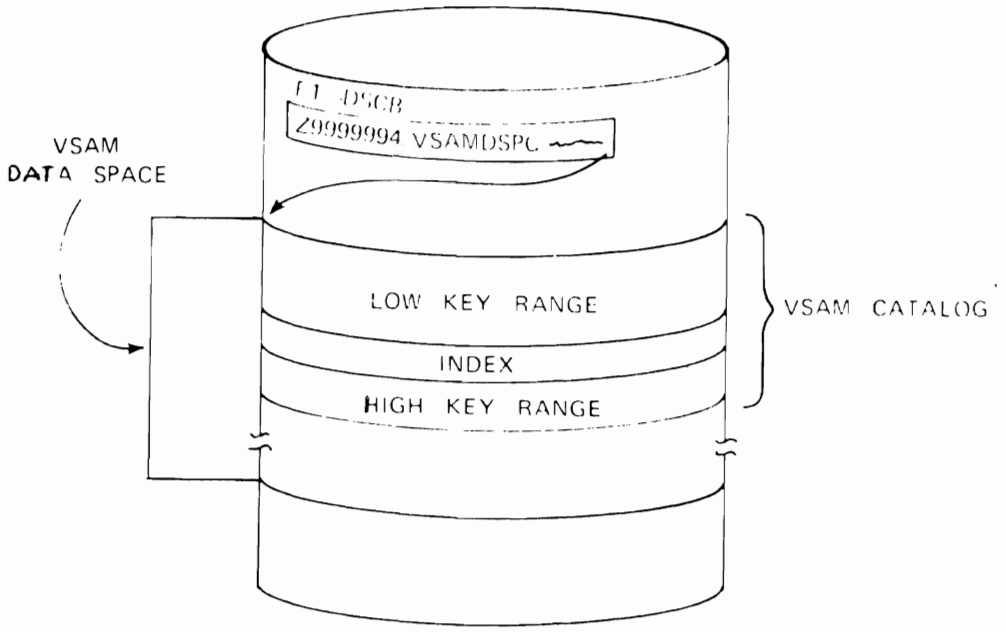


VSAM INTEGRITY

F4 DSCB – OWNERSHIP BIT FOR VOLUME OFFSET X'54

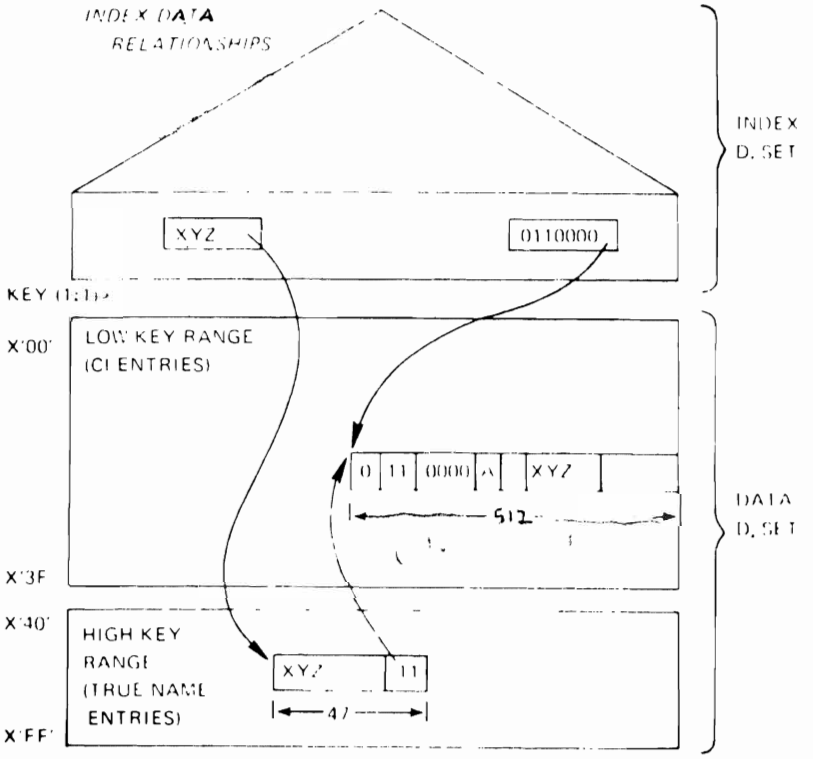
F1 DSCB – OS/VS PROTECT BITS ALWAYS ON X'5D'

VOLUME CONTAINING A VSAM CATALOG



H.3.3

VSAM CATALOG



H.3.4

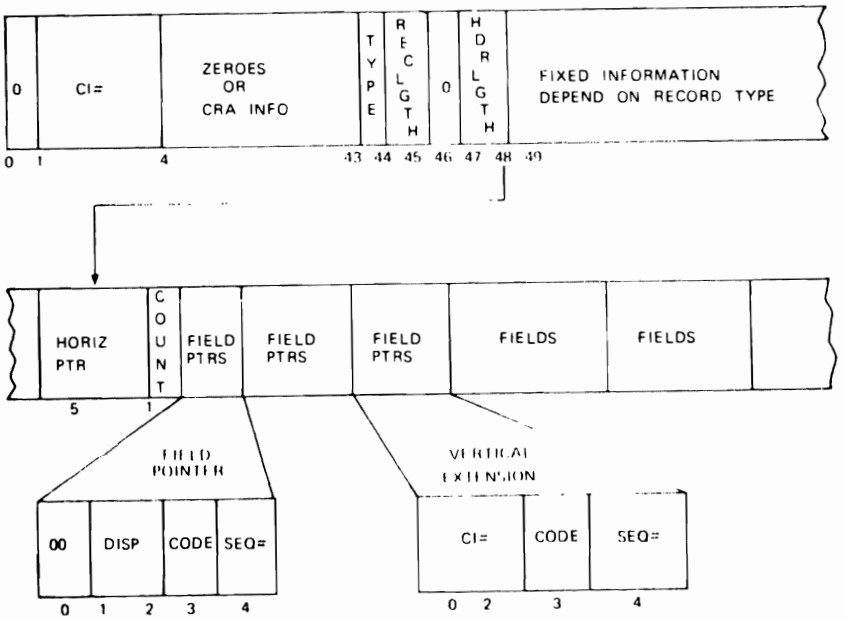
Self-Defining Catalog Records

- Located by Pre–Defined Physical Location
- Formats Same as Object Definition Records
- Record Contents

CIØ – Data Portion Descriptor
CI1 – Index Portion Descriptor
CI2 – Cluster Descriptor
CI3 – Catalog Control Record – CI Allocation Data
CI4 – Extension of CI 1 – High Level Index Extents
CI5 – Extension of CI Ø – Low Address Data Extents
CI6 – Extension of CI 1 – Low Address Sequence Set
CI7 – Extension of CI Ø – High Address Data Extents
CI8 – Extension of CI 1 – High Address Sequence Set
CI9 – This Volume Space Allocation Descriptor
CIA– Extension of CI 9 – This Volume's Bit Map
CI_n– Extension of CI 9 – As Many as Required

H 3.5

LOW KEY RANGE RECORD FORMAT



CODES 1 – AMDSB
2 – ASSOCIATION
3 – VOLUME INFO
4 – PASSWORD
5 – TRACK ALLOCATION
6 – DATA SPACE INFO
8 – DATA SET DIRECTORY

H.3.6

CATALOG STORAGE ESTIMATE WORKSHEET

	2314	3330	3340	3350
1 NUMBER OF ENTRIES FOR CATALOG	14	15	15	15
2 NUMBER OF ENTRIES REQUIRED FOR LOW KEY RANGE (SEE TABLE)				
3 TOTAL (1) + (2)				
4 NUMBER OF CIS FOR HIGH KEY RANGE (3) / 10 (ROUND HIGH)				
5 TOTAL NUMBER OF CIS REQUIRED (3) + (4)				
6 NUMBER OF TRACKS REQUIRED FOR DATA (ROUND HIGH) (5) / NO. OF CIs/TRACK*				
7 NUMBER OF TRACKS FOR IMBED SEQUENCE SET (ROUND HIGH) (6) / n**				
8. TOTAL NUMBER OF TRACKS FOR DATA AND SEQUENCE SET. (6) + (7)				
9 ROUND UP (8) TO MULTIPLE OF CA SIZE n				
10 NUMBER OF TRACKS FOR INDEX SET	5	3	5	3
11. TOTAL NUMBER OF TRACKS FOR DATA AND INDEX SET (9) + (10)				

*11 FOR 2314, 20 FOR 3330, 12 FOR 3340, 27 FOR 3350

**4 FOR 2314, 2 FOR 3330, 4 FOR 3340, 2 FOR 3350

n IS 5 FOR 2314, 3 FOR 3330, 5 FOR 3340, 3 FOR 3350

CATALOG STORAGE

LINE 2 OF WORKSHEET

NUMBER OF ENTRIES REQUIRED FOR LOW KEY RANGE:

NUMBER OF

A. KSDS X 3 = _____

B. ESDS X 2 = _____

C. RRDS X 2 = _____

D. PATHS X 1 = _____

E. AIX X 3 = _____

F. UPGRADE X 1 = _____

G. NON-VSAM X 1 = _____

H. VOL X (3+n)* = _____

TOTAL NUMBER OF ENTRIES = _____
(LINE 2)

*n=0 FOR 2314/2319

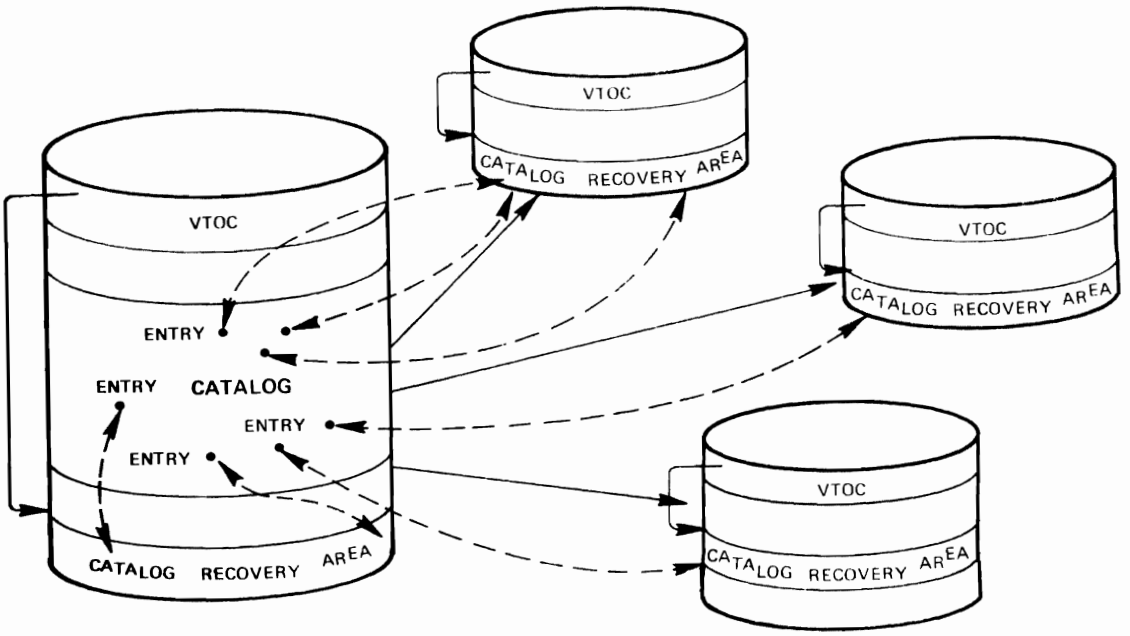
n=1 FOR 3330/3340

n=3 FOR 3350/3330-11

CATALOG RECOVERY

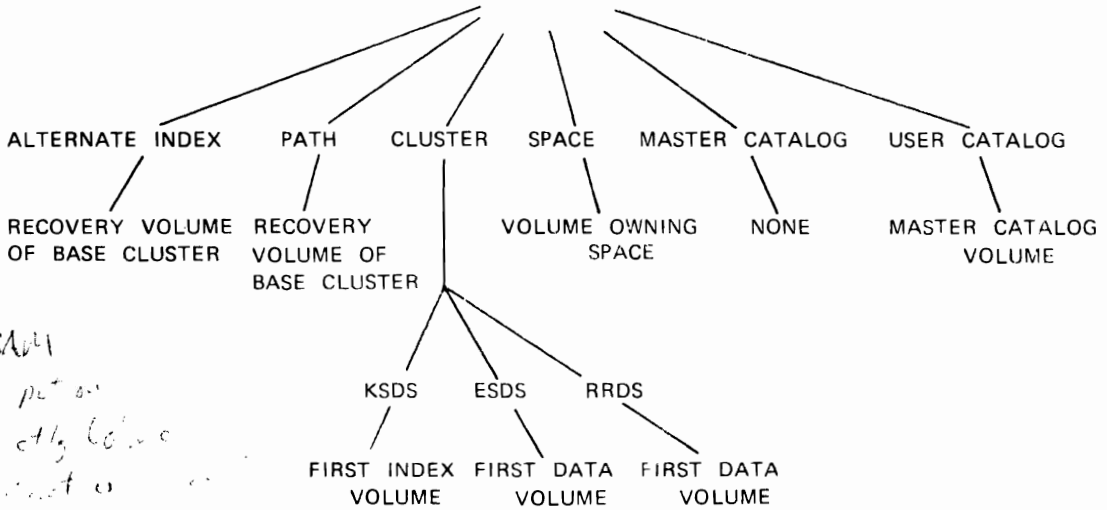
- ABILITY TO DUPLICATE CATALOG INFORMATION AT DECENTRALIZED PLACES
- A SET OF ACCESS METHOD SERVICES COMMANDS EASING THE RECOVERY FROM THE LOSS OF CATALOG INFORMATION

RECOVERABLE CATALOGS



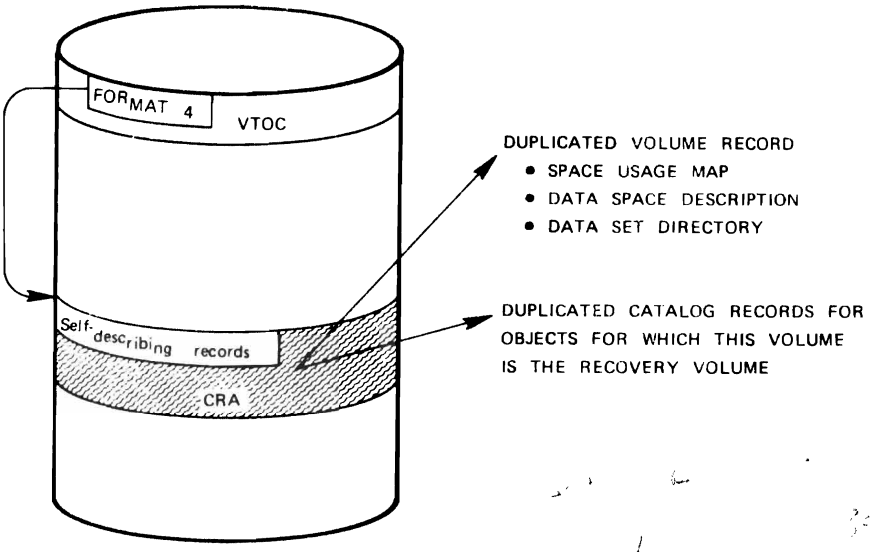
H.3.10

VOLUME CRA WHICH WILL CONTAIN THE DUPLICATE CATALOG RECORDS



H.3.11

CATALOG RECOVERY AREA (CRA)



H.3.12

ESTABLISHING A CATALOG RECOVERY AREA

- THE CATALOG RECOVERY AREA FOR A VOLUME IS ESTABLISHED AT THE TIME THE VOLUME ENTRY FOR THE VOLUME IS CREATED, I.E., WHEN THE VOLUME APPEARS FOR THE FIRST TIME IN THE VOLUMES OR ADDVOLUMES LIST OF AN ACCESS METHOD SERVICES COMMAND
- ONE CYLINDER OF THE FIRST SPACE ALLOCATION FOR A VOLUME IS SET ASIDE FOR THE CATALOG RECOVERY AREA

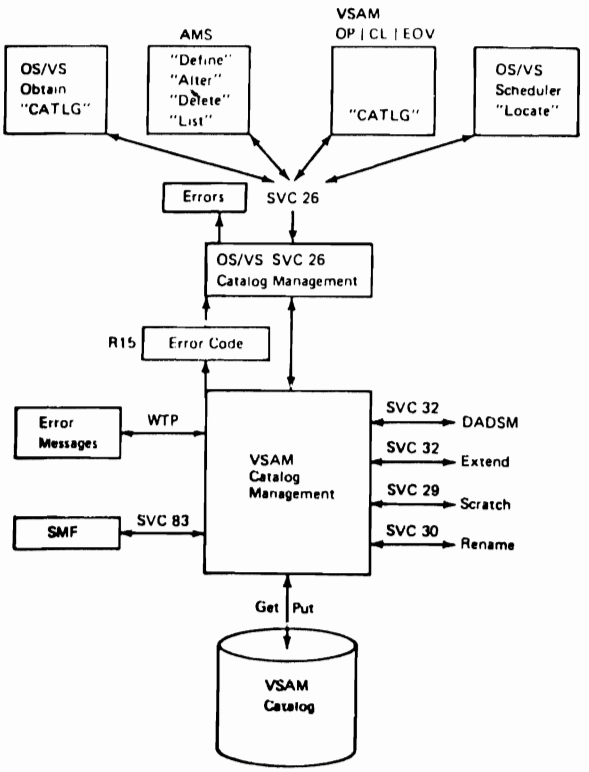
H.3.13

MOUNTING REQUIREMENTS WITH RECOVERABLE CATALOGS

ACTION	VOLUME MOUNT REQUIREMENTS
DEFINE	ALL VOLUMES OF AN EVENTUAL **VOLUMES** LIST, RECOVERY VOLUME OF OBJECT BEING DEFINED
ALTER	ALL VOLUMES OF EVENTUAL **ADDVOLUMES** OR **REMOVEVOLUMES** LISTS, RECOVERY VOLUME OF OBJECT BEING ALTERED
DELETE	ALL VOLUMES OF OBJECT BEING DELETED, RECOVERY VOLUME OF OBJECT BEING DELETED
BLDINDEX, EXPORT, IMPORT, PRINT REPRO, VERIFY	ALL VOLUMES REQUIRED FOR NON-RECOVERABLE CATALOG, RECOVERY VOLUMES OF OBJECTS BEING PROCESSED
LISTCAT VSAM PROGRAM	SAME AS FOR NON-RECOVERABLE CATALOG ALL VOLUMES REQUIRED FOR NON-RECOVERABLE CATALOG, RECOVERY VOLUMES OF OBJECTS BEING PROCESSED

H.3.14

Catalog Interfaces



H.3.15

FOUR LEVELS OF PROTECTION

MASTER LEVEL

CONTROL LEVEL

UPDATE LEVEL

READ LEVEL

ENTRY HIERARCHY

CLUSTER – HIGHEST LEVEL

DATA/INDEX – SAME LEVEL

ONLY READ LEVEL PASSWORD SPECIFIED

READPW(ALLOW)

RESULTS IN:

MASTER PASSWORD	ALLOW
CONTROL PASSWORD	ALLOW
UPDATE PASSWORD	ALLOW
READ PASSWORD	ALLOW

READ AND CONTROL PASSWORD SPECIFIED

READPW(ALLOW)
CONTROLPW(ALLOWIT)

RESULTS:

MASTER PASSWORD	ALLOWIT
CONTROL PASSWORD	ALLOWIT
UPDATE PASSWORD	not specified
READ PASSWORD	ALLOW

AUTHORIZATION PARAMETER

AUTHORIZATION (ENTRYPOINT STRING)

ENTRYPOINT IS THE ENTRY POINT OF YOUR ROUTINE ON SYS1.LINKLIB. STRING IS YOUR OWN SECURITY INFORMATION UP TO 256 BYTES

ABBR. AUTH (ENTRYPOINT STRING)

PASSWORD PROTECTION EXAMPLE 1

```
CATALOG PROTECTED AT THE MASTER LEVEL
    DEFINE CLUSTER (NAME(FILE1)
        MRPW(CM04) -
        CTLPW(CC03) -
        UPDPW(CU02) -
        RDPW(CR01)- -
      DATA NAME (DATA1) -
        MRPW(DM04) -
        CTLPW(DC03)
        UPDPW(DU02) -
        RDPW(DRO1) -
      INDEX (NAME(INDEX1)
        MRPW(IM04) -
        CTLPW(IC03) -
        UPDPW(IU02) -
        RDPW(IR01))
WHICH PASSWORD (S) IS/ARE REQUIRED FOR THE FOLLOWING
    a.  TO UPDATE THE INDEX COMPONENT ?
    b.  TO UPDATE THE DATA COMPONENT ?
    c.  TO UPDATE THE DATA SET (FILE1) ?
    d.  TO DELETE THE DATA SET (FILE1) ?
```

PASSWORD PROTECTION EXAMPLE 2

```
DEFINE CLUSTER (NAME(FILE2)
        MRPW(null) -
        CTLPW(null)
        UPDPW(null) -
        RDPW(null)
    DATA NAME(DATA2) -
        MRPW(D2M04)
        CTLPW(D2C03)
        UPDPW(D2U02)
        RDPW(D2R01) -
    INDEX (NAME(INDEX2) -
        MRPW(I2M04) -
        CTLPW(I2C03)
        UPDPW(I2U02)
        RDPW(I2R01) )
```

WHICH PASSWORD (S) IS/ARE REQUIRED TO DO THE FOLLOWING

a. UPDATE THE DATA COMPONENT (DATA2) ?

b. READ THE INDEX COMPONENT (INDEX2) ?

c. READ THE DATA SET (FILE2)

d. DELETE THE DATA SET (FILE2)

VSAM INTEGRITY

- CONTROL INFORMATION SECURITY
- USE OF FREE SPACE
- INDEX UPDATED ONLY ON SPLIT
- SPLIT SEQUENCE CONTROL
- SOFTWARE EOF
- WRITE CHECK OPTION

H.5.1

CONTROL INTERVAL SPLIT SEQUENCE

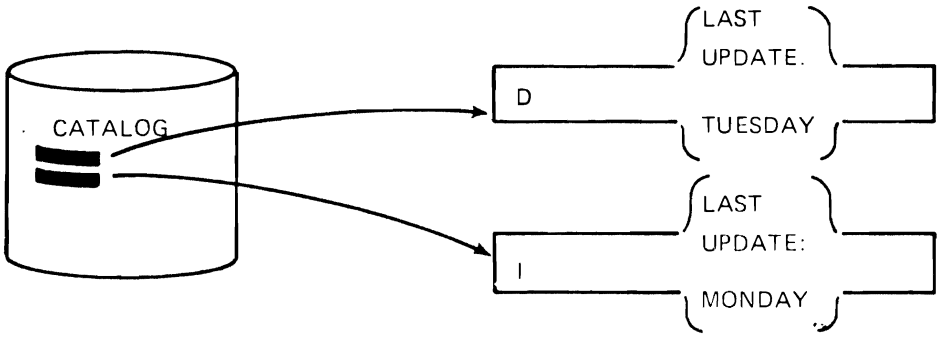
1. TARGET CI IS DIVIDED INTO TWO CI's IN PRIMARY STORAGE
2. RECORD TO BE INSERTED IS PLACED IN THE PROPER CI IN PRIMARY STORAGE
3. NEW CI IS WRITTEN TO A SPARE CI IN THE GIVEN CA ON SECONDARY STORAGE
4. SEQUENCE SET RECORD IS UPDATED IN PRIMARY STORAGE AND WRITTEN TO SECONDARY STORAGE
5. UPDATED TARGET CI IS WRITTEN TO SECONDARY STORAGE

H.5.2

SMF RECORDS AND VSAM

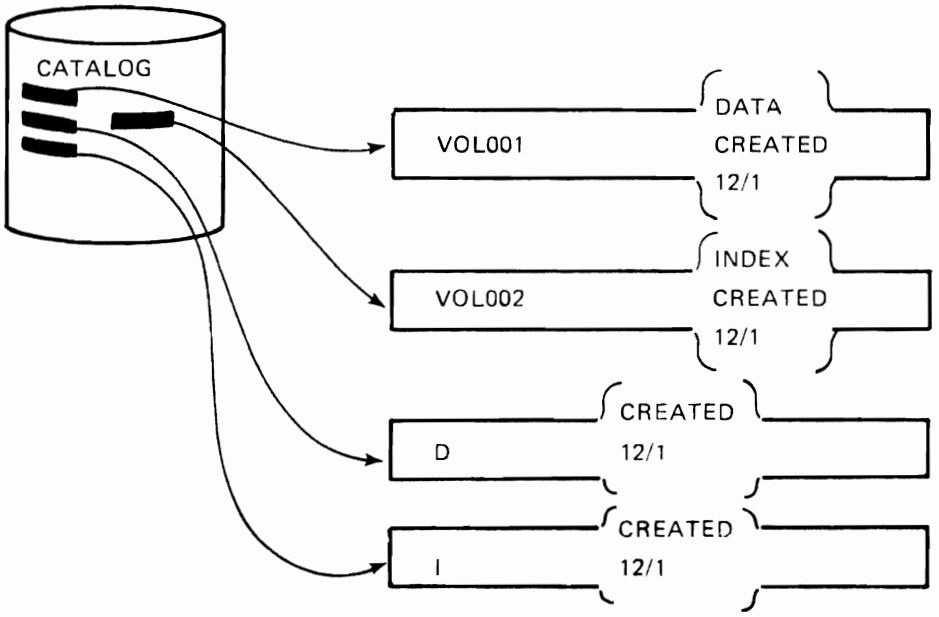
TYPE	68	–	VSAM ENTRY RENAMED
TYPE	63	–	VSAM ENTRY DEFINED
TYPE	67	–	VSAM ENTRY DELETED
TYPE	69	–	DATA SPACE DEFINED, DELETED OR EXTENDED
TYPE	64	–	DATA SET CLOSED OR EOV
TYPE	62	–	DATA SET OPENED

DATA & INDEX UPDATE (AMDSB) TIMESTAMP



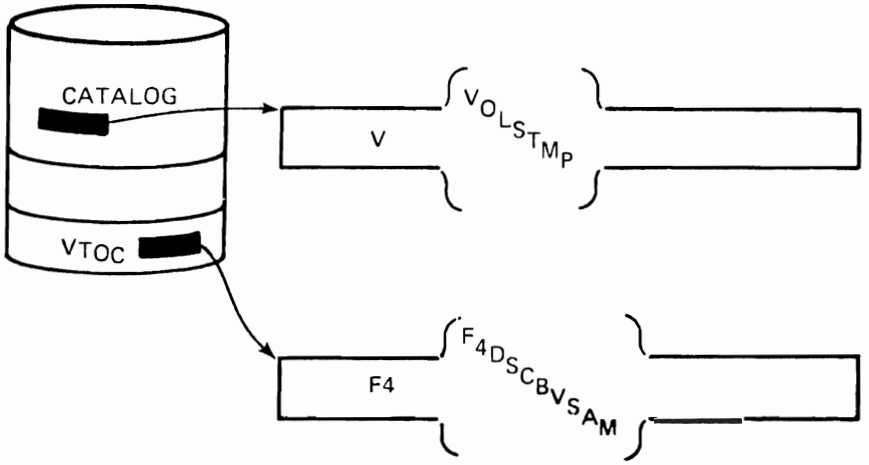
TO CORRECT: VERIFY
OR
UNLOAD, SORT, RELOAD

DATA & INDEX CREATION TIMESTAMP



H.5.5

VOLUME TIMESTAMPS



H.5.6

BACKUP / RECOVERY CONSIDERATIONS

- NECESSITY FOR BACKUP
- BACKUP
  - FREQUENCY
  - TIME REQUIRED
  - EASE
- RECOVERY
  - POSSIBLE FREQUENCY
  - TIME REQUIRED
  - EASE
- SECURITY
- INTEGRITY

TYPES OF RECOVERY

REPAIR

RESTORES ADDRESSABILITY AND ACCESS TO THE CURRENT VERSION OF THE DATA

RESET

RESTORES ADDRESSABILITY AND ACCESS TO A PREVIOUS VERSION OF THE DATA

RECOVERY TOOLS

NON-RECOVERABLE CATALOGS	
EXPORT/IMPORT	RESET
REPRO	RESET/REPAIR
IEHDASDR	RESET
VERIFY	REPAIR
RECOVERABLE CATALOGS–ADDITIONAL TOOLS	
EXPORTRA/IMPORTRA	RESET/REPAIR
LISTCRA (COMPARE)	ANALYSIS
ALTER (REMOVE VOLUMES)	RESET/REPAIR
DELETE (FORCE)	RESET/REPAIR
RESETCAT	REPAIR

RECOVERY FACILITIES FOR VSAM

ACCESS METHOD SERVICES

- REPRO
- EXPORT/IMPORT
- VERIFY
- EXPORTRA/IMPORTRA
- LISTCRA
- RESETCAT

USER PROGRAM - JOURNAL

SMF

IEHDASDR

BACKUP / RECOVERY ALTERNATIVES

- SPIN - OFF DATA SETS
- USER WRITTEN PROGRAMS
- REPRO
- EXPORT / IMPORT
- IEHDASDR

VSAM VOLUMES

- A GIVEN VOLUME CAN BE OWNED BY ONE AND ONLY ONE CATALOG
- OWNERSHIP INDICATED WHEN SPACE OR CANDIDATE VOLUME DEFINED
  - FORMAT 4 FLAG
  - CATALOG VOLUME RECORD
- RETURN OF VSAM VOLUMES
  - DELETE DATA
  - DELETE SPACE

PROBLEMS REQUIRING RECOVERY

DATA SET NOT PROPERLY CLOSED

- INCORRECT HIGH RBA IN CATALOG
- INCOMPLETE WRITE TO DASD
- DUPLICATE DATA

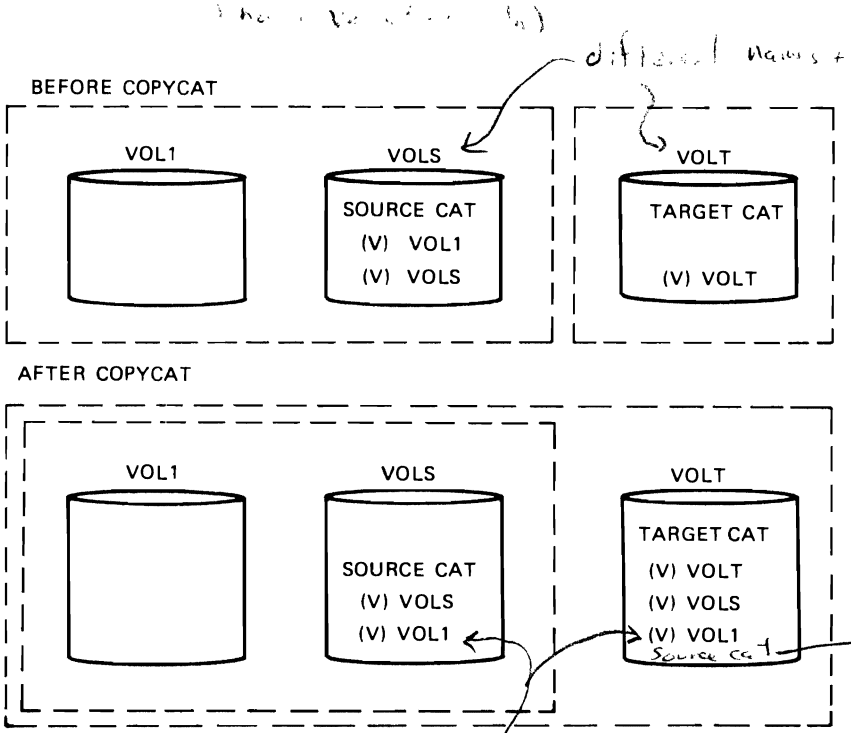
DATA SET INACCESSIBLE

- DATA SET CANNOT BE OPENed
- DATA SET COMPLETELY UNREADABLE
- DATA SET PARTIALLY UNREADABLE

UNUSABLE CATALOG

- MANY VSAM DATA SETS CANNOT BE OPENed
- THE CATALOG CANNOT BE OPENed
- THE CATALOG VOLUME IS NOT USABLE

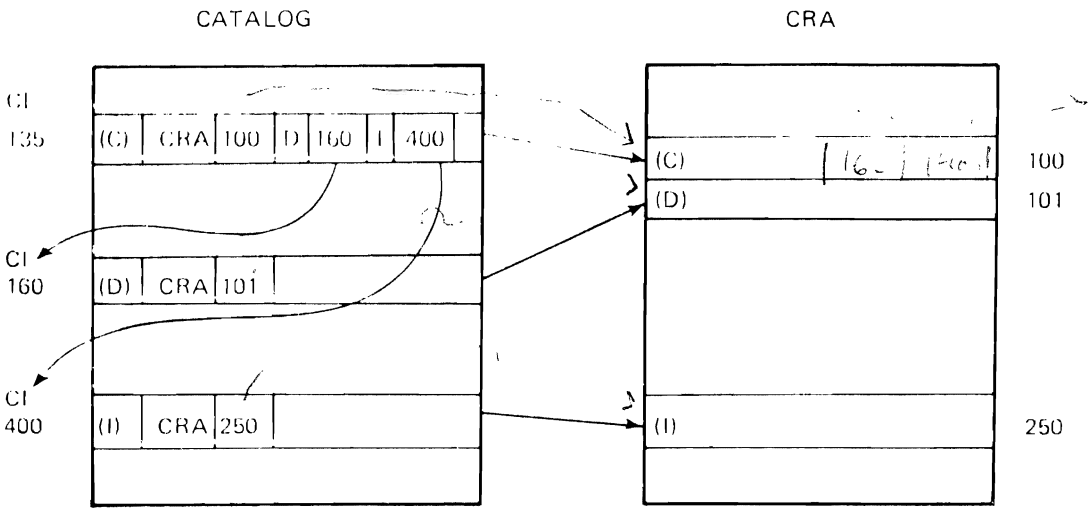
COPY A CATALOG (MVS ONLY)



CATALOG RECOVERY AREA FUNCTIONS: ACCESS METHOD SERVICES

LISTCRA.	LISTS CRA OBJECTS DUMPS CRA RECORDS COMPARES CRA WITH CATALOG
RESETCAT.	COMPARES CRA AND CATALOG REBUILDS CATALOG FROM CRA
EXPORTRA	EXPORTS FILES USING CRA MULTIPLE FILES ON SINGLE MEDIUM
IMPORTRA	IMPORTS FILES FROM COPY CREATED BY EXPORTRA

CRA RECORD RELATIONSHIP



THE ASSOCIATION THAT IS IN THE CATALOG IS NOT IN THE CRA

THERE ARE NO POINTERS JOINING CI's 100,101 AND 250 IN THE CRA

COMPARING OR LISTING THE CRA

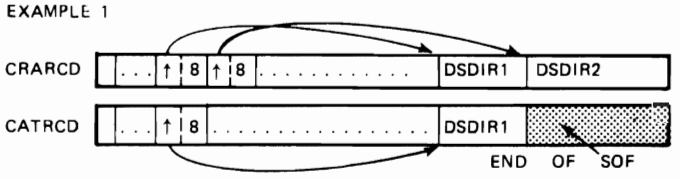
LISTCRA COMMAND

- WITHOUT COMPARE OPTION
  - LISTS NAME, TYPE, AND VOLUMES OF ALL OBJECTS "DEFINED" IN THE SPECIFIED CRA, OR
  - PRINTS ALL CRA RECORDS IN DUMP FORMAT
- WITH COMPARE OPTION
  - COMPARES CRA RECORDS WITH APPROPRIATE RECORDS OF A SPECIFIED CATALOG
  - LISTS OR DUMPS ALL NON-MATCHING CRA ENTRIES AND THEIR EQUIVALENT IN THE SPECIFIED CATALOG

LISTCRA DUMP COMPARE

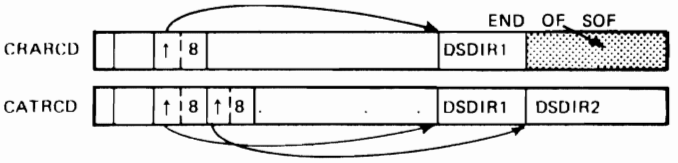
THE CRA RECORD IS ALWAYS USED AS
THE BASE FOR COMPARISON

EXAMPLE 1



"MISCOMPARE DATASET DIRECTORY" WILL ALWAYS BE
ISSUED BECAUSE DSDIR2 COMPARES INCORRECTLY.

EXAMPLE 2



THE MESSAGE ISSUED MAY BE "OTHER" BECAUSE
THE DATASET DIRECTORY FIELD COMPARES CORRECTLY.

