IBM

System/360

Operating System Workshop

Education Guide

Education Development - Poughkeepsie, New York

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Section 1

INTRODUCTION

The System/360 Operating System Workshop is designed to be used for teaching systems programmers how to extend the facilities of the operating system by including several types of user routines.

This education guide is written to be used by an instructor experienced in teaching operating systems coding. It is important that the students have an opportunity to do the class problems and run these problems on the System/360.

This guide is organized into 9 topics. Each topic except Topic I is designed to be approximately one half of a customer student day. Topic I (Internal Logic Flow) is designed to be a full customer student day in length.

Section 2

IBM

Course Description

SYSTEM/360 OS WORKSHOP

Course Code - H3660 63* (P-3684)

Provided for -

Systems or lead programmers who need to know the requirements for extending the capabilities of the 360 Operating System.

Objectives -

Upon successful completion of each of the topics listed below the student will be able to:

1. Internal Logic Flow of OS:
   a. Explain the general logic flow of the Operating System.
   b. Define and explain the internal logic of the major components and their subprograms in the system.
   c. Identify and define the prime system control blocks.
2. Execute Channel Program (EXCP Macro):
   a. Write programs utilizing the EXCP macro instruction.
   b. Provide the required control block information needed by the EXCP macro instruction.
3. Debugging Concepts:
   a. Locate the trace table and trace a program's execution flow using this table.
   b. Effectively use dumps as a debugging aid.
   c. Read and analyze storage dumps.

* Courses completing after 12/31/66.

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4. Supervisor Call Routines (SVC):

   a. Write an SVC routine.

   b. Include user SVC routines in the Operating System.

5. Accounting Routines:

   a. Write accounting routines.

   b. Include user accounting routines in the Operating System.

6. Non-Standard Labels:

   a. Write a routine to interpret a non-standard label.

   b. Include this routine in the Operating System.

7. Error Routines:

   Explain how the Operating System invokes and uses error routines.

8. Access Methods/XDAP:

   a. Explain some of the techniques of writing access methods.

   b. Define and apply XDAP.

9. Device Support:

   Outline and define requirements (e.g. the contents of Unit Control Blocks) needed to support devices.

Prerequisites -

Students enrolled should have successfully completed the following courses:

S/360 Assembler Language Coding	K3600 65*	(P-3631)
S/360 OS Facilities	F3600 63*	(S-3682)
S/360 OS Coding	S3600 65*	(P-3638)
S/360 OS Generation	I3660 63*	(S-3683)

Duration - Approximately five days.

* Courses completing after 12/31/66.

Material Requirements -

Student Materials -

Title	Form No.	Abstract Ref.
Operating System/360:		
Assembler Language	C28-6514	SRL-360
Job Control Language	C28-6539	SRL-360
Operator's Guide	C28-6540	SRL-360
Control Program Services	C28-6541	SRL-360
Systems Programmer's Guide	C28-6550	SRL-360
User Libraries	C20-1663	SRL-360
Utility Programs	C28-6586	SRL-360
Control Program Messages & Completion Codes	C28-6608	SRL-360
Sequential Access Methods	Y28-6604	PLM-360
Introduction to Control Program Logic	Y28-6605	PLM-360
Direct Access Device Space Management	Y28-6607	PLM-360
Input/Output Support (OPEN/CLOSE/EOV)	Y28-6609	PLM-360
Fixed-Task Supervisor	Y28-6612	PLM-360
Job Management	Y28-6613	PLM-360
Input/Output Supervisor	Y28-6616	PLM-360
Basic Direct Access Method	Y28-6617	PLM-360
Catalog Management	Y28-6606	PLM-360

Instructor Materials (In addition to the above)

Linkage Editor	Y28-6610	PLM-360
TESTRAN	Y28-6611	PLM-360
Utilities	Y28-6614	PLM-360

Abstracts -

R20-4067 Education Guide

8 1/2" X 11" looseleaf instructor outline, with teaching notes, to be used by a qualified 360 instructor. Included in the guide are: references to supporting information, practice problems and solutions for both classroom and machine exercises, and paper master copies of overhead projector foils used in the class presentations.

Section 3

GENERAL COURSE OUTLINE

I. Internal Logic Flow

- A. Publications, Handouts, Macro Fische Descriptions.
- B. Overview of the Operating System
- C. Explain Three Control Charts
- D. Philosophy of Operating Systems
  1. Why do we have Operating Systems?
  2. Job Management, Test Management, and Data Management Relationship to Operating Systes
  3. Phases of Control
- E. Control Blocks
- F. Generating a System
- G. Internal Logic Flow of S/360 Operating System
- H. Review & Summary
  1. System Description
     - a. Sizes of System Data Sets
     - b. Proximity of Data Sets
     - c. Catalog Structure
     - d. Library Structure
  2. Initialization and Execution
     - a. IPL Procedure
     - b. Job Scheduler
     - c. Problem Program
     - d. Job Step Termination

II. Execute Channel Program

- A. Role of EXCP in Operating System/360
  1. What Is EXCP?

2. Who Uses EXCP?

   a. Standard Access Methods

   b. Problem Programmer's Use of EXCP

3. Considerations In Using EXCP & Incorporating User Routines Into IOS

B. Introduction to IOS & The Use of EXCP

1. Control Program Logic - Tables Constructed At Systems Generation Time

   a. Unit Control Blocks

   b. Request Element Tables

   c. Logical Channel Word Table

2. Control Program Flow - Problem Program Initiation

   a. Reader/Interpreter

   b. Initiator

   c. TIOT

   d. Initiator Transfers to Problem Program

   e. Organization of Main Storage

3. Control Program Flow - OPEN

4. Problem Program Use of EXCP - General Approach

   a. User Must Construct Control Blocks and Channel Program

   b. Data Control Block for EXCP

   c. OPEN Macro

   d.. Coding EXCP

   e. Input/Output Block

   f. WAITing

   g. CLOSE

   h. Sample EXCP Program

5. Control Program Logic - I/O Supervisor

   a. General Logic Flow

   b. Detail Analysis of EXCP Supervisor

6. User Programming Responsibilities

   a. Construction of Channel Commands

   b. Error Testing Following Execution of WAIT macro

   c. End of Data Checking

   d. Preparation for Issuing EOV or CLOSE for a tape

C. Student Problem

D. Controlling DASD by EXCP

   1. Ease of Control by User

   2. IOS Handling of Disk I/O Requests

   3. Programming For Disk

III. Debugging Concepts

A. Introduction

B. Requirements for Obtaining an ABDUMP

C. Device Allocation

D. Contents Supervision

E. SAVE Area Trace

F. Control of Program Interrupts

G. Trace Table

H. Locate and Identify Control Blocks Associated With DCB's.

I. Comparison of ABDUMP with Indicative Dump

IV. SVC Routines

A. Introduction

B. Fundamental Concepts & Terminology

1. Writing the SVC

2. IBM Reserved SVC Code Numbers

3. User Reserved SVC Code Numbers

4. The Prefix Table

5. The SVC Table

6. Residence for SVC Routines

7. Types of SVC Routines

8. Review and/or Redefinition of Serially-Reusable and Re-Entrant

9. Naming Conventions for SVC Routines

10. Routines to Support SVC and SYS1.SVCLIB

C. Why Have SVC Routines?

D. How the SVC System Functions

E. Writing the SVC Routine

1. Type 1

2. Type 2

3. Type 3

4. Type 4

F. Representative Problems and Examples

G. SVC Writing Checklist

H. Placing an SVC Routine in SVC Library

1. Directly

2. Copying and Inserting a Tested Module From Another Data Set

3. SVCLIB Macro Instruction

I. Considerations

J. Practice Problem

V. Accounting Routines

A. Introduction

B. How to Write an Accounting Routine

1. Entry Linkage

2. Parameters Passed to the Accounting Routine

3. Output From the Accounting Routine

4. Exit Linkage

5. Programming Considerations

C. How to Incorporate Into the System

D. Student Problem

VI. Non-Standard Labels

A. Definition of Non-Standard Label Processing Routines

1. Existence of Non-Standard Labels

2. Non-Standard Labels Characteristic

3. Review When NSL Routines Are Needed

B. OPEN Routines

1. General

2. Functions Accomplished

3. OPEN Macro

C. General Discussion of OPEN

1. Passage of Control to the Non-Standard Label Routines

2. Return From the NSL Routine

D. Detail Discussion of Non-Standard Header Label Processing During OPEN

1. Information Supplied to NSLOHDRI by OPEN

a. DCB Addresses

b. Control Blocks Usable by EXCP in NSL Routines

2. NSLOHDRI

   a. Entry into NSLOHDRI From OPEN

   b. NSLOHDRI Considerations

   c. General Logic Flow of NSL Processing Routine

3. Example

4. Inserting NSLOHDRI Into the Control Program

5. Testing Non-Standard Label Processing Routine

6. EXCP Level of Code

E. Discussion of NSL Routines During CLOSE and EOV

1. Review NSL Module Names

2. Tape Mark Consideration

3. EOV Termination - Register Content

4. Multi-Volume Data Sets

F. Generalized Handling of Non-Standard Labels: The Data Conversion Utility II Package

1. General Description

2. Data Conversion Non-Standard Label Modules (DCNSL)

3. Comments on the Techniques of DCNSL

G. Concluding Remarks

1. Material References

2. Student Problem

VII. Error Routines

A. Error Occurrences in OS/360

1. Error Occurrence at an I/O Device

2. Catastrophic Errors in the Channel or CPU

B. General Logic of Error Handling Within IOS

1. General Summary

2. Tape Read Error Logic Flow

a. User Flag Bits

b. Error Routine Scheduling

c. Error Routine Execution

3. Summary

C. Appendages to IOS

1. Definition

2. Appendage Routines - SYS1.SVCLIB

3. Using Appendages

4. Types of Appendages

5. Coding for Appenddages

a. DCB In User Program

b. Appendage Routine

c. Student Problem

VIII. Access Methods

A. Introduction

B. Basic Rules For Use With Operating System/360

1. The Data Management Routines

2. Data Management Routines Should Not Be Modified

3. Data Management Routines Can Be Combined or Expanded

C. Execute Direct Access Program (XDAP)

1. General Information

a. Need for XDAP

b. Description

c. XDAP Limitations

2. Requirements for Execution

3. Programming Specifications

a. DCB

b. OPEN

c. XDAP

4. XDAP Options

IX. Device Support

A. Introduction

B. Operating System Requirements

1. The Operating System

a. Allocation

b. Access of the Device

2. Control Blocks

a. UCB

b. DEB

c. DCB

d. IOB

e. ECB

C. Supporting the Device

1. Defining the Unit Control Block

a. System Generation

b. Supported UCB Types

c. Device Types

2. Naming the Device

a. The Device Name

b. The Device Table

c. The Device Mask Table

d. Effect of Changing Device Type Code

Section 4

Suggested Sequence: Reference

A. Explain publications, handouts, macro fische and PLM references to be used during the course. (These are listed in the Course Description.)

B. Overview of the Operating System 1

1. Go through large 360 Wall Chart (V25-6155). OPF I-1, I-2, I-3

a. Define 3 systems and major differences.

b. Define major parts.

c. Tell the basic function of each part.

C. Explain the three control charts. Appendix I

1. Go through the routines and their functions.

2. Comment on the access methods and how they fit into this structure.

3. Comment on the Linkage Editor and how it fits into this structure.

INSTRUCTORS' NOTE:

There are various descriptions of the detail of the components of the system in the PLM's. It is recommended that at least the introduction section of each of the following PLM's be read before teaching this topic:

Y28-6605, Y28-6613, Y28-6612, Y28-6616, Y28-6606, Y28-6609, Y28-6607, Y28-6604, Y28-6617

D. Philosophy of Operating Systems

INSTRUCTORS' NOTE:

Briefly go through the philosophy of "why an operating system" and what it provides.

1. Why do we have operating systems?

a. To do more work for the programmer and operator.

b. To provide management information.

c. To utilize resources.

2. a, b, and c above are accomplished within the 3 managements we described.

Suggested Sequence: Reference

3. What then are the phases of this control?

   The phases are:

   a. Introducing a job to the system

   b. Initiating the job

   c. Initiating a task

   d. Executing the task

      1) Opening the DCB

      2) Performing I/O operations

      3) Closing DCB

   e. Terminating a task

   f. Terminating a job step

   g. Terminating a job

E. Control Blocks (Board Display) Appendix II

INSTRUCTORS' NOTE:

Cardboard squares (8 1/2 X 11) can be used to make each control block illustrated in Appendix II. A very effective way of presenting an introduction to control blocks is to use a magnetic display of these cardboard squares. Step-by-step and block-by-block, tell from what source these control blocks are built; also their functions, and how they relate to Job, Task, and Data Management.

1. Go through the control block buildup using the 8 1/2" X 11" blocks with their names only.
2. Hand out large chart of control blocks and explain the logic.

F. Generating a System - What Happens?

1. Flow through System Generation OPF I-4
2. Define libraries on board. Appendix III
3. Construction of SYSRES and its VTOC's/DSCB's OPF I-5
4. System Data Sets OPF I-6
5. Organization of core storage OPF I-7

Suggested Sequence: Reference

G. The Internal Logic Flow of the 360 Operating System

INSTRUCTORS' NOTE:

This interpretation of the logic flow of the System/360 Operating System is intended as a learning tool for a better understanding of the mechanics of the system. It defines the steps through which a processing program may pass from the time it is introduced to the system until it terminates. In this description, emphasis is placed on one job's flow through the system, asynchrous and simultaneous processing are assumed.

The routines of the Operating System that maintain control are indicated in the control column of each sheet. The three functional control charts may be used as a reference for the function of the routines in control. Appendix I

The control block chart is referred to during the explanation of the logic flow. Appendix II This chart is provided to give the function of the control blocks that are referenced and to show how the information flow and linkage takes place. From time to time it may be necessary to reference the actual format of some of the control blocks. Most of these formats can be found in PLM Y28-6605.

CONTROL	SYSTEMS INITIALIZATION	Reference
Operator	1. Operator loads nucleus into storage by dialing the system resident device and pressing the LOAD button.	
Computer	2. An Initial Program Load record is brought in from SYSRES and given control.	OPF I-6
IPL Progr.	3. This IPL record reads another IPL record that brings in the remaining portion of the IPL program.	
IPL Progr.	4. The IPL program takes control, clears main storage and searches the volume label to locate the VTOC of the system resident volume.	
IPL Progr.	5. When the VTOC is found, it is searched for the SYS1.NUCLEUS data set.	
IPL Progr.	6. When the nucleus is located, it is brought into the fixed area of storage.	
IPL Progr.	7. From SYS1.NUCLEUS, the Nucleus Initialization Program (NIP) is brought into the dynamic area.	
NIP	8. NIP takes CPU control and initializes the nucleus and the system data sets.	
NIP	9. NIP initializes the Communication Vector Table (Ref: Control Block Chart - Block 16). The CVT will provide a means by which nonresident routines may reference routines in the nucleus. It contains pointers to all of the key routines in the nucleus and the location of system data sets.	Appendix II 1
NIP	10. NIP then initializes the UCB table (Ref: Control Block Chart - Block 23).	Appendix II
NIP	11. Locates the SVCLIB, LINKLIB, and LOGREC and opens these data sets.	2
NIP	12. Builds a resident SVC table. NOTE: This is why a re-IPL is necessary when SVCLIB is moved.	
NIP	13. After completing initialization, NIP replaces itself with the Reader/Interpreter and Master Scheduler. This is accomplished by NIP locating both these routines on the LINKLIB and loading them into storage.	

SCHEDULING THE JOB		
CONTROL*	INTRODUCING JOB TO SYSTEM	Reference
IA3 IIIA2	1. When the operator receives messages instructing him to enter commands, he issues START RDR (Start Reader), START WTR (Start Writer) and SET (Set Date) commands causing an attention interrupt to occur.	OPF I-8
IA1	2. This interruption causes CPU control to be given to the Master Scheduler's Master Command EXCP Routine.	
IA3	3. Control is passed to the Master Command Routine to process these commands.	
IB1	4. The Reader/Interpreter takes control and begins to read the input job stream.	
IB1	5. As statements are read, either from the input device or procedure library, they are identified and if they are control statements the length and the starting address of the name, operation, and operand are determined.	
IB1	6. This information is then passed to the respective routines, either JOB, EXEC, or DD Routine for processing.	
IB2	a. When a JOB card is encountered, control is passed to the Job Routine which allocates table space and uses the statement contents to form the JCT (Ref: Control Block Chart - Block 1) and the ACT (Ref: Control Block Chart - Block 3) in the job queue.	Appendix II 3
IB3	b. When an EXEC card is encountered, control is passed to the EXEC Routine which allocates table space and uses the statement to form the SCT (Ref: Control Block Chart - Block 2) in the job queue.	Appendix II
IB4	c. When a DD card is encountered, control is passed to the DD Routine which allocates table space and uses the DD statement contents to form the JFCB (Ref: Control Block Chart - Block 8) and the SIOT (Ref: Control Block Chart - Block 4) in the job queue.	Appendix II 4
IB1	7. Linking pointers are established between the JCT, SCT, JFCB, SIOT, and ACT.	
IB1 IA4	8. In cases where errors occur in matching and checking the contents of the control statements in steps 6 a,b, and c the appropriate error messages are written and associated job steps are not executed.	

* NOTE: *Refer to control charts at the back of this paper for routine names and functions. Example: the key IA3 stands for - Job Management (I); Master Scheduler (A); Master Command Routine (3).*

SCHEDULING THE JOB		
CONTROL	JOB INITIATION	Reference
IC1	1. The System Control Routine of the Initiator/Terminator receives control and performs housekeeping functions such as recording the step number.	
IC1	2. If the job step is the first step of this job, its name is placed in the selected job queue.	
IC2	3. The Execute Statement Condition Code Routine takes control and processes any step condition codes that • are specified in the EXEC statement.	
IC2 IC13	a. If condition codes are specified, they are compared with the corresponding return code and where they agree, the job is cancelled, Control goes to the Step Termination Routine.	
IC3	b. If this job step is the first step or no condition codes are specified, control is turned over to the JFCB Housekeeping Routines.	
IC3	4. The JFCB Housekeeping Routines take control and complete those portions of the JFCB's and SIOT's that describe the volumes to be used during step execution.	
	a. The volume serial numbers are obtained from either the DD statement information, the pass data set information or the catalog.	
IIID1	5. If a catalog search is required, the Catalog Routine is given control and locates the data set by looking through the index levels of the catalog. This information is then saved in a work area.	OPF I-9 and OPF I-10
IC3	6. When data sets are passed, information is recorded to keep track of these data sets so they may be used later.	
IC4	7. The Allocation Control Routine takes control and begins by calculating the storage requirements for the following tables: DD Number Table, Allocate Control Block, Channel Load Table, Allocate Work Table, Potential User On Device Table, Separation Strikeout Pattern, Volume Table and Device Mask Table. These implicit tables are constructed for later use by the allocation routines.	
IC4	8. The Allocation Control Routine then reads all the SIOT's into the storage assigned to them.	
IC4	9. The number of volumes each data set requires is gotten from the SIOT's and recorded.	

SCHEDULING THE JOB			Reference
CONTROL	JOB INITIATION		
IC4	10.	The storage for the TIOT is determined and reserved.	
IC5	11.	The Demand Allocation Routine takes control and first records information that describes data sets and device allocation.	
IC5	12.	The volume affinity is resolved at this point for volumes requested by more than one data set.	
IC5	13.	The number of devices required by each data set is now determined.	
IC5	14.	Information concerning the number of data sets allocated on each channel is gathered to optimize channel usage. This information is obtained from the UCB (Ref: Control Block Chart - Block 22).	Appendix II
IC5	15.	Allocation is made of all requested resident devices.	
IC5	16.	Due to the fact that some of the devices specified that could be used may be ineligible, a check is made to assure the available device range.	
IC5 IC11	17.	Control is passed to the Allocation Error Routine if during the device range check the eligible device count becomes less than the number of devices required. In this case a message is written to the operator to this effect.	
IC5	18.	Specific device allocation is performed next.	
IC5 IC6	19.	A check is made to see if all allocation requirements have been met. If they have, go to step 22.	
IC6	20.	If they have not, control is passed to the Automatic Volume Recognition Routine (if included in the system). Volumes are allocated by this routine by checking all available mounted volumes.	
IC7	21.	If allocation request still remains, control is passed to the Decision Allocation Routine that completes the allocation process by assigning these requests.	
IC8 IIC1	22.	The TIOT Construction Routine takes control and main storage space is calculated and requested for the TIOT.	

SCHEDULING THE JOB			Referenc
CONTROL	JOB INITIATION		
IC8	23.	The TIOT is constructed primarily of information from the JCT, SCT and SIOT plus calculated information (Ref: Control Block Chart - Block 5). Linking pointers are established between the TIOT, UCB and JFCB.	Appendix II 5
IC9	24.	Control is received by the External Action Routine that checks all devices allocated to each data set and any required dismounting is called to the attention of the operator by messages.	
IC9	25.	The operator then receives messages telling him the volumes to be mounted.	
IC9	26.	A check is made to varify correct mounting.	
IC10	27.	Control is turned over to the Space Request Routine that scans the DD entries in the TIOT for D/A device users.	
IC10 IIIC1	28.	When a data set is found that requires D/A device space, a request is made to the DADSM Routine to allocate the space. In cases where the space can not be allocated the first time, requests are made until all possible ones are exausted.	
IC10 IC9	29.	When no allocation can be made on currently mounted volumes but mounting another volume will enable allocation to be made, control goes to the External Action Routine for mounting verification.	
IC10 IC11	30.	When no allocation can be made control is given to the Allocation Error Routine that cancels the job step.	
IC12	31.	The Step Initiation Routine receives control when all allocation requests have been satisfied.	
IC12	32.	Into each TIOT indicating a SYSOUT disposition is placed the address of the UCB for the device containing the system output data set.	
IC12	33.	The Logical Channel Table and the Job Control Table are written onto auxiliary storage and their storage space is made available for processing.	
IC12 IC10 IIC1	34.	Storage space for the processing program is obtained.	
IC12	35.	DCB's for job library data sets and Fetch where required are created and opened.	

SCHEDULING THE JOB	
CONTROL	JOB INITIATION
IC12 IIC2	36. A copy of the TIOT is placed into the work area of processing program and on auxiliary storage.
IC12	37. The SCT is also written onto auxiliary storage.
IC12 IIC2	38. Storage space occupied by both the SCT and TIOT is released and this space is made available for processing.
IC12	39. A cancel ECB is set up for the processing program. This will cause an ABEND or ABTERM to occur if a CANCEL command is issued.
IC12	40. In the case of the Sequential Scheduling System, if the operator does not issue a CANCEL command, the Step Initiation Routine uses an XCTL to pass control to the processing program.

SCHEDULING THE JOB		
CONTROL	ATTACHING A JOB STEP AS A TASK (Applies to the multi-task systems)	Reference
IIB1	1. A TCB is constructed from information in the JCT, SCT and the ATTACH Macro operand field (Ref: Control Block Chart - Blocks 1,2, and 11).*	Appendix II 6
IIB1	2. An ECB (Ref: Control Block Chart - Block 12) is constructed for each TCB where it is requested.	Appendix II 7
IIA2 (sss) or IID1,2,3	3. The required Request Blocks (Ref: Control Block Chart - Block 10) are constructed: Supervisor Request Block (SVRB), Program Request Block (PRB), Interruption Request Block (IRB), Loaded Program Request Block (LPRB), and Supervisor Interruption Request Block (SIRB), and/or Loaded Request Block.*	
IIB1	4. Linking pointers are established between the TCB, ECB, TIOT, and RB's.	
IIB1	5. The associated TCB is added to the chain of TCB's in the system according to priority. The TCB at the front of the chain has the highest priority.	
IIA5	6. If the tasks are queued, the task to be ATTACHed is put in a "ready" state. NOTE: A task may be in three states: ready, wait or active.	OPF I-11 and OPF I-12
IIB1 IID7	7. The ATTACH Routine takes control and determines if the required module is in storage. If it is not, control is given to the FINCH Routine that brings it into storage.	
IIA5	8. The Dispatcher Routine gives control to this task. If a task switch occurs, the "old task's" registers are saved in the TCB and linkages for the "new tasks" are constructed. The "new task" is now in the "active state".	OPF I-13 and OPF I-14
*NOTE:	*In the Sequential and Fixed Tasked systems the TCB's and the initial RB's are constructed at System Generation time.*	

PROCESSING PROGRAM			Reference
CONTROL		OPENING THE DCB	
IIA6 IIIB1	1.	The Open Routine receives control from an interruption handler when the OPEN Macro is issued and checks the status of each DCB to be opened to determine size and "busy" indications.	
IIIB1 IIC1	2.	The Open Routine then obtains main storage via the GETMAIN macro instruction for each DCB to be opened.	
IIIB1 IIC1	3.	All required work space is obtained for processing the DCB's, JFCB's, labels and building implicit tables.	
IIIB1	4.	The Open Routine now constructs a DCB, DEB, ECB, IOB and a channel program that will be required to read the JFCB's from the job queue to the work area. The EXCP macro is then used to read the JFCB into storage.	
IIIB1	5.	The TIOT's are located via the TCB. The addresses of the JFCB's are obtained from the TIOT so that the JFCB's can be located and brought into storage. (Ref: Control Block Chart - Blocks 5 and 8)	Appendix II
IIIB1	6.	The Open Routine next verifies volume mounting by checking for all required volume serial numbers in the JFCB's and the UCB's of all the devices allocated to the data sets.	
IIIB1	7.	If the volume serial number is found in the UCB, (Ref: Control Block Chart - Block 22), the volume is already mounted and no mounting instruction to the operator is required.	Appendix II
IIIB1	8.	When no volume serial number is required, a message is written to the operator to mount a scratch volume.	
IIIB1	9.	When the Open Routine finds that a volume is mounted, the volume label is read and verified. A message is issued if the wrong volume is mounted and a recheck is made when another volume is mounted.	
IIIB1	10.	When tape is checked, a file sequence number is inserted in the UCB from the JFCB along with the volume number. Unlabeled tape is checked to assure no labels and for standard labeled tape the input header label is verified.	
IIIB1 User	11.	When non-standard input labels are used, the Open Routine verifies that no standard volume label is on the tape and transfers control to the user's non-standard label routine.	

PROCESSING PROGRAM			Reference
CONTROL		OPENING THE DCB	
IIIB1	12.	When all required volumes have been mounted and verified, tapes are positioned using the sequence number that designates the logical and physical portions of data sets.	
IIIB1	13.	In the case of input standard labels the DSL or DSCB is read and used to fill in some of the fields in the JFCB. For output the Open Routine constructs and writes the header labels. (Ref: Control Block Chart - Blocks 7 and 8).	Appendix II 8
IIIB1	14.	The Open Routine now completes the JFCB and the DCB. This is accomplished for input data sets by filling in all zeroed JFCB fields with corresponding DSCB or DSL fields containing information. Then all zeroed DCB fields are filled from corresponding JFCB fields containing information. A mask of the DCB merged fields is kept to enable re-initialization of the DCB (Ref: Control Block Chart - Blocks 8 and 14).	9 Appendix II
IIIB1 User	15.	If there is a user DCB modification routine, it receives control at this time and when it completes its work turns control back over to the Open Routine.	
IIIB1	16.	Next all zero fields in the JFCB are filled with the corresponding DCB fields containing information (Ref: Control Block Chart - Blocks 8 and 14).	OPF I-15
IIIB1	17.	The Open Routine constructs the DEB from information in the JFCB and DCB. Included in the DEB is also the DCB merge mask. (Ref: Control Block Chart Blocks 8,14, and 15)	Appendix II 10
IIIB1	18.	A linking pointer is put into the TCB to the first DEB and a pointer is put into the DEB being constructed to the previous DEB for this TCB. (Ref: Control Block Chart - Blocks 11 and 15).	
IIIB1	19.	The type of access method is determined from the DCB and the proper access method executor is given control.	
Access Method Executor	20.	The selected access method executor determines the version access method required and brings it into storage if it is not already there.	
Access Method Executor	21.	The required appendages are selected using the AVT (Ref: Control Block Chart - Block 13) and brought into storage.	Appendix II 11

PROCESSING PROGRAM		Reference
CONTROL	OPENING THE DCB	
IIIB1	22. The Open Routine takes control again and for all QSAM accessing, primes the buffers.	
IIIB1	23. The DCB's are flagged "not busy" and "opened". Control is returned to the processing program.	OPF I-16

PROCESSING PROGRAM		Reference
CONTROL	PERFORMING INPUT/OUTPUT OPERATIONS	
Access Method	1. The user has selected accessing methods according to his requirements and indicated these in the DCB Macro that in turn became part of the DCB. (Ref: Control Block chart - Block 14). When an I/O request is made in the processing program, the request combinations may be: I/O LANGUAGE — ACCESS METHOD GET/PUT — QSAM, QISAM, QTAM READ/WRITE — BSAM, BDAM, BISAM, BPAM, BTAM EXCP	Appendix II OPF I-17 I-18 I-19
IIC1	2. Space is obtained to build I/O control blocks and channel program.	
Access Method	3. The access method constructs the IOB, DECB, and channel program required for this I/O request. (Ref: Control Block Chart - Blocks 17 and 18). When the EXCP Macro is used the user must write the IOB, ECB, and channel program. NOTE: The DECB serves effectively the same function for an I/O request as the ECB serves for task status.	Appendix II 12
Access Method	4. When all information needed by the I/O Supervisor has been calculated, the address of the IOB is passed to the I/O Supervisor.	
IIIA1	5. The I/O Supervisor takes control and verifies the presence and validity of the required control blocks.	
IIIA1	6. A check is made in the UCB (Ref: Control Block Chart - Block 22) to see if the device for this I/O request is available.	Appendix II
IIIA1	7. The required channel is tested for its availibility.	
IIIA1	8. A SIO is issued to start the request and the result is verified as acceptable. If an error occured an error routine is given control. NOTE: SIO enqueue, and trapcode modules for a particular device are located via the Device Table (Ref: Control Block Chart - Block 9).	Appendix II

PROCESSING PROGRAM		
CONTROL	PERFORMING INPUT/OUTPUT OPERATIONS	Reference
IIIA1	9. If the UCB indicates that the associated control unit is busy the request is queued (go to step 10), otherwise the request is entered into the RET (Ref: Control Block Chart - Block 21), and is flagged as "active". This is done by the I/O Supervisor placing the address of the request element in the UCB that represents the device being used for the I/O request. NOTE: A request element may be active - started but not completed; available - not in current use; queued - requests ready to be started.	Appendix II
IIA4	10. Control is returned to the Exit Routine.	
IIIA1	11. Request elements that are not started immediately are queued into the RET and the requests associated with each logical channel are chained together. The beginning and end of this chain is kept in the LCHTAB (Ref: Control Block Chart - Block 20)	Appendix II 13
IIIA1 IIIA2	12. Pending I/O requests are honored when an I/O interruption occurs during which time the I/O Supervisor gains control and determines from the UCB which I/O request terminated. A message is written to the user telling how the request completed.	
IIIA2	13. When all pending interruptions on the associated channel have been processed, the next I/O request for this channel is found and a SIO is issued.	
IIA4	14. Control returns to the Exit Routine.	
	15. Brief summary of key points.	OPF I-20 I-21 I-22 I-23

PROCESSING PROGRAM			Reference
CONTROL	CLOSING THE DCB		
IIIB3	1.	The Close Routine receives control from an interruption handler when the CLOSE Macro is issued in the processing program.	
IIIB3 IIC1	2.	Work space is obtained using the GETMAIN Macro.	
IIIB3	3.	The TIOT's are located via the TCB's and the JFCB's addresses gotten from the TIOT's.	
IIIB3	4.	The DCB's that are to be closed are flagged "busy" and checked; they must currently be flagged opened.	
IIIB3	5.	A task-data set relationship is established for family data sets.	
IIIB3.	6.	The Close Routine purges all pending input/output requests on data sets to be closed.	
IIIB3	7.	All trailer label construction and label updates are performed.	
IIIB3	8.	Parameters in the CLOSE Macro are used to perform all required volume disposition.	
IIIB3	9.	Access dependent routines are released.	
IIIB3	10.	Using the DCB mask from the DEB the DCB is restored to its original form.	
IIIB3 IIC2	11.	Main storage used for subroutines, appendages, the DEB, and the work area is released.	
IIIB3	12.	The DEB is removed from the DEB chain and the remaining DEB's are rechained.	
IIIB3 IIIB1 IIA4	13.	The data set is checked to see if it is concatenated in which case control is given to the Open Routine otherwise it is returned to the Exit Routine .	
	14.	Brief summary.	OPF I-24

JOB TERMINATION PROCEDURES	
CONTROL	TERMINATION OF A TASK
IC13	1. If an ECB is specified a completion flag is posted in it.
IC13 IIC2	2. The TCB (except when ECB or ETXR are specified) RB, and ECB associated with this task are removed.
IC13	3. If ETXR parameter is specified, an entry is set up to the controlling task's EOT asynchronous exit routine.
IC13 IIC2	4. All associated available main storage is released.
IC13	5. All routines loaded by this task and not used by others are released.
Processing Program	6. Control is returned to next highest level task if this task is not the highest level task. The terminating task places a return code in its TCB.
Processing Program	7. The controlling task issues a DETACH, terminating the task.
IIA4	8. Control is given to the Exit Routine.
Processing Program IC1 IC13	9. If this is the highest level task control goes to the Initiator/Terminator which issues the DETACH terminating the task.

JOB TERMINATION PROCEDURES	
CONTROL	JOB STEP TERMINATION
IC13 IIC1	1. The Step Termination Routine receives control when a job step has terminated (normally or abnormally) and proceeds by reading into main storage the TIOT and LCT.
IC13	2. The cancel ECB in the selected job queue is set to zero.
IC13 IIC1	3. The JCT and SCT are read into storage and the step status code is inserted in the SCT.
IC13 IIC1	4. Each SIOT for each data set is then read into storage.
IC13	5. Data set disposition is performed on all associated data sets and a message indicating data set name, disposition, and serial number is written to the operator.
IC13	6. Devices that are now available for use are unallocated and those volumes that can be dismounted are dismounted. Messages are written to the operator giving volume status.
IC13	7. The SCT is updated with return code information.
IC13	8. If there are job statement condition codes, they are processed at this time.
IC13 IIC2	9. Any main storage associated with this job step is released.
IC13	10. All loaded routines associated with this job step (except reenterable routines from the LINKLIB) are released.
IIIB3	11. Control is given to the Close Routine to close associated DCB's.
IC13	12. The Job Step Termination Routine issues a DETACH for the last task of the job step and puts a completion code in the SCT.

JOB TERMINATION PROCEDURES	
CONTROL	JOB TERMINATION
IC14	1. The Job Termination Routine receives control when the last job step of a job has terminated.
IC14	2. If a passed data set queue exists, a check is made to see if there are any data sets to which no reference was made. If one is found its disposition is determined and unallocation procedures take place.
IC14 User Routine	3. Control is passed to the user accounting routine.
IC14 IIC2	4. When control returns the control tables associated with this job (JCT, SCT's, SIOT's, and JFCB's) are removed from storage and the storage is freed.
IC14 IIC2	5. Auxiliary storage space used by this job is released.
IC14	6. Appropriate entries are made in the output job queue for data sets with SYSOUT disposition. These data sets are now written by the SYSOUT Routine.
IC14	7. A message of the termination of this job is written to the operator.
IIA4	8. Control is given to the Exit Routine.

Suggested Sequence: Reference

H. Review and Summary

INSTRUCTORS' NOTE:

This section is intended to summarize major points in the logic flow with emphasis on system generation, libraries, and cataloging. These diagrams could be made up as a board display or as flipcharts to be used in the following discussion. The discussion and review should be lead by the instructor and questions should be asked of the students to encourage them to participate in the discussion. (At the points where the number has an asterisk beside it, ask the class what library is involved and how it is used.) This review may be either at the end of this topic or at the end of the course. Appendix III

1. System Description
   - a. Sizes of system data sets
   - b. Proximity of data sets
     - 1) Interaction
     - 2) Frequency of access
   - c. Catalog Structure
     - 1) SYS1 catalog
     - 2) LIBR catalog
     - 3) Data Set catalog
       - a) Normal Index
       - b) Generation Data Group
       - c) Volume Control Block
   - d. Library Structure
     - 1) Library Volume
     - 2) Application Libraries
     - 3) Testing Library
2. Initialization and Execution

Suggested Sequence: Reference

INSTRUCTORS' NOTE:

Using the generated system, the sample input stream, and the console sheet, take the students through the steps of IPL, NIP, and execution of the first job step. The point that is to be made at this time, is the system library usage, interaction, and frequency of access. Take the students through a catalog search at initiator time and the cataloging of a data set at terminator time. A console sheet is included to indicate the messages that the master scheduler will issue and the commands that the operator must enter at IPL time. Appendix III

a. IPL Procedure

* 1) Operator IPL's from SYSRES

2) IPL performs the following function:

a) Clears Main Storage

b) Sets Storage Key for Supervisor

* c) Locates SYS1.NUCLEUS on SYSRES

* d) Loads Nucleus including NIP

e) Gives control to the nucleus initialization program.

3) NIP - Nucleus Initialization Program

The NIP program, the first thing executed in the operating system initializes the nucleus and the system data sets. Some of the major functions it performs are:

a) Initializes the communication vector table. The CVT provides the means by which nonresident routines may reference routines in the nucleus. It contains pointers to all of the key routines in the nucleus and the location of system data sets.

It contains such information as:

- Address of the TCB next to be dispatched

Suggested Sequence: Reference

- Address of entry point to the task supervisor
- Address of validity checking routine
- Address of the UCB for SYSRES
- Address of program fetch
- Date
- Machine Size
- Address of DCB for LINKLIB
- Address of DCB for SVCLIB
- Address of DCB for SYSJOBQE
- Address of DCB for LOGREC

b) Initializes the UCB table.

* c) Locates SVCLIB - simulates opening of this data set - builds a DEB.

* d) Locates LINKLIB - opens LINKLIB.

* e) Locates LOGREC - opens LOGREC.

f) Builds resident transient SVC table - this is why you must re-IPL any time you move SVCLIB.

g) Sets Timer.

b. Job Scheduler

* 1) NIP XCTL's to the Master Scheduler.

* a) A DCB for LINKLIB is already open.

* b) LINKLIB directory is searched for the Master Scheduler.

* c) The Master Scheduler is loaded and begins to execute.

Suggested Sequence: Reference

2) Master Scheduler

a) Master Scheduler types out READY.

b) Operator enters SET command for date and optionally for SYSJOBQE and PROCLIB.

* c) SYS1.PROCLIB and SYS1.SYSJOBQE are opened.

d) START RDR and START WTR commands are processed.

e) Operator enters START.

* 3) Reader/Interpreter

The Master Scheduler gives control to the Reader/Interpreter. It is located on LINKLIB and loaded into core.

* a) Reader/Interpreter reads job stream until it reaches next JOB card or data in the input stream.

* b) Information is placed on SYSJOBQE to be processed by the INITIATOR.

* 4) Initiator

The Reader/Interpreter turns control over to the Initiator which is loaded in from LINKLIB.

* a) The Initiator searches the catalog to locate the library specified in JOBLIB.

b) Issues a mounting message for JOBLIB and allocates a device

* c) It OPENS the JOBLIB and concatenates it with LINKLIB.

* d) Searches the catalog for input data sets that have no volume serial number specified.

e) Allocates devices for these data sets and issues mounting messages. It then verifies the mounted volumes.

Suggested Sequence: Reference

f) Allocates devices and/or space for output data sets, issuing messages as required.

g) After allocating all devices, checking that the proper volumes are mounted, it gives control to the problem program.

c. Problem Program

The Initiator XCTL's to the load module named in the EXEC card. The JOBLIB is searched first and then the LINKLIB. Space is allocated for the load module, it is loaded in, and execution begins.

* 1) OPEN data sets

Access Methods are loaded into the dynamic area from SVCLIB. OPEN operates from transient area.

2) System Macros

The Problem Program constantly issues system macros that are loaded into the transient area from SVCLIB.

* 3) LINK, XCTL, LOAD, ATTACH

The Problem Program can request additional load modules that can be called in from JOBLIB and LINKLIB.

4) EOV

a) Cataloged Input Data Sets

The system obtains the next volume serial number from SYSJOBQE and issues the proper mounting messages.

b) Output Data Sets to be Cataloged

The system records the volume serial number on SYSJOBQE and allocates a new volume.

d. Job Step Termination

* 1) The terminator is loaded in from LINKLIB.

Suggested Sequence: Reference

* 2) The catalog is updated from the volume serial numbers retained on SYSJOBQE.

3) Disposition messages are printed.

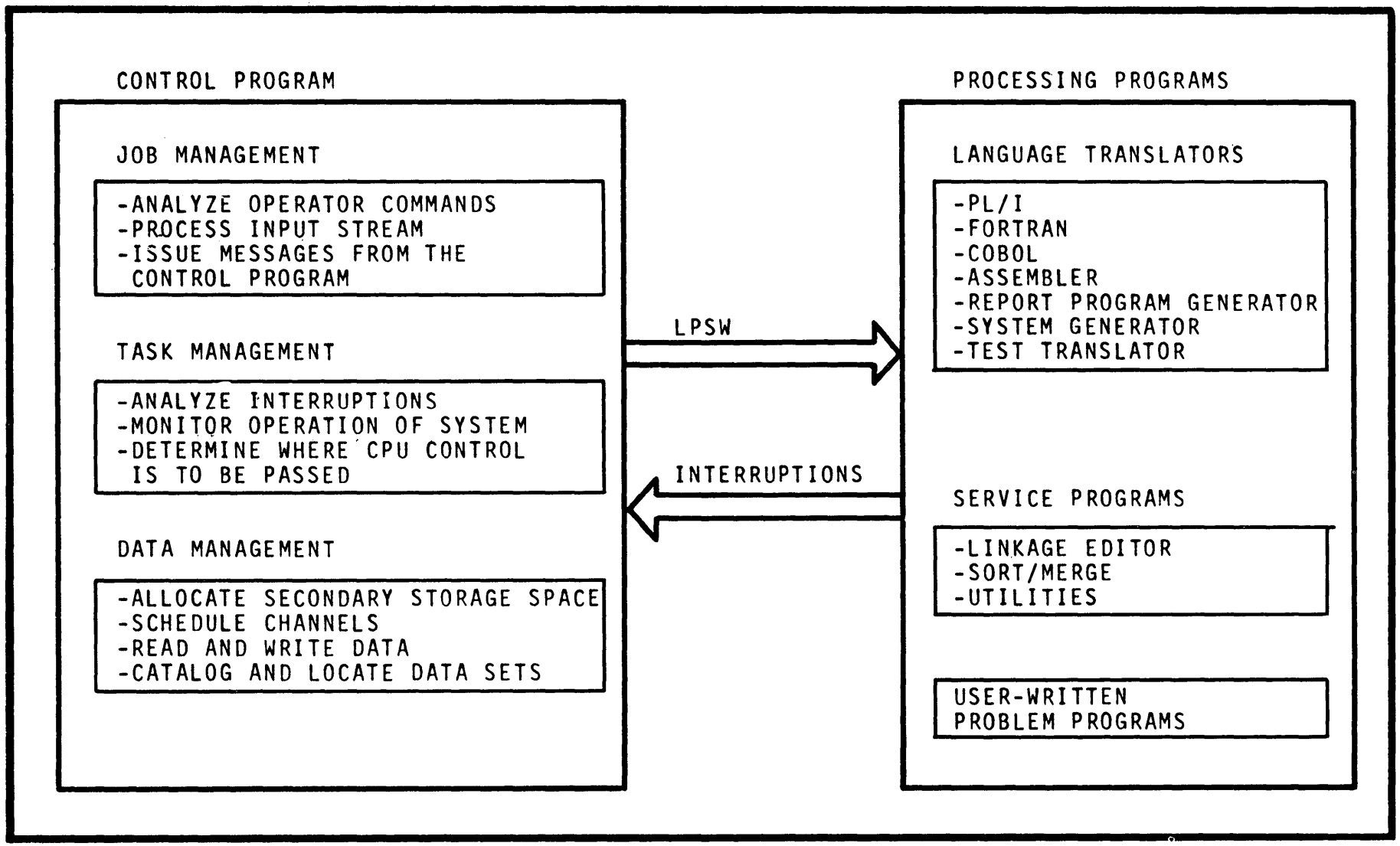
4) The Initiator or Reader/Interpreter is XCTL'ed to as required.

e. Repeat - The cycle begins again.

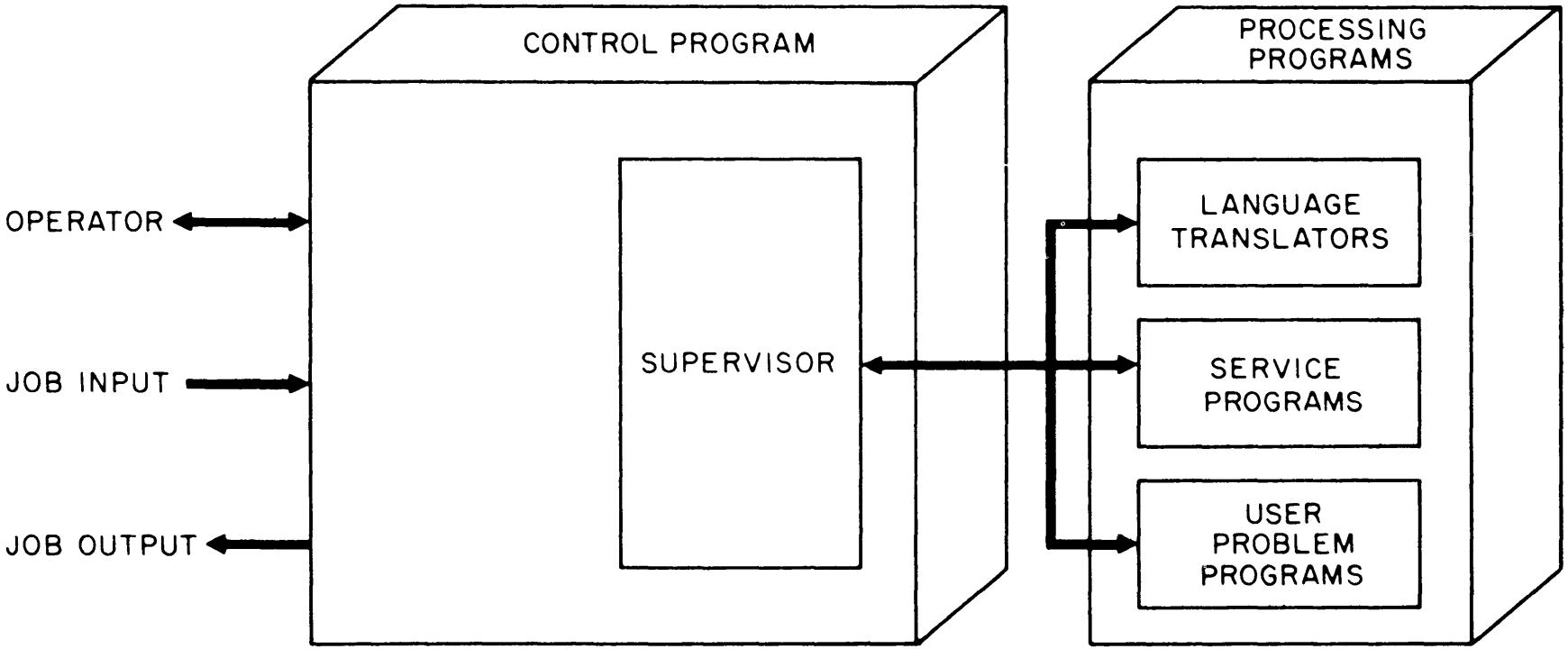
TOPIC I
REFERENCES

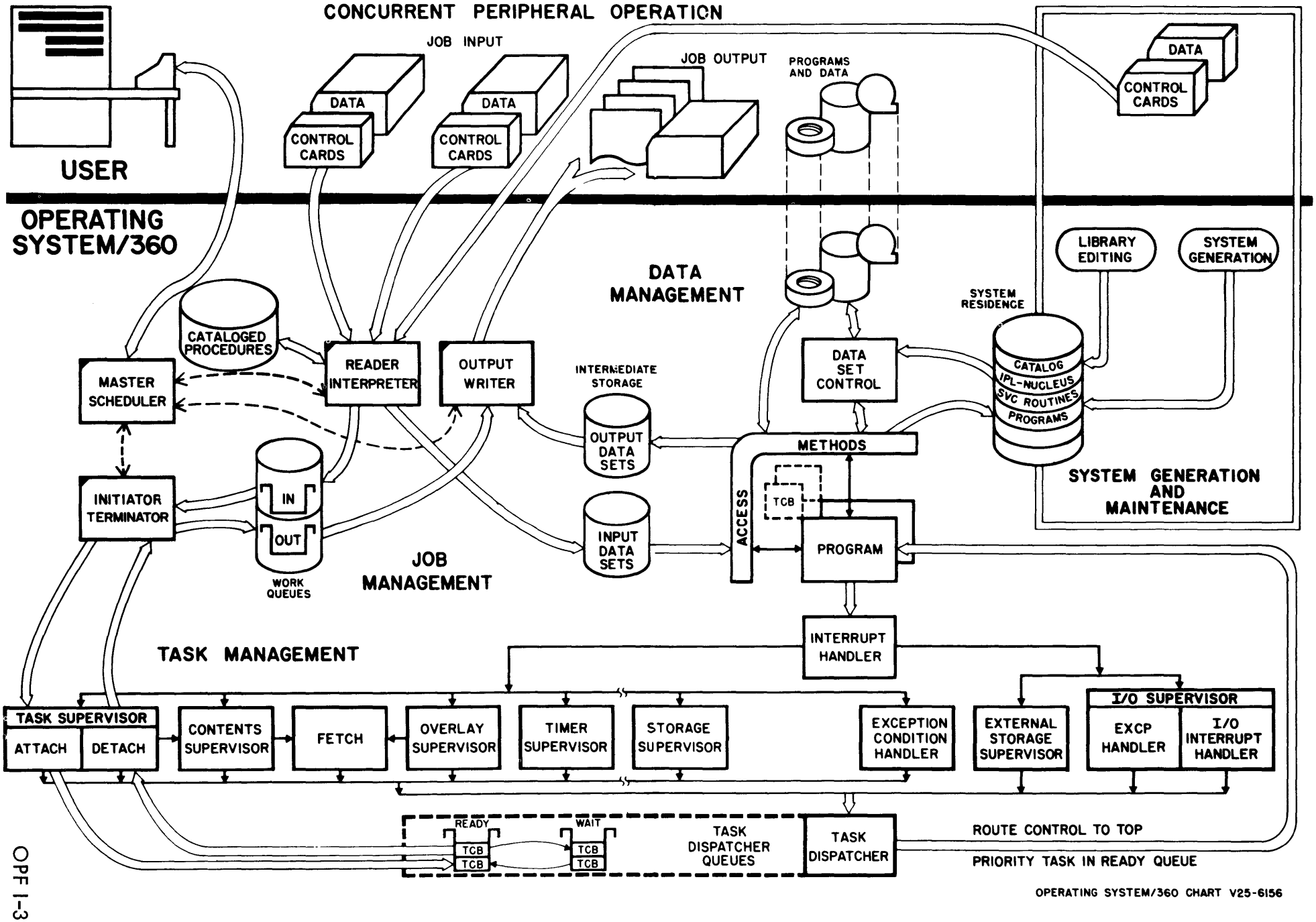
REFERENCE CODE	Introduction to Control Program Logic Y28-6605									
1	27									
2	100									
3	11									
4	75									
5	98									
6	95									
7	69									
8	53									
9	31									
10	49									
11	40									
12	70									
13	29									

OPERATING SYSTEM/360



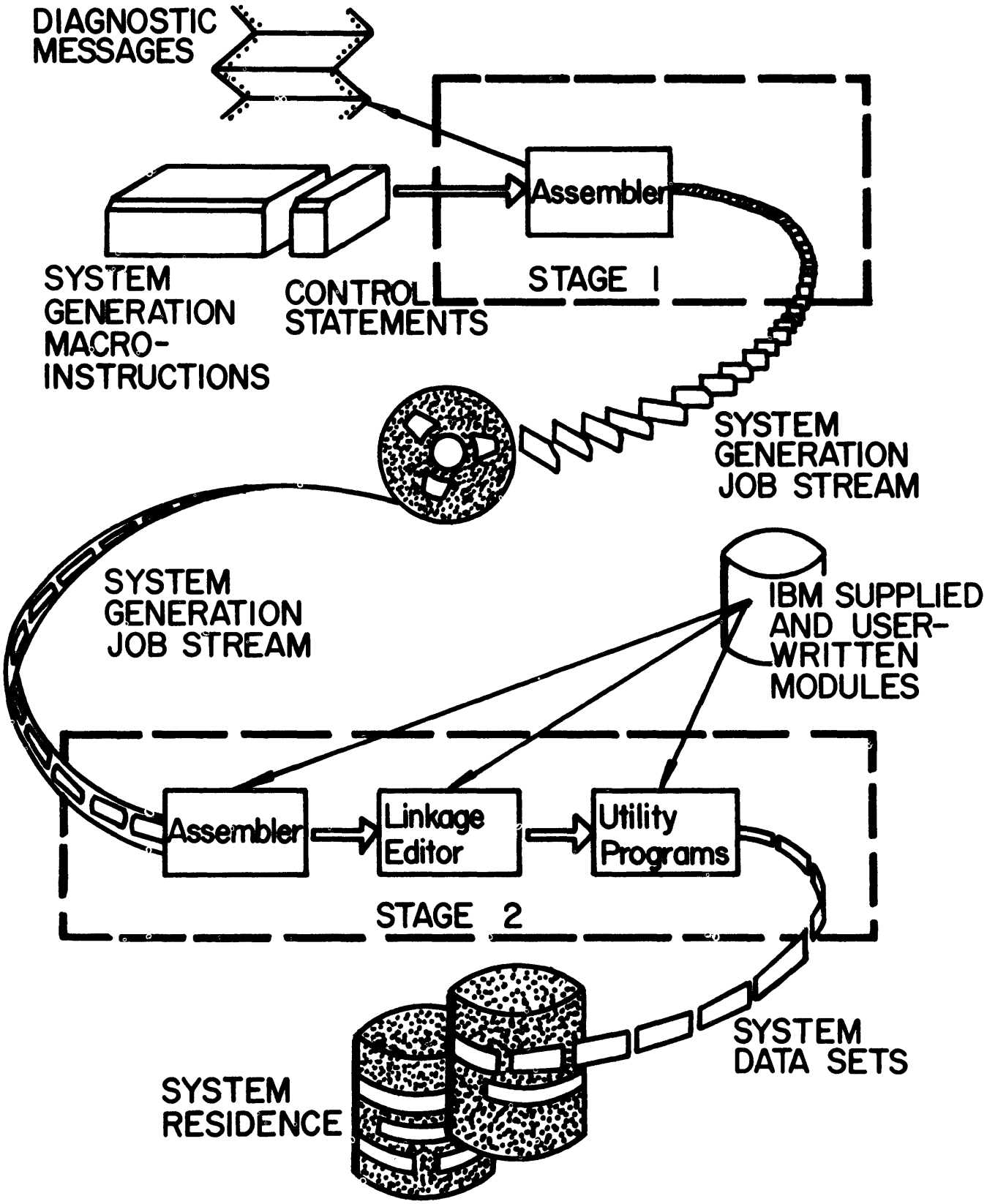
GENERAL ORGANIZATION & FUNCTION OF THE OPERATING SYSTEM



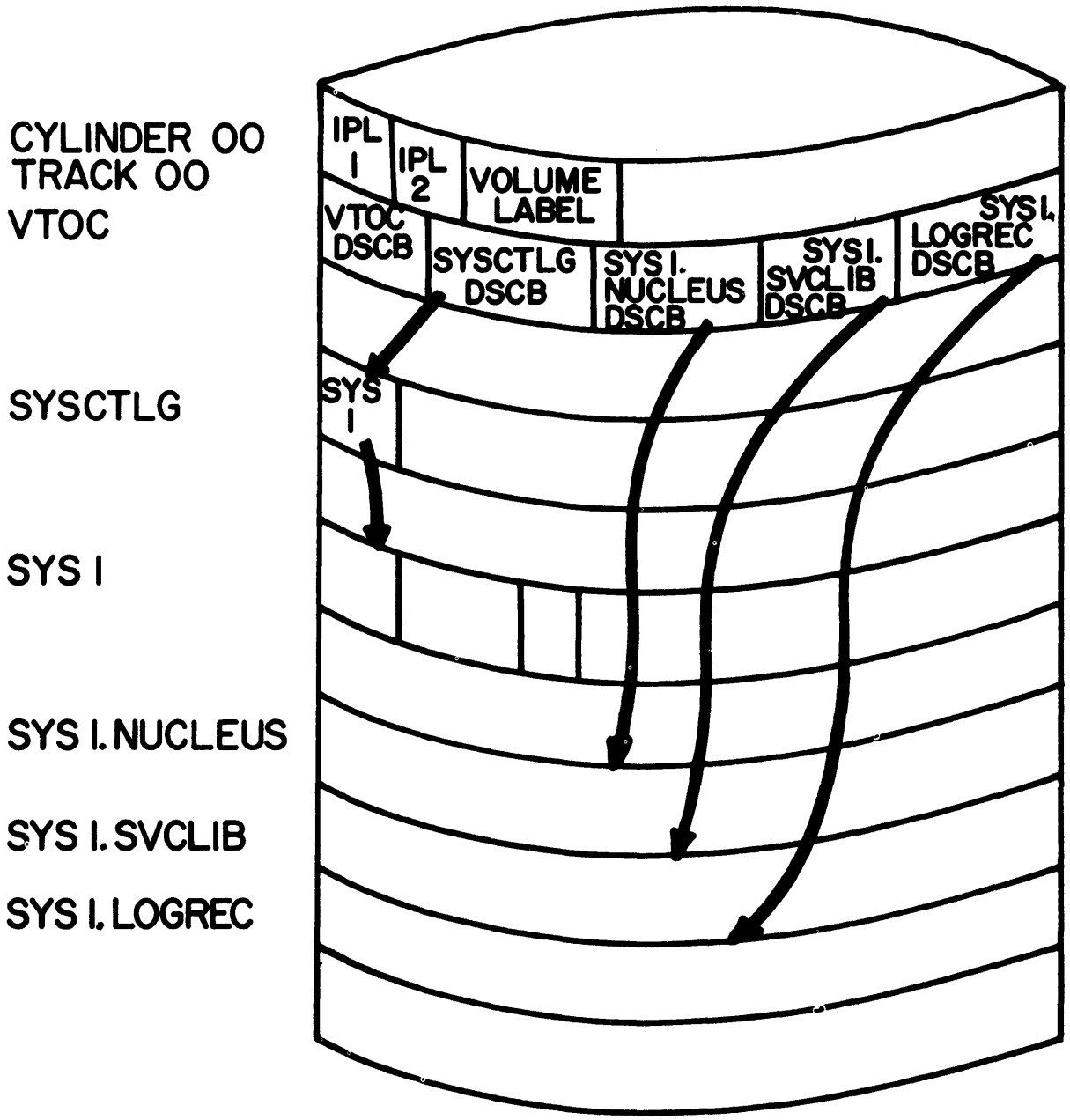


OPERATING SYSTEM/360 CHART V25-6156

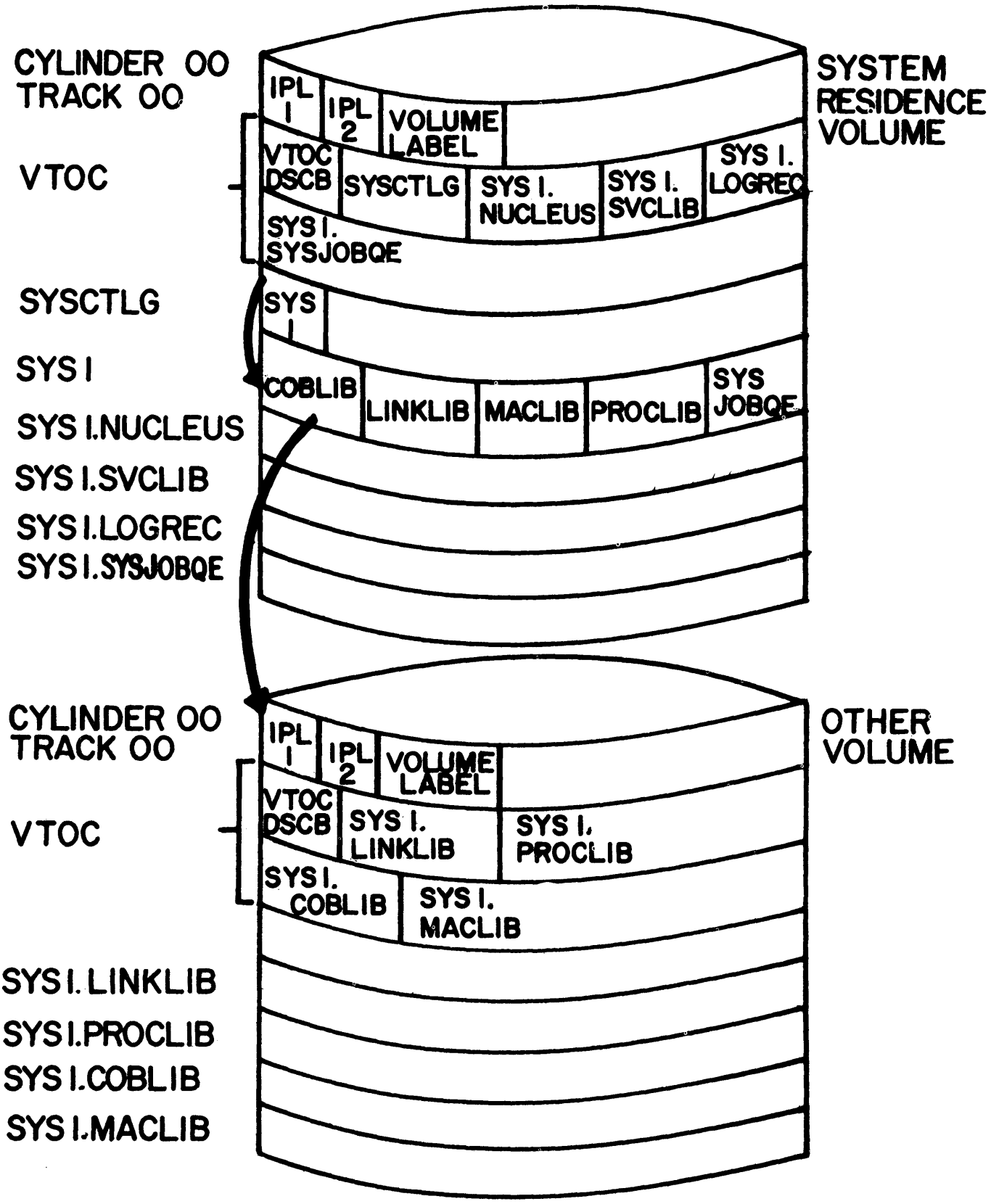
FLOW THROUGH SYSTEM GENERATION



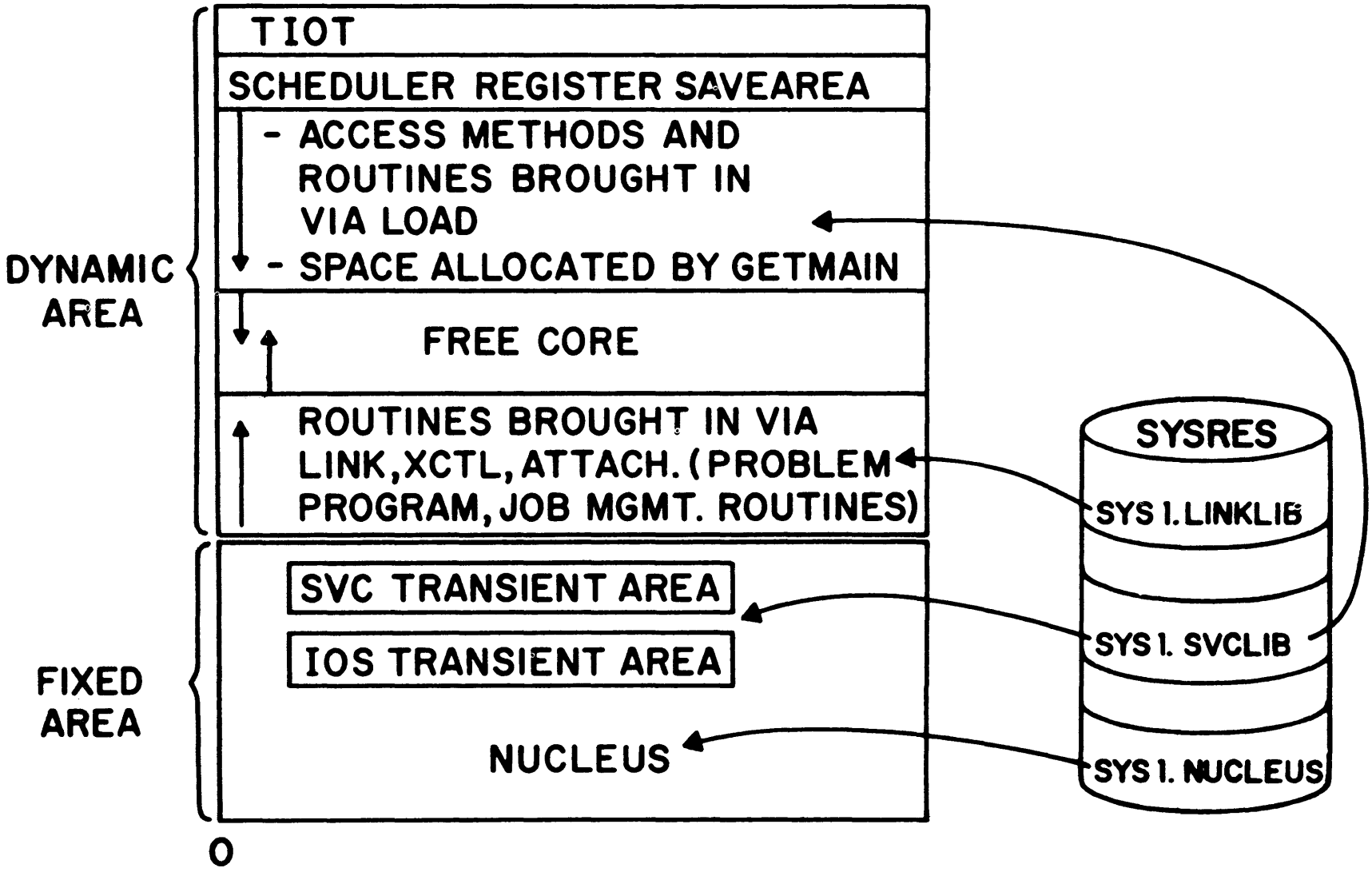
SYSTEMS RESIDENCE VOLUME



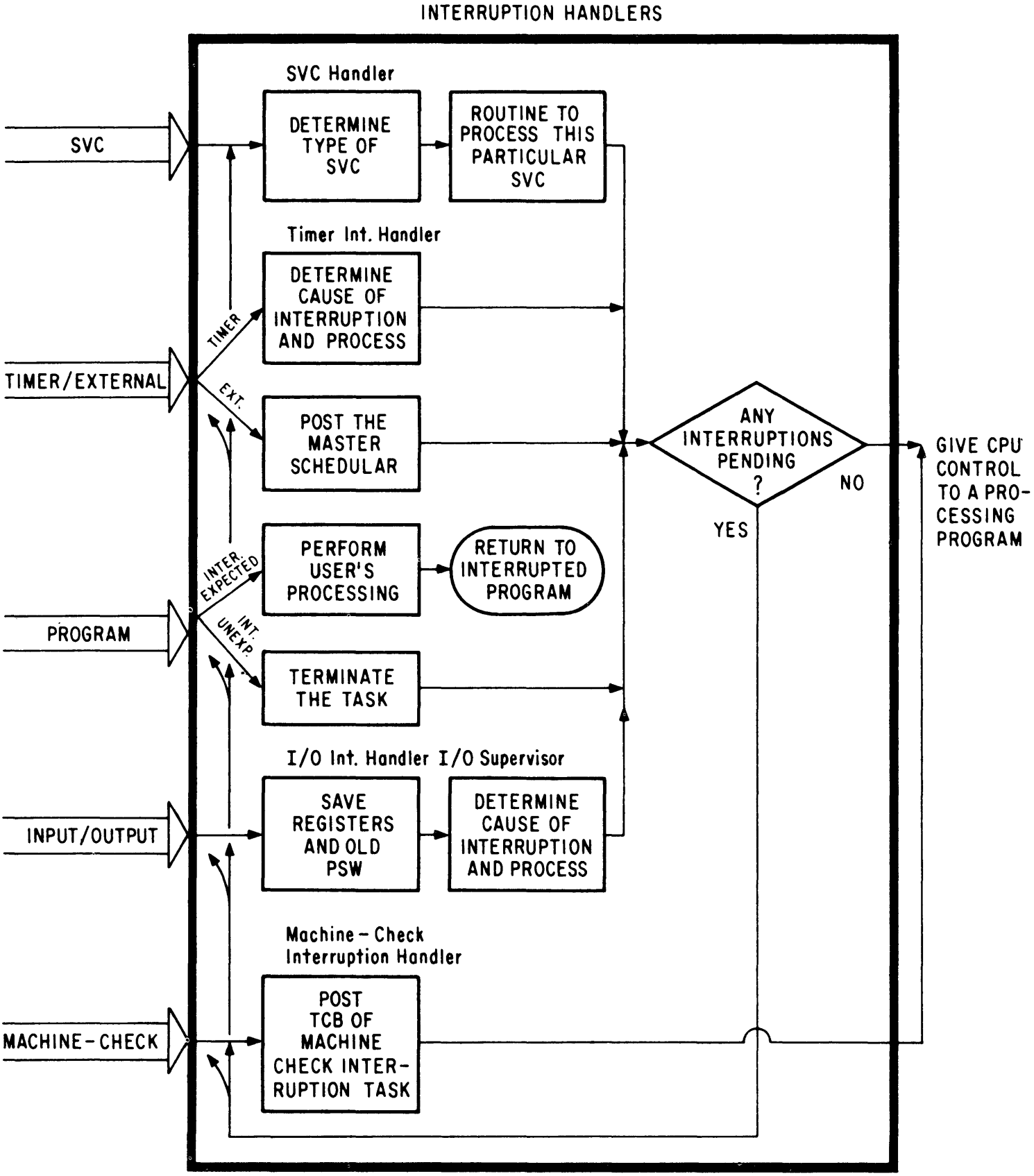
SYSTEM DATA SETS



CORE STORAGE ORGANIZATION

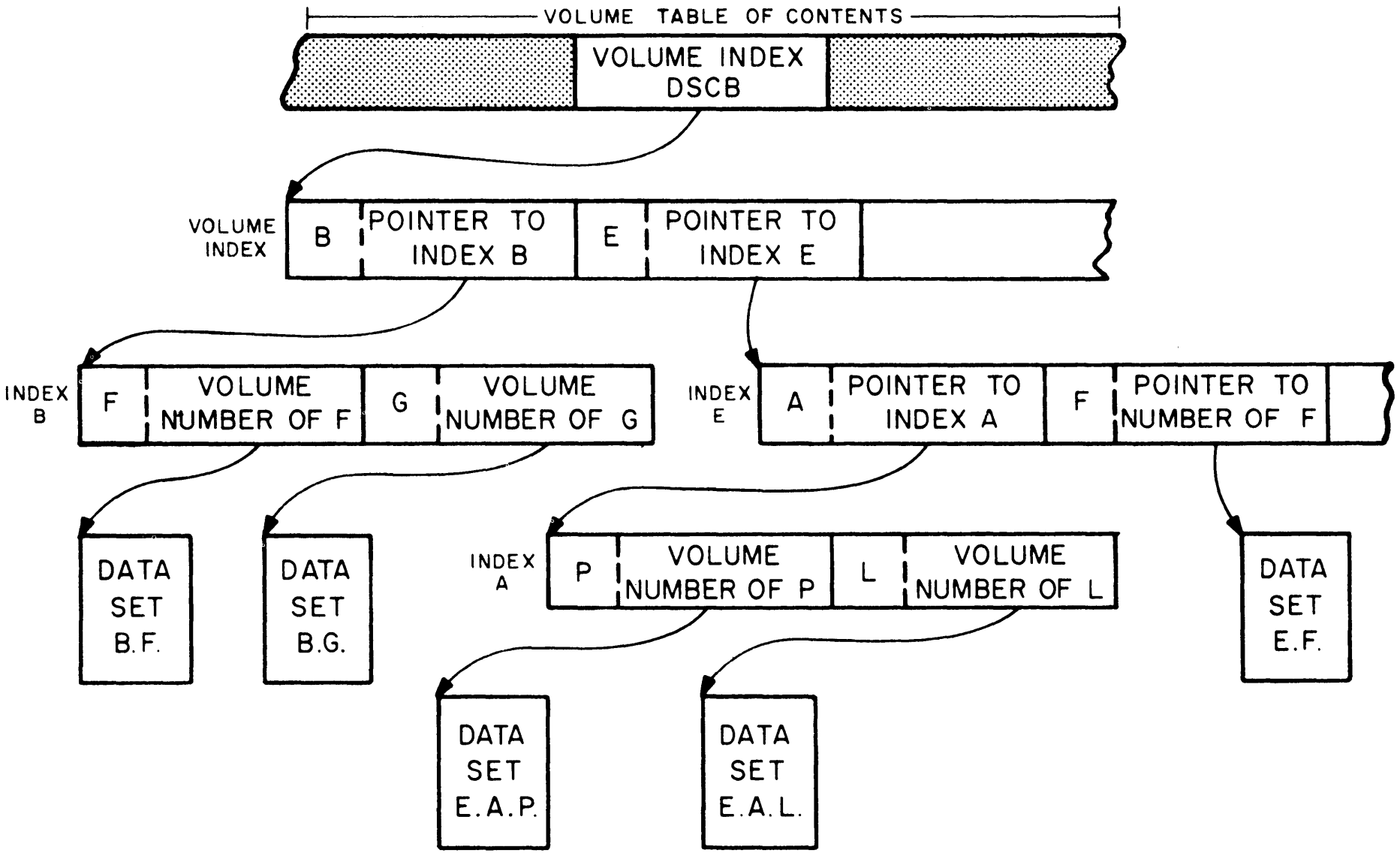


OPERATION OF THE INTERRUPTION HANDLERS

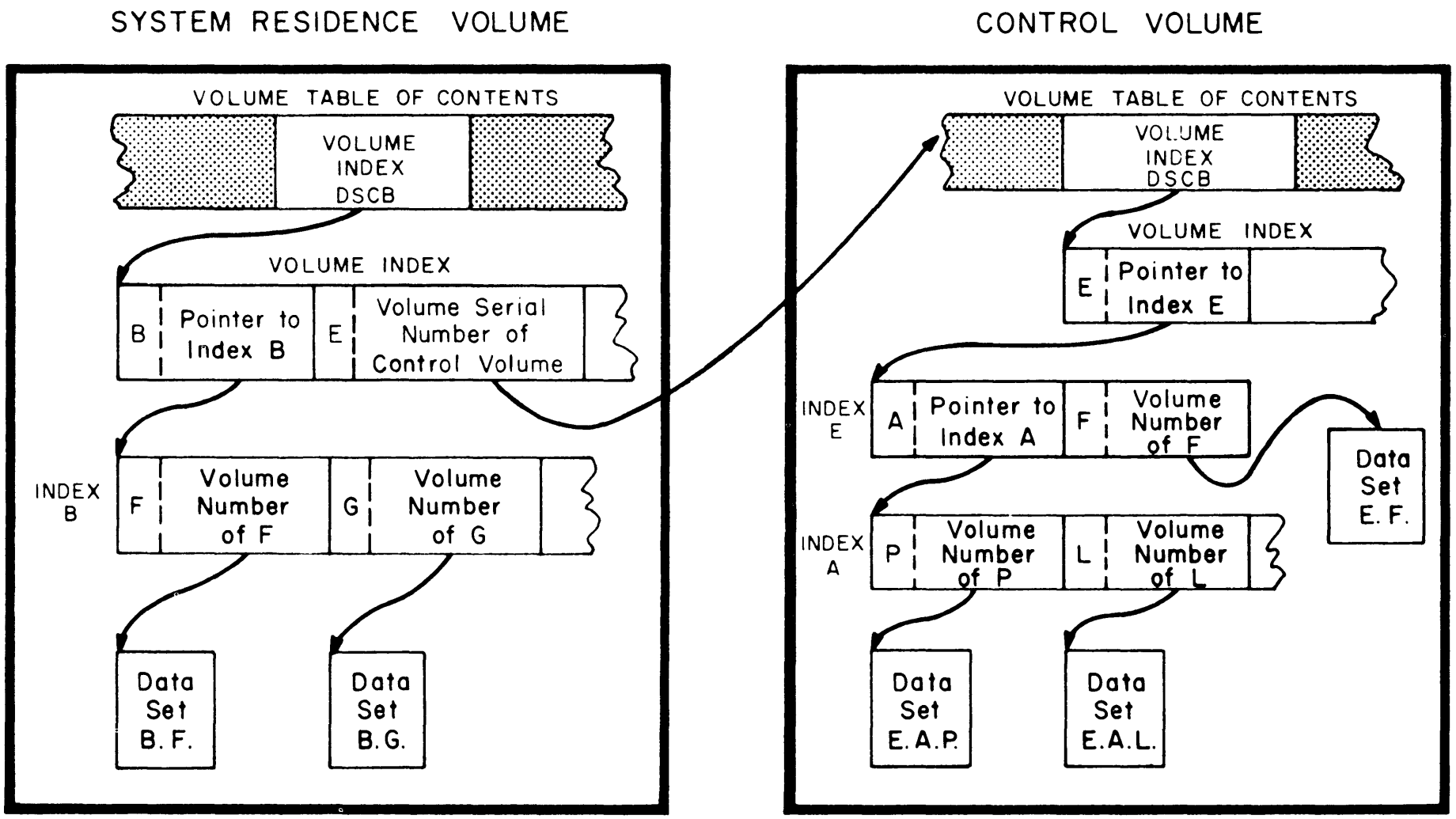


CATALOG STRUCTURE

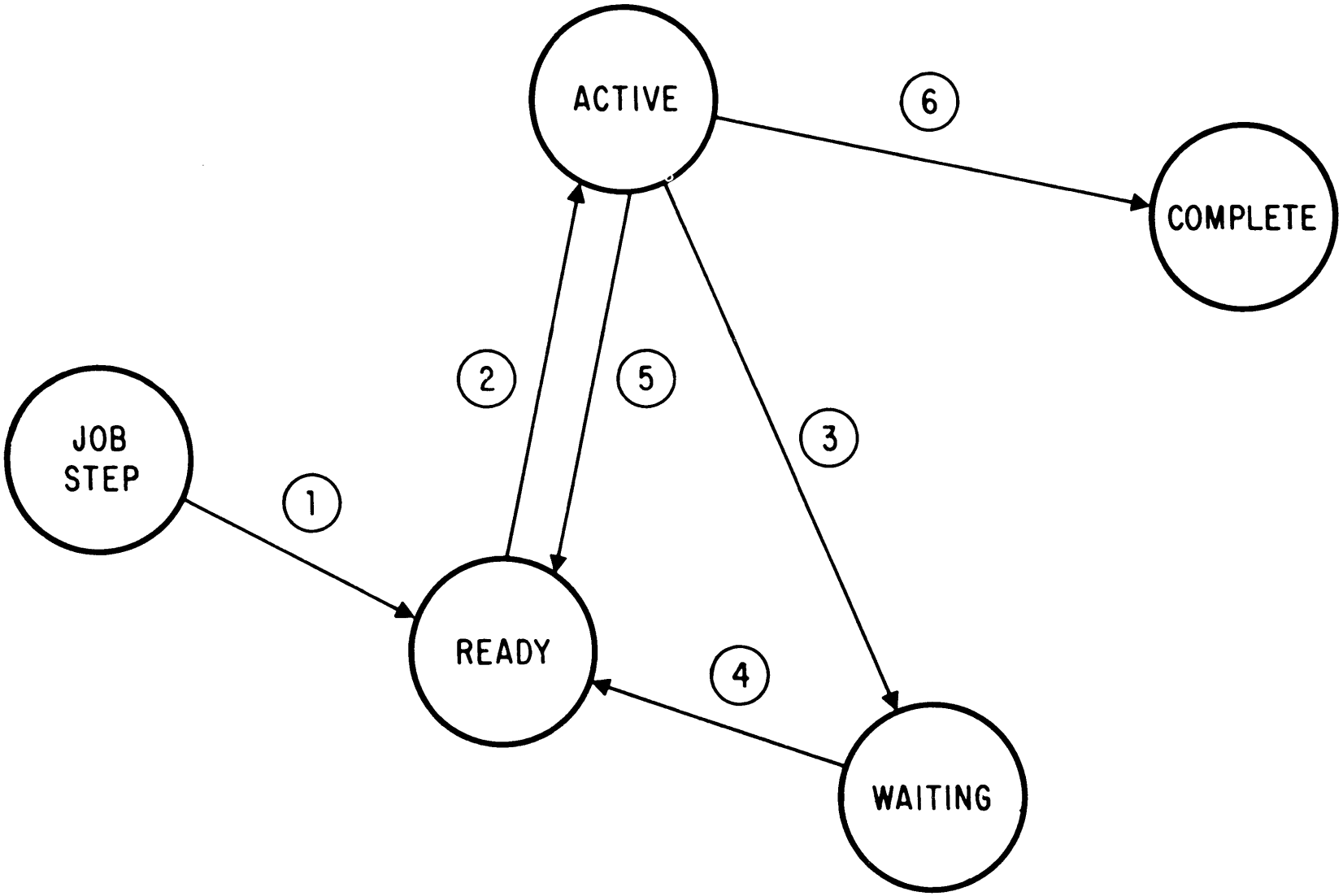
SYSTEM RESIDENCE VOLUME



CATALOG STRUCTURE ON TWO VOLUMES



STATES OF A TASK



STATES OF A TASK

LEGEND

1. The job step is attached as a task and its task control block is entered into the ready queue.

2. If this ready task has a higher priority than any other ready task, it is dispatched (receives control of the CPU).

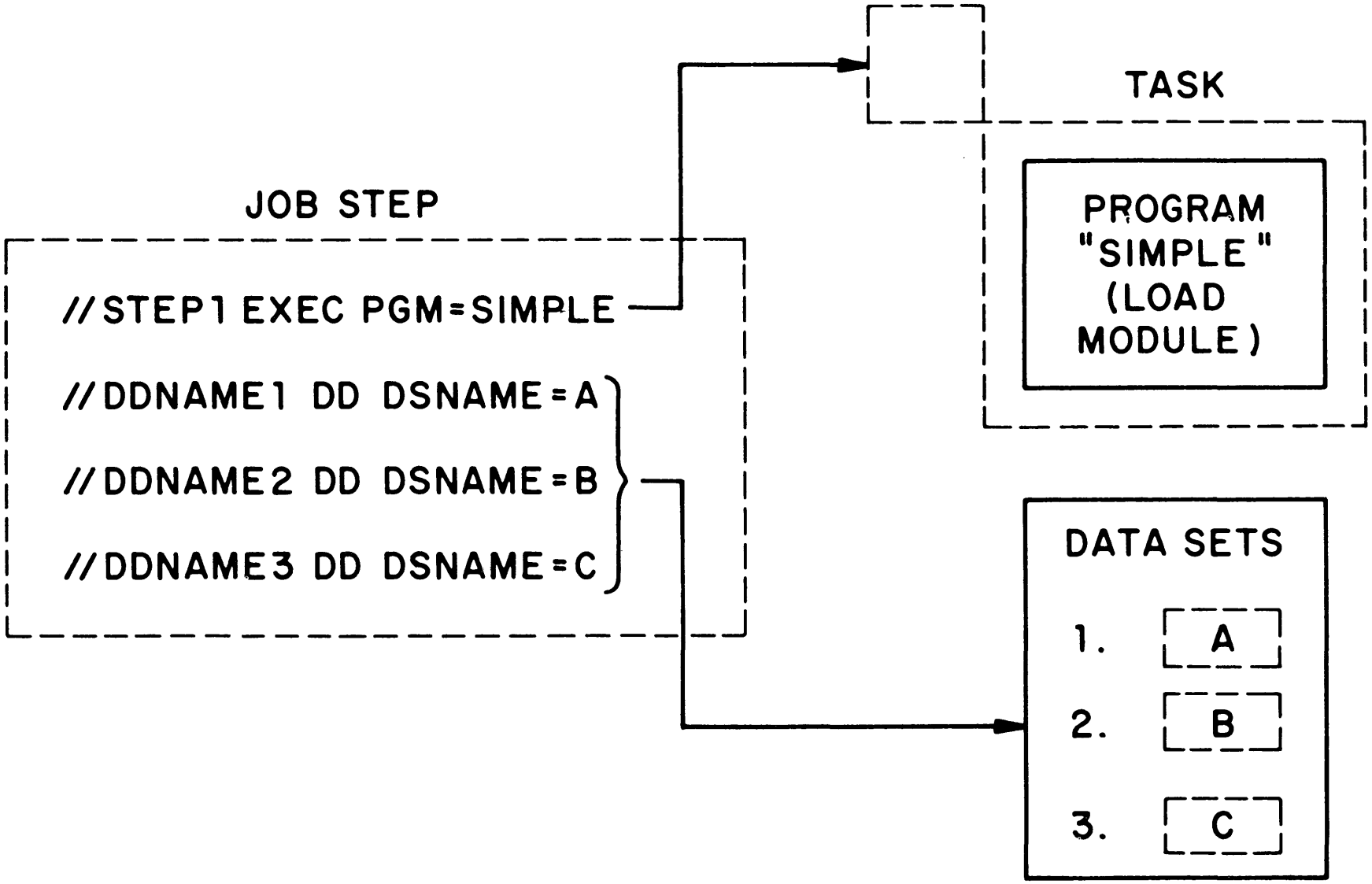
3. The task is placed in the wait state to await the completion of some event.

4. The event being waited for is completed so the task is placed in ready state.

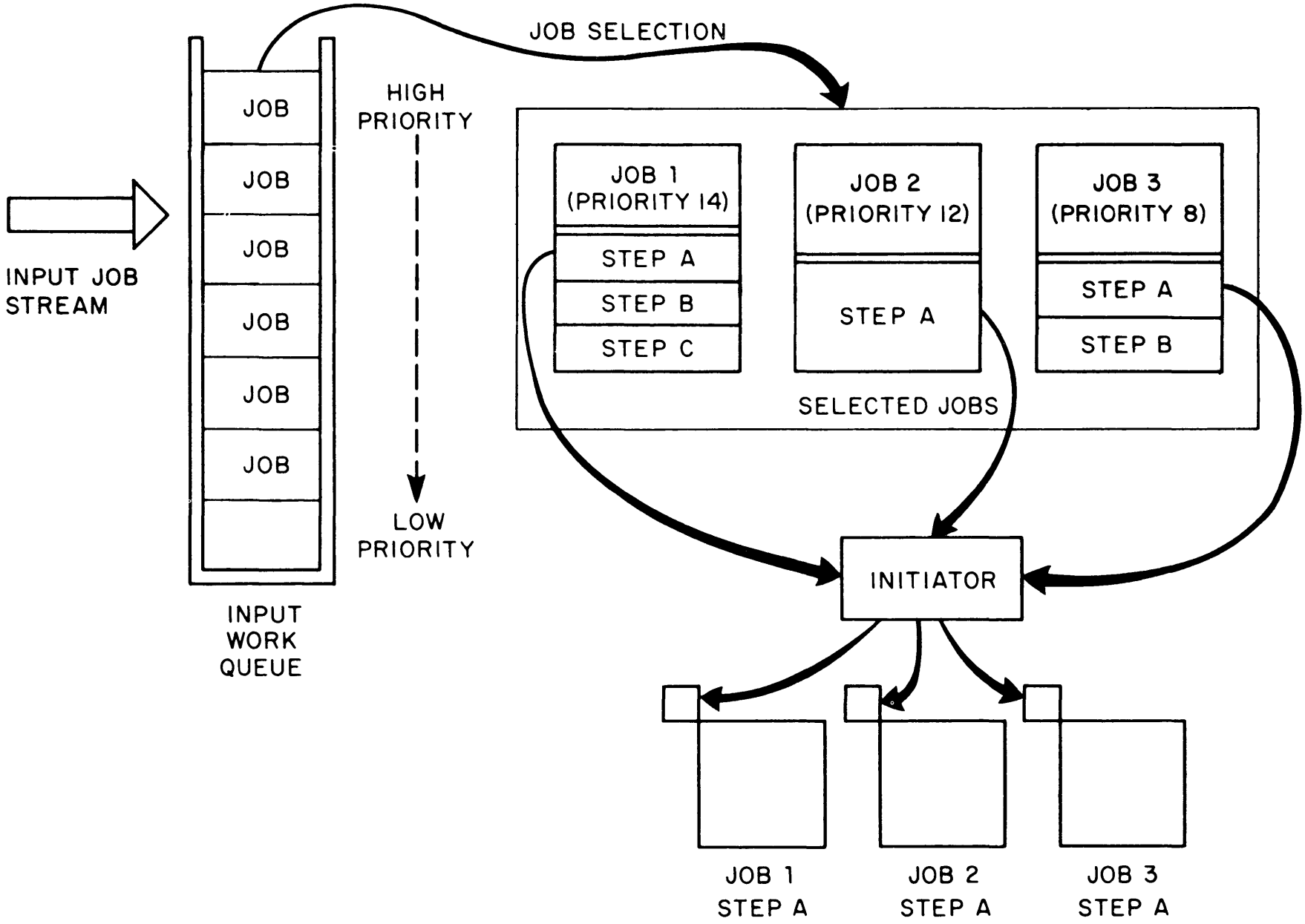
5. The active task relinguishes CPU control to a higher priority task that has become ready.

6. A task is completed. Its task control block is deleted from the ready queue and its resources are made available to the system.

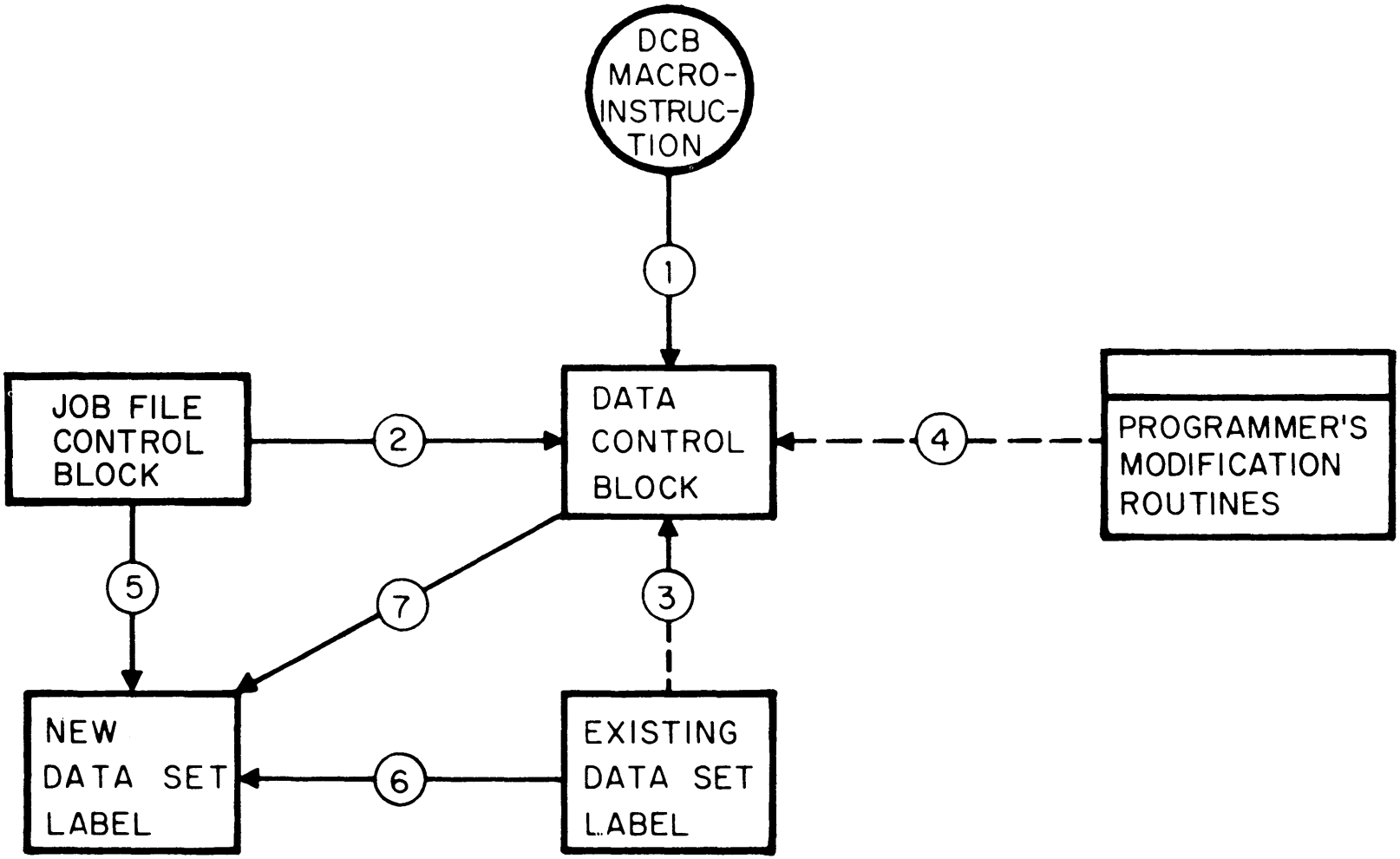
JOB STEP-TASK RELATIONSHIP



MULTIJOB INITIATION

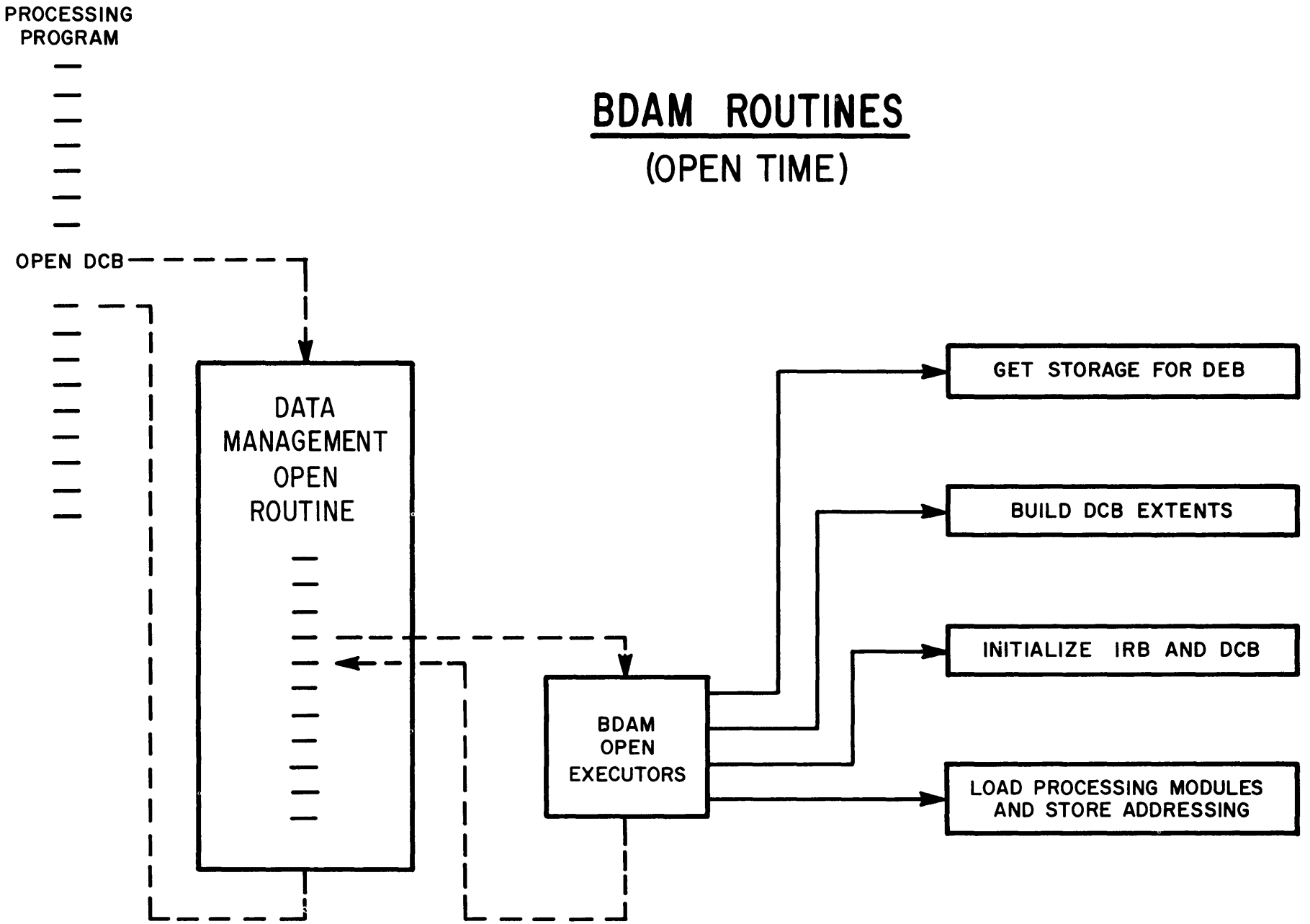


FLOW OF INFORMATION TO AND FROM DATA CONTROL BLOCK



BDAM ROUTINES

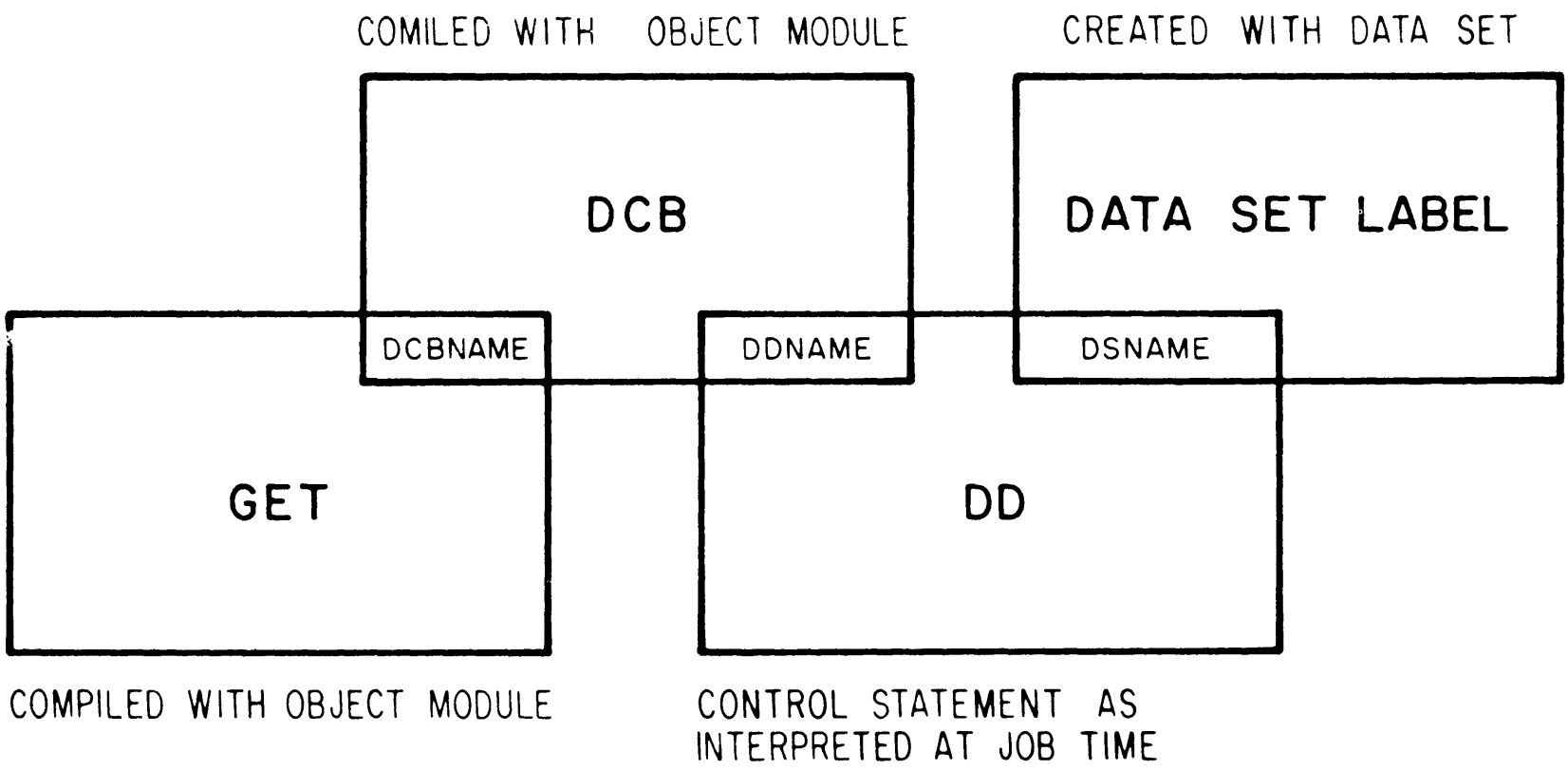
(OPEN TIME)



ACCESS METHODS

DATA SET ORGANIZATION	LANGUAGE CATEGORY	
	QUEUED	BASIC
SEQUENTIAL	QSAM	BSAM
INDEXED SEQUENTIAL	QISAM	BISAM
DIRECT		BDAM
PARTITIONED		BPAM
TELECOMMUNICATION	QTAM	BTAM

CHAIN OF SYMBOLIC REFERENCES



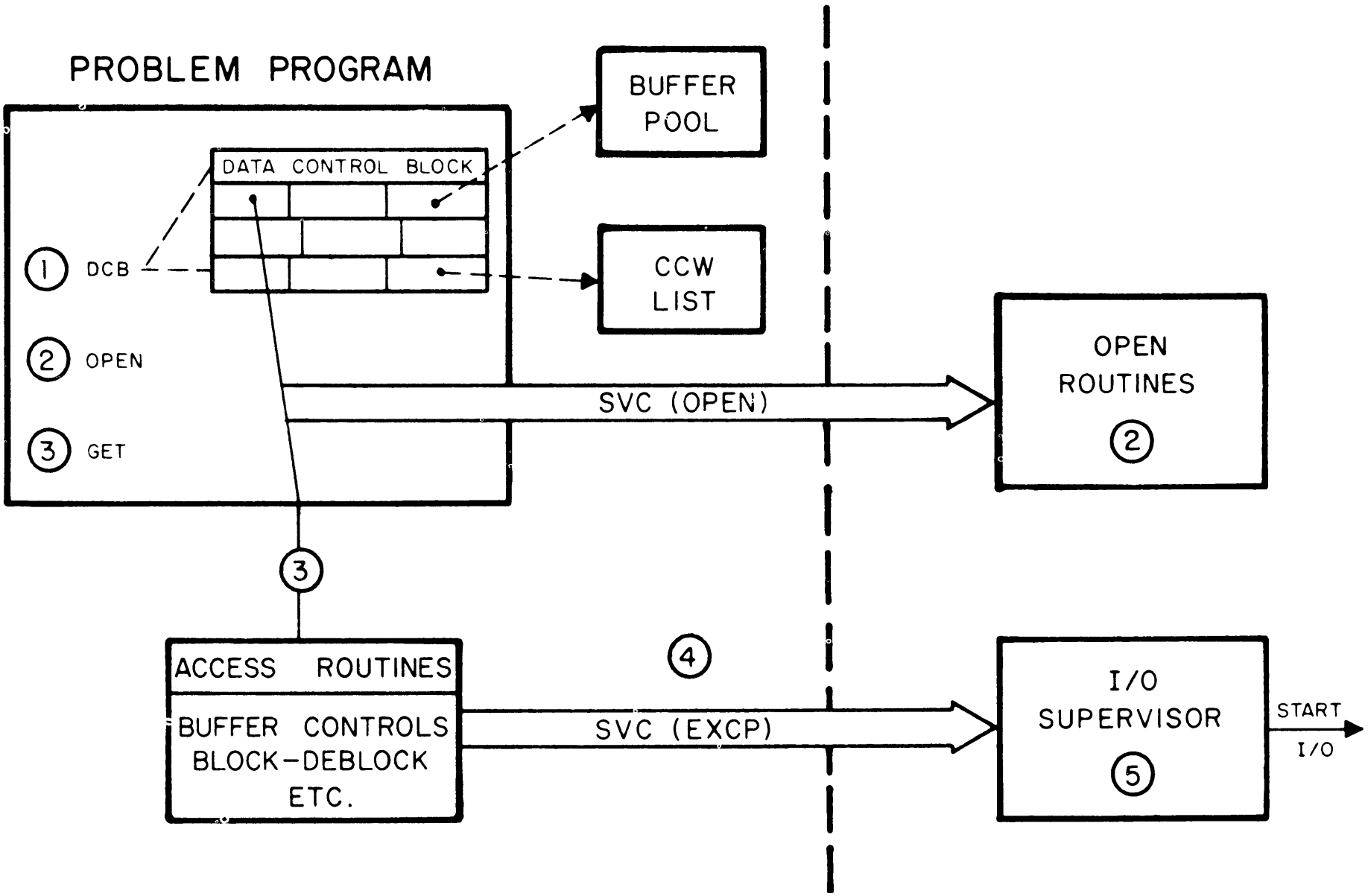
EXCP
MACRO-INSTRUCTION

EXCP IOB ADDRESS

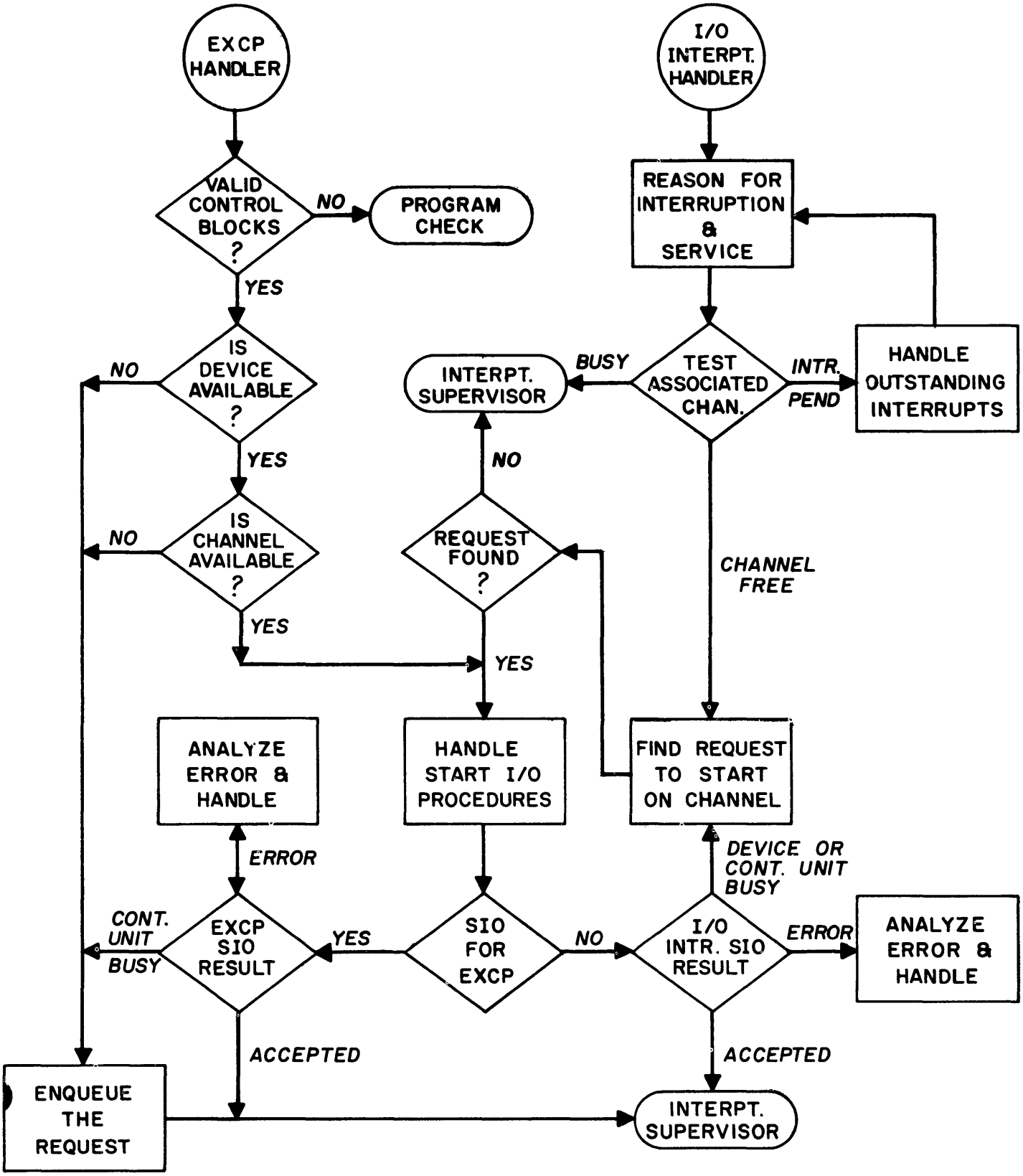
OR

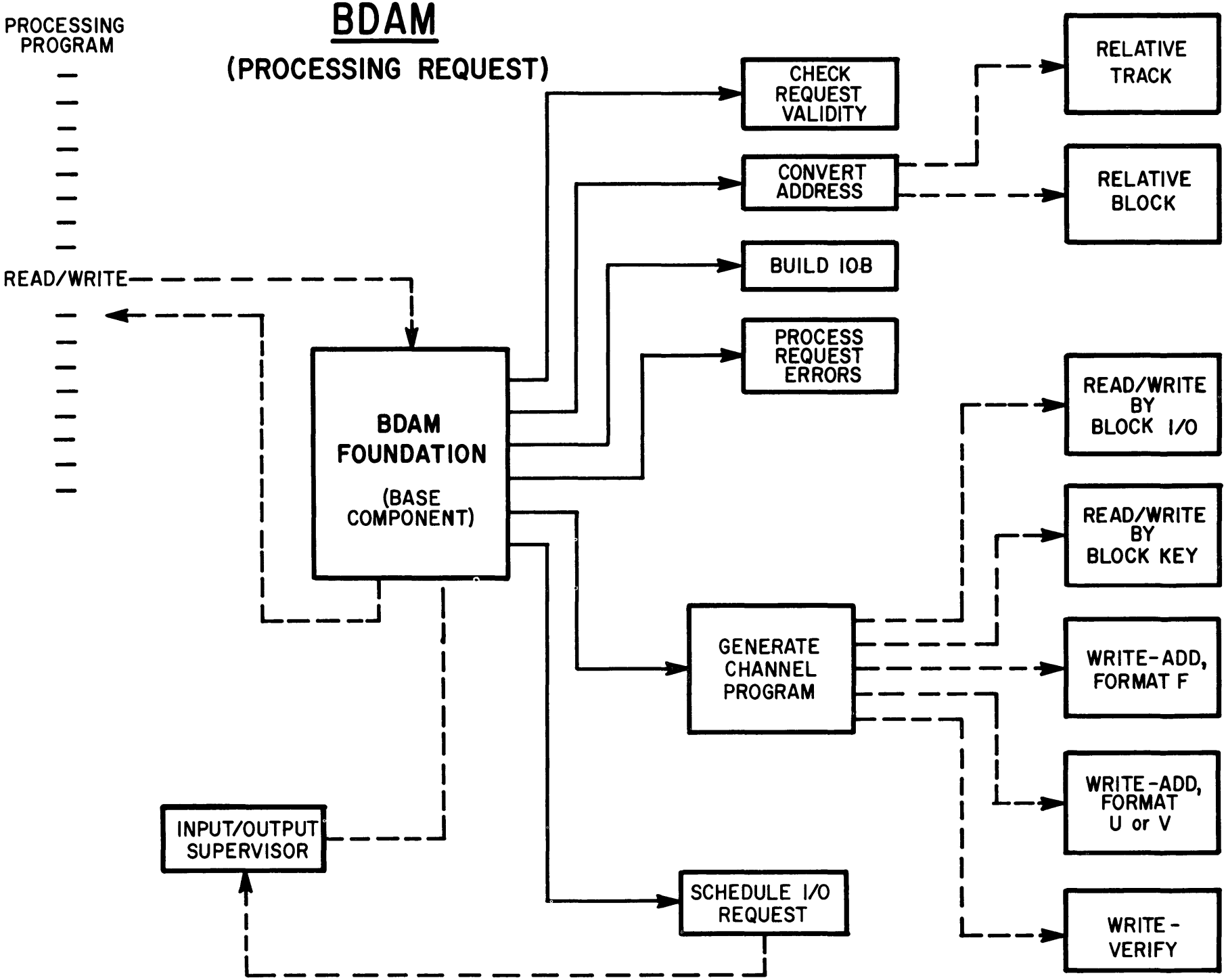
G.R.-C(IOB ADDR.)

INPUT/OUTPUT PROGRAM FLOW

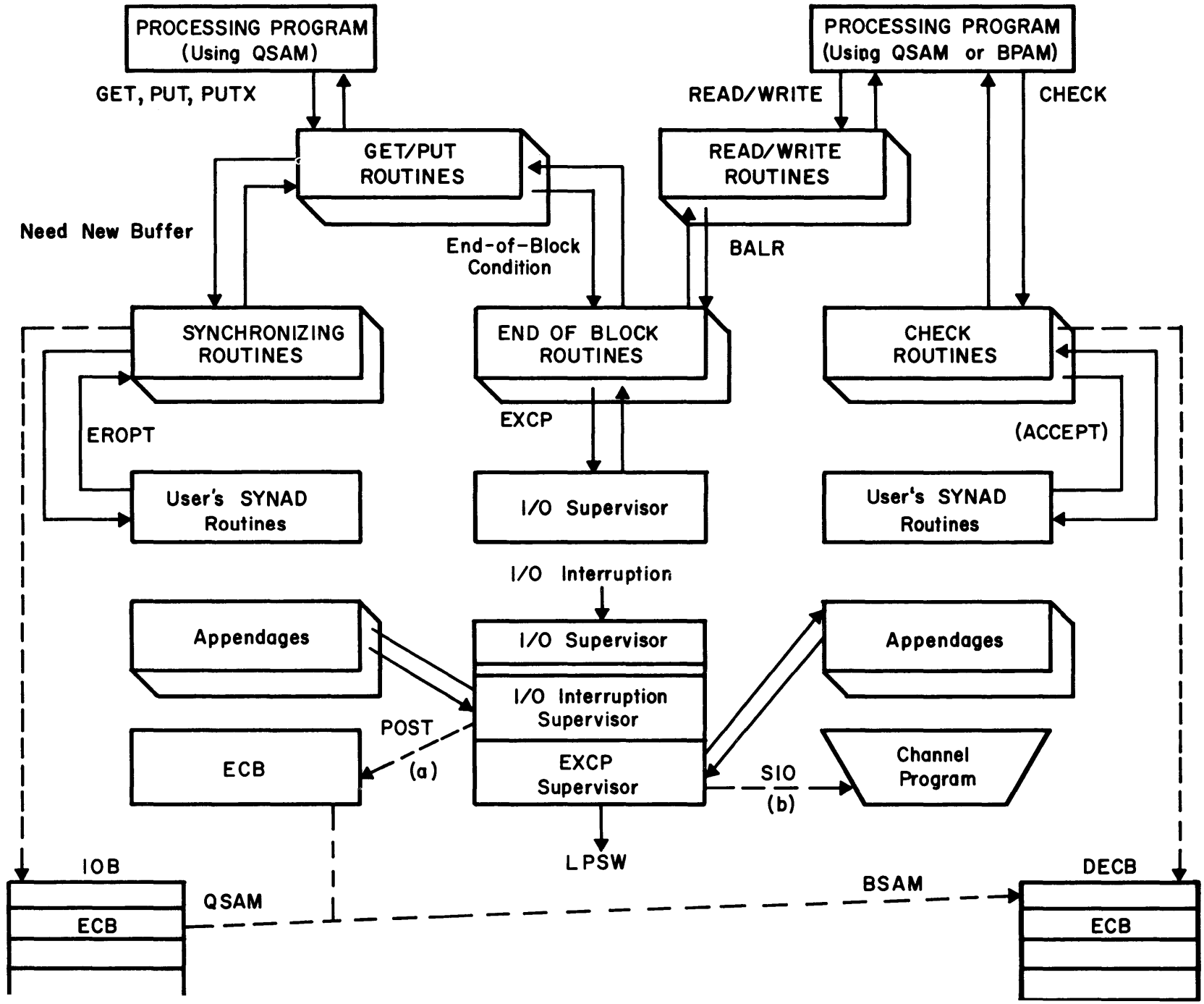


GENERAL FLOW—I/O SUPERVISOR



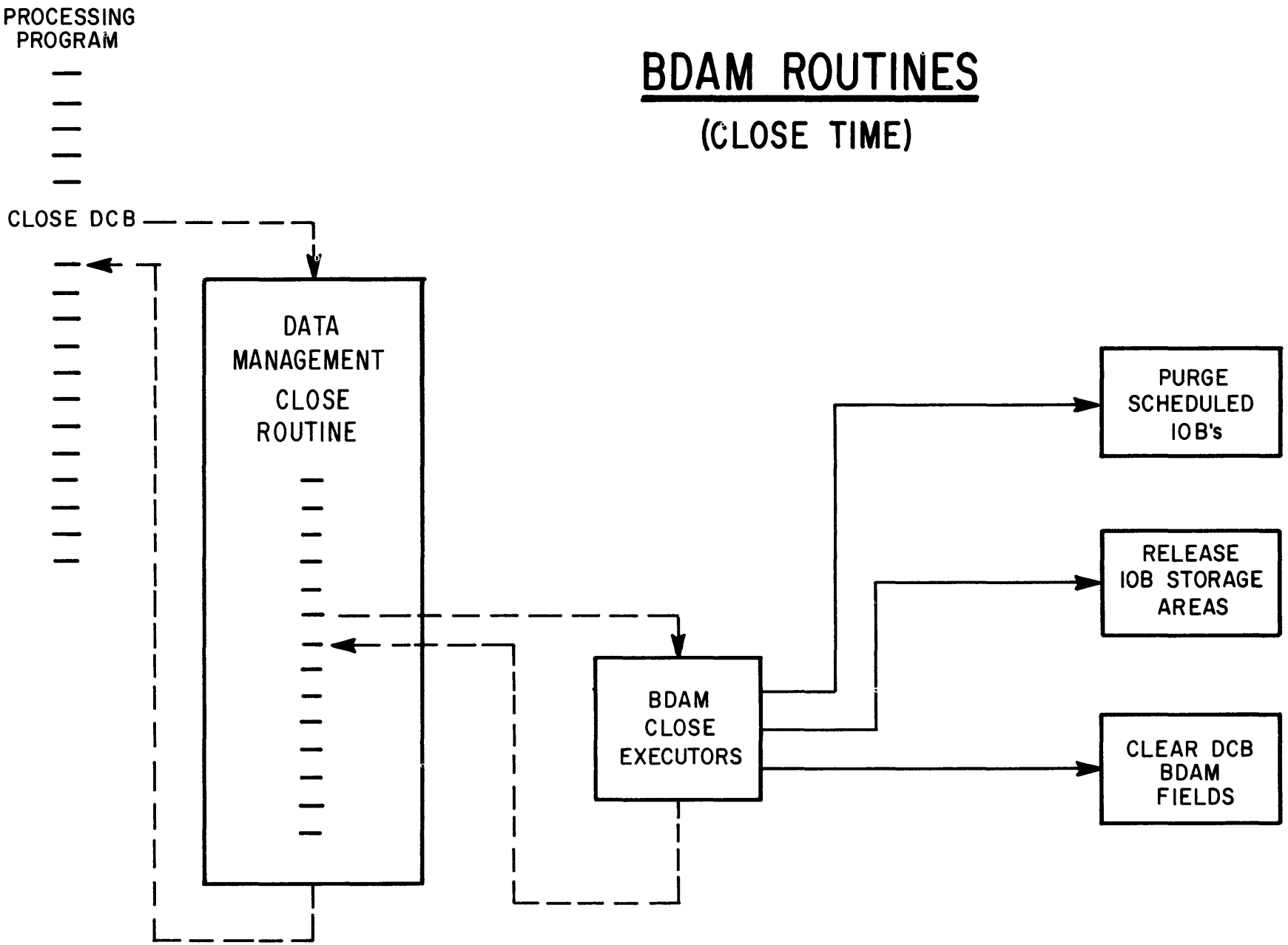

PROCESSING PROGRAM
BDAM
(PROCESSING REQUEST)
READ/WRITE
BDAM FOUNDATION
(BASE COMPONENT)
CHECK REQUEST VALIDITY
CONVERT ADDRESS
BUILD IOB
PROCESS REQUEST ERRORS
RELATIVE TRACK
RELATIVE BLOCK
READ/WRITE BY BLOCK I/O
READ/WRITE BY BLOCK KEY
GENERATE CHANNEL PROGRAM
WRITE-ADD, FORMAT F
WRITE-ADD, FORMAT U or V
WRITE-VERIFY
INPUT/OUTPUT SUPERVISOR
SCHEDULE I/O REQUEST

Flow of control in QSAM, BSAM, and BPAM for Members



BDAM ROUTINES

(CLOSE TIME)



Suggested Sequence: Reference

A. Role of EXCP in OS/360.

1. What is EXCP? 1

EXCP is the interface between any user or system program requiring input/output operations and the I/O Supervisor of OS/360. The EXCP macro-instruction causes a supervisor call interruption (SVC Ø) to pass control to what is essentially a device-dependent accessing method that allows the user to control I/O device hardware by channel commands he constructs. In no way in OS/360 is the user permitted to perform I/O operations outside the supervisory control of IOS.

The I/O Supervisor consists of two parts:

- EXCP Supervisor
- I/O Interruption Supervisor

The services provided to all users requesting any type of I/O are:

- Scheduling the I/O request on the device and a channel.
- Issuing SIO for the channel commands the user provides.
- Processing I/O interruptions and performing error recovery procedures.
- Notifying the user about the status of the computer request.