LISTCRA WITH COMPARE OPTION

```
LISTCRA  INFILE (CRA1 CRA2) -
         COMPARE -
         NAME -
         MASTERPW(MSTPW) -
         CATALOG (USER.CATALOG/UMSTPW UCAT)
```


EXPORTING DATA BASED ON THE CRA

EXPORTRA COMMAND

- USED TO RECOVER VSAM CATALOG ENTRIES AND DATA BY MEANS OF THE CATALOG RECOVERY AREA
- INFORMATION RECOVERED IS RECORDED ON A PORTABLE MEDIUM, MULTIPLE DATA SETS ON SINGLE PORTABLE MEDIUM
- SPECIFIABLE OBJECTS. ALTERNATE INDEXES, CLUSTERS, USER CATALOGS. NONVSAM
- PATHS ARE AUTOMATICALLY EXPORTED WITH PATH ENTRY CLUSTER
- RECOVERY VOLUME MUST BE MOUNTED

EXPORT BY MEANS OF CRA

```
//STEP1    EXEC PGM=IDCAMS
//DD2       DD UNIT=(3330,2),AMP='AMORG',DISP=OLD,VOL=SER=(VOL02,VOL03)
//DCRA1     DD UNIT=3330,VOL=SER=VOL01,AMP='AMORG'
//DCRA2     DD UNIT=3330,VOL=SER=VOL02,AMP='AMORG'
//DCRA3     DD UNIT=3330,VOL=SER=VOL03,AMP='AMORG'
//OUTFILE   DD UNIT=2400,VOL=SER=TAPE1,DSN=BACKUP
//SYSPRINT  DD SYSOUT=A
//SYSIN     DD *
   EXPORTRA CRA ( ( DCRA1 ENTRIES ((VSAM.CLUSTER ) ) ) -
                  ( DCRA2 ALL INFILE (DD2 ) ) -
                  ( DCRA3 NONE ) ) -
   OUTFILE (OUTFILE) -
    MASTERPW(MASTER)
```


IMPORTING DATA RECOVERED BY EXPORTRA

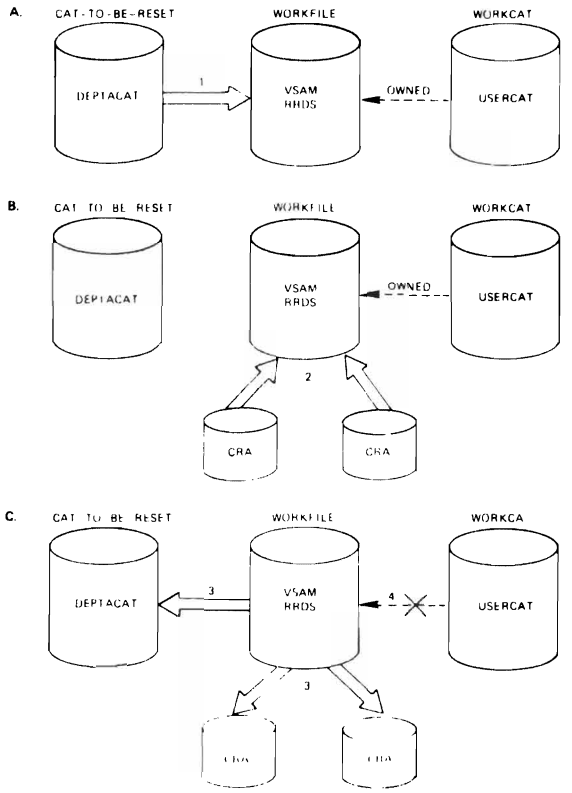
IMPORTRA COMMAND

- USED TO IMPORT OBJECTS ON A PORTABLE MEDIUM CREATED BY **EXPORTRA**
- AUTOMATIC DEFINITION OF OBJECTS ON PORTABLE MEDIUM
- ALREADY EXISTING OBJECTS ARE AUTOMATICALLY REPLACED BY OBJECTS ON PORTABLE MEDIUM
- RECOVERY VOLUME MUST BE MOUNTED

IMPORTRA EXAMPLE

```
//IMP       EXEC    PGM=IDCAMS
//INDD      DD      DSN=EXPORTRA.DATASETS,VOL=SER TAPE1, . . .
//OUTDD     DD      DSN=ANYNAME.NOTIN,DISP OLD,
//    VOL SER=(VOL111,VOL222,VOL333),UNIT 3330,
//    AMP='AMORG'
//SYSPRINT DD SYSOUT=A
//SYSIN  DD  *
     IMPORTRA  INFILE  (INDD) -
               OUTFILE  (OUTDD)
```


RESETCAT FILES



RESETCAT LOGIC

SIMPLIFIED REPLACE/INSERT/DELETE LOGIC

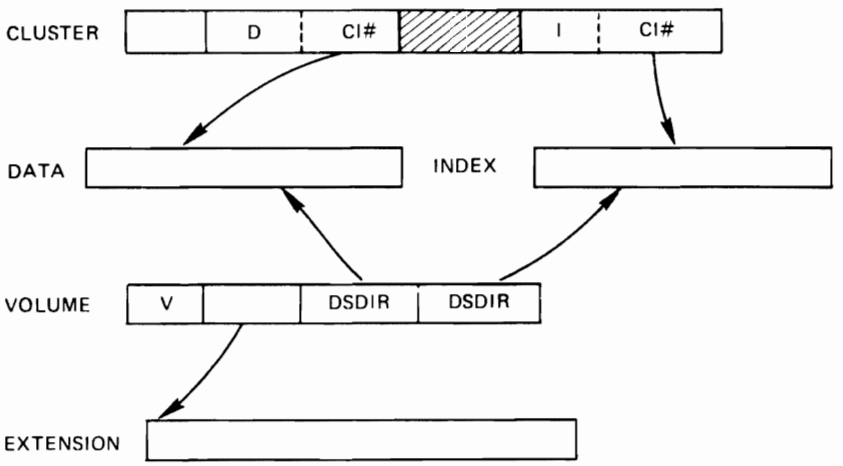
ENTRY IN CRA	Y	Y	N
ENTRY IN CATALOG	Y	N	Y
	REPLACE ENTRY IN CATALOG		–
		INSERT ENTRY IN CATALOG	–
			DELETE ENTRY IN CATALOG

H.5.25

ASSOCIATION CHECK

– MANY RECORDS IN THE VSAM CATALOG CONTAINS CI NUMBERS TO OTHER CATALOG RECORDS.

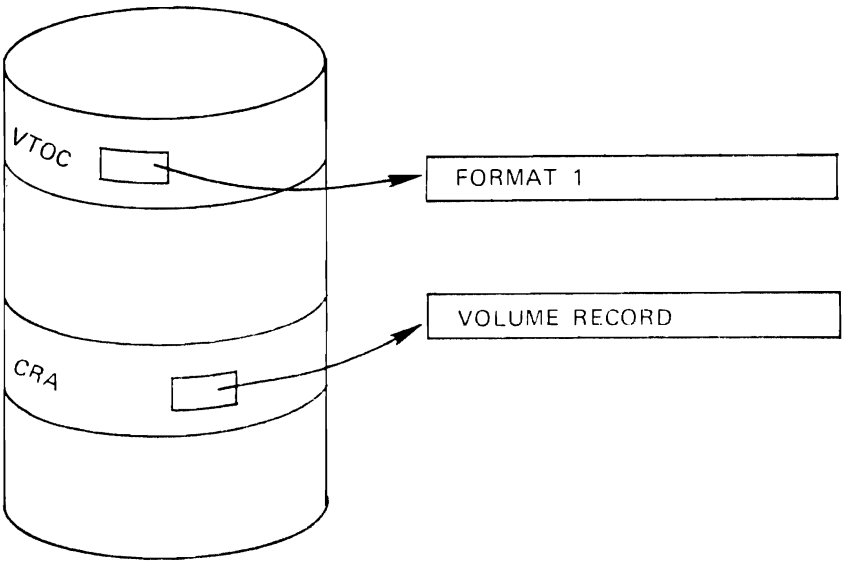
– FOR EXAMPLE



– ALL CI#s IN THE RECORDS ARE CHECKED FOR CORRECT ASSOCIATION.

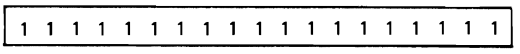
H.5.26

DATA SPACE ACCOUNTING

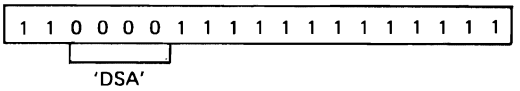


SPACE CONSISTENCY CHECK

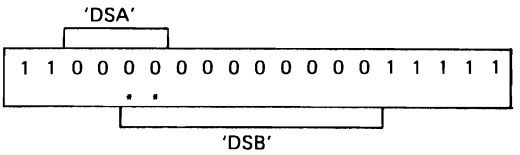
- FROM VOLUME RECORD SPACE HEADER BUILD A BIT MAP



- FOR EVERY TRACK OCCUPIED BY 'DSA' ZERO OUT CORRESPONDING BIT

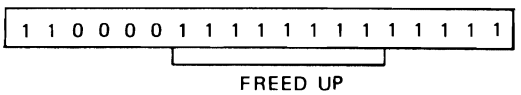


- DO THE SAME FOR 'DSB'

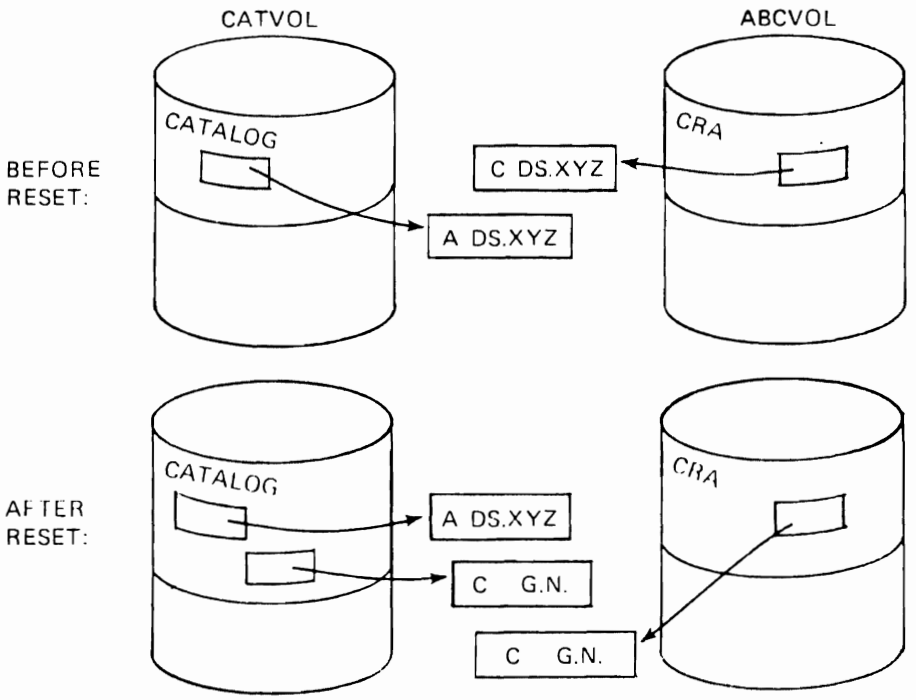


INDICATES SPACE CLAIM IN CONFLICT

- 'DSB' WILL BE MARKED USUSABLE, 8 TRACKS FREED UP



RENAME EXAMPLE



G.N.=TXXXXXXX.VSAMDSET.DFDYYDDD.TYYYYYYY

PROCEDURES TO TAKE BEFORE RESETCAT

LISTCAT ALL ON THE CATALOG TO BE RESET.

LISTVTOC ON ALL THE VOLUMES TO BE USED IN RESET.

LISTCRA COMPARE DUMP SHOULD ALSO BE TAKEN. (OPTIONALLY, PRINT THE CATALOG AND LISTCRA SDUMP).

THE CATALOG OR THE CATALOG VOLUME SHOULD BE BACKED UP.

THE VOLUMES TO BE USED FOR RESET SHOULD BE DUMPED.

PROCEDURES TO TAKE AFTER RESETCAT

EXAMINE THE MESSAGES!
LISTCAT ALL
LISTCRA COMPARE ON THE RESET VOLUMES
    DATASETS MARKED NOTUSABLE?
        DELETE
    ENTRIES RENAMED?
        ALTER
        CHANGE JCL OF PROCESSING PROGRAMS

RESETCAT COMMAND

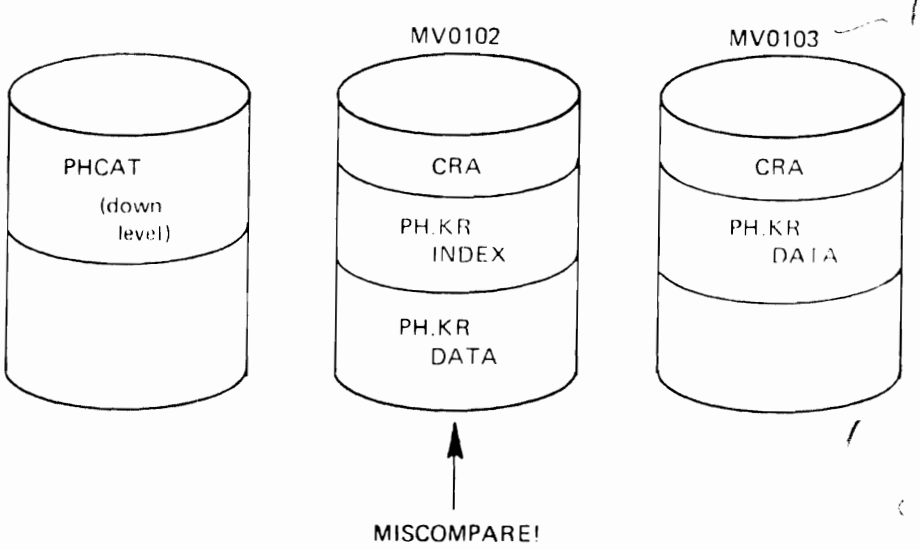
RESETCAT CATALOG (CATNAME [DNAME])
CRAVOLUMES ((VOLSER [DEVTYPE])(. . . . .). .)
CRAFILES ((DNAME { ALL | NONE })(. . . .))
[WORKFILE (DNAME)]
[WORKCAT (CATNAME)]
[MASTERPW (PASSWORD)]
[IGNORE | NOIGNORE]

RESETCAT EXAMPLE 1

```
//RESTOR   EXEC  PGM=IDCAMS
//STEPCAT  DD    DSN USERCAT,DISP=SHR
//        DD    DSN DEPTACAT,DISP=OLD
//DNAME    DD    DSN DEPTACAT,DISP=OLD
//WF       DD    UNIT 3330,VOL SER=MV0075,DISP=OLD,AMP AMORG
//VOL1     DD    UNIT=3330,VOL=SER=VOL001,DISP=OLD,AMP=AMORG
//VOL2     DD    UNIT=3330,VOL=SER=VOL002,DISP=OLD,AMP=AMORG
//SYSPRINT DD    SYSOUT=A
//SYSIN    DD    *
  RESETCAT CATALOG (DEPTACAT DNAME) -
    WORKCAT (USERCAT)       WORKFILE (WF) -
    CRAFILES (  (VOL1    ALL ) -
                (VOL2    ALL ) )
```

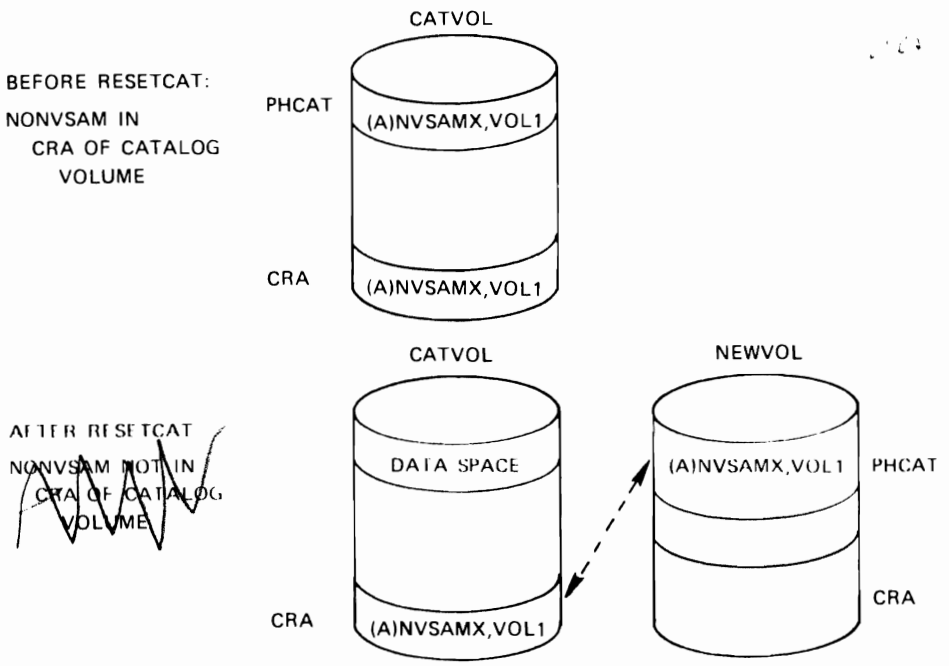
H 5.33

WHICH VOLUMES FOR RESETCAT?



H 5.34

RESETTING INTO A NEWLY DEFINED CATALOG



FORCED RELEASE OF VOLUME OWNERSHIP

- DELETE FORCE
  - SCRATCHES AND RETURNS NON-EMPTY VSAM DATA SPACES TO VTOC
  - RELEASES VOLUME OWNERSHIP
  - MARKS ALL CATALOG ENTRIES FOR VSAM DATA SETS OF RELEASED VOLUME AS UNUSABLE, ENTRIES ARE NOT DELETED

ACTIONS WHICH CAUSE MISMATCHES
FROM A BACKUP CATALOG

DEFINE / DELETE / EXTEND DATA SPACE

- VOLUME ENTRY IN BACKUP CATALOG NO LONGER VALID

DEFINE / DELETE DATA SETS

- VOLUME ENTRY IN BACKUP CATALOG NO LONGER VALID

- DATA SET ENTRIES (SOME) IN BACKUP CATALOG NO LONGER VALID

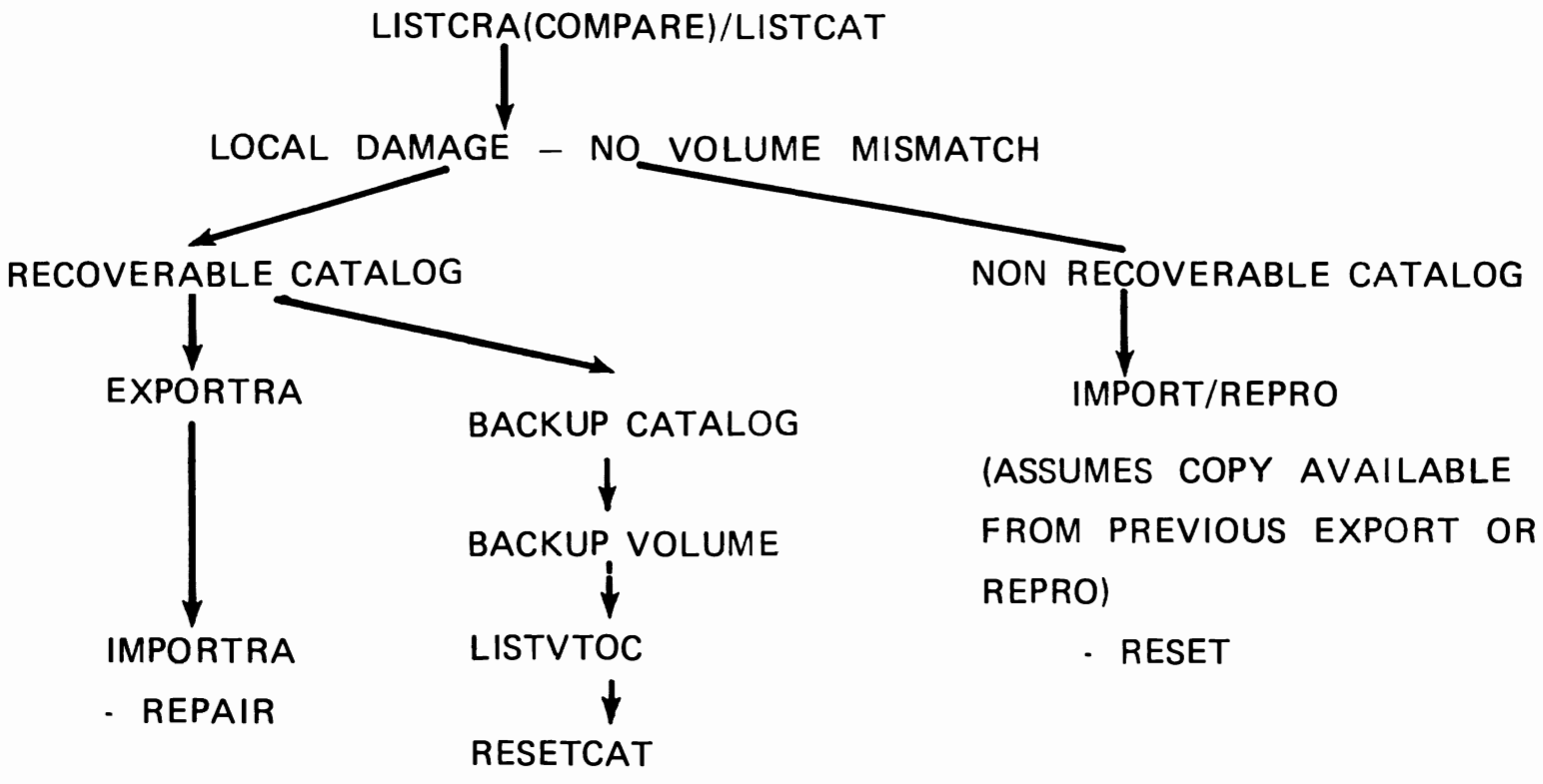
DATA SET EXTEND VIA SUBALLOCATION

- VOLUME SPACE MAP IN BACKUP CATALOG NO LONGER VALID

- DATA SET ENTRY (ONE) IN BACKUP CATALOG NO LONGER VALID

SAMPLE RECOVERY PROCEDURES

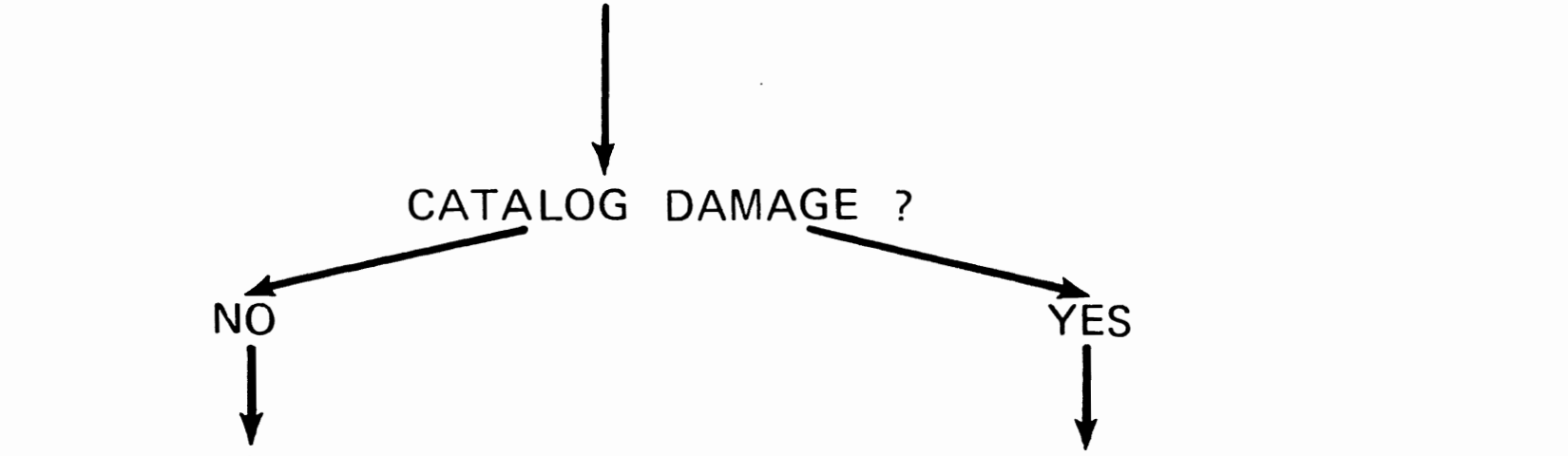
DATA SET CANNOT BE OPENED



SAMPLE RECOVERY PROCEDURES

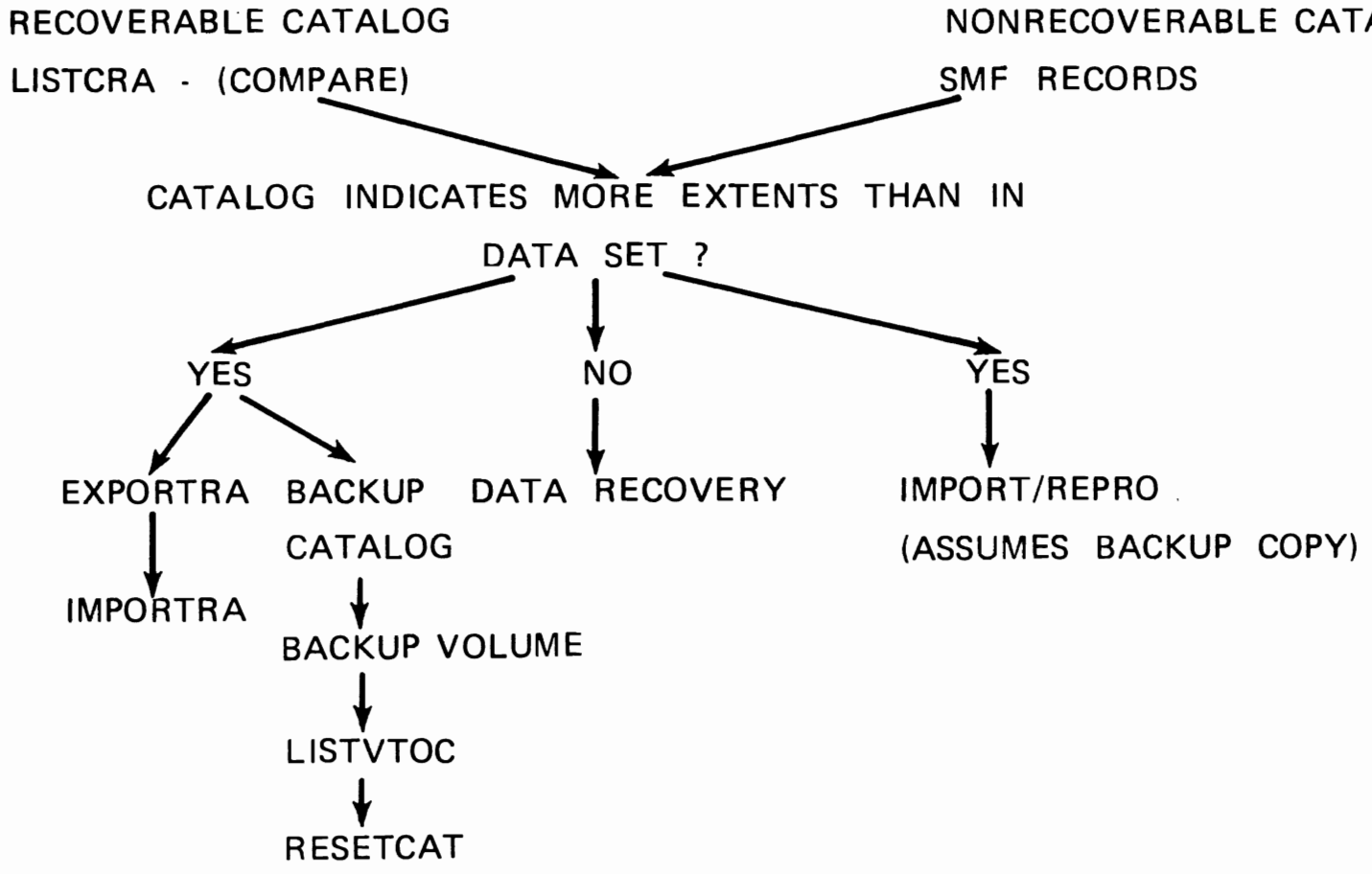
DATA SET COMPLETELY UNREADABLE

LISTCRA (COMPARE) / LISTCAT

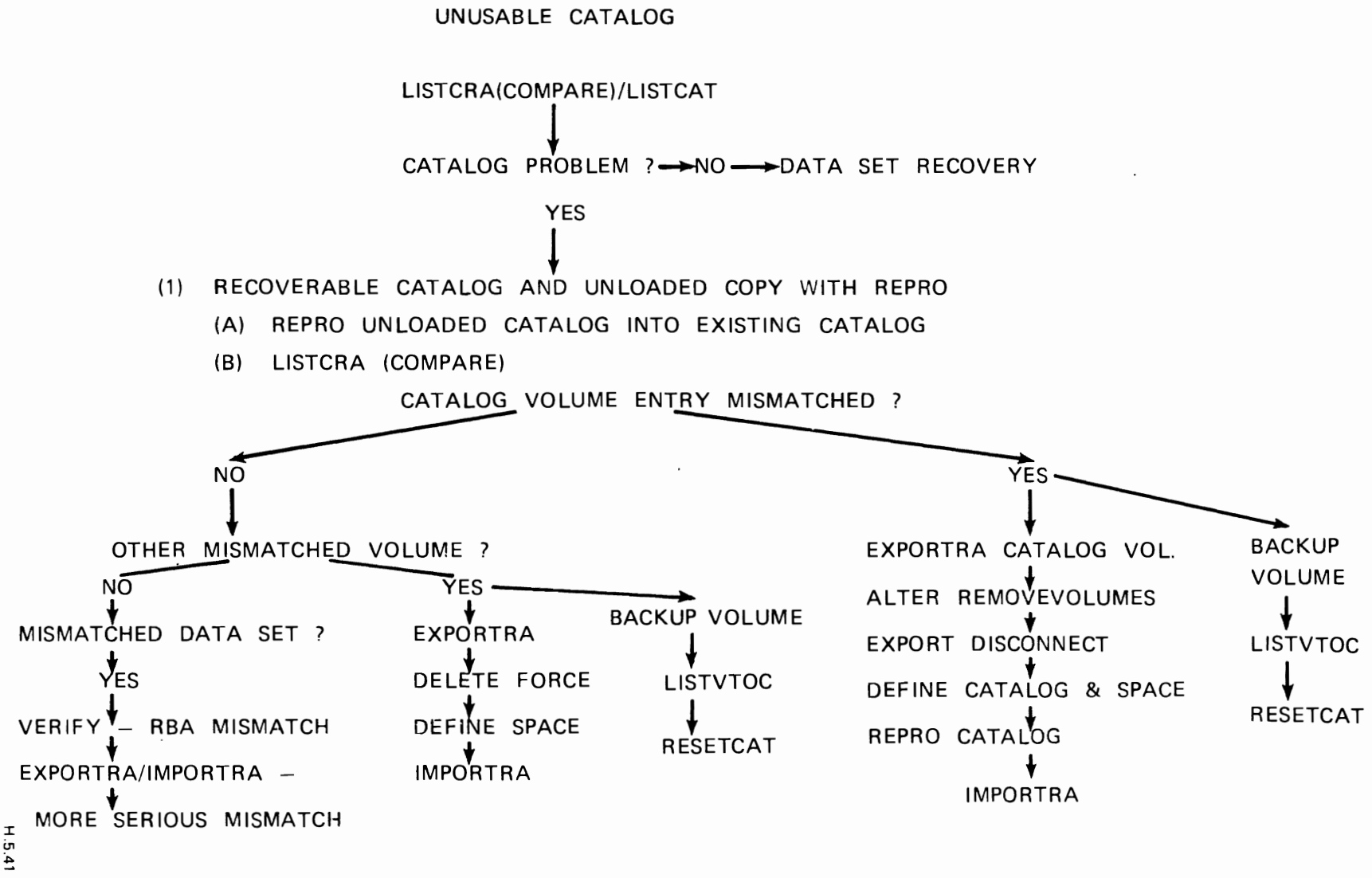


SAMPLE RECOVERY PROCEDURES

DATA SET PARTIALLY UNREADABLE



SAMPLE RECOVERY PROCEDURES



H.5.41

SAMPLE RECOVERY PROCEDURES

UNUSABLE CATALOG (CONT)

(2) DUMP OF VOLUME AVAILABLE AND RESET OF DATA ON CATALOG

(A) RESTORE BACKUP OF VOLUME TO WORK VOLUME
(B) REPRO – CATALOG UNLOAD
(C) DO PROCEDURE (1)

(3) DUMP OF VOLUME AVAILABLE AND RESET OF DATA ON CATALOG VOLUME DESIRED

(A) RESTORE CATALOG VOLUME
(B) DO PROCEDURE (1) STARTING WITH B

SAMPLE RECOVERY PROCEDURES

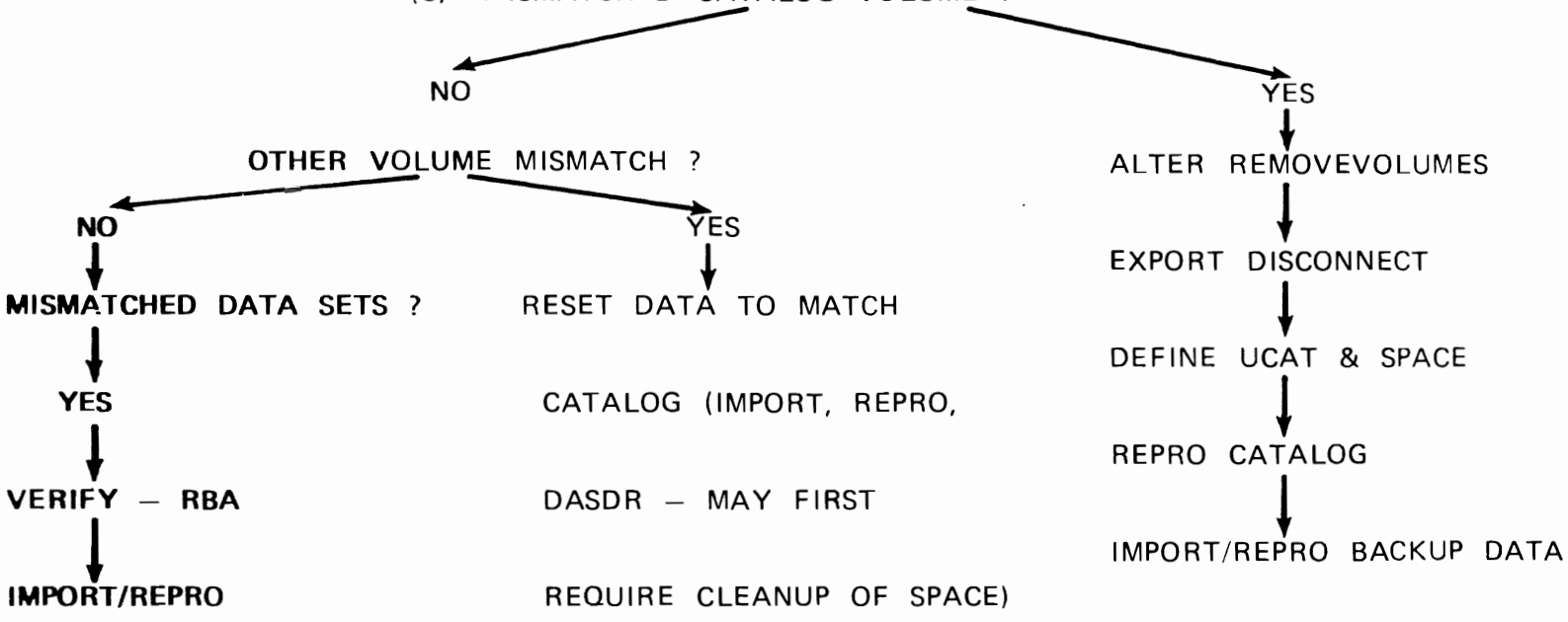
UNUSABLE CATALOG (CONT.)

(4) CATALOG NOT RECOVERABLE – AND UNLOADED COPY OF CATALOG FROM REPRO

(A) REPRO UNLOADED CATALOG INTO EXISTING

(B) LISTCAT – SMF VSAM RECORDS

(C) MISMATCHED CATALOG VOLUME ?



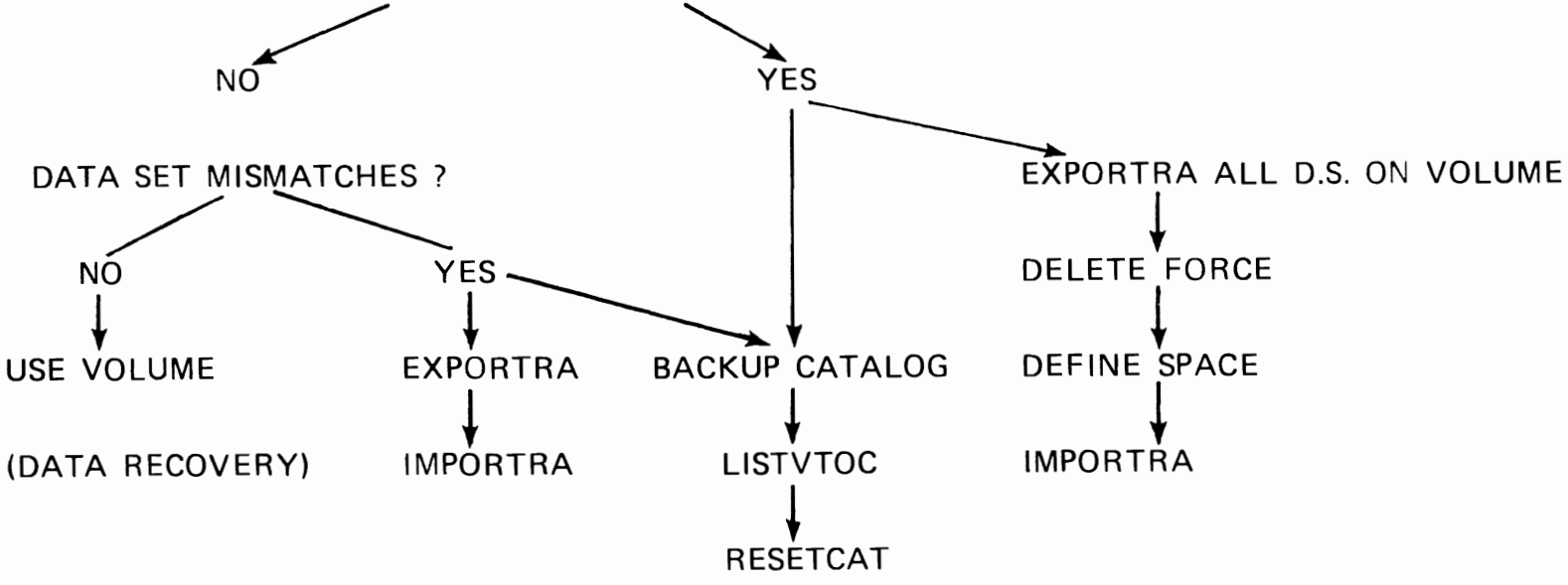
SAMPLE RECOVERY PROCEDURES

UNUSABLE VOLUME

(RECOVERABLE CATALOGS)

(1) DUMP OF VOLUME AVAILABLE AND VOLUME RESET DESIRED

- (A) RESTORE DAMAGED VOLUME
- (B) LISTCRA (COMPARE)
- (C) VOLUME MISMATCH OTHER THAN SPACE MAP ?



SAMPLE RECOVERY PROCEDURES

UNUSABLE VOLUME
(RECOVERABLE CATALOG)

(2) DUMP OF VOLUME AVAILABLE, RESET DATA SETS AND DATA SETS ACCESSIBLE

- (A) EXPORTRA/EXPORT VSAM DATA SETS
- (B) RESTORE VOLUME
- (C) DELETE FORCE
- (D) DEFINE SPACE
- (E) IMPORTRA/IMPORT

(3) NO DUMP OF VOLUME, VSAM DATA SETS ACCESSIBLE

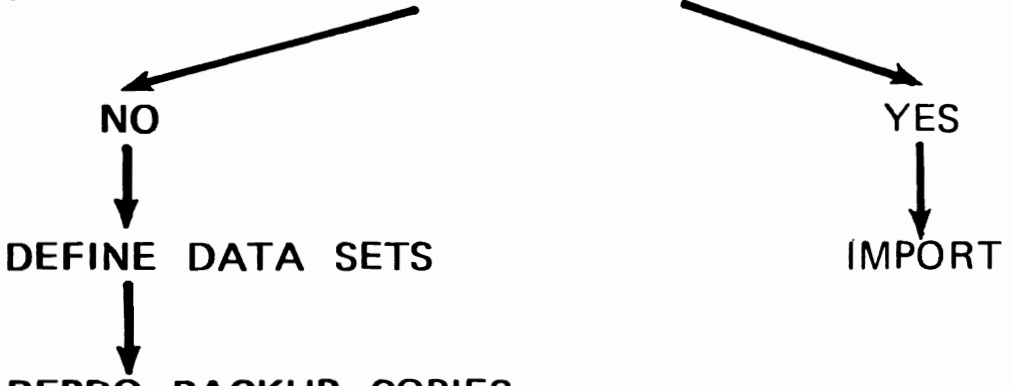
- (A) EXPORTRA/EXPORT
- (B) INITIALIZE VOLUME – RESTORE NON-VSAM DATA SETS
- (C) DELETE FORCE
- (D) DEFINE SPACE
- (E) IMPORTRA/IMPORT

SAMPLE RECOVERY PROCEDURES

UNUSABLE VOLUME
(RECOVERABLE CATALOGS)

(4) NO DUMP OF VOLUME, VSAM DATA SETS NOT ACCESSIBLE, BACKUP COPIES OF DATA SETS

- **(A) INITIALIZE VOLUME**
- **(B) RESTORE NON-VSAM DATA SETS**
- **(C) DELETE FORCE**
- **(D) DEFINE SPACE**
- **(E) EXPORTED COPIES OF VSAM DATA SETS ?**



SAMPLE RECOVERY PROCEDURES

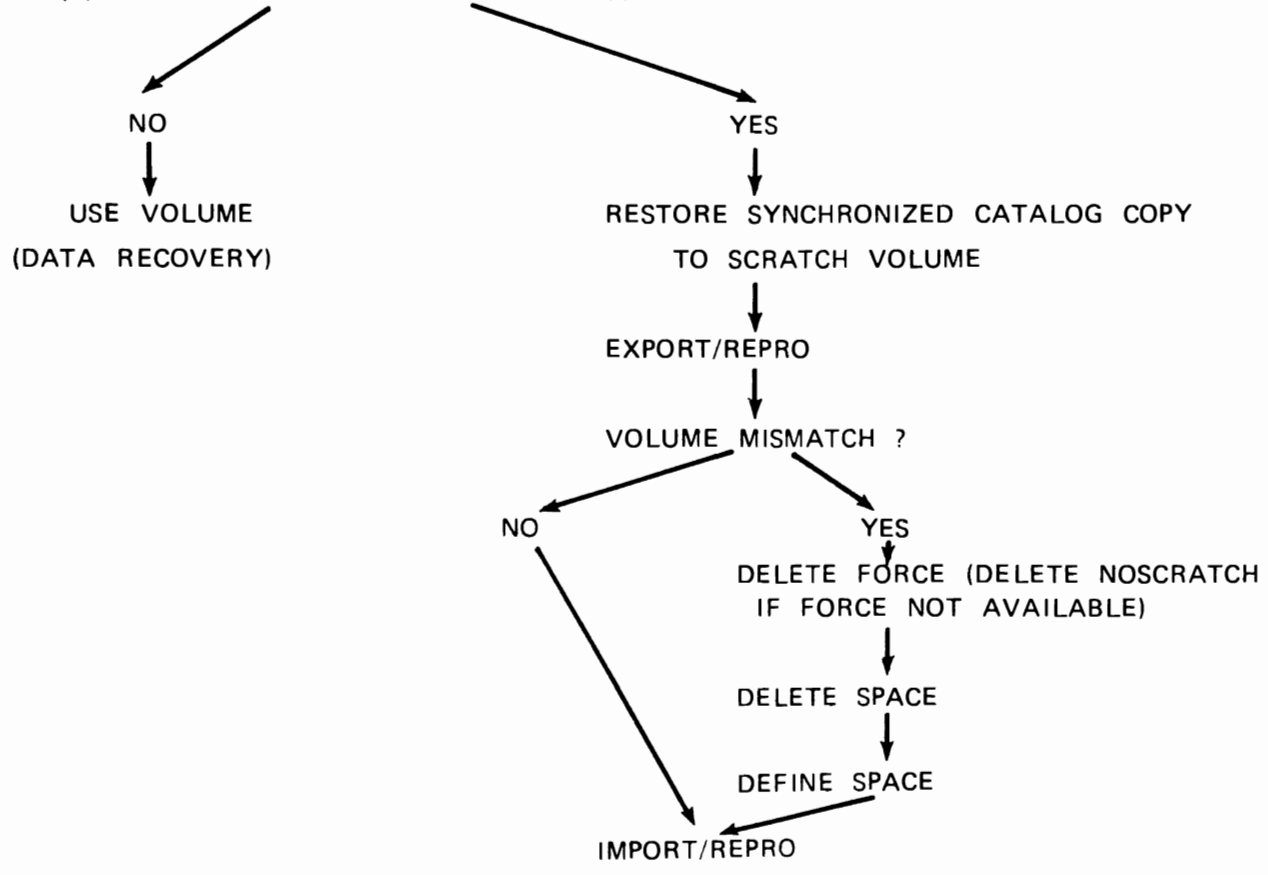
UNUSABLE VOLUME
(NON-RECOVERABLE CATALOGS)

(1) DUMP OF VOLUME, SYNCHRONIZED COPY OF CATALOG AND RESET OF VOLUME DESIRED

(A) RESTORE VOLUME

(B) EXAMINE SMF RECORDS SINCE BACKUP

(C) MISMATCHES WITH CURRENT CATALOG ?



SAMPLE RECOVERY PROCEDURES

UNUSABLE VOLUME

(NON-RECOVERABLE CATALOGS)

(2) DUMP OF VOLUME AVAILABLE, REPAIR OF VSAM DATA SETS DESIRED AND VSAM DATA SETS ACCESSIBLE

- (A) EXPORT VSAM DATA SETS
- (B) RESTORE VOLUME
- (C) DELETE FORCE/DELETE NOSCRATCH
- (D) DELETE SPACE
- (E) DEFINE SPACE
- (F) IMPORT

(3) NO DUMP OF VOLUME AND VSAM DATA SETS ACCESSIBLE

- (A) EXPORT VSAM DATA SETS
- (B) INITIALIZE VOLUME AND RESTORE NON-VSAM DATA SETS
- (C) DELETE FORCE/DELETE NOSCRATCH
- (D) DELETE SPACE
- (E) DEFINE SPACE
- (F) IMPORT

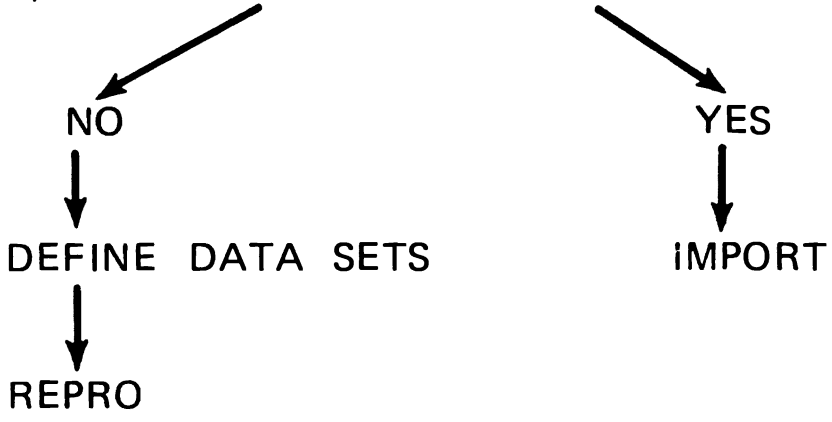
SAMPLE RECOVERY PROCEDURES

UNUSABLE VOLUME

(NON-RECOVERABLE CATALOGS)

(4) NO DUMP OF VOLUME, VSAM DATA SETS NOT ACCESSIBLE AND BACKUP COPIES OF DATA SETS

- (A) INITIALIZE VOLUME
- (B) RESTORE NON-VSAM DATA SETS
- (C) DELETE FORCE/DELETE NOSCRATCH
- (D) DELETE SPACE
- (E) DEFINE SPACE
- (F) EXPORTED COPIES AVAILABLE ?



QUICK RECOVERY

USE WHEN DATA SET RECOVERY MUST BE DONE AS QUICKLY AS POSSIBLE, **SUCH AS IN** THE CASE OF AN OUTLINE TP SYSTEM. REQUIRES RESTRICTIONS **TO BE PLACED** ON VSAM DATA SETS IN ORDER TO DO QUICK RECOVERY.

(1) DEFINE ALL DATA SETS WITH ONLY PRIMARY SPACE (WILL NOT PROHIBIT CONTROL AREA SPLITS AS LONG AS UNUSED SPACE IN PRIMARY)

(2) REPRO UNLOAD CATALOG WHEN ANY DATA SETS DEFINED, ALTERED OR DELETED

(3) IF CATALOG LOST,

  (A) REPRO UNLOADED CATALOG INTO EXISTING OR DEFINE NEW CATALOG AND REPRO

  (B) RUN VERIFY ON ALL DATA SETS

(4) IF VOLUME LOST,

  (A) RESTORE LOST VOLUME TO BACKUP COPY

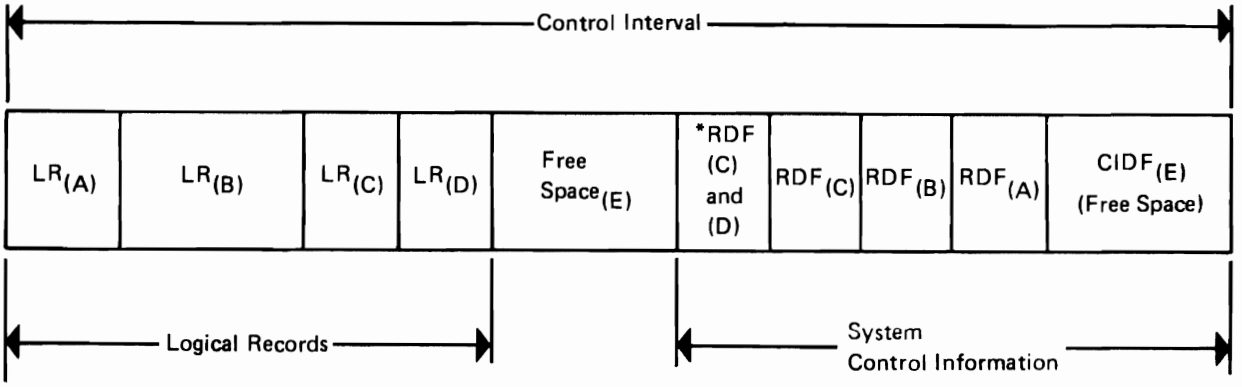
  (B) REPRO BACKUP CATALOG INTO EXISTING

  (C) VERIFY ALL DATA SETS

  (D) UPDATE RESTORED DATA SETS FROM JOURNALLED RECORDS

USING THE ABOVE PROCEDURES ELIMINATES ANY NEED FOR THE CATALOG **TO BE RECOVERABLE.**

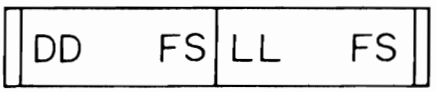
CONTROL INTERVAL FORMAT



* Since logical records $LR_{(C)}$ and $LR_{(D)}$ are of equal length, $RDF_{(C)}$ and $_{(D)}$ tells the system that $LR_{(D)}$ is the same size as $LR_{(C)}$.

H.6.1

Control Interval Definition Field (CIDF)



DD FS 2 Bytes: Offset from the beginning of the control interval to the free space areas.

LL FS 2 Bytes: Specifies the length of the free space area within the control interval.

H.6.2

RECORD DEFINITION FIELD (RDF)

R 1 BYTE; CONTROL INDICATORS

BIT POSITION	VALUE	INDICATION
0	0	RESERVED (SET TO 0).
1	0	NO ADDITIONAL CONTROL INFORMATION RELATED TO THIS RDF FOLLOWS.
	1	ADDITIONAL CONTROL INFORMATION RELATED TO THIS RDF FOLLOWS.
2-3	00	NOT SPANNED RECORD
	01	FIRST SEGMENT
	10	LAST SEGMENT
	11	INTERMEDIATE SEGMENT
4	0	SINGLE-RECORD DESCRIPTOR.
	1	REPLICATION COUNT DESCRIPTOR.
	0	SLOT CONTAINS RECORD-RRDS
5	1	SLOT EMPTY-RRDS
6-7	00	RESERVED

LL 2 BYTES; LENGTH OR COUNT

ACCESSING A CONTROL INTERVAL

```
        ACB     MACRF=(CNV,...
        RPL     OPTCD=(CNV,...
```

– WITH USER BUFFER MANAGEMENT

```
        ACB     MACRF=(CNV,UBF,...
        RPL     OPTCD=(CNV,MVE,...),AREA=BUF
```

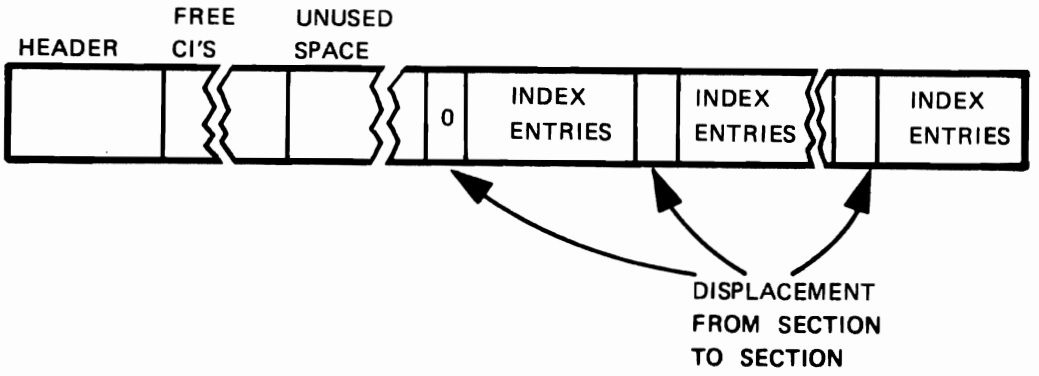
– WITH "IMPROVED" CI PROCESSING

```
        ACB     MACRF=(CNV,UBF,ICI,...
        RPL     OPTCD=(CNV,MVE,...),AREA=BUF
```

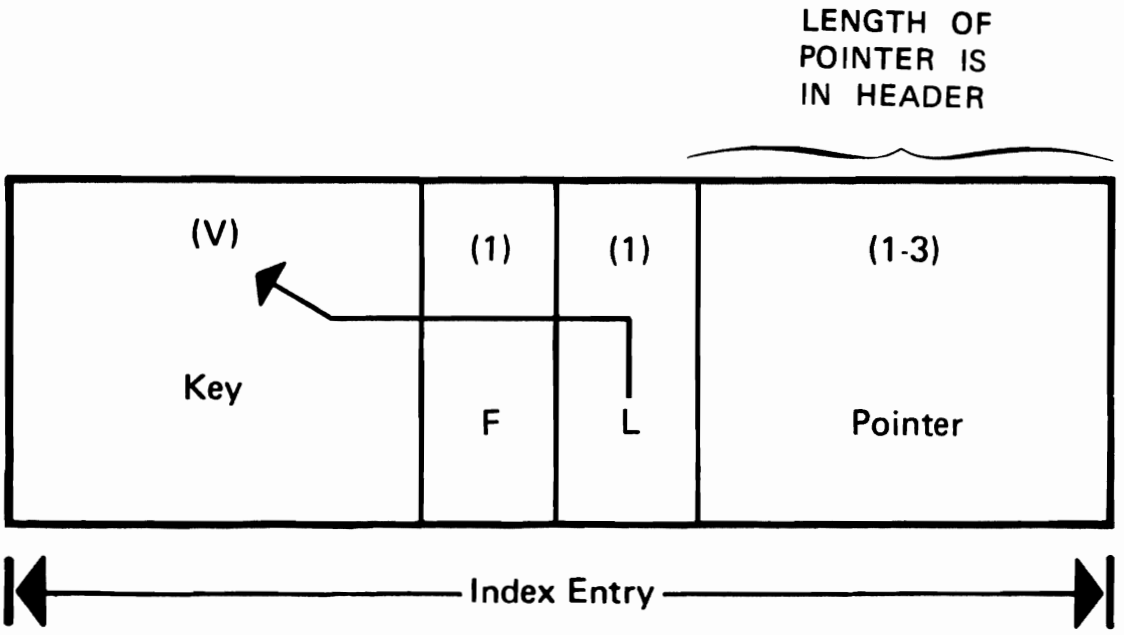
– WITH FIXED CONTROL BLOCKS

```
        ACB     MACRF=(CNV,UBF,ICI,CFX,...
        RPL     OPTCD=(CNV,MVE,...),AREA=BUF
```

INDEX RECORD GENERAL FORMAT

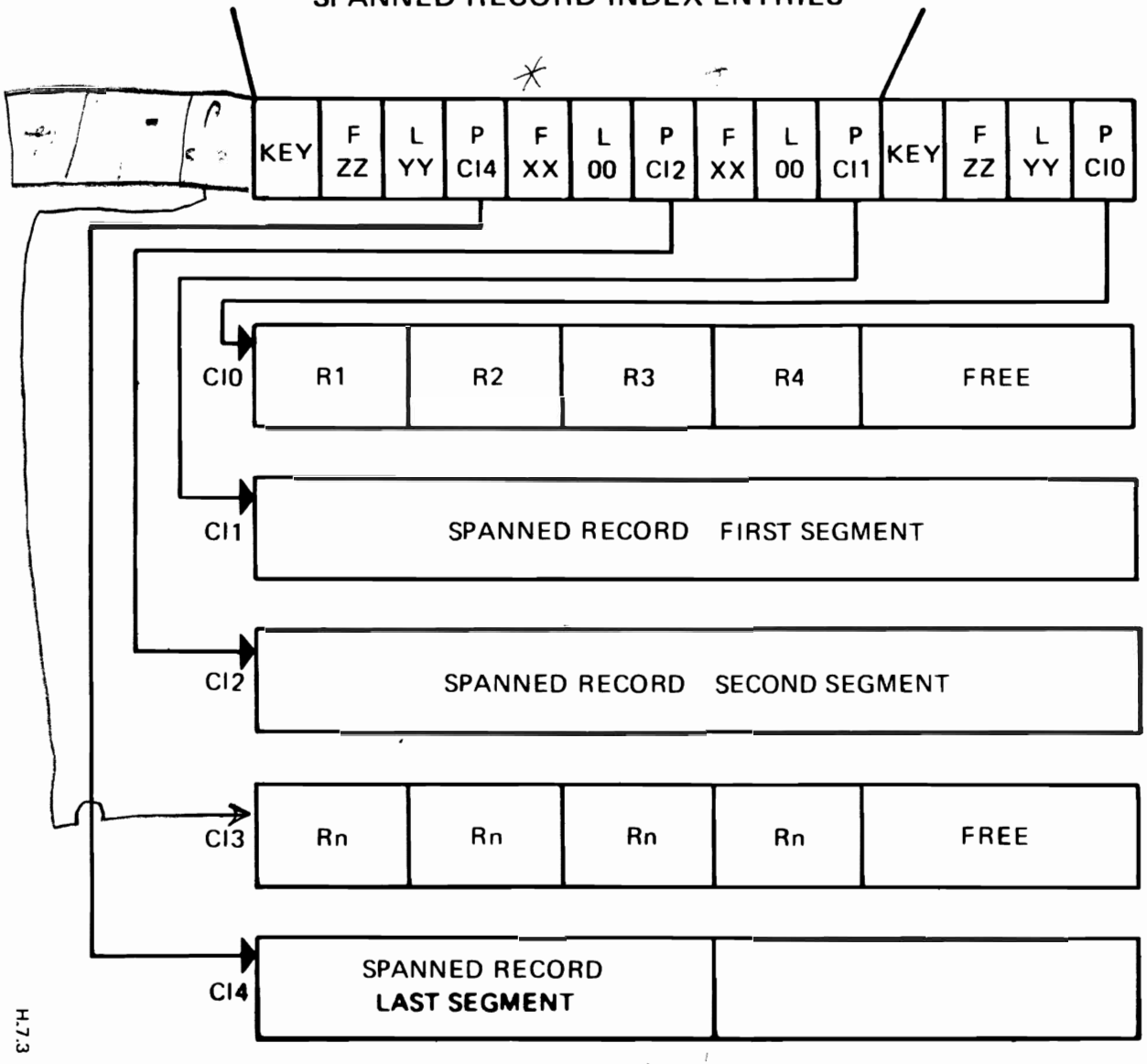


H.7.1



H.7.2

SPANNED RECORD INDEX ENTRIES



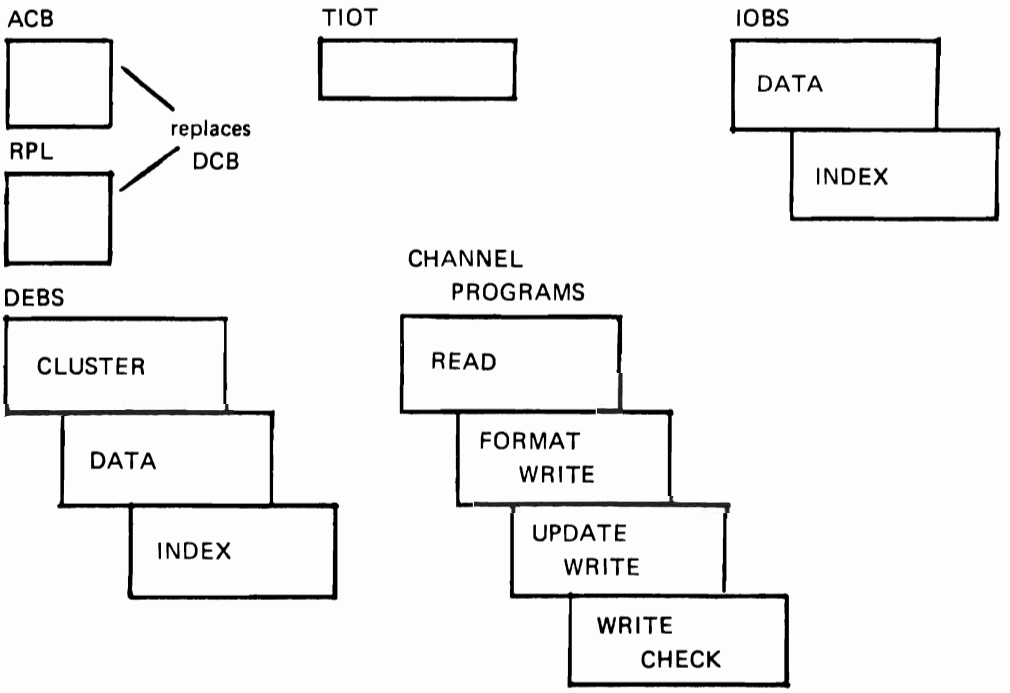
XX = FULL KEY – FRONT COMPRESSED

YY = LENGTH KEY STORED

ZZ = NORMAL KEY COMPRESSION

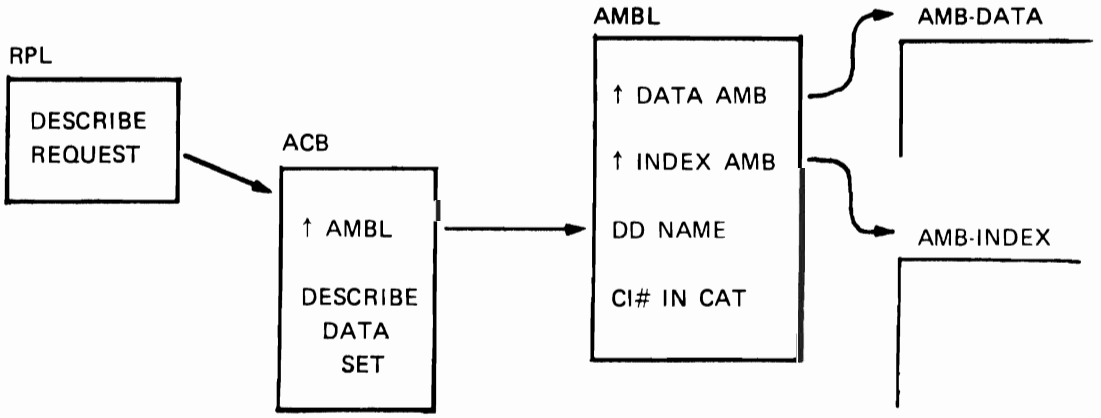
H.7.3

I/O CONTROL BLOCKS



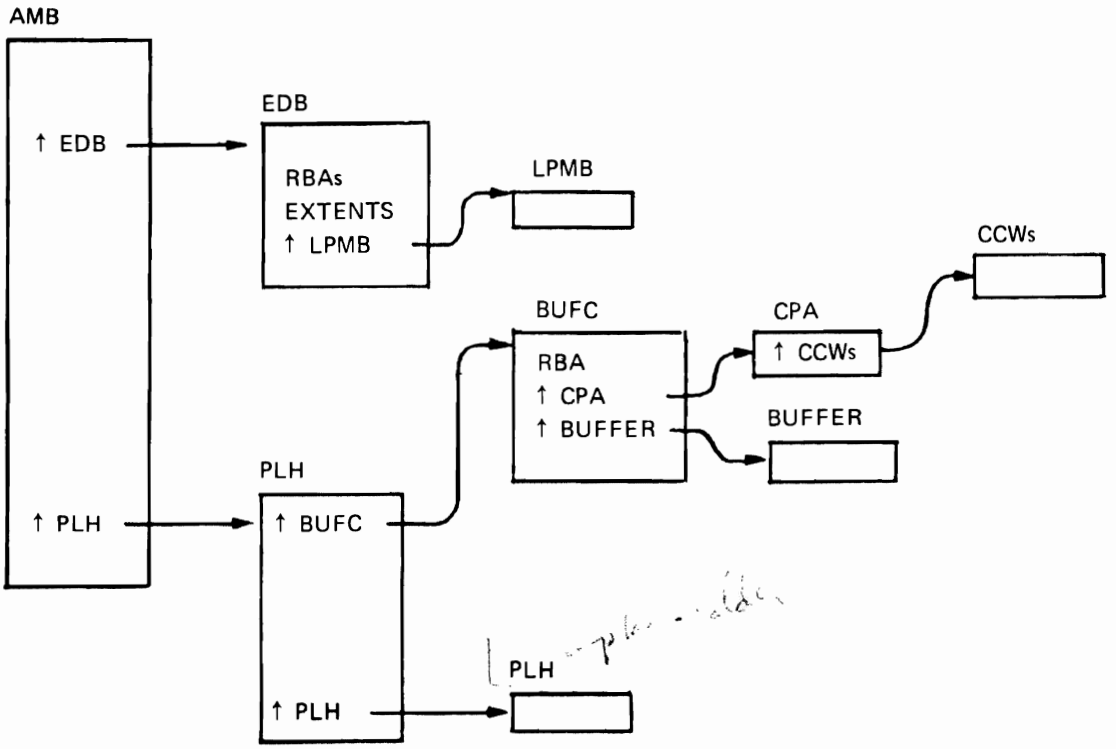
H.8.1

CLUSTER CONTROL BLOCKS



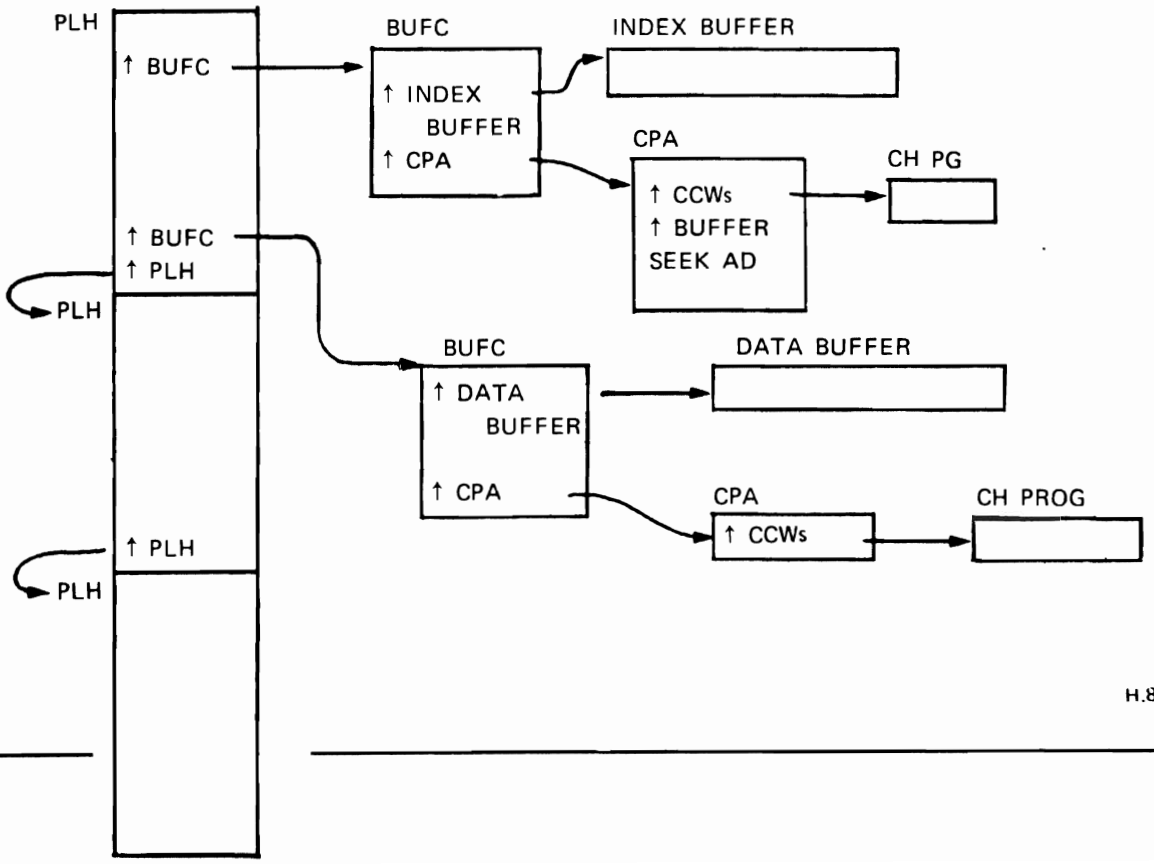
H.8.2

COMPONENT CONTROL BLOCKS



H.8.3

PLACEHOLDERS & BUFFERS



H.8.4

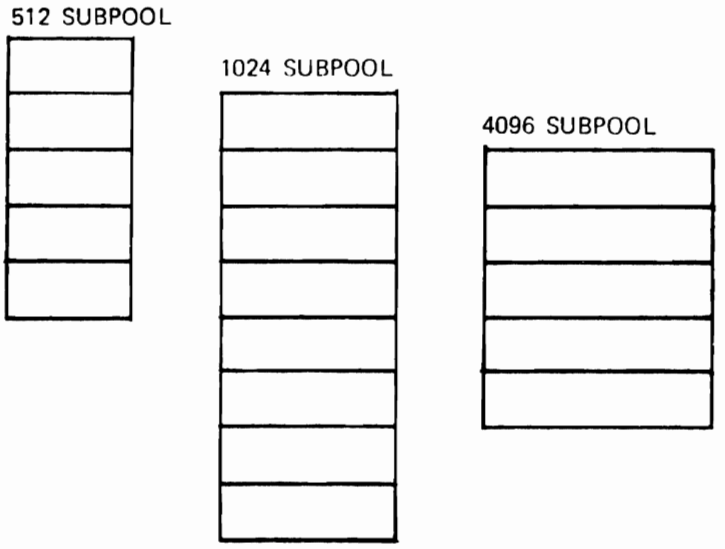
SHARED RESOURCES

- SHARE CONTROL BLOCKS & BUFFERS
- REDUCED STORAGE REQUIREMENTS
- DEFERRED WRITES
- RELATE I/O OPERATIONS
- FOR RANDOM OPERATIONS
- USER CODE OR PACKAGE
- LOCAL SHARED RESOURCES (LSR)
- MVS ONLY: GLOBAL SHARED RESOURCES (GSR)

BUILD & USE THE RESOURCE POOL

```
          BLDVRP  BUFFERS=(512(5),1024(β),4096(5)),
                  STRNO=10,KEYLEN=12

CUST      ACB     MACRF=(LSR,DFR,. . .), . . .
```

BUFFER POOL EXAMPLE



WRTBFR MACRO

```
WRTBFR  RPL=any,TYPE=ALL
WRTBFR  RPL=name,TYPE=LRU(50)
WRTBFR  RPL=name,TYPE=TRN
WRTBFR  RPL=name,TYPE=DS
```

THE "DISP" PARAMETER

```
//MYDATA    DD   DSNAME=MY.VSAM.CLUSTER,DISP=OLD
```

exclusive enq for dsname

```
//OTHER     DD   DSNAME=MY.OTHER.CLUSTER,DISP=SHR
```

check shareoptions

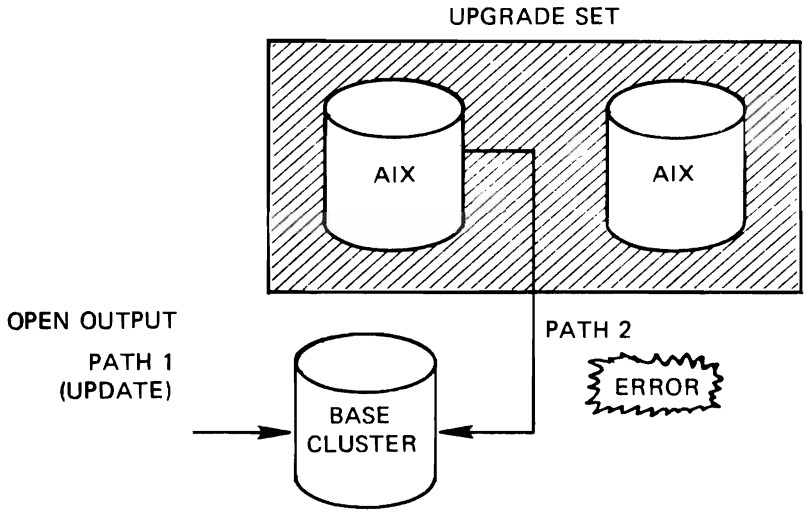
VSAM SHAREOPTIONS

- PROVIDE DATA INTEGRITY WHILE SHARING FILES
- SPECIFY AMOUNT OF SHARING:
  - ACROSS REGIONS

```
DEFINE  SHR (1, 3)
```

  - ACROSS SYSTEMS

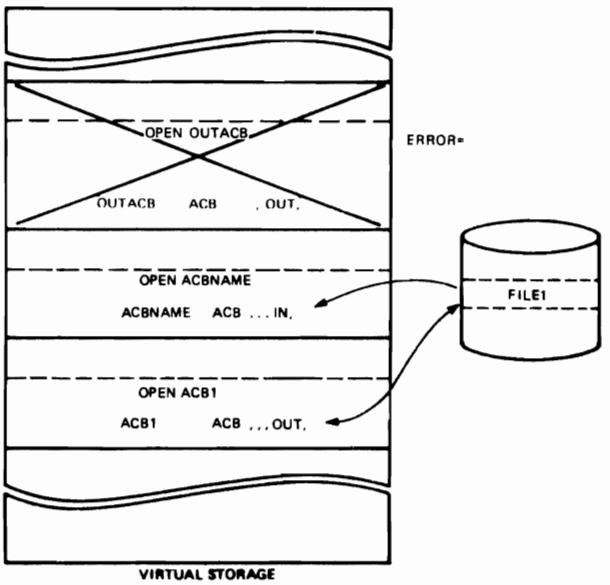
SHARE OPTION 1
ALTERNATE INDEXES



SHAREOPTION 2
WRITE INTEGRITY

– OPEN FOR SEVERAL INPUTS *AND* ONE OUTPUT

SHAREOPTION 2



SHAREOPTION 3
NO INTEGRITY

PROCESSING FOR

– SEVERAL INPUTS AND SEVERAL OUTPUTS

VSAM DOES NOT MONITOR THE ACCESSING TO ENSURE DATA INTEGRITY

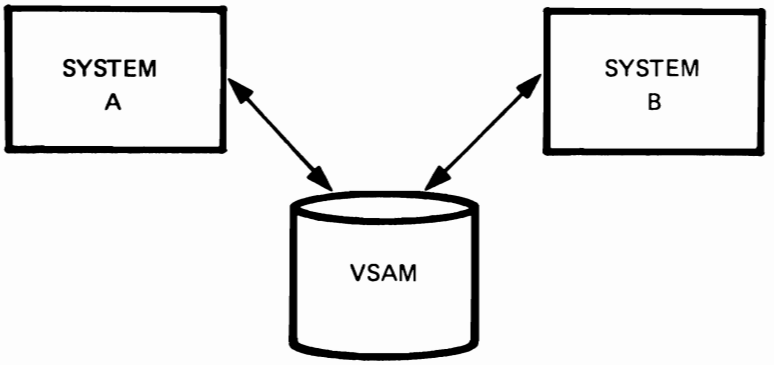
SHAREOPTION 4 – NO INTEGRITY
BUT HELP FROM VSAM

- SEVERAL INPUTS AND SEVERAL OUTPUTS
- LIMITED AID FROM VSAM
- RESTRICTION ON PROCESSING
- USER RESPONSIBILITY FOR INTEGRITY