2. Who uses EXCP?

a. Standard Accessing Methods

In most cases the system supplied accessing methods, such as SAM and DAM, will satisfy the customer and application requirements. They provide the programmer with relatively simple macros (GET, READ, etc.) and relieve him of responsibility for coding device dependent and tedious housekeeping routines in his application programs.

The standard accessing method routines are entered via a branch when the user issues GET or READ, and they ultimately issue EXCP

macros. For the problem program they:

- Construct all required system control blocks except the Data Control Block by which the user specifies in his program which accessing method he needs.
- Create channel programs peculiar to the device type assigned to the user's data set.
- Link to appendages providing end of data and end of extent recognition.
- Perform volume switching when necessary.

b. Problem programmers use EXCP directly when:

1) Designing their own accessing methods.

2) Writing non-standard label processing routines.

3) Processing data recorded in a fashion not supported by the standard accessing methods, e.g. tapes where tape marks occur after every record.

4) Handling I/O devices not supported by OS/360:

- Unsupported in current systems (2302, hypertapes, etc.)
- No support announced (7770 audio response)
- Non-IBM devices

The user must in these cases build the control blocks and perform the housekeeping that the standard routines normally provide.

3. Considerations in using EXCP and incorporating user routines into IOS.

a. I/O programming is considerably more difficult because:

1) User manipulates system control information (ECB's, IOB's, channel

programs, seek addresses).

2) User must be aware of logic of IOS, how it manipulates control blocks, and how it flags error conditions.

3) User must know in detail the operating characteristics of the devices he is controlling.

- How EOF is signalled.
- What device and channel end errors mean and how they are indicated.
- How the device responds or fails to respond to S/360 channel commands, such as SENSE.

b. However, in situations where standard accessing methods impose restrictions (no command and data chaining in a single tape channel program, inability to handle interspersed tape marks easily), the user can take full advantage of the flexibility of S/360 hardware by using EXCP.

B. Introduction to IOS and the use of EXCP

INSTRUCTORS' NOTE:

The following sections are intended to give the students a basic understanding of:

- How channel scheduling is performed.
- Queue and control block manipulation by IOS.
- Error recovery in OS.

Excellent reference material is available on this subject It is recommended that EXCP users become familiar with:

Introduction to Control Program Logic, Part I - Y28-6605
OS/360 Input/Output Supervisor - Y28-6616
System Programmer's Guide - C28-6550

All discussions of logic and control blocks apply only to single task and sequential scheduler systems.

Suggested Sequence: Reference

1. Control Program Logic - Tables constructed at System Generation time. — 2, OPF II-1

   a. Unit Control Blocks — 3

      1) One block for each device on system.

      2) Part of nucleus of OS.

      3) Used by IOS and job scheduler.

      4) Contents

         a) Device address (channel part of address will vary if there are alternate paths to the device.)

         b) Unit name - 183,000, etc.

         c) Device status bits - UCB busy, not ready, etc.

         d) Volume # currently mounted.

         e) Pointers to: Device table containing pointers to queuing, SIO, interrupt analysis routines for this device type.

            - Beginning of logical channel table.

            - SVC error routine.

            - Statistical counters for this device.

         f) Seek queue control information if this is DASD.

      5) UCB's are arranged in core by device address within channel.

   b. Request Element Table — 4

      1) These blocks are queued onto logical channels or seek queues as I/O requests are made during system execution.

      2) Any element in the table can be active, queued, or available.

Suggested Sequence: Reference

3) There are as many RQE's as you specified simultaneous I/O options in the CTRLPROG macro at System Generation.

4) If at execution time an I/O request is made and there are no RQE's available, IOS sits in a pseudo disabled loop waiting till an I/O interrupt occurs during an RQE.

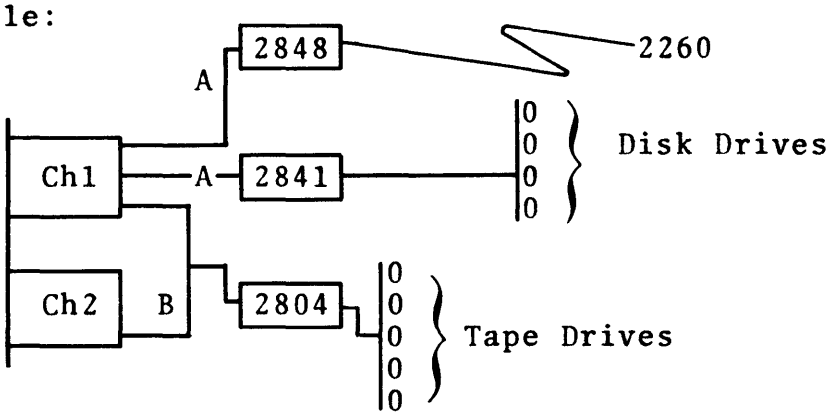
5) Contains pointers to UCB, IOB, DEB (discussed later), and next element in queue.

c. Logical Channel Word Table

1) Concept of a logical channel 5

Definition: All devices that can be reached thru the same set of physical channel paths are said to be in the same logical channel.

Example:



DASD's on the 2841 and 2260's on their control unit are in the same logical channel. (They can be accessed only thru physical channel 1.)

Tapes on the 2804 (or switching unit) are in a different logical channel because they can be reached either thru channel 1 or, if it is busy, thru channel 2.

INSTRUCTORS' NOTE:

The multiplexor channel constitutes only 1 logical channel.

Suggested Sequence: Reference

2) An LCWT entry is constructed for each logical channel and contains:

   a) Pointers to 1st and last entries in RQE table that are currently in this logical channel.

   b) Pointer to the TCH (test channel) module entered when I/O request is made. This module tests to see if physical channels within the logical channel are available.

3) Relationship of LCWT and request element table. OPF II-2

   a) All entries in RQE table are queued onto something: free list, logical channel queue.

   b) All those currently waiting to be handled on logical channel X are linked together and are pointed to by LCWT entry. Last one is pointed to so that it can be easily found when new request has to be added to the queue.

   c) Last element in any queue always has link field containing all 1 bits.

2. Control Program Flow - Problem Program Initiation 6 Appendix V

Refer to chart.

a. Reader/Interpreter constructs tables for 1 job and stores them in SYSJOBQE. (R/I reads control cards and builds tables until it hits a DD* card or another JOB card.)

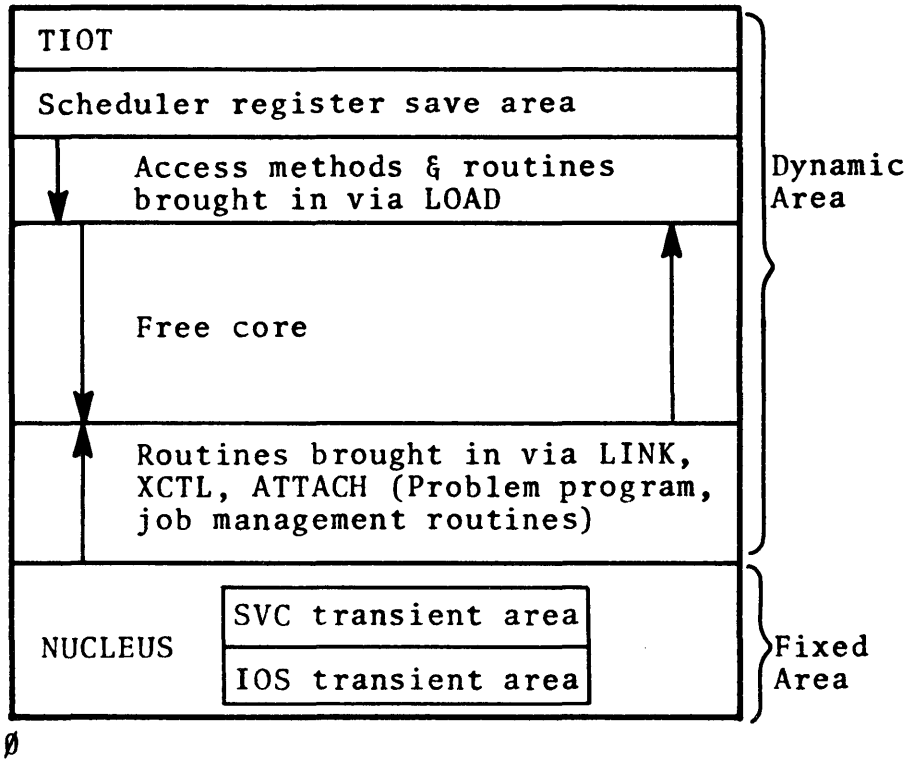
b. Initiator overlays R/I in dynamic core, builds Task I/O Table in high core, and prepares for fetching of problem program (besides device allocation, etc.).

c. TIOT contains each DDNAME for this job step and pointers to UCB's assigned to the associated data set.

d. Initiator XCTL's to problem program.

Suggested Sequence: Reference

e. Organization of main storage. OPF II-3
7



1) Any storage allocated from free core by GETMAIN or LOAD will come from the highest part of free core.

2) Any area allocated for LINK, etc., will be immediately above the last currently active module in dynamic core.

3. Control Program Flow - OPEN 8
Appendix VI

Refer to chart.

a. OPEN, specifying any series of Data Control Blocks the programmer has built in his program, generates an in-line SVC 19.

b. The system locates the secondary OPEN routines in SVCLIB by issuing a BLDL macro and LOADing them into main storage.

c. OPEN (routines run enabled for I/O interruption).

1) Completes the DCB and output DSCB.

Suggested Sequence: Reference

2) Causes non-standard labels to be checked.

3) Exits to any user label processing routines specified in an EXLST.

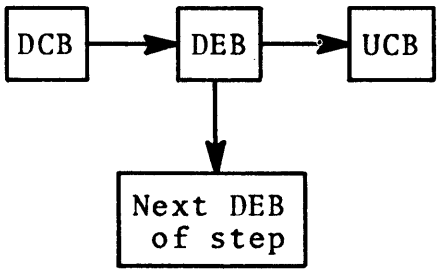
4) LOADS any IOS appendage routines specified in the Data Control Block.

5) Exits to accessing method routines which build Data Extent Block for each DCB opened. 9, 10

6) DEB - built in high core (is not protected in current system).

- contains system control information about subroutines loaded, other tables, etc.

- linkages built:



- contains extents on this DASD volume.

The disk address for every DASD seek request is checked against extent boundaries by IOS.

4. Problem program use of EXCP - general approach. 11

a. User must construct and do the following: OPF II-4

1) Data Control Block

2) Input/Output Block

3) Channel Program

4) Event Control Block

Suggested Sequence: Reference

5) Code EXCP and OPEN and CLOSE.

6) Wait for event completion.

7) Test status of completed request.

8) Perform certain housekeeping operations on DCB, IOB, & ECB.

b. Data Control Block for EXCP 11

INSTRUCTORS' NOTE:

Students should follow the description in the System Programmer's Guide.

1) MACRF & DDNAME parameters are required, although DDNAME could be inserted into the DCB prior to OPEN.

2) If user has placed IOS appendages into SVCLIB and wants to use them, he must indicate their identification numbers in the DCB. (Note: Appendages are discussed later.) Ex. A SAM appendage checks for /*EOData when data is input job stream.

3) EODAD is required only when EOV macro is being used and is issued when data set is currently positioned on last volume. (Last volume is determined by volume count or list of volume serial numbers maintained by job control.)

4) Note common interface and foundation block extension information. The information is primarily useful for building data set labels.

5) Note device-dependent parameters. If you specify no device type, 20 bytes will be reserved.

c. OPEN macro is coded just as it is for other accessing methods. 12

OPEN (dcb-name,[(INPUT|RDBACK|OUTPUT,REREAD|LEAVE|DISP)][,dcbname])

OPEN (INFILE,,OUTFILE,(OUTPUT))

Suggested Sequence: Reference

d. Coding EXCP - EXCP IOB-ADDR

e. Input/Output Block - IOB 13

1) User must build the block containing primarily points to his:

Data Control Block
Channel Program (discussed later)
Event Control Block

2) User's I/O request is entered into logical channel queue by having address of IOB put into RQE.

3) Summary of control block linkages. OPF II-5

4) The SIO routines of IOS locate the channel program that is to be executed via RQE → IOB → CCW.

5) Completion of the event is signalled by a post code in the ECB indicated by the IOB, and by channel status information stored in the IOB.

f. WAITing on event completion WAIT ECB=ecbname

1) User must construct the full word Event Control Block and be sure the complete bit is set to zero before issuing EXCP. 14

2) When event is completed, the user must check the completion code (1st byte of ECB) to determine success of request. (Specific codes will be covered later.)

g. User issues normal CLOSE when he determines he is at end of data set. 15

CLOSE (dcbname[,LEAVE | REREAD | DISP])

CLOSE performs these functions:

- Release of DEB.
- Restoration of DCB to its status prior to OPEN.
- Verification or creation of standard labels.

Suggested Sequence: Reference

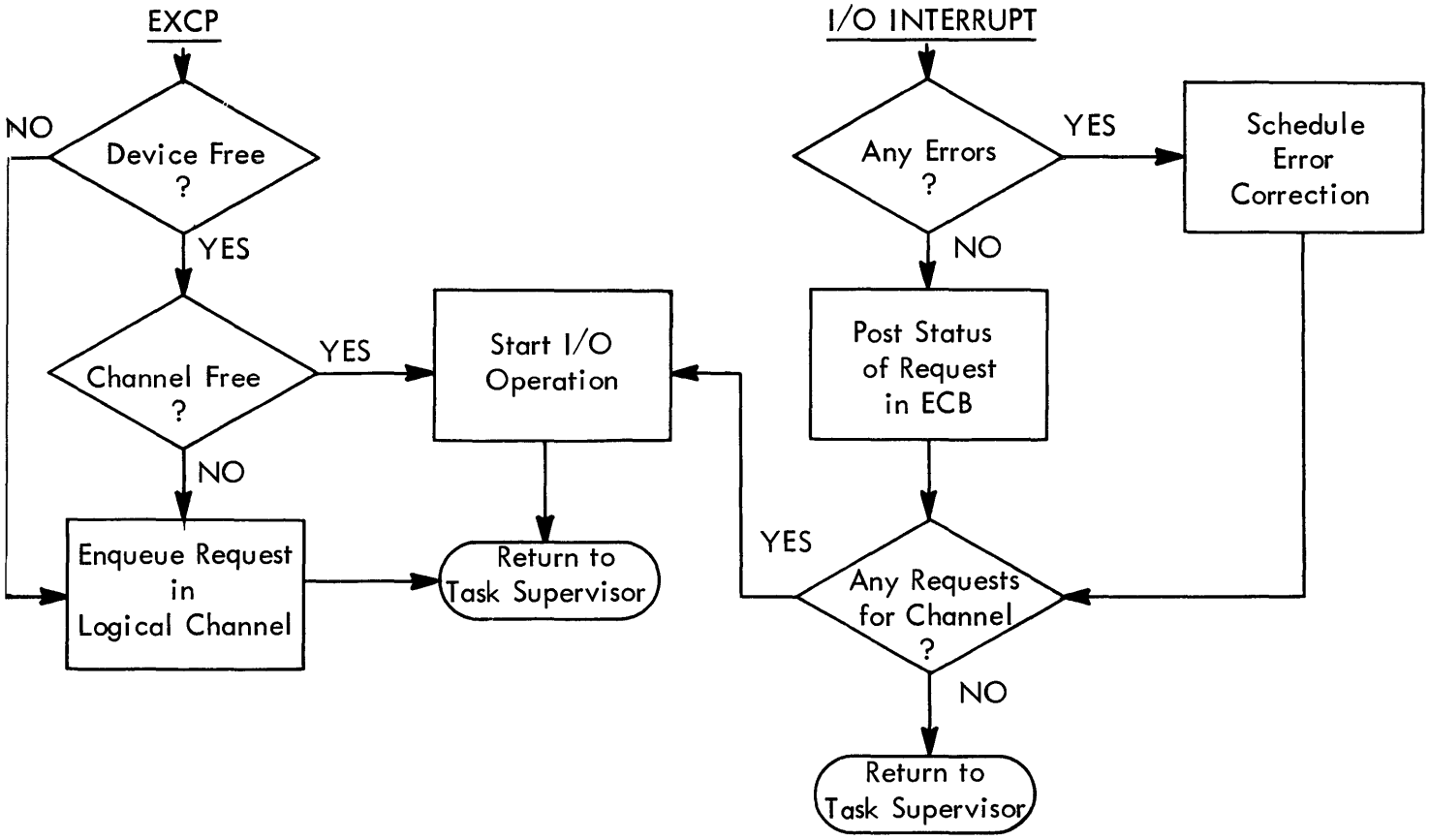
- Volume disposition.
- Release of programmer - written appendages routines.

h. Sample EXCP program OPF II-6

5. Control Program Logic - I/O Supervisor

a. Very general flow chart - IOS in this system is not in general concept different from other channel schedulers and interrupt supervisors.

Develop on board:



In implementation detail, however, it is quite different.

b. Detailed analysis of EXCP Supervisor handling of I/O requests. 16

Suggested Sequence: Reference

Review logic of flow chart. Appendix VIII

Develop example of request for a tape operation on Selector Channel. (Note: There are few differences in the handling of unit record devices on multiplexor channel and several in handling DASD on any channel. Techniques in handling DASD are covered in the second part of the EXCP outline.)

1) EXCP for tape I/O issued - assumed device and channel free. Follow IOS logic.

   a) After validity of request is checked, a request element RQE is issued for the I/O operation and pointers to it will be placed in a queue or in UCB. 17

   b) Test channel modules - 2 types 18

      - Selector channel - TCH is sufficient.

      - Multiplexor - TCH would always reply available, so only way to test is to issue SIO.

   c) A TCH module exists for each logical channel so that the unique set of physical channels in the logical channel can be tested for availability.

   d) SIO routine for specific device type entered. UCB busy set if SIO is given. 19

      NOTE: If request is for a burst device on MPX channel, the request is held up until all overrunable devices have stopped operating.

   e) Tape SIO - Channel program consists of 2 CCW's in addition to user's CCW's:

      1st - Sets mode for 7 track tape operation - IOS finds the information in DEB (mode is NOP for 9 track tape).

Suggested Sequence: Reference

2nd - TIC to user CCW's.

f) Unit record SIO - no preliminary commands are required.

g) Result of SIO

- If MPX channel is operating there may be a busy result indicating that the sub-channel is busy.

- If control unit is shared between 2 channels and is currently in use, control unit busy signal will be indicated.

h) SIO accepted - return to task supervisor.

2) User program issues second request for tape drive, requiring queuing of the request.

a) Device is already busy: UCB busy bit on.

b) Queuing a request in a logical channel. 18

- Next available RQE is filled in with information for this request (top of free-list).

- UCB → LCWT entry for proper logical channel.

- Queuing techniques for non-DASD.

FIFO - RQE added at end of current logical channel queue.

Priority - applies to multitask system only. Within a given priority entries are queued in a FIFO arrangement.

Suggested Sequence: Reference

3) I/O interruption occurs 20

a) UCB for device causing interrupt is found via a UCB look-up table in Nucleus.

b) UCB → active RQE → IOB & DEB

c) Trapcode modules exist for each device class and analyze the CSW bits as they apply to a specific device type. 21

d) In case of errors:

- DASD routines are mostly resident and are entered directly.

- Other error routines are transient and must be pulled in by an input operation from SYSRES. If SYSRES or its channel is currently busy, then the I/O request must be queued. Error correction then does not take place immediately.

e) Channel restart procedure 22

- Any pending interruptions are taken (e.g. seeking or rewinding complete) until channel is free.

- Channel search modules - 1 per physical channel. Routines search the queues of the logical channels to which it belongs for a waiting RQE. 22

  NOTE: All seeks waiting for the channel are started before any data transfer operations.

- 4 types of channel search routines:

  . MPX - no burst devices

  . MPX - burst devices

Suggested Sequence: Reference

- Selector channel in only one logical channel
- Selector channel in more than one logical channel

f) After channel has been serviced, IOS returns to task supervisor.

6. User Programming Responsibilities - Detail

a. Construction of channel commands. OPF II-7 OPF II-8

1) CCW instruction

OP	Operands
CCW	cmd, data address, flags, count

Command code, flags, and count must be absolute expressions.

2) Channel Program examples OPF II-9

a) SILI flag - channel returns an error if data length specified in count is not the same as physical block or buffer length. To suppress error indication, turn the flag on.

SILI is required for all tape writing operations.

b) Count should never be equal to zero in a control command.

c) Control commands that may not appear in user chanel programs are:

Rewind, Rewind and Unload, set file mask for 7 track tape, set file mask for disk, and seek on disk.

IOS always sets file masks for disk and tape, and the hardware does not permit two such commands in the same channel program. The DASD set file mask inhibits further seeks outside current cylinder. OPF II-10

Suggested Sequence: Reference

d) On data and command chaining for tape and UR, IOS does not have the ability to determine where to restart a channel program if there is any mixture of DC and CC in a CCW series. IOS will signal permanent error, and user can figure out how to handle the error.

e) The user must set bits 0 and 1 of the first IOB byte to indicate data or command chaining.

INSTRUCTORS' NOTE:

Disk examples will be covered in the second section of EXCP. For further information on channel commands, see pp. 11 and 12 of S/360 Reference Card, X20-1703, or the control unit hardware manuals.

b. Error testing following execution of WAIT Macro 10

In case of unrecoverable error the first 2 bits of I FLAGS in DCB are set on, and the first byte of the ECB is set. User must test the ECB. OPF II-11

1) Channel program terminated. When channel end, with or without device end, occurs:

- the ECB is posted complete, indicating whether or not there were data transfer errors, and

- the associated RQE is freed.

If device end occurs simultaneously (as in tape and disk data transfers), then unit exception and unit check conditions are also noted.

2) Channel program intercepted. If device end occurs after channel end (as in typewriter and printer operations where the device continues to operate after data transfer has terminated), and if there were unit errors (carriage return or forms failures), the UCB is marked intercepted.

Suggested Sequence: Reference

If error correction procedures initiated on next request for the device fail to correct the situation, the ECB is marked intercepted, the DCB exception bits 0, 1 of IFLAGS are set to 1's, and the current request is not executed.

User may reissue the intercepted request after resetting the DCB bits.

c. End of data checking

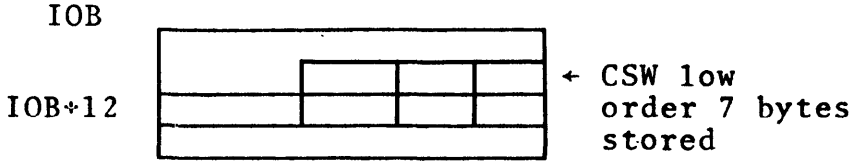
1) If input data is from system input stream, user must check for /*.

2) On reading tape mark, EOD record on disk, or trying to read past EOF on card reader, user gets:

a) ECB - Channel end error.

b) Unit exception flagged in CSW.

3) Testing for unit exception in IOB.



TM IOB+12, X'01' unit exception is the seventh bit of this byte.

d. Preparation for issuing EOV or CLOSE for a tape. 15

1) The action taken and label processing will depend on the setting of OFLGS field in the DCB. User must set bits 0, 1, 4, 5 as follows:

Bit 0 - indicates that a tape mark is to be written.

Bit 1 - indicates that a backwards read was the last I/O operation.

Bit 4 - indicates that data sets of unlike attributes are to be concatenated.

Suggested Sequence: Reference

Bit 5 - indicates that a tape mark has been read.

If Bits 0 and 5 of OFLGS are both off when EOV is executed, the tape is spaced past a tape mark, and standard labels, if present, are verified on both the old and new volumes. The direction of spacing depends on Bit 1. If Bit 1 is off, the tape is spaced forward; if Bit 1 is on, the tape is back-spaced.

If Bit 0 is on when EOV is executed, a tape mark is written immediately following the last data record of the data set, and standard labels, if specified, are created on the new volume.

To indicate that a tape mark is to be written:

```
OI   DCBNAME + 48,X'80'
```

C. Student Problem to be Tested in Machine Lab
(For alternate problem, see Appendix XVIII.)

Appendix XVIII

1. Write a program using EXCP to load a tape from an input data set containing 80 character blocks. The data set may be on cards or on tape. End of data set is to be determined by checking the unit exception bit in the channel status word stored in the IOB.

   Before writing each output record, insert your name in positions 10-25 for identification on the tape dump.

   In the following job step, dump the tape to the printer using the IEBPTPCH Utility program.

   Job control cards will be provided.

2. Write and insert into SVCLIB a channel end appendage routine that you will use on every input data set you process using EXCP. The appendage is to determine whether or not your input data set is the SYSIN data set (indicated by data set status flags in the DEB).

   If it is, and the record just read contains /* in the first 2 positions, the appendage is to set the unit exception bit in the CSW storage

Suggested Sequence: Reference

of the IOB to indicate the standard end of data set condition. In all cases, provide for a normal return to IOS.

Modify the DCB of part one of the problem so that it uses the appendage.

The problem solutions are contained in Appendix IX. Appendix IX

D. Controlling DASD by EXCP

1. Ease of Control by User

a. DASD are not as difficult to control on S/360 as on some past systems, but the user housekeeping requirements when using EXCP are considerable when compared to handling tape or unit record.

b. Programmer responsibilities in addition to usual control block construction and error testing: OPF II-12

1) Building and maintenance of the seek address in the IOB.

- Incrementing record #
- Incrementing head # when track exhausted
- Incrementing cylinder # when cylinder is exhausted

2) Recognition of end of extent and initializing seek address to beginning of next extent if there is one.

3) Construction of channel commands and construction of count field in core if loading a sequential data set.

4) Giving CLOSE information about where to record EOD marker at end of PS or PO data set.

2. IOS handling of disk I/O requests. Refer to IOS logic chart. Appendix VIII

a. All DASD requests are broken into two separate requests:

Suggested Sequence: Reference

- Stand alone seek which overlaps other operations on the channel, such as other seeks or data transfers.

- Seek and data transfer chain of commands.

b. Seek Queuing - (Assume device is busy - seeking, transferring data, or waiting to begin a data transfer - when request is made.)

1) DASD I/O requests are first queued onto the seek queue which begins in the UCB. An RQE is taken from the freelist and queued onto the UCB in one of 3 ways, depending on SYSGEN options: 23

   - FIFO

   - Priority (multitask system)

   - Ordered queuing

2) Assuming seek address is valid, the SIO for stand alone seek is issued and IOS waits for channel end indicating that the seek address has been received. Disk arm seeking and UCB busy bits are set.

3) If entry to SIO module came from Interruption Supervisor, then IOS loops back to see if there were other seek requests in seek queues or data transfer requests in a logical channel queue for this physical channel.

c. Device end for the stand alone seek. RQE placed in logical channel queue to await its turn on the channel. 22

NOTE: The UCB is still busy, so, prior to starting the data transfer, all other problem program seek requests would be queued onto the UCB.

ARM STEALING CAN NEVER TAKE PLACE IN ANY VERSION OF IOS.

d. Data transfer operation begins. The SIO module for DASD always issues 2 channel 24

Suggested Sequence: Reference

commands before transferring in channel (TIC) to the user's commands:

1st - reissue SEEK - to reset head register in the control unit.

2nd - set file mask as indicated in DEB to inhibit certain types of seeks and writes. 25

The disk data transfer flag is turned on.

e. When channel and device end interrupt occur, if there are errors, the core resident 2311 error routine is immediately entered. If the non-resident portion is required, it is scheduled in the normal manner.

f. The channel is restarted, and CPU control eventually goes to the task supervisor.

3. Programming for disk. Refer to sample disk program. Appendix VII

a. IOB 26

1) Indicate command chaining in the Flags 1 byte.

2) Build space for the seek address.

b. Maintaining seek address

1) Set M - the extent number (the 1st is zero) and extract the extent beginning CCHH address beginning at the 38th byte of the DEB. 27

2) Prior to each new disk operation, user must be sure that the IOB seek address field is set properly.

3) User is responsible for incrementing record, track, and cylinder numbers as required.

4) At end of extent, the user is notified and must check to see if there are additional extents - (extent count field in DEB).

Suggested Sequence: Reference

5) To get volume switching or, for output files, secondary allocation, use the EOV macro.

When issuing EOV for sequentially organized output data sets on direct-access volumes, you can determine whether additional space has been obtained on the same or different volume by checking the volume serial number in the unit control block (UCB) both before and after issuing EOV. 15

c. End of file handling

1) Input or update files - sequential.

2) FIFO - request is added at end of current queue.

3) Priority - request is inserted into queue following requests of other tasks with the same priority.

4) Ordered Seek Queuing - Minimizes irregular arm movement.

- Stand alone seeks are executed in order of seek address as the arm moves from lower to higher cylinder addresses.

- Technique: If current request is for a cylinder higher than current position of arm, then RQE is entered in its place in a primary queue; otherwise, it is entered in the secondary queue which begins at cylinder 0. When the primary queue is exhausted, the secondary queue becomes primary.

d. Eventually the device and channel become available and an SIO module is entered from I/O Interruption Supervisor.

1) Prior to stand alone seek, the DASD SIO module checks seek address against extent boundaries. If request is not 24

Suggested Sequence: Reference

within extents, then:

- End of extent appendage is entered where user may fix up the extent problem and request that IOS try again.

- Or if no fix up, permanent error posted and abnormal end appendage is entered.

- Without either appendage, the request is posted complete with end of extent violation in ECB.

Unit exception bit is turned on when EOD record is read.

- User must check for this.

2) Sequential or partitioned output files being loaded. CLOSE will write an EOD record following last record written. User must set DCB fields: 28

- DCBADDR + 5 - MBBCCHHR
CLOSE will write the file mark in R + 1 record position.

- TRBAL (DCBADDR + 18) indicates the balance of space left on the track. File mark is written only if there is enough space.

e. Writing the channel program - See the 2841 hardware manual. OPF II-13

1) Reading records

a) User provides address for seeking in IOB.

b) Channel commands specify the record to be located and what part of the data to be read.

c) Search must be executed; a read alone would read whatever followed the next address marker.

Suggested Sequence: Reference

d) If search argument is not equal to ID or Key on disk, the channel falls through to the next command, which must force re-execution of the Search command.

NOTE: Flags are ignored in a TIC command.

e) When search argument and disk agree, the channel will jump one command to reach the Read.

f) I/O area must be large enough to hold (Key and) Data, and count must specify the combined lengths to avoid incorrect length indication.

2) Updating - change the command from Read to Write.

3) File Loading. Programmer formats the track as he loads records. OPF II-14

a) Programmer builds 8 byte count area in core and supplies actual key and data lengths. CCHHRK DD Data. When he writes the new record, he specifies the beginning of the count area, and the length of information to be written is count (8) + Key - Data Lengths.

b) Channel Program

Search ID - for record preceding one you are writing.

TIC * - 8
Write Count = Key and Data

NOTE: The ID on which you search and the ID you write are different. To write the first record on the track, search on record 0.

c) Never include in your channel program: 29

Set file mask: hardware

Suggested Sequence: Reference

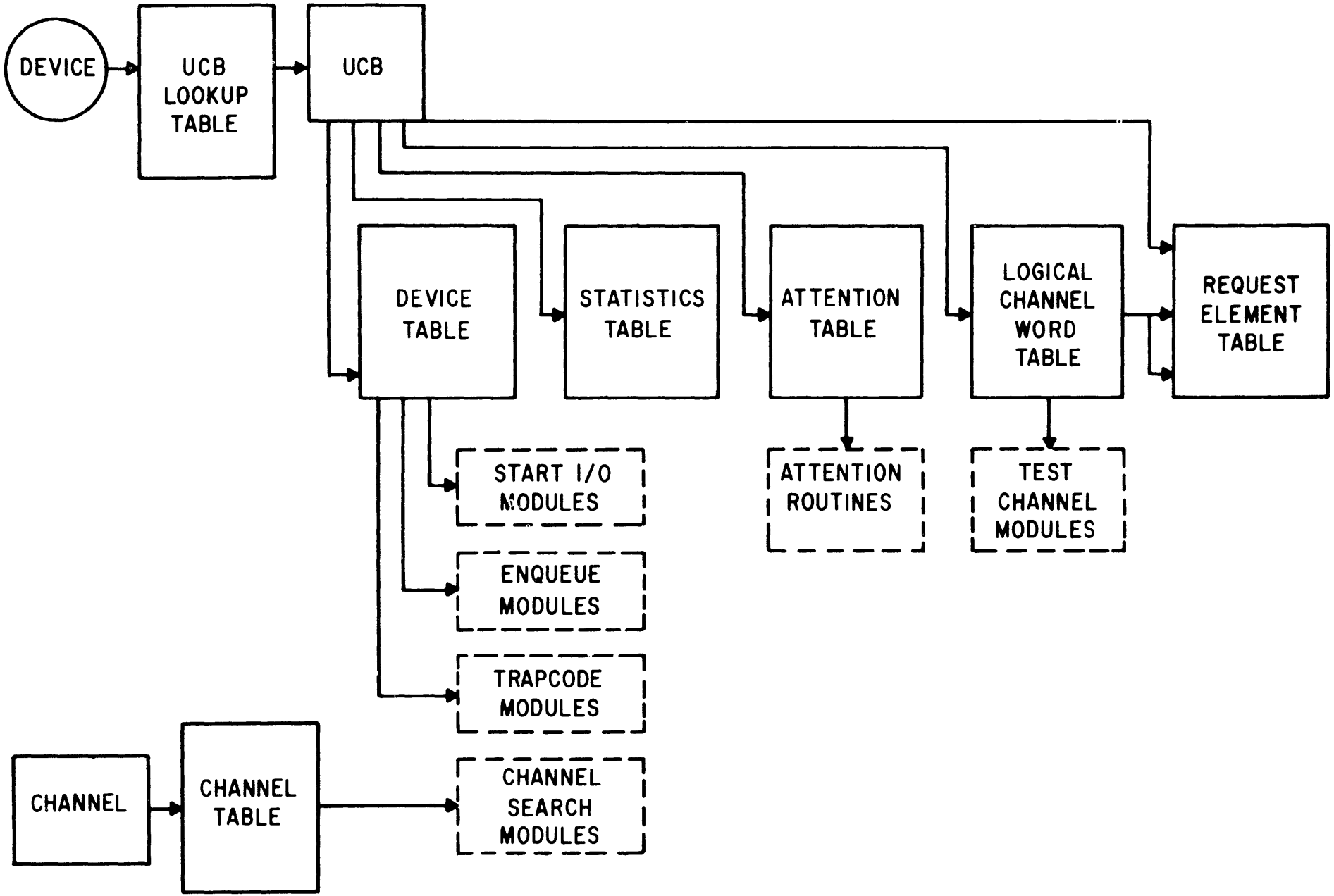
will reject it.

- Seek for more than a head switch within the current cylinder, and that only if your extents begin on cylinder boundaries.

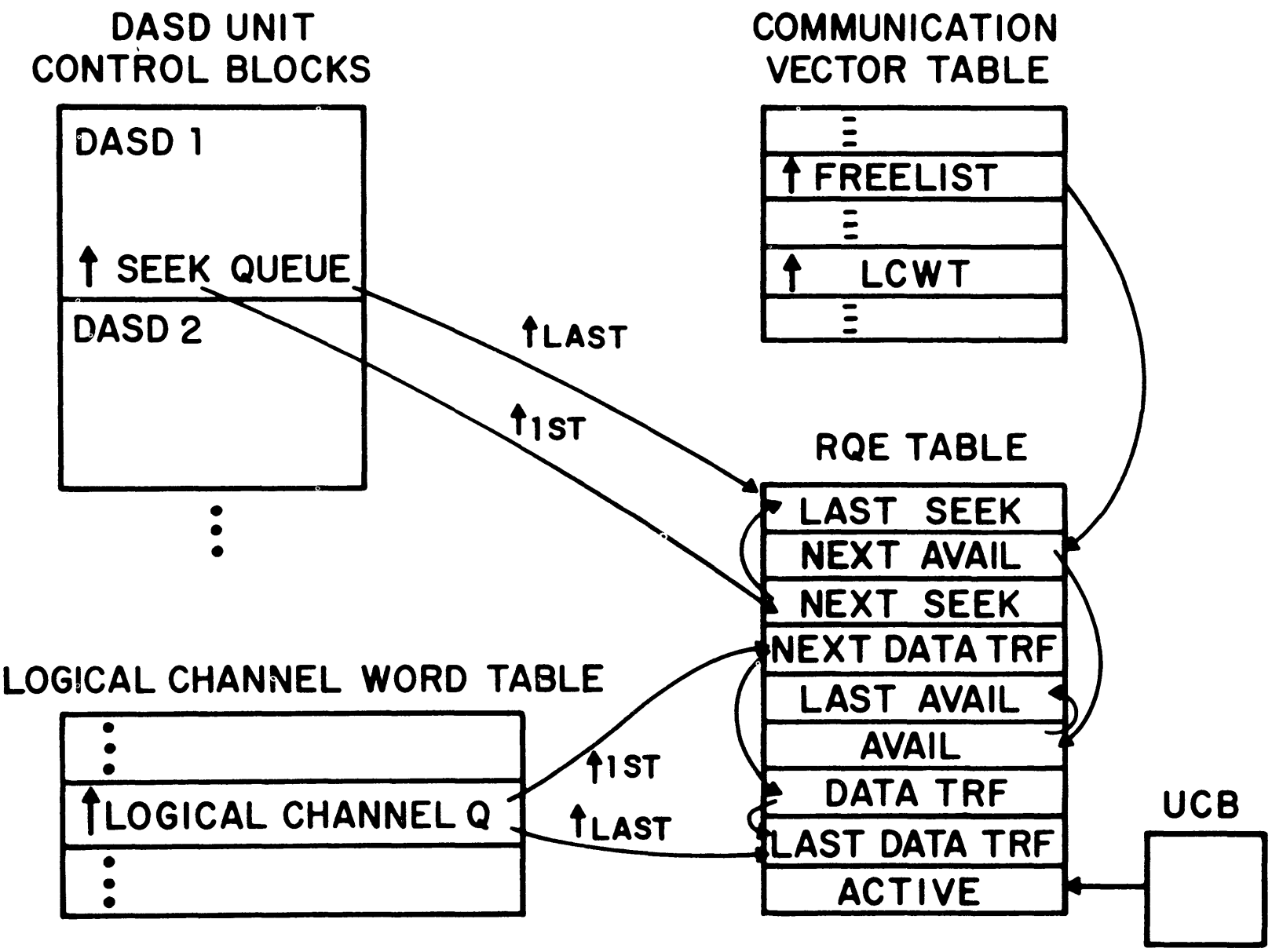
TOPIC II
REFERENCES

REFERENCE CODE	OS/360 System Programmer's Guide C28-6550	OS/360 I/O Supervisor PLM Y28-6616	Introduction to Control Program Logic Y28-6605
1	72		
2		14	
3		71	
4		67	
5		86	
6			11
7			9
8			20
9		59	
10	94		
11	82		
12	89		
13	91		
14	93		
15	90		
16		18	
17		20	
18		21	
19		23 & 24	
20		28	
21		31	
22		32	
23		22	
24		25	
25	97		
26	92		
27	96		
28	86		
29	76,97		

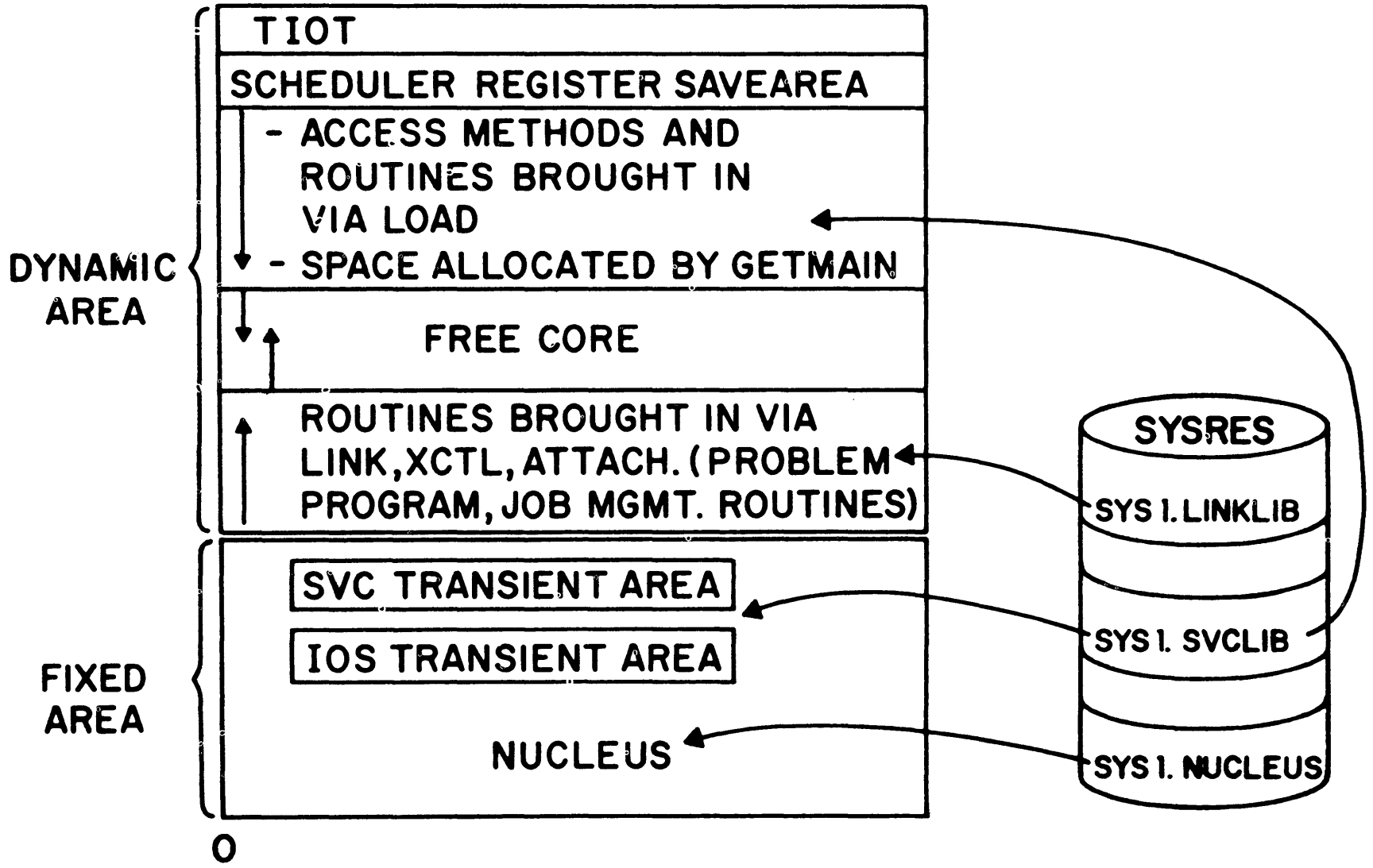
TABLES USED BY I/O SUPERVISOR



USAGE OF REQUEST ELEMENT TABLE



CORE STORAGE ORGANIZATION



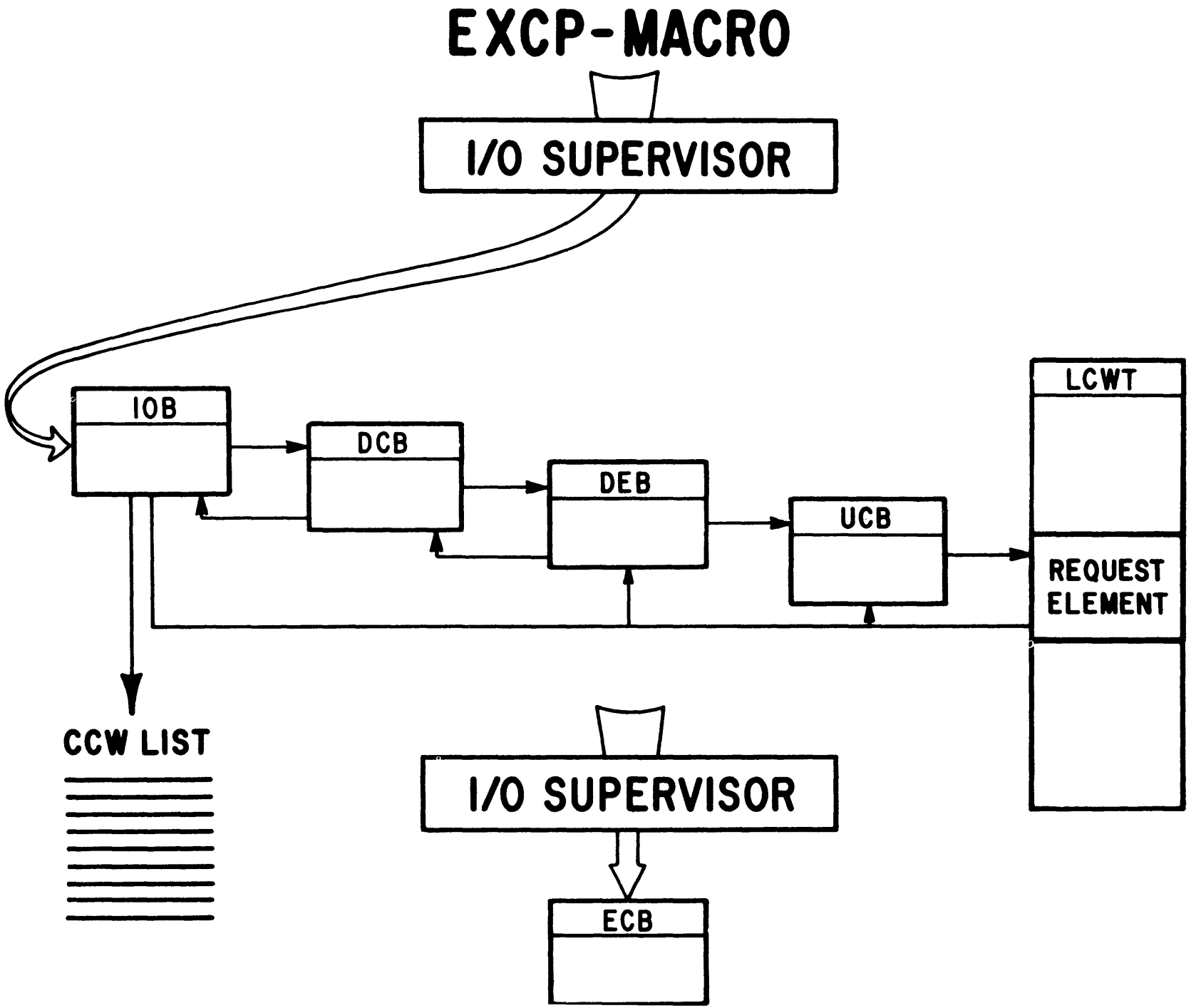
USER OF EXCP MUST

CONSTRUCT:

- DATA CONTROL BLOCK
- INPUT / OUTPUT BLOCK
- CHANNEL PROGRAM
- EVENT CONTROL BLOCK
- SEEK ADDRESSES FOR DASD

CODE:

- OPEN AND CLOSE MACROS
- EXCP
- WAIT FOR EVENT COMPLETION
- TEST OF STATUS OF COMPLETED REQUEST
- HOUSEKEEPING ON DCB, IOB, AND ECB


EXCP-MACRO
I/O SUPERVISOR
IOB
DCB
DEB
UCB
LCWT
REQUEST ELEMENT
CCW LIST
I/O SUPERVISOR
ECB

SAMPLE EXCP PROGRAM

```
                 ≀
                OPEN     (DCBIN)
                 ≀
READ            NI       ECBIN,X'00'          Reset complete bit
                EXCP     IOBIN
                WAIT     ECB=ECBIN
                TM       ECBIN,X'7F'          Successful completion test
                BO       PROCESS
                TM       IOBCSW+4,X'01'       Unit exception test
                BO       EOF

                         -ERROR-

EOF             OI       DCBIN+48,X'04'       Tape mark has been read
                CLOSE    (DCBIN)
-------------------------------------------------------------------------
DCBIN           DCB      MACRF=(E),DSORG=PS,DDNAME=INPUT
ECBIN           DC       F'0'
CHANPRG         CCW      X'02',INAREA,0,100   Read into INAREA a 100 byte block
```

IOBIN

FLAGS	SENSE BYTES
00 1	

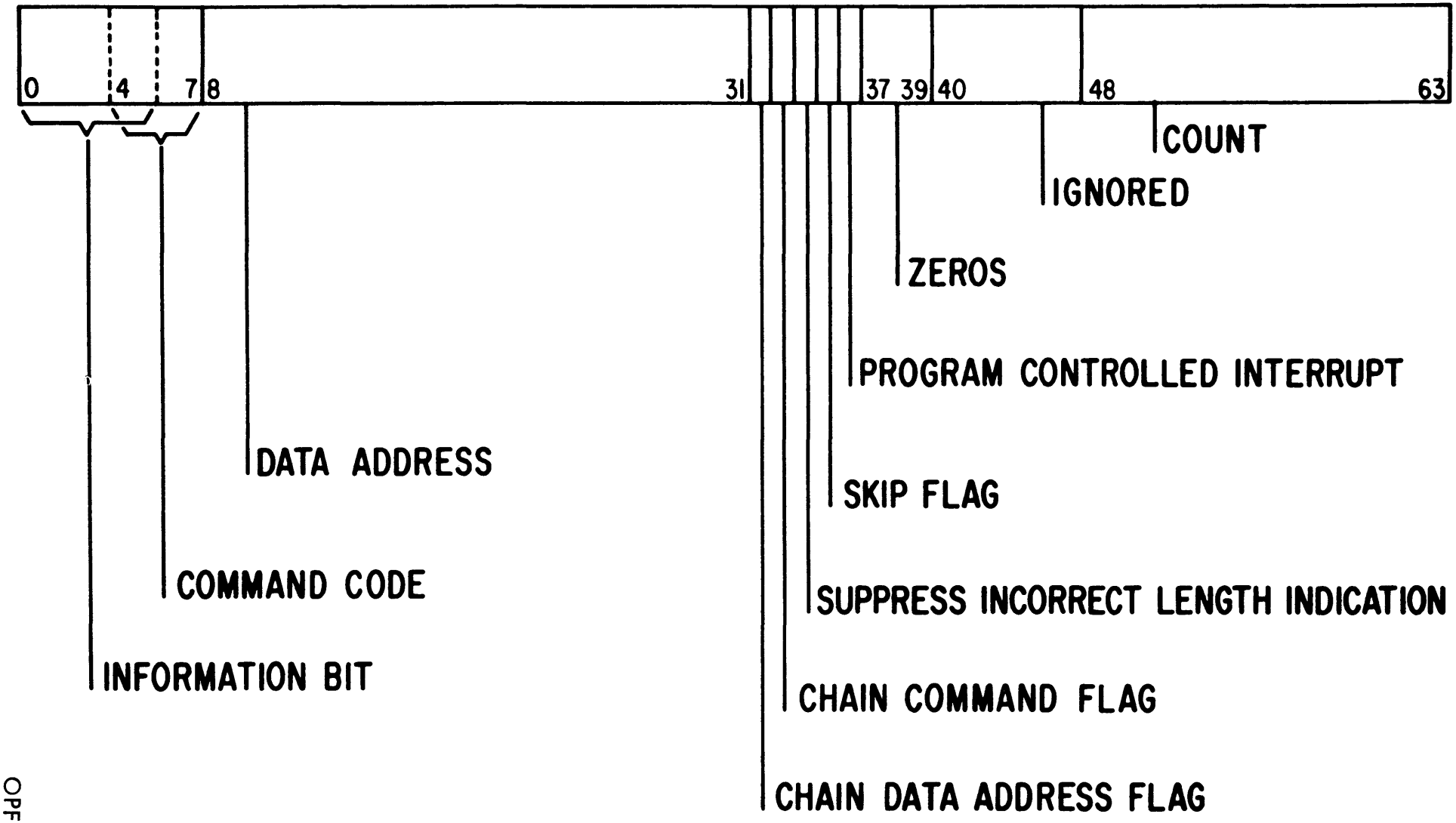
— Set by IOS on unit check

IOBCSW

A(ECBIN)
CHANNEL STATUS
A(CHANPRG)
A(DCBIN)

— Stored by IOS on channel end

CHANNEL COMMAND WORD



SUMMARY OF COMMAND CODES

READ

WRITE

READ BACKWARD

SENSE

TRANSFER IN CHANNEL

CONTROL

* *REW*
* *RUN*
ERG
WTM
BSR
BSF
FSR
FSF
RELEASE
RESTORE
* *SEEK*
* *SET FILE MASK*

SEARCH

H.A.-EQ
ID-EQ
ID-HI
ID-EQ/HI
KEY-EQ
KEY-HI
KEY-EQ/HI

* MUST NOT APPEAR IN USER CHANNEL PROGRAM

CHANNEL PROGRAM EXAMPLES

* READING BLOCKS WHERE COUNT AGREES WITH PHYSICAL BLOCKSIZE.

```
CCW    X'02', TAPEAREA, 0, 100      Read 100 byte tape block
CCW    X'02', CARDAREA, 0, 80       Read card and stack in Pocked 1
```

* READING BLOCKS WHERE COUNT DIFFERS FROM PHYSICAL BLOCKSIZE

```
CCW    X'02', TAPEAREA, X'20', 90   SILI Flag
CCW    X'02'. CARDAREA, X'20', 50   SILI Flag, read part of buffer
```

* WRITING TAPE BLOCKS - INCORRECT LENGTH INDICATION MUST ALWAYS BE SUPPRESSED.

```
CCW    X'01', TAPEAREA, X'20', 100
```

* PRINTING - SILI MUST BE USED IF BUFFER IS NOT FULLY LOADED

```
CCW    X'11', PRTAREA, X'20', 95    Double space after printing
CCW    X'89', PRTAREA, 0, 132       Skip to 1 after printing
```

* CONTROL COMMANDS - COUNT MUST NEVER BE EOUAL TO ZERO

```
CCW    X'8B', 0, 0, 1               Skip to 1 immediately
CCW    X'1F', 0, 0, 1               Write tape mark
```

CHANNEL PROGRAM EXAMPLES

COMMAND AND DATA CHAINING

* READING 3 PHYSICAL BLOCKS FROM TAPE

```
CCW    X'02', AREA, X'40', 100
CCW    X'02', AREA+100, X'40', 100
CCW    X'02', AREA+200, 0, 100
```

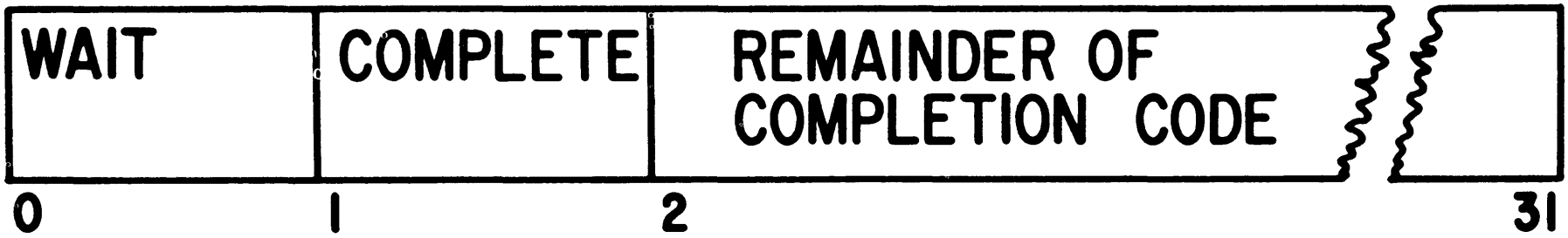
Each block is exactly 100 bytes long.

* SCATTERING ONE BLOCK INTO MULTIPLE AREAS

```
CCW    X'02', A, X'80', 50
CCW    0, B, X'80', 20
CCW    0, C, X'20', 25
```

Read 1st 95 bytes of a tape record and suppress incorrect length.

EVENT CONTROL BLOCK (ECB)



	TERMINATED	INTERCEPTED	OTHER	
7F000000	✓			WITHOUT ERROR
41000000	✓			PERMANENT ERROR
42000000	✓			VIOLATION D/A EXTENT ADDR.
44000000		✓		PERMANENT ERROR
48000000			✓	REQUEST ELEMENT AVAILABLE
4F000000			✓	DIRECT ACCESS ERROR

PROGRAMMING FOR DASD

PROGRAMMER RESPONSIBILITIES:

- ISSUING OPEN, EXCP, AND CLOSE MACROS
- CONSTRUCTING IOB, INCLUDING SEEK ADDRESS
- CONSTRUCTING CHANNEL COMMANDS AND COUNT OR SEARCH FIELDS IN CORE
- EXTRACTING EXTENT BOUNDARIES FROM DEB
- UPDATING CYLINDER, HEAD, AND RECORD NUMBERS IN SEEK ADDRESS
- ON END-OF-EXTENT, RE-INITIALIZING SEEK ADDRESS TO BEGINNING OF NEXT EXTENT
- RECOGNIZING EOF ON INPUT FILES
- BUILDING DCB FILE MARK ADDRESS FOR AN OUTPUT FILE PRIOR TO CLOSE

DASD PROGRAMMING EXAMPLES

* READING 1ØØ BYTE DATA RECORDS WITHOUT KEYS

IOB	A(CHANPROG)				
	M	BB	CC	HH	R
SEEKADDR	Ø	ØØ	25	Ø2	1

```
IOAREA      DS    25F

CHANPROG    CCW   X'31',SEEKADDR+3,X'4Ø',5     Search ID = and
                                               chain commands

            CCW   X'Ø8',*-8,Ø,Ø                Transfer in channel
            CCW   X'Ø6',IOAREA,Ø,1ØØ           Read 100 Byte data
            ____________________________       area
            EXCP  IOB
```

DASD PROGRAMMING EXAMPLES

* LOADING 1ØØ BYTE DATA RECORDS WITHOUT KEYS

```
IOB                  ⌇
                     A(CHANPROG)

                M    BB   CC   HH   R
SEEKADDR        Ø    ØØ   25   Ø2   Ø     - RECORD # IN SEEKADDR IS 1
                                            LOWER THAN RECORD ID TO BE
                                            WRITTEN

                                 CC  HH  R  KL  DL
DISKAREA     DS     D           |25  Ø2  1  Ø   1ØØ|

DATAAREA     DS     CL 1ØØ

CHANPROG     CCW    X'31',SEEKADDR+3,X'4Ø',5     Search ID =, Immediately
                                                 preceding record
             CCW    X'Ø8',*-8,Ø,Ø                transfer in channel
             CCW    X'1D',DISKAREA,X'2Ø',1Ø8     Write count and data
             ____________________________        following next address
             EXCP IOB                            marker
```

Suggested Sequence: Reference

A. Introduction

This topic concerns the study of a ABEND Dump consisting of three load modules ABLE, BAKER, and CHARLIE. Their relationship to one another is interpreted in figure 1 of Appendix 15. The "ABDUMP DEBUGGING PROCEDURES" should be used as the primary text for discussion of System Control Flow, RB Queues and Trace AREAS. Appendix 15

The Student Project on Systems Debugging contains 32 questions which will give the student a fairly comprehensive study of the information contained in an ABDUMP. These questions are designed to be used in the classroom or as an outside project. When used in the classroom the instructor should give a brief introduction to each section and then allow student time to develope his answers. At the completion of a section the instructor should summarize the important points that should have been discovered by the student.

It is important that the students be given a chance to study the dump without expensive instructor guidance. This will aid him in learning the fundamentals of the structure of the dump.

INSTRUCTORS' NOTE:

This section should serve as a review of OS/360 LOGIC FLOW topic.

B. Requirements for obtaining an ABDUMP.

1. Assign questions 1 and 2.

2. Discuss under what conditions SYSABEND DD statement would be included.

C. Device allocation.

1. Assign questions 3 thru 8.

2. Discuss the following control blocks, their function, and describe when they were created.

Suggested Sequence: Reference

a) TIOT

b) DEB

c) DCB

D. Contents supervision.

1. Assign questions 9 thru 24.

2. These questions concentrate on the size of the nucleus, size of partions, and the two RB Queues that make up the Contents Directory for Option 1 of OS/360 (PCP).

E. Save Area Trace.

1. Assign questions 25 thru 27.

2. Discuss the value of forward chaining of the Save Area.

3. Discuss the advantages and disadvantages of using the DD field of the LINK and SAVE macros.

4. Frequently word 00 (word where Register normally stored) of the SAVE AREA pointed to by register 13 will have a valid address. Because Register 0 is a parmeter passing register it seldom contains a valid address, therefore when word 00 of SAVE AREA has a valid address it usually means that a branch was taken to an access routine. In these routines they issue a STM 14, instruction for the registers they are going to use. They store them in the 00 location of the current Save Area. Therefore, word 00 contains the contents of register 14 which is the return to the program that called the access routine. This address can be used as a checkpoint in identifying how far the program had proceeded if the Resume PSW did not have a valid address with which to work.

F. Control of Program Interrupts.

1. Assign question 28.

Suggested Sequence: Reference

2. An important area to stress is testing to see if a previous SPIE macro has been issued, if it has the pointer to the PICA must be saved and PIE must be reset to point to this PICA upon exiting the current routine.