SHARING WITHIN A REGION
FULL INTEGRITY

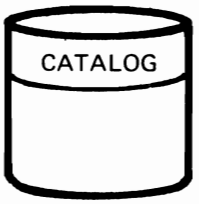
- MULTIPLE STRINGS: ACB STRNO=#
- REQUEST FAILS IF
  - CI ALREADY HELD BY OTHER STRING
  - CI OR CA SPLIT IN PROGRESS

SHARING ACROSS SYSTEMS



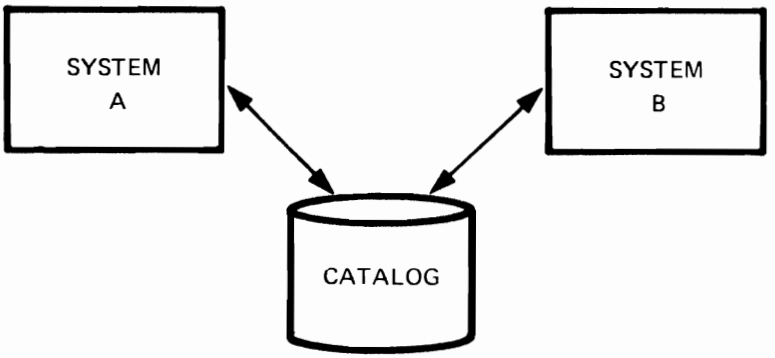
DEFINE SHR (X, 3)
or
SHR (X, 4)

SHARING A CATALOG WITHIN A SYSTEM



- TOTAL INTEGRITY
- UP TO 7 CONCURRENT REQUEST
- BUFFER SPACE
  - 512 – EXTRA BUFFER
  - 1K – PER STRING

SHARING A CATALOG ACROSS SYSTEMS



- COMPLETE INTEGRITY
- NO RESTRICTIONS

VSAM OPTIMIZATION

- CI SIZE
- CA SIZE
- ALLOCATION
- INDEX OPTIONS
- KEY COMPRESSION
- BUFFER SPACE
- FREE SPACE
- MULTIPLE VOLUMES
- SPEED/RECOVERY
- 3350

CI SIZE CONCERNS

- DASD UTILIZATION
- MULTIPLE BLOCKS
- SPANNING A TRACK

CONTROL INTERVAL SIZE
GENERAL PROCESSING GUIDELINES

- SEQUENTIAL/SKIP SEQUENTIAL

  LARGER DATA CI IMPROVES PERFORMANCE WITHIN THE TASK

- DIRECT

  SMALLER DATA CI IMPROVES PERFORMANCE WITHIN THE TASK

- SEQUENTIAL/SKIP SEQUENTIAL AND DIRECT

  SMALLER DATA CI

  MULTIPLE BUFFERS WHEN PROCESSING SEQUENTIALLY

BUFFER SPACE

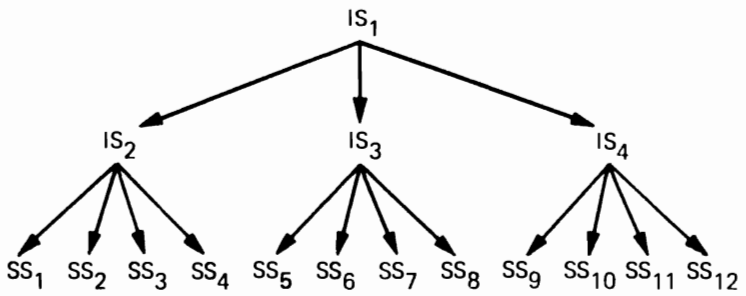
SPECIFIED IN

- DEFINE
- ACB (OVERRIDES DEFINE)*
- // DD (OVERRIDES ACB & DEFINE)*

*MUST *NOT* BE LESS THAN VALUE OF DEFINE

SCHEDULING BUFFERS – DIRECT

DIRECT GET FROM CA_n	STRING 1 DATA BUFFER 1	STRING 2 DATA BUFFER 2				
CA2	CA2-CI		IS_1	IS_2	SS_2	
CA3		CA3–CI				SS_3
CA5	CA5–CI			IS_3	SS_5	
CA2		CA2–CI		IS_2		SS_2
CA6	CA6–CIA			IS_3	SS_6	
CA6 SAME CI		CA6–CIA				SS_6



INDEX BUFFERS RECOMMENDATION

DIRECT:

MIN = #LEVELS – 1 + STRNO

MAX = #INDEX SET RECORDS + STRNO

SEQUENTIAL:

STRNO

SCHEDULING BUFFERS – SEQUENTIAL/SKP

	DATA BUFFER 1	DATA BUFFER 2	DATA BUFFER 3	
GET SEQ REC 1	CI 1	CI 2		
2				
3	CI 4		CI 3	
4				
5				
6				
7		CI 5	CI 6	
8				
9				
10				
11	CI 7	CI 8		

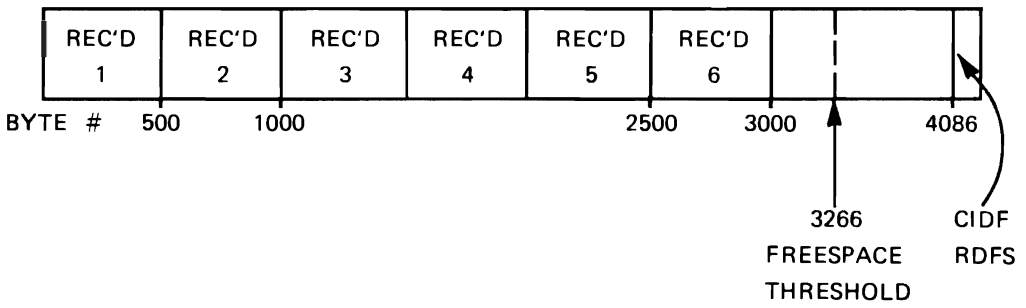
ASSUME 3 DATA BUFFERS
1 INDEX BUFFER
6 CIS PER CA
2 RECORDS PER CI

CA SIZE

- GOOD PERFORMANCE WHEN ENTIRE CAs NUMBER IN CYLINDER
- THE LARGER THE CA:
  - THE FEWER THE PROBABILITIES OF CA SPLITS
  - THE FEWER THE READS OF SEQUENCE SET RECORDS
  - THE MORE CONSOLIDATED THE INDEX

FREE SPACE EXAMPLE

FSPC (20,10) CISZ (40 96) RESCZ (500,500)
119 CIs/CA



FREESPACE CONSIDERATIONS

- LARGE FREESPACE
  - MORE DASD SPACE
  - MORE I/O FOR SEQUENTIAL PROCESSING FOR SAME NUMBER OF RECORDS
  - MORE LEVELS OF INDEX, SO POSSIBLE INCREASE IN RUN TIME FOR DIRECT PROCESSING
- SMALL FREESPACE
  - MORE CI/CA SPLITS
  - AFTER SPLITS, MORE TIME FOR SEQUENTIAL PROCESSING WHEN FILE NOT IN PHYSICAL SEQUENCE

FREE SPACE ESTIMATION

EVALUATE PRECENT AND UNIFORMITY OF GROWTH

GROWTH

- EVENLY DISTRIBUTED
  - SPECIFY THAT PERCENT AS FREE SPACE
- UNEVENLY DISTRIBUTED
  - SPECIFY SMALL PERCENT OF FREE SPACE
  - LOAD THE DATA SET
  - ALTER PERCENT OF FREE SPACE

MULTIPLE VOLUME SUPPORT
SPACE ALLOCATION

✓ PRIMARY ALLOCATION ON EACH VOLUME

- WITHOUT KEYRANGE

  ACQUIRED FROM FIRST VOLUME WITH DEFINE

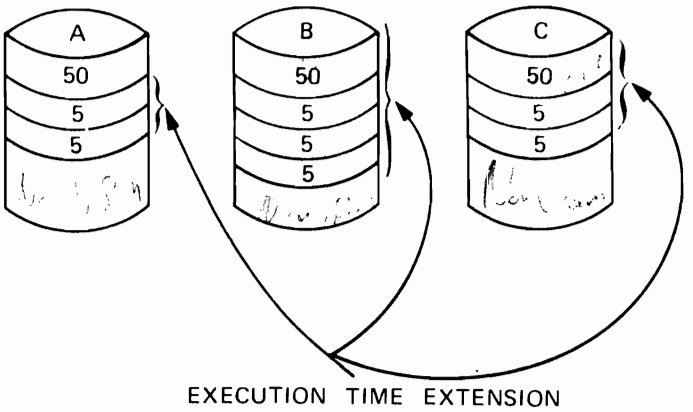
  ACQUIRED FROM OTHER VOLUMES WHEN NEEDED FOR EXTENSION OF FILE

- WITH KEYRANGE

  ACQUIRED FROM EVERY VOLUME WITH DEFINE

EXAMPLE 1

```
DEFINE    •
          •
          •
          VOLUMES (C A B)

          CYLINDERS (50 5)
          •
          •
          •
```



EXECUTION TIME EXTENSION

DEFINE

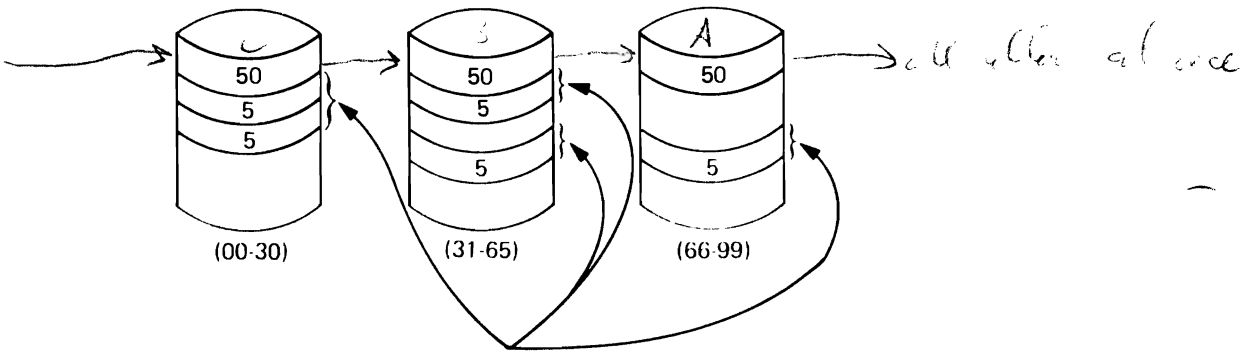
- PRIMARY SPACE ACQUIRED FROM FIRST VOLUME (NEED NOT BE VOLUME A)

EXECUTION

- USE REMAINING SPACE ON VOLUME IN SECONDARY EXTENTS
- IF MORE SPACE REQUIRED TAKES PRIMARY ALLOCATION FROM NEXT VOLUME
- REPEAT EXECUTION ALLOCATIONS

EXAMPLE 2

```
DEFINE    •
          •
          •
          VOLUMES (A B C)
          KEYRANGES ((00 30)(31 65)(66 99))
          UNORDERED
          CYLINDERS (50 5)
```



EXECUTION TIME EXTENSION

DEFINE

- PRIMARY ALLOCATION TAKEN FROM EACH VOLUME

  NOTE: IF ANY VOLUME DOES NOT HAVE SPACE FOR PRIMARY, SEVERAL MAY BE PLACED ON SAME VOLUME

EXECUTION

- SECONDARY ALLOCATIONS FOR A KEYRANGE WILL BE ON VOLUME OF ITS PRIMARY ALLOCATION

UNORDERED/ORDERED

UNORDERED

- PRIMARY ALLOCATION* MUST BE AVAILABLE ON ONE OF SPECIFIED VOLUMES OR DEFINE FAILS
- SECONDARY ALLOCATION MAY BE OBTAINED FROM ANY VOLUME

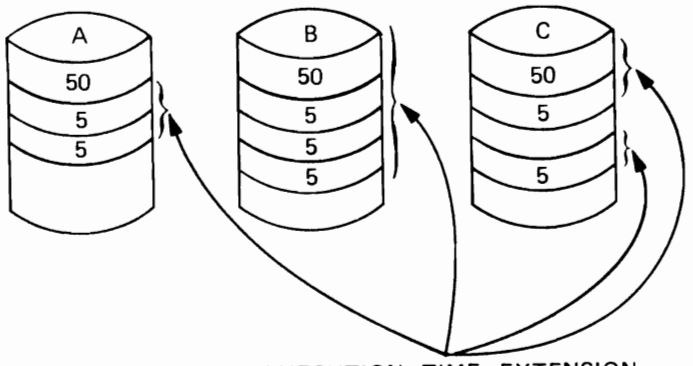
ORDERED

- SPACE IS ALLOCATED* ON VOLUMES IN THE ORDER SPECIFIED IN THE VOLUMES PARAMETERS
- PRIMARY ALLOCATION MUST BE AVAILABLE ON FIRST VOLUME SPECIFIED OR DEFINE FAILS

*PER KEY RANGE IF SPECIFIED

EXAMPLE 3

```
DEFINE  •
        •
        •
        VOLUMES (A B C)
        ORDERED
        CYLINDERS (50 5)
```



EXECUTION TIME EXTENSION

DEFINE

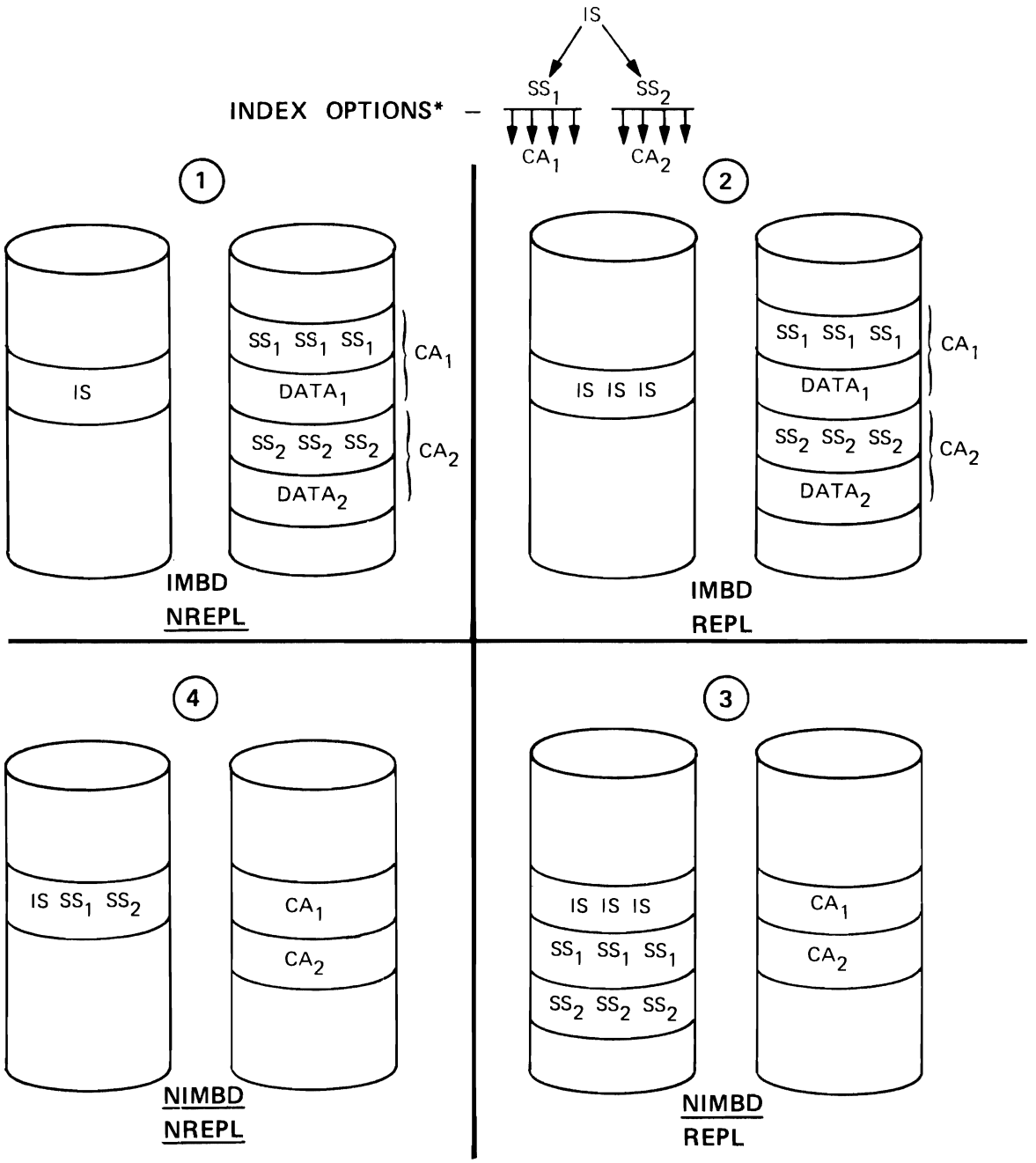
- PRIMARY ALLOCATION TAKEN FROM VOLUME A OR DEFINE FAILS

EXECUTION

- USE REMAINING SPACE ON VOLUME A IN SECONDARY EXTENTS
- IF MORE SPACE REQUIRED TAKE PRIMARY ALLOCATION FROM VOLUME B; IF NOT POSSIBLE, REQUEST IS REJECTED
- REPEAT FOR VOLUME C.

INDEX OPTIONS

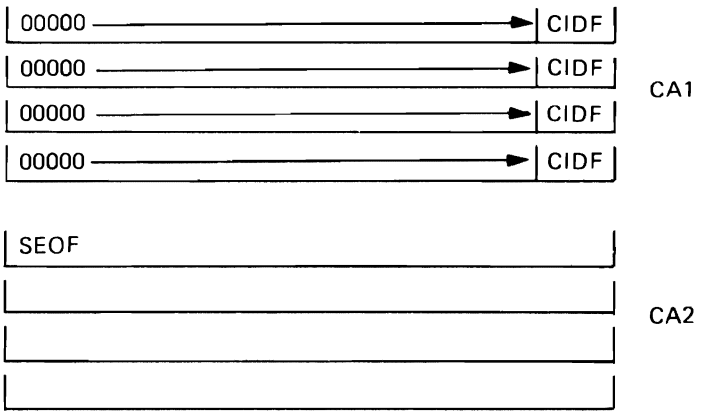
- INDEX AND DATA ON SEPARATE VOLUMES
  - SIMULTANEOUS ACCESS TO INDEX AND DATA
  - INDEX ON FASTER DEVICE
  - SPECIFY VOLUMES AT DATA AND INDEX LEVELS
- SEQUENCE SET IMBEDDED IN CAs
  - SEQUENCE SET ALSO REPLICATED
  - DISK ARM MOVEMENT REDUCED
  - SPECIFY IMBED AT EITHER CLUSTER OR INDEX LEVELS
- INDEX RECORDS REPLICATED
  - INDEX SET AND SEQUENCE SET REPLICATED
  - ROTATIONAL DELAY REDUCED
  - SPECIFY REPLICATE AT EITHER CLUSTER OR INDEX LEVELS



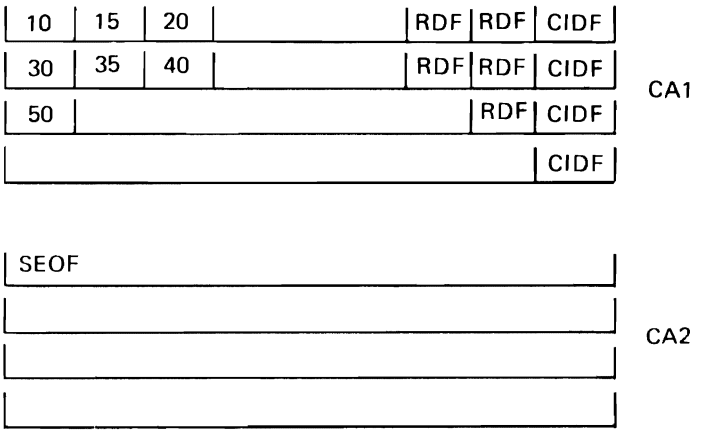
* 2 VOLUMES ARE SHOWN, COULD BE 2 AREAS ON 1 VOLUME

RECOVERY EXAMPLE

PREFORMATTING

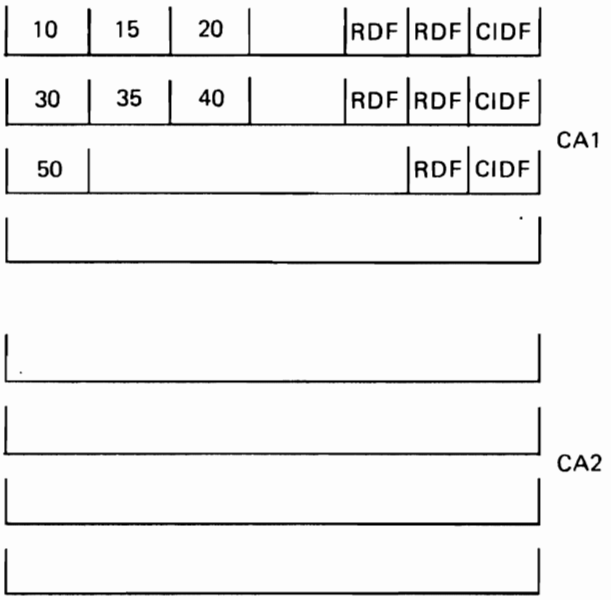


LOADING



SPEED EXAMPLE

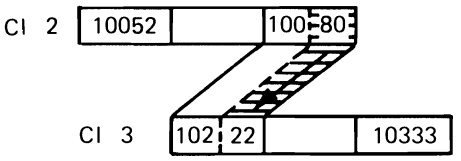
LOADING



INDEX KEY COMPRESSION

- MINIMIZE KEY SIZE
- MINIMIZE BYTES EXAMINED
- MAXIMIZE INDEX FAN-OUT
- FEWER INDEX LEVELS ⟶ FASTER KEYED ACCESS
- FRONT COMPRESSION
- REAR COMPRESSION
- DIFFERENCES BETWEEN KEYS – NOT IDENTIFICATION OF COMPLETE KEY
- INDEX ONLY – KEYS NOT COMPRESSED IN DATA RECORD

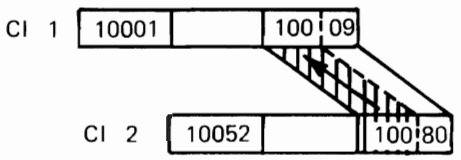
REAR KEY COMPRESSION



CONTROL INTERVAL	COMPLETE KEY	KEY AFTER REAR KEY COMPRESSION
CI 1	(10001)* 10009 **	1000--
CI 2	(10052) 10080	100--
CI 3	(10222) 10333	10333
CI 4	(10334) 14000	1400-
CI 5	(14021) 14028	1----
CI 6	(23456) 23630	2363-
CI 7	(23685)	

*FIRST KEY IN THE CONTROL INTERVAL
**LAST KEY IN THE CONTROL INTERVAL

FRONT KEY COMPRESSION



CONTROL INTERVAL	COMPLETE KEY	REAR COMPRESSION	KEY AFTER FRONT KEY COMPRESSION
CI 1	10009	1000-	1000
CI 2	10080	100 -	
CI 3	10033	10333	= = 333
CI 4	14000	1400	400
CI 5	14028	1----	=----
CI 6	23630	2363-	2363-

KEY COMPRESSION

FRONT COMPRESSION

BEST WHEN MANY KEYS HAVE SAME LEADING CHARACTERS

REAR COMPRESSION

BEST WHEN KEYS HAVE LARGE DIFFERENCES IN RIGHTMOST CHARACTERS

3850 OPTIONS

OPEN: BIND
CYLINDERFAULT
STAGE

CLOSE: DESTAGEWAIT
NODESTAGEWAIT

MVS MASTER CATALOG

VSAM CATALOG STRUCTURE

ENTRIES FOR SYSTEM DATA SETS

ENTRIES FOR CATALOGS

CREATED AT SYSGEN

LOCATED VIA 'SYSCATLG' MEMBER IN SYS1.NUCLEUS

BACKUP

- VOLUME BACKUP WITH STANDALONE RESTORE

OR

- DUPLICATE CATALOG
  - DEFINE UCAT
  - LOAD UCAT - Eg REPRO
  - ENTRY IN SYS1.NUCLEUS

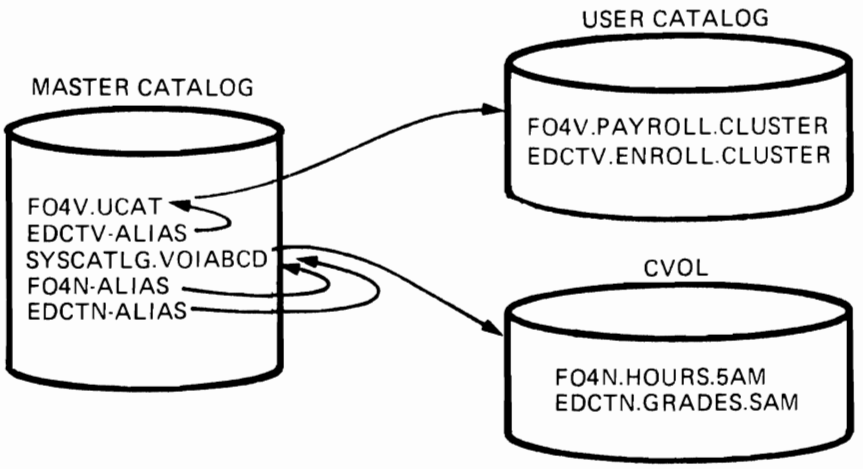
IPL WITH DUPLICATE CATALOG

1. ADDRESS STOP AT IEAVNP11

2. IPL

3. ALTER CONSTANT AT @CC02209

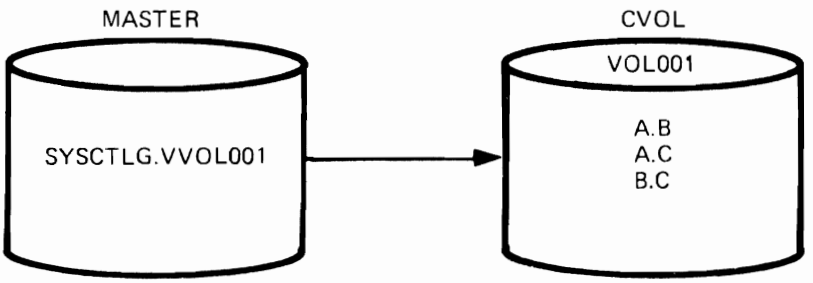
QUALIFIED NAMES



ESTABLISH CVOL POINTER

```
DEFINE NONVSAM

NAME (SYSCTLG.VVOL001) -
        DEVICE TYPES (2314) -
        VOLUMES (VOL001)
```

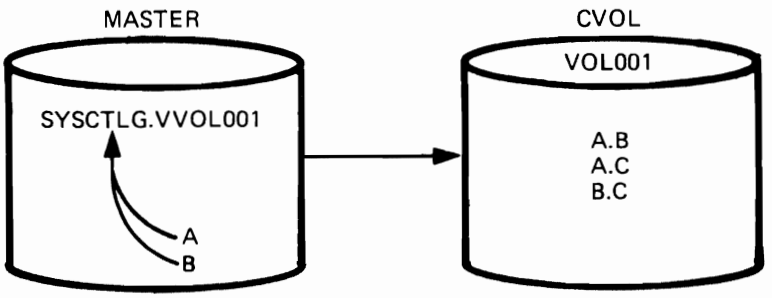
The first qualifier Must Be 'SYSCTLG'.



ESTABLISH ALIAS

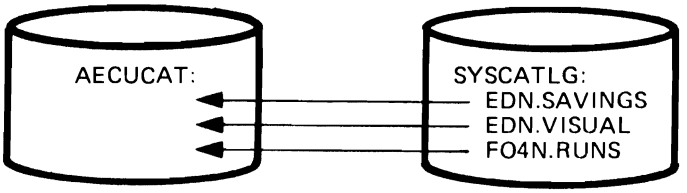
```
DEFINE ALIAS –
        NAME (A) –

        RELATE (SYSCTLG.VVOL001)
```

DEFINE ALIAS NAME (B) RELATE (SYSCTLG.VVOL001)



CONVERT CVOL TO VSAM UCAT

```
// MVE          EXEC     IDCAMS
// OSCAT          DD     DSN=SYSCATLG,VOL=SER=CAT004,
//        UNIT=3330
// SYSPRINT      DD          SYSOUT=A
// SYSIN        DD   *
     CNVTCAT INFILE (OSCAT) CAT (AECUCAT)
```

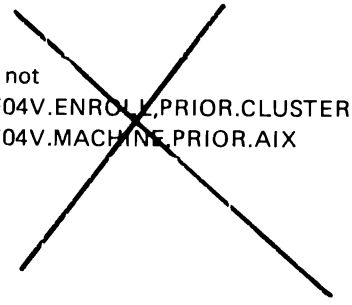


GENERIC NAMES AND LISTC, DEL, ALTER

LISTCAT ENTRIES (F04V.*.PRIOR.CLUSTER)

will list: F04V.anyname.PRIOR.CLUSTER

as in F04V.ENROLL.PRIOR.CLUSTER
F04V.MACHINE.PRIOR.CLUSTER



But not
F04V.ENROLL.PRIOR.CLUSTER.ADDED
F04V.MACHINE.PRIOR.AIX

LEVEL PARAMETER

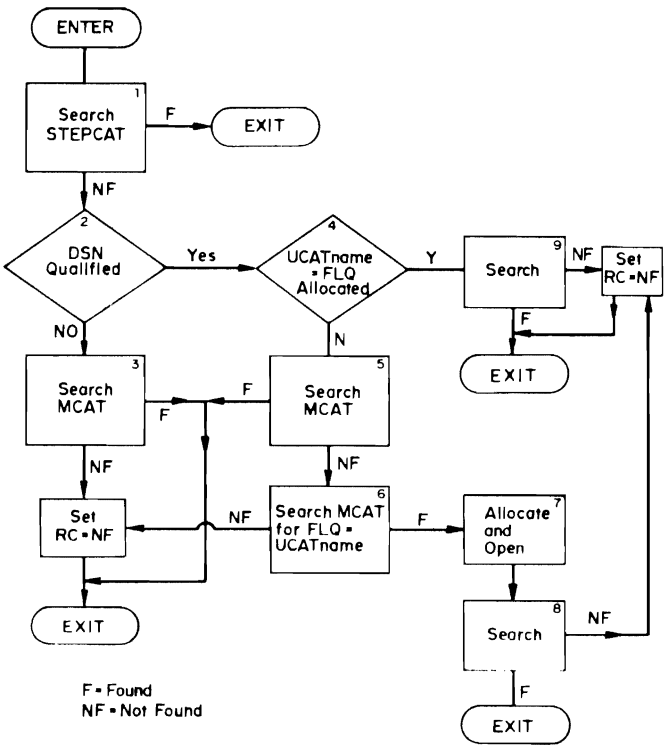
LISTCAT LEVEL (F04V)

includes F04v.ENROLL.PRIOR.CLUSTER
F04V.ROSTER.AFTER.CLUSTER
F04V.GRADES.CLUSTER
F04V.MACHINE.PRIOR.CLUSTER

LISTCAT LEVEL (F04V.*.PRIOR)

includes F04V.ENROLL.PRIOR.CLUSTER
F04V.MACHINE.PRIOR.CLUSTER

CATALOG SEARCH ALGORITHM



LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - 0000000001000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000000 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  0000CC00 00000000 00000000 C4011600   8FE5E2C1 D44BC3C1 E3C1D3D6 C74BC2C1   *.............D....VSAM.CATALOG.BA*
0040  E2C5E4E4 C1E3C14B D9C5C3D6 D9C44040   40404040 40404040 40404040 40FFFFFF   *SE.DATA.RECORD                ...*
0060  FFFFFFFF FF000000 00000008 A0000000   0C000000 0A000005 80000080 00000080   *................................*
0080  00000001 F90000FF FFFFFFFF FFFFFF00   00000000 05000000 C0000000 06010100   *....9..........................*
00A0  00000201 00000583 01000007 83020006   C3000002 00626044 00600000 0000002C   *.............C.....-..-.......*
00C0  00000320 00000000 00000000 02000000   01F90000 00000000 00000000 00002000   *.................9.............*
00E0  00000000 0000d767 E083F4EB 20000000   00020000 000E0000 00000000 00000000   *.........4.....................*
0100  00000000 00000000 96000000 00000000   00000000 00190000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  CCCCCCCC 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 01000000 00                 *................................ *

KEY OF RECORD - 0000000101000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000001 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  0000C000 00000000 00000000 C9011800   8FE5E2C1 D44BC3C1 E3C1D3D6 C74BC2C1   *.............I....VSAM.CATALOG.BA*
0040  E2C5E4E4 D5C4C5F7 40D9C5C3 D6D9C440   40404040 40404040 40404040 40FFFFFF   *SE.INDEX.RECORD               ...*
0060  FFFFFFFF FF000000 00000000 A000FFFF   FFFF0000 05000005 80000072 00000072   *................................*
0080  00FFFFFF FF000FFF FFFFFFFF FFFFFF00   00000000 06000000 C0000000 06010100   *................................*
00A0  00000201 00000483 01000006 83020006   03830300 06C30000 02006263 24006000   *.....................C.....-..-.*
00C0  07000320 20000000 00000000 00000000   00020000 00001F00 00000000 006E0000   *.....................9......>..*
00E0  00000020 00000000 00000387 67E083F4   EB200000 02000300 00000300 00000000   *.............4.................*
0100  00000000 00000000 00000000 006C0000   00000000 00000000 00000000 00000000   *.............%.................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *................................ *

KEY OF RECORD - 0000000201000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000002 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C300C300   6CE4E2C5 D9C3C1E3 F1404040 40404040   *............C.C.%USERCAT1      *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                               ...*
0060  FFFFFFFF FF75178F 00000F00 00000000   00000000 00020100 00060202 000C0C04   *................................*
0080  01000604 00000000 06090000 01013404   C1D2F3C5 D940404F FFFFFFFF FFFFFFFF   *...D.....I.....MASTER  .........*
00A0  FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF   FFFFFFFF FFFFFF00 02FFFFFF FFFFFFFF   *................................*
00C0  FF000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................ .*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................ *
```

LISTING OF DATA SET -USERCAT1

```
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 C0000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *........................        *

KEY OF RECORD - 0000000300000000000000000000C0000000000000000000000000000000000000000000000000000000000000000000
0000  00000003 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 D3000028   00002900 00120000 1D000050 00000058   *...........L.............&....*
0040  00000058 00000058 00000080 00000080   00000002 0000006E 00000070 00000070   *...........................>........*
0060  00000072 00000072 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 0000000C   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *........................        *

KEY OF RECORD - 0000000401000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000004 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5007D00   31000000 00000100 00000301 032730C0   *.............E.'..............*
0040  2008E3E2 D6D7C1D2 00008001 00000000   00000200 00006E00 00000200 00080001   *..TSOPAK.............>.........*
0060  00000000 00000000 14000100 0A000500   0A000900 05000000 00000060 FF000000   *.............................-....*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *........................        *

KEY OF RECORD - 0000000501000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000005 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5007F00   31000000 00000100 00000301 032730C0   *.............E.'..............*
0040  2008E3F2 D6D7C1D2 00008001 00001600   00005800 00005800 00000200 00080005   *..TSOPAK.....X...X.............*
0060  00000100 01000001 3F001400 01000A00   00000400 34000500 00000000 0057FF00   *.........?.....4.............W..*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

H.13.2

LISTING OF DATA SET -USERCAT1

```
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.............................  *

KEY OF RECORD - 0000000601000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000006 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5007F00   31000000 00000100 00000302 032730C0   *............E."..............*
0040  2008E3E2 D6D7C1D2 00008001 00000000   00007000 00007000 00000200 00080005   *..TSOPAK.......................*
0060  80000100 01000001 3F001400 01000A00   00000A00 04000500 006E0000 006FFF00   *.............>...?...>...?...*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.............................  *

KEY OF RECORD - 0000000701000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000007 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5007F00   31000000 00000100 00000302 032730C0   *............E."..............*
0040  2008E3E2 D6D7C1D2 00008001 00005800   0000B000 0000B000 00000200 00080005   *..TSOPAK.......................*
0060  00000100 01400001 FF001400 01000A00   0A000A00 0E000500 00580000 00AFFF00   *.....  .....>...?...>...?...*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.............................  *
```

LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - 0000000801000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000008 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5007F00   31000000 00000100 00000303 032730C0   *............E.".............'{*
0040  2008E3E2 D6D7C1D2 00008001 00000000   00007200 00007200 00000200 000B0005   *..TSOPAK.....................*
0060  80000100 01400001 FF001400 01000A00   0A000A00 0E000500 00700000 0071FF00   *.....  ..............  ....q..*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000C00 00000000 C0000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.........................      *

KEY OF RECORD - 0000000901E3E2D6D7C1D2000009300C020088767E0A900000000000000000000000000000000000000000000000000
0000  00000009 01E3E2D6 D7C1D200 00093000   20088767 E0A90000 00000000 00000000   *.....TSOPAK....................*
0020  00000000 00000000 00000000 E501C400   7FE3E2D6 D7C1D200 00000000 00000000   *.............V.D."TSOPAK.......*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00876CD2   *................................%K*
0060  0BE72340 0030C020 0800001C 7E00CB00   141C7E92 2D2D0102 16000500 00000000   *.X. .........=.....".............*
0080  00000000 0C000000 C0000000 000A8500   01000008 85000200 00000600 0100005A   *...............................!*
00A0  06000200 00550800 010000AF 08000200   00BB0800 030000C7 08000400 00D30800   *.....................G.....L...*
00C0  05000CDF 08000600 00EB0800 07005587   67E0A9B7 07600000 19000006 08018000   *.....................P-..........*
00E0  000500C8 00230000 00000000 00000000   00000000 00000000 00000000 00000000   *...H...........................*
0100  0000C000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  0000CC05 00000200 55876CC4 CC6CEB60   00001900 00040001 C0000000 012C003C   *.........%D.%.-.............*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 000C0000   *................................*
0180  26876CC4 EF000622 000C0000 24876CC4   F10007DF 000C0000 23876CC4 F1000135   *..%D.....%D1.....%D1...*
01A0  000C0000 21876CC5 1F000136 000C0000   1F876CC5 26000140 000C0000 1E876CC5   *.....%E.....%E... .....%E*
01C0  26000138 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.........................      *