G. Trace Table.

1. Assign questions 29 and 30.

2. Discuss the value of the Trace Table. Emphasize the amount of care it requires and the benifits derived from it.

H. Locate and identify the Control Blocks associated with Data Control Blocks.

1. Assign questions 31 and 32.

I. Compare ABDUMP with Indicative Dump.

1. When is an Indicative Dump provided?

2. What is its value compared to a ABDUMP?

INSTRUCTORS' NOTE:

Refer to OS Messages, Completion Codes and Storage Dumps (C28-6631) page 287, to discuss the answers to the above two questions.

Suggested Sequence: Reference

A. Introduction

1. Incorporated into the hardware of the System/360 is a Supervisor Call (SVC) instruction. This instruction causes an interrupt with the OLD SVC PSW stored. The SVC code number, in the range from 0 to 255, and writtin in the operand field of the SVC instruction is placed in the fourth byte of the OLD SVC PSW for subsequent retrieval and use. OPF IV-1

2. The software implementation of this hardware feature (SVC) is arbitrary and can be designed in many imaginative and creative ways. In our discussion, however, we shall consider only how the SVC software is implemented in the 360 Operating System (OS).

3. Because of the fact that SVC routines (routines called by a given SVC number) can be an integral part of the resident control program, one is not as free in writing routines of this type as in writing a separate programming routine to be executed separately from its location in LINKLIB.

4. The SVC routine and the SVC library concept allow the resident control program to be much shorter than would otherwise be possible with a completely resident system, allow standardized and generalized routines to be always available but not included in every program which needs them; and further, allow the program to be executed in supervisory mode, thus reducing the restrictions normally associated with the problem state of the machine.

5. In this section we shall consider:

   a. The fundamental concepts.

   b. The placing of a routine in SYS1.SVCLIB library.

   c. The options which may be exercised at SYSGEN time.

   d. The writing of an SVC routine of the various types.

Suggested Sequence: Reference

e. Limitations, restrictions and over-all concept and understanding shall be stressed.

B. Fundamental Concepts and Terminology

1. Writing the SVC

Routines are called from the SVC library (actually the SYS1.SVCLIB cataloged and partitioned data set) by giving the following instruction:

SVC n 1

where: n is the decimal SVC code number from 0 to 255.

2. IBM Reserved SVC Code Numbers

The numbers (n) from 0 to 199 have been reserved for IBM generated SVC routines. The numbers 0-69 are in current use. 1

3. User Reserved SVC Code Numbers

The numbers (n) from 200-255 (56 in total) are reserved for user SVC routines and are to be allocated backward, starting with 255 and allocating toward 200. 1 OPF IV-2 and IV-3

4. The Prefix Table Appendix XX

a. A single byte (8 bit) index pointer entry table is used to convert SVC code numbers to SVC table entries at SVC execution time.

b. A maximum of 256 possible table entries is possible (one for each SVC code number in current use).

c. These entries are generated at SYSGEN time based on the SVCTABLE parameter specifications.

Suggested Sequence: Reference

5. The SVC Table

a. Format of Section 1 of SVC Table

1) Twenty-one (21) high order bits of a twenty-four (24) address pointer. 2

2) A three (3) bit field designating 1 to 6 double-word extended storage areas in the Supervisor Call Request Block (SVRB). The pointer in register 5 indicates where the SVRB is located. This area of a maximum of 48 bytes of additional storage area for routine use is displaced by 96 from the starting of the SVRB Block. Thus, if one desires access to the first word, an L n, 96 (5) instruction would be appropriate.

b. Format of Section 2 of SVC Table

1) Normally, a three (3) bit field designating 1 to 6 double word extended storage areas in the request block (SVRB). These 3 bits are in the low order part of a byte, the high order 5 bits being zero. The number in the byte is actually one greater than the number of double words requested, therefore, when no reservation is made a one (1) is present and when 6 double words are requested (48 bytes), a 7 in hexadecimal (or 00000111) appears in the byte.

2) Or, if the TRSVCTBL option is selected in the SUPRVSOR macro at SYSGEN time, a four (4) bytes field containing a ten (10) bit track address (TT), an eight (8) bit record number (R), an eleven (11) bit length (1), and a three (3) bit extended storage area (ESA) field. This section of the SVC Table resides in core and is created during the Nucleus Initiation Program (NIP) after each IPL. **Appendix XXV**

Suggested Sequence: Reference

6. Residence for SVC Routines

   a. As a member of a cataloged, partitioned data set on the systems residence device (SYS1.SVCLIB).

   b. Or, as a resident SVC routine in the primary control program (PCP) area.

7. Types of SVC Routines OPF IV-4

   a. Type 1 - resident, serially-reusable, non-interruptable.

   b. Type 2 - resident, re-entrant, interruptable.

   c. Type 3 - non-resident, re-entrant, single module, interruptable.

   d. Type 4 - non-resident, re-entrant, multiple modules, interruptable.

8. Review and/or redefinition of serially-reusable and re-entrant.

   a. Serially-reusable

      A routine designed and written in such a manner so that the routine normally resets all modified areas before it exists.

   b. Re-entrant

      A routine designed so that the routine can be interrupted and continued at any point without catastrophic results.

9. Naming Conventions for SVC Routines 3

   a. Type 1 - IGCnnn OPF IV-5

   b. Type 2 - IGCnnn+

   c. Type 3 - IGC00nnn+

   d. Type 4 - IGCssnnn

   NOTE: The above names are the member names

Suggested Sequence: Reference

which are used in cataloging the SVC into the SYS1.SVCLIB data set. nnn is the SVC code number and ss is the module order number (01 for the second module). Since the system constructs these names from the SVC in instruction, it is absolutely necessary that the SVC programmer place into the SVCLIB a routine which is named properly so that it can be retrieved when desired.

10. Routines specifically included in system to support SVC instruction and SYS1.SVCLIB data set. — 4 Appendix XXI

    a. Resident (in PCP)

        1) SVC First Level Interrupt Handler (FLIH).

        2) SVC Second Level Interrupt Handler (SLIH).

        3) Type 1 Exit

        4) EXIT (SVC 3)

    b. Part of NIP (optional)

        The TTR SVC Table Initiation routine for transient (non-resident) SVC types.

INSTRUCTORS' NOTE:

At this point the functions and logical flow of the routines to support the SVC system can be undertaken. However, the routines are somewhat sophisticated and any effort to cover them should be done with full knowledge of the interest and capabilities of the student body as well as their probable use of the information.

C. Why have SVC Routines?

1. Allow a smaller primary control program (PCP) than otherwise possible.

2. Allow execution of routines in "supervisory" state avoiding "problem" state limitations.

3. Allow a generalization, standardization and availability of often-used routines and/or programming procedures.

Suggested Sequence:	Reference
D. Understanding How the SVC System Functions	4
1. An interrupt takes place.	
2. SVC interrupts transfers to the SVCFLIH routine with all interrupts (except machine check) disabled.	Appendices XXII, XXIII, XXIV
3. A check is made for Type 1 or other routine requested.	
4. On Type 1, the registers are stored, the transfer address is retrieved for the SVC Table, Section 1 by use of the index pointer of the Prefix Table. Return is made from Type 1 routines by a BR 14 instruction. Therefore, Type 1 routines must Save and Restore Register 14 if used by the routine itself.	OPF IV-56 and IV-7
5. On Types 2, 3 and 4 SVC routines, Saved registers are moved to the TCB. An SVRB is constructed using ESA definitions from the SVC table.	
6. On Type 2 SVC routines, the SLIH routine stores requestor's PSW in the current RB, develops the transfer address and initializes it in the SVRB and queues the SVRB into the active RB queue. Return is made by either a BR 14 or SVC 3 (EXIT).	
7. On Type 3 and Type 4 SVC routines, the SLIH Type 3 section stores requestor's PSW in current RB, examines SVC Table, extracts ESA field and creates and initializes SVRB. If routine is not already in transient area, FINCH routine (combination of BLDL and FETCH) is called to retrieve it and place it in the transient area.	
8. Normal return for Type 3 routines is BR 14 or SVC 3 (EXIT). Generally speaking, the SVC 3 is safer.	
9. Normal exit for Type 4 modules is XCTL IGCSSnnn for all modules except the last. On the last module SVC 3 (EXIT) is the best way to leave routine and terminate entire SVC procedure and return to the calling program just beyond the SVC which started the procedure.	

Suggested Sequence: Reference

E. Writing the SVC Routine

1. Writing Type I Routines

a. This type of routine must be incorporated at systems generation (SYSGEN) time using the RESMODS macro. 5

b. Its control section must be properly named. For example, a user Type 1, resident, non-interruptable routine for SVC code number 255 would be IGC255.

c. An entry must be placed into the SVC Table using the SVCTABLE SYSGEN macro. For example, to include a user SVC entry for code 255, Type 1 and no ESA areas would be accomplished by the following macro:

```
SVCTABLE SVC-255-T1-S0
```
5

d. Program should either be re-entrant or serially reusable.

e. Program should be terminated with a BR 14.

2. Writing Type 2 Routines

a. Must be incorporated at SYSGEN time using the RESMODS macro. 5

b. Debugged, cataloged, partitioned data set must be on a library.

c. An SVCTABLE card such as the following must be used:

```
SVCTABLE SVC-255-T2-S6
```

d. Program must be re-entrant.

e. EXIT from routine must be through a BR 14 or SVC 3 (EXIT).

3. Writing Type 3 Routines

a. Entries in SVC Table must be made at SYSGEN time.

b. After debugging: assembled and link edited partitioned data set may be placed

Suggested Sequence: Reference

on SYS1.SVCLIB data set by DDNAME=SYS1.SVCLIB (IGC0025E) in the SYSLMOD DD card.

c. Program must be written re-entrant.

d. Exit from routine must be by an SVC 3 (EXIT).

4. Writing Type 4 Routines

a. Entries must be made in SVC Table at SYSGEN time.

b. Routines should be assembled, link edited and run as an entity if at all possible.

c. Then, routines should be assembled, link edited and placed on the SYS1.SVCLIB data set under their proper names.

d. Normal return for each module is by an XCTL IGC0125E (next module). Last module should return by an SVC 3 (EXIT).

F. Representative Problems and Examples

1. WTO/WTOR (SVC 35 Type 3 Routine) Example — Appendix XXVI

2. FIND/BLDL (SVC 18 Type 2 Routine) Example — Appendix XXVII

3. STOW (SVC 21 Type 3 Routine) Example — Appendix XXVIII

G. SVC Writing Checklist

1. Is the control section properly named? IGC255 or IGC0025E for Type 1 and 2 or Types 3 and 4 respectively.

2. Does program start with first byte? (No constants or control blocks up front.)

3. Types 2, 3 and 4 must be re-entrant. All locations which must be modified must be built in a GETMAIN dynamic storage area. Modules may be tested for being re-entrant by using TESTRAN and the dump CHANGES macro or RENT parameter of F ASSEMBLER.

4. Do Type 1 routines terminate with a BR 14? Do Type 2, 3 and last module of Type 4 routines

Suggested Sequence: Reference

terminate with an SVC 3 (EXIT)? Do other Type 4 modules terminated with an XCTL IGCssnnn where ss is module name and nnn+ is SVC code number? +

H. Placing an SVC Routine in SVC Library

1. Directly

By specifying DDNAME=SYS1.SVCLIB (member name) in SYSLMOD card. Thus, a Type 3 routine would be written as follows:

```
//SYSLMOD DD DSNAME=SYS1.SVCLIB(IGC0025E)
```

for SVC 255 Type 3 routine.

2. By copying and inserting a tested module from another data set. 7

Considerations in copying the SVCLIB. The moving or copying of this library should be done with caution due to the fact that the system is using this library concurrently while it is making a fresh copy. After building a new SVCLIB, it is not usable until a program call IEHIOSUP is run.

The function of this program is to update TTR's in the Transfer Control Tables in some of the Data Management modules. Because there are absolute track addresses in these modules, the SVCLIB is marked unmovable. When using the MOVE function of IEHMOVE, the source data (or old SVCLIB) is scratched. For this reason and because IEHIOSUP must be run before you IPL and use the new SVCLIB, it is not a good idea to use this method.

The following discussion describes how this can be accomplished using the "COPY" function of IEHMOVE. (Only cards that are not self-explanatory and are unique to this operation will be explained.)

Card

3 Space is allocated for the new copy of SVCLIB temporarily named SVCLIB2. VOLUME=SER=SYSRES is important because the SVC library must be on the system residence pack. OPF IV-8

Suggested Sequence: Reference

Card

5 A DD card is required for the Data Set from which you are going to merge the new module.

9 Control card for IEHMOVE instructing it to copy the current SVCLIB to SVCLIB2.

11 Control card instructing IEHMOVE to merge module "NEWSVC" into SVCLIB2.

13 IEHIOSUP is executed to update the absolute track address in the transfer control tables in the data management modules in SVCLIB2.

16 IEHPROGM is run to scratch the old SYS1.SVCLIB and to rename SVCLIB2 to SYS1.SVCLIB.

23 Now that the new SVCLIB is ready to use, the user must IPL so that NIP will open the new library and the system will use it for all of its future loading of SVC routines.

3. SVCLIB Macro Instruction 7

a. Names the members of a PDS to be added to SYS1.SVCLIB during the system generation process.

b. Applies to Types 3 and 4 only.

c. The user may add his module to SVCLIB later - through LINKEDIT:

```
//SYSLMOD DD DSNAME=SYS1.SVCLIB

    OR THRU UTILITIES:

  MOVE (or COPY) PDS

    INCLUDE  (New member)
```

d. Format of operands is the same as in RESMODS, though here the member names must be strictly defined.

e. Example: To insert a Type 3 SVC routine with code number 254,

```
SVCLIB  PDS=SYS1.SET,MEMBERS=(IGC0025D)
```

Suggested Sequence: Reference

I. Considerations

1. Resident or Non-resident
2. Re-entrant construction — OPF IV-9
3. Routine naming — OPF IV-10 and IV-11
4. Entry point positioning
5. Terminating methods
6. Use of SVCTABLE, RESMODS and SVCLIB macros at SYSGEN time.
7. Writing and debugging
8. Cataloging into SYS1.SVCLIB
9. Moving or Copying into SYS1.SVCLIB.

J. Practice Problem

INSTRUCTORS' NOTE:

During the OS/360 Work Shop the student writes an SVC Type II for the accounting routine and also writes a non-standard label routine which goes into the SVCLIB and has the same restrictions as a Type 3 or 4 SVC. Because of this, no additional practice is required for SVC's.

TOPIC IV
REFERENCES

EFERENCE CODE	OS/360 System Programmer's Guide C28-6550	Fixed Task Supervisor Program Logic Z28-6612	Utility Programs C28-6586-2	Systems Generation C28-6554	Introduction to Control Program Logic Y28-6605			
1		13						
2		13-14						
3	40							
4		12-16						
5			47					
6			46					
7		15-26						

SVC ROUTINES IN DISTRIBUTED SYSTEM **

TYPE 1	TYPE 2	TYPE 3	TYPE 4
EXCP (00)	LINK (06)	SPIE (14)*	ABEND (13)
WAIT (01)	XCTL (07)	EXTRACT (40)*	OPEN (19)
POST (02)	LOAD (08)	IDENTITY (41)*	CLOSE (20)
EXIT (03)	SYNCH (12)	ATTACH (42)*	OPENJ (22)
GETMAIN (04)	BLDL (18)	ERREXCP (15)	TCLOSE (23)
FREEMAIN (05)	OVERLAY SUPERVISOR (37)	PURGE (16)	CATALOG (26)
DELETE (09)	RESIDENT SVC (38)	RESTORE (17)	CVOL (28)
GETMAIN/ FREEMAIN (10)		STOW (21)	SCRATCH (29)
TIME (11)		TRACK	EOV (31)
TTIMER (46)		BALANCE (25)	ALLOCATE (32)
		OBTAIN (27)	EXCP-MASTER (34)
		RENAME (30)	ABDUMP (51)
		WTO (35)	EOV (55)
		CIRB (43)	
		TTOPEN1 (49)	
		SAVE (61)	
		RDJFCB (64)	
		BACKSPACE (69)	

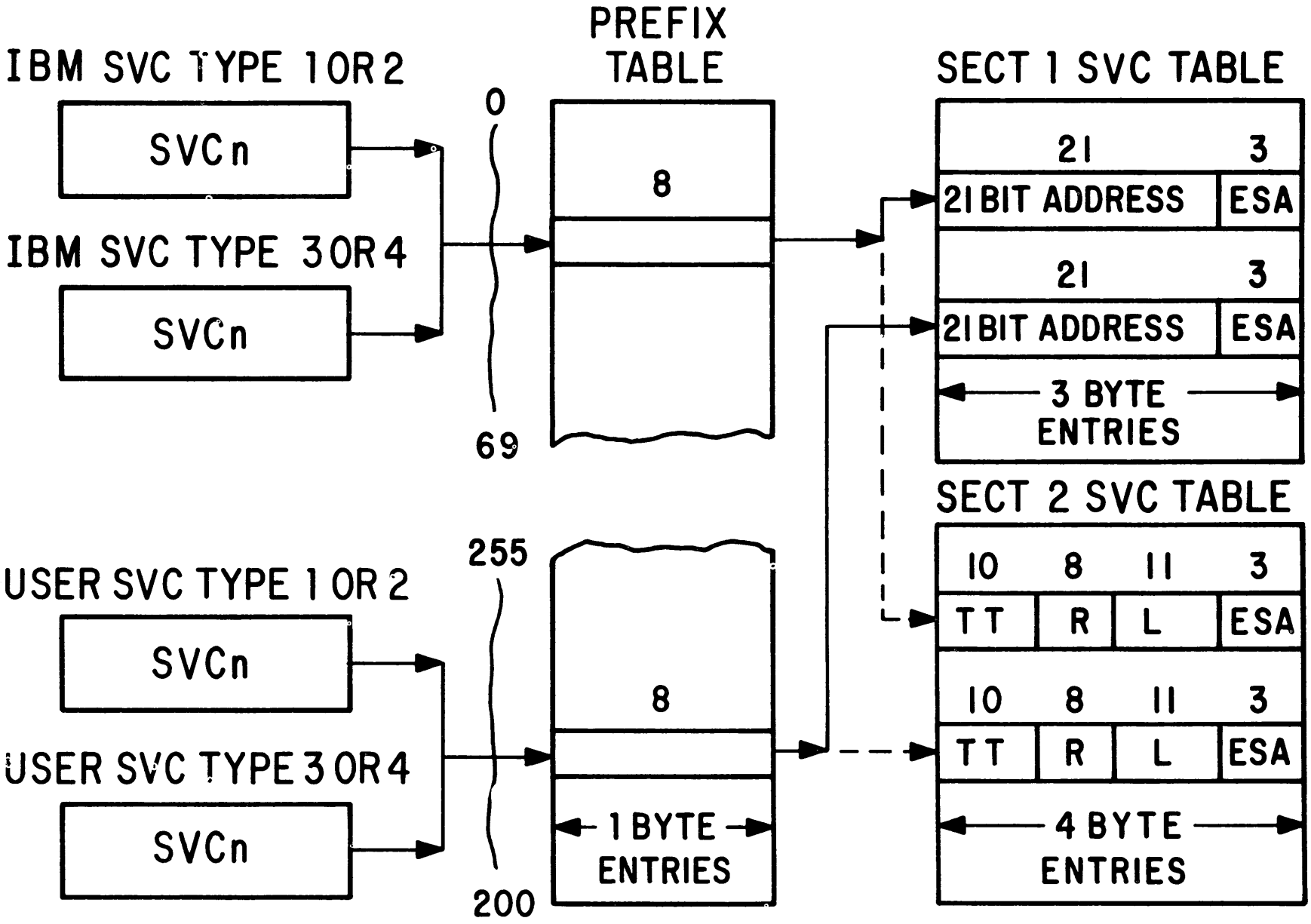
* Optionally, can be Type 2

** OS/360 Release #1

TABLES USED BY SVC AND THEIR FUNCTION

TABLE	SIZE / ENTRY	ENTRIES (MAX.)	FUNCTION
1. PREFIX	SINGLE BYTE	256	INDEX POINTER TO SVC TABLE SECTION 1 OR SECTION 2
2. SVC TABLE SECTION 1	3 BYTES	VARIABLE (21 IN DISTRIBUTED VERSION)	(1) A 24 BIT ADDRESS OF ENTRY POINT OF RESIDENT ROUTINE (2) A 3 BIT FIELD DESCRIBING THE NUMBER OF ESA DOUBLE WORDS (3) A SINGLE BIT IDENTIFYING ROUTINE AS TYPE 1 OR 2
3. SVC TABLE SECTION 2 (NO TRSVCTBL OPTION IN SUPERVISOR MACRO).	1 BYTE	VARIABLE (25 IN DISTRIBUTED VERSION)	A 3 BIT FIELD DESCRIBING THE NUMBER OF ESA DOUBLE WORDS
OR			
SVC TABLE SECTION 2 (A TRSVCTBL OPTION ENTRY IN THE SUPERVISOR MACRO).	4 BYTES	VARIABLE (NOT IN DISTRIBUTED VERSION)	(1) A 10 BIT TT FIELD (2) A 8 BIT R FIELD (3) A 11 BIT L FIELD (4) A 3 BIT ESA FIELD

RELATIONSHIP BETWEEN SVC, PREFIX TABLE AND SVC TABLE



SVC ROUTINE TYPE VERSUS ROUTINE CHARACTERISTICS

ROUTINE TYPE	CHARACTERISTICS
TYPE 1	SERIALLY REUSABLE OR REENTRANT, NON-INTERRUPTABLE
TYPE 2	REENTRANT, INTERRUPTABLE
TYPE 3	REENTRANT, INTERRUPTABLE, SINGLE ROUTINE LESS THAN OR EQUAL TO 1024 BYTES.
TYPE 4	REENTRANT, INTERRUPTABLE, n ROUTINES LESS THAN OR EQUAL TO 1024 BYTES. ENTERED BY XCTL MACRO.

ASPECTS FOR CONSIDERATION IN WRITING SVC ROUTINES

(1) Use proper control section name

IGCnnn	CSECT	Type 1 and 2
or		
IGC00nnn+	CSECT	Type 3
or		
IGCssnnn+	CSECT	Type 4

(2) Use proper return or exit

BR	14	All types if register 14 has been saved
XCTL	IGCssnnn+	All but last load module of Type 4 routines
SVC	3	Calls EXIT routine. Types 2, 3 and last load module of Type 4.

(3) Do not modify instructions or data in the routine itself. Instead, use register storage and/or GETMAIN macro.

ROUTINES IN SUPERVISION TO SUPPORT SVC

(1) SVC FLIH Routine

(2) SVC SLIH Routine

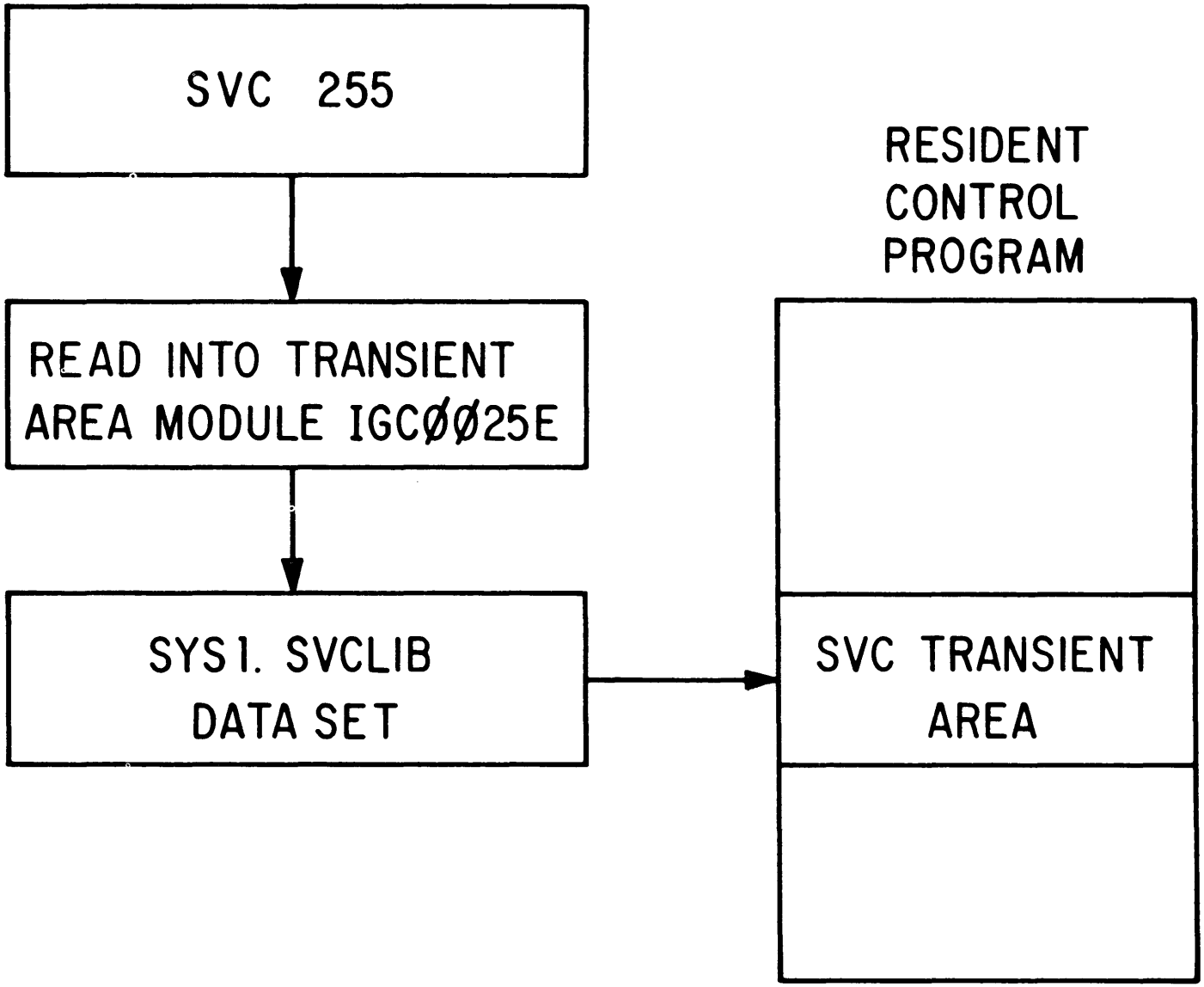
(3) TYPE 1 EXIT Routine

(4) EXIT Routine (used by Types 2, 3 and 4 programs)

OPTIONAL ROUTINE IN NUCLEUS INITIATION PROGRAM (NIP)

(1) SVC Table (TTR) Initiation Routine

RELATIONSHIP BETWEEN SVC SYS1.SYSLIB AND TRANSIENT AREA



```
//UPDATE JOB    999,PRN,MSGLEVEL=1                                              1
//STEPA  EXEC   PGM=IEHMOVE                                                     2
//A      DD     DSNAME=SVCLIB2,DISP=(NEW,KEEP),SPACE=(CYL,(13,,50)),     C     3
//             UNIT=2311,VOLUME=SER=SYSRES                                      4
//B      DD     DSNAME=USERLIB,DISP=OLD                                         5
//SYSUTI DD     DSNAME=SYS1.LINKLIB,DISP=OLD                                    6
//SYSPRINT DD   SYSOUT=A                                                        7
//SYSIN  DD     *                                                               8
       COPY     PDS=SYS1.SVCLIB,TO=2311=SYSRES,                          C     9
                FROM=2311=SYSRES,RENAME=SYCLIB2                                10
        INCLUDE  DSNAME=USERLIB,MEMBER=NEWSVC                                  11
/*                                                                             12
//STEPB  EXEC   PGM=IEHIOSUP                                                   13
//SYSUT1 DD     DSNAME=SVCLIB2,DISP=(OLD,KEEP)                                 14
//SYSUT2 DD     DSNAME=SVCLIB2,DISP=(OLD,KEEP)                                 15
//STEPC  EXEC   PGM=IEHPROGM                                                   16
//A      DD     DSNAME=SYS1.LINKLIB,DISP=OLD                                   17
//SYSPRINT DD   SYSOUT=A                                                       18
//SYSIN  DD     *                                                              19
      SCRATCH  SYS1.SVCLIB,VOL=2311=SYSRES                                     20
      RENAME   DSNAME=SVCLIB2,VOL=2311=SYSRES,NEWNAME=SYS1.SVCLIB              21
/*                                                                             22
****     IPL     FROM    SYSRES    ***************************************     23
```

SVC CHECKLIST

(1) IS CONTROL SECTION NAMED PROPERLY?

(2) IS THE FIRST LOCATION OCCUPIED BY THE FIRST BYTE OF THE FIRST INSTRUCTION?

(3) DOES ROUTINE CAUSE ITSELF TO BE OVERLAYED WITHOUT BEING REENTRANT?

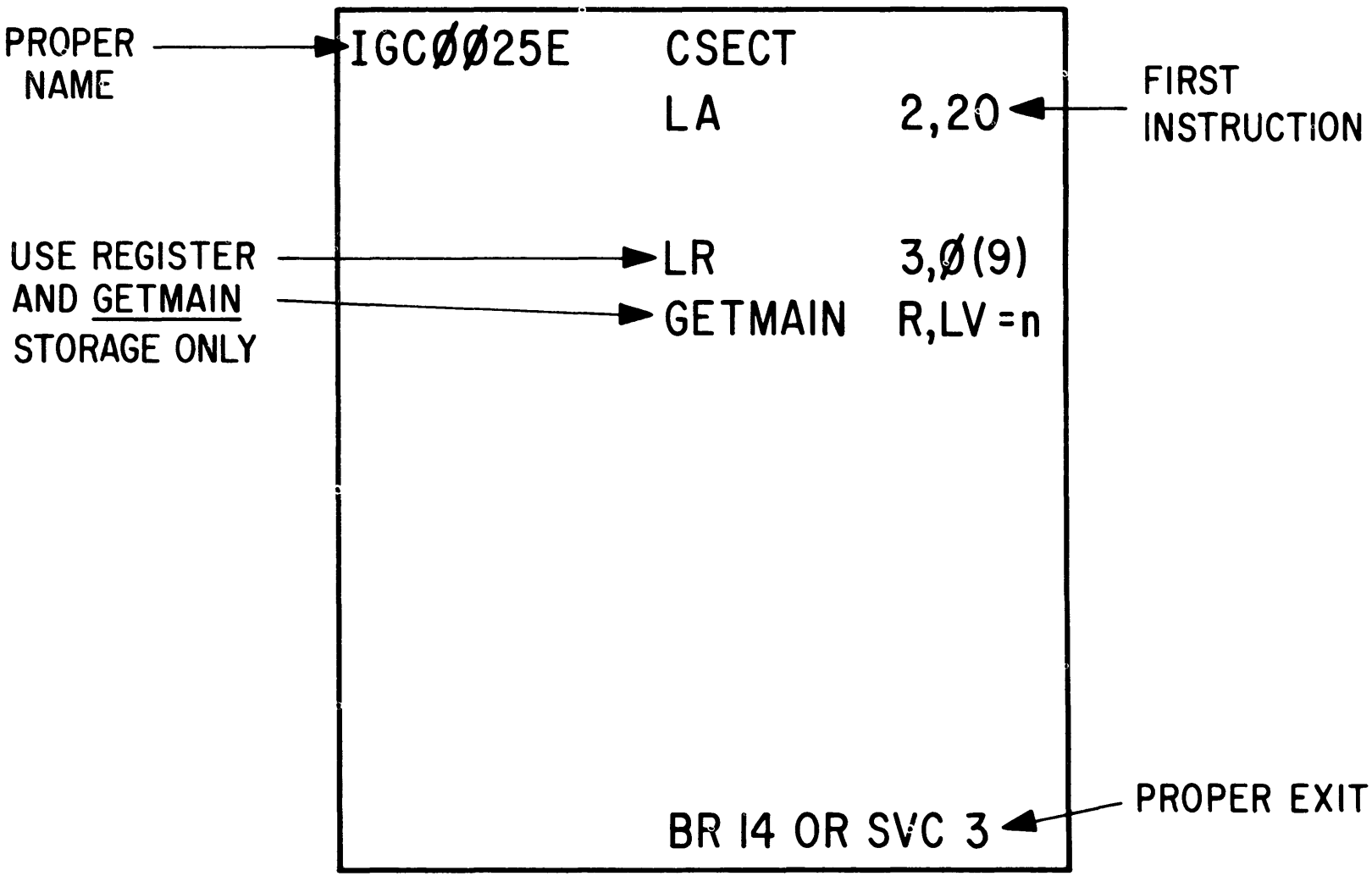
(4) ARE ANY LOCATIONS MODIFIED IN THE PROGRAM FOR TYPES 2, 3 and 4?

(5) IS PROPER EXIT USED?

REGISTER POINTERS ON ENTERING AN SVC ROUTINE

REGISTER	MEANING
3	Communication Vector Table (CVT) Pointer
4	Task Control Block (TCB) Pointer
5	Supervisor Request Block (SVRB) Pointer for Types 2, 3 and 4. Last Active Request Block for Type 1 Routines
14	Contains return address
0, 1, 15	Used for passing information between routines. Not restored.

MAIN POINTS IN WRITING SVC ROUTINES



Suggested Sequence: Reference

A. Introduction

1. An accounting routine can be incorporated into the system for automatic recording of time and account number by job and/or job step.

2. Control is passed to the accounting routine at job and job step termination.

3. Up to 144 characters of accounting data can be passed from the JOB or EXEC statement. OPF V-1

B. How to Write an Accounting Routine OPF V-2

1. Entry Linkage 1

a. The entry point in the accounting routine must be named IEFACTRT. This name can be supplied in a CSECT statement or ENTRY statement.

b. A store-multiple instruction is issued to save the contents of registers 0-14. Register 13 contains the address of a register save area of 18 full words. The SAVE macro can be issued.

[SAVE (14,12)]

2. Parameters passed to the accounting routine. OPF V-3 2

a. Register 1 contains the starting address of a list of seven pointers. Each pointer is 4 bytes long and begins on a full word boundary. Appendix X

1) Pointer 1 contains the address of the job name, which is located in an 8 byte field, left-adjusted with trailing blanks, EBCDIC coding.

2) Pointer 2 contains the address of the step name, which is located in an 8 byte area, left-adjusted with trailing blanks, EBCDIC coding.

3) Pointer 3 contains the address of a 20 byte area into which has been placed the programmer's name, left-adjusted with trailing blanks, EBCDIC coding.

Suggested Sequence: Reference

4) Pointer 4 contains the address of a 4 byte area.

a) The first three bytes are used to hold job running time. This will be provided by the system if option 4 and interval timing were selected at system generation. This field will be in packed format HHMMSS, (hour, minute, second). Without timing incorporated into the system, this field will contain zeroes.

b) The fourth byte will contain a binary count of the number of fields passed to the accounting routines in the JOB statement.

5) Pointer 5 contains the address of the job accounting data fields from the JOB statement. The fields are variable in length and contiguous in storage. The first byte of each field contains a binary count of the number of data characters to follow. The last data field is followed by a byte of zeroes.

6) Pointer 6 contains the address of a 4 byte area, of which the first three bytes will contain step running time with the same restrictions as 4) above. The last byte will contain a binary count of the number of step accounting data fields.

7) Pointer 7 contains the address of the area of step accounting data fields from the EXEC statement. The fields are variable in length and contiguous in storage. The first byte in each field contains a binary count of the number of data characters to follow. The last data field is followed by a byte of zeroes. (This pointer is zero when the job is terminated.)

b. Register 12 contains the address of a message queue block. This block can be used for output to the standard system output device.

Suggested Sequence: Reference

3. Output from the accounting routine. 3

   a. Console messages - can use WTO or WTOR OPF V-4

   b. System Output

      1) Register 12 must contain the same value as when the routine was entered. (It points to the message queue block, which is to be provided with the length and address of the date to be written. See System Programmer's Guide.) OPF V-5 OPF V-6

      2) Register 13 must contain the address of an area of 18 full words.

      3) The standard system output writer routine (IEFYS) can be used.

INSTRUCTORS' NOTE:

These are the only types of output available when the accounting routine is in storage. It is brought in as part of the job scheduler, so it would not be possible to OPEN and CLOSE a data set. OPEN and CLOSE could be simulated by the programmer by providing necessary control blocks (JFCB, TIOT, etc. and making appropriate changes to them as needed.

4. Exit Linkage OPF V-7

   a. Register 13 must be restored to point to the system's SAVE area.

   b. A RETURN macro can then be issued to restore the registers and branch back.

```
L       13,SAVE13

RETURN  (14,12)
```

5. Programming Considerations

   a. The programmer may issue the TIME macro to obtain date and clock time of day.

   b. The programmer should not issue the STIMER macro. Since this routine is a part of the job scheduler, exit from the routine will force reset of the time interval just set.

c. A new copy of the accounting routine is read into storage at step termination time and job termination time. This means that data cannot be stored within the routine for use at another time.

INSTRUCTORS' NOTE:

The following should be discussed at the instructor's discretion. An extensive knowledge of the O.S. Internals is assumed.

d. Passing of parameters may be accomplished in either of two ways.

1) Resident SVC routine - the accounting routine can issue an SVC instruction and cause control to pass to an SVC routine which is part of the nucleus. Data could be retained in this portion of main storage. This would have to be a type 1 - SVC.

a) Type 1 - SVC routines are assumed to be re-entrant or serially reusable. Data can be saved and reset by program self-modification or IPL.

b) Programming the SVC - routine.

- May not allow interrupts during execution.
- May not issue other SVC instructions.
- Exit using register 14.
- Parameters may be passed to the SVC routine using registers 0, 1, 13 and 15.
- Registers 2-14 are saved before control is passed to the SVC routine and restored when the return is made.

c) SVC routine must be included at System Generation time.

Suggested Sequence: Reference

2) The system data set SYS1. SYSJOBQE can be used for temporary storage. The Table Store Subroutine (p.37 in Job Management P.L.M.) can be used to assign tracks and read and/or write 176 byte records. The tracks are assigned only for the duration of a single job. Since SYSJOBQE is cleared between jobs, it cannot be used to retain job to job timing information.

C. How to Incorporate Into the System

1. At system generation time the user must specify that he has an accounting routine to incorporate by inserting in the SCHEDULR macro the parameter ACCTRTN=SUPPLIED.

2. The user-written routine can be link edited into the system at either of two times.

   a. Before SYSGEN - link edit into the system module library (SYS1.MODLIB) to replace the existing module IEFACTRT. OPF V-8

   b. After SYSGEN - link edit into the link library (SYS1.LINKLIB) to replace the control section IEFACTRT which is in the modules IEFZA and IEFYN. OPF V-9 OPF V-10

D. Student Problem Appendix XI

TOPIC V
REFERENCES

REFERENCE CODE	S/360 Operating System Programmer's Guide C28-6550
1	46
2	46
3	47

ACCOUNTING ROUTINES

```
//JOBA JOB  (A, B, . . .), 'JOE BLOW'

//     EXEC  . . ., ACCT = (A, B, . . .)
```

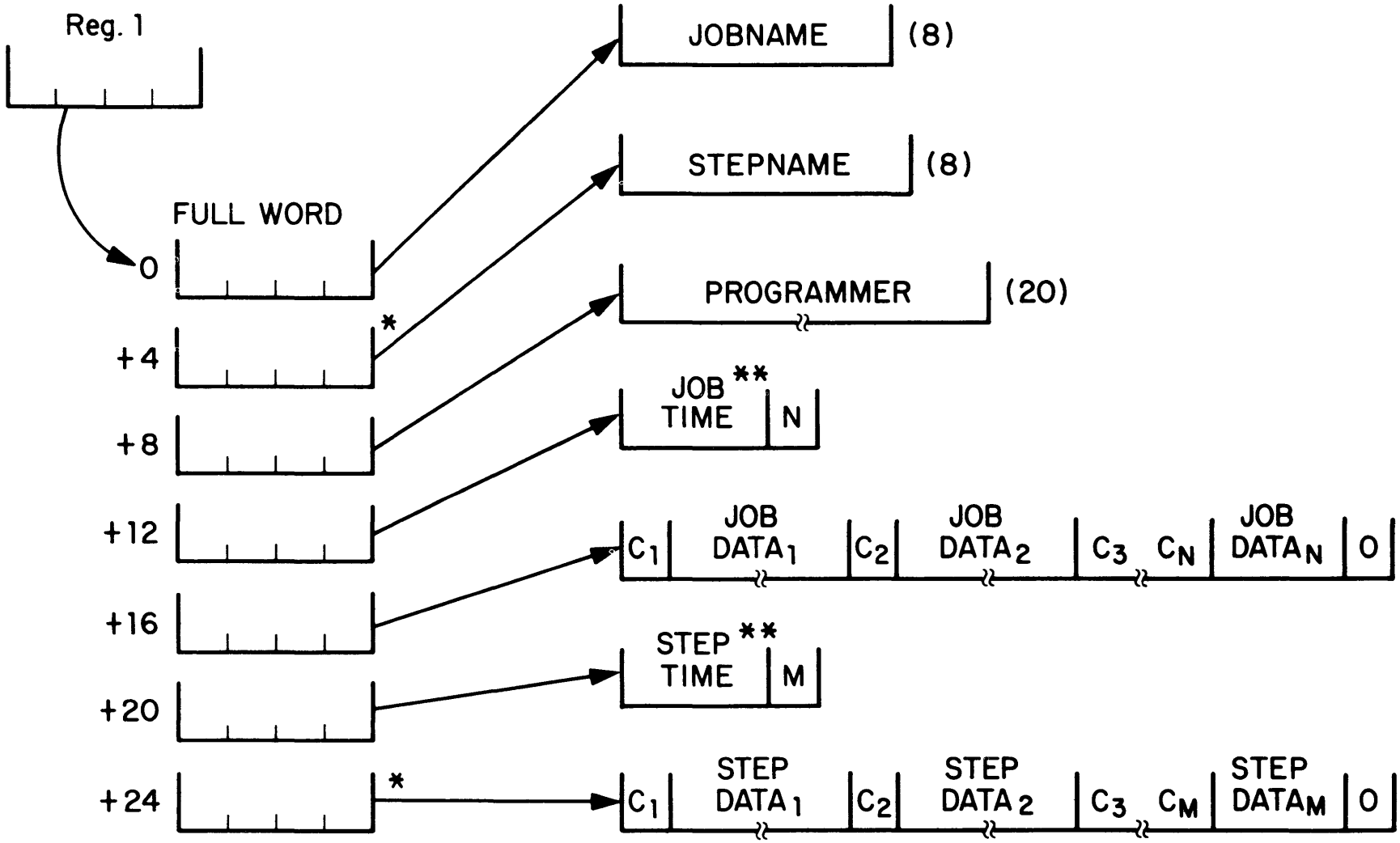
ENTRY LINKAGE

```
IEFACTRT  START 0
          SAVE (14,12)
          ST    13,SAVAR+4
```

OR

```
          CSECT
IEFACTRT  SAVE (14,12)
          ENTRY   IEFACTRT
          ST    13,SAVAR+4
```

PARAMETERS PASSED



* ZERO AT JOB TERMINATION

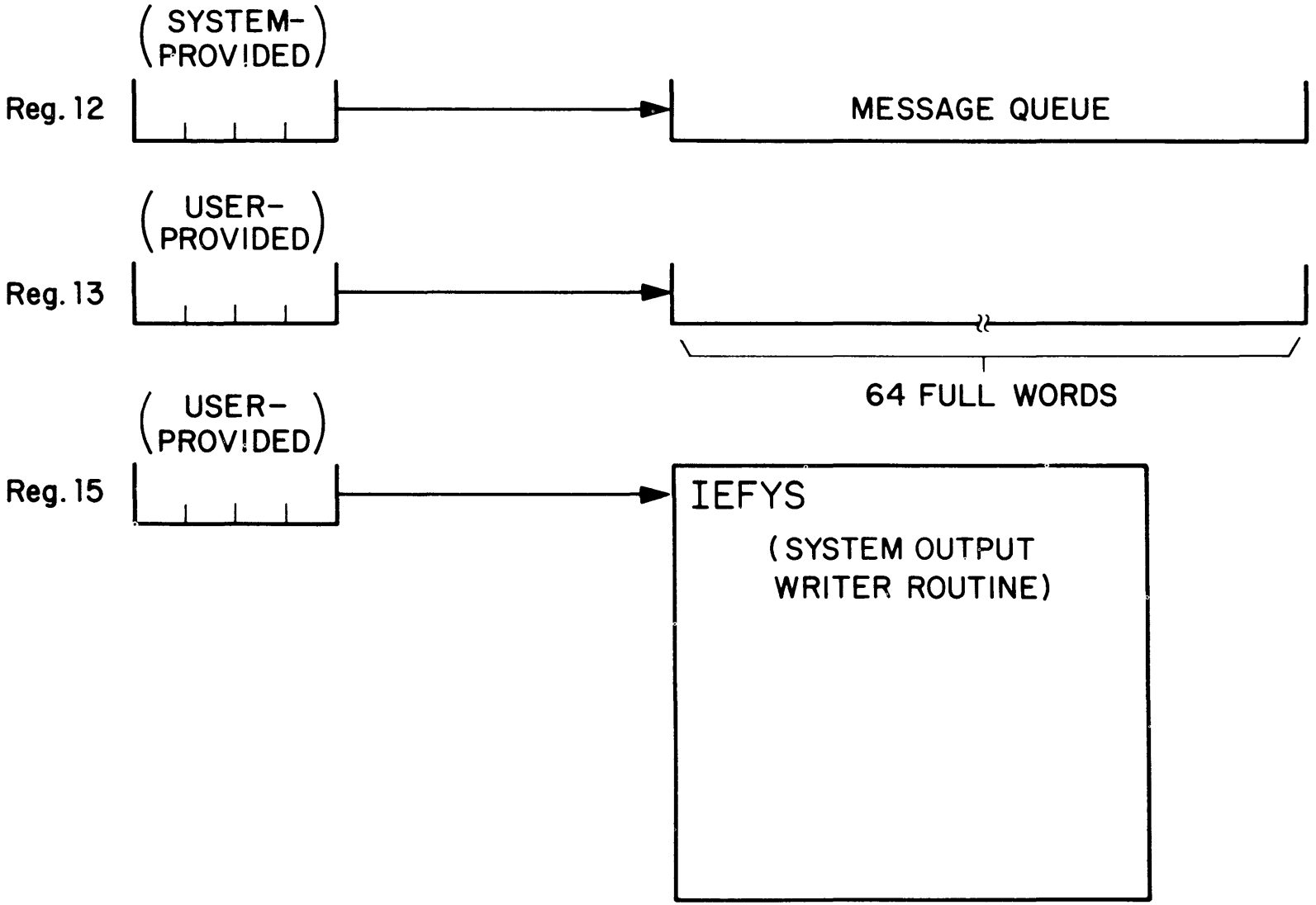
** ZERO WITHOUT OPTIONS 4 & 6B

OUTPUT TO CONSOLE

1. WTO

2. WTOR

SYSTEM OUTPUT



IBM IBM System/360 Assembler Coding Form

PROGRAM	ACCOUNTING ROUTINES		PUNCHING INSTRUCTIONS		PAGE OF
			GRAPHIC		CARD ELECTRO NUMBER
PROGRAMMER		DATE	PUNCH		

STATEMENT				Identification-Sequence
Name (1–8)	Operation (10–14)	Operand (16–71)	Comments	(73–80)
IEFACTRT	START	0		
	SAVE	(14,12)	SAVE REGISTERS	
	ST	13,SAVE	STORE 13	
	LA	13,SAVEAR	LOAD 13 WITH ADDR OF 64 FULL WORD AREA	
	MVC	36(4,12),MSGADDR	MOVE ADDRESS OF MESSAGE INTO QUEUE	
	MVC	42(2,12),MSGLEN	MOVE LENGTH OF MESSAGE INTO QUEUE	
	L	15,VCONYS	BRANCH AND LINK TO OUTPUT WRITER	
	BALR	14,15	ROUTINE	
	L	13,SAVE	RESTORE 13	
	RETURN	(14,12)		
SAVE	DS	1F		
SAVEAR	DS	64F		
MSGADDR	DC	A(MSG)		
MSG	DC	C'TEXT OF MESSAGE'		
MSGLEN	DC	H'LENGTH OF MESSAGE'		
VCONYS	DC	V(IEFYS)		
	END			

EXIT LINKAGE

```
L     13,SAVAR+4
RETURN  (14,12)
```

IBM IBM System/360 Assembler Coding Form

PROGRAM BEFORE SYSGEN

PUNCHING INSTRUCTIONS

PAGE 1 OF 1

GRAPHIC

CARD ELECTRO NUMBER

PROGRAMMER

DATE

PUNCH

STATEMENT — Name 1–8, Operation 10–14, Operand 16–, Comments; Identification-Sequence 73–80

```
//JOB1    JOB
//        EXEC  PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSPRINT DD   SYSOUT=A
//SYSUT1 DD     DSNAME=&TEMP,UNIT=2311,SPACE=(TRK,(20,10))
//SYSLMOD DD    DSNAME=SYS1.MODLIB,DISP=(OLD,KEEP)
//SYSLIN DD     *
          {
          {
          { NEW IEFACTRT        (OR INCLUDE)
          {
          {
 INCLUDE  SYSLMOD(IEFACTRT)
 NAME     IEFACTRT(R)
/*
```

IBM IBM System/360 Assembler Coding Form

PROGRAM	AFTER SYSGEN 44K SCHEDULER	PUNCHING INSTRUCTIONS		PAGE 1 OF 1
		GRAPHIC		CARD ELECTRO NUMBER
PROGRAMMER	DATE	PUNCH		

```
//JOB3    JOB
//        EXEC  PGM=LINKEDIT,PARM='NCAL'
//SYSPRINT DD   SYSOUT=A
//SYSUT1  DD    DSNAME=&TEMP,UNIT=2311,SPACE=(TRK,(20,10))
//SYSLMOD DD    DSNAME=SYS1.LINKLIB,DISP=(OLD,KEEP)
//SYSLIN  DD    *
         }
         }NEW IEFACTRT    (OR INCLUDE)
         }
 INCLUDE SYSLMOD(IEFYN)
 ALIAS   IEFYN
 ALIAS   IEFW21SD
 ENTRY   IEFSD011
 NAME    GO(R)
         }
         }NEW IEFACTRT    (OR INCLUDE)
         }
 INCLUDE SYSLMOD(IEFZA)
 ENTRY   IEFZA
 NAME    IEFZA(R)
/*
```

IBM IBM System/360 Assembler Coding Form

PROGRAM AFTER SYSGEN - 18K SCHEDULER	PUNCHING INSTRUCTIONS	PAGE 1 OF 1
	GRAPHIC	CARD ELECTRO NUMBER
PROGRAMMER / DATE	PUNCH	

```
//JOB2    JOB
//        EXEC  PGM=LINKEDIT,PARM='NCAL'
//SYSPRINT DD   SYSOUT=A
//SYSUT1  DD    DSNAME=&TEMP,UNIT=2311,SPACE=(TRK,(20,10))
//SYSLMOD DD    DSNAME=SYS1.LINKLIB,DISP=(OLD,KEEP)
//SYSLIN  DD    *
        {
        } NEW IEFACTRT    (OR INCLUDE)
        {
 INCLUDE SYSLMOD(IEFYN)
 ALIAS   IEFYN
 ENTRY   IEFSD011
 NAME    GO(R)
        {
        } NEW IEFACTRT    (OR INCLUDE)
        {
 INCLUDE SYSLMOD(IEFZA)
 ENTRY   IEFZA
 NAME    IEFZA(R)
/*
```

Suggested Sequence: Reference

A. To define non-standard label processing routines.

1. The existence of non-standard labels.

a. Direct-access-stored data sets must be written onto the new devices of the S/360; this is a hardware requirement.

1) Creation of new labels at data-set-creation time will cause little problem; thus little problem is encountered in creating standard labels for these data sets.

2) OS/360 requires S/360 standard labels for all data sets on direct-access-devices.

b. The 2400 tape drives have the capacity to handle tape volumes compatible with drives used by other IBM computer systems.

1) Without a hardware obligation to rewrite the data set, there is less impetus to create OS/360 standard labels for data sets.

2) OS/360 recognizes this situation, and permits the existence of /360 non-standard labels for data sets on magnetic tape volumes. In addition, tape volumes without labels are permitted by the system.

a) Unlabeled tape volumes are handled by a combination of DD card entries and code built into OS.

b) Non-standard labels are handled by extensions of OS, created by an installation to satisfy its own particular needs.

2. A characteristic of non-standard labels is that although they do not meet the requirements of OS/360 labeling conventions, they most likely will be labels that are standard to another computing system, e.g. 7000 series, 7010, etc.

Suggested Sequence: Reference

INSTRUCTORS' NOTE:

It is assumed that the students are aware of the advisability of maintaining labels for data sets residing on tape volumes.

3. Review the times in processing when NSL routines of any type would be required.

   Note that for our purposes, we are restricted to the Sequential Access Method and magnetic tape.

   a. Input data set

      1) At OPEN time, to insure that the proper input volume has been mounted.

      2) With multi-volume data sets, at EOV time, to insure that the next volume to be processed is the proper one.

      3) At CLOSE time to handle volume dispositioning and trailer label checking.

   b. Output data set

      1) At OPEN time to check the expiration of the mounted volume, and to create new header labels.

      2) At EOV time (for a multi-volume data set) to ascertain that the next volume contains an expired data set, and to create new header labels for that volume.

      3) At CLOSE time to create trailer records for the data set, and to provide dispositioning of the volume.

   c. Before discussing the conventions of the NSL routines for input or output data sets, we will look at the OPEN routines.

INSTRUCTORS' NOTE:

The students should be familiar with the OPEN macro.

Suggested Sequence: Reference

B. The OPEN routines

1. General — OPF VI-1

All belong to the I/O Support Routines which are non-resident SVC routines (Type IV primarily). As such, they are all executed in the SVC transient area in supervisor mode.

2. The functions accomplished during OPEN are:

a. Complete DCB's - the interface between the problem program and the access method.

The data control block is created when the processing program is assembled, but it may not be complete at that time. The OPEN process includes completing the DCB from information in the Job File Control Block (JFCB) and the input data set label or DSCB.

b. Fetching access routines.

3. The OPEN macro — OPF VI-2

a. Basic Initialization — 1

1) Basic initialization phase of OPEN uses a GETMAIN to obtain a work and control block area for each DCB in the parameter list.

. It includes an area to input or output label data for the data set. — OPF VI-3

. It includes an area to input the job file control block. (The JFCB was created by Job Management from DD card information and stored at the time onto a secondary device.)

2) Build the WTG Table

After determining the length of the Where To Go Table (WTG Table) issue a GETMAIN and build it. — OPF VI-4

Suggested Sequence: Reference

a) The WTG Table is built at OPEN time using:

- XCTL tables (contain IDTTR of OPEN Access Method Executors used to build DEB's and load Access Method Routines into dynamic storage).
- Work And Control Block Area (WACBA) addresses obtained during GETMAIN.
- BLDL macro.
- Parameter list of OPEN (i.e. DCB's).

b) The WTG Path (Bytes 30 and 31) developed during basic initialization of OPEN determines which OPEN modules will be required after basic initialization. This depends on the device type, the label characteristics and the number of volumes for the data set.

Bit assignments in byte 30 are for:

- direct-access device.
- standard label tape positioning.
- unlabeled tape positioning.
- input label processing (verification).
- non-standard input tape.
- non-standard output tape.

Bit assignments in byte 31 are for:

- output label processing (verification).
- More than five volumes specified by the JFCB.

Suggested Sequence: Reference

Each OPEN module or executor determines the next OPEN module to be loaded by testing the bits in the WTGPATH. Each OPEN module or executor has an XCTL table consisting of the other load ID's to which the current load module can XCTL.

3) Read the JFCB.

To read the JFCB from the job queue to the work area, the OPEN routine must construct control blocks (DCB, DEB, ECB, and IOB) and a channel program within the work area. OPF VI-3

OPEN obtains the address of each JFCB from the task input/output table (TIOT).

b. The volume mounting and verification phase performs the following functions:

1) It determines whether correct volumes have been mounted; if necessary, a mounting message is issued.

2) It checks the labels of the volume; if necessary, a mounting message is issued.

c. The third phase of OPEN merges control information to and from the DCB, to and from the JFCB.

1) Each time a merge is executed, a bit which is later placed into the DEB) is set to indicate that a particular field was merged.

2) CLOSE routines use these indicators to reset the DCB to its pre-OPEN status.

d. During access-method-determination, OPEN passes control to an appropriate access method executor (a segment of OPEN).

1) A DEB is built in upper dynamic storage for each DCB.

2) The required access method routines are loaded from LINKLIB into the dynamic area.

Suggested Sequence: Reference

e. The final phase rewrites the JFCB's into secondary storage if they were changed during the merge phase, and uses a FREEMAIN to free the work areas assigned to each DCB.

f. General comments on the OPEN modules. 2

1) OPEN is a type IV SVC routine written with re-entrant code.

2) Before a module is replaced, it is executed as many times as is needed to open the specified DCB's.

a) Thus, if a user specifies multiple DCB's in a single OPEN, rather than defining multiple OPENs, the processing time will be improved.

b) To allow this recursive processing of modules, each DCB will have defined for it a work area (536 bytes). Thus dynamic storage requirements are increased.

C. General discussion of OPEN in relation to non-standard label processing.

1. Passage of control to the NSL routines.

a. The DD entry LABEL=(,NSL) is the primary indicator to OS concerning NSL processing. This information is retained in the JFCB.

b. Control is passed to a NSL routine via an XCTL macro instruction.

1) The required names of the first NSL modules are: OPF VI-5

Member Name	Processing Type	IOS Module
NSLOHDRI	Input header	OPEN
NSLEHDRI		EOV
NSLOHDRO	Output header	OPEN
NSLEHRRO		EOV
NSLETRLI	Input trailer	EOV
NSLETRLO	Output trailer	EOV
NSLCTRLO		CLOSE

Suggested Sequence: Reference

2) The NSL routines must be coded as Type IV SVC modules and put in SYS1.SVCLIB. OPF VI-1 OPF VI-6

3) Additional NSL modules required must be named so that the first three characters are either NSL or IGC.

2. Return from the NSL routine.

The NSL modules must return control via an XCTL macro instruction to an appropriate OPEN module. OPF VI-7

Module Name	Processing Type	IOS Module
IGG0190B	Input header	OPEN
IGG0550D		EOV
IGG0550B	Input trailer	EOV
IGG0190R	Output header	OPEN
IGG0550H		EOV
IGG0550F	Output trailer	EOV
IGG0200B		CLOSE

Note that: 0190 is OPEN
0550 is EOV
0200 is CLOSE

D. Detail discussion of non-standard header label processing during OPEN.

1. Information supplied to NSLOHDRI by OPEN.

a. DCB addresses OPF VI-8

1) Each problem program DCB, coded as a parameter in the OPEN macro instruction, is located by means of a 4-byte pointer.

a) The three low-order bytes contain the address of the DCB in the problem program.

b) The high order byte indicates type of I/O operation as specified in the OPEN and tape disposition. The high order bit identifies the last DCB address when set to 1. OPF VI-9

Suggested Sequence: Reference

BITS	0	1	2	3	4	5	6	7	
		0	0	1					REREAD
		0	1	1					LEAVE
		0	0	0					NEITHER
					0	0	0	0	INPUT
					1	1	1	1	OUTPUT
					0	0	1	1	INOUT
					0	1	1	1	OUTIN
					0	0	0	1	RDBACK
					0	1	0	0	UPDAT

3

2) The 4-byte pointers are maintained in a contiguous list in dynamic storage. OPEN places the address of this list in GR5 prior to passing control to NSLOHDRI.

b. Control blocks usable by EXCP in the NSL routine:

1) OPEN routines create a combined work and control block area for each DCB in the parameter list. 4

a) All blocks necessary for the EXCP level of code are a part of this I/O Support Work Area. OPF VI-3

b) The JFCB is located in this area.

c) A 100-byte I/O area exists to be used for transmission of standard label and DSCB information.

2) The NSL coder is directed to the I/O Support Work Areas via the Where-To Go (WTG) Table, which is also dynamically constructed by OPEN modules. 5 OPF VI-10

. The address of the WTG table is loaded into GR6 by OPEN prior to passing control to NSLOHDRI.

3) OPEN provides additional information to the NSLOHRDI module - - e.g. a pointer to the TIOT via GR9 - - but the DCB and the WTG table should provide ample data to the NSL coder.

Suggested Sequence: Reference

2. NSLOHDRI

a. Entry into NSLOHDRI from OPEN.

1) An XCTL to the NSLOHDRI module is activated when the following conditions have occurred in OPEN processing.

a) OPEN does not find an 80 byte, VOL1 label of the specified density on the volume.

b) LABEL=(,NSL) has been specified in the DD card.

2) OPEN will reposition the tape to the IRB immediately preceding the NSL before XCTL'ing to NSLOHDRI.

3) OPEN will load GR's 5 & 6 so that they point to the parameter DCB's and their work and control block areas respectively.

4) OPEN will have turned on the mount bit to indicate that a mounting message has been issued for the volume, but that the label has not been verified.

a) The high order bit of the SRTEDMCT byte in the UCB is the mount bit.

b) The mount bit is used by the NSL module to indicate whether the volume is acceptable.

5) OPEN will pass control to NSLOHDRI only after inspecting all of the OPEN parameter DCB's. For unlabeled or standard labeled tapes, some degree of volume verification will have been performed. 6

b. NSLOHDRI Considerations

1) NSLOHDRI is a module of OPEN, a type IV SVC Routine. Code must therefore be re-entrant, and the entry point must be the first byte of the load module. 7

Suggested Sequence: Reference

2) Registers 2-14 must be saved, and should be stored in an area of main storage acquired by a GETMAIN. 8

3) NSLOHDRI must provide for symbolic definition of the fields within the DCB, the Work and Control Block Area, and the UCB. The relevant macro instructions are: OPF VI-11

a) IECDSECT

Defines symbolic names for all fields in the Work and Control Block Area. 9

Code this as: DSECT
IECDSECT

b) IEFUCBOB

Defines the symbolic names for all fields in the UCB.

Code this as: DSECT
IECDSECT

c) DCBD

Produces a DSECT for a DCB.

d) Note that IECDSECT and IEFUCBOB must be included in MACLIB in order to use these macro instructions. Appendix XIX

e) See Appendix XIX for example of writing your own macros to accomplish the function performed by IECDSECT and IEFUCBOB. Appendix XIX

4) NSLOHDRI must determine the parameter DCB's to be processed. 10

a) The DCB field DCBOFLGS indicates whether the DCB is already open. Bit 3 of this field, when zero, indicates that the DCB is not open.

b) The UCB field UCB3TAPE indicates whether the data set is tape. The bit is a one for tape.

Suggested Sequence: Reference

c) The JFCBLTYP field of the JFCB will contain a hexadecimal 04 if NSL has been specified.

5) NSLOHDRI's use of the mount switch. 11

a) If NSL processing indicates that the tape is satisfactory, the mount switch should be set to zero.

b) If the tape is found to be unsatisfactory, the mount switch should be set to one. When OPEN regains control, it performs as follows:

(1) Issues a rewind and unload and a mount message.

(2) Verifies that the newly mounted tape does not contain standard labels.

(3) XCTL's to NSLOHDRI.

6) Additional operator messages should be handled by a WTO or a WTOR in E-form. (The macro form must be out-of-line, otherwise it would wipe out the NSL routine which is in the SVC transient area.)

7) Before returning control to OPEN, NSLOHDRI must position the tape to the IRG preceding the first data record.

c. General logic flow of a non-standard label processing routine after receiving control from the OPEN routine. OPF VI-12

3. Example

INSTRUCTORS' NOTE:

Refer to the Systems Programmer's Guide, pages 55 and 58-59 for an example.

Suggested Sequence: Reference

4. Inserting NSLOHDRI into the Control Program. 12

   a. Inclusion during system generation.

      1) Use the SVCLIB macro instruction to insert the member NSLOHDRI, and any additional members required, into the SVC library.

      2) Each load module must be a member of a PDS; the first member: SYS1.NSLOHDRI, subsequent members:

         NSL

         SYS1.XXXXXXXX.

         IGC

   b. Inclusion after system generation requires the use of linkage editor to add an additional module - NSLOHDRI - to the already existing OPEN. OPF VI-13 Appendix XIX

   c. Note that if a NSL condition occurs prior to inserting the appropriate NSL module into SVCLIB, the system will execute an ABEND.

5. Testing the non-standard header label processing routine.

   a. Insertion into SVCLIB may be too costly for a test-and-debug situation.

   b. A more realistic approach is to recode NSLOHDRI as a stand-alone problem program.

      - All required control blocks could be built by the problem code, and the XCTL back to OPEN removed.

6. EXCP level of code

   a. The first point to make is the need for the EXCP level of I/O coding for handling tape labels. Quite simply, the reason is that OPEN has not loaded any accessing methods at the time labels are processed.

Suggested Sequence: Reference

INSTRUCTORS' NOTE:

If the non-standard label presentation is to include an EXCP presentation, then it should be inserted here. Normally the above references to control blocks should be more of a reminder than a presentation.

b. EXCP code requirements must include:

1) A DCB

2) An IOB

3) A DEB

4) An ECB

5) CCW's to perform the desired operation

c. The coder may establish these control blocks himself in dynamic storage, or he may use blocks already created by OPEN.

E. **Discussion of non-standard label routines during CLOSE and EOV.**

1. Review NSL module names. Review processing required at CLOSE and EOV time: OPF VI-5

a. The CLOSE macro performs the following: OPF VI-14

1) Processes labels on tape output data sets by writing the appropriate output label. It determines volume disposition from parameters in CLOSE - - either LEAVE or REREAD - - or, in their absence, from the (resident) TIOT.

2) It restores the DCB to its original state, using the bits set by OPEN into the DEB.

3) CLOSE releases the main storage used for:

a) Subroutines and appendages.

Suggested Sequence: Reference

b) The DEB (The DEB is also removed from the DEB chain; remaining DEB's are rechained.)

c) The work area built and used by CLOSE itself.

b. EOV is an I/O Support Module invoked by the control program, or by an FEOV macro instruction in the processing program. Its purpose is to process end-of-volume and/or end-of-data-set conditions.

1) The control program passes control to EOV whenever:

a) A tape mark is read on tape.

b) A file mark is read on a DASD.

c) The end of the last extent is recognized on a direct access volume.

d) An end of file indication occurs for a U/R device.

e) End of reel is encountered on a tape volume.

2) EOV processing begins by issuing a GETMAIN; the storage acquired is used for a work area and a JFCB area. (Note that both OPEN and CLOSE do this.) EOV is responsible for: OPF VI-15

a) Issuing any necessary mounting messages.

b) Checking and/or writing label information.

c) Handling disposition of the "old" volume - just as CLOSE performs this function.

2. Tape mark consideration

a. For Input Data

If no tape mark exists before the NSL trailer record(s), then user code must

determine data or volume end and issue an FEOV macro.

b. For Output Data

The output trailer NSL routine is automatically entered when a reflective strip is encountered. User code must provide for a tape mark prior to the trailer record if one is desired.

3. When control is passed from EOV, register 2 contains the address of the relevant DCB, and register 4 contains the address of its combined Work and Control Block Area.

4. Multi-volume Data Sets

a. OS/360 determines the number of volumes required for a multi-volume data set via the VOL entry on the DD card. For example, the entry:

VOL = SER = (ABCDE,FGHIJ)

implies that two volumes are necessary for this data set.

b. In an OPEN NSL routine, the coder could set the VOLCOUNT field in the JFCB to reflect the actual number of volumes.

c. Assume that EOR-EOF is an operator decision. (This is feasible when "merging" an unknown number of distinct data sets, e.g. a report.) Then based on his reply, via a WTOR, the NSL-EOV code could set the VOLCOUNT field in the DEB. If truly EOF, this field should be set equal to the VOLCOUNT field of the JFCB.

Note that the DEB indicated here is pointed to by the DCB. The coder should locate and change that VOLCOUNT field.

F. A Generalized Handling of Non-standard Labels: The Data Conversion Utility II Package.

1. General Description

a. The package has been developed by IBM (Los Angeles Aerospace) to assist the

Suggested Sequence: Reference

user with converting current IBM system data files to S/360 data sets. Its scope is broader than consideration of non-standard labels. However, the set of special purpose macros, subroutines, and modules may be combined in a large variety of ways to create specific data conversion programs.

b. The package is designed for conversion from these systems:

1) 7040/44, 7070/74, 7080, 7090/94

2) 1401, 1410, 7010

2. Data Conversion Non-Standard Label Modules (DCNSL)

a. The conversion package handles input header and trailer processing only.

b. DCNSL consists of seven modules:

1) NSLOHDRI/NSLEHDRI - label discrimination and header label modules.

2) NSLTYPEX - the header label checking modules for current system label types A, B, C and D. OPF VI-16

3) NSLETRLI - the trailer label module.

4) User modules may be included additionally for header and trailer checking. (NSLOUSRI and NSLCUSRI)

3. Comments on the Techniques of DCNSL.

a. The modules NSLOHDRI/NSLEHDRI receive control from OPEN and EOV respectively. It is their responsibility to determine to which NSLTYPEX module to pass control.

b. NSLOHDRI attempts to read specifying a different density if the one passed from the DCB or JFCB is unsuccessful. (To change the density specification, bits in the DEB - which exist in the work and control block area - must be changed.)

c. The modules are coded to utilize information passed through the DD card for label verification.

Suggested Sequence: Reference

1) No change was made to the DD macros.

2) Utilization was made of specifications such as:

VOL=SER=(list of volume serials)

Such an entry creates a field in the JFCB which is accessible to DCNSL, and because NSL is specified, is of little interest to OS.

3) This technique of parameter communication is relatively simple, yet quite effective.

G. Concluding Remarks

1. The NSL Coder should have the following materials for information sources:

a. IBM System/360 OS System Programmer's Guide, C28-6550.

b. IBM System/360 OS Input/Output Support (OPEN/CLOSE/EOV), Y28-6609.

c. IBM System/360 OS Job Control Language, C28-6539.

d. IBM System/360 OS Introduction to Control Program Logic, Part II (Control Blocks), Y28-6605.

e. System/360 Data Conversion Utilities Appreciation Description, H20-0194.

2. A problem should be assigned. Some suggestions follow. OPF VI-6, VI-12, VI-17

INSTRUCTOR'S NOTE:

The students should be assigned one of the following problems at this time. Problem "a" has been worked out and could be used for this assignment. The problem assignment can be very effectively presented using OPF's VI-6, VI-12, and VI-17. The problem solution is in Appendix XIX. Appendix XIX

Suggested Sequence: Reference

3. Problems

   a. Code a NSL routine for OPEN input.

   b. Code a NSL routine for OPEN output.

   c. Code a NSL routine for CLOSE.

   d. Code a NSL routine for EOV input header.

   e. Code a NSL routine for EOV output header.

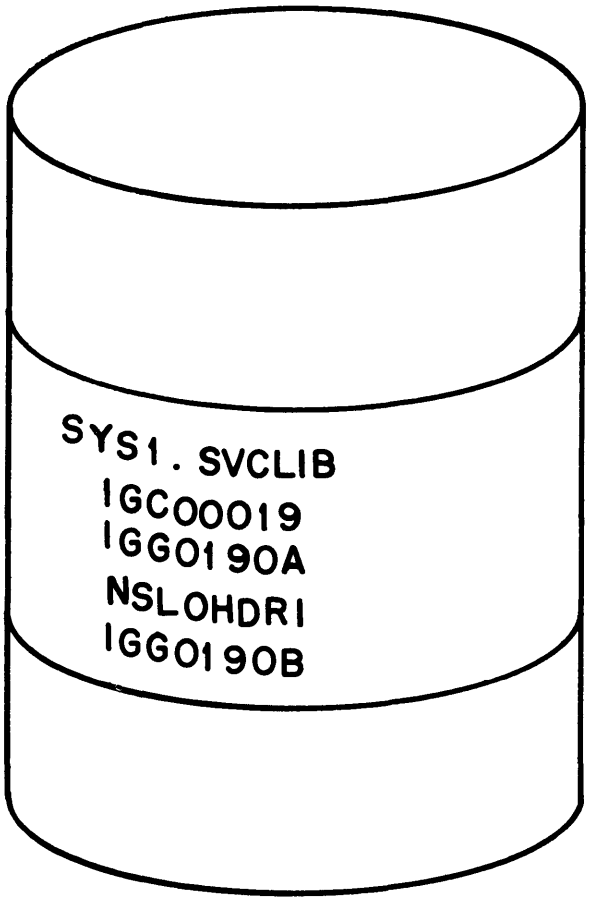
   f. Code a NSL routine for EOV input trailer.

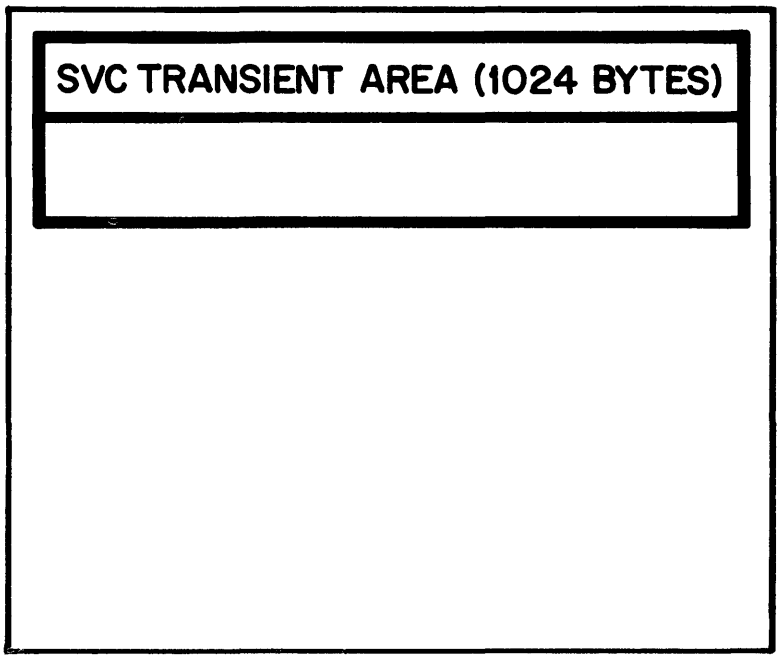
   g. Code a NSL routine for EOV output trailer.

TOPIC VI
REFERENCES

REFERENCE CODE	System/360 Operating Sys. I/O Support (OPEN/CLOSE/EOV) PLM - Z28-6609	OS/360 System Programmer's Guide C28-6550
1	8	
2	5-6	
3		58
4	33	
5		53
6	9	
7		51-52
8		51
9		60-65
10		58
11	11	
12		59

NSL SVC ROUTINES USE TRANSIENT AREA





FUNCTIONS OF THE OPEN MACRO

BASIC INITIALIZATION

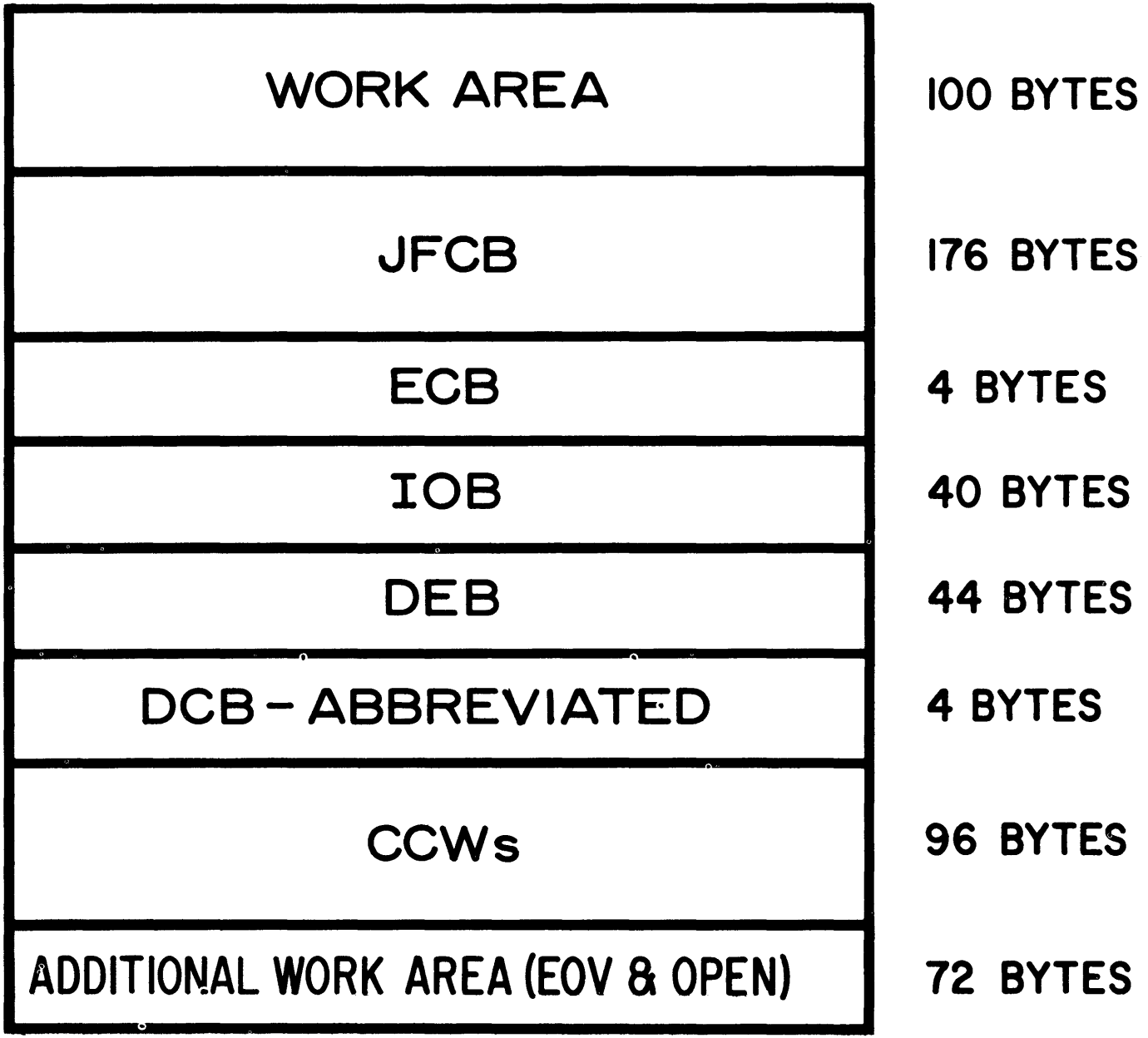
VOLUME MOUNTING & VERIFICATION

MERGING OF CONTROL INFORMATION

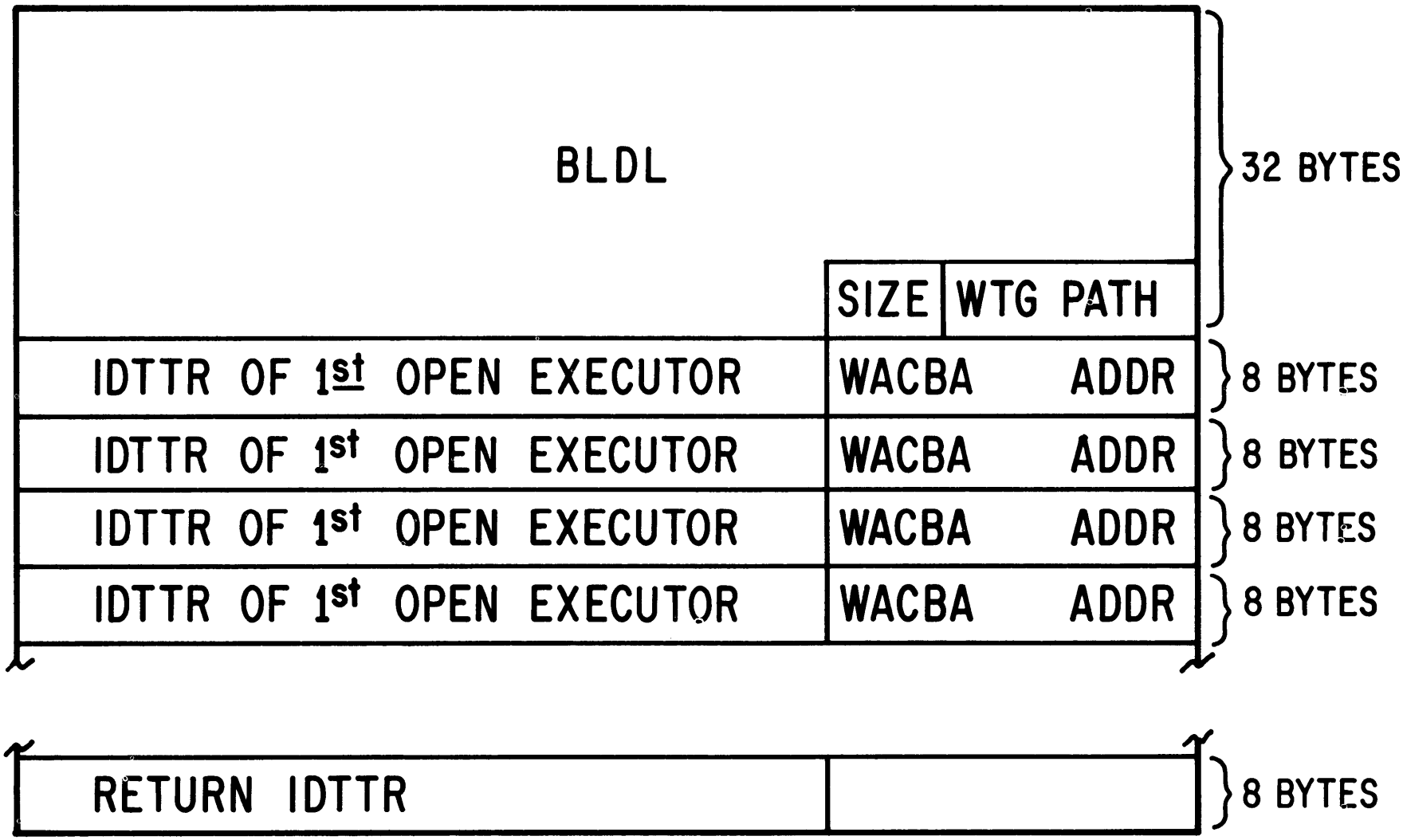
ACCESS METHOD DETERMINATION

TERMINATION

WORK AND CONTROL BLOCK AREA



WTG TABLE



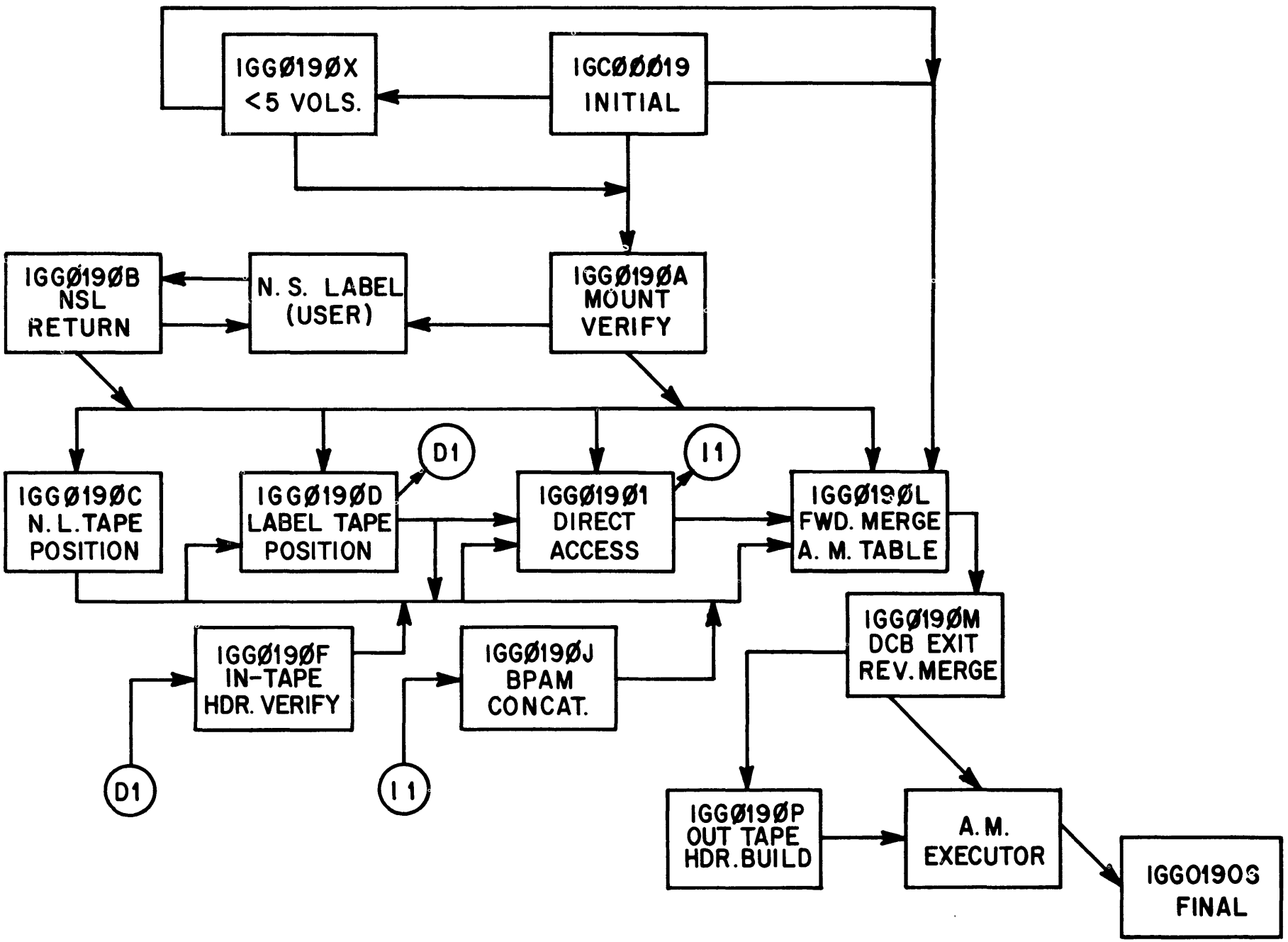
SIZE = 8n +8+32
n = # DCB's

NSL MODULES

MEMBER NAME	PROCESSING TYPE	IOS MODULE
NSLOHDRI	INPUT HEADER	OPEN
NSLEHDRI		EOV
NSLOHDRO	OUTPUT HEADER	OPEN
NSLEHDRO		EOV
NSLETRLI	INPUT TRAILER	EOV
NSLETRLO	OUTPUT TRAILER	EOV
NSLCTRLO		CLOSE

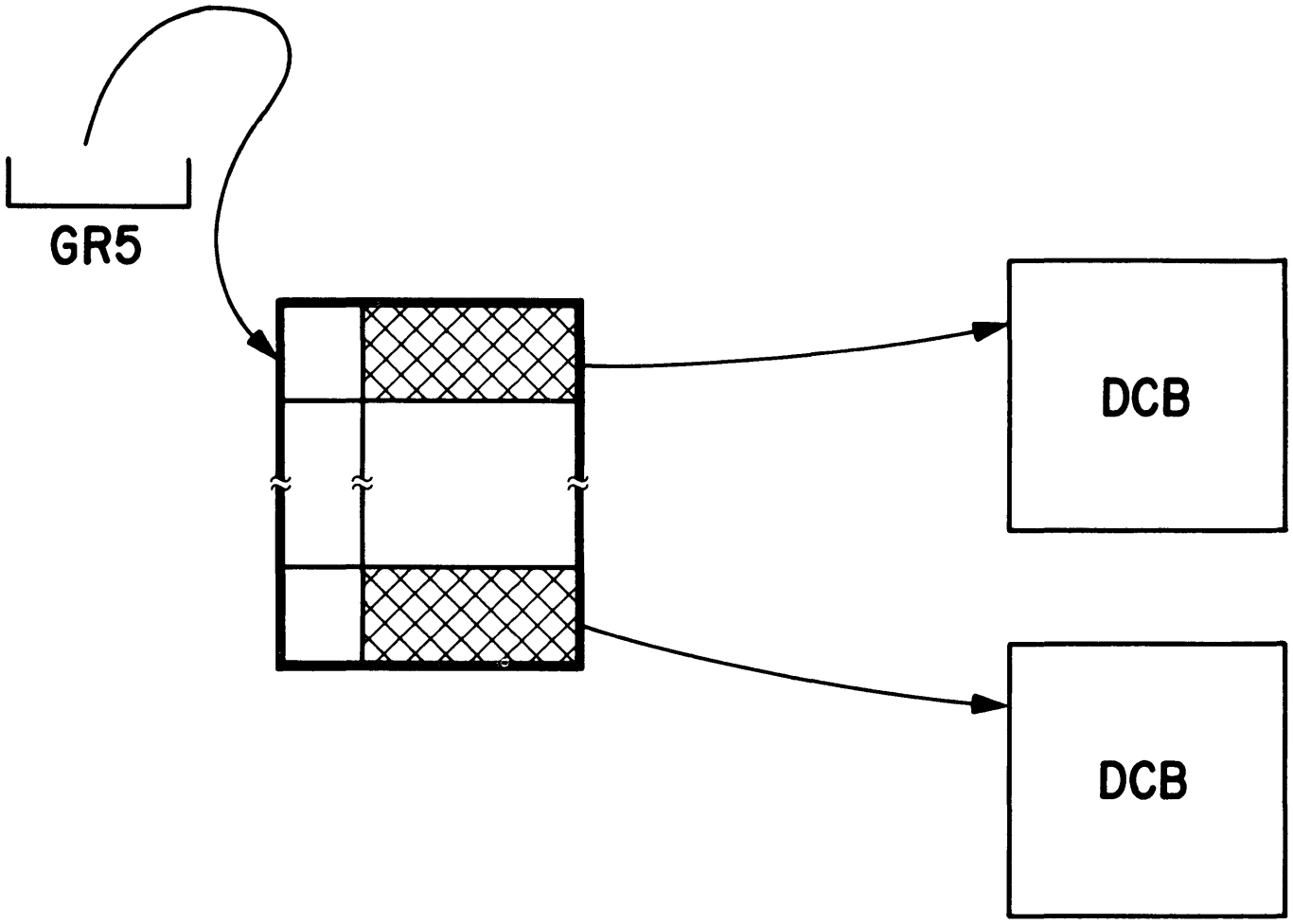
ADDITIONAL MODULE NAMES BEGIN
NSL OR IGC

OPEN (SVC 19)

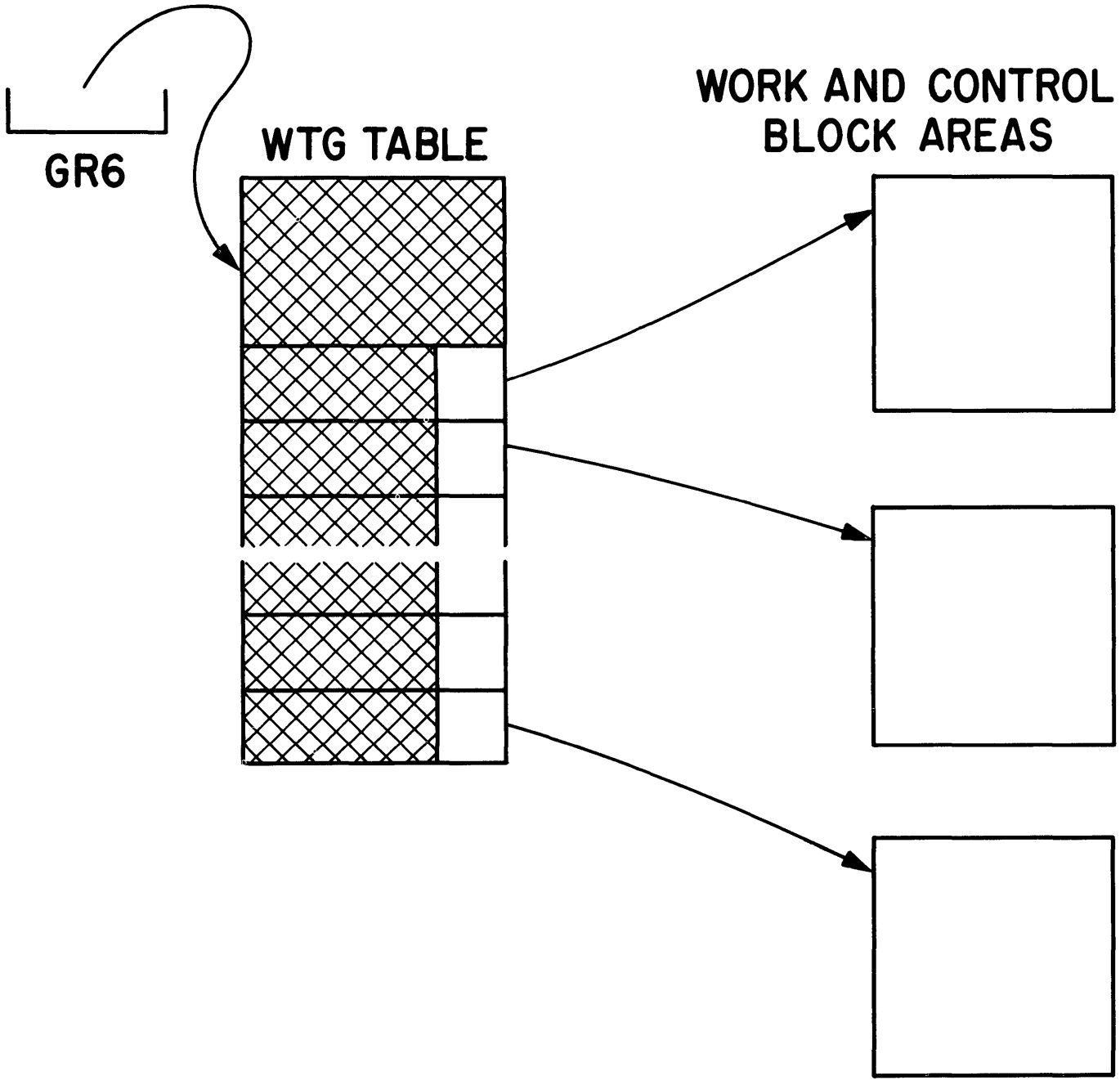

IGGØ19ØX
<5 VOLS.
IGCØØØ19
INITIAL
IGGØ19ØB
NSL
RETURN
N. S. LABEL
(USER)
IGGØ19ØA
MOUNT
VERIFY
IGGØ19ØC
N. L. TAPE
POSITION
IGGØ19ØD
LABEL TAPE
POSITION
D1
IGGØ19Ø1
DIRECT
ACCESS
I1
IGGØ19ØL
FWD. MERGE
A. M. TABLE
IGGØ19ØM
DCB EXIT
REV. MERGE
IGGØ19ØF
IN-TAPE
HDR. VERIFY
IGGØ19ØJ
BPAM
CONCAT.
D1
I1
IGGØ19ØP
OUT TAPE
HDR. BUILD
A. M.
EXECUTOR
IGGO19ØS
FINAL

CONTROL MUST RETURN TO:

MODULE NAME	PROCESSING TYPE	IOS MODULE
IGGØ19ØB	INPUT HEADER	OPEN
IGGØ55ØD		EOV
IGGØ55ØB	INPUT TRAILER	EOV
IGGØ19ØR	OUTPUT HEADER	OPEN
IGGØ55ØH		EOV
IGGØ55ØF	OUTPUT TRAILER	EOV
IGGØ2ØØB		CLOSE


GR5
DCB
DCB

BITS	0	1	2	3	4	5	6	7
REREAD		Ø	Ø	1	—	—	—	—
LEAVE		Ø	1	1	—	—	—	—
NEITHER		Ø	Ø	Ø	—	—	—	—
INPUT		—	—	—	Ø	Ø	Ø	Ø
OUTPUT		—	—	—	1	1	1	1
INOUT		—	—	—	Ø	Ø	1	1
OUTIN		—	—	—	Ø	1	1	1
RDBACK		—	—	—	Ø	Ø	Ø	1
UPDAT		—	—	—	Ø	1	Ø	Ø


GR6
WTG TABLE
WORK AND CONTROL
BLOCK AREAS

```
* TO DEFINE SYMBOLICALLY THE WORK AND CONTROL BLOCK AREA

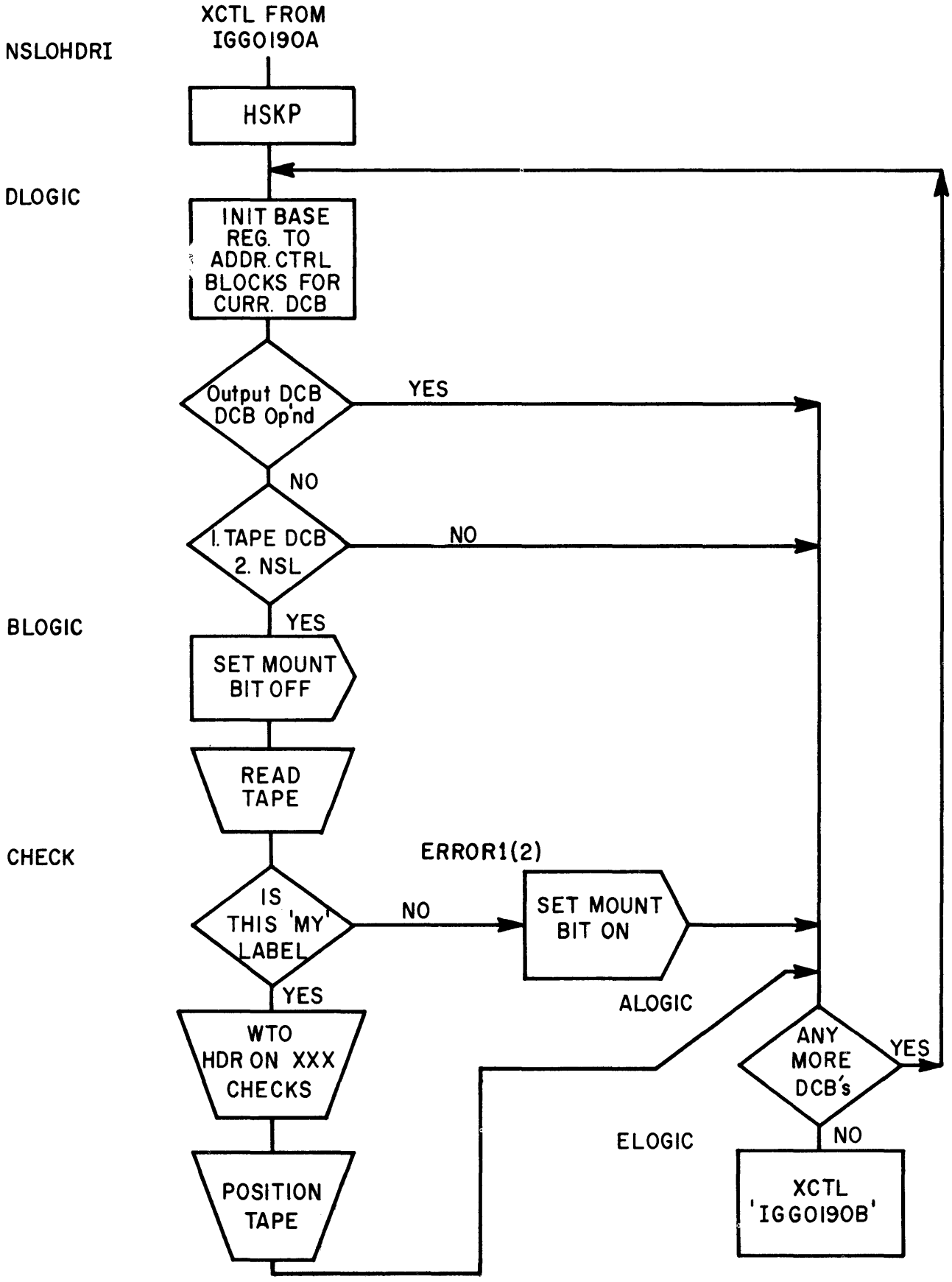
          DSECT
          IECDSECT

* TO DEFINE SYMBOLICALLY THE UCB

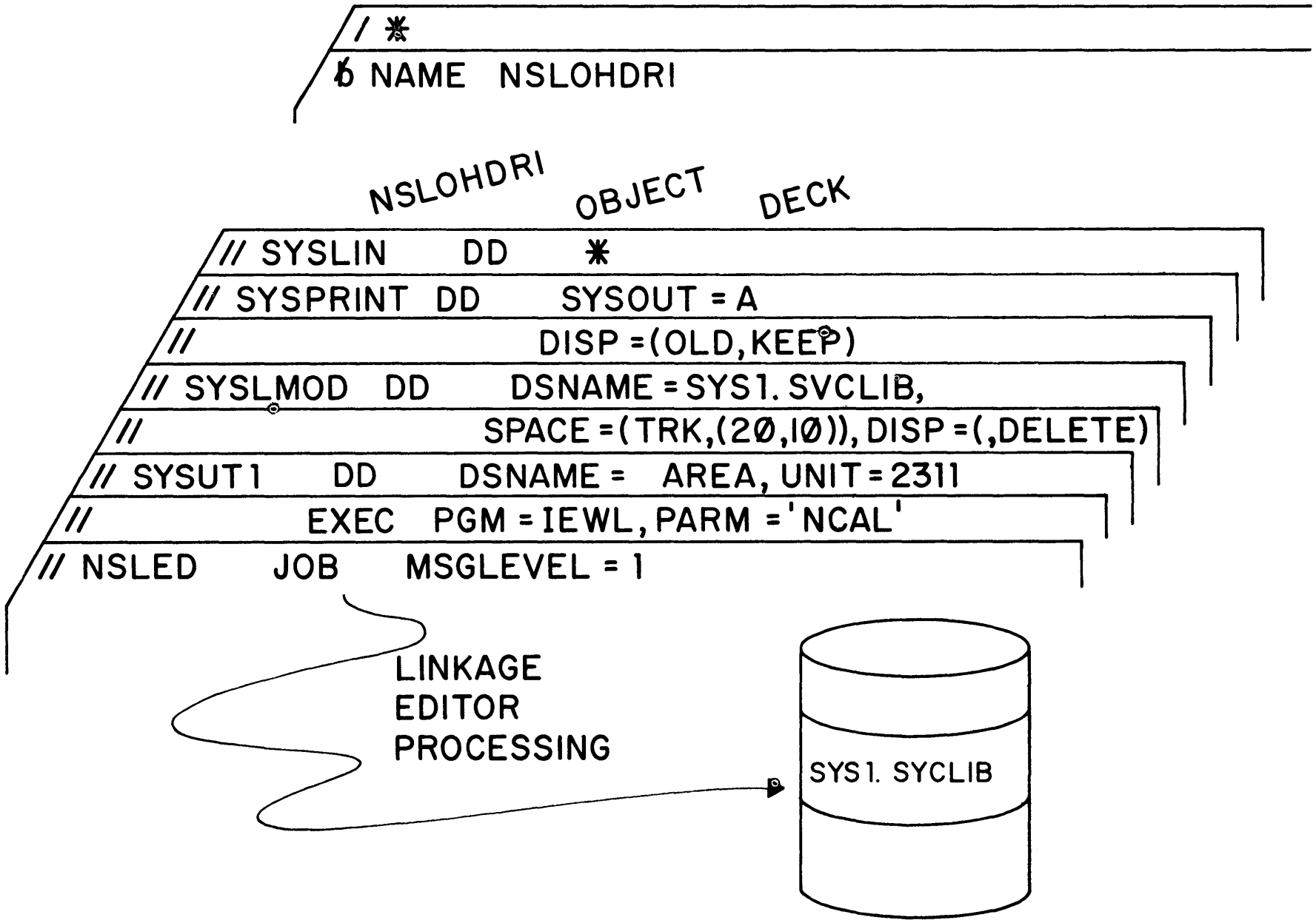
          DSECT
          IEFUCBOB

* TO DEFINE SYMBOLICALLY THE DCB

          DCBD
```


NSLOHDRI
XCTL FROM IGG0190A
HSKP
DLOGIC
INIT BASE REG. TO ADDR. CTRL BLOCKS FOR CURR. DCB
Output DCB DCB Op'nd
YES
NO
1. TAPE DCB 2. NSL
NO
BLOGIC
YES
SET MOUNT BIT OFF
READ TAPE
CHECK
ERROR1(2)
IS THIS 'MY' LABEL
NO
SET MOUNT BIT ON
YES
ALOGIC
WTO HDR ON XXX CHECKS
ANY MORE DCB's
YES
ELOGIC
NO
POSITION TAPE
XCTL 'IGG0190B'

TO INSERT NSLOHDRI AFTER SYSGEN



FUNCTIONS OF THE CLOSE MACRO

LABEL PROCESSING

RESTORES DCB

RELEASES MAIN STORAGE

- SUBROUTINES
- APPENDAGES
- DEB

FUNCTIONS OF EOV PROCESSING

ISSUES MOUNTING MESSAGES

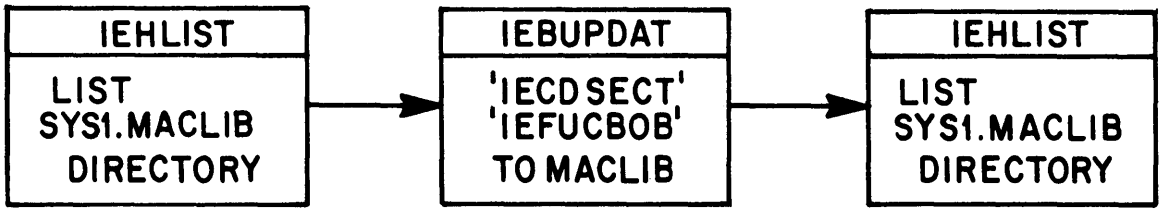
LABEL PROCESSING

OLD VOLUME DISPOSITIONS

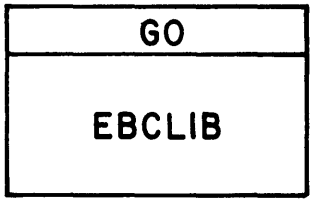
DATA CONVERSION UTILITY II PACKAGE

LABEL TYPE	LABEL LENGTH (BYTES)	USED BY
A	12Ø	7Ø4Ø/44, 7Ø8Ø(HYPERTAPE) 14Ø1, 141Ø, 7Ø1Ø
B	8Ø	7Ø7Ø/44, 14Ø1, 141Ø, 7Ø1Ø
C	84	7Ø9Ø/94, 14Ø1, 141Ø, 7Ø1Ø
D	8Ø	7Ø8Ø INCLUDING INTERMEDIATE HEADER CHECKING

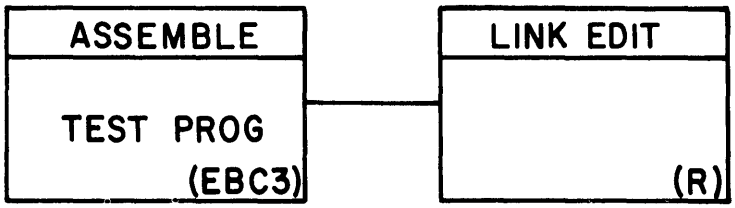
UPDATE SYS1.MACLIB



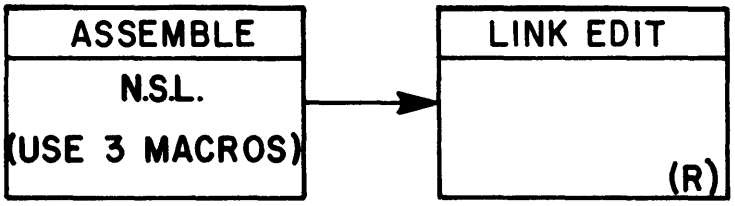
CREATE A JOBLIB



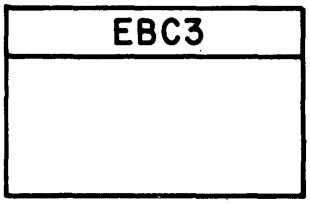
PUT TEST PROGRAM IN EBCLIB



PUT NSLOHDRI IN SYS1.SVCLIB



TEST



Suggested Sequence: Reference

A. Error occurrence in OS/360 and how it affects execution of user's program.

1. Error occurrence at an I/O device.

Very rarely will this type of error cause the system to blow up or the task to terminate when EXCP is being used.

a. Three conditions may arise in IOS:

1) Catastrophic error - system is put in permanent wait state. EX: If I/O device cannot be sensed, or permanent I/O error on the system's single typewriter console.

2) Abnormal task termination - primarily the result of program errors - errors in control block pointers, program or protection check in a channel program. 1

3) Uncorrectable error condition - recovery procedures failed. IOS flags DCB and ECB with permanent error.

b. Error Handling in the Accessing Methods

1) EXCP - When error recovery fails, the user is told that he has a permanent error by the post code in his ECB. Among the options he has are:

a) Continue processing the data set (after resetting the DCB permanent error flags) either skipping the erroneous block or processing it anyway. User must determine from sense bits whether or not data transfer even took place.

b) Programming a channel program retry.

c) ABENDing his task.

2) Standard Accessing Methods

Programmer has less control over error procedures. In queued accessing and

in BSAM the user's task will be terminated on occurrence of error unless he supplies an EROPT other than ABEND. There is very little he can do in a SYNAD exit; he can't reset DCB error bits and cause the accessing method to continue processing an output file, for example. He could, however, note information he required for program restarting.

QSAM - with or without SYNAD exit, EROPT is taken on error occurrence.

BSAM - no SYNAD, then BSAM ABENDs. If SYNAD, then default assumption is ACCEPT.

In BDAM processing, the system is more flexible. Prior to posting the Exception Code in DECB, BDAM resets permanent error flags in the DCB. The user then can test or not test the DECB bits and continue processing the data set. In the event of unrecoverable error, he should log information about the record that could not be read or written.

3) System execution programs. EX: Assembler uses BSAM.

- ABENDs on punch check (error correction provided only by QSAM).
- On tape write error IOS prints permanent error message but assembler goes ahead.
- Late in assembly there may be an unidentified ABEND--may be caused by OPEN trying to find a DD card for SYSPRINT or SYSPUNCH.

2. Catastrophic Errors in the Channel or CPU

a. Whenever a machine check occurs, the SER (System Environment Recording) interface is entered, some indicature information is stored, and the system is put into permanent wait state. (Computer disabled) The SEREP program should be executed and the system restarted by IPL.

Suggested Sequence: Reference

b. Channel errors (i.e., channel data check, channel control check, interface control check) are considered catastrophic and cause the SER interface routine to be entered. 1

1) Models 30-50. These channel errors actually cause machine check interrupts; IOS is never entered.

2) Models 65 and up. I/O interruption occurs, but IOS simulates machine check by loading the new MCH PSW.

c. In these situations there is no ABEND dump; there are no messages. There is no choice but to re-IPL.

B. General Logic of Error Handling Within IOS Appendix IV

INSTRUCTORS' NOTE:

Refer to chart. The IOS PLM presents IOS logic in detail showing how the entire I/O Supervisor is constructed and how its modules interact with each other. In this section of the outline we are not as concerned with the logical construction of IOS as with the services and correction procedures it performs for users. An attempt has been made here to show what happens when a user's request for a tape read develops an error. Of particular interest are the times and the order in which IOS and other control program functions are executed for a specific request before completion is posted and the user's program is re-entered.

1. General Summary

Between the time EXCP is executed and control returns to the user after the WAIT, IOS will execute the channel program, go through correctional procedures, and perform all statistical updating and error logging procedures. The user need only test the completion code posted in ECB; he never needs to be concerned with forcing error recovery.

2. Follow the general logic flow chart, and assume that a tape read error has occurred at the time that I/O Interrupt Supervisor is entered. Appendix IV

a. In EXCP processing the user can set two flag bits - bits 4 and 5 of IFLGS (DCB+44) 2

Suggested Sequence: Reference

to ones to indicate that IBM-supplied error routines are not to be executed. The user would have to check sense and status bits in his own program to determine the severity of the error.

b. Error Routine Scheduling

1) Error routine may be entered following:

a) Unit check

b) Unit exception

c) Wrong length

d) Program, protection, and chaining check.

2) 2311 error routines are mostly resident and are entered directly.

3) Others must be pulled in from SVCLIB. 3
At SYSGEN time the identifier code of the error routine for this device type is placed in each device's UCB ERRTAB field. This field is attached to IGE000xx providing program fetch for the member name it must locate in SVCLIB.

4) The user can supply his own error routine only by replacing the named module in SVCLIB. The error routines are re-entrant and execute from the 400-byte IOS transmit area in supervisor mode, disabled for interrupts.

5) The RQE for the request in error is queued onto an asynchronous exit queue (AEQ) to be used when the error routine reinitiates the channel program. Error routines are considered asynchronous.

6) IOS then enters the contents supervisor and ultimately program fetch, which issues EXCP to get the error routine into the transient area. 4

EXCP supervisor cannot distinguish this request from any other and will

Suggested Sequence: Reference

enqueue it as usual in a seek queue and later in a logical channel queue. This means that all previously queued requests for SYSRES and its channel are serviced before the request for loading an error routine; consequently, there can be a significant wait before the error routine is actualy executed.

The channel restart routines for the channel containing the error are not entered; thus, the channel and device will be free when the error routine is entered, unless other interrupts for device end on that channel occur in the meantime.

c. Error Routine Execution 5

1) Sense bits read into UCB and CSW bits stored in the IOB are examined and corrective procedures are set up.

Some examples are:

a) Tape read error - backspace and reread ten times and then backspace past tape error. Perform maximum of ten times for a total of 100 reads. These counts are kept in the IOB because the error routine may not remain in the transient area for the duration of the correction. 6

b) Tape write - backspace 1 record, erase and rewrite. Perform a maximum of three times.

NOTE: In tape processing if there is a mixture of command and data chaining, the error routine flags a permanent error and returns via abnormal end. 7

c) Disk data errors - in general the entire channel program will be retried ten times. In case of an overrun, the task is abnormally terminated if recovery is impossible. 8

Suggested Sequence: Reference

d) 2540 errors - no error recovery attempted unless QSAM is in control and requests it. 9

- Equipment errors such as hole count, invalid card code, and buffer parity error are considered permanent.

- If operator intervention is required, a message is typed. When the operator performs the right action, the last operation on the device is repeated.

2) If error has not been corrected and is not yet considered permanent, the ERREXCP macro, specifying the RQE address, is executed to get the request requeued into the proper logical channel. On return from EXCP supervisor, the error routine returns to the task supervisor awaiting interrupt.

The transient area is now free and can be reused, if necessary. It is conceivable that the error routine for tape read correction might have to be fetched 100 times while attempting to correct one error.

The ERREXCP routine determines that an error routine is in control by testing the IOB error flag which was set by the error routine.

3) If on I/O interrupt re-entry to the error routine the error is found to have been corrected, STATAB counters are updated, bits reset, and ERREXCP executed to get normal return to IOS where channel restarting and IOB posting procedures will be performed. Users program will be re-entered from task supervisor.

4) If error recovery is found to be successful (100 reads on tape, validity check on reader), the error is

Suggested Sequence: Reference

marked permanent for IOS (IOB exception bit), and the IBM error flag is reset.

- Statistical counters in core are updated. See chart for contents of these tables. 10

- The error routine XCTL's to the outboard recording routine (IOBR). 11

5) When ERREXCP is entered this last time, the error routine is no longer in control, the error condition persists, and no purging has been performed; ERREXCP then sets the DCB permanent error flags (IFLGS bits 0 and 1). If this IOB represents a request that is not related to any other, then control goes to the I/O interruption supervisor via abnormal end appendage exit.

NOTE: Any further I/O requests involving the DCB with error flags on will be posted complete with permanent error, unless the USER of EXCP resets the IFLGS bits. 12

6) Related requests 12

a) Related channel programs are requests that are associated with a particular DCB and DEB within the same job step.

b) QSAM's manipulation of multiple buffers provides an example of related requests. Each buffer has an IOB and a channel program. If an error develops in filling one buffer, then I/O operations cannot be scheduled for the others. All IOB's have the related bit set - Flags 1, bit 6, value of 0 - and are logically linked together because they all point to the same DCB.

NOTE: BDAM constructs channel programs and IOB's dynamically

Suggested Sequence: Reference

and appears not to generate related requests.

c) Handling of related requests in error situations. 12

The PURGE routine is executed to find and remove from logical channel and seek queues all related IOB's associated with the same DEB. The IOB's are then queued onto the DEB so that they may possibly be RESTOREd later. All are posted complete without exception and permanent error. 13

You may restart the entire chain of requests by resetting the DCBIFLGS bits and issuing the RESTORE macro.

3. Summary of Error Routine Discussion

a. User has these choices in using error routines:

1) Use the supplied error routines.

2) Substitute new ones for those found in SVCLIB.

3) Specify in DCB that no error recovery is to be attempted.

b. There is no way to include error routines for I/O devices in a user program at execution time.

However, user can insert extensions to IOS in SVCLIB, call them in at execution time, and somewhat modify the execution logic of IOS.

C. Appendages To IOS 14

1. Definition

User written routines that provide additional control over I/O operations during channel program execution. They execute in supervisor state disabled for all interruptions except machine checks.

Suggested Sequence: Reference

2. Appendage routines can be inserted into SYS1.SVCLIB by link edit either at SYSGEN time or afterwards as part of a user's job. Appendage member names must be IGG019xx, where xx are two user-specified characters ranging from WA to Z9 in collating sequence.

3. Using Appendages

   a. User specifies which appendage routines he wants by entering in his EXCP Data Control Block the 2 character appendage ID codes.

   b. OPEN locates the appendages and pulls them into high core where they remain until the DCB is closed. These addresses are placed into an appendage vector table. If an exit is not specified, an address causing a return to IOS is inserted. IOS branches and links to an appendage routine at the appropriate time.

4. Types of Appendages

   a. There are five appendage exits which are provided primarily for the use of the standard accessing methods, but which can be used by EXCP programmers. (Refer to logic chart, Appendix VIII to see points at which appendage exists are taken.) Appendix VIII

      1) End-of-Extent Appendage - This exit is taken during execution of the SIO module for DASD when it is found that a seek address is outside the boundaries of the extent specified in the DCB. The routine can:

         - Initialize the seek address to the beginning of the next extent and indicate that the request is to be tried again. (Done by SAM if another extent exists.)

         - Return control to IOS such that the IOB is posted complete with end-of-extent error (normal return). (Done by SAM if no further extents. EOV could be executed to force secondary allocation.)

Suggested Sequence: Reference

2) SIO Appendage - This exit is taken from the SIO subroutine just before the SIO instruction is executed. User may bypass execution of the SIO instruction, in which case the IOB is not posted complete but the RQE is released; or he may return to IOS normally.

3) Programmed Controlled Interrupt Appendage - This exit is taken just after the I/O supervisor has located the UCB of the device for which the interrupt occurred.

A PCI interrupt occurs as soon as possible after the channel accesses a CCU with the PCI flag on. How soon this happens depends on whether or not the system is masked for interrupts on that channel.

The SAM routines for chained scheduling use CCW's with the PCI flag on to let them know when each buffer specified in a chain of channel commands is filled. Since channel and device end are indicated only at the end of the entire chain, there is no way for the CPU program to determine that a particular command has executed unless the PCI flag is on. Using PCI will allow a user to start processing data in one buffer while the next is being filled. IOS overhead is reduced, because only one SIO is needed for a chain and because very little interruption analysis needs to be performed on PCI interrupt. 15

4) Channel End Appendage - This exit is taken after I/O interrupt analysis has been performed and abnormal end conditions were found not to exist.

SAM routines use this appendage to provide device independence when checking EOF on input files. If the input file is SYSIN and /* appears in columns 1 and 2 of the input record, the appendage routine sets the unit exception bit in the IOB so

that EOF looks the same for all sequential devices.

5) Abnormal End Appendage - This exit is taken twice:

- 1st - when some error check condition arises with the channel end the first time the request is executed.

- 2nd - On exit from error routines when the error is found to be permanent. One user option is to reset IOB error flags and error count fields and put the RQE back on a queue to be retried.

5. Coding For Appendages

a. DCB in User Program.

```
EOEA  = xx
PCIA  = xx
SIOA  = xx
CENDA = xx
XENDA = xx
```

Provide 2 byte appendage name code.

b. Appendage Routine

1) General register contents on entry to routine:

R1 - address of RQE
R2 - address of IOB
R3 - address of DEB
R4 - address of DCB
R7 - address of UCB
R14 - return address
R15 - address of appendage routine

Registers 10 and 11 in all routines may be used freely without saving and restoring them.

2) Cautions:

- Do not destroy contents of R1 and reset R9 to binary zeros if it is used.

Suggested Sequence: Reference

- Do not issue any instructions that would change the status of the system, such as WTO, LPSW, or SSM.

- Do not enter any loops testing for end of I/O operations.

c. Class Problem - Part 2 of EXCP machine exercise — Appendix XV

In coding any appendage where the user manipulates system bits, he must know exactly how IOS uses them.

In the channel end appendage, setting the unit exception bit is not enough to cause the IOB to be posted with permanent error. In addition, set these bits:

- IOB Exception bit in Flag1 - causes error routine interface to be entered on exit from the appendage.

- DCB IFLGS permanent error bits - prevents execution of any other EXCP's for this Data Control Block.

INSTRUCTORS' NOTE:

See System Programmer's Guide for information on appendages, and Input/Output Supervisor PLM for detailed description of flag bits in the control blocks.

TOPIC VII
REFERENCES

REFERENCE CODE	OS/360 I/O Supervisor PLM Y28-6616	OS/360 System Programmer's Guide C28-6550							
1	36								
2	57								
3	35,81								
4	35								
5	38,82								
6	45								
7	82								
8	46								
9	41								
10	49								
11	50								
12		77							
13	53								
14		78							
15	79								

Suggested Sequence: Reference

A. Introduction

1. An access method is a routine or series of routines written by one or more individuals to access data records.

2. There are several reasons for writing an access method. Among these are:

a. Need for a specialized access method.

b. Ease of coding for programmers to supported special devices.

c. Unusual handling of record formats.

B. Basic Rules for Use with Operating System/360

1. The Data Management routines must be used. OPF VIII-1

a. The Operating System requires certain control blocks in several areas:

1) Data Control Block (DCB) - filled in from DD card and data set label; used in OPEN and CLOSE.

2) Data Extent Block (DEB) - checked for limits, linked with DCB and UCB.

3) Event Control Block (ECB) - posted by I/O Supervisor.