KEY OF RECORD - 0000000A01E3E2D6D7C1D200000A30C02008876 7E0A900000000000000000000000C0C0000000000000000000
0000  0000000A 01E3E2D6 D7C1D200 000A30C0   20088767 E0A90000 00000000 00000000   *.....TSOPAK....................*
0020  0000C000 00000000 00000000 E601F900   31000000 00000100 00000500 01010201   *.............W.9...............*
0040  B800C000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 7FFF0000   00000000 00000000 00000000 00000000   *.............".................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 0000C000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  0000C000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

LISTING OF DATA SET -USERCAT1

```
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000000801E3E2D6D7C1D2000008B30C020088767E0A900000000000000000000000000000000000000000000000000000
0000  00000008 01E3E2D6 D7C1D200 0008B30C   20088767 E0A90000 00000000 00000000   *.....TSOPAK.....W.............*
0020  00000000 00000000 00000000 E6008500   31000000 00000100 00000500 02010200   *.............W................*
0040  44000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000000C0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000000C 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000000   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000000D0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000000D 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C5000000   00000000 00000000 00000000 00000000   *............E...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

LISTING OF DATA SET -USERCAT1

```
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................       *

KEY OF RECORD - 0000000E00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000000E 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600000D   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 0000000C   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................       *

KEY OF RECORD - 0000000F00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000000F 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600000E   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................       *
```

H.13.6

LISTING OF DATA SET -USERCAT1

KEY OF RECORD - 0000001000000000000000000000C000000000000000000000000000000000000000000C000000000000000000

```
0000  00000010 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600000F    00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000    00000000 00000000 00                  *........................        *
```

KEY OF RECORD - 0000001100000000000000000000C000000000000000000000000000000000000000000000000000000000000000000

```
0000  00000011 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000010    00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000    00000000 00000000 00                  *........................        *
```

KEY OF RECORD - 0000001200000000000000000000C000000000000000000000000000000000000000000000000000000000000000000

```
0000  00000012 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000011    00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000    00000000 00000000 00000000 00000000   *................................*
```

H.13.7

LISTING OF DATA SET -USERCAT1

```
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 00000013000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000013 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0020  00000000 00000000 00000000 C6000012   00000000 00000000 00000000 00000000  *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 00000014000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000014 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0020  00000000 00000000 00000000 C6000013   00000000 00000000 00000000 00000000  *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 00000015000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000015 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0020  00000000 00000000 00000000 C6000014   00000000 00000000 00000000 00000000  *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
```

LISTING OF DATA SET -USERCAT1

```
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *................................ *

KEY OF RECORD - 0000001600000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000016 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000015   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *................................ *

KEY OF RECORD - 0000001700000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000017 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000016   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *................................ *
```

LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - 0000001800000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000018 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000017   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.............................   *

KEY OF RECORD - 0000001900000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  00000019 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C6000018   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.............................   *

KEY OF RECORD - 0000001A00000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000001A 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600001A   00000000 00000000 00000000 00000000   *............F...................*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

H1310

LISTING OF DATA SET -USERCAT1

```
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 0000001B000000000000000000C0000000000000000000000000000000000000000000000000000000000000000000
0000  0000001B 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600001A   00000000 00000000 00000000 00000000   *............F...............*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 0000000C   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 0000001C000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  0000001C 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600001B   00000000 00000000 00000000 00000000   *............F...............*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00A0  00000000 00000000 00000000 0000000C   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *........................        *

KEY OF RECORD - 0000001D010000000000000000C0000000000000000000000000000000000000000000000000000000000000000000
0000  0000001D 01000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0020  00000000 00000000 00000000 C600001C   00000000 00000000 00000000 00000000   *............F...............*
0040  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0060  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0080  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

H.13.11

LISTING OF DATA SET -USERCAT1

```
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000001E01E3E2D6D7C1D20000153000200088767E0A9876CC5260000000000000000000000000000000000000000
0000  0000001E 01E3E2D6 D7C1D200 00153000   20088767 E0A9876C C5260000 00000000   *.....TSOPAK.............%E........*
0020  00000000 00000000 00000000 C9015700   8FE3F5F5 F4C6F5C5 F04BE5E2 C1D4C4E2   *.............I....T554F5E0.VSAMDS*
0040  C5E34BC4 C6C4F7F5 F1F8F24B E3F8F7F6   C3C3F5F2 4BE3F5F5 F4C6F5C5 F0FFFFFF   *ET.DFD75182.T876CC52.T554F5E0...*
0060  FFFFFFFF FF75182F 00000000 2000FFFF   FFFF0000 01000001 80000000 00000016   *.....u./.... ..................*
0080  00FFFFFF FF00000F FFFFFFFF FFFFFF00   00000000 05000000 C0000000 00010100   *................................*
00A0  0062C201 0000e803 01000000 44010062   60000060 00050005 00030000 000B0000   *.....b..h.....D..b-..-.........*
00C0  00000000 00000200 000001F9 00000000   00000000 00000000 00000000 00000000   *.............9.................*
00E0  00000000 00000000 00000001 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00001600 00000000 00000000 00000000   0006C700 00200327 30C02008 E3E2D6D7   *.................G.....3.. .TSOP*
0120  C1D20000 80010000 00000000 00000000   16000000 02000008 00014000 07000000   *AK.......................... .....*
0140  00001400 11000F00 0F000F00 0F000100   00000000 0015FF00 00000000 000C0000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000001F01E3E2D6D7C1D20000143000200088767E0A9876CC5260000000000000000000000000000000000000000
0000  0000001F 01E3E2D6 D7C1D200 00143000   20088767 E0A9876C C5260000 00000000   *.....TSOPAK.............%E........*
0020  00000000 00000000 00000000 C4015700   8FE3F5F5 F4F7F9F9 F04BE5E2 C1D4C4E2   *.............D....T5547990.VSAMDS*
0040  C5E34BC4 C6C4F7F5 F1F8F24B E3F8F7F6   C3C3F5F2 4BE3F5F5 F4F7F9F9 F0FFFFFF   *ET.DFD75182.T876CC52.T5547990...*
0060  FFFFFFFF FF75182F 00000000 20000000   22000000 01000001 C0000000 000001E0   *.....u./.... ..{.....{.....{..*
0080  0000000F F60000FF FFFFFFFF FFFFFF00   00000000 05000000 C0000000 00010100   *....6.....................{.....*
00A0  00620201 00006803 01000000 44010062   60810060 00310005 00030000 001E0000   *.....b..h.....D..b-..-.........*
00C0  00000000 00001000 0007F58 00000000   00000000 00000000 80000000 00000000   *.....5.....".....{.....{.....*
00E0  00000000 00000000 00000001 00000000   00000000 00000000 00000000 00000000   *................................*
0100  0001E000 00000000 00000000 00000000   0006C700 00200327 30C02008 E3E2D6D7   *.....{.....{.....G.....3.. .TSOP*
0120  C1D20000 80010000 00000000 00000001   E0000000 08000003 00144000 06000000   *AK.......................... .....*
0140  00001400 11001000 00001000 13001400   00000000 01DFFF00 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00C00000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *
```

111312

LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - 000000200 1E3E2D6D7C1D200001330C020088767E0A900000000000000000000000000000000000000000000
0000  00000020 01E3E2D6 D7C1D200 001330C0   20088767 E0A90000 00000000 00000000   *.....TSOPAK.....................*
0020  00000000 00000000 00000000 C700A800   6CC1D9C5 C1C3C4C9 E7404040 40404040   *.............G...%AREACDIX      *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                               ...*
0060  FFFFFFFF FF75182F 00000F00 00000000   00060000 00C00000 00000201 00000602   *.....u./.......................*
0080  02000C0C 02030000 12020400 00004401   0006C400 001F0006 C900001E 0006C300   *..................D.....I.....C.*
00A0  00270006 D9000028 00000000 00000000   00000000 00000000 00000000 00000000   *....R...........................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  0000C000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  000C0000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *.........................      *

KEY OF RECORD - 000000210 1E3E2D6D7C1D200001230C020088767E0A9876CC51F000000000000000000C00000000000000000
0000  00000021 01E3E2D6 D7C1D200 001230C0   20088767 E0A9876C C51F0000 00000000   *.....TSOPAK.............%E.......*
0020  00000000 00000000 00000000 C4015700   8FE3C4F0 F5C6C1F9 F048E5E2 C1D4C4E2   *.............D....TD05FA90.VSAMDS*
0040  C5E348C4 C6C4F7F5 F1F8F248 E3F8F7F6   C3C3F5F1 48E3C4F0 F5C6C1F9 F0FFFFFF   *ET.DFD75182.T876CC51.TD05FA90...*
0060  FFFFFFFF FF75182F 00000000 20000000   04000000 05000001 80000000 0000006E   *.....u./.... ..............>*
0080  00000000 500000FF FFFFFFFF FFFFFF00   00000000 05000000 C0000000 00010100   *....&...........................*
00A0  00620201 00006803 01000000 44010062   60000060 00000000 00000000 000B0000   *.....h.....-..-.....-..........*
00C0  00000000 00000200 00000050 00000000   00000000 00000000 08000000 00000000   *..........&.....................*
00E0  876CD215 8FC5F000 00000001 00000000   00000000 00000000 00000000 00000000   *.%K..E0........................*
0100  00006E00 00000000 00000000 00000002   0006C300 00220327 30C02008 E3E2D6D7   *..>.............C.....TSOP*
0120  C1D20000 80010000 00000000 00000000   6E000000 0200000B 00010000 05000000   *AK.............>................*
0140  00001400 11000F00 0A000F00 0E000500   00000000 006DFF00 00000000 00000000   *......................_..........*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *.........................      *

KEY OF RECORD - 000000220 1E3E2D6D7C1D200001130C020088767E0A900000000000000000000000000000000000000000000
0000  00000022 01E3E2D6 D7C1D200 001130C0   20088767 E0A90000 00000000 00000000   *.....TSOPAK.....................*
0020  00000000 00000000 00000000 C3008200   6CC6C9D3 C5F24040 40404040 40404040   *.............C...%FILE2        *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                               ...*
0060  FFFFFFFF FF75182F 00000F00 00000000   00020000 00020100 00004401 0006C400   *.....u./.....................D...*
0080  00210000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *.!.............................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
```

H.13.13

LISTING OF DATA SET -USERCAT1

```
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 000C0000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *................................*

KEY OF RECORD - 0000002301E3E2D6D7C1D200001C30C020088767E0A9876CC4F1000000000000000000000000000000000000
0000  00000023 01E3E2D6 D7C1D200 001030C0   20088767 E0A9876C C4F10000 00000000   *.....TSOPAK.............%D1......*
0020  00000000 00000000 00000000 C9015700   8FE3F1F1 C1C5F5F3 F04BE5E2 C1D4C4E2   *.............I....T11AE530.VSAMDS*
0040  C5E34BC4 C6C4F7F5 F1F8F24B E3F8F7F6   C3C3F4C6 4BE3F1F1 C1C5F5F3 F0FFFFFF   *ET.DFD75182.T876CC4F.T11AE530...*
0060  FFFFFFFF FF75182F 00000000 2000FFFF   FFFF0000 01000001 80000014 00000016   *................................*
0080  00FFFFFF FF0000FF FFFFFFFF FFFFFF00   00000000 05000000 C0000000 00010100   *................................*
00A0  00620201 00006803 01000000 44010062   60000060 00030000 00180000 00080000   *.............-..-...............*
00C0  00000000 00000200 000001F9 00000400   00000000 00000000 08000000 00000000   *............9..................*
00E0  876CD22A 59944000 00020001 0000000A   00000000 00000000 00000000 00000000   *.%K... ........................*
0100  00000200 00000000 00000000 00000032   0006C300 00250327 30C02008 E3E2D6D7   *...................C.........TSOP*
0120  C1D20000 80010000 00000000 14000000   16000000 0200000B 00010000 04000000   *AK.............................*
0140  00001400 11000F00 09000F00 09000100   00000000 0015FF00 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00C00000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *................................*

KEY OF RECORD - 0000002401E3E2D6D7C1D200000E30C020088767E0A9876CC4F1000000000000000000000000000000000000
0000  00000024 01E3E2D6 D7C1D200 000E30C0   20088767 E0A9876C C4F10000 00000000   *.....TSOPAK.............%D1......*
0020  00000000 00000000 00000000 C4018B00   8FE3F1F1 C1F6F8F2 F04BE5E2 C1D4C4E2   *.............D....T11A6820.VSAMDS*
0040  C5E34BC4 C6C4F7F5 F1F8F24B E3F8F7F6   C3C3F4C6 4BE3F1F1 C1F6F8F2 F0FFFFFF   *ET.DFD75182.T876CC4F.T11A6820...*
0060  FFFFFFFF FF75182F 00000000 20000000   06000000 04000001 800000C6 000000C6   *.........................F...F*
0080  00000000 500000FF FFFFFFFF FFFFFF00   00000000 05000000 C0000000 00010100   *....&..........................*
00A0  00620201 00006803 01000000 44010062   60800060 00000000 00180000 00080000   *.............-..-...............*
00C0  00000000 00000200 00000050 00000000   00000000 00000000 08000000 00000000   *............&..................*
00E0  876CD22A 59944000 00000006 00000216   00000000 00000000 00000000 00000000   *.%K... ........................*
0100  00001400 00000000 00000000 00000065   0006C300 00250327 30C02008 E3E2D6D7   *...................C.........TSOP*
0120  C1D20000 80060000 80000000 C6000000   C6000000 0200000B 00010000 03000000   *AK.........F...F...............*
0140  00007800 11000F00 05000F00 08000400   00000000 0057FF00 11001100 00001100   *................................*
0160  00000100 00580000 0060FF00 11001100   01001100 01000100 006E0000 0083FF00   *.........._.............>.......*
0180  11001100 02001100 02000100 00840000   0099FF00 11001100 03001100 03000100   *................................*
01A0  009A0000 00AFFF00 11001100 04001100   04000100 00B00000 00C5FF00 00000000   *........................E.......*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00               *................................*

KEY OF RECORD - 0000002501E3E2D6D7C1D200000F30C020088767E0A900000000000000000000000000000000000000000000
0000  00000025 01E3E2D6 D7C1D200 000F30C0   20088767 E0A90000 00000000 00000000   *.....TSOPAK....................*
0020  00000000 00000000 00000000 C3008D00   6CD2C5E8 D7C8D6D5 40404040 40404040   *.............C...%KEYPHON     *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                              ...*
0060  FFFFFFFF FF75182F 00000F00 00000000   00030000 00020100 00060202 00000044   *................................*
0080  010006C4 00002400 06C90000 23000000   00000000 00000000 00000000 00000000   *...D.....I.....................*
```

H.13.14

LISTING OF DATA SET -USERCAT1

```
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000002601E3E2D6D7C1D200000D30C02008876 7E0A9876CC4EF0000000000000000000000000000000000000000
0000  00000026 01E3E2D6 D7C1D200 000D30C0   20088767 E0A9876C C4EF0000 00000000   *.....TSOPAK.............%D.......*
0020  00000000 00000000 00000000 C401AC00   8FE3C1F9 F0F4C3F0 F04BE5E2 C1D4C4E2   *.............D....TA904C00.VSAMDS*
0040  C5E34BC4 C6C4F7F5 F1F8F248 E3F8F7F6   C3C3F4C5 4BE3C1F9 F0F4C3F0 F0FFFFFF   *ET.DFD75182.T876CC4E.TA904C00....*
0060  FFFFFFFF FF75182F 00000000 20000000   04000000 05000001 800009B4 000000C6   *.....................F*
0080  00000000 500000FF FFFFFFFF FFFFFF00   00000000 06000000 C0000000 00010100   *....&...........................*
00A0  00620201 00000042 02000068 03010000   00440100 82600000 60000000 00000000   *.....................-.-.-.-.....*
00C0  00000800 00000000 00000002 00000000   50000000 00000000 00000000 00080000   *................&................*
00E0  00000000 00876CD2 13290D80 00000000   05000002 19000000 00000000 00000000   *......%K.......................*
0100  00000002 19000012 00000000 00000000   00000000 BD0006C3 00002703 2730C020   *.........................C.........*
0120  08E3E2D6 D7C1D200 00800500 00000000   00840000 00C60000 00020000 08000100   *.TSOPAK..............F..........*
0140  00020000 00000064 0011000F 0000000F   00040005 00000000 00006DFF 0011000F   *......................_.....*
0160  0010000F 00100001 00006E00 000083FF   0011000F 0011000F 00110001 00008400   *..........>....................*
0180  0000999F 0011000F 0012000F 00120001   00009A00 0000AFFF 0011000F 0013000F   *................................*
01A0  0013C001 00008000 0000C5FF 00000000   00000000 00000000 00000000 00000000   *..........E....................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *

KEY OF RECORD - 0000002701E3E2D6D7C1D200000C30C02008876 7E0A900000000000000000000000C0000000000000000000
0000  00000027 01E3E2D6 D7C1D200 000C30C0   20088767 E0A90000 00000000 00000000   *.....TSOPAK....................*
0020  00000000 00000000 00000000 C3009200   6CD7C8D6 D5C6C9D3 C5404040 40404040   *.............C...%PHONFILE    *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                               ...*
0060  FFFFFFFF FF75182F 00000F00 00000000   00040000 00C00000 00000201 00000602   *.....................D.....G.....*
0080  02000000 44010006 C4000026 0006C700   00200000 00000000 00000000 00000000   *.....D.....G...................*
00A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.......................        *
```

H.13.15

LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - 00000028 01E3E2D6 D7C1D200 01730C02 00088767 E0A90000 C0000000 00000000 00000000 C0C00000 00000000 00000000
0000  00000028 01E3E2D6 D7C1D200 01730C02   00088767 E0A90000 00000000 00000000   *.....TSOPAK.....................*
0020  00000000 00000000 00000000 D900DE00   6CC1D9C3 C4D7C1E3 C8404040 40404040   *.............R...%ARCDPATH       *
0040  40404040 40404040 40404040 40404040   40404040 40404040 40404040 40FFFFFF   *                               ...*
0060  FFFFFFFF FF75182F 00000F00 00000000   00060000 00C00000 00000201 00000602   *.....u./.......................*
0080  02000000 02030000 12020400 00180401   0006C700 00200006 C400001F 0006C900   *...................G.....D.....I.*
00A0  001E0006 C4000026 0134E6D9 C9E3C540   4040E6D9 C9E3C540 4040E6D9 C9E3C540   *....D.....WRITE   WRITE   WRITE *
00C0  4040FFFF FFFFFFFF FFFFFFFF FFFFFFFF   FFFF0002 FFFFFFFF FFFFFFFF 00000000   *  ................................*
00E0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0100  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0120  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0140  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0160  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
0180  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01A0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01C0  00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000   *................................*
01E0  00000000 00000000 00000000 00000000   00000000 00000000 00                 *.........................       *

KEY OF RECORD - C1D9C3C4D7C1E3C8404040404040404040404040404040404040404040404040404040404040404040404040404040
0000  C1D9C3C4 D7C1E3C8 40404040 40404040   40404040 40404040 40404040 40404040   *ARCDPATH                       *
0020  40404040 40404040 40404040 000028                                           *            ...                *

KEY OF RECORD - C1D9C5C1C3C4C9E7404040404040404040404040404040404040404040404040404040404040404040404040404040
0000  C1D9C5C1 C3C4C9E7 40404040 40404040   40404040 40404040 40404040 40404040   *AREACDIX                       *
0020  40404040 40404040 40404040 000020                                           *            ...                *

KEY OF RECORD - C6C9D3C5F2404040404040404040404040404040404040404040404040404040404040404040404040404040404040
0000  C6C9D3C5 F2404040 40404040 40404040   40404040 40404040 40404040 40404040   *FILE2                          *
0020  40404040 40404040 40404040 000022                                           *            ...                *

KEY OF RECORD - D2C5E8D7C8D6D5404040404040404040404040404040404040404040404040404040404040404040404040404040404040
0000  D2C5E8D7 C8D6D540 40404040 40404040   40404040 40404040 40404040 40404040   *KEYPHON                        *
0020  40404040 40404040 40404040 000025                                           *            ...                *

KEY OF RECORD - D7C8D6D5C6C9D3C5404040404040404040404040404040404040404040404040404040404040404040404040404040404040
0000  D7C8D6D5 C6C9D3C5 40404040 40404040   40404040 40404040 40404040 40404040   *PHONFILE                       *
0020  40404040 40404040 40404040 000027                                           *            ...                *

KEY OF RECORD - E3C1F9F0F4C3F0F04BE5E2C1D4C4E2C5E34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F4C54BE3C1F9F0F4C3F0F0
0000  E3C1F9F0 F4C3F0F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *TA904C00.VSAMDSET.DFD75182.T876C*
0020  C3F4C54B E3C1F9F0 F4C3F0F0 000026                                           *C4E.TA904C00...                  *
```

H.13.16

LISTING OF DATA SET -USERCAT1

```
KEY OF RECORD - E3C4F0F5C6C1F9F04BE5E2C1D4C4E2C5E34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F5F14BE3C4F0F5C6C1F9F0
0000  E3C4F0F5 C6C1F9F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *TD05FA90.VSAMDSET.DFD75182.T876C*
0020  C3F5F14B E3C4F0F5 C6C1F9F0 000021                                          *C51.TD05FA90...                  *


KEY OF RECORD - E3E2D6D7C1D200000000000000000000000000000000000000000000000000000000000000000000000000000000
0000  E3E2D6D7 C1D20000 00000000 00000000   00000000 00000000 00000000 00000000   *TSOPAK..........................*
0020  C0000000 00000000 00000000 000009                                          *................                  *


KEY OF RECORD - E3F1F1C1C5F5F3F04BF5E2C1D4C4E2C5E34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F4C64BE3F1F1C1C5F5F3F0
0000  E3F1F1C1 C5F5F3F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *T11AE530.VSAMDSET.DFD75182.T876C*
0020  C3F4C64B E3F1F1C1 C5F5F3F0 000023                                          *C4F.T11AE530...                  *


KEY OF RECORD - E3F1F1C1F6F8F2F04BE5E2C1D4C4E2C5E34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F4C64BE3F1F1C1F6F8F2F0
0000  E3F1F1C1 F6F8F2F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *T11A6820.VSAMDSET.DFD75182.T876C*
0020  C3F4C64B E3F1F1C1 F6F8F2F0 000024                                          *C4F.T11A6820...                  *


KEY OF RECORD - E3F5F5F4C6F5C5F04BE5E2C1D4C4E2C5E34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F5F24BE3F5F5F4C6F5C5F0
0000  E3F5F5F4 C6F5C5F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *T554F5E0.VSAMDSET.DFD75182.T876C*
0020  C3F5F24B E3F5F5F4 C6F5C5F0 00001E                                          *C52.T554F5E0...                  *


KEY OF RECORD - E3F5F5F4F7F9F9F04BE5E2C1D4C4E2C5F34BC4C6C4F7F5F1F8F24BE3F8F7F6C3C3F5F24BE3F5F5F4F7F9F9F0
0000  E3F5F5F4 F7F9F9F0 4BE5E2C1 D4C4E2C5   E34BC4C6 C4F7F5F1 F8F24BE3 F8F7F6C3   *T5547990.VSAMDSET.DFD75182.T876C*
0020  C3F5F24B E3F5F5F4 F7F9F9F0 00001F                                          *C52.T5547990...                  *


KEY OF RECORD - E4E2C5D9C3C1E3F140404040404040404040404040404040404040C4040404040404040404040404040404040
0000  E4E2C5D9 C3C1E3F1 40404040 40404040   40404040 40404040 40404040 40404040   *USERCAT1                         *
0020  40404040 40404040 40404040 000002                                          *                 ...               *


IDC0005I NUMBER OF RECORDS PROCESSED WAS 54

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
```

H1317

```
  LISTC CAT(USERCAT1/MASTER) ALL
```

H.13.18

```
                          LISTING FROM CATALOG -- USERCAT1

AIX         -- AREACDIX
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000013'
      PROTECTION (NULL)
      ASSOCIATIONS
         DATA        T5547990.VSAMDSET.DFD75182.T876CC52.T5547990
         INDEX       T554F5E0.VSAMDSET.DFD75182.T876CC52.T554F5E0
         CLUSTER     PHONFILE
         PATH        ARCDPATH
      ATTRIBUTES
         NUPG

   DATA      -- T5547990.VSAMDSET.DFD75182.T876CC52.T5547990
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000014'
      PROTECTION (NULL)
      ASSOCIATIONS
         AIX         AREACDIX
      ATTRIBUTES
           AXRKP-----RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
              49         5         3          4086         32600          8704          4096       30     (NULL)
         SHR(1,3)  RCVY       SUBAL      NERAS      IXD        NWCK       NIMBD      NREPL      UNORD      NRUS       SPND
             NUNQK
         STATISTICS                  FREESPACE:  %BYTES    %CI'S    TOTAL BYTES
            SYSTEM-TIMESTAMP                      IN-CI    IN-CA    IN DATA SET
            X'0000000000000000'                       0        0         122880
            ----------------------RECORDS-----------------------   ---------SPLITS--------   ----NUMBER----
                 TOTAL       DELETED      INSERTED      UPDATED     RETRIEVED          CI            CA     EXCPS  EXTENTS
                     0             0             0            0             0           0             0         0        1
         ALLOCATION   ----------SPACE----------   ----------RBA---------
                      TYPE      PRIMARY    SECONDARY   HIGH-ALLOC     HIGH-USED
                      CYL             1            1   X'0001E000'   X'00000000'
            VOLUMES                                  ---EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
               VOLSER---DEVTYPE-------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
               TSOPAK   X'30C02008'   PRIME            1   X'40'   X'0001E000'   X'00000000'        2048         3        20
               EXTENTS:   LOW-CCHH-----HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                          X'00100000'   X'00100013'        20       X'00000000'   X'0001DFFF'

   INDEX     -- T554F5E0.VSAMDSET.DFD75182.T876CC52.T554F5E0
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000015'
      PROTECTION (NULL)
      ASSOCIATIONS
         AIX         AREACDIX
      ATTRIBUTES
```

H.13.19

```
                          LISTING FROM CATALOG -- USERCAT1

          RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
            5        3           0          505            0           512      11     (NULL)
        SHR(1,3)  RCVY       SUBAL      NERAS      NWCK       NIMBD      NREPL      UNORD      NRUS
      STATISTICS                 FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
        SYSTEM-TIMESTAMP                      IN-CI    IN-CA   IN DATA SET
        X'0000000000000000'                       0        0          5632
        ------------------------RECORDS-------------------------   ---------SPLITS--------   ----NUMBER----
             TOTAL      DELETED      INSERTED      UPDATED     RETRIEVED          CI            CA    EXCPS  EXTENTS
                0            0             0            0             0           0             0        0        1
        ----------------INDEX-----------------------
                  ENTRIES    SEQUENCE-SET     HIGH-LEVEL
        LEVELS    PER SECT              RBA            RBA
             0           5    X'00000000'    X'00000000'
      ALLOCATION    ----------SPACE----------   ---------RBA---------
                    TYPE      PRIMARY    SECONDARY   HIGH-ALLOC     HIGH-USED
                    TRK             1            1   X'00001600'    X'000C0000'
        VOLUMES                                      ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
          VOLSER---DEVTYPE-------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
          TSOPAK    X'30C02008'   PRIME             1   X'40'   X'00001600'   X'00000000'         512         11         1
          EXTENTS:    LOW-CCHH-------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                      X'000F000F'    X'000F000F'         1       X'00000000'   X'000015FF'

    PATH      -- ARCDPATH
        HISTORY
          OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
          (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000017'
        PROTECTION
          MASTERPW---CTLPW------UPDATEPW---READPW-----CODE-------ATTEMPTS---USVR
          WRITE      WRITE      WRITE      (NULL)     (NULL)             2   (NULL)
          USER-SECURITY-AUTHORIZATION-RECORD
          (NONE)
        ASSOCIATIONS
          AIX         AREACDIX
          DATA        T5547990.VSAMDSET.DFD75182.T876CC52.T5547990
          INDEX       T554F5E0.VSAMDSET.DFD75182.T876CC52.T554F5E0
          DATA        TA904C00.VSAMDSET.DFD75182.T876CC4E.TA904C00
        ATTRIBUTES
          NUPD

    CLUSTER      -- FILE2
        HISTORY
          OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
          (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000011'
        PROTECTION (NULL)
        ASSOCIATIONS
          DATA        TD05FA90.VSAMDSET.DFD75182.T876CC51.TD05FA90

    DATA      -- TD05FA90.VSAMDSET.DFD75182.T876CC51.TD05FA90
```

```
                          LISTING FROM CATALOG -- USERCAT1

      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'000012'
      PROTECTION (NULL)
      ASSOCIATIONS
         CLUSTER    FILE2
      ATTRIBUTES
           RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
             0        0          80           80          1024           512      11     (NULL)
         SHR(1,3)  RCVY       SUBAL     NERAS     NIXD      NWCK       NIMBD     NREPL     UNORD      NRUS       NSPND
      STATISTICS                 FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
         SYSTEM-TIMESTAMP                     IN-CI   IN-CA   IN DATA SET
         X'876CD2158FC5F000'                      0       0         28160
         ----------RECORDS----------                  ---------SPLITS--------   ----NUMBER----
              TOTAL      DELETED      INSERTED      UPDATED    RETRIEVED          CI          CA    EXCPS  EXTENTS
                 0            0            0            0            0           0           0        2       1
      ALLOCATION   ----------SPACE----------   ----------RBA----------
                   TYPE      PRIMARY   SECONDARY   HIGH-ALLOC    HIGH-USED
                   TRK             5           1   X'00006E00'   X'00000000'
         VOLUMES                                 ----EXTENT----   ----------RBA---------     PHYSICAL   PHYRECS   TRACKS
            VOLSER---DEVTYPE-------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
            TSOPAK   X'30C02008'   PRIME            1   X'00'   X'00006E00'   X'00000000'        512        11         1
            EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                       X'000F000A'   X'000F000E'         5       X'00000000'   X'00006DFF'

CLUSTER     -- KEYPHON
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'00000F'
      PROTECTION (NULL)
      ASSOCIATIONS
         DATA       T11A6820.VSAMDSET.DFD75182.T876CC4F.T11A6820
         INDEX      T11AE530.VSAMDSET.DFD75182.T876CC4F.T11AE530

   DATA     -- T11A6820.VSAMDSET.DFD75182.T876CC4F.T11A6820
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
         (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'00000F'
      PROTECTION (NULL)
      ASSOCIATIONS
         CLUSTER    KEYPHON
      ATTRIBUTES
           RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
             0       24          80           80          1536           512      11     (NULL)
         SHR(1,3)  RCVY       SUBAL     NERAS     IXD       NWCK       NIMBD     NREPL     UNORD      NRUS       NSPND
      STATISTICS                 FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
         SYSTEM-TIMESTAMP                     IN-CI   IN-CA   IN DATA SET
         X'876CD22A59944000'                      0       0          5120
```

H.13.21

LISTING FROM CATALOG -- USERCAT1

```
          -----------------------------RECORDS-----------------------------    ---------SPLITS--------    ----NUMBER----
               TOTAL      DELETED      INSERTED      UPDATED    RETRIEVED          CI            CA    EXCPS  EXTENTS
                 534            0             0            0            0           0             0      101        6
       ALLOCATION    ----------SPACE----------    ----------RBA----------
                     TYPE      PRIMARY   SECONDARY   HIGH-ALLOC    HIGH-USED
                     TRK             4           1   X'0000C600'   X'0000C600'
          VOLUMES                                  ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
             VOLSER---DEVTYPE--------VOLFLAG---NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
             TSOPAK   X'30C02008'   PRIME            6   X'00'   X'0000C600'   X'0000C600'        512        11         1
             EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                        X'000F0005'   X'000F0008'         4      X'00000000'   X'000057FF'
                        X'00110000'   X'00110000'         1      X'00005800'   X'00006DFF'
                        X'00110001'   X'00110001'         1      X'00006E00'   X'000083FF'
                        X'00110002'   X'00110002'         1      X'00008400'   X'000099FF'
                        X'00110003'   X'00110003'         1      X'00009A00'   X'0000AFFF'
                        X'00110004'   X'00110004'         1      X'00008000'   X'0000C5FF'

INDEX     -- T11AE530.VSAMDSET.DFD75182.T876CC4F.T11AE530
   HISTORY
      OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
      (NULL)          75.182       00.000       2       TSOPAK       X'30C02008'      X'000010'
   PROTECTION (NULL)
   ASSOCIATIONS
      CLUSTER     KEYPHON
   ATTRIBUTES
        RKP---KEYLEN-----AVGLRECL----MAXLRECL------BUFSPC---------CISZ---CI/CA----EXCPEXIT
          0        24            0          505           0          512       11     (NULL)
      SHR(1,3)  RCVY       SUBAL      NERAS      NWCK       NIMBD      NREPL      UNORD      NRUS
   STATISTICS                      FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
      SYSTEM-TIMESTAMP                          IN-CI   IN-CA   IN DATA SET
      X'876CD22A59944000'                           0       0           512
          -----------------------------RECORDS-----------------------------    ---------SPLITS--------    ----NUMBER----
               TOTAL      DELETED      INSERTED      UPDATED    RETRIEVED          CI            CA    EXCPS  EXTENTS
                  10            0             0            0            0           0             0       50        1
          ----------------INDEX-----------------------
                     ENTRIES    SEQUENCE-SET     HIGH-LEVEL
          LEVELS   PER SECT          RBA            RBA
               2          3   X'00000000'   X'00000400'
       ALLOCATION    ----------SPACE----------    ----------RBA----------
                     TYPE      PRIMARY   SECONDARY   HIGH-ALLOC    HIGH-USED
                     TRK             1           1   X'00001600'   X'00001400'
          VOLUMES                                  ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
             VOLSER---DEVTYPE--------VOLFLAG---NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
             TSOPAK   X'30C02008'   PRIME            1   X'00'   X'00001600'   X'00001400'        512        11         1
             EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                        X'000F0009'   X'000F0009'         1      X'00000000'   X'000015FF'

CLUSTER     -- PHONFILE
```

H.13.22

```
                          LISTING FROM CATALOG -- USERCAT1

     HISTORY
        OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
        (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'00000C'
     PROTECTION (NULL)
     ASSOCIATIONS
        DATA        TA904C00.VSAMDSET.DFD75182.T876CC4E.TA904C00
        AIX         AREACDIX

  DATA      -- TA904C00.VSAMDSET.DFD75182.T876CC4E.TA904C00
     HISTORY
        OWNER-IDENT---CREATION---EXPIRATION---REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
        (NULL)          75.182       00.000       2        TSOPAK       X'30C02008'      X'00000D'
     PROTECTION (NULL)
     ASSOCIATIONS
        CLUSTER     PHONFILE
     ATTRIBUTES
          RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
            0        0           80            80          1024           512      11     (NULL)
        SHR(1,3)  RCVY       SUBAL      NERAS      NIXD       NWCK       NIMBD      NREPL      UNORD      NRUS       NSPND
     STATISTICS                  FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
        SYSTEM-TIMESTAMP                      IN-CI    IN-CA   IN DATA SET
        X'876CD21329DD8000'                       0        0          4608
        ---------------------------RECORDS---------------------------   ----------SPLITS--------   ----NUMBER----
             TOTAL       DELETED      INSERTED       UPDATED     RETRIEVED            CI            CA    EXCPS  EXTENTS
               537             0             0             0           537             0             0      189        5
     ALLOCATION   ------------SPACE------------   ----------RBA----------
                  TYPE       PRIMARY    SECONDARY   HIGH-ALLOC    HIGH-USED
                  TRK              5            1   X'0000C600'   X'00008400'
        VOLUMES                                    ----EXTENT----   ----------RBA----------      PHYSICAL    PHYRECS    TRACKS
           VOLSER---DEVTYPE-------VOLFLAG-----NUMBER---TYPE---HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
           TSOPAK   X'30C02008'   PRIME              5   X'00'   X'0000C600'   X'00008400'          512         11         1
           EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                      X'000F0000'   X'000F0004'          5       X'00000000'   X'00006DFF'
                      X'000F0010'   X'000F0010'          1       X'00006E00'   X'000083FF'
                      X'000F0011'   X'000F0011'          1       X'00008400'   X'000099FF'
                      X'000F0012'   X'000F0012'          1       X'00009A00'   X'0000AFFF'
                      X'000F0013'   X'000F0013'          1       X'00008000'   X'0000C5FF'

VOLUME       -- TSOPAK
   REL-----RCVY-VOL-----RCVY-DEVT-------RCVY-CI
    2        TSOPAK       X'30C02008'      X'000009'
                MAX-DEVICE                                                                  MAX-EXTENTS     DATASETS    DATASPACES
   DEVTYPE------PHYREC-SIZE---BYTE/TRK---TRK/CYL---CYL/VOL---VOLUME-TIMESTAMP--------PER-ALLOC---ON-VOLUME----ON-VOLUME
   X'30C02008'          7294         7294          20         203   X'876CD20BE7234000'               5             7             2
   DATASPACE
      ----------FORMAT 1 DSCB----------                                                        SECONDARY
      C C H H R       TIMESTAMP             -------ATTRIBUTES------   EXTENTS---ALLOCATION---TYPE---DATASETS
      X'0019000006'   X'8767E0A987D76000'    SUBAL    EXPL    UCAT              1             5   TRK             1
```