4) Other examples as needed.

b. The Operating System requires certain macros to be used in all languages.

1) OPEN - needed for identification of data sets with DD cards, for construction of DEB's, for label checking, etc.

2) CLOSE - needed for construction of labels or label checking, for removal of DEB's, etc.

3) Data transfer request macros (READ/WRITE, GET/PUT, EXCP, XDAP) - needed

Suggested Sequence: Reference

to cause execution of channel programs.

4) I/O device control macros (PRTOV, CNTRL, etc.) - needed to modify programs.

c. Example of QSAM

1) OPEN modules determine that a supported access method is being used and does the following:

a) Stage 1: Constructs DEB
Starts merge of DCB and JFCB
Builds buffer pools

b) Stage 2: Constructs IOB's and CCW's
Completes merge of DCB and JFCB and Data Set Label or DSCB

c) Stage 3: LOAD's QSAM modules and establishes linkage from DCB.

2) QSAM MODULES

a) GET/PUT - Deblock/block logical records

- Return or LINK to EOB

b) EOB (End of block)
- Issues EXCP to schedule I/O

- Return to GET/PUT which LINK'S to ERRS

c) ERRS (Synchronizer)
- Tests ECB's for completion

- Issues WAIT if none complete

- Update IOB address

- Return to GET/PUT

Suggested Sequence: Reference

2. The Data Management routines should not be modified.

   a. Programming Systems will disclaim any ownership to their routines if modified by a user.

   b. Updates to IBM-supplied routines would have to be checked to delete changes to user-modified routines.

   c. An extensive study of the macro definitions of IBM-supplied routines would have to be made by the user.

3. Data Management routines can be combined or expanded.

   a. OPEN and CLOSE must always be specified.

   b. It is possible to combine routines such as BDAM and QSAM or BSAM and EXCP in the same program. The user can write a general routine to do this, transform this macro to a macro definition, and insert the macro into SYS1.MACLIB. Then to use the access method, he simply codes the macro name. (Examples in Appendix) Appendix XVI & XVII

   c. Another possibility is to write a macro which will expand other macros. Example: A macro to build all control blocks for EXCP; user writes macro name and operands. The following section describes an example of this. XDAP is the macro being described.

C. Execute Direct Access Program (XDAP)

1. General Information

   a. Need for XDAP

      1) When not using standard access methods.

Suggested Sequence: Reference

2) Requires less storage space than standard access methods.

3) Requires less detailed coding than with EXCP.

b. Description

The XDAP macro instruction that may be used to read, verify, or update data set blocks on a direct access volume. XDAP will generate control blocks and a designated channel program necessary for reading or updating records through either the key of the block or block identification. OPF VIII-2

c. XDAP Limitations

1) Blocks cannot be added to a data set - EXCP may be used for this function if required.

2) When block is located by identification, both key and data may be read or updated.

3) When block is located by key, only the data may be read or updated.

4) Block lengths are not verified.

5) No blocking or deblocking of records.

2. Requirements for Execution OPF VIII-3

a. DCB macro must be issued - Data Control Block is reserved at assembly time and partially filled.

b. OPEN macro issued - initializes DCB and produces a DEB (Data Extent Block).

c. XDAP macro issued - generates another control block that may be logically divided into three sections: OPF VIII-4

1) Event Control Block (ECB) which is supplied with completion code when channel program is terminated.

Suggested Sequence: Reference

2) Input/Output Block which contains information about channel program.

3) Direct Access Channel Program which consists of three CCW's.

d. WAIT macro issued specifying the ECB.

e. EOV macro issued if volume switching is necessary.

f. CLOSE macro issued:

1) When processing is completed.

2) Restores the DCB.

3. Programming Specifications

a. DCB - Define Data Control Block 1

EXCP form of DCB issued for each data set to be read or updated. 2

b. OPEN - Initialize Data Control Block

1) Initializes one or more DCB's so that their associated data sets can be processed.

2) Some of procedures performed:

a) Construction of DEB.

b) Transfer of information from DD statements and data set labels from Data Set Control Block (DSCB) to the DCB.

c) Verification or creation of standard labels.

d) Loading of programmer-written appendage routines.

3) Parameters of OPEN

a) Address(es) of DCB(s) to be initialized.

b) Method of processing (INPUT or OUTPUT) if neither stated, INPUT is assumed.

Suggested Sequence: Reference

c. XDAP - Execute Direct Access Program 3

1) Macro Instruction Format OPF VIII-5

OPERATION	OPERAND
XDAP	ecb-symbol,type-,dcb-addr, area-addr,length-value, (Key-addr,Keylength value), blkref-addr

ecb-symbol

- symbolic name assigned to XDAP control block.

type - {R|W|V}{I|K}

- specifies type of I/O operation and location method.

  R - read a block.

  W - write a block.

  V - verify contents of a block - do not transfer data.

  I - locate by identification.

  K - locate by key.

dcb-addr

- address of the data control block of the data set.

area addr

- address of an input or output area for a block of the data set.

length-value

- number of bytes to be transferred.

Suggested Sequence: Reference

. includes key length if located by identification.

. Maximum bytes - 32767

key-addr (optional)

. address in main storage of key when location is by key.

keylength-value (optional)

. length in bytes of key.

blkref-addr

. address in main storage of field containing actual device address of the track containing the block to be located.

- when located by key - 7 bytes in form of MBBCCHH.

- when located by identification - 8 bytes in form of MBBCCHHR.

2) Produces XDAP control block that contains: OPF VIII-6

a) ECB 4

. 4 bytes in length.

. Begins on full word boundary.

. I/O Supervisor places completion code containing status information upon channel program termination.

. WAIT-macro must be issued before testing "Complete Bit".

Suggested Sequence: Reference

b) IOB 5

- 40 bytes in length.
- immediately follows ECB.
- only fields of concern to XDAP user are "First Two Sense Bytes" and "Channel Status Word".
- these fields may have to be examined when unit check or I/O interruption occurs.

c) Direct Access Channel Program

- 24 bytes in length.
- immediately follows the IOB.
- one of four channel programs generated (depending on I/O type specified). OPF VIII-7

Type of I/O Operation	CCW	Command Code
Read by Ident.	1	Search ID Equal
	2	TIC
*(Verify)	3	Read Key & Data
Read by Key	1	Search Key Equal
	2	TIC
*(Verify)	3	Read Data
Write by Ident.	1	Search ID Equal
	2	TIC
	3	Write Key & Data
Write by Key	1	Search Key Equal
	2	TIC
	3	Write Data

* If Verify option is specified, the third CCW is flagged for SKIP.

4. XDAP Options 6

a. To issue XDAP, you must provide the actual device address of the track containing the block to be processed. If

Suggested Sequence: Reference

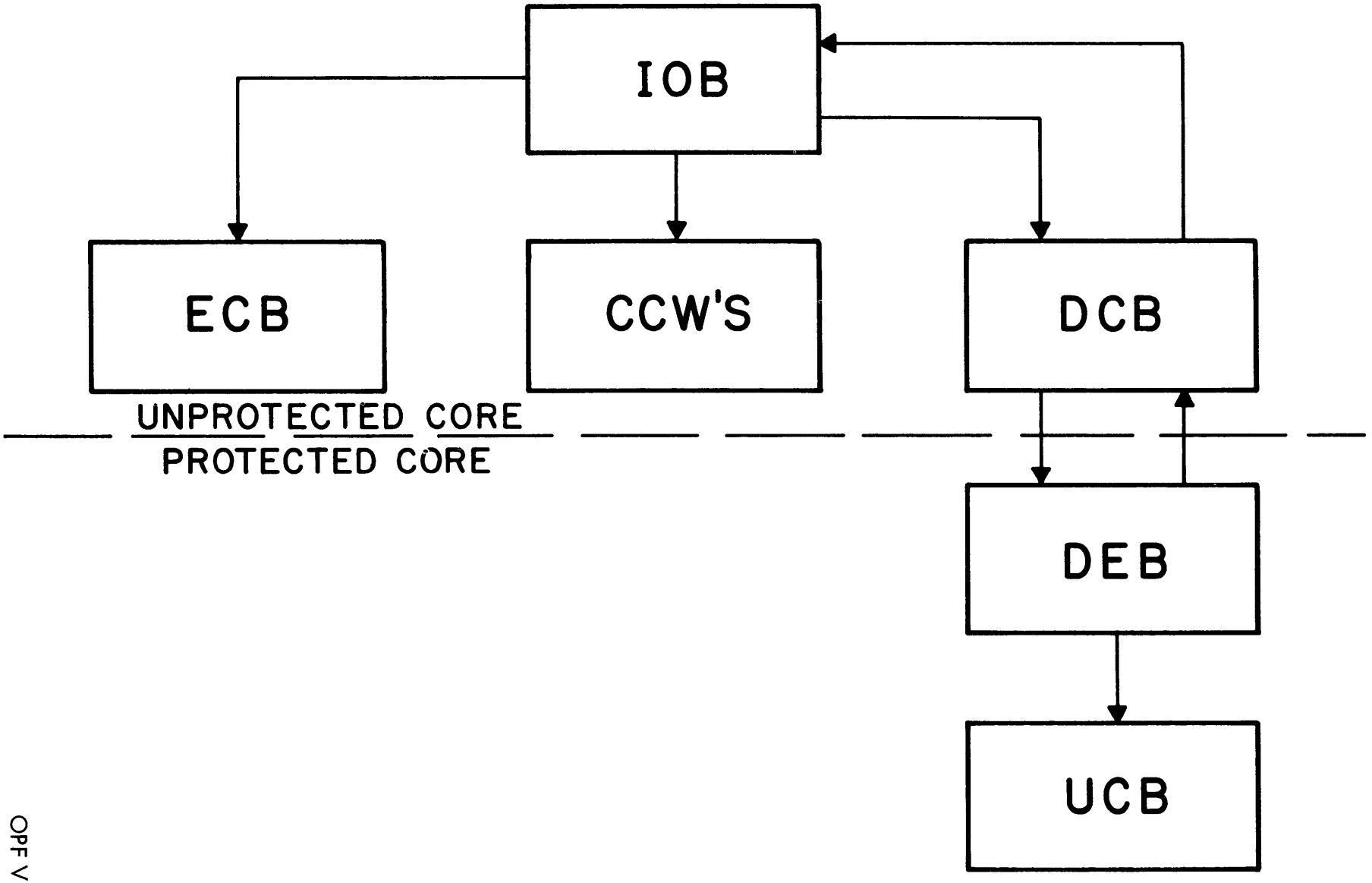
you know only the relative track address, you can convert it to the actual address by using a resident system routine. The entry to this conversion routine is labeled IECPCNVT. The address of the entry point is in the Communications Vector Table (CVT). The address of the CVT is in location 16.

b. The conversion routine does all its work in general registers. You must load registers 0, 1, 2, 14 and 15 with input to the routine. 7

TOPIC VIII
REFERENCES

REFERENCE CODE	OS/360 System Programmer's C28-6550	Introduction to Control Program Logic C28-6605							
1	71-78								
2		31							
3	92-94								
4	95								
5	82								
6	96								
7	96-97								

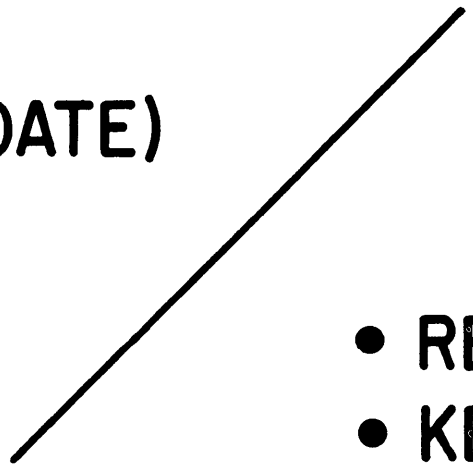
CONTROL BLOCKS FOR I/O



XDAP

(EXECUTE DIRECT ACCESS PROGRAM)

- READ
- WRITE (UPDATE)
- VERIFY



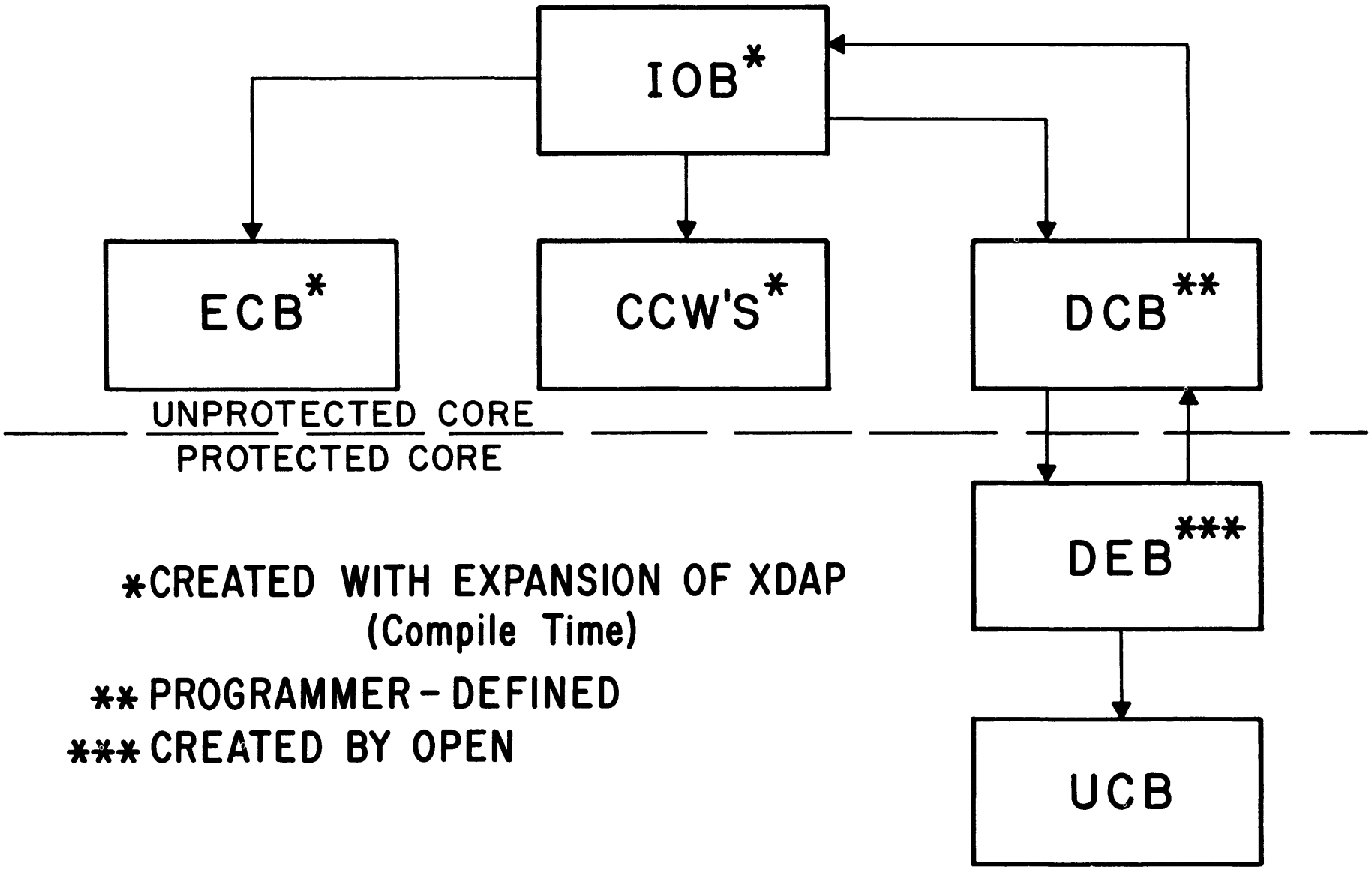
- RELATIVE BLOCK
- KEY

XDAP PROGRAMMING

PROGRAMMER

```
AB      DCB     ...,MACRF=(E),...
        OPEN    AB
          }
        XDAP    XECB,...
        WAIT    ECB=XECB
          }
        EOV     AB
          }
        CLOSE   AB
```

XDAP



*CREATED WITH EXPANSION OF XDAP
(Compile Time)

** PROGRAMMER-DEFINED

*** CREATED BY OPEN

```
                XDAP        ECB1,RI,DCB1,INAREA1,58,,BLKID
                 ≀
                 ≀
                 ≀
BLKID           DS          0CL8
M               DC          C'0'
BB              DC          C'00'
CC              DC          C'00'
HH              DC          C'00'
R               DC          C'0'
```

```
         XDAP    ECB1,RI,DCB1,INAREA1,58,,BLKID
+ECB1    DC      F'0'
+        DC      C'00'
+        DC      C'00'          Sense Bytes
+        DC      A(ECB1)
+        DC      D(0)           Channel Status Word
+        DC      F'0'
+        DC      A(DCB1)
+        DC      H'58'
+        DC      H'0'
+        DC      2F(0)          MBBCCHHR
+        CCW
+        CCW
+        CCW
```

IOB

CHANNEL PROGRAM

XDAP CHANNEL PROGRAMS

TYPE	CCW	COMMANDS
READ BY ID	1	SEARCH ID EQUAL
	2	TIC
* (VERIFY)	3	READ KEY & DATA
READ BY KEY	1	SEARCH KEY EQUAL
	2	TIC
* (VERIFY)	3	READ DATA
WRITE BY ID	1	SEARCH ID EQUAL
	2	TIC
	3	WRITE KEY & DATA
WRITE BY KEY	1	SEARCH KEY EQUAL
	2	TIC
	3	WRITE DATA

* THIRD CCW IS FLAGGED FOR SKIP

Suggested Sequence: Reference

A. Introduction

1. This topic is designed to give an approach to use to cause the control program to recognize a device for which there is no available Type I programming support. This method will be used for implementing the device for storage of non-system data sets (not SYSRES, SYSIN, SYSOUT, Cataloged Control Volume).

INSTRUCTORS' NOTE:

The prerequisite for understanding this topic is reading the introductory pages of Input/Output Supervisor PLM (Y28-6616)

2. The outline will be concerned primarily with using as many features of the control program as possible with a minimum of modification.

B. Operating System Requirements

1. The Operating System must be able to handle all devices within the system in the following ways:

a. Allocation

1) The Job Management routines must be able to recognize the device by a UNIT name and handle mounting and disposition of data sets.

2) If this is a direct access device, it should be possible to use the Direct Access Device Space Management routines.

b. Access of the Device

1) The I/O supervisor must be able to start an I/O request, enqueue requests, interrupt processing, etc.

2) The I/O interrupt handler must be able to recognize channel interrupts and pass control to the appropriate routine in case of error.

3) The lowest level of coding for the user will be EXCP. (In some cases it may be possible to use BSAM, QSAM, XDAP, etc.)

Suggested Sequence: Reference

2. These control blocks are required by the system to perform its functions.

   a. Unit Control Block (UCB) OPF IX-1

      1) This control block must be created at System Generation time and must be contained in the nucleus.

      2) It will be 24, 40, or 100 bytes long depending on the device type (unit record, tape, or direct access).

      3) It will contain such information as:

         . Actual channel and unit address.

         . EBCDIC unit name.

         . An indexing value into the device class table (for device dependent start I/O, enqueue, etc.).

         . An indexing value into the attention interrupt table.

         . A numeric constant to be appended to the constant IGE0000 to form the name of an error routine located in SYS1.SVCLIB.

   b. Data Extent Block (DEB) OPF IX-2

      1) This control block is built in protected core by the Access Method Executor at OPEN time. (Ref. p.20, PLM, Y28-6605)

      2) This block contains such information as:

         . Number of extents specified in DSCB's.

         . Address of DCB.

         . A device modifier (such as a Set Mode code or file mask).

Suggested Sequence: Reference

- Address of UCB associated with this extent.
- Cylinder, track addresses for start of an extent limit.
- Cylinder, track addresses for end of an extent limit.
- Access method dependent fields.

c. Data Control Block (DCB) OPF IX-3

1) This control block is built in the user's program area.

2) OPEN establishes a pointer to the DEB and IOB.

d. Input/Output Block (IOB)

1) This control block is built in the user's program at the EXCP level.

2) It contains a pointer to the DCB, to the CCW list, and to the ECB that will be posted at completion of the I/O request.

e. Event Control Block (ECB)

1) This control block is built in the user's program.

2) It is posted with a completion code by the I/O supervisor at the end of a channel program.

C. Supporting the Device

1. Defining the Unit Control Block.

a. System Generation OPF IX-4

1) The CHANNEL, IOCONTROL, and IODEVICE macros supplied as input to Stage 1 of the System Generation process determine the device types to be included in the new system. Only those devices listed as supported in the Systems Generation SRL will generate properly.

Suggested Sequence: Reference

INSTRUCTORS' NOTE:

It is possible to specify unit number for certain unsupported (as yet) devices and perform the SYSGEN process; but to determine which are included, it is necessary to study the global switch settings in the SGGEN100 macro in SYS1.GENLIB.

2) Output from Stage 1 consists of a series of macros to be assembled. The IECIUCB macro will be generated for each device defined by an IODEVICE macro. The operands of the macro are as follows: OPF IX-5

   a) UCB sequential number.

   b) Actual device address.

   c) Class of device (UR, TP, TA, DA).

   d) Device table index value.

   e) Error routine hexadecimal suffix.

   f) Statistical table index value.

   g) Logical channel index value.

   h) Assigned UNIT NAME (EBCDIC).

   i) UCB type (over-runnable,burst or byte mode, data chaining, device class, unit type, model, features).

   j) Allocation channel mask.

   k) Status bits A (4-7) - (permanently resident).

   l) Seek queue option (FIFO, ordered seek).

3) Explanation of foil OPF IX-6

   a) This is the eighth UCB defined.

   b) It is located on Channel 1, control unit 4, device 0.

   c) It is a magnetic tape unit.

Suggested Sequence: Reference

d) The device table index value is 18.

e) The error routine used will be IGE0000I from SYS1.SVCLIB.

f) The statistics table index value is 7.

g) The logical channel index value is 1.

h) The UNIT NAME 140 has been assigned.

i) This is a burst mode device (3). It will permit data chaining, has no model code (0), has no optional features (00), is a magnetic tape device (80), and is a 2400 series magnetic tape (01).

j) 64 is the allocation channel mask.

k) The volume will not be permanently resident.

l) There is no seek queue option.

4) The way to support the unsupported device is to generate an IECIUCB macro for a supported device and then change the operands in the macro before executing Stage 2 of the Systems Generation process.

b. Supported UCB Types

1) Direct Access OPF IX-7

a) 100 bytes long (See I/O Supervisor).

b) Contains an index into an I/O supervisor device table which points to queuing modules, start I/O modules, and trap modules. The direct access start I/O module will always perform a stand alone seek and prohibit any seeks in the problem program

Suggested Sequence: Reference

list of CCW's.

2) Tape OPF IX-8

a) 40 bytes long.

b) Contains an index into a device table, containing a pointer to queuing modules, start I/O modules, and trap modules. The tape start I/O module will issue a set mode command.

3) Unit record or teleprocessing OPF IX-9

a) 24 bytes long.

b) Contains an index into the device table, which holds a pointer to queuing modules, start I/O modules, and trap modules. The unit record start I/O module issues no control commands.

4) If a user should need a UCB of larger than 24 bytes (UR size), but does not want control commands to be issued before his channel program, he may specify a unit record device in the IODEVICE macro as input to Stage 1 of SYSGEN to obtain an index value point to the unit record start I/O module. He would then have to change the IECIUCB macro device type to TA or DA, depending on the number of bytes needed.

EX: Stage 1 Output IECIUCB..,..,UR,..
Change to IECIUCB..,..,DA,..

c. Device Types

1) Teleprocessing

a) All reference must be at EXCP level. A thorough knowledge of types and time of interrupt is required.

b) Implementation

The SYSGEN process will accept:

```
IOCONTROL UNIT=2702,

IODEVICE  UNIT=1050,ADAPTER=IBM 1,SETADDR=1
```

INSTRUCTORS' NOTE:

This information was found in SYS1.GENLIB.

- The generated macro will contain:

```
IECIUCB  ,  , TP,  00,
```

- The user must change the error suffix value (00) and incorporate his error routine into SYS1.SVCLIB.

c) Attention interrupts (request key or graphics light pen) are not recognizable to the system except from the console. Attention interrupt routines can only be included by modifying the IOS attention table. This means modification of the IECIOS macro on SYS1.GENLIB. The attention index value in the UCB must also be changed, but since there is no parameter in the IECIUCB macro, this means modification of the IECIUCB macro in SYS1.GENLIB or a user SVC routine at IPL time to write in the correct value.

2) Unit record

a) The SYSGEN process will allow 1403, 1443, 2671, 2540R, 2540P, 1442, 2501*, 2520* at initial release. (*No error routines)

INSTRUCTORS' NOTE:

Check current release to find out what is currently supported.

b) The IECIUCB macro can then be changed for the unsupported device. (Error suffix, device type for longer than 24 bytes.)

3) Magnetic Tape

a) Must determine whether standard error routines are to be used.

Suggested Sequence: Reference

b) Start I/O module will issue a set mode command. If user wants to write his own (EXCP level), he can define IODEVICE as unit record for Stage 1 and change device type for Stage 2. Appendix XII

4) Direct Access

a) May require modification of device characteristics table and error routines.

b) Some kind of DASD1 program must be run to write:

. HA

. R_0

. Track descriptor records

. Volume label

. VTOC Appendix XIII

2. Naming the Device Appendix XIV

a. The device name table and device mask table are built from the macros SGIEF010, SGIEF011, and SGIEF015 (output of Stage 1). These tables are used by Job Management in allocating devices from the UNIT=xxx parameter in the DD card.

b. The device name table (DEVNAMET) contains an entry for every:

1) UNIT (2311, 2400, etc.)

2) ADDRESS (00C, 180, 290, etc.)

3) User name specified in UNITNAME macro.

c. The device mask table (DEVMASKT) contains a count of the number of devices assigned to a name and the relative position of each device in the UCB lookup table.

d. Effect of changing device type code in UCB on allocation procedures.

Suggested Sequence: Reference

EX: SYSGEN five 2311's, change one to 2302.

1) Allocation by device assigned (00C, 180, etc.) is not affected.

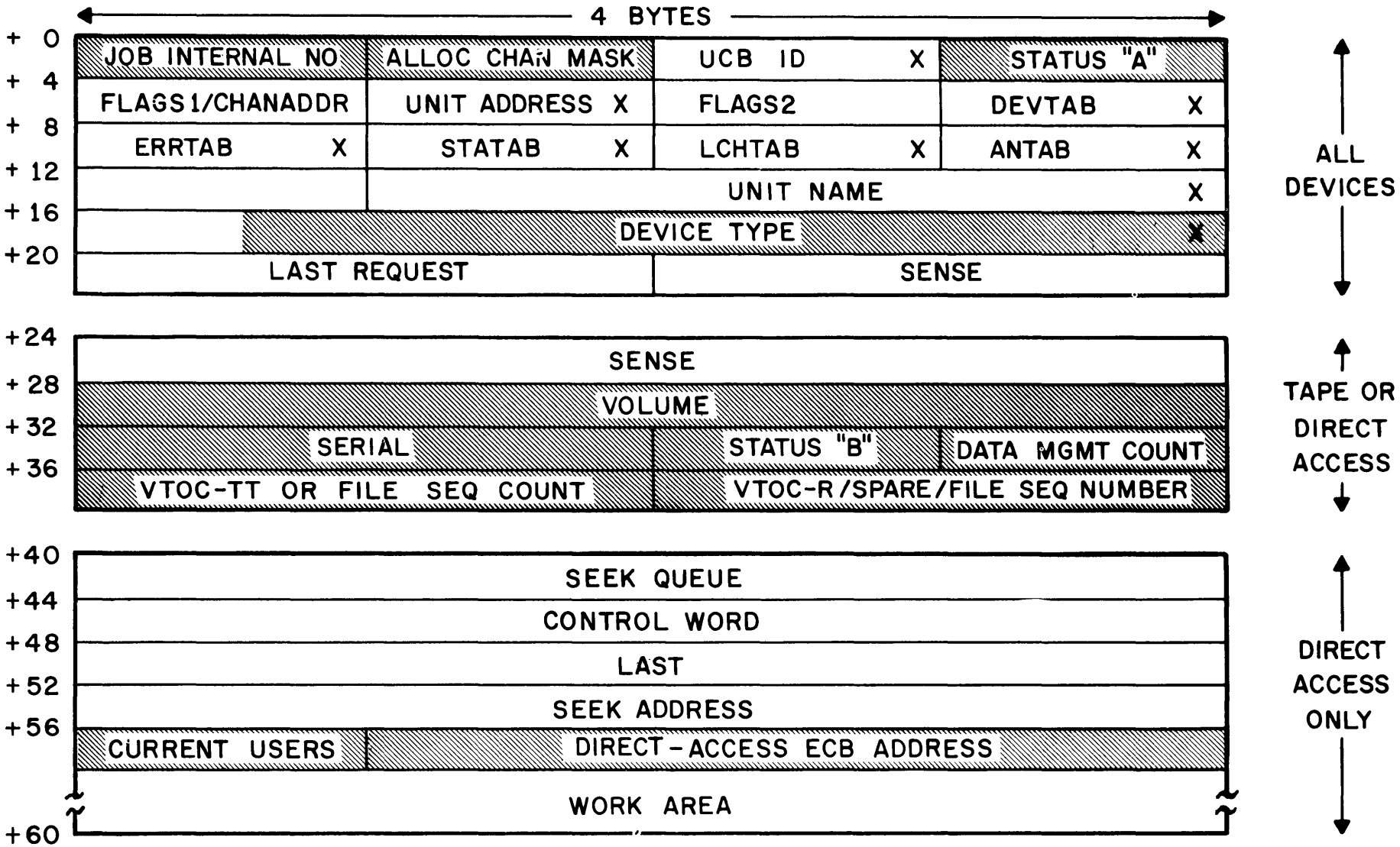
2) Allocation by device name (2540, 2311, etc.) will reference only UCB's not altered, but may at certain times be a problem, since the DEVMASKT has not been updated to show four rather than five 2311's.

3) Allocation by user-defined name (at SYSGEN) should always work.

INSTRUCTORS' NOTE:

Appendices XII, XIII, XIV, and XVIII are examples of device support. When these devices are supported by a released version of the 360 Operating System, you may find it necessary to use additional examples.

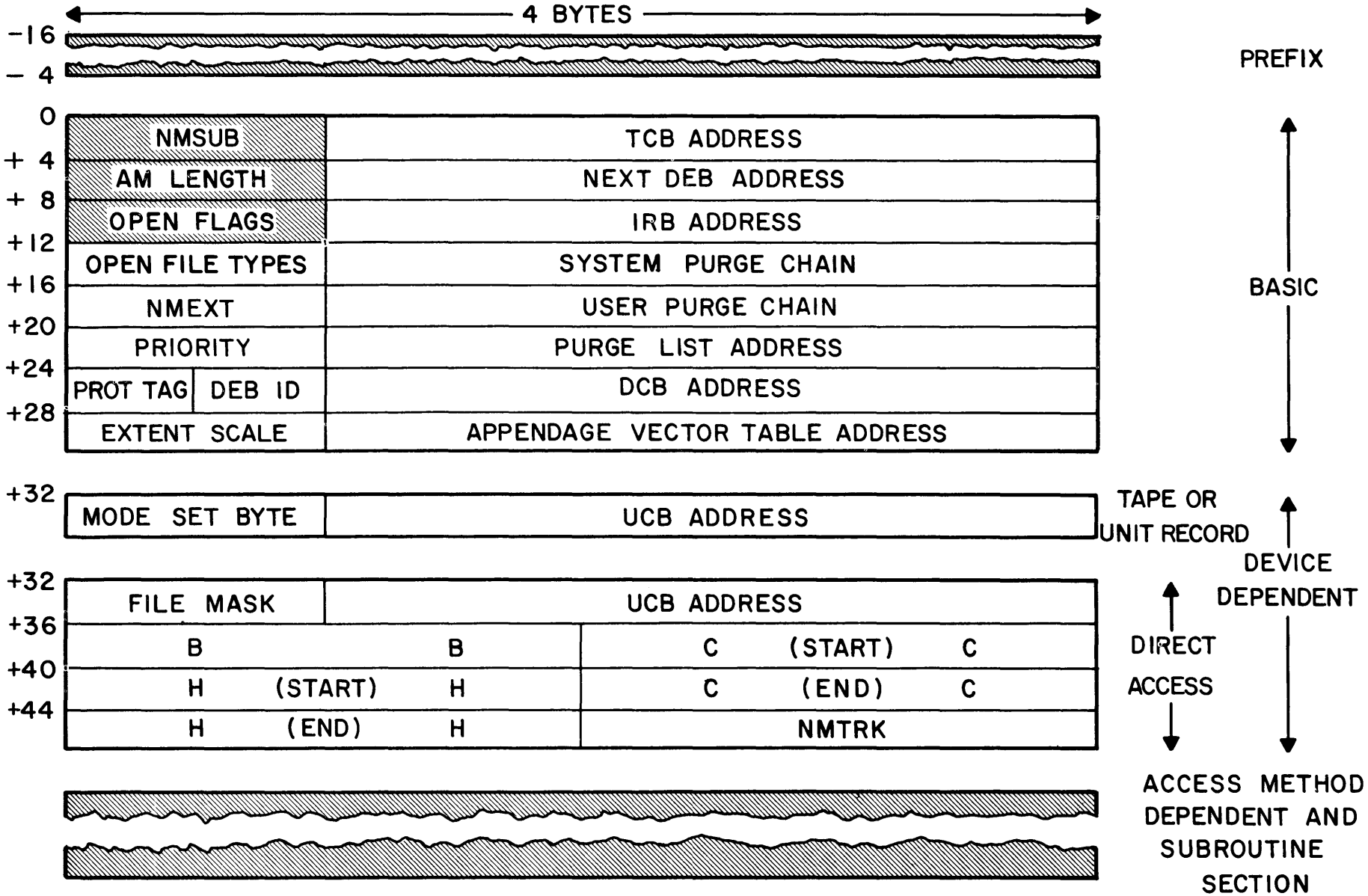
UNIT CONTROL BLOCK



X The X areas are loaded at system generation time; all except ATNTAB, which is changed by system routines, remain constant.

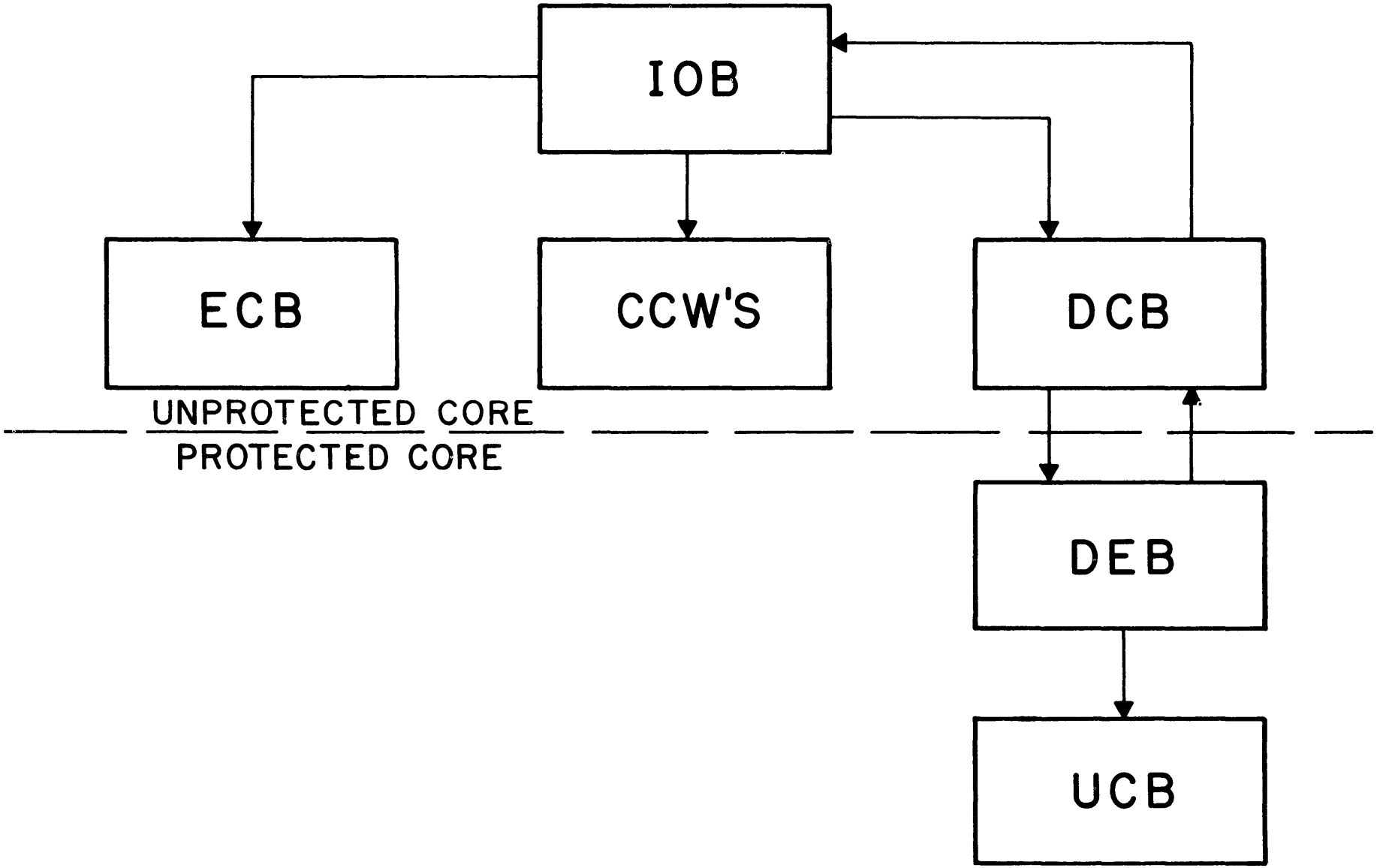
▨ The I/O supervisor does not use the shaded fields.

DATA EXTENT BLOCK



The I/O supervisor does not use the shaded fields.

CONTROL BLOCKS FOR I/O



SYSTEM GENERATION INPUT

```
CHAN 1        CHANNEL       ADDRESS = 1,
                            TYPE = SELECTOR
TAPECNTL      IO CONTROL    UNIT = 2804, ADDRESS = 14,
                            MODEL = 2
TAPE 1        IO DEVICE     UNIT = 2402, ADDRESS = 140,
                            MODEL = 2, FEATURE = 9 -
                            TRACK
```

IECIUCB MACRO

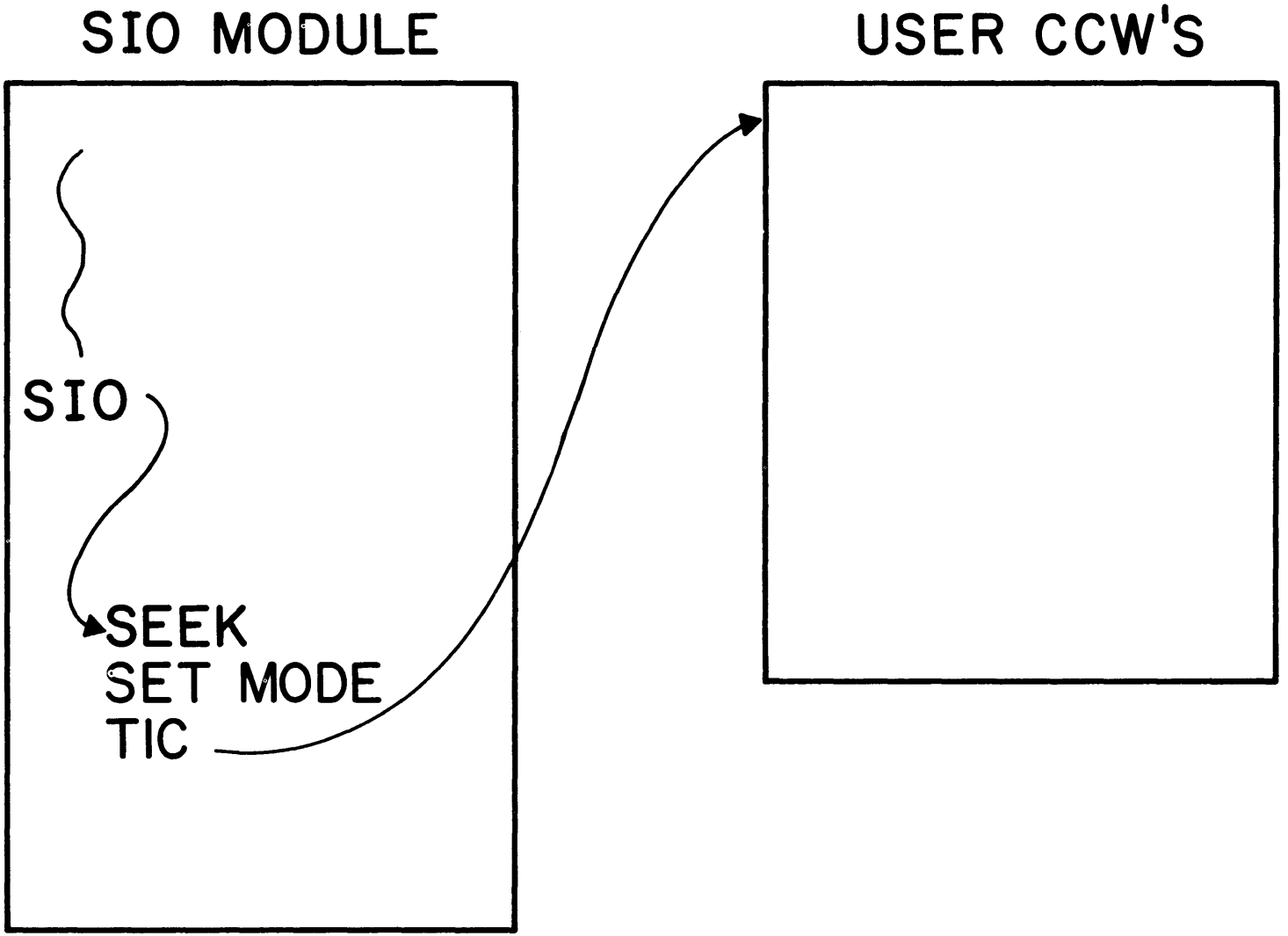
```
IECIUCB   (UCB seq. no.),                          X
          (actual device address),                 X
          (class of device),                       X
          (device table index value),              X
          (error routine suffix),                  X
          (statistical table index value),         X
          (logical channel index value),           X
          (assigned unit name-EBCDIC),             X
          (UCB type),                              X
          (allocation channel mask),               X
          (status bits),                           X
          (seek queue option)
```

IECIUCB MACRO

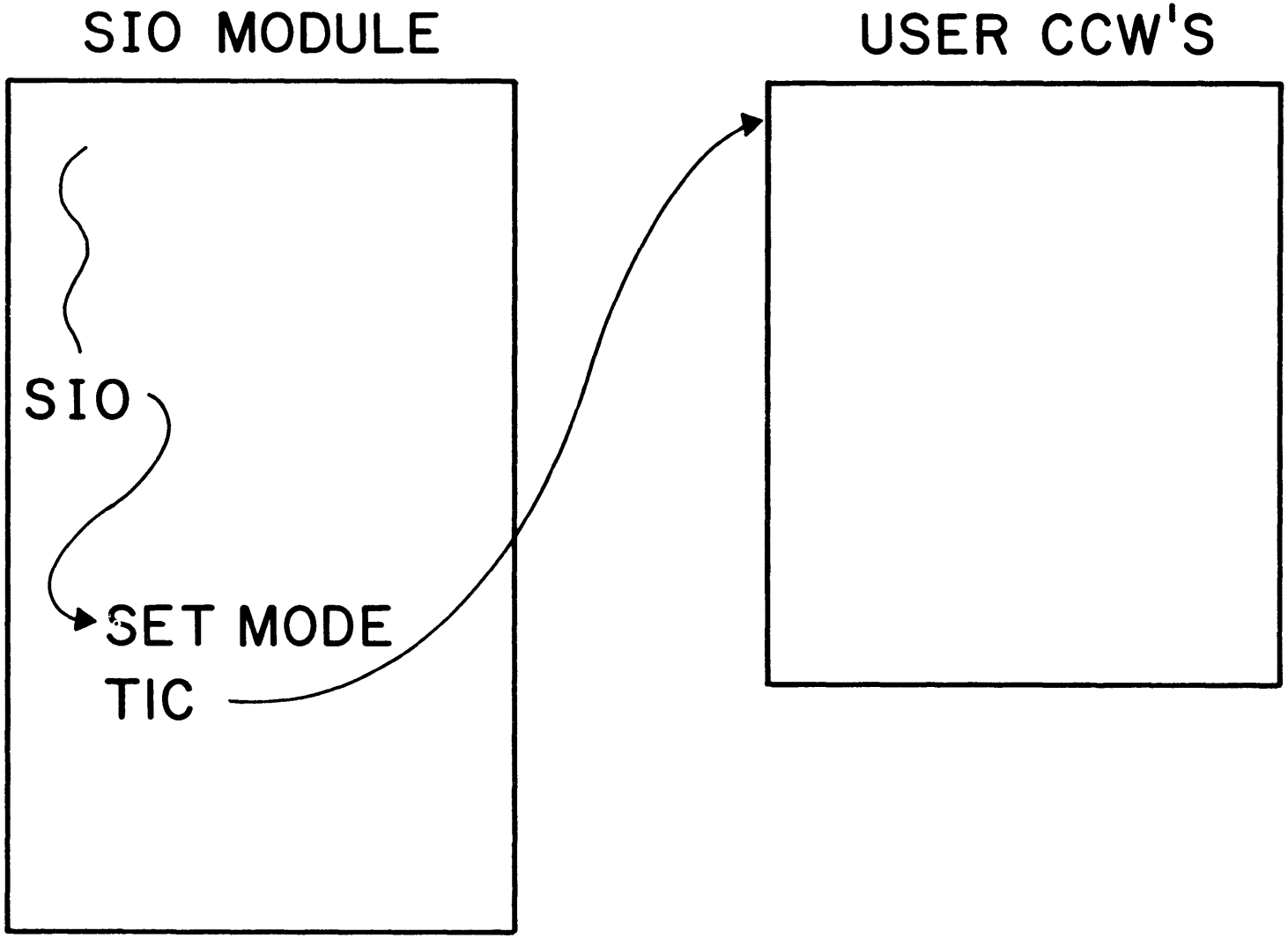
IECIUCB 8,14Ø,TA,18,09,7,1,14Ø,3ØØØ8ØØ1,64,Ø,Ø

(2400 SERIES-9-TRACK MAGNETIC TAPE
WITH A DEVICE ADDRESS OF 140)

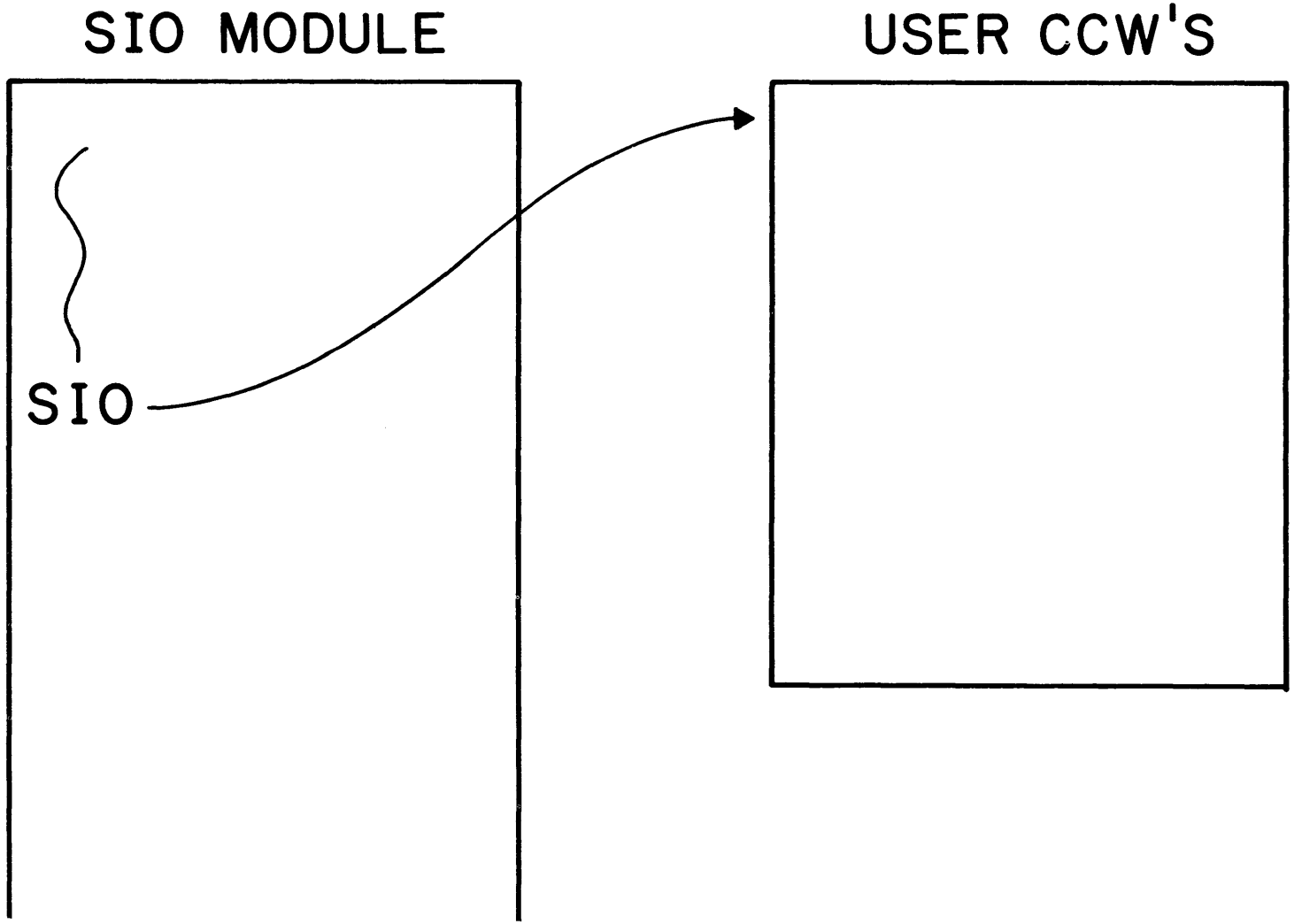
DIRECT ACCESS START I/O



TAPE START I/O



UNIT RECORD I/O



Section 5

Appendix 1

I. JOB MANAGEMENT

A Master Scheduler

1 CONSOLE INTERRUPT ROUTINE

FUNCTION: Provides the supervisor with the information necessary to give control to the routine that is to receive it when an attention interruption is processed.

2 MASTER COMMAND EXCP ROUTINE

FUNCTION: Processes the CANCEL, DISPLAY, MOUNT, REQ, START, STOP, UNLOAD and LOAD commands.

3 MASTER COMMAND ROUTINE

FUNCTION: Analyzes command verbs and gives control to the proper command execution routines.

4 WRITE-TO-OPERATOR ROUTINE

FUNCTION: Processes messages to operator and operator replies.

5 EXTERNAL INTERRUPT ROUTINE

FUNCTION: Handles switch to alternate console when external interruptions occur.

B Reader/Interpreter

1 CONTROL ROUTINE

FUNCTION: Reads and interprets control statements passing control to the proper statement processing routine.

2 JOB ROUTINE

FUNCTION: Performs JOB statement analysis and constructs the Job Control Table from its contents.

3 EXECUTE ROUTINE

FUNCTION: Performs EXEC statement analysis and constructs the Step Control Table from its contents.

4 DATA DEFINITION ROUTINE

FUNCTION: Performs DD statement analysis and constructs the Job File Control Block and the Step I/O Table from its contents.

C Initiator/Terminator

1 SYSTEM CONTROL ROUTINE

FUNCTION: Performs housekeeping requirements as first step in initiating a job.

2 EXECUTE STATEMENT CONDITION CODE ROUTINE

FUNCTION: Processes condition codes specified in EXEC statement.

3 JFCB HOUSEKEEPING CONTROL ROUTINE

FUNCTION: Determines and directs control to proper JFCB processing routine.

4 ALLOCATION CONTROL ROUTINE

FUNCTION: Performs Initiator/Terminator housekeeping for allocation and setup.

5 DEMAND ALLOCATION ROUTINE

FUNCTION: Constructs the allocate work and volume tables and begins devices assignment to data sets that are assigned specific devices.

6 AUTOMATIC VOLUME RECOGNITION ROUTINE

FUNCTION: Performs allocation of devices on which volumes are mounted.

7 DECISION ALLOCATION ROUTINE

FUNCTION: Allocates remaining devices not already allocated by other allocation routines.

8 TIOT CONSTRUCTION ROUTINE

FUNCTION: Obtains space for and builds the TIOT for the processing program.

9 EXTERNAL ACTION ROUTINE

FUNCTION: Issues mounting instructions, verifies correctly mounted volumes, and unloads incorrectly mounted ones.

10 SPACE REQUEST ROUTINE

FUNCTION: Processes request for space on direct access device volumes.

11 ALLOCATION ERROR ROUTINE

FUNCTION: Processes error conditions occuring during allocation and setup.

12 STEP INITIATION ROUTINE

FUNCTION: Performs all initiation operations required before control is passed to the processing program.

13 STEP TERMINATION ROUTINE

FUNCTION: Performs general task termination procedures in addition to passing control to appropriate routines for disposition and unallocation of data and processing condition codes.

14 JOB TERMINATION ROUTINE

FUNCTION: Performs general job termination procedures in addition to passing control to the appropriate routine to release job queue, performing disposition and unallocation, and user accounting.

II. TASK MANAGEMENT

A Interruption Supervision

1 SVC FLIH ROUTINE
FUNCTION: The supervisor call first level interruption handler does the introductory work following an SVC interruption, and prepares for the execution of type 1 SVC's.

2 SVC SLIH ROUTINE
FUNCTION: The supervisor call second level interruption handler monitors the SVC transient area and prepares for the execution of types 2,3, and 4 SVC's.

3 TYPE 1 EXIT ROUTINE
FUNCTION: Performs SVC type 1 existing procedures going to the dispatcher for task switching or to the interrupted program.

4 EXIT ROUTINE
FUNCTION: Performs the dequeuing of the SVRB from the TCB's active RB and passes control to the dispatcher.

5 DISPATCHER ROUTINE
FUNCTION: Passes control among routines, handles asynchronous exits and monitors the I/O Supervisor transient area.

6 I/O FLIH ROUTINE
FUNCTION: The input/output first level interruption handler performs machine interruption supervision and insulates the input/output interruption from other types of interruption.

7 T/E FLIH ROUTINE
FUNCTION: The timer/external first level interruption handler performs operations for interruptions caused by the hardware timer and the console key and passes control to appropriate handling routines.

8 P-FLIH ROUTINE
FUNCTION: The program first level interruption handler performs operations and passes control for all program interruptions.

9 MK-FLIH ROUTINE
FUNCTION: The machine check first level interruption handler places machine in a wait state or passes control to Systems Environment Recording.

10 VALIDITY CHECK ROUTINE
FUNCTION: Performs a common function for the system routines preventing program interruption caused by invalid addressing.

B Task Supervision

1 ATTACH ROUTINE
FUNCTION: Locates requested routine, controls required RB queueing and post event control block when necessary.

2 EXTRACT ROUTINE
FUNCTION: Performs all operations required in changing fields of the users' list.

3 SPIE ROUTINE
FUNCTION: Sets flags that indicate the user has program interruption control.

4 WAIT (Single Event) ROUTINE
FUNCTION: Performs status checking of wait by bit test of ECB passing control to proper routines.

5 WAIT (Multiple Event) ROUTINE
FUNCTION: Performs status checking of wait count and ECB indicators plus enabling caller for input/output and external interruptions.

6 POST ROUTINE
FUNCTION: Checks status of ECB bits and performs proper control transfer.

7 ABTERM ROUTINE
FUNCTION: Schedules the abnormal termination of task for systems routines.

8 ABEND ROUTINE
FUNCTION: Terminates all internal activities both for normal and abnormal termination of the current task.

C Main Storage Supervision

1 GETMAIN ROUTINE
FUNCTION: Allocates storage to tasks according to requirements.

2 FREEMAIN ROUTINE
FUNCTION: Releases specified storage space on request.

D Contents Supervision

1 LINK ROUTINE
FUNCTION: Passes control from the issuing routine to another routine in such a way that the issuing routine regains control at completion of the second routine.

2 LOAD ROUTINE
FUNCTION: Searches the loaded program list for requested routine and passes control to FINCH when the routine requires loading.

3 XCTL ROUTINE
FUNCTION: Passes control from issuing routine to a requesting routine.

4 IDENTIFY ROUTINE
FUNCTION: Builds, initializes, and chains to the load list a minor RB for the routine specified by the issuer of the macro.

5 DELETE ROUTINE
FUNCTION: Reduces the RB use count of the loaded routine by one and when it becomes zero frees storage occupied by associated routine.

6 SYNCH ROUTINE
FUNCTION: Creates, initializes and queues program request blocks.

7 FINCH ROUTINE
FUNCTION: Retrieves specified routines from auxiliary storage.

E Overlay Supervision

1 OVERALY SUPERVISOR 1
FUNCTION: A resident routine that performs initialization procedures, links to Overlay Supervisor 2 and after regaining control, performs the remaining termination procedures and issues an SVC EXIT instruction.

2 OVERLAY SUPERVISOR 2
FUNCTION: This routine is envoked when a requested program is an overlay program performing the remaining initialization procedures, loading the requested segments, updating the segment table and entry tables, and performing some termination procedures.

F Ti

1
FUNCTION: Se spe de int

2
FUNCTION: P c

3
FUNCTION: R c

4
FUNCTION: A n

II. TASK MANAGEMENT

C Main Storage Supervision

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2 OVERLAY SUPERVISOR 2

FUNCTION: This routine is envoked when a requested program is an overlay program performing the remaining initialization procedures, loading the requested segments, updating the segment table and entry tables, and performing some termination procedures.

F Time Supervision

1 STIMER ROUTINE

FUNCTION: Sets an interval into a software interval timer, specifies when that interval timer is to be decremented and what action is taken when interruptions signal completion of the interval.

2 TIME ROUTINE

FUNCTION: Places the time of day in register 0 and the current day in register 1.

3 TTIMER ROUTINE

FUNCTION: Records remaining time interval in register 0 or cancels previously specified intervals.

4 TIMER SLIH

FUNCTION: Monitors all types of interval expirations and maintains the queue of time interval requests.

G Program FETCH

1 INITIALIZATION/TERMINATION ROUTINE

FUNCTION Performs the job of a relocation loader which brings a program module processed by the linkage editor from secondary storage into a single area of storage and computes the modules entry point.

2 LOADING ROUTINE

FUNCTION: Reads text and RLD records of a load module into main storage.

3 RELOCATING ROUTINE

FUNCTION: Adjust values of address contents to reflect the relocation of a module that has been loaded into main storage.

III. DATA MANAGEMENT

A Input/Output Supervisor

1 EXCP SUPERVISOR

FUNCTION: The EXCP Supervisor tests channels for activity, handles enqueuing and dequeuing, handles SIO, and performs EXCP validity checking.

2 I/O INTERRUPT SUPERVISOR

FUNCTION: Performs UCB lookup, I/O interruption analysis, channel search and restart, I/O purge and handles trapcodes.

B OPEN/CLOSE/EOV

1 OPEN ROUTINE

FUNCTION: Performs volume verification, label checking, control block information, and determining access method routines.

2 RDJFCB ROUTINE

FUNCTION: Reads into the dynamic area the JFCB's associated with the DCB's in the parameter list.

3 CLOSE ROUTINE

FUNCTION: Performs labeling operations, purges queued and active I/O requests associated with data sets that are being operated on at the EXCP level, and keeps track of the access method executors and close modules necessary for closing each DCB.

4 EOV ROUTINE

FUNCTION: Processes end-of-volume and end-of-data set conditions for data sets having sequential organization.

C DADSM

1 ALLOCATE ROUTINE

FUNCTION: Allocates initial space to data sets.

2 EXTEND ROUTINE

FUNCTION: Allocates additional space to a data set at end-of-volume.

3 SCRATCH ROUTINE

FUNCTION: Deletes data sets by deleting their respective data set control blocks.

4 RELEASE ROUTINE

FUNCTION: Returns unused data set space to available storage when a data set is closed.

5 RENAME ROUTINE

FUNCTION: Changes the name of a referenced data set.

6 OBTAIN ROUTINE

FUNCTION: Obtains direct access to any block in the VTOC.

III. DATA MANAGEMENT

B OPEN/CLOSE/EOV

1	OPEN ROUTINE
FUNCTION:	Performs volume verification, label checking, control block information, and determining access method routines.

2	RDJFCB ROUTINE
FUNCTION:	Reads into the dynamic area the JFCB's associated with the DCB's in the parameter list.

3	CLOSE ROUTINE
FUNCTION:	Performs labeling operations, purges queued and active I/O requests associated with data sets that are being operated on at the EXCP level, and keeps track of the access method executors and close modules necessary for closing each DCB.

4	EOV ROUTINE
FUNCTION:	Processes end-of-volume and end-of-data set conditions for data sets having sequential organization.

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1	ALLOCATE ROUTINE
FUNCTION:	Allocates initial space to data sets.

2	EXTEND ROUTINE
FUNCTION:	Allocates additional space to a data set at end-of-volume.

3	SCRATCH ROUTINE
FUNCTION:	Deletes data sets by deleting their respective data set control blocks.

4	RELEASE ROUTINE
FUNCTION:	Returns unused data set space to available storage when a data set is closed.

5	RENAME ROUTINE
FUNCTION:	Changes the name of a referenced data set.

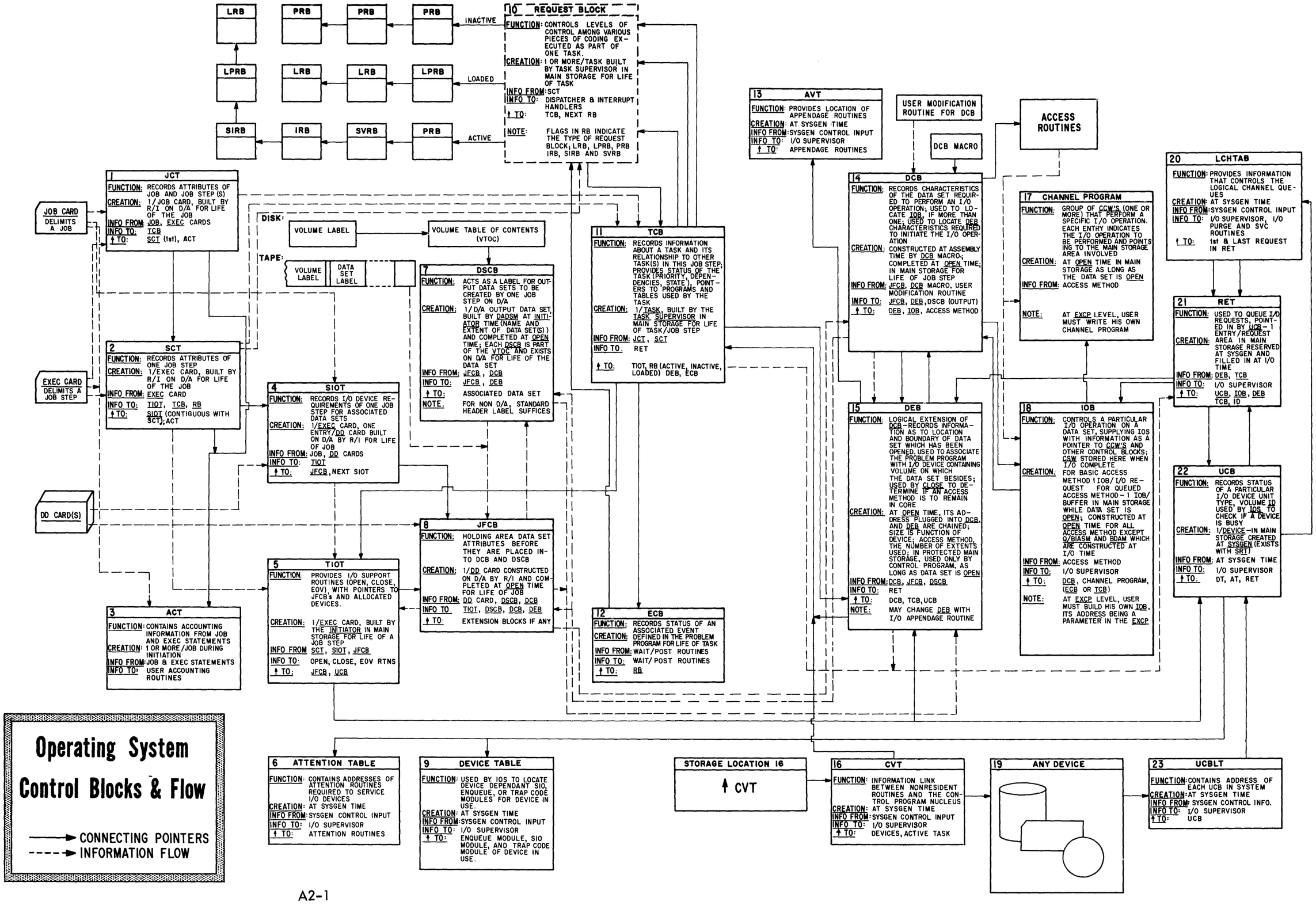
6	OBTAIN ROUTINE
FUNCTION:	Obtains direct access to any block in the VTOC.

D Catalog Management

1	CATALOG ROUTINE
FUNCTION:	Finds entries in the catalog; inserts, deletes, or replaces data set pointer entries, volume control block pointer entries, and volume control blocks; and enters into and deletes from the catalog the indexes, generation index pointer entries, index pointer entries, control volume pointer entries and alias entries.

2	CVOL ROUTINE
FUNCTION:	Provides services to the catalog routine by opening catalog data sets for processing and by writing format blocks in new catalog data sets.

Appendix 2


LRB
PRB
PRB
PRB
INACTIVE
10 REQUEST BLOCK
FUNCTION: CONTROLS LEVELS OF CONTROL AMONG VARIOUS PIECES OF CODING EXECUTED AS PART OF ONE TASK.
CREATION: 1 OR MORE/TASK BUILT BY TASK SUPERVISOR IN MAIN STORAGE FOR LIFE OF TASK
INFO FROM: SCT
INFO TO: DISPATCHER & INTERRUPT HANDLERS
↑ TO: TCB, NEXT RB
NOTE: FLAGS IN RB INDICATE THE TYPE OF REQUEST BLOCK, LRB, LPRB, PRB IRB, SIRB AND SVRB
LPRB
LRB
LRB
LPRB
LOADED
SIRB
IRB
SVRB
PRB
ACTIVE
13 AVT
FUNCTION: PROVIDES LOCATION OF APPENDAGE ROUTINES
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INPUT
INFO TO: I/O SUPERVISOR
↑ TO: APPENDAGE ROUTINES
USER MODIFICATION ROUTINE FOR DCB
DCB MACRO
ACCESS ROUTINES
20 LCHTAB
FUNCTION: PROVIDES INFORMATION THAT CONTROLS THE LOGICAL CHANNEL QUEUES
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INPUT
INFO TO: I/O SUPERVISOR, I/O PURGE AND SVC ROUTINES
↑ TO: 1st & LAST REQUEST IN RET
1 JCT
FUNCTION: RECORDS ATTRIBUTES OF JOB AND JOB STEP (S)
CREATION: 1/JOB CARD, BUILT BY R/I ON D/A FOR LIFE OF THE JOB
INFO FROM: JOB, EXEC CARDS
INFO TO: TCB
↑ TO: SCT (1st), ACT
JOB CARD
DELIMITS A JOB
DISK:
VOLUME LABEL
VOLUME TABLE OF CONTENTS (VTOC)
TAPE:
VOLUME LABEL
DATA SET LABEL
11 TCB
FUNCTION: RECORDS INFORMATION ABOUT A TASK AND ITS RELATIONSHIP TO OTHER TASK(S) IN THIS JOB STEP; PROVIDES STATUS OF THE TASK (PRIORITY, DEPENDENCIES, STATE), POINTERS TO PROGRAMS AND TABLES USED BY THE TASK
CREATION: 1/TASK, BUILT BY THE TASK SUPERVISOR IN MAIN STORAGE FOR LIFE OF TASK/JOB STEP
INFO FROM: JCT, SCT
INFO TO: RET
↑ TO: TIOT, RB (ACTIVE, INACTIVE, LOADED) DEB, ECB
14 DCB
FUNCTION: RECORDS CHARACTERISTICS OF THE DATA SET REQUIRED TO PERFORM AN I/O OPERATION; USED TO LOCATE IOB, IF MORE THAN ONE; USED TO LOCATE DEB CHARACTERISTICS REQUIRED TO INITIATE THE I/O OPERATION
CREATION: CONSTRUCTED AT ASSEMBLY TIME BY DCB MACRO; COMPLETED AT OPEN TIME; IN MAIN STORAGE FOR LIFE OF JOB STEP
INFO FROM: JFCB, DCB MACRO, USER MODIFICATION ROUTINE
INFO TO: JFCB, DEB, DSCB (OUTPUT)
↑ TO: DEB, IOB, ACCESS METHOD
17 CHANNEL PROGRAM
FUNCTION: GROUP OF CCW'S (ONE OR MORE) THAT PERFORM A SPECIFIC I/O OPERATION. EACH ENTRY INDICATES THE I/O OPERATION TO BE PERFORMED AND POINTS ING TO THE MAIN STORAGE AREA INVOLVED
CREATION: AT OPEN TIME IN MAIN STORAGE AS LONG AS THE DATA SET IS OPEN
INFO FROM: ACCESS METHOD
NOTE: AT EXCP LEVEL, USER MUST WRITE HIS OWN CHANNEL PROGRAM
21 RET
FUNCTION: USED TO QUEUE I/O REQUESTS, POINTED IN BY UCB - 1 ENTRY/REQUEST
CREATION: AREA IN MAIN STORAGE RESERVED AT SYSGEN AND FILLED IN AT I/O TIME
INFO FROM: DEB, TCB
INFO TO: I/O SUPERVISOR
↑ TO: UCB, IOB, DEB TCB, ID
2 SCT
FUNCTION: RECORDS ATTRIBUTES OF ONE JOB STEP
CREATION: 1/EXEC CARD, BUILT BY R/I ON D/A FOR LIFE OF THE JOB
INFO FROM: EXEC CARD
INFO TO: TIOT, TCB, RB
↑ TO: SIOT (CONTIGUOUS WITH SCT); ACT
EXEC CARD
DELIMITS A JOB STEP
7 DSCB
FUNCTION: ACTS AS A LABEL FOR OUTPUT DATA SETS TO BE CREATED BY ONE JOB STEP ON D/A
CREATION: 1/D/A OUTPUT DATA SET, BUILT BY DADSM AT INITIATOR TIME (NAME AND EXTENT OF DATA SET(S)) AND COMPLETED AT OPEN TIME; EACH DSCB IS PART OF THE VTOC AND EXISTS ON D/A FOR LIFE OF THE DATA SET
INFO FROM: JFCB, DCB
INFO TO: JFCB, DEB
↑ TO: ASSOCIATED DATA SET
NOTE: FOR NON D/A, STANDARD HEADER LABEL SUFFICES
15 DEB
FUNCTION: LOGICAL EXTENSION OF DCB - RECORDS INFORMATION AS TO LOCATION AND BOUNDARY OF DATA SET WHICH HAS BEEN OPENED; USED TO ASSOCIATE THE PROBLEM PROGRAM WITH I/O DEVICE CONTAINING VOLUME ON WHICH THE DATA SET RESIDES; USED BY CLOSE TO DETERMINE IF AN ACCESS METHOD IS TO REMAIN IN CORE
CREATION: AT OPEN TIME, ITS ADDRESS PLUGGED INTO DCB, AND DEB ARE CHAINED; SIZE IS FUNCTION OF DEVICE; ACCESS METHOD, THE NUMBER OF EXTENTS USED; IN PROTECTED MAIN STORAGE, USED ONLY BY CONTROL PROGRAM, AS LONG AS DATA SET IS OPEN
INFO FROM: DCB, JFCB, DSCB
INFO TO: RET
↑ TO: DCB, TCB, UCB
NOTE: MAY CHANGE DEB WITH I/O APPENDAGE ROUTINE
18 IOB
FUNCTION: CONTROLS A PARTICULAR I/O OPERATION ON A DATA SET, SUPPLYING IOS WITH INFORMATION AS A POINTER TO CCW'S AND OTHER CONTROL BLOCKS; CSW STORED HERE WHEN I/O COMPLETE
CREATION: FOR BASIC ACCESS METHOD I IOB/I/O REQUEST FOR QUEUED ACCESS METHOD - 1 IOB/BUFFER IN MAIN STORAGE WHILE DATA SET IS OPEN; CONSTRUCTED AT OPEN TIME FOR ALL ACCESS METHOD EXCEPT Q/BISAM AND BDAM WHICH ARE CONSTRUCTED AT I/O TIME
INFO FROM: ACCESS METHOD
INFO TO: I/O SUPERVISOR
↑ TO: DCB, CHANNEL PROGRAM, (ECB OR TCB)
NOTE: AT EXCP LEVEL, USER MUST BUILD HIS OWN IOB, ITS ADDRESS BEING A PARAMETER IN THE EXCP
22 UCB
FUNCTION: RECORDS STATUS OF A PARTICULAR I/O DEVICE UNIT TYPE, VOLUME ID USED BY IOS TO CHECK IF A DEVICE IS BUSY
CREATION: 1/DEVICE - IN MAIN STORAGE CREATED AT SYSGEN (EXISTS WITH SRT)
INFO FROM: AT SYSGEN TIME
INFO TO: I/O SUPERVISOR
↑ TO: DT, AT, RET
DD CARD(S)
4 SIOT
FUNCTION: RECORDS I/O DEVICE REQUIREMENTS OF ONE JOB STEP FOR ASSOCIATED DATA SETS
CREATION: 1/EXEC CARD, ONE ENTRY/DD CARD BUILT ON D/A BY R/I FOR LIFE OF JOB
INFO FROM: JOB, DD CARDS
INFO TO: TIOT
↑ TO: JFCB, NEXT SIOT
8 JFCB
FUNCTION: HOLDING AREA DATA SET ATTRIBUTES BEFORE THEY ARE PLACED INTO DCB AND DSCB
CREATION: 1/DD CARD CONSTRUCTED ON D/A BY R/I AND COMPLETED AT OPEN TIME FOR LIFE OF JOB
INFO FROM: DD CARD, DSCB, DCB
INFO TO TIOT, DSCB, DCB, DEB
↑ TO: EXTENSION BLOCKS IF ANY
5 TIOT
FUNCTION: PROVIDES I/O SUPPORT ROUTINES (OPEN, CLOSE, EOV), WITH POINTERS TO JFCB's AND ALLOCATED DEVICES.
CREATION: 1/EXEC CARD, BUILT BY THE INITIATOR IN MAIN STORAGE FOR LIFE OF A JOB STEP
INFO FROM SCT, SIOT, JFCB
INFO TO: OPEN, CLOSE, EOV RTNS
↑ TO: JFCB, UCB
3 ACT
FUNCTION: CONTAINS ACCOUNTING INFORMATION FROM JOB AND EXEC STATEMENTS
CREATION: 1 OR MORE/JOB DURING INITIATION
INFO FROM: JOB & EXEC STATEMENTS
INFO TO: USER ACCOUNTING ROUTINES
12 ECB
FUNCTION: RECORDS STATUS OF AN ASSOCIATED EVENT DEFINED IN THE PROBLEM PROGRAM FOR LIFE OF TASK
CREATION: WAIT/POST ROUTINES
INFO FROM: WAIT/POST ROUTINES
INFO TO:
↑ TO: RB
Operating System
Control Blocks & Flow
CONNECTING POINTERS
INFORMATION FLOW
6 ATTENTION TABLE
FUNCTION: CONTAINS ADDRESSES OF ATTENTION ROUTINES REQUIRED TO SERVICE I/O DEVICES
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INPUT
INFO TO: I/O SUPERVISOR
↑ TO: ATTENTION ROUTINES
9 DEVICE TABLE
FUNCTION: USED BY IOS TO LOCATE DEVICE DEPENDANT SIO, ENQUEUE, OR TRAP CODE MODULES FOR DEVICE IN USE.
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INPUT
INFO TO: I/O SUPERVISOR
↑ TO: ENQUEUE MODULE, SIO MODULE, AND TRAP CODE MODULE OF DEVICE IN USE.
STORAGE LOCATION 16
↑ CVT
16 CVT
FUNCTION: INFORMATION LINK BETWEEN NONRESIDENT ROUTINES AND THE CONTROL PROGRAM NUCLEUS
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INPUT
INFO TO: I/O SUPERVISOR
↑ TO: DEVICES, ACTIVE TASK
19 ANY DEVICE
23 UCBLT
FUNCTION: CONTAINS ADDRESS OF EACH UCB IN SYSTEM
CREATION: AT SYSGEN TIME
INFO FROM: SYSGEN CONTROL INFO.
INFO TO: I/O SUPERVISOR
↑ TO: UCB

CONTROL BLOCK ABBREVIATION LIST

JCT	Job Control Table
SCT	Step Control Table
SIOT	Step I/O Table
TIOT	Task I/O Table
DSCB	Data Set Control Block
JFCB	Job File Control Block
TCB	Task Control Block
ECB	Event Control Block
DCB	Data Control Block
DEB	Data Extent Block
IOB	Input/Output Block
UCB	Unit Control Block
ACT	Accounting Control Table
LCHTAB	Logical Channel Table
RET	Request Element Table
UCBLT	Unit Control Block Lookup Table
CVT	Communication Vector Table
RB	Request Blocks:
PRB	Program Request Block
LRB	Loaded Request Block
LPRB	Loaded Program Request Block
SVRB	Supervisor Request Block
IRB	Interrupt Request Block
SIRB	Supervisor Interrupt Request Block
AVT	Appendage Vector Table
DT	Device Table
AT	Attention Table
VTOC	Volume Table of Contents

Appendix 3

The following system data sets are required and must have space allocated on the system residence volume. These data sets need not be cataloged.

- SYSCTLG (System Catalog) - The system catalog contains pointers to all cataloged data sets. Only the volume index of the system catalog need reside on the system residence volume.

- SYS1.NUCLEUS (Nucleus Library) - This library usually contains only one member, the resident portion (nucleus) of the control program.

- SYS1.SVCLIB (SVC Library) - The members of the SVC library are the nonresident SVC routines, the data management access methods, and the system's standard error recovery routines.

- SYS1.LOGREC - This data set is used for the recording of statistical data about machine errors. Space must not be allocated for this data set by the user.

The following system data sets are required, and must have space allocated on direct access volume. They need not reside on the system residence volume.

- SYS1.LINKLIB (Link Library) - The members of the link library are program and routines that can be referred to by XCTL, ATTACH, LINK, or LOAD macro instructions, or by EXEC statements. Nonresident operating system programs, e.g., the COBOL compiler, are contained in this library. This data set must be cataloged.

- SYS1.PROCLIB (Procedure Library) - The members of the procedure library include those cataloged procedures used to perform certain system functions, e.g., compile-linkage edit-go. It is recommended that this data set be cataloged.

- SYS1.SYSJOBQE - This data set is used as a work area by the job scheduler. This data set does not have to be cataloged.

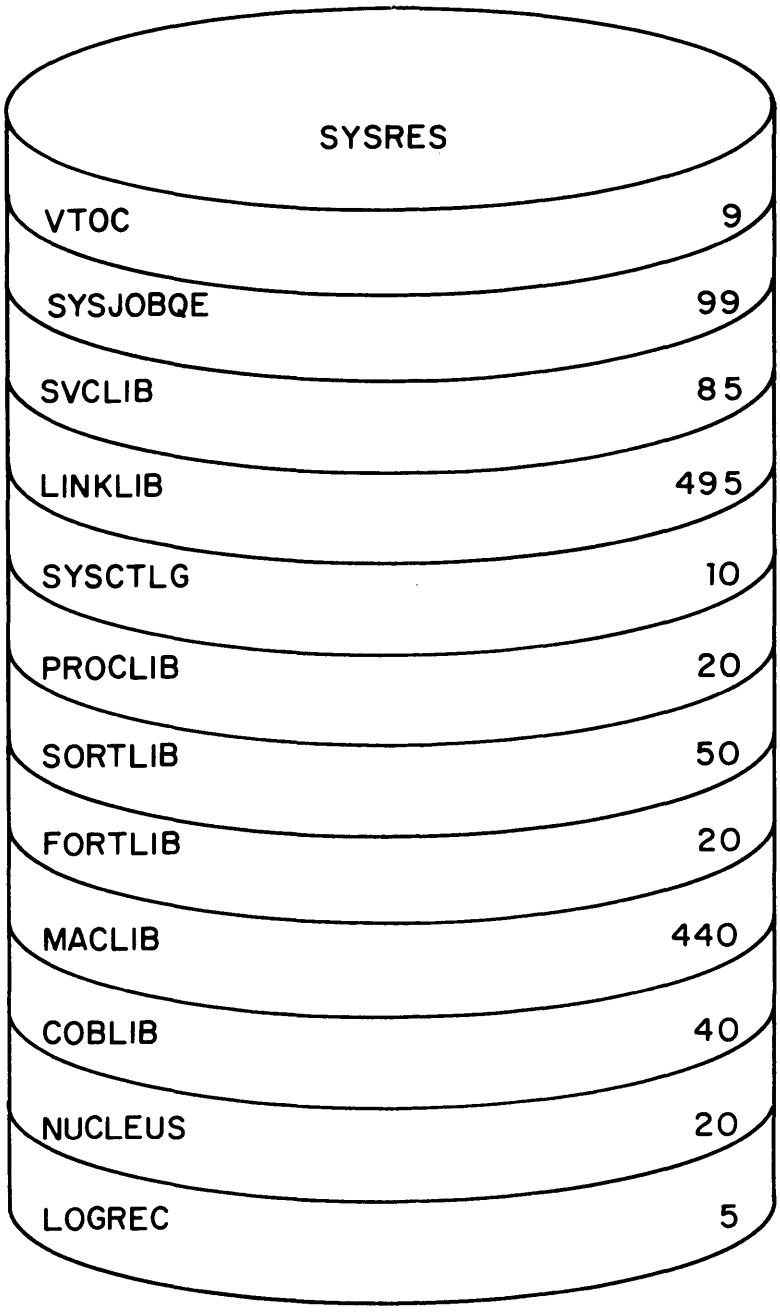
An IBM System/360 Operating System can function without the following optional system data sets. If the user wishes to make use of the facilities they provide, they can be included in the operating system to be generated. Space must be allocated on a direct-access volume for the optional data sets desired. They need not reside on the system residence volume. It is recommended that the data sets to be included be cataloged.

- SYS1.MACLIB (Macro Library) - The members of the macro library include the macro definitions for the system macro instructions.

- SYS1.SORTLIB (Sort Library) - The members of the sort library are the load modules from which a sort/merge program is produced at execution time.

- SYS1.COBLIB (COBOL Library) - The members of the COBOL library are load modules (COBOL subroutines).

- SYS1.FORTLIB (FORTRAN Library) - The members of the FORTRAN library are load modules (FORTRAN subprograms).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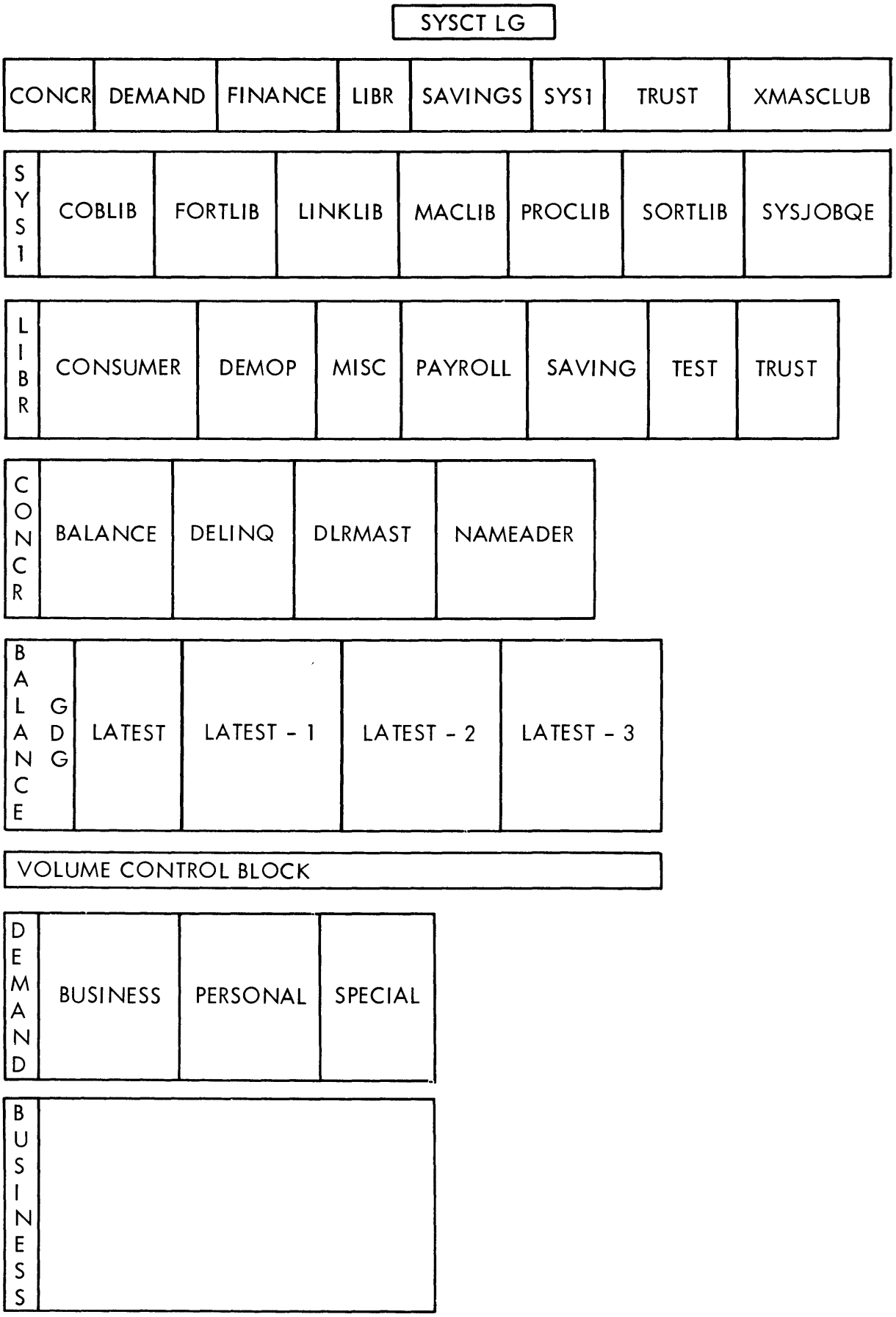
VTOC 9
SYSJOBQE 99
SVCLIB 85
LINKLIB 495
SYSCTLG 10
PROCLIB 20
SORTLIB 50
FORTLIB 20
MACLIB 440
COBLIB 40
NUCLEUS 20
LOGREC 5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CONCR
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SYS1
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XMASCLUB
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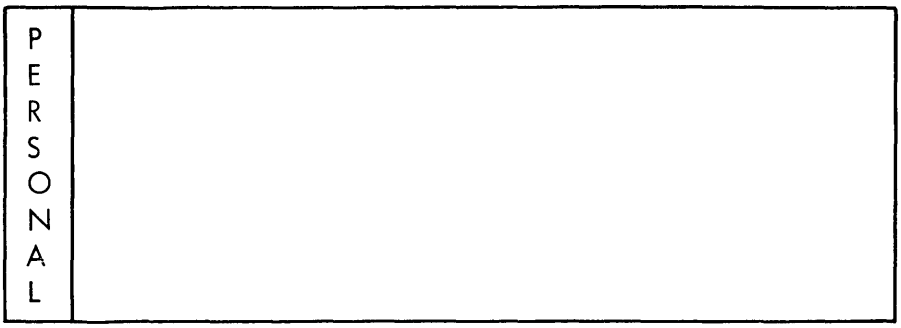
SORTLIB
SYSJOBQE
LIBR
CONSUMER
DEMOP
MISC
PAYROLL
SAVING
TEST
TRUST
CONCR
BALANCE
DELINQ
DLRMAST
NAMEADER
BALANCE GDG
LATEST
LATEST - 1
LATEST - 2
LATEST - 3
VOLUME CONTROL BLOCK
DEMAND
BUSINESS
PERSONAL
SPECIAL
BUSINESS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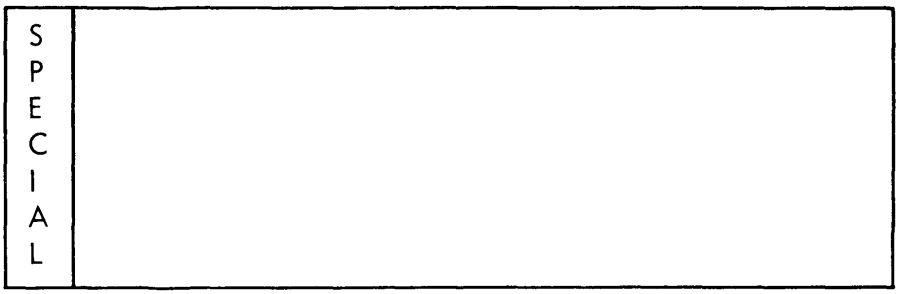
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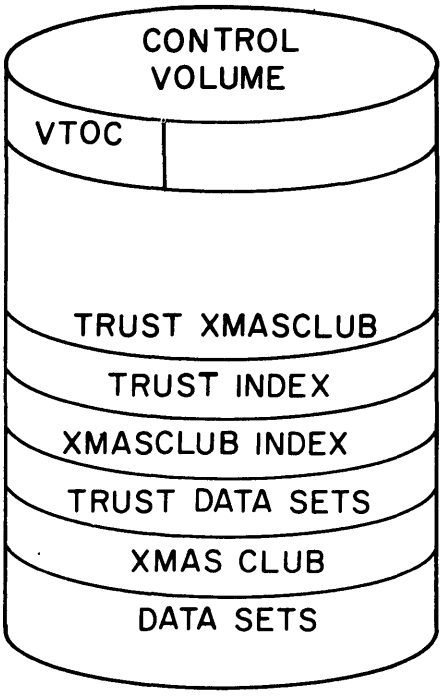
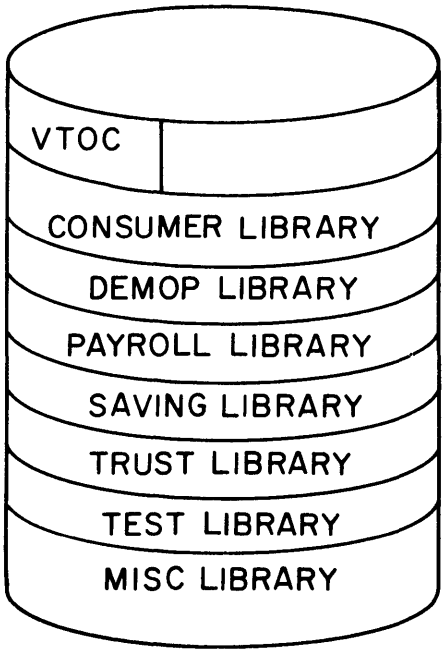
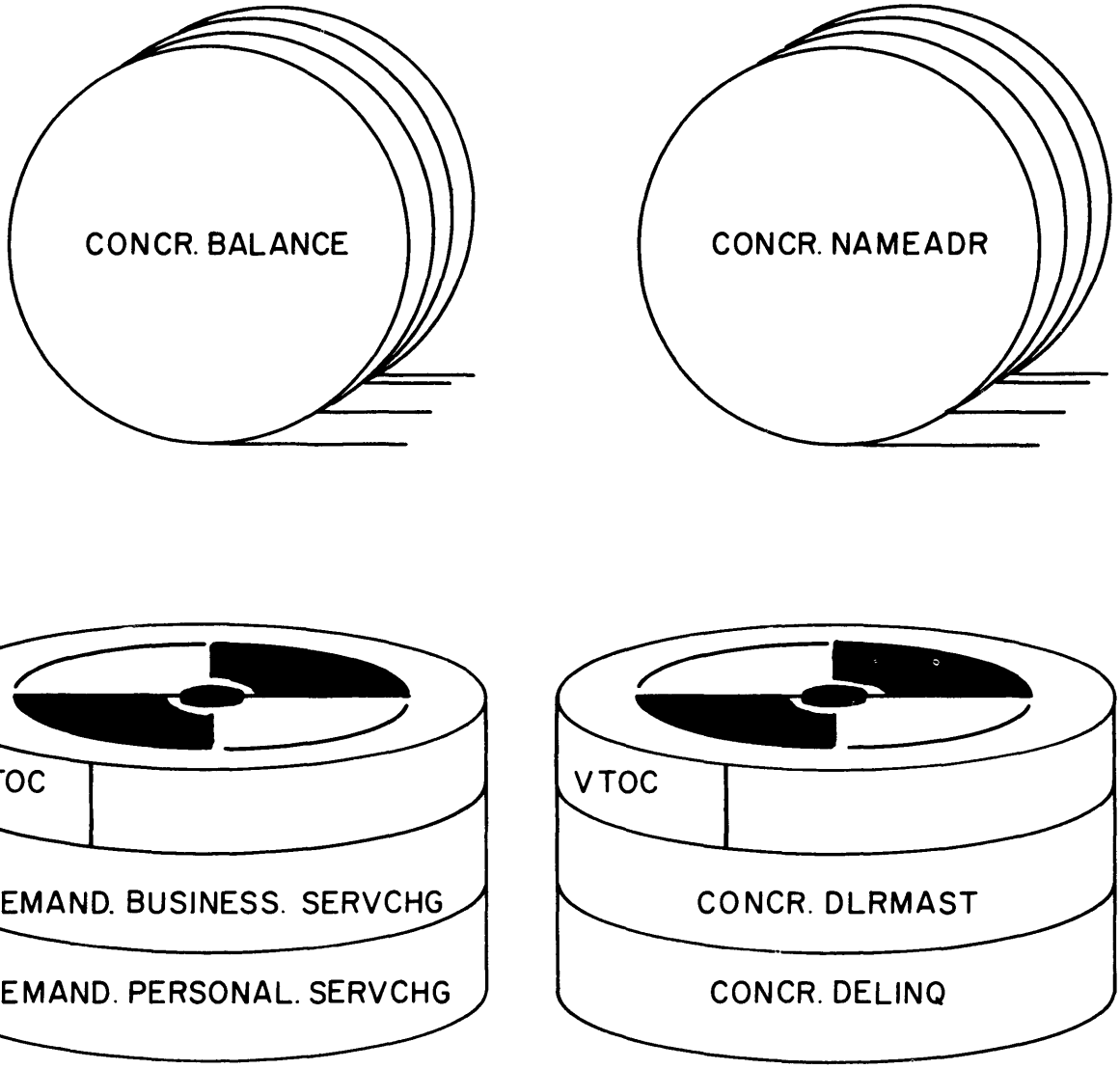

CONTROL
VOLUME
VTOC
TRUST XMASCLUB
TRUST INDEX
XMASCLUB INDEX
TRUST DATA SETS
XMAS CLUB
DATA SETS


VTOC
CONSUMER LIBRARY
DEMOP LIBRARY
PAYROLL LIBRARY
SAVING LIBRARY
TRUST LIBRARY
TEST LIBRARY
MISC LIBRARY



NOTE: These data sets are not involved in those being used in the job stream example. They may be used in other examples and discussions.

INPUT STREAM

```
//      JOB1     JOB
//      JOBLIB   DD      DSNAME=LIBR.CONSUMER,DISP=OLD
//      STEP     EXEC    PGM=UPDATE
//      IN       DD      DSNAME=CONCR.BALANCE(0),DISP=OLD
//      OUT      DD      DSNAME=CONCR.BALANCE(+1),
                         DISP=(NEW, CATLG), UNIT=2400

//      SYSIN    DD      *

        { DATA CARDS }

/*
```

CONSOLE SHEET

```
IEE007A READY
SET DATE=66.067
START RDR,00C
START WTR,00E
START

IEF2371        M    191, 14732,JOB1
IEF2371        M    140, 12793,JOB1
IEF2371        M    141, SCRTCH, JOB1
IEF2361        Allocation For JOB1 STEP
IEF2371        SYSIN ON 00C
IEF2801        K    140, 12793,JOB1
IEF2371        M    140, 12413,JOB1
IEF2801        K    141, 12741,JOB1
IEF2371        M    141, SCRTCH, JOB1

    .
    .
    .
```

Appendix 4

GENERAL LOGIC OF ERROR HANDLING

USER PROGRAM

EXCP TAPE IOB

WAIT TAPE CB

(ALL ERROR CORRECTION AND STATISTICAL RECORDING HAVE BEEN PERFORMED)

I/O INTERRUPT SUPERVISOR (ASSUME TAPE READ ERROR)

LOOK UP UCB AND FIND RQE

CHANNEL AND DEVICE END

UNIT CHECK

NO

YES

RETURN POINT FOR IOS COMPLETION

RESTART CHANNEL

RETURN

TO I/O REQUESTOR

READ SENSE DATA INTO UCB FOR DEVICE

ERRORS IN SENSE OPN ?

YES

CATASTROPHY OR ABTERM: ROUTINES

NO

ERROR RTN INTERFACE

ARE RECOVERY PROCEDURES TO BE USED (DCB BITS)

SCHEDULE ERROR ROUTINE

DASD: ENTER DIRECTLY

OTHER:

- PUT RQE IN ASYNCH EXIT Q TO WAIT FOR HANDLING
- GET ERRTAB ENTRY FROM UCB

CONTENTS SUPERVISOR

EXCP REQUEST FOR SYSRES TO GET ERROR RTN INTO I/O TRANSIENT AREA

EXCP SPVR. ENQUEUE & SIO

I/O INT SPVR.

DEVICE-DEPENDENT ERROR ROUTINE IN TRANSIENT AREA

EXAMINE CHANNEL STATUS & SENSE BITS

TAPE:- CHECK FOR NOISE RECORD
- ALLOW FOR 10 LOOPS OF 10 READS AND BACKSPACES PAST TAPE CLEANER

HAS ERROR BEEN CORRECTED

YES

CLEAR ALL DCB & IOB BITS INDICATING ERROR

UPDATE STATISTICS COUNTERS

ERREXCP & RETURN

(NORMAL RETURN TO IOS)

NO

ERROR FOUND TO BE PERMA-NENT

YES

LEAVE IOB EXCEPTION SET

RESET ERROR RTN. IN CTL.

UPDATE STATISTICS COUNTERS

OUTBOARD RECORDING

PUT STAT. RECD. ON SYS1.LOGREC

ERREXCP

(PERMANENT ERROR RETURN)

NO

ERREXCP

(RESCHEDULE CHANNEL PROGRAM)

TO EXCP SPVR

FOR REQUEST SCHEDULING

I/O INTERRUPTION FOR RE-EXECUTED CHANNEL PROGRAM

ERREXCP ROUTINE (SVC 15)

ERROR RTN IN CTL.

NO

IS ERROR CORRECTED ?

YES

NORMAL RETURN TO IOS

YES

NO

RETURN FROM I/O PURGE ?

YES

ABNORMAL RETURN TO IOS

NO

INDICATE PERMANENT ERROR

RELATED REQUEST

NO

YES

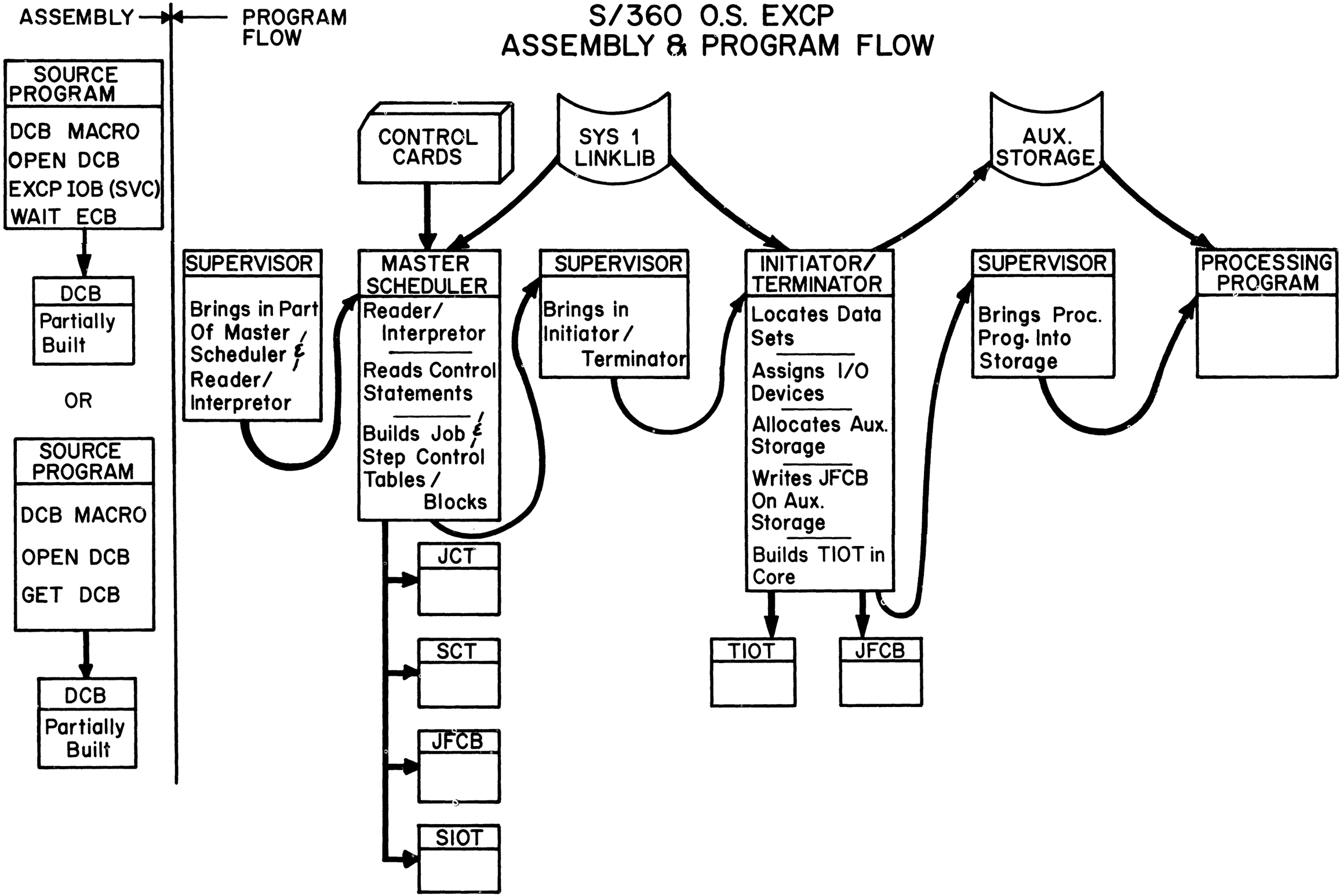
PURGE ALL OTHER REQ. RELATED TO THIS ONE

ERREXCP

(USE NORMAL EXIT PROCEDURE FROM ERROR CORRECTION)

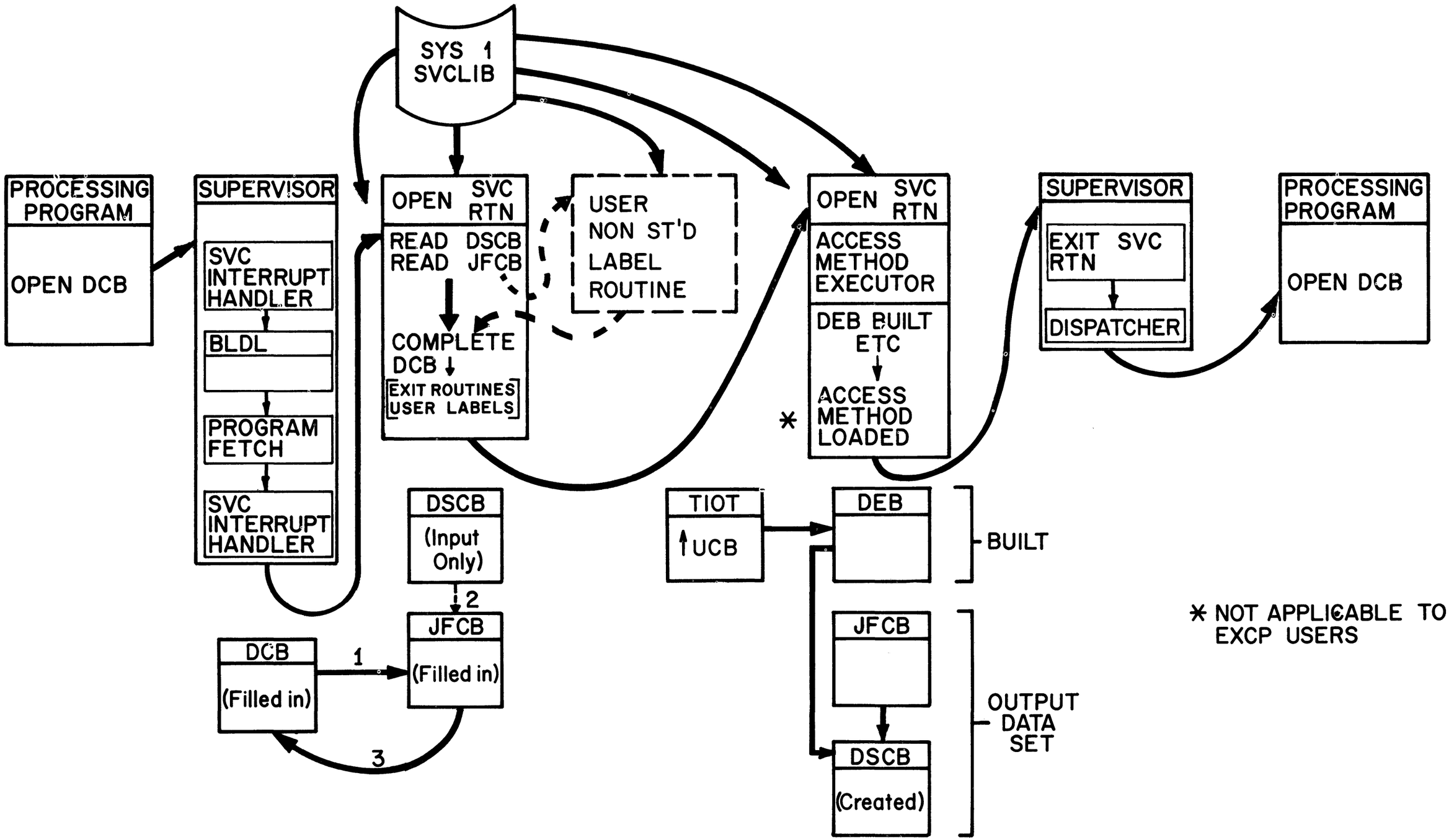
Appendix 5

S/360 O.S. EXCP
ASSEMBLY & PROGRAM FLOW



Appendix 6

S/360 O.S. EXCP OPEN FLOW



* NOT APPLICABLE TO EXCP USERS

Appendix 7

```
*  THIS PROGRAM LOADS 25 80-CHARACTER RECORDS ON EACH TRACK OF 2311.

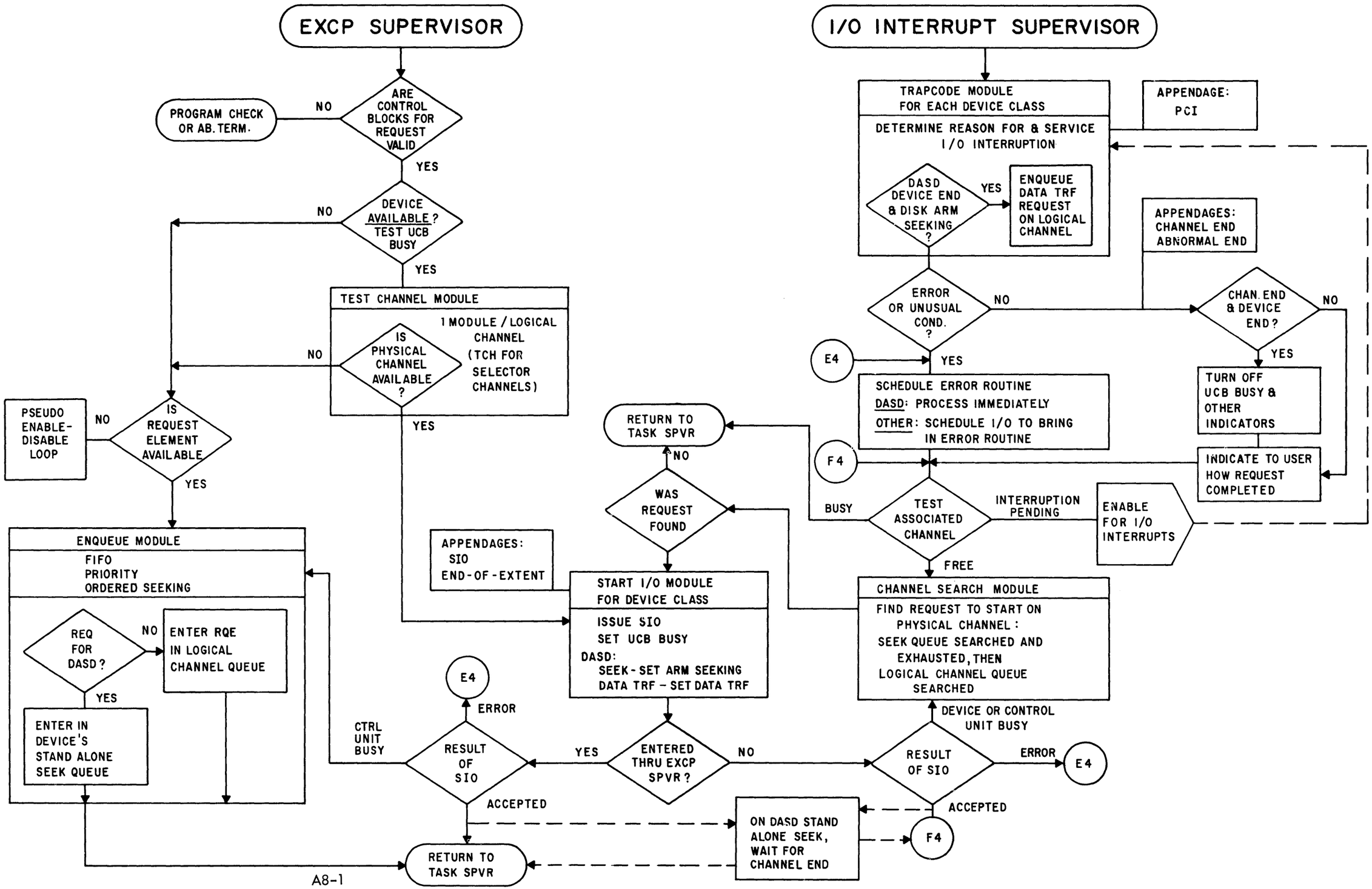
*CONTENTS OF REGISTERS
*    R3 - CYLINDER NUMBER
*    R4 - HEAD NUMBER
*    R5 - CURRENT RECORD NUMBER
*    R6 - LOOPINDEXING VALUE
*    R7 - LOOP LIMIT VALUE
*    R8 - SUBROUTINE LINKAGE REGISTER
*    R10 - ADDRESS OF EXTENT FIELD IN DEB
*    R11 - ADDRESS OF DEB

          LA     6,1         INITIALIZE LOOP INCREMENT VALUE
          LA     7,25    INITIALIZE LOOP LIMIT VALUE
          L      11,DISKDCB+44       GET DATA EVENT BLOCK ADDRESS
          LA     10,38(11)      PUT EXTENT ADDRESS IN REG 10
          BAL    9,DISKINIT          INITIALIZE SEEKADDRESS FIRST EXTENT
     *** EXCP  CARD READ ****
DISKIO    STC    5,SEEKADDR+7  ESTABLISH SEARCH ID FOR FILE LOAD
          BXH    5,6,OUT    INCREMENT RECORD COUNT AND TEST FOR 25
          MVC    SRCHID(5),SEEKADDR+3        SET UP SEARCH ID FIELD
          STC 5,SRCHID+4   EXTABLISH WRITE OR READ ID FIELD
          NI     DISKECB,X'00'
          EXCP   DISKIOB           PERFORM DISK INPUT OR OUTPUT
          WAIT   ECB=DISKECB
          CLI    DISKECB,X'7F'     ANY DISK ERRORS
          BE     URIO
          CLI    DISKECB,X'42'     WAS THERR EXTENT VIOLATION
          BE     NEXTENT
          ABEND   255,DUMP
OUT       BAL    9,ENDTRK       GENERALIZED LINKAGE
          B      DISKIO
ENDTRK    SR     5,5       CLEAR   RECORD = TO ZERO
          CH     4,=H'9'      TEST END OF CYLINDER
          BE     NEXTCYL
          LA     4,1(4)      INCREMENT HEAD NUMBER
NEXTTRK   STC    4,SEEKADDR+6
          BR     9                    RETURN TO ROUTINE
NEXTCYL   LA     3,1(3)     INCREMENT CYLINDER NUMBER
          LA     4,0      RESET HEAD = TO TOP OF CYLINDER
          B      NEXTTRK
*
NEXTENT   IC     3,16(11)         GET = OF EXTENTS FROM DEB
          IC     4,SEEKADDR           GET CURRENT EXTENT =
          LA     4,1(4)     INCREMENT EXTENT = BY 1
          CR     3,4      ARE ALL EXTENTS EXHAUSTED
          BE     JOBEND
          STC    4,SEEKADDR      STORE NEXT EXTENT =
          LA     10,16(10)      EXTRACT NEXT EXTENT FROM DEB
          BAL    9,DISKINIT        RESET CYL, TRK, AND RECORD  REGISTERS
          B      DISKIO          REPEAT DISK OPERATION
*  INITIALIZE SEEK ADDRESS IN IOB AT BEGINNING OF EACH EXTENT.
DISKINIT  MVC    SEEKADDR+3(5),0(10)  EXTENT ADDR TO IOB SEEKADDR
          LA     3,0
          IC     3,SEEKADDR+4     LOAD CYLINDER REGISTER
          LA     4,0
          IC     4,SEEKADDR+6    LOAD HEAD REGISTER
          SR     5,5     RESET RECORD REGISTER
```

```
          BR     9
*
ENDDATA   CH     5,=H'25'          IS LAST RECORD AT END OF TRACK
          BNE    EODMARK    IF NOT,  LET IOS WRITE EOD MARK
          BAL    9,ENDTRK        GO TO TRACK INCREMENTING ROUTINE
EODMARK   STC    5,SEEKADDR+7      SET RECORD = TO 0 OR TO ID OF LAST
*                                    RECORD WRITTEN
          MVC    DISKDCB+5(8),SEEKADDR   SET UP DCB SO THAT EOD MARK
*                                      CAN BE WRITTEN
          LA     3,800           SET UP TRBAL FIELD WITH PHONY NUMBER
          STH    3,DISKDCB+18
          CLOSE  (DISKDCB)
     DS   0F
DISKIOB   DC   X'42C0CCCC'          IOB FLAGS= CMD CHAIN, UNRELATED
          DC     A(DISKECB)
DISKCSW   DC     2F'0'         CSW STORAGE
DISKCCW   DC     A(DISKOUT)        POINTER TO CHANNEL PROGRAM
          DC     A(DISKDCB)
          DC     2F'0'
SEEKADDR  DC     2F'0'
SRCHID    DC     D'80'         CC   HH   R     KEY LENGTH   DATA LENGTH
INAREA    DS     CL80
DISKECB   DC     F'0'
DISKOUT     CCW     X'31',SEEKADDR+3,X'40',5     SEARCH ID EQUAL ON
*                                      RECORD PREVIOUSLY WRITTEN
          CCW    X'08',DISKOUT,0,0     TRANSFER IN CHANNEL
          CCW    X'1D',SRCHID,X'20',88      WRITE COUNT AND DATA
DISKDCB   DCB    DDNAME=DISK,MACRF=(E),DSORG=PS,DEVD=DA
```

Appendix 8

FUNCTIONAL FLOW OF I/O SUPERVISOR



Appendix 9

```
//RH1   JOB   01,'ASSEMBLE APPENDAGE',MSGLEVEL=1
//       EXEC  PGM=IETASM
//SYSPRINT     DD                    SYSOUT=A
//SYSLIB  DD  DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1  DD  UNIT=2400,LABEL=(,NL)
//SYSUT2  DD  UNIT=2400,LABEL=(,NL)
//SYSUT3  DD  UNIT=2311,SPACE=(TRK,(10,10))
//SYSPUNCH  DD  UNIT=2540-2
//SYSIN  DD  *
IGGO19WA START 0
* CHANNEL END APPENDAGE ROUTINE.
* ON ENTRY TO THE ROUTINE THE REGISTERS CONTAIN THE FOLLOWING INFO.
*        R1 - ADDR OF RQE
*        R2 - ADDR OF IOB
*        R3 - ADDR OF DEB
*        R4 - ADDR OF DCB
*        R7 - ADDR OF UCB
*        R14 - RETURN ADDRESS
*        R15 - ADDRESS OF APPENDAGE ROUTINE ITSELF
*        REGISTERS 10-13 MAY BE USED FREELY.
*
         USING *,15
         TM    12(7),X'80'    TEST UCB TO SEE IF DATA SET IS SYSIN
         BZ    RETURN     IF NOT, RETURN
* FIND I/O AREA ADDRESS
         L     13,16(2)  LOAD ADDRESS OF CHANNEL PROGRAM
         L     12,0(13)  LOAD DATA ADDRESS PORTION  OF CCW
         CLC   0(2,12),=C'/*'   TEST FIRST 2 BYTES OF DATA AREA FOR /*
         BNE   RETURN
         OI    12(2),X'01'   SET UNIT EXCEPTION BIT IN IOB
         OI    0(2),X'04'      SET IOB EXCEPTION BIT
         OI    44(4),X'C0'   SET DCB IFLGS PERMANENT ERROR BITS
RETURN   BR    14
         END
```

```
//RH2  JOB  01,'INSERT APPENDAGE',MSGLEVEL=1
//STEP1  EXEC  PGM=IEWL,PARM='LET,NCAL,LIST'
//SYSPRINT  DD  SYSOUT=A
//SYSUT1  DD  UNIT=2311,SPACE=(TRK,(10,10))
//SYSLMOD  DD  DSNAME=SYS1.SVCLIB,DISP=OLD
//SYSLIN  DD  *
   NAME  IGGO19WA(R)
```

```
//RF3           JOB     C1,'TEST EXCP',MSGLEVEL=1,COND=(08,LT)
//STEP1  EXEC   PGM=IETASM
//SYSPRINT  DD  SYSOUT=A
//SYSLIB   DD  DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1   DD  UNIT=2400,LABEL=(,NL)
//SYSUT2   DD  UNIT=2400,LABEL=(,NL)
//SYSUT3   DD  UNIT=2311,SPACE=(400,400)
//SYSPUNCH  DD  UNIT=2540-2
//SYSIN   DD  *
TESTPROG START X'4530'
         SAVE  (14,12)
         BALR  12,0
         USING *,12
         ST    13,SAVEAREA+4
         LA    13,SAVEAREA
         OPEN  (INFILE,,OUTFILE,(OUTPUT))
         WTO   'FILE LOAD BEGINNING'
LOOP     MVI   INECB,X'00'   TURN OFF COMPLETE BIT
         EXCP  INIOB   READ INPUT RECORD
         WAIT  ECB=INECB
         CLI   INECB,X'7F'   ANY ERRORS
         BE    LOADTAPE
         TM    INCSW+4,X'01'   TEST UNIT EXCEPTION BIT  FOR EOD
         BO    ENDDATA
         ABEND 255,DUMP
LOADTAPE MVI   OUTECB,X'00'   RESET COMPLETE BIT
         EXCP  OUTIOB   WRITE TAPE
         WAIT  ECB=OUTECB
         CLI   OUTECB,X'7F'  ANY ERRORS
         BE    LOOP
         ABEND 15,DUMP
OUT     ABEND  255,DUMP
ENDDATA  OI    OUTFILE+48,X'48'    TAPE MARK IS TO BE WRITTEN
         CLOSE (INFILE,,OUTFILE)
         WTO   'JOB ENDING'
         L     13,SAVEAREA+4
         RETURN (14,12)
SAVEAREA DS    18F
INECB    DC    F'0'
INCCW    CCW   X'02',INAREA,0,80      READ EITHER TAPE OR CARD
INIOB    DC    F'0'
         DC    A(INECB)
INCSW    DC    2F'0'
         DC    A(INCCW)
         DC    A(INFILE)
         DC    2F'0'
INAREA   DS    20F
*
OUTECB   DC    F'0'
OUTCCW   CCW   X'01',INAREA,X'20',80      WRITE TAPE, SILI FLAG
OUTIOB   DC    F'0'
         DC    A(OUTECB)
         DC    2F'0'
         DC    A(OUTCCW)
         DC    A(OUTFILE)
         DC    2F'0'
INFILE   DCB   DSORG=PS,MACRF=(E),DDNAME=SYSIN,CENDA=WA
OUTFILE  DCB   DSORG=PS,MACRF=(E),DDNAME=SYSOUT,DEVD=TA
         END
```

Appendix 10

A. Passing parameters between accounting routines using SYS1.SYSJOBQE as temporary storage. To pass data:

1. Accounting Routine

a. Must build a list of parameters and load the address of the list into register 1.

```
          .
          .
          .
LIST      DS    F
          DS    F
QMPOP     DC    X'00'
          DS    XL3
          DS    5F
QMPCM     DC    X'01'      No. of 176-BYTE RECORDS
QMPNC     DC    X'01'
QMPCL     DC    AL3(LISTA)
LISTA     DC    A(AREA)
RCADDR    DS    F
          .
          .
          .
AREA      DS    CL176
```

b. Must issue an SVC to determine whether or not this is the first time through the routine and locate areas in the SVC routine.

c. On return from the SVC routine, check "QMPOP" to see if it has been changed. If not, this is the first time through the routine. The address of the Table Store Subroutine should be loaded into Register 15, and a branch issued to Register 15. Record addresses will then be assigned. The accounting routine should move these into the SVC area. If this is not the first time through the routine, the record address can be picked up from the SVC area and used in Read or Write functions.

d. At Job End the SVC area and any switches should be reset.