LISTING FROM CATALOG — USERCAT1

```
                          ---TRACKS----
      EXTENT-DESCRIPTOR:  TOTAL     USED    BEG-CCHH       SPACE-MAP
                            35       35    X'000A0000'    23
      DATASET DIRECTORY                                     ATTRIBUTES   EXTENTS
         USERCAT1                                           (NULL)             3
   DATASPACE
      ----------FORMAT 1 DSCB----------                                        SECONDARY
      C C H H R        TIMESTAMP             -------ATTRIBUTES-------   EXTENTS---ALLOCATION---TYPE---DATASETS
      X'0019000004'    X'876CC4CC6CEB6000'   SUBAL   EXPL                      1              0   CYL            6
                          ---TRACKS----
      EXTENT-DESCRIPTOR:  TOTAL     USED    BEG-CCHH       SPACE-MAP
                            60       45    X'000F0000'    2DOF
      DATASET DIRECTORY                                     ATTRIBUTES   EXTENTS
         TA904C00.VSAMDSET.DFD75182.T876CC4E.TA904C00       (NULL)             5
         T11A6820.VSAMDSET.DFD75182.T876CC4F.T11A6820       (NULL)             6
         T11AE530.VSAMDSET.DFD75182.T876CC4F.T11AE530       (NULL)             1
         TD05FA90.VSAMDSET.DFD75182.T876CC51.TD05FA90       (NULL)             1
         T5547990.VSAMDSET.DFD75182.T876CC52.T5547990       (NULL)             1
         T554F5E0.VSAMDSET.DFD75182.T876CC52.T554F5E0       (NULL)             1

CLUSTER     -- USERCAT1
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL
         (NULL)          75.178       00.000      2
      PROTECTION
         MASTERPW---CTLPW------UPDATEPW---READPW-----CODE-------ATTEMPTS---USVR
         MASTER      (NULL)      (NULL)     (NULL)     (NULL)        2    (NULL)
         USER-SECURITY-AUTHORIZATION-RECORD
         (NONE)
      ASSOCIATIONS
         DATA        VSAM.CATALOG.BASE.DATA.RECORD
         INDEX       VSAM.CATALOG.BASE.INDEX.RECORD

   DATA     -- VSAM.CATALOG.BASE.DATA.RECORD
      HISTORY
         OWNER-IDENT---CREATION---EXPIRATION---REL
         (NULL)          00.000       00.000      2
      PROTECTION (NULL)
      ASSOCIATIONS
         CLUSTER     USERCAT1
      ATTRIBUTES
           RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
            0        44           505           505         3072          512       44     (NULL)
         SHR(3,3)  RCVY       SUBAL     NERAS     IXD       NWCK       IMBED     NREPL     UNORD     NRUS      NSPND
              BIND       RVBL
      STATISTICS                  FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
         SYSTEM-TIMESTAMP                      IN-CI    IN-CA   IN DATA SET
         X'8767E083F4EB2000'                       0        0         38400
```

H.13.24

```
                        LISTING FROM CATALOG -- USERCAT1

     ------------------------RECORDS------------------------   ---------SPLITS--------   ----NUMBER----
          TOTAL      DELETED      INSERTED      UPDATED    RETRIEVED          CI           CA   EXCPS  EXTENTS
            14            0             0            0          108           0            0      67        2
   ALLOCATION   ----------SPACE----------   ----------RBA----------
                TYPE      PRIMARY   SECONDARY   HIGH-ALLOC     HIGH-USED
                TRK            10           5   X'00008000'   X'00008000'
      VOLUMES                                  ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
        VOLSER---DEVTYPE-------VOLFLAG----NUMBER---TYPE---HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
        TSOPAK   X'30C02008'   PRIME            1   X'00'   X'00005800'   X'00005800'        512        11         5
          LOW-KEY:   00
          HIGH-KEY:  3F
          HIGH-KEY-RBA:  X'00001600'
        EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS-----LOW-RBA-------HIGH-RBA
                   X'000A0000'   X'000A0004'        5      X'00000000'   X'000057FF'
      VOLUMES                                  ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
        VOLSER---DEVTYPE-------VOLFLAG----NUMBER---TYPE---HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
        TSOPAK   X'30C02008'   PRIME            1   X'00'   X'00008000'   X'00008000'        512        11         5
          LOW-KEY:   40
          HIGH-KEY:  FF
          HIGH-KEY-RBA:  X'00005800'
        EXTENTS:   LOW-CCHH------HIGH-CCHH-----TRACKS------LOW-RBA-------HIGH-RBA
                   X'000A000A'   X'000A000E'        5      X'00005800'   X'0000AFFF'

INDEX    -- VSAM.CATALOG.BASE.INDEX.RECORD
   HISTORY
      OWNER-IDENT---CREATION---EXPIRATION---REL
      (NULL)          00.000       00.000      2
   PROTECTION (NULL)
   ASSOCIATIONS
      CLUSTER    USERCAT1
   ATTRIBUTES
        RKP---KEYLEN-----AVGLRECL-----MAXLRECL-------BUFSPC---------CISZ---CI/CA----EXCPEXIT
          0        44            0          505            0          512      11    (NULL)
      SHR(3,3)  RCVY       SUBAL      NERAS      NWCK       IMBED      NREPL      UNORD      NRUS       BIND
   STATISTICS                  FREESPACE:  %BYTES   %CI'S   TOTAL BYTES
      SYSTEM-TIMESTAMP                      IN-CI   IN-CA   IN DATA SET
      X'8767E0B3F4EB2000'                       0       0         27648
      ------------------------RECORDS------------------------   ---------SPLITS--------   ----NUMBER----
           TOTAL      DELETED      INSERTED      UPDATED    RETRIEVED          CI           CA   EXCPS  EXTENTS
             3            0             0            0            0           0            0      16        3
      ---------------INDEX----------------------
                ENTRIES   SEQUENCE-SET     HIGH-LEVEL
      LEVELS   PER SECT          RBA           RBA
          2          7   X'00006E00'   X'00000000'
   ALLOCATION   ----------SPACE----------   ----------RBA----------
                TYPE      PRIMARY   SECONDARY   HIGH-ALLOC     HIGH-USED
                TRK             5           5   X'00007200'   X'00007200'
      VOLUMES                                  ----EXTENT----   ----------RBA----------     PHYSICAL   PHYRECS   TRACKS
```

LISTING FROM CATALOG -- USERCAT1

```
   VOLSER---DEVTYPE------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
   TSOPAK   X'30C02008'   PRIME          1    X'00'   X'00006E00'   X'00000200'        512         11         1
   EXTENTS:   LOW-CCHH-----HIGH-CCHH----TRACKS-----LOW-RBA-------HIGH-RBA
              X'000A0005'   X'000A0009'        5      X'00000000'   X'00006DFF'
VOLUMES                                 ----EXTENT----   ---------RBA---------     PHYSICAL   PHYRECS   TRACKS
   VOLSER---DEVTYPE------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
   TSOPAK   X'30C02008'   PRIME          1    X'80'   X'00007000'   X'00007000'        512         11         5
      LOW-KEY:   00
      HIGH-KEY:  3F
   EXTENTS:   LOW-CCHH-----HIGH-CCHH----TRACKS-----LOW-RBA-------HIGH-RBA
              X'000A0000'   X'000A0004'        5      X'00006E00'   X'00006FFF'
VOLUMES                                 ----EXTENT----   ---------RBA---------     PHYSICAL   PHYRECS   TRACKS
   VOLSER---DEVTYPE------VOLFLAG----NUMBER---TYPE----HIGH-ALLOC----HIGH-USED-----REC-SIZE---PER-TRK---PER-CA
   TSOPAK   X'30C02008'   PRIME          1    X'80'   X'00007200'   X'00007200'        512         11         5
      LOW-KEY:   40
      HIGH-KEY:  FF
   EXTENTS:   LOW-CCHH-----HIGH-CCHH----TRACKS-----LOW-RBA-------HIGH-RBA
              X'000A000A'   X'000A000E'        5      X'00007000'   X'000071FF'
```

LISTING FROM CATALOG -- USERCAT1

THE NUMBER OF ENTRIES PROCESSED WAS:

ALIAS	0
CLUSTER	4
DATA	5
GDG	0
INDEX	3
AIX	1
PATH	1
NONVSAM	0
PAGESPACE	0
SPACE	1
USERCATALOG	0
TOTAL	15

THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0

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Systems

OS/VS2 Virtual Storage Access Method (VSAM) Logic

Release 3.7

IBM

INTRODUCTION

Virtual Storage Access Method (VSAM) is an access method for use with OS/VS1 and OS/VS2. VSAM is used with direct-access storage to provide fast storage and retrieval of data.

VSAM's record format is different from that of other access methods. All VSAM records are stored in *control intervals*. A control interval is a continuous segment of auxiliary storage. The records are ordered according to values in a key field or according to when they were stored. With key-sequenced data sets, the user can gain access to a record by specifying its key or its relative byte address (RBA). With entry-sequenced data sets, the user can gain access to a record only by specifying its RBA. For additional information on VSAM records and how they are stored, see "Data Areas."

User programs that contain Indexed Sequential Access Method (ISAM) macros can be used to process records in a VSAM data set. The ISAM interface program that allows the use of ISAM macros builds the necessary VSAM control blocks when an OPEN macro is issued and ensures that VSAM control blocks are properly initialized when subsequent requests are made for reading or writing records.

Most of VSAM resides in the pageable link pack area in the common area of virtual storage. Figure 1 illustrates VSAM's relationship to OS/VS2, to the processing program, and to the data stored on a direct-access storage device and in mass storage. The subpools indicated in the figure (230, 231, 239, 241, 245, 250, 252) contain VSAM control blocks. For more information see "Virtual-Storage Management" in "Diagnostic Aids."

VSAM is controlled by user macros. These macros are expanded into calling sequences to VSAM functions. For additional information on user macros, see *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide* and *OS/VS Access Method Services.*

VSAM communicates with other parts of the operating system through the SVC processor and through VS2 control blocks used by VSAM. In addition to the VS2 control blocks used by VSAM, VSAM builds and uses the access-method control block (ACB). The ACB describes a VSAM data set in much the same way that a DCB describes a nonVSAM data set.

In addition to processing records and data sets, VSAM opens and closes data sets and does most of its own space management, that is, VSAM makes only minor use of VS2 Open and Close and relies on VS2 DADSM for only part of its space management. To do much of this work, VSAM uses the VS2 catalog. VS2 catalogs contain a description of VSAM space, where available space is, how space is used, and the location of data sets. For additional information on the catalog, see *OS/VS2 Catalog Management Logic.*

VSAM is logically grouped into the following functional areas:

- Data-Set Management (sometimes referred to in program documentation as "I/O Support"), which comprises Open and Close for VSAM and for the ISAM Interface, Virtual-Storage Management, and BLDVRP/DLVRP processing
  - Open connects a user's program to a VSAM data set and builds the control blocks required to permit the user to read from and write to the data set.

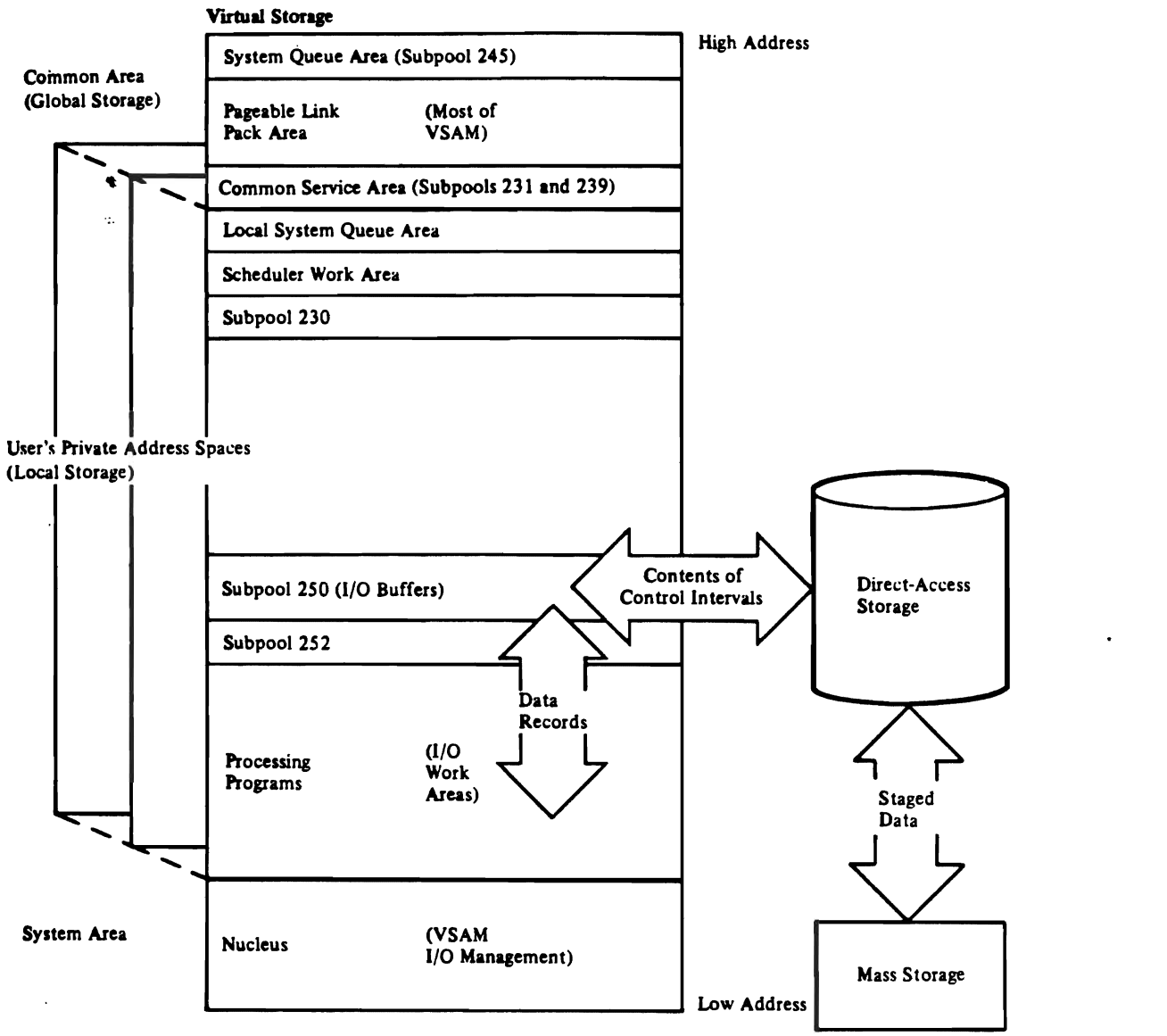


Figure 1. Relationship of VSAM, OS/VS2, User's Processing Program, and Stored Data

- Close disconnects a user's program from a data set and releases the data set's control blocks built by Open. Close also updates statistics in the catalog.
- Virtual-Storage Management centralizes the processing of most requests for virtual storage.
- BLDVRP/DLVRP processing builds and deletes VSAM resource pools for processing with local or global shared resources. (Processing with shared resources is described from the user's point of view in *OS/VS VSAM Options for Advanced Applications*.)

• Record Management, which comprises processing to satisfy user requests for access to data, including end-of-volume processing

- Data-Request Processing requests I/O Management to read and write records in response to user-issued VSAM and ISAM macros (the latter by way of the ISAM Interface). It also requests I/O Management to read and write records for VS2 Catalog Management.

  - End of Volume mounts volumes and allocates space. It modifies the existing control blocks to reflect the newly mounted volumes and newly allocated space.

- Control Block Manipulation, which allows a user's program to generate some control blocks (ACB, EXLST, and RPL) dynamically and to modify, display, and test their contents
- I/O Management, which comprises the Problem-State I/O Driver, the Supervisor-State I/O Driver, the Actual Block Processor, end appendages, an asynchronous routine, and a purge routine
  - The drivers and the Actual Block Processor translate requests for access to the contents of control intervals to requests for reading and writing physical records. They build a channel program to give to the VS2 I/O Supervisor.
  - The appendages and the asynchronous routine get control back to the requester after I/O is finished.

Diagram AA. Method of Operation Contents

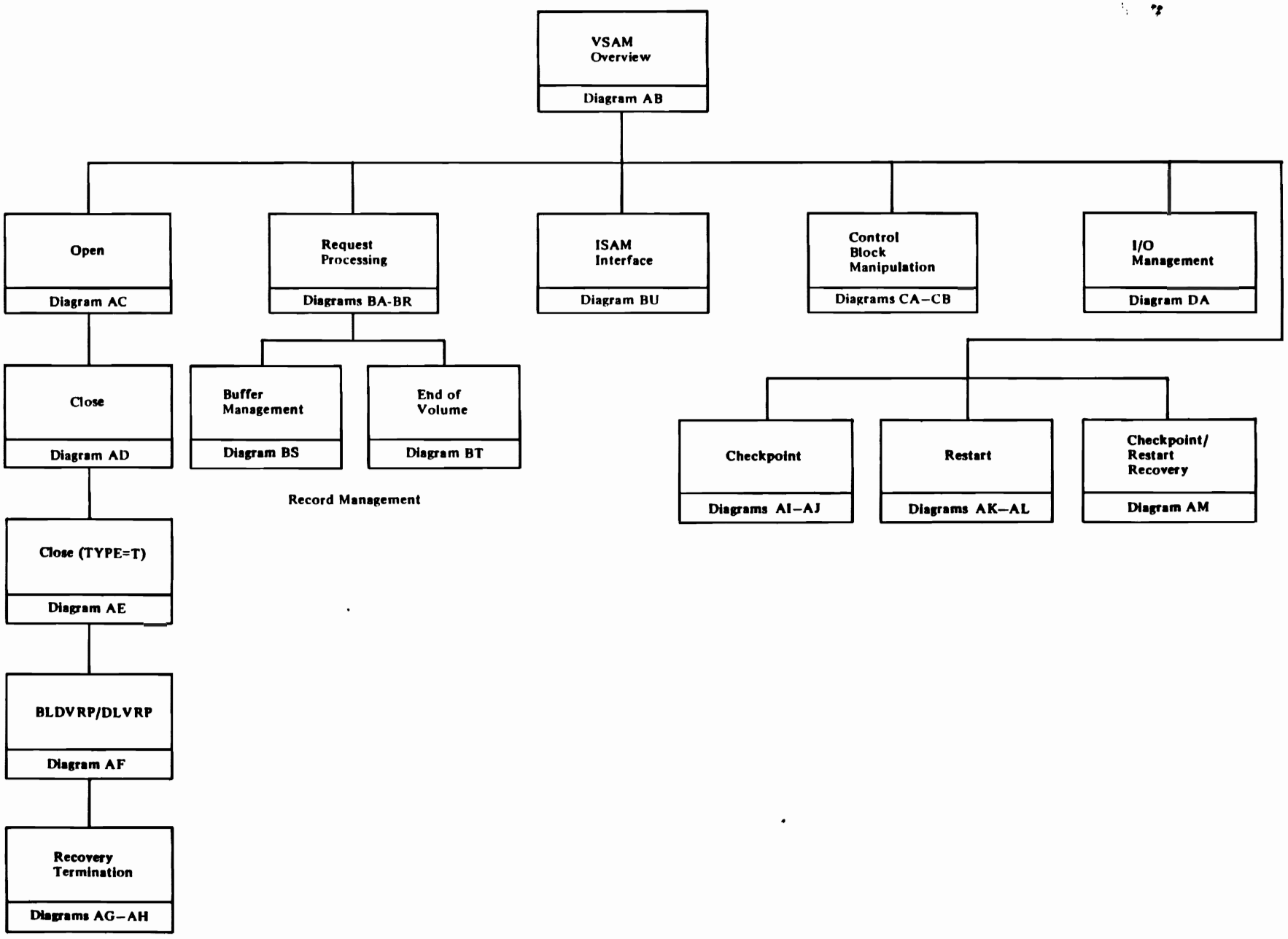


Diagram AB. VSAM Overview

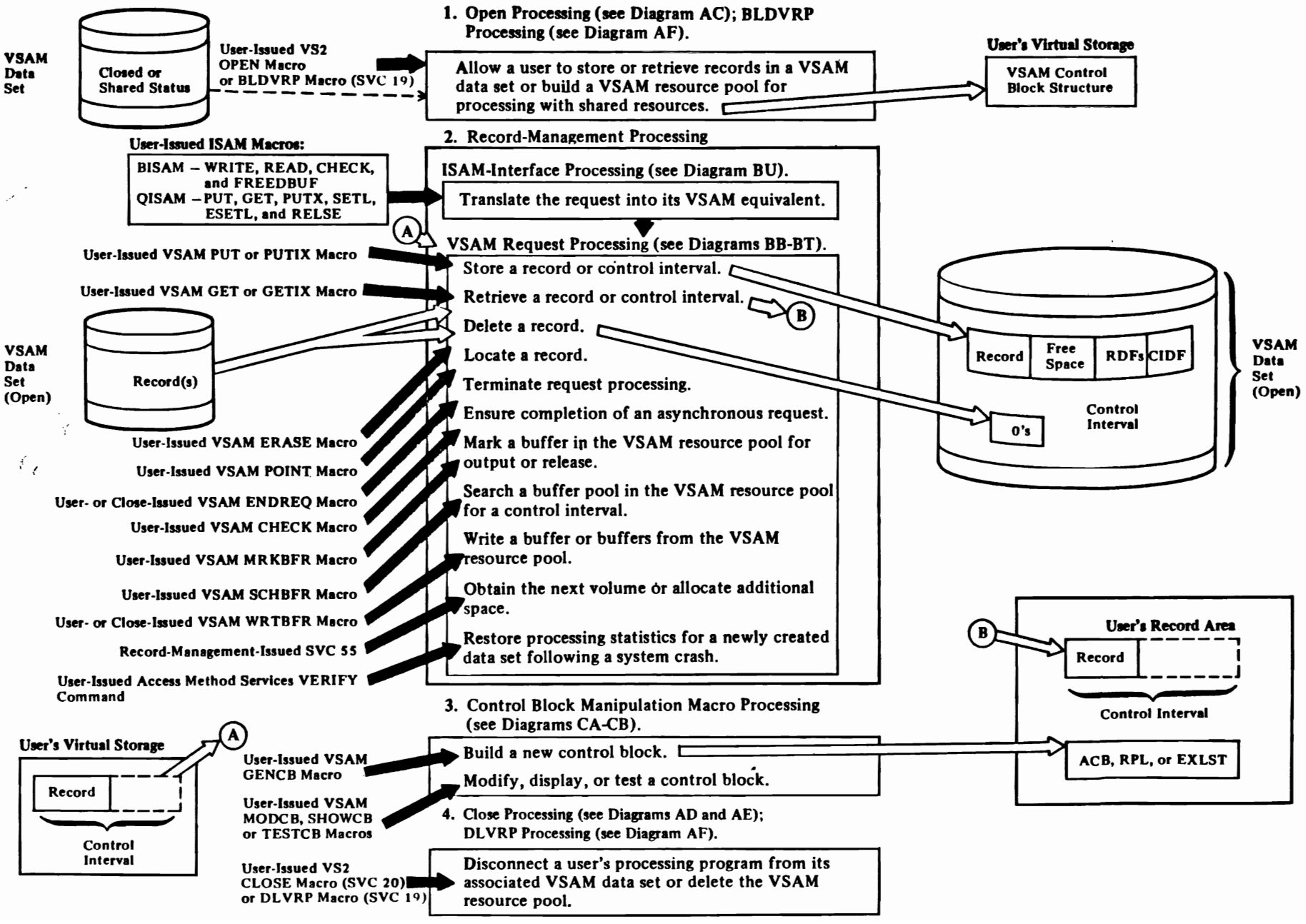
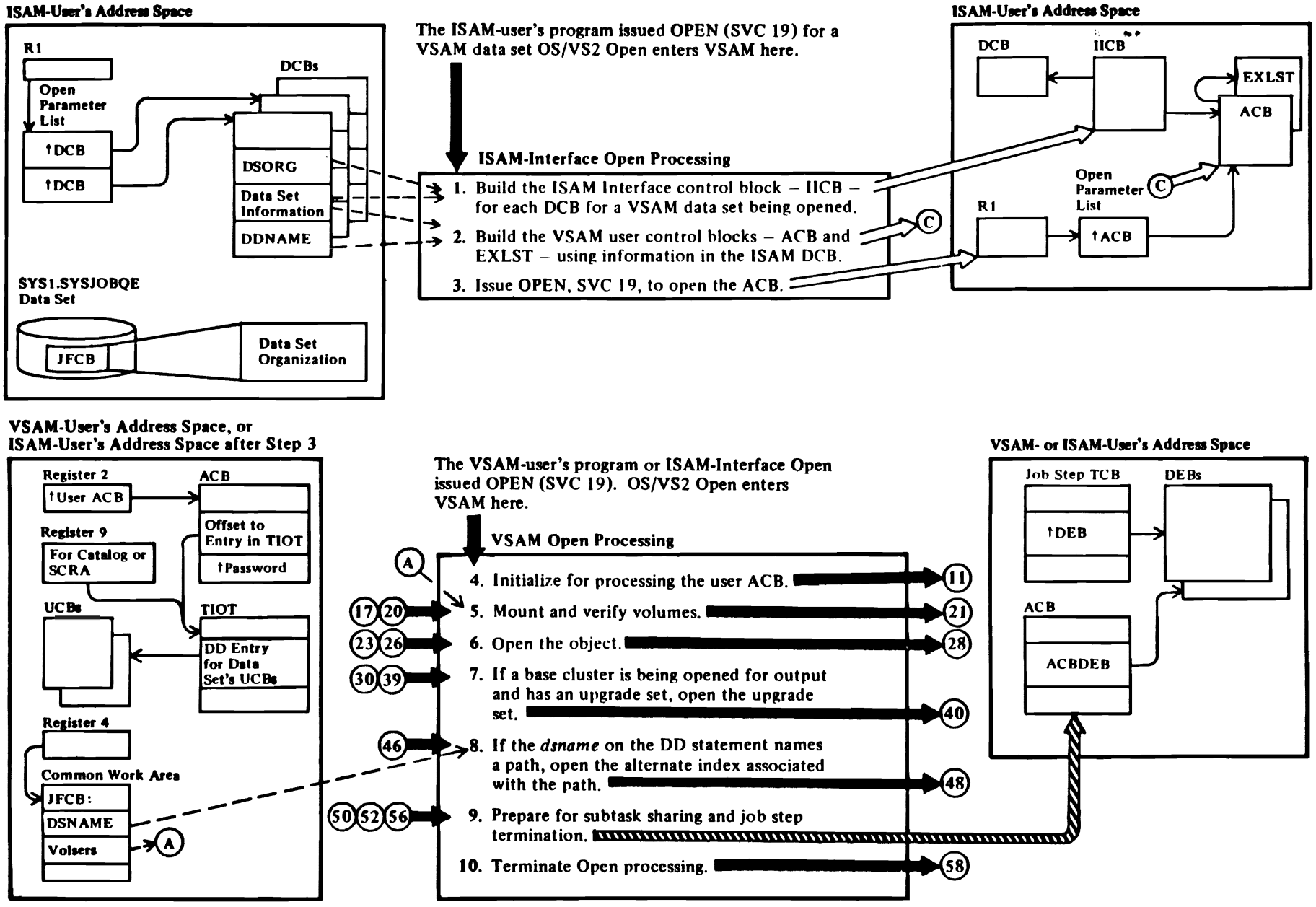


Diagram AC1. VSAM OPEN: Connect a User to a VSAM Data Set



Notes for Diagram AC1

When the caller issues the OPEN macro, SVC 19, IGC0001I (VS2 Open) is entered by the VS2 SVC Interruption handler.

VS2 Open obtains the JFCB from the scheduler work area.

If the JFCB data-set organization (JFCDSORG) field indicates a VSAM data organization and the DCB data-set organization (DCBDSORG) indicates indexed sequential organization, IFG0193A (VS2 Open) sets the identifier for each DCB-for-VSAM-data-organization entry in the WTG table to '2I', the identifier of the ISAM-Interface Open routine.

1 IDA01921: BLDIICB, INITIICB

The IICB serves as a bridge between the ISAM user program's DCB and the VSAM control blocks that allow the user's program to read and write records.

See "Data Areas" for details about the IICB.

See *OS/VS2 Data Areas* for details about the DCB.

2 IDA01921: BLDIICB, INITIICB, ACBMERGE

The ISAM-Interface Open routine builds an ACB and an EXLST for each DCB for a VSAM data set being opened. The ACB is initialized with the DCB DDNAME and MACRF fields.

See "Data Areas" for details about the ACB and EXLST.

3 IDA01921: OPENACB

The ISAM-Interface Open routine builds an open parameter list and issues SVC 19 to open the ACB.

VS2 Open copies the ACB from the user's area into the Open work area.

If the open-parameter-list entry addresses a VSAM ACB, VS2 Open sets the identifier field for each ACB entry in the WTG table to C'2A', the identifier of the VSAM Open routine. All further VS2 Open processing is bypassed for each ACB entry until the VSAM Open routine returns control to VS2 Open at step 57.

VSAM Open Processing

4 See Diagram AC2.

5 See Diagram AC3. This step is skipped for a dummy data set.

6 See Diagram AC4. The object could be an alternate index that is itself being opened for processing by the user.

7 See Diagram AC5. This step is skipped for a dummy data set.

8 See Diagram AC6. This step is skipped for a dummy data set.

9 IDA0192A: BLDDDEB

VSAM Open builds a "dummy DEB" for the user ACB and adds its address to the job step's TCB DEB chain. (The device-dependent section of the DEB is set to 0.) Each open ACB is identified by a dummy DEB in the chain. If the user's program ends abnormally, ABEND closes the ACB or DCB associated with each DEB in the chain.

10 See Diagram AC7.

A Note about Dynamic String Addition

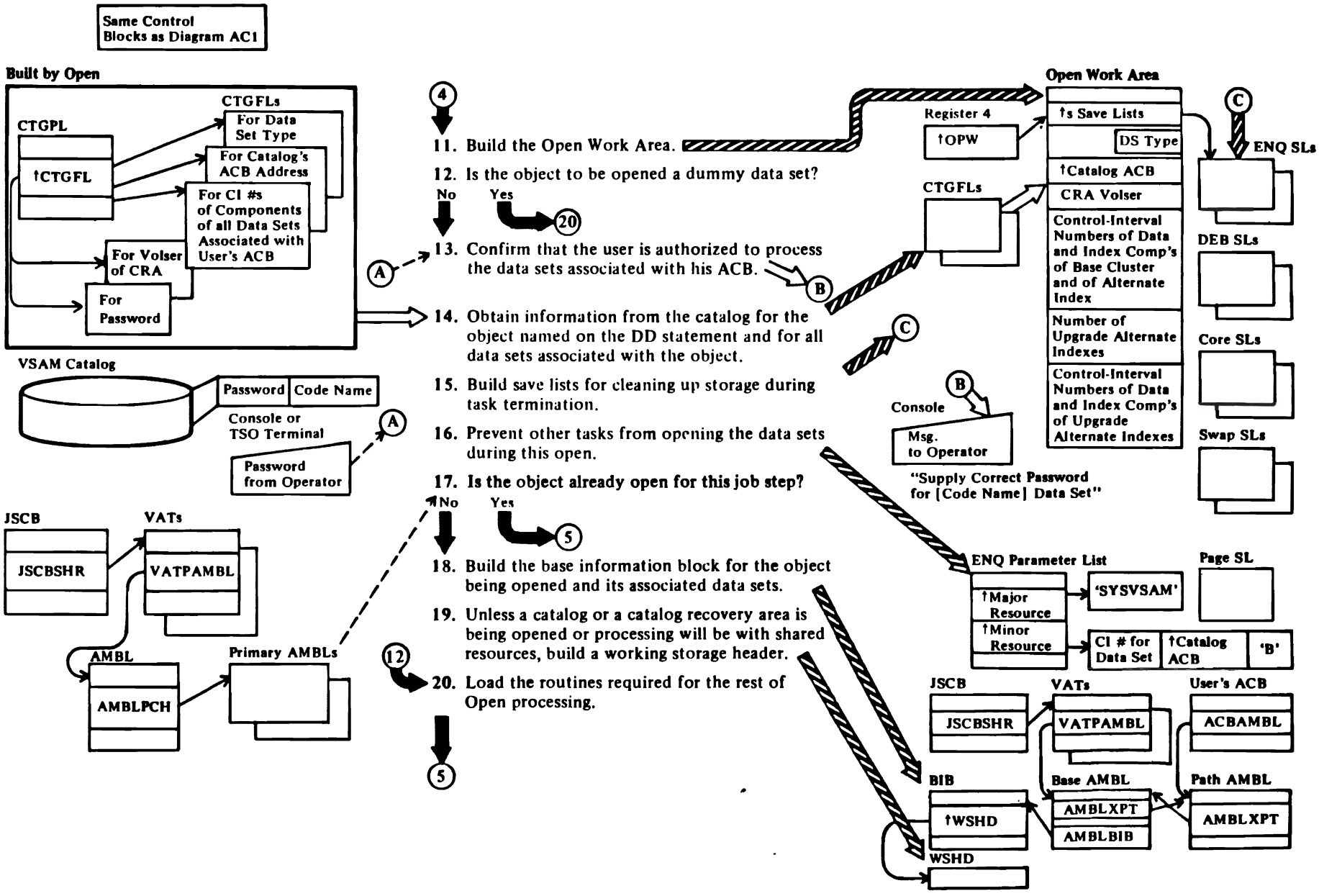
When OPEN is issued, not to open a data set, but to dynamically add a string to the user's capability to process multiple requests concurrently, the string is added and Open returns to the caller. VSAM Record Management requests dynamic string addition when more strings are required than the user specified.

Record Management indicates dynamic string addition by a flag in the ACB.

IDA0192Y (ENQBUSY) issues ENQ on 'SYSVSAM' with 'B' (busy) indicated to prevent Open from using the control block structure that is affected by dynamic string addition.

IDA0192Y (INITPLH) builds and initializes an additional PLH, IOMB, IOSB, and PFL. IDA0192Y (BLDBUFC) builds and initializes an additional BUFC and buffer. IDA0192W builds an additional CPA and chains it to the BUFC. IDA0192Y (DYNSTRAD) chains these new control blocks into the existing control block structure. (PLHDR points to the PLH, and BUFDR points to the BUFC.)

Diagram AC2. VSAM OPEN: Initialize for Processing the User ACB



Notes for Diagram AC2

11 IDA0192A: INIT192A

The open work area is mapped by the IDAOPWRK macro.

13 IDA0192C

The user establishes the number of times the operator may attempt to supply the correct password, as described in *OS/VS2 Access Method Services*. If the correct password isn't supplied, VSAM Open sets the 'ACB not opened' return code in register 15 and the 'user password invalid' flag in ACBERFLG.

14 IDA0192C: LOC1

LOC1 issues a LOCATE (SVC 26) to obtain data-set type, catalog ACB address, catalog recovery area volume serial number, and control-interval number for each data set associated with the object named on the DD statement.

15 IDA0192A: BLDLISTS

During termination the ENQs indicated in the ESL (enqueue save list) will be dequeued, the DEBs indicated in the DSL will be unchained, the storage ("core") indicated in the CSL will be freed, and the pages indicated in the PLS will be freed. The SSL enables Open to chain control blocks at the end of Open processing.

16 IDA0192A: BLDENQPL, INIT192A

Open enqueues on each data set to prevent it from being opened by other tasks during the current Open processing.

17 IDA0192A: CONBASE

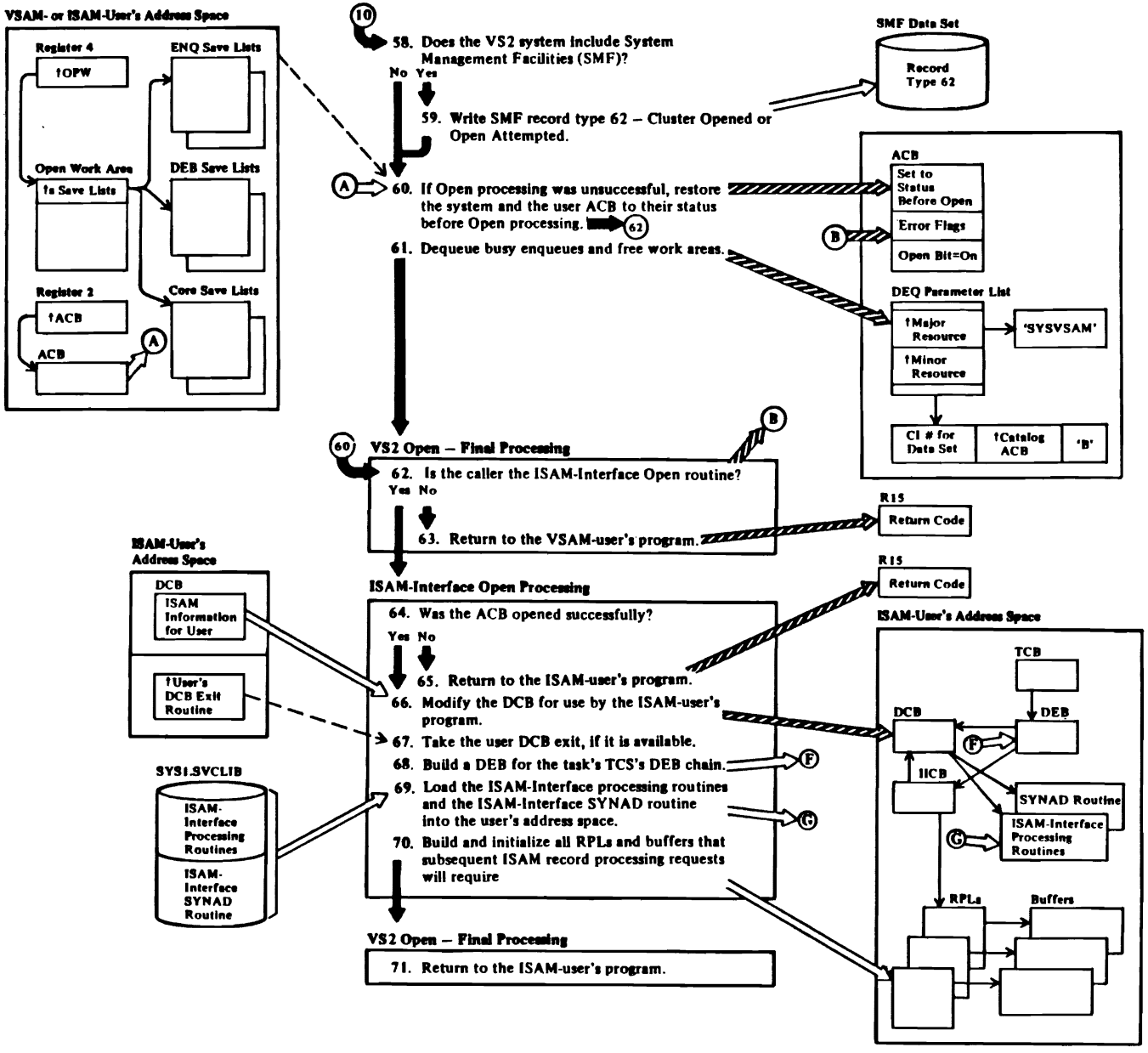
If the IDF field in the AMBL of the data set being opened matches the IDF field of an AMBL on the primary chain, the control blocks for the base cluster already exist.

18 The base information block contains the addresses of many of the control blocks built by Open for Record Management.

19 No working storage header is used for processing a catalog, which is a special case.

20 The addresses of various VSAM routines (Record-Management modules, I/O appendages, special processing routines) are placed in various control blocks (AMBL, IOSB, IRB, DEB, EXLST).

Diagram AC7. VSAM OPEN: Terminate Open Processing



Notes for Diagram AC7

58 IDA0192A: TERM192A, UPSMF

59 IDA0192S

See *OS/VS System Management Facilities (SMF)* for details about SMF record type 62.

60 IDA0192A: TERM192A, CLNUP

CLNUP resets open indicators in the VSAM catalog for data sets that were processed. It unchains AMBLs and deletes entries from the valid-AMBL table. It unchains DEBs. It decrements any use counts that were incremented.

CLNUP deletes all volume mount table entries that were added.

61 IDA0192A: DEQBUSY

A DEQ is issued for each data set that was enqueued busy (in step 16) to allow other tasks to open them.

63 IDA0192A

The VSAM Open routine sets the ACB's open bit (ACBOFLGS) on if the ACB is opened successfully. If an error occurs while opening an ACB, the VSAM Open routine or VS2 Open sets the appropriate error flag.

The VSAM Open routine returns control to VS2 Open by putting the identifier of the Open Final Termination routine, C'8N', in the WTG table and transferring control (through the IECRES macro) to the Open/Close/End-of-Volume resident routine. The resident routine examines the open parameter list and, if all ACB entries have been processed by the VSAM Open routine, returns to the VS2 Open Final Termination routine. If not, the next ACB entry in the open parameter list is processed (return to step 4).

VS2 Open modules (IFG0196V and IFG0196W) ensure that an ACB entry in the open parameter list is not processed by any access method executor routine.

IFG0196V sets the identifier for each VSAM ACB entry in the WTG table to 0.

IFG0196W sets the identifier for each VSAM ACB entry in the WTG table to C'8N', the identifier of the VS2 Open Final Termination routine.

IFG0198N sets the return code in register 15.

See "Diagnostic Aids" for details about the VSAM Open return codes.

64 IDA0192I: OPENACB

The ISAM-Interface Open routine sets the DCB open bit (DCBOFLGS) to 1 if the DCB's associated ACB was opened correctly.

66 IDA0192I: DCBMERGE, AMSMERGE, VALIDCHK

See *OS/VS2 Data Areas* for details about the DCB.

67 IDA0192I: DCBEXIT

Register contents passed to the user's DCB exit routine are:

- R1: address of DCB
- R2 through 13: User's registers
- R14: return address
- R15: address of user's DCB exit routine

IDA0192I: BFRMERGE

Merge buffer-related information into the DCB.

68 IDA0192I: BUILDDEB

The ISAM-Interface Open routine builds a DEB so that:

- There is meaningful DEB information for the user's program to examine;
- The DEB fields on which COBOL, PL/I, and ISAM System Integrity routines depend are properly initialized;
- The checkpoint/restart or abnormal end (ABEND) routines can examine the task's DEB chain and close all of the user's DCBs and ACBs; and
- The user's program cannot modify the IICB address or other fields in the DEB.

The DEB's ISAM-Interface indicator is now set on.

See *OS/VS2 Data Areas* for details about the DCB, DEB, and TCB.

69 IFG0192I: LOADMOD

Each DCB module-address field addresses an ISAM-Interface processing routine that will translate an ISAM record-processing request into a VSAM request.

The ISAM SYNAD routine is loaded when it is specified in the user's JCL AMP parameter.

The EXLST (built in step 2) addresses ISAM exit routines.

See "Data Areas" for details about the EXLST.

The DEB (built in step 68) is initialized to point to the ISAM-Interface FREEDBUF routine.

70 IDA0192I: BLDRPL, INITRPL, BLDBUFR

RPLs and ISAM-Interface buffers are built for each ACB (the number of RPLs and buffers is based on the ACB's STRNO value for BISAM; one of each is built for QISAM) that the ISAM user opens. Two of the uses of the ISAM-Interface buffers are to support ISAM locate mode and dynamic buffer processing.

IDA0192I: DCBINIT

When the ISAM-Interface Open processing completes, the DCB open flags (DCBOFLGS) field contains:

- Busy bit on (set to 0)
- Open bit on (set to 1)
- Lock bit off (set to 1)

71

VS2 Open modules (IFG0196V and IFG0196W) ensure that a DCB for a VSAM entry in the open parameter list is not processed by any access method executor routine.

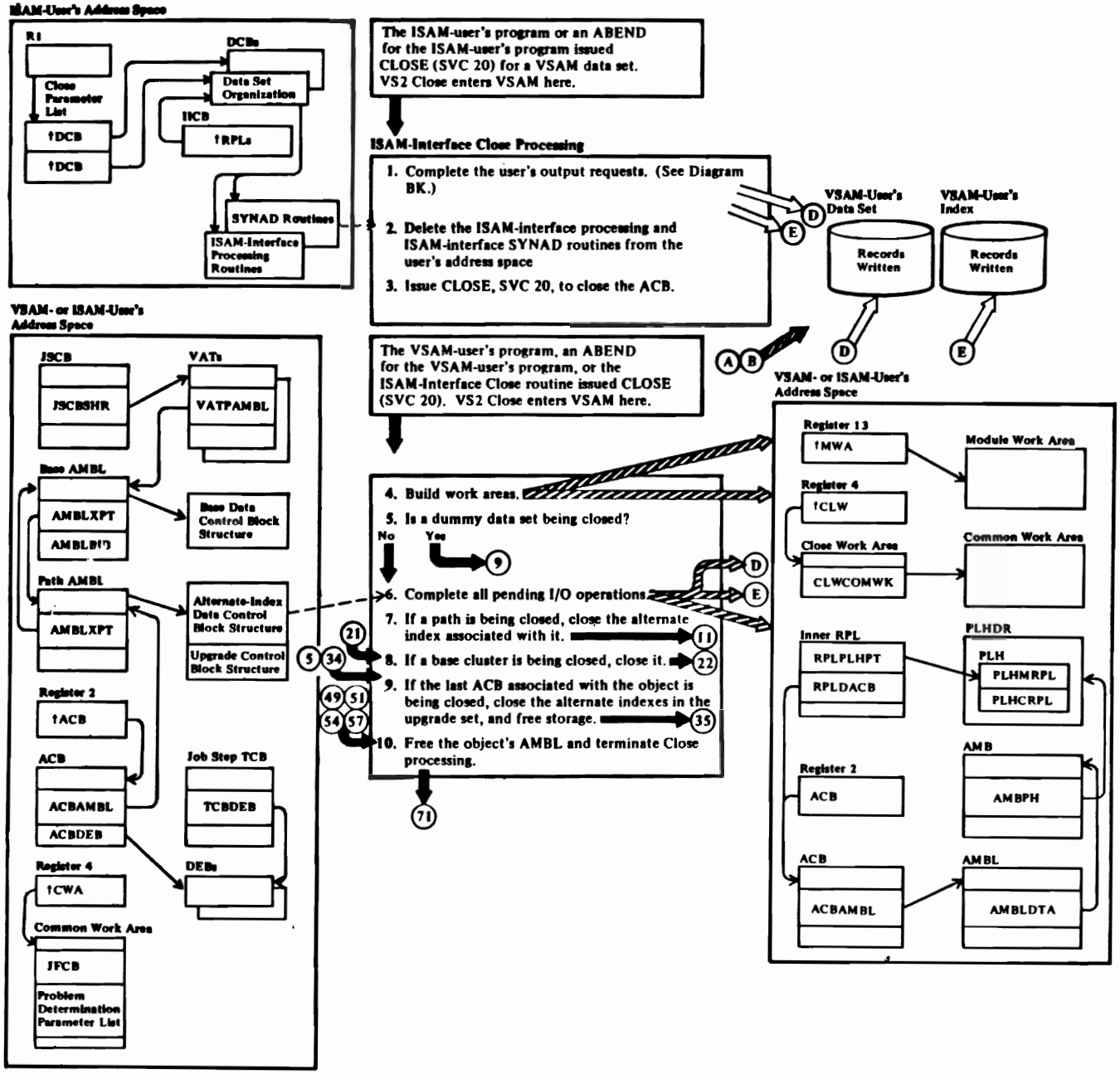
IFG0196V sets the ID field for each DCB-for-VSAM entry in the WTG table to 0.

IFG0196W sets the identifier field for each DCB-for-VSAM entry in the WTG table to C'8N', the identifier of the VS2 Open Final Termination module (IFG0198N).

IFG0198N sets the return code in register 15.

If the ACB (built by the ISAM-Interface Open routine in step 2) is not opened correctly by the VSAM Open routine, the ISAM-Interface Open routine sets the DCB open bit to 0 (DCBOFLGS) and sets all DCB module-address fields to 0. If the user's ISAM program issues an ISAM record processing request without confirming that the DCB is successfully opened, an ABEND 0C4 (caused by a branch to address 000) results.

Diagram AD1. VSAM CLOSE: Disconnect a User from a VSAM Data Set



Notes for Diagram AD1

If the DCB data-set organization (DCBDSORG) field indicates that an ACB is being processed and if the DEBFLGS1 field (in the DEB) indicates ISAM-Interface processing, VS2 Close modules (IGC00020 and IFG0200V) do the following:

IGC00020: Bypasses purging of the outstanding EXCP requests.

IFG0200V: Bypasses DSCB processing and transfers control to the ISAM-Interface Close routine, IDA0200S.

1 IDA0200S: FLUSHBFR

The ISAM-Interface Close routine issues a SYNCH macro to transfer control to the ISAM-Interface Load routine, which issues the final PUT request, if all of these conditions exist:

- The DCB was opened for output in the locate mode and a PUT request was issued prior to the CLOSE request (indicated in the DCBMACRF field).
- No errors occurred (indicated in the DCBEXCD field).
- The ACB associated with the user program's DCB was not previously closed (indicated in the ACBOFLGS field).

See "Data Areas" for details about the ACB.

See *OS/VS2 Data Areas* for details about the DCB and the DEB.

2 IDA0200S: DELETRTN

The ISAM-Interface Close routine resets each DCB module address field. Virtual storage for the routines is released to the system by issuing a DELETE macro against the ISAM-Interface routines that were loaded by ISAM-Interface Open processing.

3 IDA0200S: CLOSEACB

The ISAM-Interface Close routine issues a CLOSE macro (SVC 20) to close the VSAM ACB.

VS2 Close modules (IGC00020 and IFG0200V) allow an ACB to be closed and copy it into the Close work area.

IGC00020 bypasses the DEB validity check and the purging of outstanding EXCP requests and, if a VS2 catalog is being closed, calls IFG0200N to locate the TIOT entry and read the JFCB for the catalog ACB.

IFG0200V reads the JFCB for non-catalog ACBs and tests for the user program's diagnostic options (that is, Generalized Trace Facility), and sets the ID field for each ACB entry in the WTG table to C'0T', the identifier of the VSAM Close module.

VSAM Close Processing

The input is from IFG0200T.

4 IDA0200T: INIT200T, GETCORE

The module work area and the close work area are built.

If neither a catalog nor a catalog recovery area in system storage (SCRA) is being closed, the dummy DEB is verified. Unless a dummy data set is being closed, IDA0200T (ENQFUNC, ENQINIT, PARMINIT) builds an ENQ parameter list and issues ENQ for every data set associated with the user ACB. The parameter list indicates 'SYSVSAM' as the major resource and control-interval number of the data set, catalog ACB address, and 'B' (busy) as the minor resource.

6 IDA0200T: FLQUIS, ENDIO

If the close is not for an ABEND and is not for improved control-interval access to load a data set or process the mass storage volume inventory data set, the data set is flushed and quiesced (that is, any I/O activity yet to be done or already started is done):

An inner RPL is built and pointed to the user ACB. The PLH chain is searched for PLHs connected to the user ACB. The inner RPL is connected to each PLH and an ENDREQ macro is issued. No record is returned for an incomplete input request (GET or POINT). The output buffer is written to the VSAM data set for an incomplete output request (PUT or ERASE). After I/O completes, the inner RPL is freed.

7 IDA0200T: CLSPATH calls IDA0200B

The alternate index in a path is closed before the base cluster. See Diagram AD2.

8 IDA0200T: CLSBASE calls IDA0200B

The cluster being closed may be a base cluster (part of a path), a cluster that was not processed through a path, or an alternate index that was itself processed by the user. See Diagram AD3.

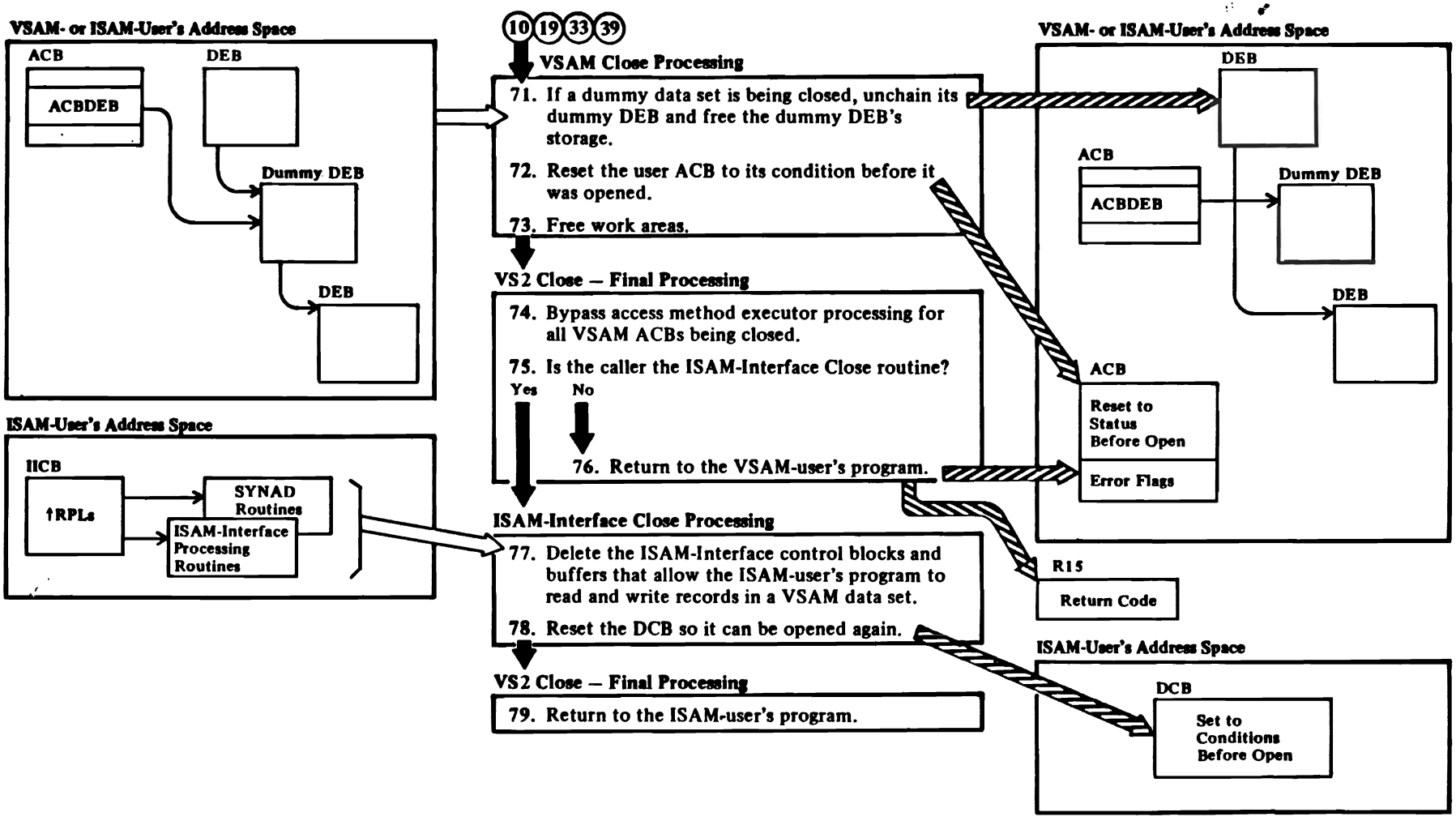
9 IDA0200T: CLSPHERE

This processing is not done if an ACB for the cluster is still open. For example, two users might have been processing a cluster, and the first user is closing his ACB. See Diagrams AD4 and AD5.

10 IDA0200T: FREECORE, TERM200T

See Diagram AD7 for a description of termination processing.

Diagram AD7. VSAM CLOSE: Terminate Close Processing



Notes for Diagram AD7

71 IDA0200T: DEHOOK, DECHNDEB

IDA0200T calls IDA0192C

If a catalog is being closed, IDA0192C issues a dummy LOCATE to indicate that the closing of the catalog is complete.

Unless a dummy data set has been closed (see note between notes for steps 4 and 6), a DEQ parameter list is built and a DEQ is issued for every data set associated with the user ACB. The parameter list indicates 'SYSVSAM' as the major resource and control-interval number of the data set, catalog ACB address, and 'B' (busy) as the minor resource.

72 IDA0200T: RESTORE

The ACB condition before it was opened is:

- Open bit (ACBOFLGS) is off
- Address of the VSAM interface routine (IDA019R1) is 0
- Address of the AMBL is 0
- DDNAME field contains the DDNAME from the TIOEDDNM field in the TIOT DD entry

73 IDA0200T: FREECORE

The storage for the close work area and the module work area is freed.

74 IDA0200T

The VSAM Close routine sets the ACB's open bit (ACBOFLGS) off if the ACB is closed successfully. If an error occurs while closing an ACB, the VSAM Close routine or VS2 Close sets the appropriate error flag.

The VSAM Close routine returns control to VS2 Close by putting the identifier of the Close Final Termination routine, X'2L', in the WTG table and transferring control (through the IECRES macro) to the Open/Close/End-of-Volume resident routine. The resident routine examines the close parameter list and, if all ACB entries have been processed by the VSAM Close routine, returns to the VS2 Close Final Termination routine. If not, the next ACB entry in the close parameter list is processed (return to step 4).

VS2 Close modules (IFG0200W and IFG0200Y) ensure that an ACB entry in the close parameter list is not processed by any access method executor routine.

IFG0200W sets the identifier for each VSAM ACB entry in the WTG table to 0.

IFG0200Y sets the identifier for each VSAM ACB entry in the WTG table to C'2L', the identifier of the VS2 Close Final Termination routine.

77 IDA0200S: FREEBFRS, FREEDEB, RESETDCB, FREEWA, FREEMAIN

The ISAM-Interface Close routine releases the virtual storage obtained for the ACB, the IICB, the DEB, the RPLs, and the ISAM-Interface buffers.

78 IDA0200S: RESETDCB

The DCB conditions before open are:

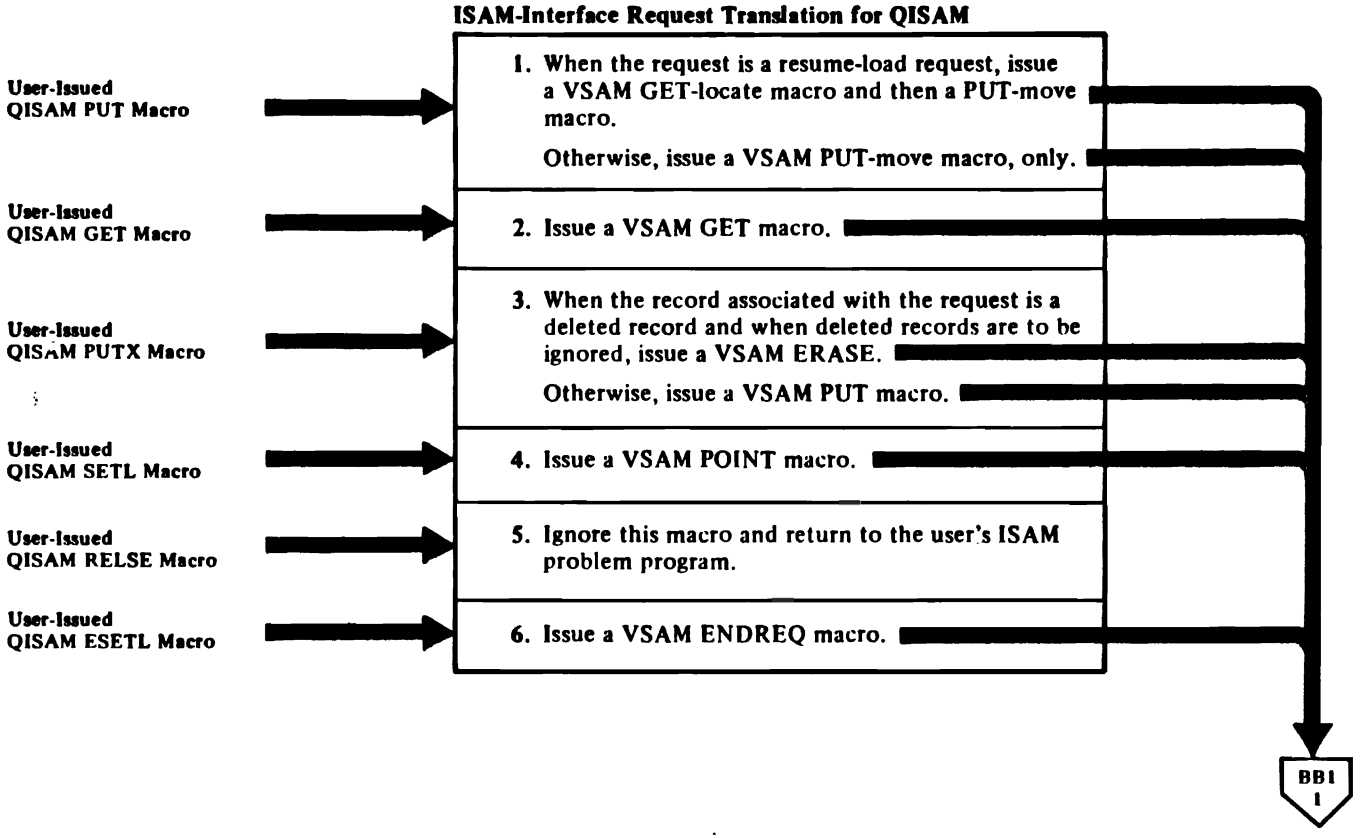
- DCBOFLGS: Open bit off, Lockbit off (set to 1), and Busy bit off
- DCBDSORG: ISAM-Interface bit off

79

IFG0202L sets the return code in register 15.

See "Diagnostic Aids" for details about the VSAM Close return codes.

Diagram BU1. ISAM-Interface: Processing a VSAM Data Set with an ISAM-User's Program



Notes for Diagram BU1

1 IDAIIPM1: QISAM PUT Processing

To handle an ISAM PUT-Locate request, VSAM uses the ISAM-Interface buffer to contain records to be written. For ISAM PUT-move requests, the user supplies the buffer. (Note: In both cases, VSAM treats the buffer as the user's work area, and transfers records to its own output buffers before writing them.)

For ISAM resume-load requests, a GET-locate is issued to VSAM to search the previously created data set for a key greater than or equal to the key of the first record to be written by resume-load. If the VSAM search is unsuccessful, it is assumed that the previous last key and the new key are in correct sequence, and load processing continues.

A successful search indicates that the new key is less than a key already in the data set (a logical error); and control is passed to the user's ISAM SYNAD routine if it exists. Otherwise, an ABEND is issued.

2 IDAIIPM2: QISAM GET Processing

If the ISAM GET request is preceded by a SETL request (used to determine whether the located record was a deleted record), the retrieved record is moved from the ISAM-Interface buffer to the user's buffer and a VSAM GET macro is not issued.

When the ISAM GET request is in locate mode or specifies data-only, the ISAM-Interface buffer is used for the record; otherwise, the user's buffer is used. (Note: Data-only implies that the key resides at the beginning of the data record; the relative key position of the record is 0.) A VSAM GET macro is issued. If the request specifies move-mode and data-only options, the data (minus the key) is moved into the user's buffer. When a deleted record is retrieved, and such records are to be ignored, successive GET macros are issued until a normal record is retrieved.

3 IDAIIPM2: QISAM PUTX Processing

If the record to be written had only the data portion of the record retrieved (see note 2), the data is moved from the user's buffer to the ISAM-Interface buffer to rejoin its key before it is written; otherwise, the complete record already resides in the appropriate buffer.

The record is then examined to determine whether it is marked as a deleted record. Deleted records are ignored, if requested, by issuing a VSAM ERASE macro to eliminate the original record from the data set. A VSAM PUT macro is issued for those records that are to be written.

4 IDAIIPM2: QISAM SETL Processing

The validity of the request is tested, and if two SETL requests have been issued without an intervening GET, PUTX, or ESETL macro, an invalid SETL macro has been issued or an invalid generic key has been used. An invalid request error code is set and control is passed to the ISAM-Interface SYNAD routine (see note 11).

If the request is valid, the address of the key to be located is placed in the RPL, and a VSAM POINT macro is issued.

If the data set contains deleted records and if the request is directed at a specific record's key, a VSAM GET macro is issued to retrieve the record. If the record is a deleted record, a no-record-found indicator is set in the DCB and control is passed to the ISAM-Interface SYNAD routine (see note 11).

5 IDAIIPM2: QISAM RELSE Processing

This request is ignored by the ISAM-Interface routine, and control is immediately returned to the user. The release function is not required by ISAM-Interface or VSAM because each QISAM request handled by ISAM-Interface uses only a single data record for request processing.

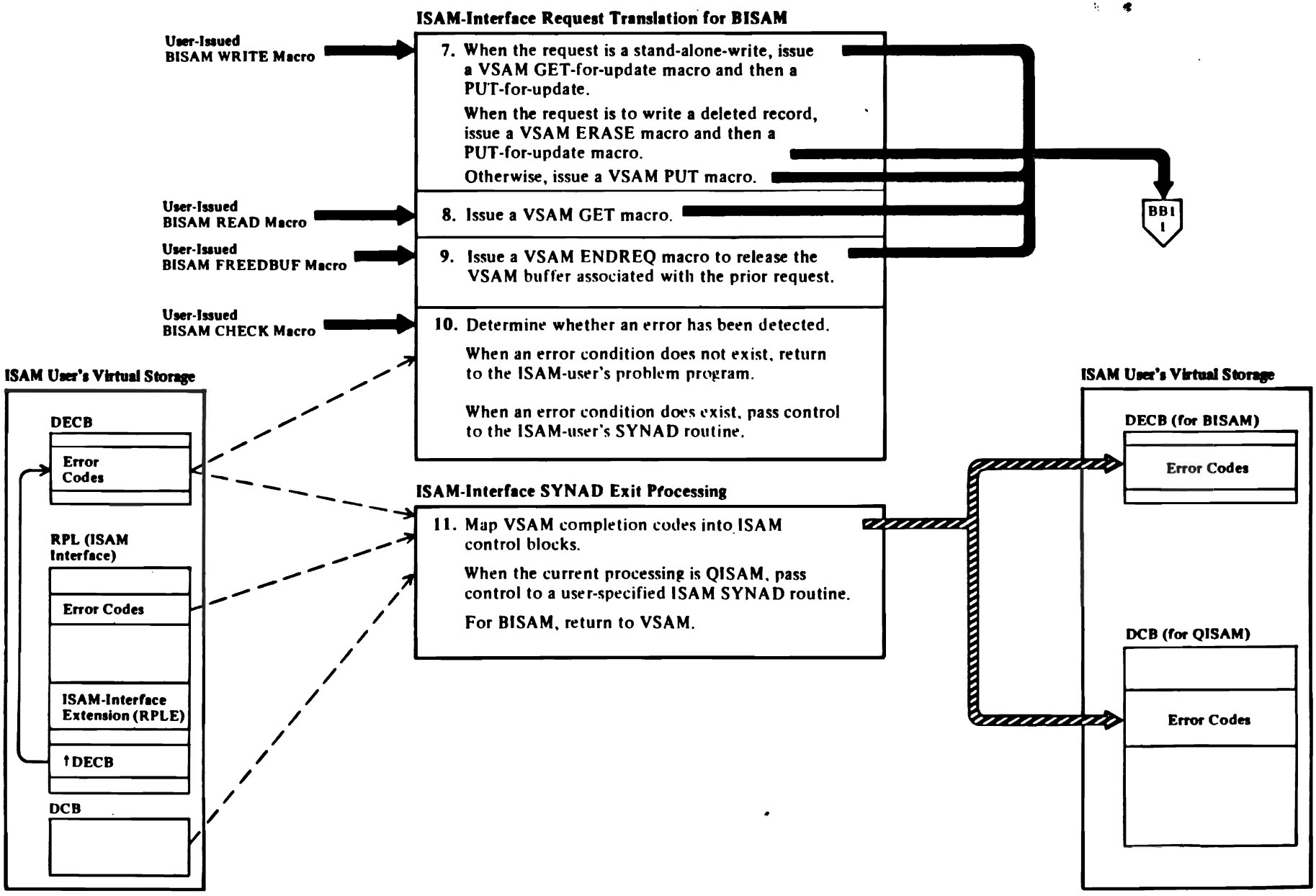
6 IDAIIPM2: QISAM ESETL Processing

A VSAM ENDREQ macro is issued to release any VSAM resources. ISAM Interface resets the scan-mode indicator in the IICB, which enables another SETL request to be issued, and returns control to the user.

IDAIIPM2: QISAM EODAD Processing

This routine receives control when VSAM reaches an end-of-data condition. The ISAM EODAD routine is given control if one has been specified; otherwise, an ABEND is issued.

Diagram BU2. ISAM-Interface: Processing a VSAM Data Set with an ISAM User's Program



Notes for Diagram BU2

7 IDAIIPM3: BISAM WRITE Processing

The ISAM-Interface RPLs are searched for one which is associated with the current request's DECB. If an RPL is not found, an available RPL is assigned to the request and initialized. If an RPL is not available, an invalid request is indicated in the DECB and a return is made to the user's problem program.

If the write request is an ISAM stand-alone-write for update, VSAM GET-for-update and PUT-for-update macros are issued to satisfy the request.

For a write request to overlay an existing data record with a deleted record, the VSAM PUT macro is issued to satisfy the request unless the option to ignore the deleted record is specified. In this case, the ERASE macro is issued. (Note: Deleted records have a X'FF' in their first byte.)

For a write-key-new request, a VSAM PUT is issued. If VSAM returns an error code indicating that the record to be written is a duplicate of an existing data record, ISAM-Interface issues a VSAM GET to retrieve the existing data record to determine whether it is a deleted record. If the record is a deleted record, a VSAM PUT-for-update request is issued to replace it with the new record.

When VSAM returns control, the ISAM-Interface RPL is released (disconnected from the DECB), a VSAM ENDREQ macro is issued to free the VSAM resources, and the request is posted complete.

8 IDAIIPM3: BISAM READ Processing

The RPLs are searched for one which is associated with the current request's DECB. If an RPL is not found, an available RPL is assigned to the request and initialized. If an RPL is not available, a return is made to the user's problem program.

After establishing the buffer to be used (that is, an ISAM buffer or an ISAM-Interface buffer) and adjusting the record pointer to include a record descriptor word (RDW) for variable-length records, a VSAM GET macro is issued.

When VSAM returns control, the ISAM-Interface RPL is released (disconnected from the DECB) and a VSAM ENDREQ macro is issued to free the VSAM resources, unless the ISAM request was a successful read-for-update.

9 IDAIIFBF: BISAM FREEDBUF Processing

This routine issues a SYNCH SVC to get into problem program state and then searches the ISAM-Interface request-string for an RPL associated with the current ISAM DECB. When found, a VSAM ENDREQ macro is issued to free the resources held by the RPL. The RPL is then disconnected from the DECB. If an associated RPL is not found, a return is made to the user's problem program.

If the RPL is found and processing of it is complete, a VSAM ENDREQ macro is issued to free the VSAM resources, and then the ISAM-Interface RPL is released (disconnected from the DECB) for reuse by another request.

10 IDAIIPM3: BISAM CHECK Processing

The ISAM-Interface Check routine tests for an error code in the DECB (see note 3). If an error is not detected, a return is made to the user's problem program. If an error is detected, the Check routine passes control to the user's ISAM SYNAD routine if it exists; otherwise, an ABEND is issued.

11 IDAIISM1: ISAM-Interface SYNAD Processing

The ISAM-Interface SYNAD routine is entered by a VSAM processing routine when an error condition is detected.

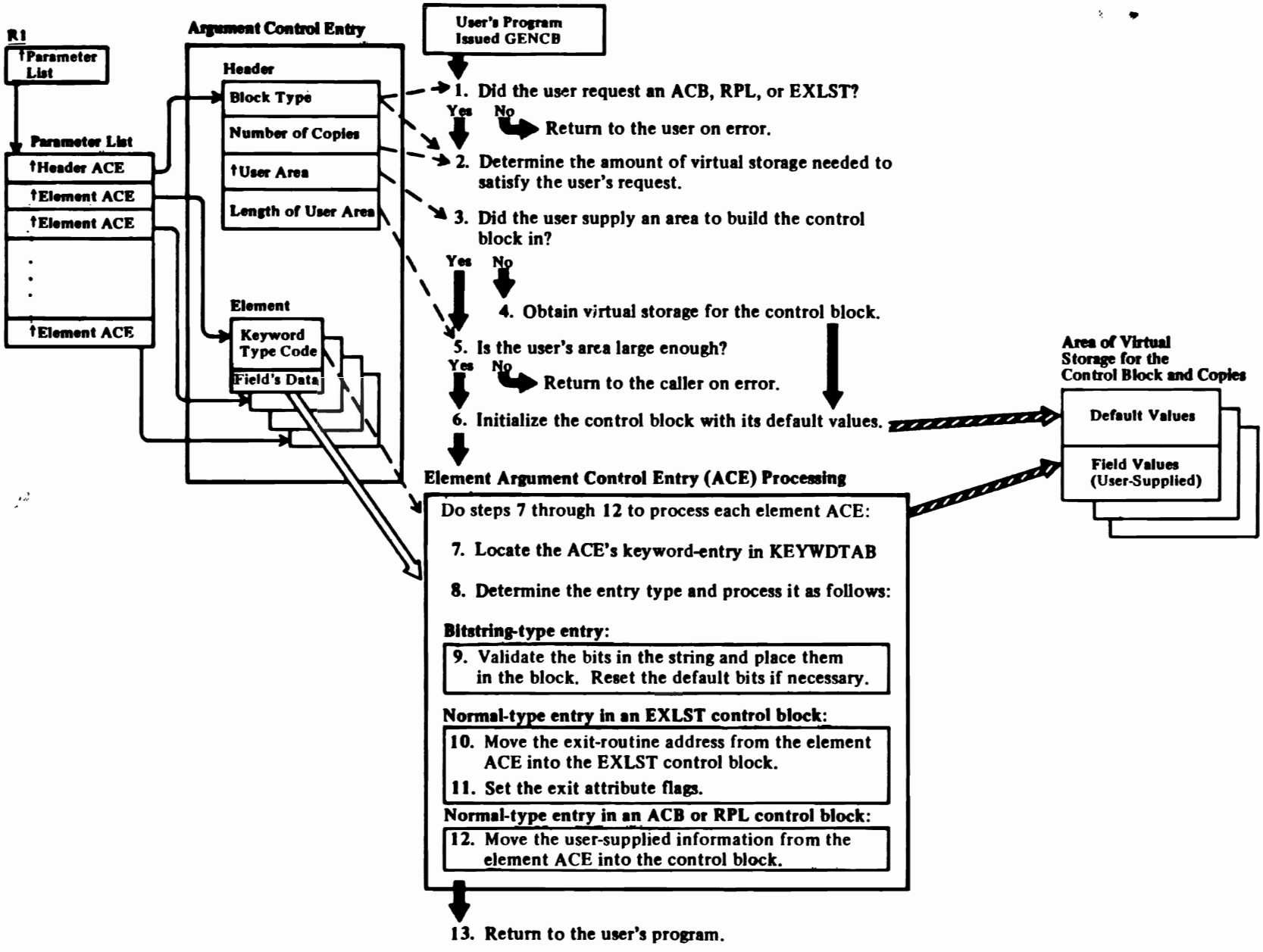
For QISAM processing, the VSAM error codes in the RPL are copied into the DCB, and for BISAM processing, the error codes are copied into the DECB.

For QISAM processing, control is passed to the user's ISAM SYNAD routine if it exists. If it does not exist, an ABEND is issued.

For BISAM processing, a return is made to VSAM, which returns to the ISAM-Interface BISAM processing routine and then to the user's problem program. An ensuing ISAM CHECK macro causes the user's ISAM SYNAD routine to receive control if it exists (see note 10).

The ISAM-Interface SYNAD routine also builds the SYNADAF message.

Diagram CA. GENCB: Build a New Control Block



Notes for Diagram CA

1 IDA019C1

The GENCB macro is issued to create an ACB, RPL, or EXLST dynamically.

2-5

The ACB and RPL are fixed-length control blocks, but the EXLST is variable-length. The Control Block Manipulation routine calculates the amount of space needed for the control block and any copies the user requested. The Control Block Manipulation routine issues a GETMAIN macro to obtain the required virtual storage for any block for which a user area is not provided.

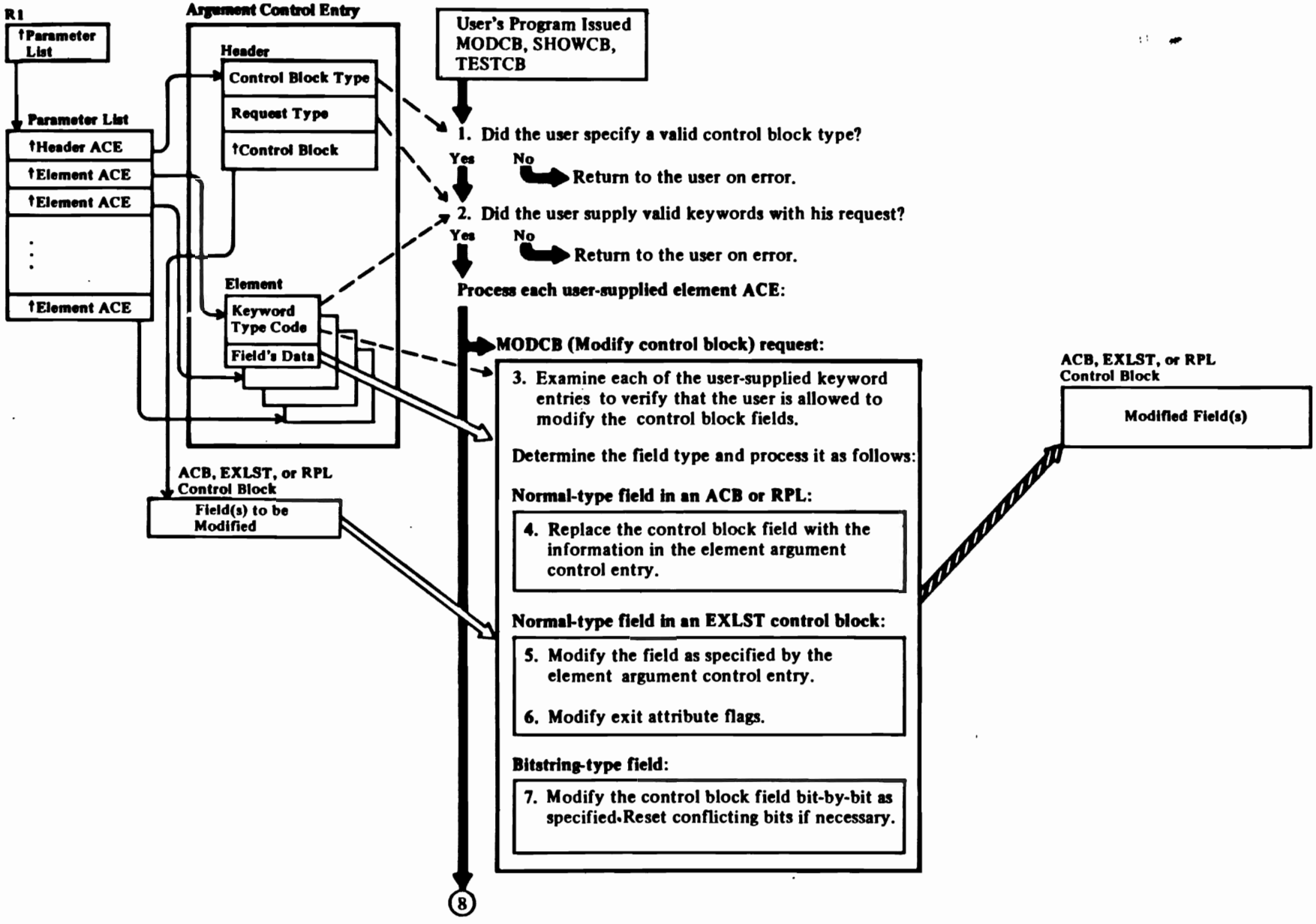
6

The block is initialized to its default values. Information is subsequently added to the block as specified by the element argument control entries (ACEs)

11

The exit attribute flags indicate that an exit address is present, active, inactive, or set during link-edit.

Diagram CB1. MODCB, SHOWCB, TESTCB: Modify, Display, or Test a Control Block

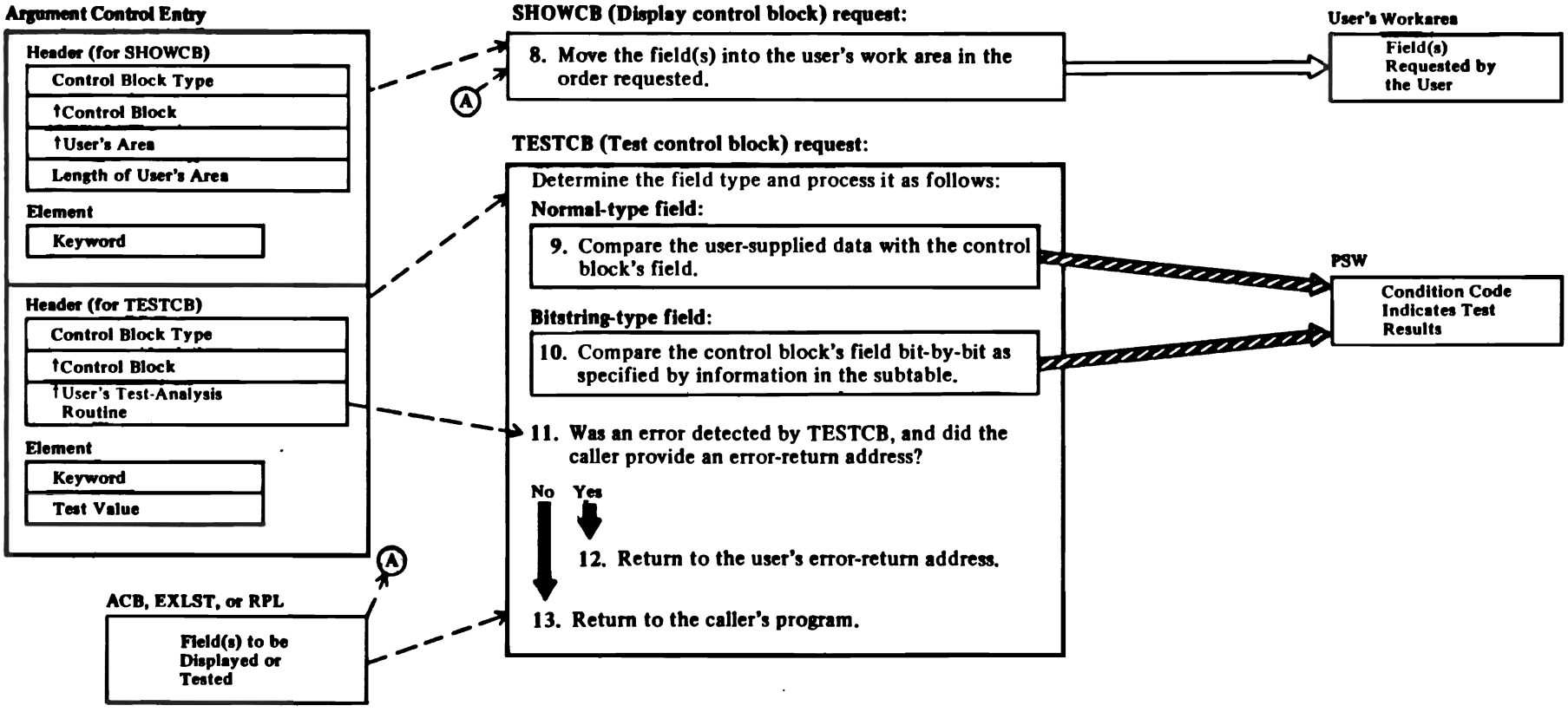


Notes for Diagram CB1

1 IDA019C1

The MODCB, SHOWCB, and TESTCB macros are issued to modify, display, and test, respectively, the ACB, RPL, and EXLST control blocks in the user's address space.

Diagram CB2. MODCB, SHOWCB, TESTCB: Modify, Display, or Test a Control Block



Notes for Diagram CB2

4-13

The field attribute table entry contains the length, offset from the beginning of the block, and characteristics of the field in the control block.

Three types of entries are identified in the field attribute table: bitstring, normal, and entries that require a special subroutine to process them.

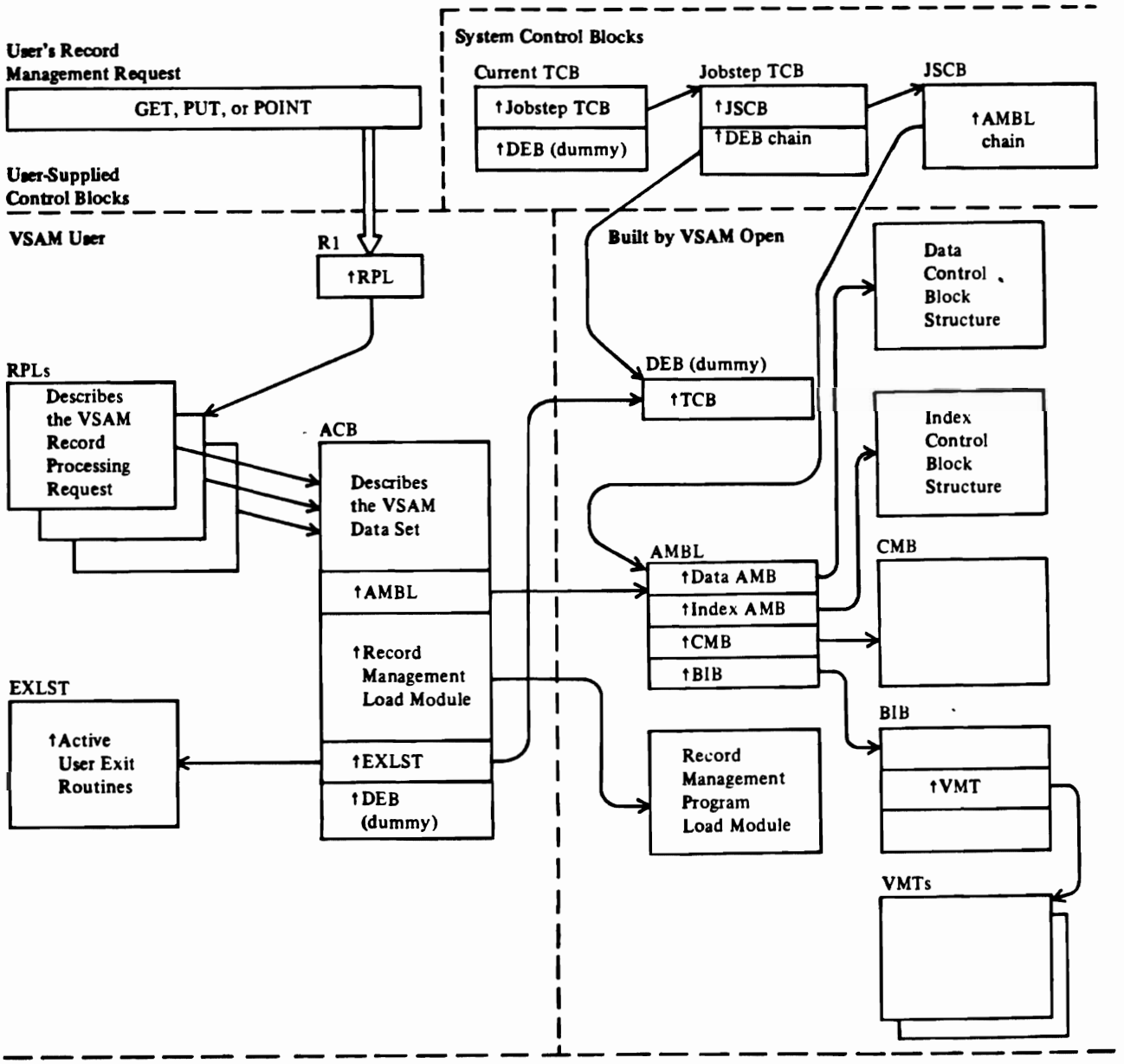
If the entry is a bitstring type, the field attribute table points to a series of bit entries in the bitstring table that are used to modify the control block (MODCB), or are compared to a value supplied by the user (TESTCB).

If the entry is a normal type, the element argument control entry is moved into the block (MODCB), a character string or field is moved into the user's area (SHOWCB), or the user's argument field is compared with the appropriate fields in the block (TESTCB).

Control Block Interrelationships

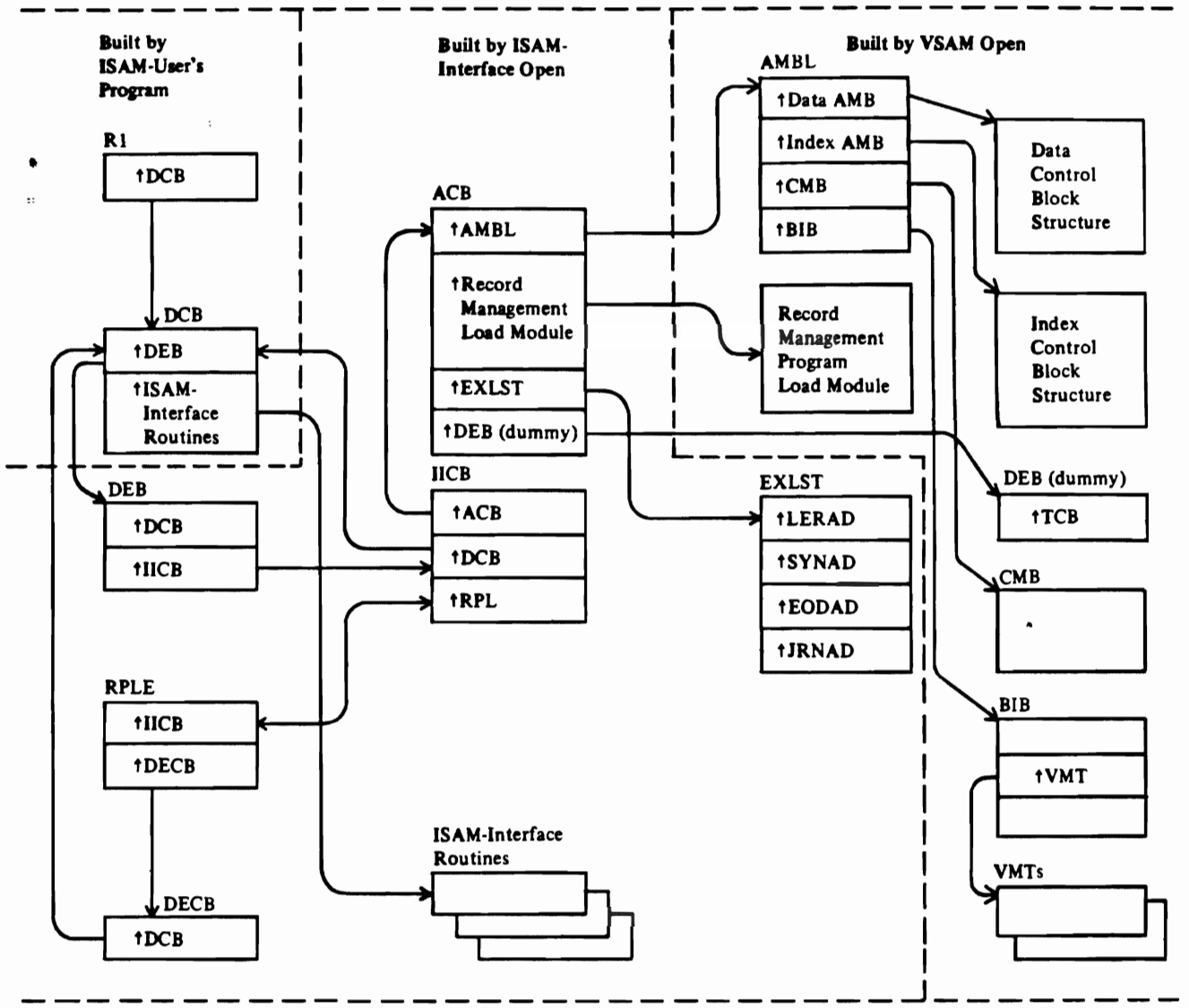
Figure 47 and 48 show the VSAM control blocks built when a key-sequenced data set is opened.

The role of the BIB and CMB in virtual-storage management is described in "Virtual-Storage Management" in "Diagnostic Aids."



Note: The data control block structure is shown in Figure 52. The index control block structure is shown in Figure 54.

Figure 47. VSAM Control Block Structure for a Key-Sequenced Data Set (VSAM User)



Note: The data control block structure is shown in Figure 52. The index control block structure is shown in Figure 54.

Figure 48. VSAM Control Block Structure for a Key-Sequenced Data Set (ISAM User)

ACB—Access Method Control Block

The VSAM ACB describes a VSAM cluster. It is built by the user's program with the ACB or GENCB macro. Before the cluster is opened, the ACB can be modified by the user's DD statements and by the MODCB macro. After the cluster is opened, the ACB is pointed to by the RPL (RPLDACB) that describes the user's record processing request.

Access Method Control Block (ACB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	ACBID	Control block identifier, X'A0'
1 (1)	1	ACBSTYP	Subtype: X'10' = VSAM X'20' = VTAM
2 (2)	2	ACBLENG	Length of the ACB
4 (4)	4	ACBAMBL ACBIXLST ACBJWA ACBIBCT	Address of the AMBL Address of the index list
8 (8)	4	ACBINRTN	Address of the VSAM Interface routine (IDA019R1)
12 (C)	2	ACBMACRF	MACRF flags:
		ACBMACR1	MACRF flag byte 1:
	1...	ACBKEY	The record is identified by a key—keyed processing
	.1..	ACBADR ACBADD	The record is identified by a RBA (relative byte address)—addressed processing
	..1.	ACBCNV ACBBLK	Control interval processing
	...1	ACBSEQ	Sequential processing
	.... 1...	ACBDIR	Direct processing
	.... .1..	ACBIN	Input (GET, READ) processing
	.... ..1.	ACBOUT	Output (PUT, WRITE) processing
	1	ACBUBF	User-supplied buffer space
13 (D)		ACBMACR2	MACRF flag byte 2:
	...1	ACBSKP	Skip sequential processing
	.... 1...	ACBLOGON	VTAM LOGON indicator
	.... .1..	ACBRST	Set data set to empty state
	.... ..1.	ACBDSN	Basic subtask shared control-block connection on common DSNAMEs
	1	ACBAIX	Object to be processed is the alternate index of the path specified in the given DDNAME
	xxx.		Reserved
14 (E)	1	ACBBSTNO	Number of concurrent strings for alternate-index path
15 (F)	1	ACBSTRNO	Number of RPL strings
16 (10)	2	ACBBUFND	Number of buffers requested for data
18 (12)	2	ACBBUFNI	Number of buffers requested for index
20 (14)	4	ACBBUFPL	Address of the buffer header (BUFC)

Access Method Control Block (ACB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
20 (14)	1	ACBMACR3	MACRF flag byte 3:
	.1..	ACBLSR	Local shared resource
	..1.	ACBGSR	Global shared resources
	...1	ACBICI	Improved control-interval access
	.... 1...	ACBDFR	Write operations are to be deferred
	.... .1..	ACBSIS	Sequential insert strategy
	.... ..1.	ACBNCFX	Control blocks are fixed in real storage
	x... ...x		Reserved
21 (15)	1	ACBMACR4	Reserved
22 (16)	2	ACBJBUF	Number of buffers requested for journal
24 (18)	1	ACBRECFM	Record format:
	1...	ACBRECAF	JES format
25 (19)	1	ACBCCTYP	Control character:
	xxxx		Reserved
	 xxxx	ACBASA	Control character type
26 (1A)	2	ACBOPT	Non-user options:
			Byte 1:
	xx..	ACBCROPS	Checkpoint/restart options:
	1...	ACBCRNCK	Restart hasn't checked for modification since last checkpoint
	.1..	ACBCRNRE	Data added since last checkpoint hasn't been erased by restart, and no reposition to last checkpoint takes place
	..xx xxxx		Reserved
			Byte 2:
	.... 1...	ACBDSORG	Match with DCBDSORG
	xxxx .xxx		Reserved
28 (1C)	4	ACBMSGAR	Message area
32 (20)	4	ACBPASSW	Address of the user-supplied password
36 (24)	4	ACBEXLST ACBUEL	Address of the user exit list
Before OPEN			
40 (28)	8	ACBDDNM	DD name
After OPEN			
40 (28)	2	ACBTIOT	Offset to the TIOT
42 (2A)	1	ACBINFL	Indicator flags
43 (2B)	1	ACBAMETH	Access method type
44 (2C)	1	ACBERFL	Error flags
45 (2D)	3	ACBDEB	Address of the DEB
Not Changed by OPEN			
48 (30)	1	ACBOFLGS	Open/Close flags:
	..1.	ACBEOV	EOV concatenation
	...1	ACBOPEN	The ACB is open
	.... 1...	ACBDSERR	No further requests are possible against the ACB
	.... ..1.	ACBEXFG	An ACB Exit routine exists
	1	ACBIOSFG	The Open or Close routine is in control
	xx.. .x..		Reserved

Access Method Control Block (ACB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
49 (31)	1	ACBERFLG	Error flags Note: See "Open and Close Return Codes" in "Diagnostic Aids" for details on the ACBERFLG error flags.
50 (32)	2	ACBINFLG	Indicator flags:
	.1..	ACBJEPS	JEPS processing
	..1.	ACBIJRQE	RQE being held by JAM
	...1	ACBCAT	The ACB describes a VSAM catalog
	.... 1...	ACBSCRA	Catalog recovery area is built in system storage
	.... .1..	ACBUCRA	Catalog recovery area is built in user's storage
	.... ..1.	ACBSDS	A VSAM data set is being opened as a system data set
	x... ...x		Reserved
51 (33)	1		Reserved
52 (34)	4	ACBUJFCB	Address of the user JFCB
56 (38)	4	ACBBUFSP	Amount of space available for the buffers
60 (3C)	2	ACBBLKSZ	Length of the physical DASD record
		ACBMSGLEN	Message length
62 (3E)	2	ACBLRECL	Length of the user's record
64 (40)	4	ACBUAPTR	Address of the user's work area
68 (44)	4	ACBCBMWA	Address of the work area for control block manipulation
72 (48)	4	ACBAPID	Address of application ID

AMB—Access Method Block

The AMB describes a VSAM data set or index and points to control blocks needed to process data set and index records, such as the BUFC, the PLH, the catalog's ACB, and the AMDSB. An AMB is built for a cluster's data set and, if the cluster is key-sequenced, an AMB is built for the index. Each AMB associated with the cluster is pointed to by the AMBL (AMBLDTA points to the data AMB; AMBLIX points to the index AMB). When a data set's or index's record is being processed by VSAM record management, register 3 (RAMB) points to the data set's or index's AMB.

Access Method Block (AMB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	AMBID	Control block identifier, X'40'
1 (1)	1	AMBRSC	Resource TS byte
2 (2)	2	AMBLEN	Length of the AMB
4 (4)	4	AMBLINK	Address of the next AMB in the AMB chain
8 (8)	4	AMBBUFC	Address of the BUFC associated with the AMB
12 (C)	4	AMBPH	Address of the PLH associated with the AMB
16 (10)	4	AMBCACB	Address of the VSAM catalog's ACB (the ACB of the catalog that contains the object's catalog record)

EXLST—Exit List

The EXLST contains the addresses of exit routines supplied by the user. It is created by the user with the EXLST or GENCB macro. The EXLST is pointed to by the ACB (ACBEXLST).

Exit List (EXLST)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	EXLID	Control block identifier, X'81'
1 (1)	1	EXLSTYP	Subtype identifier: X'10' = VSAM X'20' = VTAM
2 (2)	2	EXLLEN	Length of the control block
4 (4)	1		Reserved
5 (5)	1	EXLEODF	Entry description
6 (6)	4	EXLEODP	Address of the EODAD exit routine
10 (A)	1	EXLSYNF	Entry description
11 (B)	4	EXLSYNP	Address of the SYNAD exit routine
15 (F)	1	EXLLERF	Entry description
16 (10)	4	EXLLERP	Address of the LERAD exit routine
20 (14)	10		Reserved
30 (1E)	1	EXLJRNF	Entry description
31 (1F)	4	EXLJRNP	Address of the JRNAD exit routine
35 (23)	10		Reserved

HEB—Header Element Block

The HEB is used by VSAM Virtual-Storage Management to allocate and free unprotected storage blocks. It contains 16 header elements, each of which describes a storage block. It is further described in "Virtual-Storage Management" in "Diagnostic Aids."

The HEB is pointed to by the BIB (BIBHEBPT). The first free header element is pointed to by BIBHEBFQ.

Header Element Block (HEB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
HEB Block Definition			
0 (0)	1	HEBID	Control block identifier, X'13'
1 (1)	1		Reserved
2 (2)	2	HEBLEN	Length of the HEB (including header elements)
4 (4)	4	HEBNHEB	Address of the next HEB (or 0)
8 (8)	2		Reserved
10 (A)	2	HEBCNT	Number of header elements
12 (C)	20 x 16	HEBHDELS	Header elements:
HEB Header Element Definition			
0 (0)	8	HEBFREMN	Information for freeing the storage block described by this header element:
0 (0)	1	HEBSP	Subpool in which the storage block is located

Index Create Work Area (ICWA)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
42 (2A)	2	ICWKEY1L	Length of the current key
44 (2C)	2	ICWKEY2L	Length of the previous key
46 (2E)	2	ICWKEY3L	Length of the section key
48 (30)	2	ICWNEST	Number of entries in the index section
50 (32)	2	ICWNOSEG	Number of segments in a spanned record
52 (34)	2	ICWCRSEG	Number of the segment being processed
54 (36)	1	ICWREQ	Request type
55 (37)	1	ICWPTL	Index entry pointer length
56 (38)	1	ICWCER	Rear compression count of the current index entry
57 (39)	1	ICWCEF	Current index entry F—number of front-key compressed bytes
58 (3A)	1	ICWCEL	Current index entry L—length of the compressed key in the entry
59 (38)	1	ICWCERP	Rear compression count of the previous index entry
60 (3C)	(key length)	ICWKEY1	Save area for the current key
VL	(key length)	ICWKEY2	Save area for the previous key
VL	(key length)	ICWKEY3	Save area for the section key

IICB—ISAM Interface Control Block

The IICB is used to address the DCB (ISAM) and the ACB and RPL (VSAM) control blocks and associated areas needed by the ISAM interface. The IICB is pointed to by the DEBWKPT5 field in the ISAM DEB to provide integrity and by the RPLIICB field in the RPL Extension to provide the connection to VSAM control programs.

ISAM Interface Control Block (IICB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	IICBID	Control block identifier, X'80'
1 (1)	1		Reserved
2 (2)	2	IICBLEN	Length of IICB, in bytes
4 (4)	4	IIDCBPTR	Address of DCB
8 (8)	4	IIACBPTR	Address of ACB
12 (C)	4	IIRPLPTR	Address of RPL
16(10)	4	IIW1CBF	Address of dummy scan work area
16 (10)	2	IISAVLRL	Length of current record
18 (12)	2	IIMAXLRL	Maximum record length
20 (14)	4	IIKEYPT	Address of key (dummy ISAM) save area
24 (18)	1	IIFLAG1	ISAM interface status flags:
	1...	IIFSCAN	Scan mode
	.1..	IIFGET	First GET request
	..1.	IIFPASS	First pass in load mode
	...1	IIFCLOSE	Close in process
	.... 1...	IIDATA	Data only retrieval

ISAM Interface Control Block (IICB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
	.... .1..	IIFTEST	Loop test bit
	.... ..1.	IISEQCHK	Resume load sequence check
	1	IIQBFRS	QISAM does not use buffers—no FREEMAIN is required
25 (19)	3	IIACBL	ACB, EXLST, IICB length for GETMAIN/FREEMAIN
28 (1C)	1	IIFLAG2	ISAM interface status flags used by Open to designate the fields being merged by ISAM Interface. ISAM Interface Close uses the same mask to restore the DCB to its pre-open status.
	1...	MRKP	Relative key position
	.1..	MLRECL	Logical record length
	..1.	MBLKSI	Block size
	...1	MOPTCD	Option code
	.... 1...	MRECFM	Record format
	.... .1..	MBUFL	Buffer length
	.... ..1.	MBUFNO	Buffer number
	1	MKEYLE	Key length
29 (1D)	3	IIRPLL	RPL and RPLE: length for GETMAIN/FREEMAIN
32 (20)	2	IIKEYSL	Length of key save area, in bytes
34 (22)	2	IIBUFL	Length of single ISAM Interface buffer (used in calculations)
36 (24)	1	IIFLAG3	ISAM interface status flags:
	1...	MBFALN	BFALN merge bit
	.xxx xxxx		Reserved
37 (25)	3	IIMSGL	Message area length
40 (28)	4	IIMSGPTR	Message area pointer
44 (2C)	1	IIBUFNO	Number of ISAM Interface buffers built by Open
45 (2D)	3	IITBUFL	Total BCB and buffer length for GETMAIN/FREEMAIN
48 (30)	4	IISVCLST	SVC exit for SYNADAF
52 (34)	8	IISAMSYN	ISAM SYNAD name—used when SYNAD is specified in the AMP parameter
60 (3C)	72	IIREGSAV	Register save area
60 (3C)	4		Reserved
64 (40)	4	IIREGBC	Previous save area pointer
68 (44)	4	IIREGFC	Next save area pointer
72 (48)	60		Remainder of save area
132 (84)	36	IIAUD	Audit information
132 (84)	4	IIAUDHDR	
132 (84)	1	IIAUDFL1	Audit flags
	1...	AUDACBOP	OPEN was issued for ACB
	.1..	AUDACBRO	Control was returned from Open
	..1.	AUDDCBEX	A DCB exit was taken
	...1	AUDDCBRT	Control was returned from the DCB exit
	.... xx..	AUDPRMOD	A processing module was loaded: '01'IDAIIPM1

ISAM Interface Control Block (IICB)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
			'10'IDAIIPM2 '11'IDAIIPM3
	.... ..1.	AUDIISYN	ISAM-Interface SYNAD routine was loaded
	1	AUDURSYN	User SYNAD routine was loaded
133 (85)	1	IIAUDFL2	Audit flags
	1...	AUDIIFBF	IDAIIFBF was loaded
	.1..	AUDACBCL	CLOSE was issued for ACB
	..1.	AUDACBRC	Control was returned from Close
	...1	AUDBFREX	A flush-buffer exit was taken to IDAIIPM1
	.... 1...	AUDBRFRT	Control was returned from IDAIIPM1
	.... .1..	AUDDEBXF	The DEB extension was freed
	xx		Reserved
134 (86)	2	IIGMCNTR	Offset from IIAUD to the next available entry in the audit-information fields
136 (88)	32	IIGMAUD	Address of virtual-storage areas gotten
136 (88)	4	AUDIICB	Address of this IICB
140 (8C)	4	AUDCSPLI	Subpool number and length
140 (8C)	1	AUDCSPI	Subpool number
141 (8D)	3	AUDCLI	Length
144 (90)	4	AUDCDEB	Address of the DEB
148 (94)	4	AUDCSPLD	Subpool number and length
148 (94)	1	AUDCSPD	Subpool number
149 (95)	3	AUDCLD	Length
152 (98)	4	AUDCBFRS	Address of the area for buffers and RPLs
156 (9C)	4	AUDCSPLB	Subpool number and length
156 (9C)	1	AUDCSPB	Subpool number
157 (9D)	3	AUDCLB	Length
160 (A0)	4	AUDCMSGA	Address of the physical-error message area
164 (A4)	4	AUDCSPLM	Subpool number and length
164 (A4)	1	AUDCSPM	Subpool number
165 (A5)	3	AUDCLM	Length

IMWA—Index Insert Work Area

The IMWA is a control block used in inserting an index entry into the index of a key-sequenced data set. The IMWA is created by the Open routine, and is pointed to by the ICWA (ICWCHN).

Index Modification Work Area (IMWA)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	IMWID	Control Block identifier, X'42'
1 (1)	1	IMWFLAGS	Control flags:
	1...	IMWNEWHL	Indicates a new high level should be built in the index structure
	.1..	IMWRIPL	Indicates a new entry must be built in an index record at the next higher level to reflect a new index record created by an index split

RPL—Request Parameter List

The RPL contains user-request information and error feedback information. It also contains information required by GET and PUT macros.

The RPL is created by the user with the RPL or the GENCB macro.

Request Parameter List (RPL)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	4	RPLIDWD	Identification word of the RPL:
0 (0)	1	RPLID	Control block identifier, X'00'
1 (1)	1	RPLSTYP	RPL subtype: X'10' = VSAM X'20' = VTAM
2 (2)	1	RPLREQ	Request type—when the user issues a VSAM macro, register 0 contains one of the following request-type codes; when VSAM processes the request, the request-type code in register 0 is transferred to the RPLREQ field (unless the request is CHECK or ENDREQ) 0(0) GET request 1(1) PUT request 2(2) CHECK request 3(3) POINT request 4(4) ENDREQ request 5(5) ERASE request 6(6) VERIFY request 8(8) Data preformat request 9(9) Index preformat request 10(A) Force I/O request 11(B) GETIX request 12(C) PUTIX request 13(D) SCHBFR request 14(E) MRKBFR request 15(F) WRTBFR request
3 (3)	1	RPLLEN	Length of the RPL
4 (4)	4	RPLPLHPT	Address of the PLH
8 (8)	1	RPLECB	Address of the external ECB, or an internal ECB:
	1...	RPLWAIT	The event has not yet completed
	.1..	RPLPOST	The event has completed
	..xx xxxx		Reserved
9 (9)	3		Reserved, if RPLECB is an internal ECB, or the address of the external ECB
12 (C)	4	RPLFDBWD	Feedback work:
12 (C)	1	RPLSTAT	RPL status flags:
	.1..	RPLCHKI	CHECK has been issued
	..1.	RPLEDRQI	ENDREQ has been issued
	x..x xxxx		Reserved
13 (D)	3	RPLFDBK	RPL feedback area (See "Diagnostic Aids" for a list of RPL return codes and condition codes.)
13 (D)	1	RPLRTNCD RPLERREG	RPL return code
	X'00'		Normal return
	X'04'		Invalid control block

Request Parameter List (RPL)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
	X'08'		Logical error
	X'0C'		Physical error
14 (E)	2	RPLCNDCD	RPL condition code
14 (E)	1	RPLCMPON	Component issuing the code
15 (F)	1	RPLERRCD	Error code
16 (10)	2	RPLKEYLE RPLKEYL	Key length
18 (12)	2	RPLSTRID	RPL string identifier
20 (14)	4	RPLCCHAR	Address of the control character
24 (18)	4	RPLDACB	Address of the caller's ACB
28 (1C)	4	RPLTCBPT	Address of the user's TCB—this field is always zero for a VSAM RPL
32 (20)	4	RPLAREA	Address of the caller's record area
36 (24)	4	RPLARG	Address of the caller's search argument
40 (28)	4	RPLOPTCD	Option flags
40 (28)	1	RPLOPT1	Option flag byte 1:
	1...	RPLLOC	Locate mode
	0...		Move mode
	.1..	RPLDIR	Direct-search access
	..1.	RPLSEQ	Sequential access
	...1	RPLSKP	Skip sequential processing
	.... 1...	RPLASY	Asynchronous request
	.... 0...		Synchronous request
	.... .1..	RPLKGE	Search key greater than or equal
	.... .0..		Search key equal
	.... ..1.	RPLGEN	Generic key
	.... ..0.		Full key
	1	RPLECBSW	The RPLECB field contains the ECB's address
41 (29)	1	RPLOPT2	Option flag byte 2:
	1...	RPLKEY	Locate the record identified by a key
	.1..	RPLADR RPLADD	Locate the record at the caller-specified relative byte address (RBA)
	..1.	RPLCNV	Locate the control interval at the caller-specified RBA
	...1	RPLBWD	Process in backward direction
	.... 1...	RPLLRD	Locate or retrieve the last record in the data set
	.... ..1.	RPLUPD	Update processing
	1	RPLNSP	Note the string position
	.... .x..		Reserved

Request Parameter List (RPL)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
42 (2A)	1	RPLOPT3	Option flag byte 3:
	1...	RPLEODS	End of the user's output data set
	.1..	RPLSFORM	Spool form on remote
	..1.	RPLBLK	Block the records
	..0.		The records are unblocked
	...1	RPLVFY	UCS/FCB verify
	.... 1...	RPLFLD	UCS fold
	.... .xx.	RPLFMT	Format type:
	.... .00.		UCS load
	.... .01.		FCB load
	.... .10.		Reserved
	.... .11.		Reserved
	1	RPLALIGN	Align the buffer and notify the operator
	0		Do not align the FCB buffer loads
43 (2B)	1	RPLOPT4	Reserved
44 (2C)	4	RPLNXTRP RPLCHAIN	Address of the next RPL in the chain
48 (30)	4	RPLRLEN	Length of the record
52 (34)	4	RPLBUFL	Length of the user's buffer
56 (38)	4		Reserved
60 (3C)	8	RPLRBAR	RBA return location
60 (3C)	2	RPLAIXPC	Alternate-index pointer count
62 (3E)	1	RPLAIXID	Alternate-index pointer type:
	x... ...	RPLAXPKP	Pointer is: 0 Prime-key pointer 1 RBA pointer
	.xxx xxxx		Reserved
63 (3F)	1		Reserved
64 (40)	4	RPLDDDD	Relative byte address
68 (44)	1		Reserved
69 (45)	1	RPLACTIV	CHECK not issued
70 (46)	2	RPLEMLEN	Error message length
72 (48)	4	RPLERMSA	Address of the error message area

RPLE—Request Parameter List Extension

An RPLE is built and appended to each ISAM Interface RPL when the user's ISAM program opens a VSAM cluster. The RPLE contains the address of the IICB, a register save area, a linkage to other RPLs in the ISAM Interface RPL pool, and a pointer to the ISAM DECB.

Request Parameter List Extension (RPLE)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	4	RPLIICB	Address of the IICB
4 (4)	4	RPLDECB	Address of the DECB—if the field contains zeros, the RPL has not been assigned to a DECB (BISAM only)

8 (8)	4	RPLIIBFR	Address of the ISAM Interface buffer associated with the RPL (the buffer is required for locate mode processing, data only retrieval, dynamic buffering, and BISAM stand-alone write)
12 (C)	4	RPLRPLPT	Address of the next RPL in the ISAM Interface RPL pool—if the RPL is the last RPL in the pool, this field contains zeros
16 (10)	1	RPLIITSB	Test-and-set (TS) byte—this field is used to indicate the assignment of the RPL to a BISAM DECB
17 (11)	3		Reserved
20 (14)	4	RPLSAVE	Register save area
24 (18)	4	RPLSAVE2	Register save area

SRB—Service Request Block

The SRB is used by the VS2 I/O Supervisor to dispatch I/O processing for a request. It identifies the address space in which processing is to be done.

The format of the SRB is given in *OS/VS2 Data Areas*.

SSL—Swap Save List

The SSL contains up to 16 entries that identify control blocks that are to be chained after Open has otherwise completed successfully. Deferring chaining makes it unnecessary to unchain the control blocks should Open fail.

Open uses the Compare-and-Swap instruction to chain or alter storage that is subject to simultaneous alteration by two or more tasks.

The SSL is pointed to by OPWA (called the ACB work area). Additional SSLs are chained as required.

Swap Save List (SSL)—Description and Format

Offset	Bytes and Bit Pattern	Field Name	Description
0 (0)	1	SSLSUBPL	Subpool number of the SSL
1 (1)	3	SSLLENTH	Length of the SSL
4 (4)	8	SSLID	Identifier: 'bIDASSLb'
12 (C)	4	SSLNXPTR	Address of the next SSL (zero for the last SSL in the chain)
16 (10)	2	SSLACEN	Number of active entries
18 (12)	2		Reserved
20 (14)	8 x 16	SSLENTRY	Entries for control blocks to be chained:
20 (14)	4	SSLSWPTR	Address of the word in which SSLSWAP is to be placed
24 (18)	4	SSLSWAP	The value that is to be placed at the address given is SSLSWPTR