2. Resident SVC Routine

a. Must set and test a switch to determine first time through the routine.

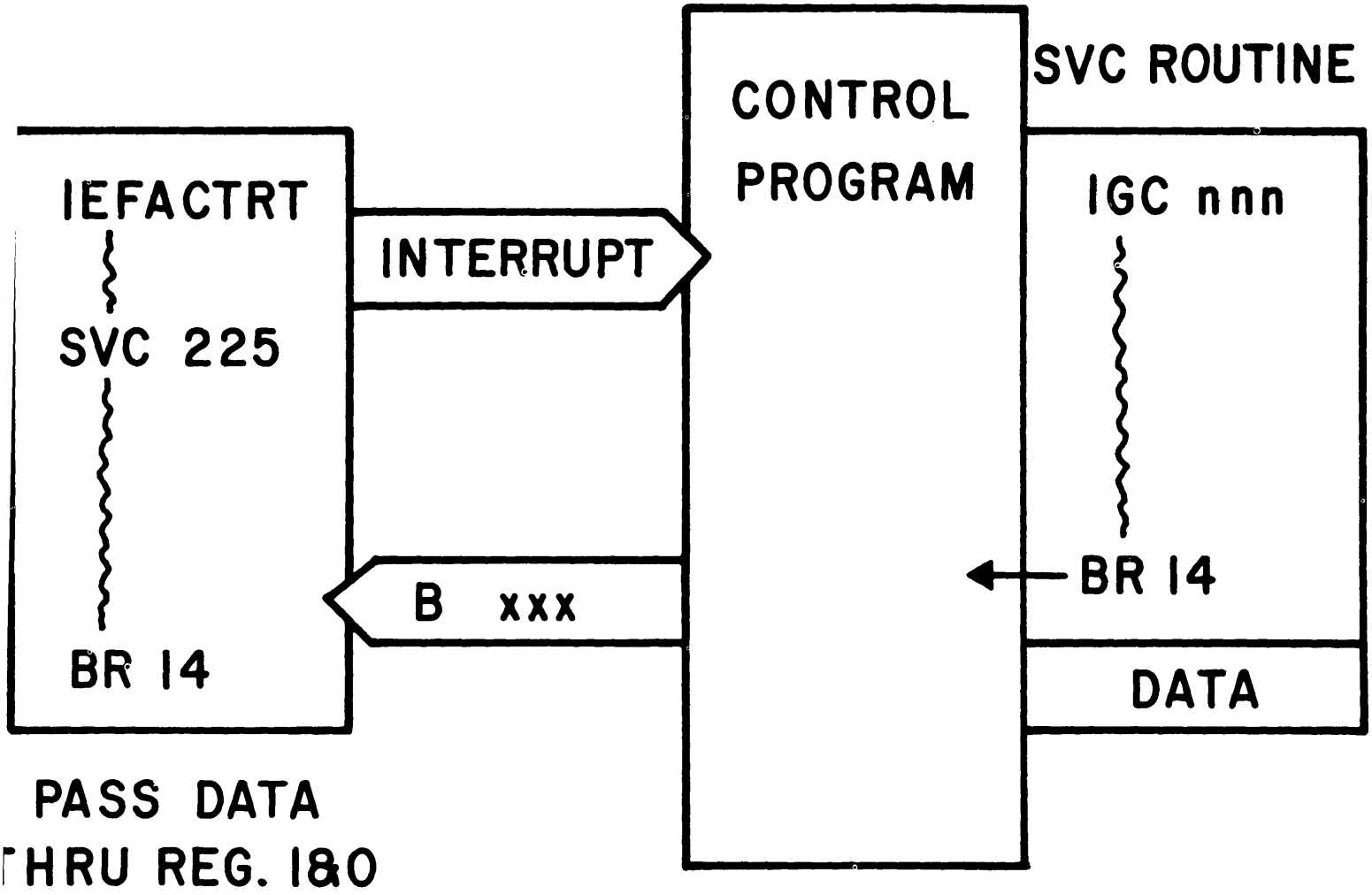
b. Must provide and point to an area to be used as a work area. (Use Reg. 0, 1)

c. May do other functions as user desires.

3. Programming Considerations

SYS1.SYSJOBQE is reset as part of the job termination routine in the sequential scheduler system.

PASSING DATA-RESIDENT SVC



IBM

IBM System/360 Assembler Coding Form

PROGRAM	ACCOUNTING ROUTINE	PUNCHING INSTRUCTIONS	PAGE 1 OF 4
		GRAPHIC	CARD ELECTRO NUMBER
PROGRAMMER	DATE	PUNCH	

```
IEFACTRT START 0

         LA    1,LIST
         SVC   255                BRANCH TO SVC ROUTINE
         ST    1,SAVESVC
         LA    1,LIST
         TM    QMPOP,X'FF'             ALL ZEROS - SAME AS BEFORE - 1ST
         BC    7,READ
         MVI   QMPOP,X'01'
         L     15,VCONST          LOAD ADDRESS OF TABLE STORE SUBR.
         BALR  14,15
         L     2,SAVESVC          POINTER TO AREA IN SVC ROUTINE
         MVC   0,(4,2),RCADDR     MOVE RECORD ADDRESS INTO RES. STOR.
         MVI   AREA,X'0'          CLEAR AREA
         MVC   AREA+1(175),AREA
         B     STEPEND
READ     MVI   QMPOP,X'04'        SET UP AND READ RECORD
         L     15,VCONST             INTO AREA
         BALR  14,15

                   DETERMINE IF JOB OR STEP TERMINATION

         BE    JOBEND
```

IBM IBM System/360 Assembler Coding Form

PROGRAM	ACCOUNTING ROUTINE	PUNCHING INSTRUCTIONS	PAGE 2 OF 4
		GRAPHIC	CARD ELECTRO NUMBER
PROGRAMMER	DATE	PUNCH	

```
STEPEND  {
         {         UPDATE RECORD
         {
         {
         MVI    QMPOP,X'03'
         LA     1,LIST
         L      15,VCONST
         BALR   14,15
EXIT     L      13,SAV13
         RETURN (14,12)
JOBEND

                   PROCESS ACCUMULATED DATA


         L      1,SAVSVC
         MVC    0(4,1),ZEROS          RESET RECORD ADDRESS
         MVC    4(1,1),ZEROS          RESET SWITCH
         B      EXIT
ZEROS    DC     F'0'
VCONST   DC     V(IEFQMSSS)
```

IBM

IBM System/360 Assembler Coding Form

PROGRAM ACCOUNTING ROUTINE		PUNCHING INSTRUCTIONS	PAGE 3 OF 4
		GRAPHIC	CARD ELECTRO NUMBER
PROGRAMMER	DATE	PUNCH	

STATEMENT				Identification-Sequence
Name (1–8)	Operation (10–14)	Operand (16–71)	Comments	(73–80)
LIST	DS	2F		
QMPOP	DC	X'00'		
	DS	CL23		
QMPCM	DC	X'01'	NO.OF 176-BYTE RECORDS TO BE ASSIGNED	
QMPNC	DC	X'01'	NO. OF 176-BYTE RECORDS TO BE USED	
QMPCL	DC	AL3(LISTA)		
LISTA	DC	A(AREA)		
RCADDR	DC	F'0'		
AREA	DS	CL176		
SAVESVC	DS	F		
	END			

IBM

IBM System/360 Assembler Coding Form

PROGRAM	SVC ROUTINE		PUNCHING INSTRUCTIONS		PAGE 4 OF 4
			GRAPHIC		CARD ELECTRO NUMBER
PROGRAMMER		DATE	PUNCH		

STATEMENT				Identification-Sequence
Name (1–8)	Operation (10–14)	Operand (16–71)	Comments	(73–80)
IGC255	START	0		
	TM	SWITCH,X'FF'	CHECK FOR FIRST TIME	
	BC	7,NOTFIRST		
	MVI	SWITCH,X'FF'		
BACK	LA	1,RCRD		
	BR	14		
NOTFIRST	MVI	8(1),X'01'	NOT FIRST TIME	
	MVC	SAVEAD+1(3),33(1)		
	L	2,SAVEAD		
	MVC	4(4,2),RCRD		
	B	BACK		
RCRD	DC	F'0'		
SWITCH	DC	X'0'		
	END			

Appendix 11

ACCOUNTING ROUTINE STUDENT PROBLEM

Write a JOB termination accounting routine to perform the following:

1. Calculate the elapsed time for execution of the previous JOB. This will be terminator to terminator time.

2. Type a message on the console that this is JOB time, the name of the JOB, and the time in hours, minutes and seconds. Also include your name in the massage for identification. (The JOB name and your name are to be retrieved via the pointer in Register 1.)

3. Store the previous JOB time in the CVT, as a decimal (packed) number representing HHMMSSTH. This field is in CVT+156.

Additional information for accounting routine problem.

1. The location of the CVT is contained in a full word starting at location 16, decimal.

2. The accounting routine uses one field in the CVT which is not used in the current release of the system. This is not a recommended procedure. A better approach would be to provide a field for this in a user written resident SVC routine.

```
*     THE BASIC LOGIC OF THE ACCOUNTING ROUTINE IS SIMPLE.  THE FOLLOW-
*ING LISTS THE SEQUENCE OF OPERATIONS REQUIRED...
*
*
*         1.  INITIALIZE FOR ASSEMBLY
*
*         2.  SAVE REGISTERS
*
*         3.  STORE POINTER
*
*         4.  ISSUE THE TIME MACRO
*
*         5.STORE THE TIME
*
*         6.  GET THE CVT WORD ADDRESS
*
*         7.  SETUP THE CVT CONTENTS OF DECIMAL ARITHMETIC
*
*         8.  ZAP THE CURRENT READING
*
*         9.  SUBTRACT THE AMOUNT IN SETUP
*
*        10.  ADJUST THE SECONDS AND MINUTES
*
*        11.  UPDATE THE CVT WORD
*
*        12.  EDIT THE ELAPSED TIME
*
*        13.  MOVE THE JOB NAME
*
*        14.  MOVE THE PROGRAMMERS NAME
*
*        15.  MOVE THE JOB ACCOUNTING DATA FIELDS
*
*        16.  WRITE TO OPERATOR
*
*        17.  RETURN
*
*
```

```
*     THE ACCOUNTING ROUTINE USES THE FOLLOWING AREAS....
*
*
*      POINTER 1--1--1--1--1--1       THE TERMINATOR PROVIDES A POINTER (IN
*              1  1  1  1  1  1    REGISTER 0)  TO ADDRESSES OF ACCOUNTING
*              1--1--1--1--1--1    INFORMATION. THIS POINTER IS SAVED HERE.
*
*
*      TMPCLKST  1--1--1--1--1--1--1  THE TIME, TAKEN AT THE END OF EACH
*                1  1  1  1  1  10C1  JOB, IS STORED HERE. (THIS SHOULD BE
*                1--1--1--1--1--1--1  ALIGNED ON AN FWB)
*
*
*      CVT+148   1--1--1--1--1--1     HERE IS SAVED THE READING TAKEN AT
*                1  1  1  1  1  1     THE END OF THE PREVIOUS JOB.
*                1--1--1--1--1--1       (INITIALLY IT SHOULD BE ZERO)
*
*
*      WKAREAST  1--1--1--1--1--1--1  WORK AREA WHERE THE DIFFERENCE OF
*                1  1  1  1  1  10C1  JOB TIME READINGS IS CALCULATED.
*                1--1--1--1--1--1--1
*
*
*      SETUP     1--1--1--1--1--1--1  THIS AREA IS USED TO GIVE THE VALUE
*                1  1  1  1  1  10C1  FROM THE CVT A SIGN  (SIGNS ARE
*                1--1--1--1--1--1--1  REQUIRED FOR DECINAL ARITHMETIC)
*
*
*
*
```

JOB CONTROL STATEMENT SETUP

```
//ASMJACT     JOB     101466,HCADOW,MSGLEVEL=1
//ASMJ30      EXEC    PGM=IEUASM,PARM=DECK
//SYSLIB      DD      DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1      DD      UNIT=2311,SPACE=(200,(100,50))
//SYSUT2      DD      UNIT=2311,SPACE=(200,(100,50))
//SYSUT3      DD      UNIT=2311,SPACE=(200,(100,50))
//SYSPUNCH    DD      UNIT=00D
//SYSPRINT    DD      SYSOUT=A
//SYSIN       DD*

*    YOUR SOURCE DECK HERE
```

```
//LINKACT    JOB    100766,HWC,MSGLEVEL=1
//            EXEC   PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSABEND   DD     SYSOUT=A
//SYSPRINT   DD     SYSOUT=A
//SYSUT1     DD     DSNAME=&TEMP,UNIT=2311,SPACE=(TRK,(20,10))
//SYSLMOD    DD     DSNAME=SYS1.LINKLIB,DISP=(OLD,KEEP)
//SYSLIN     DD*

*   YOUR OBJECT DECK GOES HERE


            INCLUDE  SYSLMOD(IEFZA)
            ENTRY    IEFZA
            NAME     IEFZA(R)
```

PROBLEM SOLUTION

```
IEFACTRT CSECT
         SAVE      (14,12)
         BALR      10,0
         USING     *,10
         ST        13,SAVACCT+4
         LR        9,13
         LA        13,SAVACCT      PUT SV AR ADDR OF ACCT RTN IN R13
         ST        13,4(,9)
GENESIS  ST        1,POINTER       SAVE STARTING ADDRESS OF 7 POINTERS
         TIME
         ST    0,TMPCLKST          SAVE  HHMMSSTH
         L     11,16      GET ADDR OF CVT'S BEGINNING
         MVC   SETUP(4),156(11)    SIGNING TIME  QTY OF DEC ARITH
         ZAP   WKAREAST(5),TMPCLKST(5)  CURR RDNG TO ACCUMULATOR
         SP    WKAREAST(5),SETUP(5)    SUBT PREVIOUS VALUE
         CLC   TMPCLKST+2(1),SETUP+2    THE NECESSITY OF ADJUSTING SECS
         BNL   TESTMINS                 & MINS IS DETERMINED AS FOLLOWS: :
         SP    WKAREAST(5),SUB40S       1) IF MINUEND > OR = TO THE
TESTMINS CLC   TMPCLKST+1(1),SETUP+1    SUBTRAHEND, NO ADJ NECESSARY
         BNL   CLOKOK                   2) IF MINUEND < SUBTRAHEND,SUBT
         SP    WKAREAST(5),SUB40M       40 FROM RESULTANT SECS OR MINS.
CLOKOK   MVC   156(4,11),TMPCLKST   NEW'PREVIOUS' TIME VALUE
         MVC       MSG(1),BLANK
         MVC       MSG+1(99),MSG  OVERLAP BLANX
         MVC       MSG(11),EDCTLWD  MOVE PUNCTUATION FOR ELAPSED TIME
         ED    MSG(11),WKAREAST
         L         1,POINTER        RESTORING R1
         L     5,0(,1)      PUT ADDR OF JOBNAME IN R5
         MVC      MSG+12(8),0(5)   JOBNAME TO MSG
         L         5,8(,1)         ADDR OF PRGMRS NAME INTO R5
         MVC       MSG+21(20),0(5) MOVE PRGRMRS NAME TO MSG
         LA        7,X'00'         ZERO OUT R7
         L         5,16(,1)        ADDR OF 1ST JOB ACCT DATA FLD BYTE
LOOP     SR        6,6              ZERO OUT R6
     IC        6,0(,5)         MOVE 1 BYTE LNG INTO REG 6
         TM        0(5),X'FF'      ANY MORE FIELDS
     BC        8,NOMORE
         AR        7,6              SUM OF LENGTHS
         A         7,ONE            INCL LNG FLD IN SUM OF LNGTHS
         MVC       0(1,5),BLANK    REPLACE LNG WITH A BLANK
         AR        5,6              UPDATE-
         A         5,ONE                 -THE BASE
         BC        15,LOOP
NOMORE   EX        7,MOVE           REG 7 CONTAINS LNG
         BC        15,WRITE
MOVE     MVC       MSG+42(0),0(5)  MOVE ACCTNG DATA TO MSG AREA
EDCTLWD  DC        X'21204B20204B20204B2020'
BLANK    DC        C' '
WRITE    WTO   '                                                        H
                                                          ' CNT CARD
         L         13,SAVACCT+4
         RETURN    (14,12)
SAVACCT  DS        18F
POINTER  DS        F
```

```
TMPCLKST DC     X'000000000C'  TEMP STORAGE FOR CURRENT READING
SUB40S   DC         X'40000C'
SUB40M   DC         X'4000000C'
SETUP    DC     X'000000000C'
WKAREAST DC     X'000000000C'
MSG      EQU        WRITE+8
         DS         0F
ONE      DC     X'00000001'
         END
         END
```

Appendix 12

Unit Definition

The released level of the Operating System will support magnetic tape device models 1, 2 and 3. It is not possible to SYSGEN any control information for 7340 Hypertape or 1600 BPI models 4, 5 and 6. The user of these device types can provide UCB support by specifying 2400 type IOCONTRL and IODEVICE macros.

Fields of the IECIUCB macro which may require change:

Field	Name
5	Error Routine Suffix

The user of 7340 or 1600 BPI device types may have to provide his own or modify the released error recovery procedure. To determine what error recovery procedure is required by IBM Standards, the user should refer to the "Operating System/360 Design Summary Book", available through the Field System Centers.

Device Type Models 4, 5, 6

The released version of the Operating System has within the input/output Supervisor a magnetic tape start I/O module which causes a set mode command prior to every read or write operation. For 9-track device type, a mode 1 set 800-NOP command is given. If one does not utilize feature #5320 (9-track, 800 BPI-NR7I, compatibility), then the NOP command has no effect and the addressed tape unit will automatically go to 1600 BPI for any read or write operation.

To utilize feature #3471 (dual density) or feature #5320, a mode 2 set (800/1600) command is necessary. To insert the correct modifier bytes into the released level of the control program would require modification to one or more data management modules, primaly OPEN and EOV (end of volume).

Data Representation

In many accounts it is not a device type which is unsupported, but rather the data itself. Especially with magnetic tape, the desire is to implement a record format or length not normally allowed by Data Management. In these situations the best resource is to generate an IECIUCB macro for a unit record device rather than magnetic tape. The reason being that the device type code for magnetic tape will cause certain standard control program functions to be performed, while unit record device type code will not.

For example, the control program will always cause a read for the volume label record because the device type code specifies magnetic tape. If you have no labels and the first record is not of the correct length and mode, then a unit check condition is indicated. The standard error recovery procedure will execute 100 entries before passing control to the problem program.

To eliminate this control program function one can modify the OPEN modules or generate a unit record control block. The latter course is recommended.

Hypertape

It is possible to record data at 1511 bpi or 3022 bpi. The operating density is set by a set density control order similar to the mode 1 set command of the 2400 magnetic tape series. The normal operating density of hypertape is low density, as set by a general or selective reset. (Ref. SRL A22-6828, IBM 7340 Hypertape Drive Model 3 with IBM System/360).

If one wishes to operate at high density, he must insure that the correct modifier bits are used by the control program. The 7340 control order to set high density has the operation code in binary '01010011. This format coincides with a 2400, 7-track, 556 BPI, data convert on.

Therefore, to implement hypertape, the IOCONTRL macro should indicate FEATURE=(DATACONV, 7-track), and the IODEVICE macro indicates FEATURE=7-track. This will cause the necessary device type code to be created in the IECIUCB macro. The device type code will be used by Job Management to create the correct mode operation code.

At problem program execution time, the unit allocated must be a 7-track data convert control unit.

If high density is required, then the DCB parameters would be:

DEN=1, TRTCH=C

If low density is required, then the DCB parameters would be:

DEN=0, TRTCH=C

The standard error routines will work on these.

Appendix 13

Unit Definition

An I/O device macro with UNIT=2311, together with a CHANNEL and IOCONTRL macro with UNIT=2841 will create a valid IECIUCB macro. In order to provide support for other direct access device types, certain fields are known to require changing. They are:

Field	Name
5	Error routine constant - (refer to section titled "User Written Error Routines".)
9	UCB type - Refer to PLM Y28-6603, UCB Definition.
11	Status bits A (4-7). If the device is to be considered permanently resident, bit 5 must be set by coding the character '4'.

Access Methods

The user of the EXCP macro is responsible for providing his own MBBCCHHR in the input/output block and therefore, requires no relative address conversion routines from the control program. In order to utilize other access methods, the 4th byte of the UCB type field specifies an index value to the "device characteristic table".

Device Characteristic Table (IECZDTAB)

The purpose of this module is to provide the necessary direct access hardware constants such as track length, gap byte overhead, etc. It is used by a resident routine to convert relative track address to actual address. Refer to SRL C28-6550, System Programmer's Guide, under the topic "XDAP Options", for a more detailed explanation and use of the conversion routine.

All I/O modules concerned with access to a record utilize the device characteristic table. The current known exception is EXCP. The table is created during Stage I of the System Generation process and specified by Stage I output as the macro SGIECODT. The format is: SGIECODT TYPE = (a, b, c, d, e) where an entry causes selection of constants for a particular device type. Current definitions are:

Field	Type
a	2311
b	2301
c	2321
d	2302
e	7320

NOTE: No definition currently exists for the 2314 or 2303.

A typical SGIECODT macro as output of Stage I would be TYPE=(1,0,0,0,0). The first and only parameter stating that 2311 constants are to be assembled as the device characteristic table. To include support constants for other device types you must place a '1' into the appropriate parameter.

Since no parameters are available for the 2314 or 2303, you must either expand the library definition of this macro or replace unneeded existing constants. For example, replace the 7320 with 2314 constants. The SGIECODT macro exists in SYS1.GENLIB and can be updated through the use of the utility IEBUPDAT.

In summary, the correct device type constants, as indexed to by the UCB type field, will provide the TTR conversion routine with necessary data to produce MBBCCHHR.

TTR Conversion Routine

The released version of the operating system provides a conversion routine that supports the 2311. It is quite possible that the routine may work without change for other device types. However, in the specific case of the 2321 data cell, it will not work without modification. To change the module you must update the member IECPFIND which exists in SYS1.MODLIB and is included in the nucleus at SYSGEN time. (Bin # calculation is wrong.)

Direct Access Error Routines

The released version of the operating system provides for error correction of the 2311. While it is true that status and sense information is identical across device types, it also is the case that the same error may require a different method of correction. For example, the current direct access error routine will recognize multi-track file mask violation and cause cylinder switch upon reading the 10-track. Therefore, if one used the QSAM access method which employs multi-track search and read with a 2302, he will either lose capacity or data retrieval. He will use the first ten tracks on each cylinder.

For a particular device then, the user may or may not have to modify the current direct access error routine. The dependency is based on what access method and features are employed. The resident error routine is a member of SYS1.MODLIB with a name of IEC2311A which is included with the nucleus at SYSGEN time. The transient portion is also in SYS1.MODLIB with the load module name of IGE0000A and included in SYS1.SVCLIB at SYSGEN time.

Refer to section entitled, "User Written Error Routines" for additional information.

Special Features

The two-channel switch is not currently supported by the operating system. However, it is possible to SYSGEN an alternate channel path by the macro specifications.

```
IOCONTRL  UNIT=2841,ADDRESS=XX,FEATURE=2-CHANSW

IODEVICE  UNIT=2311,ADDRESS=XXX,OPTCHAN=2
```

No comment can be made as to possible execution time capabilities. Indications are that current IOS routines would allow two channel paths, however, this has not been tested.

Direct Access Device Initialization

Before a direct access routine can be referenced by the Operating System, it must be initialized to certain standards. The direct access storage device initialization utility (DASDI, Ref: SRL C28-6586) performs this function for IBM direct access devices. The released level of the utility will initialize and assign alternate tracks for the 2311 and 2302.

Basically, the differences among the various device types is reflected in the VTOC constants table maintained within DASDI itself. This table provides necessary device constants for the format 4-DSCB created by DASDI and required for each volume. These constants are used by DASDM in order to allocate space on a volume. For additional details, reference PLM Y28-6607, "Direct Access Device Space Management".

Implementation

Unless one wishes to modify the control program in order to provide his own space management routines (a task too enormous to contemplate), he must initialize his volumes to OS/360 standards.

The released version of DASDI contains device constants for 2311 and 2302 only, however, it is possible to modify the program so that it will provide support for 2321, 2301, 2303, and 2314.

The symbolic listing of DASDI can be obtained through the use of the Print/Punch utility program. It is distributed from PID as volume SLIB03 with a partitioned data SYS1.SYMLIB.UT507A and member name DASDI.

Appendix 14

A. O/S 360 Support of 2302

This document is intended to assist anyone in supporting the 2302 under OS/360 until it is supported by SDD. This is a summary of the approach used at the Lockheed (California) account. Lockheed is currently using the 2302 for the following functions:

1. Utility work space for the COBOL compiler and the assembler.

2. User data storage (accessed by BSAM, QSAM and BPAM).

3. User's program libraries (JOBLIB).

The following functions are not supported:

- System residence.

- Work space for SORT (This may be implemented in the future.)

B. Procedure

1. DASDI all volumes. (Access Mechanisms)
NOTE: The released version of DASDI will initialize both 2311 and 2302 volumes.

2. Modify the 2311 error routine to handle both 2311 and 2302. This is a minor modification.

3. Incorporate the modified 2311 error routine into SYS1.MODLIB. This can be done prior to SYSGEN by linkediting the revised object module into SYS1.MODLIB member name IEC2311A. (During System Generation this module will be linkedited into the NUCLEUS of the generated system.)

   Additional information is given in C.

4. Do stage I of System Generation. Define each 2302 volume (access mechanism) as a 2311 using the standard IODEVICE macro.

5. Modify the SYSGEN Job Stream as follows:

   a. In the assembly step that expands the macro SGIECODT, change subparameter

number 4 of the key word operand TYPE= from a 0 to a 1. This will usually be step #8 in the job stream. This macro will normally be:

```
SGIECODT  Type = (1,0,0,0,0)
```

Change to:

```
SGIECODT  Type = (1,0,0,1,0)
```

This will cause the 2302 direct access device characteristics to be included in the NUCLEUS of the generated system.

b. In the assembly step that assembles the I/O supervisor, change the IECIUCB macros for the devices that will be 2302's rather than 2311's. This step will be the third from the last assembly step. It is the largest assembly step in the job stream. The IECIUCB macros build the UCB's for the generated system. There will be one IECIUCB macro in this step for each IODEVICE macro written in the input to stage 1. The particular IECIUCB macro(s) that need to be changed can be easily identified because the I/O address appears as the second operand.

c. Modify these macro(s) as follows:

. Operand 9 will be 30002001

. Change it to 30002004

This causes data management to use the 2302 device characteristics instead of the 2311.

. Operand 11 will be 0

. Change it to 4

This will cause the volume to be permanently mounted.

6. Do stage II of System Generation.

7. 2302 device allocation can now be made via the DD card using Unit=XXX where XXX is the 2302 I/O address. During SYSGEN the user can assign names to I/O devices or groups of I/O devices by the UNITNAME macro. The user could assign one name to his 2311's and another to

his 2302(s). These names could then be used for device allocation in the DD card to insure allocation of the desired device type.

C. Additional Information Concerning Step B.3.

1. The "local fix" flag in the System Status Index (SSI) for the IEC2311A module should be set on when linkediting the revised module into SYS1.MODLIB. This will cause the Update Analysis Program (UAP) to ignore maintenance to this module unless the user supplies a FORCE card to UAP. The current SSI will be the last 4 bytes of the user data field in the directory.

2. The procedure would be:

   a. LISTPDS for SYS1.MODLIB.

   b. Determine current SSI.

   c. Supply a SETSSI XXXXXXXX card in the link edit step. XXXXXXXX is a hexadecimal representation of the 4 byte SSI. It should be the original SSI plus a 2 bit in the third hexadecimal digit.

3. Example: The initial release of this module has an SSI of 00052029. The SETSSI should be 00252029. See the SRL on OS/360 Maintenance, C27-6918, for more details on SSI.

4. An alternate approach to Step B is to go through SYSGEN using the standard SYS1.MODLIB; then linkedit the revised 2311 error routine into the generated NUCLEUS after SYSGEN, replacing the standard 2311 routine. This approach has the advantage of allowing the generated system to be tested out before any modifications are made to it. No SSI modification is required. The disadvantage of this approach is that the linkedit into the generated NUCLEUS would have to be done following each SYSGEN.

Appendix 15

DEBUGGING CONCEPTS

STUDENT PROJECT

The following questions have been designed to give direction in reading and interpreting information from an ABEND Dump. Emphasis is placed on control block content, the relationship among control blocks and many of the major internal functions of the Operating System.

The questions should be answered in the sequence they appear since some of the answers depend on those obtained from previous questions.

The following list of material is recommended as references.

IBM System/360 Operating System Job Management	Y28-6613
IBM System/360 Operating System Fixed Task Supervisor	Y28-6612
IBM System/360 Operating System Operators' Guide	C28-6540
IBM System/360 Operating System System Programmers' Guide	C28-6550
IBM System/360 Operating System Messages, Completion Codes and Storage Dumps	C28-6631
IBM System/360 Operating System Control Program Services	C28-6541
IBM System/360 Principles of Operation	A22-6821
IBM System/360 Introduction to Control Program Logic	Y28-6605

QUESTIONS

1. a. Name the JCL requirements for obtaining a full ABEND dump.

   b. Name 3 ways in which a DUMP can be initiated. (Ref. CPS pg 102, Op. Guide pg 16)

2 a. Explain who initiated the DUMP for JOB JPL.

   b. What is source of the value "0444" in the completion code line of the DUMP? (Ref: CPS pg 102)

3. Where should one look to find the I/O devices which had been allocated to this Job Step? (Ref. Job Mgmnt PLM pg 25, Debugging Proc. pg 41)

4. List the "ddnames" for the devices allocated in this job step.

5. List the UCB addresses for each "ddname" in the TIOT.

6. List the physical address of I/O devices associated with each of the UCB's for question 5.

7. How could one determine the data sets whose DCB's are currently opened? (Ref. Debug Proc. pg 43)

8. a. List the addresses of the DCB's referenced in question 7.

   b. List the ddname for each DCB.

9. What is the size of the nucleus (in this Operation System)? (Ref: Debug Proc. pg 41)

10. How many bytes of core storage does the 360 Model 40 (used in this DUMP) have?

11. a. How many bytes are required for A003's RB and program?

    b. What type of an RB is it?

    c. How many bytes are there for the RB for A003?

    d. Why is the size of the RB for A003 different than the size of the RB for A002 and A001?

12. a. What does the "Q" field in RB A001 point to?

    b. Why does it point to this address?

13. In RB A003 - why is the use count=03?

14. Which RB is "at the top" of the RB list?

15. RB A004 is an SVRB for what SVC routine? (Ref: Debug Proc. pg 35)

16. The registers displayed in RB A004 contain values that were used by which load module? (Ref: Fixed Task Supr. pg 14)

17. Do the SVRB's for A004 and A005 have an extended save area? (How did you determine your answer?) (Ref: Fixed Task Supr. pg 14)

18. What is the size of the load module for RB A004?

19. What is the maximum size the load module in RB A005 could be? (Ref: FTS pg 7)

20. What is the address of the first byte of the SVC transient area? (Ref: SPG pg 39)

21. a. Why does the PSW for L001 of the load list consist of all zeros?

    b. Why are no PSW contents listed for L002 thru L008.

22. a. Why were the modules for L002 thru L008 loaded?

    b. What operation requires their use?

23. The modules referenced in question 22 are marked RENT or REUS.

    a) Who (or what) has the initial responsibility for assigning this attribute.

    b) When is this assignment originally made?

24. How could one find all the information asked for by the previous 23 questions if the only document available were a stand-alone dump? (A stand-alone dump has no formatted control blocks nor are the locations of the control blocks specifically given.)

25. What is the address of the Save area provided by load module ABLE?

26. a. Into which word of the Caller's Save Area must the Called programmer store information for backward chaining?

    b. Is this the address of the high save area or low save area?

    c. What is the contents of this word when CHARLIE is entered? (Ref: CPS pg 29)

27. On page two of the Dump it says "CHARLIE WAS ENTERED, VIA LINK 00222, AT EP INFO FROM IN FIELD OF SAVE MACRO."

    a) Where did this EP come from?

    b) Where did the 00222 come from? (Ref: Debug Proc. pg 50)

28. a. The current PICA indicates that the programmer wants to control how many different types of interrupt?

    b. List the manes of the interrupt conditions.

    c. What is the address to be taken if one of the selected interrupts occurs?

    d. In which load module is routine to be executed when such an interrupt occurs? (Ref: CPS pg 97)

29. How many entries can the trace table on this system hold? (Ref: Debug Proc. pg 53)

30. What type of an interrupt was last entered into the table. (Ref: SPG pg 114)

31. a. What access method is specified in the DCB for PRINTER?

    b. Locate the IOB associated with the DCB.

    c. What is the address of the last CCW executed?

    d. What was the channel status upon termination?

    e. How many bytes were transmitted?

32. a. Was a buffer pool used with DCB for READER? Explain your answer.

    b. What is the contents of the first byte of the last record loaded into core?

ABLE

```
ABLE  CSECT
      SAVE  (14,  12), *
      ---
      GETMAIN
      ---
      ---
      IDENTIFY EP=XRAY
            ENTRY=XRAY
      ---
      ---
      OPEN  DCB's
      ---
      ---
      ---
      LINK EP=BAKER,
           ID=111
      ---
      CLOSE  DCB's
      FREEMAIN
      ---
      RETURN (14, 12)
      ---
XRAY  SAVE  (14, 12)
      ---
      ---
      ---
      RETURN  (14,  12)
```

BAKER

```
BAKER  CSECT
       SAVE  (14, 12), *
       ---
       GETMAIN
       ---
       ---
       SPIE  ERR, (1, 15)
       ---
       ---
       ---
       LOAD EP=CHARLIE
       ---
       ---
       ---
       LINK EP=CHARLIE,
            ID=222
       ---
       ---
       SPIE
       FREEMAIN
       RETURN (14, 12)
       ---
ERR    ---
       ---
       ---
       ---
       RETURN
```

CHARLIE

```
CHARLIE  CSECT
         ---
         SAVE  (14,  12),
               INFOFROM
               IDFIELDS
               OFSAVE
               MACRO
               ---
         GETMAIN
         ---
         ---
         ---
         ---
         ---
         ---
         CL
         BE    BAD
         ---
         ---
         RETURN (14, 12)
         ---
         ---
         ---
BAD      ABEND 444, DUMP
         ---
         ---
         ---
```

```
  * * * A B D U M P  R E Q U E S T E D * * *

JOB JPL              STEP GOGO            DATE 66179                                                    PAGE 0001

COMPLETION CODE      USER = 0444

PSW UPON ENTRY TO ABEND FF050000 4901F5BF

TCB  000180            RB 01F4C8  PIE 01FDA8  DEB 01F45C        TIOT 01FF4C     CMP 0001BC      TRN 00000000
MSS  00003170    PK/FLGS 00910400       FLGS/LDP 00000000       LLS  01F528     JLB 01FED0      JSE 00000000
ID/FSA  0401FFB8       TCB 000000             TME 003184

PIE     PICA 0001F634  PSW 00000000 00000000  14 00000000  15 00000000  00 00000000  01 00000000  02 00000000


ACTIVE RBS

A001 004CD0  NM ABLE      SZ/STAB 006710C0  USE/EP 00004CF0  PSW FF050006 70004E52  Q 01FE60  WT/LNK 00000180  UB 005008

A002 005008  NM BAKER     SZ/STAB 00290040  USE/EP 00005028  PSW FF050006 690050A6  Q 000000  WT/LNK 00004CD0  UB 005150

A003 01F530  NM CHARLIE   SZ/STAB 00162040  USE/EP 0301F550  PSW FF05000D 4901F5BE  Q 000000  WT/LNK 00005008  UB 01F5E0

A004 01FBB0  NM SVC-401C  SZ/STAB 000CD072  USE/EP 00002D70  PSW FF040033 40002F14  Q A103A1  WT/LNK 0001F530
REGS 0-7     00000048    8000018C    0001F630    00000002        00000008    00000002    00002388    00000080
REGS 8-15    0000003C    4000AC7A    0001F5E0    00000000        6901F576    0001FD60    00002408    00000000

A005 01F4C8  NM SVC-105A  SZ/STAB 000CD072  USE/EP 00002D70  PSW FF04000E 0001F36C  Q DF03DF  WT/LNK 0001FBB0
REGS 0-7     000000E0    00005188    00000878    40002D72        00000000    0001F098    00005150    80002EF0
REGS 8-15    00003170    0000521F    00020000    00000180        00000180    00005188    50002F9A    0001F348

LOAD LIST

L001 01FF68  NM XRAY      SZ/STAB 0004F000  USE/EP 00005000  PSW 00000000 00000000  Q 000000  WT/LNK 00000000

L002 01FB48  NM IGG019BB  SZ/STAB 000DF010  USE/EP 0201FB58                                          UB 01FBB0

L003 01F9F0  NM IGG019BA  SZ/STAB 002AF010  USE/EP 0201FA00                                          UB 01FB40

L004 01F998  NM IGG019CL  SZ/STAB 000AF010  USE/EP 0101F9A8                                          UB 01F9F8

L005 01F910  NM IGG019CE  SZ/STAB 0010F010  USE/EP 0101F920                                          UB 01F990

L006 01F860  NM IGG019CB  SZ/STAB 0015F010  USE/EP 0101F870                                          UB 01F908

L007 01F818  NM IGG019CK  SZ/STAB 0008F010  USE/EP 0101F828                                          UB 01F858

L008 01F7E0  NM IGG019CC  SZ/STAB 0006F010  USE/EP 0101F7F0                                          UB 01F810

L009 01F530  NM CHARLIE   SZ/STAB 00162040  USE/EP 0301F550  PSW FF05000D 4901F5BE  Q 000000  WT/LNK 00005008  UB 01F5E0
```

Part I

A15-7

```
SAVE AREA TRACE

ABLE     WAS ENTERED                    AT EP ABLE

SA 0001FF88  WD1 00000181  HSA 00000000  LSA 0001FF88  RET 00002408   EP 40004CF0
00 00000030   01 0001FF1C   02 0000006C   03 00000181   04 00004C40   05 0001FF4C   06 000023B8
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 0001FF4C   12 00000180

BAKER    WAS ENTERED, VIA LINK 00111, AT EP BAKER

SA 0001FF88  WD1 FF05400C  HSA 0001FF88  LSA 0001F5F0  RET 00002408   EP 70005028
00 FFFFFFFF   01 00004F58   02 0001FF1C   03 00000001   04 00004C40   05 0001FF4C   06 000023B8
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 0001FF4C   12 40004D00

CHARLIE  WAS ENTERED, VIA LINK 00222, AT EP INFOFROMIDFIELDOFSAVEMACRO

SA 0001F5F0  WD1 00005150  HSA 0001FF88  LSA 0001FD60  RET 00002408   EP 6901F550
00 0001F550   01 0001F630   02 00004F58   03 00000002   04 00004C40   05 0001FF4C   06 000023B8
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 00000000   12 70005038

ABLE     WAS ENTERED, VIA CALL

SA 0001FD60  WD1 FF05691C  HSA 0001F5F0  LSA 0001F550  RET 0001F628   EP 00004F58
00 00000002   01 00004C40   02 0001FF4C   03 000023B8   04 00000080   05 0000003C   06 4000AC7A
07 0001FF0C   08 00000000   09 70005038   10 0001F5F0   11 00002408   12 6901F550

INCORRECT BACK CHAIN

SA 0001F550  WD1 47F0F020  HSA 1AC9D5C6  LSA D6C6D9D6  RET D4C9C4C6   EP C9C5D3C4
00 D6C6E2C1   01 E5C5D4C1   02 C3D9D600   03 90ECD00C   04 05C01821   05 41000048   06 4510C00A
07 0A0A50D1   08 0004501D   09 00081801   10 58520000   11 5C420004   12 50520008

INTERRUPT AT 01F5BE

PROCEEDING BACK VIA REG 13

ABLE     WAS ENTERED, VIA CALL

SA 0001FD60  WD1 FF05691C  HSA 0001F5F0  LSA 0001F550  RET 0001F628   EP 00004F58
00 00000002   01 00004C40   02 0001FF4C   03 000023B8   04 00000080   05 0000003C   06 4000AC7A
07 0001FF0C   08 00000000   09 70005038   10 0001F5F0   11 00002408   12 6901F550

CHARLIE  WAS ENTERED, VIA LINK 00222, AT EP INFOFROMIDFIELDOFSAVEMACRO

SA 0001F5F0  WD1 00005150  HSA 0001FF88  LSA 0001FD60  RET 00002408   EP 6901F550
00 0001F550   01 0001F630   02 00004F58   03 00000002   04 00004C40   05 0001FF4C   06 000023B8
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 00000000   12 70005038
```

REGS	ENTRY TO ABEND							
REG 0-7	00000048	800001BC	0001F630	00000002	00000008	00000002	000023B8	00000080
REG 8-15	0000003C	4000AC7A	0001F5E0	00000000	6901F576	0001FD60	00002408	00000000
000000	00000000	0000051C	F0F0F5C1	0C0D0E17	00002388	00003AD8	00000000	00000000
000020	FF040001	4001F36C	FF050006	40000003	0000FF00	00000000	FF06000F	0001F36C
000040	0001F438	08000000	0001F428	000023B8	6309109E	00000000	00040000	000002B4
000060	00040000	00000346	00040000	000002FE	00020000	000000E2	00040000	0000025E
000080	01000007	00000000	00050000	00000000	00000000	00000000	00000000	00000000
0000A0	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
LINES 0000C0-000120 SAME AS ABOVE								
000140	00000000	00000000	00000000	00000000	00003134	00000000	00000000	00000000
000160	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
000180	0001F4C8	0001FDA8	0001F45C	0001FF4C	800001BC	00000000	00003170	00910400
0001A0	00000000	0001F528	0001FED0	00000000	00003170	000051A8	50002D72	00005188
0001C0	5000526E	50002002	00000001	00005200	00005150	0001F408	00005200	0001F348
0001E0	0000533C	0000533C	00000008	00000000	0401FFB8	00000000	00003184	0001FEE4
000200	0001FF24	60005706	00005DF8	6001FADA	00000001	0000241D	00005078	0001F0A0
000220	00002A40	0000338E	00000001	4000284C	00003592	00000180	00000000	0000207D
000240	0000203A	00002138	00002000	00001000	000019C8	00003A86	00003A70	00174700
000260	028096F0	025F9029	01D04700	028E5840	0180D207	40100038	94FD4011	90A10180
000280	58900254	05895850	024C47F0	0BC690A1	021CD207	04400038	47F00280	940F025F
0002A0	98290100	91F00268	47800448	98A1021C	82000440	90290100	91F00268	478002CE
0002C0	90A1021C	D2070440	001847F0	02E45890	048490A1	90305899	0000D207	90100018
0002E0	94FD9011	91800018	478002F2	582002F8	052247F0	029C0000	00001C58	0A0390A9
000300	01FC98CD	00285880	02509101	0029078B	58A00184	12AA07CB	90C2A004	181A58A0
000320	100012AA	07CB9280	100098F0	A0008900	C0001200	078B50F0	002C41E0	02FC98AD
000340	01FC8200	00284700	03D6900F	04005890	02580589	18AA43A0	00239546	002347A0
000360	03EA9889	023C43A9	A000418A	A0001ABA	478003EA	58300010	58400484	58504000
000380	49A0025C	47A003DE	1E880202	0249B000	91078002	477003DE	96F00347	58600248
0003A0	05E6D400	03470022	477003B8	982E0408	95000482	478003BC	82000020	95FF0020
0003C0	47400388	90A10180	58A00180	D207A010	002047F0	044892FF	002247F0	034ED23F
0003E0	40300400	58C00244	07FC4810	00224110	1F008910	000C988B	04200A00	00000000
000400	00000001	00005200	00005150	0001F408	00005200	0001F348	0000533C	0000533C
000420	00000008	00000000	00003170	000051A8	50002D72	00005188	5000526E	0001F348
000440	FF04000E	0001F36C	47000504	58C00180	D2070440	C0109500	C01C4770	047C5810
000460	01F89181	10004790	049A9029	01D05830	04A80523	98290100	47F0049A	96020441
000480	581001F8	91881000	4770049A	902901D0	583004AC	05239829	01D098A1	01B0D201
0004A0	04820486	82000440	00001D84	00001C10	00000180	00000180	0000048A	048A048A
0004C0	FF0004C0	FF0004C0	12114740	04EC48A0	04BCD201	1000A0C0	4010A000	401004BC
0004E0	92F00449	D7020481	048107FE	131158A0	04C4D203	1000A000	5010A000	501004C4
000500	47F004E0	90290400	91400628	4770044C	902901D0	581004C0	12114740	053A5510
000520	04C4D203	04C01000	47700532	D20304C4	10004590	059E47F0	05144810	04BA4910
000540	048E4780	06144910	04BCD201	04BA1000	4770055A	D20104BC	10005820	10089101
000560	10034780	056E94FE	100347F0	06844190	053A5840	20084150	401A4860	50001266
000580	4780058A	185647F0	057A4010	50004060	10009101	019D4770	053A47F0	05D05840
0005A0	1008960C	400B4150	40185860	50001266	478005BA	185647F0	05AA5010	50005060
0005C0	10009101	019D4770	053A1801	58101004	91404008	0779D227	402001C8	D2174048
0005E0	01B09640	400BD202	401D0181	50400180	D2024015	400D9101	40114710	06029200
000600	401041E0	06B658F0	400C58D0	400090D1	01BC07F9	92000449	98290400	47F0044C
000620	C9C7C5F0	F0F0F0C7	00048000	00002BE0	FF040190	00003382	00001520	00004CD0
000640	00000001	0001FB38	0001FB84	0001FC68	0001FB38	0001F930	00000050	0001FA00
000660	0001FA48	0001FA00	0001FE28	0001FE28	00000180	0001FAEC	50008480	50002002
000680	00002656	41400620	50104018	459005D0	48610002	18DD43D0	600845F0	06B855E0
0006A0	062450E0	06244780	044C58B0	068041A0	06200588	000A0A03	4ED00000	F3320008

0006C0	000558E0	000807FF	41500800	1A551821
0006E0	5834002C	910F3018	47E00B62	189918A9
000700	47800714	4393001C	43A20020	89A09000
000720	1BAA43A7	000A89A0	000341DA	51F207EC
000740	927F2004	501B0000	48105050	12114740
000760	A0709101	10014710	07C8D201	50501000
000780	91CB7006	41C00790	077C4180	07944BA0
0007A0	58A05070	181207FA	58A0505C	439A0000
0007C0	928050EA	47F00748	05022015	50794730
0007E0	41AA0000	9501A001	477007D6	41B00020
000800	9102[illegible]00	47100818	91C0402C	47800818
000820	07FA9110	70064710	082E47E0	0810D201
000840	D2012002	701647F0	0F120200	50902018
000860	91202000	47100884	58F3001C	58FF0004
000880	511407FA	92000048	43670005	9C006000
0008A0	00045890	506C0589	18994017	00149487
0008C0	0B0C9130	20104710	0916913E	00454770
0008E0	0C6E94E0	70069458	70069120	00444718
000900	70069184	00444788	00089477	70064188
000920	200C47F0	0EEC9459	700647E8	00089110
000940	4780094A	02025089	20199108	20004140
000960	921B50B0	0200A000	302047F0	08549110
000980	0A0E40A0	50C29101	20004710	09940207
0009A0	30209108	20014710	09EAD501	7031A004
0009C0	7033A00A	47200A4C	91043008	4780C9EA
0009E0	47C009EA	D2017035	A00841A0	50C09202
000A00	09FA9602	700641E0	08DE47E0	0A9240A0
000A20	42A050D5	41A050C8	02025009	20119101
000A40	41C008BC	96067006	47F00884	58F3001C
000A60	09949130	201041E0	091A4710	0A929110
000A80	0A929242	200494FE	700694DF	20004E0
000AA0	003C47F0	0A3C9110	20004710	084A58A2
000AC0	08544397	000748A9	51C407FA	41D70028
000AE0	9101D001	47800AF8	401D0000	401D0002
000B00	47F00AEC	91207012	47100A92	18AD18BA
000B20	B0001000	91011001	078E408D	000207FE
000B40	43910004	58C05054	58C9C000	07FE4180
000B60	0B664110	004041E0	0D304A10	50E458F0
000B80	4060003A	920F0073	82000070	41F00D14
000BA0	50E98000	439050E9	46900B8A	41A0007F
000BC0	B00050E9	07FE910E	00454770	08844180
000BE0	004450E6	47800D8C	18A68C60	00088870
000C00	1A661AAA	1AA6487A	52064860	003A9120
000C20	00149180	00454780	0C5458F3	001C58FF
000C40	47800D38	43900045	9D006000	47200D38
000C60	47800C6E	D4010044	50EB9420	70069108
000C80	47800C88	947F7006	91800044	47100F28
000CA0	95500044	47800EFE	910C0044	47800C8A
000CC0	0D2241F0	000C9498	70069120	20004710
000CE0	0CEA9171	20004780	0CEE9604	200005FF
000D00	91042000	47100F0A	45F00B30	91202001
000D20	100407F8	47000000	9F006000	47C00DA8
000D40	200441C8	00049180	50EA4710	0D5418EC
000D60	91040044	47800C88	91807006	47800F28
000D80	700647F0	0C84D606	00412009	948F2001

928050EA	41C00730	18111804	58420014	
91FE3010	47700704	48730022	91707012	
587A3020	91FF7002	47F00B62	58B20004	
4012001F	D7082008	2008D403	200050DC	
07A84071	00029023	100418A0	D2001004	
91022000	47100780	91C0402C	47100FE2	
000607EA	47F007A0	47F007E4	45E00AC2	
92F0A000	80005088	80000078	429A0000	
076A41A0	54F00501	A0021002	4770076A	
47F00852	41800794	91117006	47700822	
91202000	47880008	43970007	48A951C6	
200C7014	94EF7006	45F00804	927E2004	
41A05090	41C008BC	92005080	50A00048	
05EE47E0	08841E0	0D0C4390	508048A9	
47200926	05A088A0	001842A2	00104067	
700696A0	70069130	201005CC	18E84780	
00989110	00444710	08E645E0	0B0C47F0	
00049608	70069140	00444718	00089680	
000447E0	0E2845E0	0B0C9240	20029202	
20004710	084AD202	50B92011	91012000	
50804780	096441A0	50A8D200	50857018	
20014710	0A9E41A7	00319102	70064710	
70302020	1BAA43A7	003089A0	000441AA	
47700A4C	D5037033	A0064740	0A4CD503	
D5017035	A0084740	09E4D501	7035A00C	
508045C0	085C4770	0A629D00	60004780	
50CA1BAA	43A70030	89A00004	43AA3020	
20004780	0A3CD202	50D92019	50A00048	
58FF0000	05EF47F0	0A8247F0	0A7A47F0	
00444710	08E247F0	0A0241E0	0D0847F0	
0F3E4397	000748A9	51C447FA	000841A7	
00189101	20004710	0ABE58A2	001047F0	
47F00AE0	47F00AD8	41D70028	47F00B0C	
D2011000	505207FF	48AD0002	401A0000	
48AB0000	12AA074E	19A14770	0B0ED201	
58B20004	43A20004	89A00018	58F05060	
001045F0	0B409200	7006180C	181847F0	
001058FF	00348910	001007FF	50100118	
58B30014	58CB0000	41BB0004	1899D100	
89A00018	58F05060	07FF4290	50E9D100	
0D249200	50EA1B99	18114860	003AD500	
001C4366	51FA1A67	436651FA	54A050BC	
70064780	0C5C4817	00149823	10045842	
000805EF	91FF0044	47700C54	91310045	
40900044	91402001	47100D86	91807004	
00444780	0D58D206	20090041	91040044	
91020044	47100FE8	91310045	47700EFC	
43970007	48A951C8	05EA9120	70064780	
0F1658A3	001C58FF	A0009103	200C4770	
47F00D00	47F00D0C	47F00D3E	47F00D22	
4710088C	D2011000	50504010	505092FF	
918050EA	47100FA0	58A05074	07FA927F	
41C00AC2	47F00720	91207006	47100D90	
91030044	47800C84	D2017014	00449610	
947F7006	47F00C76	910E0045	47700B7C	

000DA0	41B00080	47800B52	45E00E14	918050EA	47100DC4	8000A002	80000078	47000000
000DC0	45F00E14	48EA0000	07FE4817	002891C6	7006477E	00041211	474E0004	48710002
000DE0	91C47006	077E180E	98231004	58420014	41800E08	912050EA	478007F8	45C00720
000E00	41C00E10	47F0078E	47F00D24	47F00D8C	18E007FF	41A051D6	50605080	43905082
000E20	89900002	1AA907FE	94AE7006	43970008	58F95104	58A0507C	05EF4817	001447F0
000E40	0C9007FE	91207006	47800D22	58A4000C	4AA2001C	50A4000C	47F00CC2	91047006
000F60	071E9106	7006078E	91040044	078891A0	50EA4748	000494DF	700645C0	072041E0
000E80	0DBC48A7	002E07FA	91807006	47100EF4	41A70016	50A050A0	920450A0	41A050A0
000EA0	50A00048	9C006000	47400E88	4730084E	9D006000	47800EB0	910F0045	47700884
000EC0	91020044	47800ED0	92107016	92FF7017	91100044	47100EA4	91207006	47800D22
000EE0	D2012002	701607FE	45E00E88	41F00010	47F00CC6	96402001	47F00D22	07FE9106
000F00	70064740	0D3894D9	70069120	20044780	0D08943F	402C910C	402C4780	0F5A9130
000F20	200D4770	0D989120	20044780	0F3E957E	20049244	20044780	0F3E9241	200441E0
000F40	0FDA9102	2000071E	9640402C	40730012	D2011002	523A47F0	0F849102	20004710
000F60	0F669640	402C9120	70124780	0F8458F0	506405EF	47F00FEF	47F00FC6	47F00F84
000F80	47F00E7E	58A0507C	96011003	41E00D22	07FA0014	58CB0000	41500800	1A5592A0
000FA0	50EA5821	000445C0	06DA4867	00045460	50844180	0DBC9120	20004780	0FC691C6
000FC0	700647F0	07849104	200041F0	000C4780	0CD291C0	402C47E0	0F1F41F0	001047F0
000FE0	0CD29248	20044180	079447F0	0FDA9601	700641E0	0DBC41D7	002847F0	0AC258B0
001000	001058C8	00649180	C00458BC	00044710	501658BC	000C48A8	00044180	07FF14A8
001020	9D00A000	47705020	41805048	50800048	9C00A000	50005044	82005040	91310045
001040	01060000	00000000	08000000	00000001	152CFFFF	000004B0	000011C4	00000268
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47E07210	9200600C	4186001C	50B60008
1880D227	601C8000	8799723A	D203A004
47E07282	800073AB	8799733E	58130054
902A610C	58B3005C	41D60040	05EB982A
60324780	74425886	00348880	000841C0
91206032	4780728C	43D60031	41DD0003
58107480	8799720A	41A00008	1A0A5600
477072E0	96E0A00A	1ACA50C6	00041ACD
00038799	73100600	400A0008	D207A000
91016028	47807336	D2026001	30098000
D2096032	74AAD203	6035A018	418078C8
30558000	73688799	7392D203	A000602A
5880747C	D7078000	80009024	61DC4116
18EE12FF	4770745A	80007381	879973D6
9610A00A	5880747C	D2078000	A000D202
91FF600C	47807402	D2000268	600D9130
74164116	00000201	600E7546	0A3D9120
74881811	0A088799	8002581A	001841F0
010041EE	010041EE	00FE41EE	010141EE
4780747A	91FF600C	4780747A	D2000268

002920	600D0A0D	00002214	000031F8	0001F3A0	0001EE98	00000200	00002930	208045FF
002940	4DFF063F	4DFF6B3F	758F767F	7CFF2C7F	0700C350	00010024	80000000	47707456
002960	C9C5E6E2	E9D6E5D9	00008000	00002974	12000000	00000000	00000000	00000000
002980	00000000	01000000	00000000	0F002940	04003550	C000132C	00000017	00000052
0029A0	00090258	00008000	00002980	12000000	00000000	00000000	00000000	00000000
0029C0	01000000	00000000	0F00297C	04003550	C000132C	00000000	00000016	00090064
0029E0	0000297C	0001F080	000029FC	FF000001	FF01F080	0001F080	00000000	C9C7C7F0
002A00	F1F9C3C6	00000000	00000015	08000000	0000CB78	00000000	00060000	00F00018
002A20	31002A7F	60000005	08002A20	00000000	08002A40	60000005	9E002A87	A0000008
002A40	0601F080	00000000	9E002A87	A0000008	06000000	20000100	7F000000	02000000
002A60	7F002A58	00002A48	0C000000	40002A20	0000297C	00000000	00000000	00000000
002A80	0F000108	00000000	0F000108	00008000	00000000	00000000	00000000	000029FC
002AA0	0001F0A0	00000000	800032F0	00000001	40002840	000031F8	FF000000	00040000
002AC0	06000400	40000080	00030080	00000000	00000000	00000000	00000000	00000000
002AE0	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
LINES 002B00-002B80 SAME AS ABOVE								
002BA0	00000000	00000000	00000000	00000000	00000000	00000000	00000000	0001F498
002BC0	00002398	00000180	0001F3A0	000029E0	00002AA8	800025F8	7F000000	0001F0A0
002BE0	58A10004	48710002	58800010	9624A000	91C0A000	4710F13A	9110A010	4710F038
002C00	584A0008	4840F148	9140A000	4780F038	504A0018	9601A000	9101A000	4710F136
002C20	9102A00C	4780F0E2	58280070	18DD4307	00094CD0	F14A1A2D	D6002008	A0029470
002C40	2008910A	70134710	F072910C	A0024750	F136189F	58F80044	05CF068C	038A010A
002C60	021C0742	00B62F80	957FA004	4770F13F	94FFA000	927FA004	47F0F13E	9108A00C
002C80	4710F136	9110A008	4710F136	9610A008	0A0F0A03	957FA004	4770F11C	94FFA000
002CA0	47F0F0DA	58DA0014	9620D02C	124447C0	F0844144	0008504A	0018927F	A0040A0F
002CC0	0A03189F	58F80044	05CF1A0A	1808170E	192C2F16	94DFA000	0A0F0A03	58DA0014
002CE0	9610D02C	47F0F0CC	58DA0014	943FD02C	94DAA000	9200A008	47F0F120	94DFA000
002D00	9110A008	4710F12C	0A0F0A03	410000FF	58E8002C	07FE9601	A0089604	A0084100
002D20	00FD58E8	002C07FF	0008000A	9610A000	950C8000	4770F15C	9237A018	0A0F0A03
002D40	9601A008	9604A008	410000FD	58E8002C	07FF0008	00010005	00009244	A0049608
002D60	A0084100	070907FF	00080001	000A0000	05C09240	01701832	58B0013C	9239D05C
002D80	455D0060	02150177	C3C9455D	00605843	00004133	00185833	000018A3	91028000
002DA0	4710C036	5844001C	41440020	D2060176	C3DF4190	00084180	00004160	01841876
002DC0	4550C346	455D0060	D2070176	C3E64190	00084180	00004160	01841876	4550C346
002DE0	455D0060	92F00170	91088000	4710C08E	58880004	58980009	4550C162	92F00170
002E00	91028000	4710C112	58330000	12334780	C1505823	00001222	4780C08A	19234720
002E20	C13E1832	58220000	47F0C0A4	588A0004	19834720	C0D01893	18984550	C16292F0
002E40	D1701823	583A0000	19234780	C0FA5923	00004780	C0EC5833	000047F0	C0DC1882
002E60	5A880004	18931898	47F0C0C8	18925A88	00045984	000847A0	C1125894	00081898
002E80	4550C162	1B884550	01189857	D1581255	4780C132	18754100	00008900	00181607
002EA0	18150A0A	410001F0	181D0A0A	18E80A03	1B88589A	00084550	C1624180	001047F0
002EC0	C114588A	0004589A	00081B98	4550C162	47F0C112	505D0164	508D013C	509D0140
002EE0	D703D148	D1481858	5450C382	19584780	C1881878	1B754070	0148585D	01404A5D
002F00	01481844	5D40C3AE	404D0146	405D0144	12554770	C1C64870	01461277	4770C184
002F20	585D0164	07F58870	00021897	4550C30E	455D0060	47F0C1AF	4550C30A	455D0060
002F40	487D0144	06704070	0144487D	01481277	4780C1EC	1B884080	014847F0	C2D2487D
002F60	01441277	4720C28C	47F0C1A4	588D013C	489D014A	06908990	00055A9D	013C508D
002F80	014C4120	014C9240	D171D276	D1720171	487D014A	06701277	4770C258	D203D177
002FA0	C3B6F364	D17C2000	0C05D17C	C248D20D	D182C3B8	455D0060	487D014A	89700005
002FC0	5A7D013C	5070013C	07F40204	D177C3B6	F3640170	20000C05	D17DC2A8	9260D183
002FE0	509D014C	412D014C	F354D184	2000DC05	D184C2A8	D20DD18A	C3B847F0	C242486D
003000	014A8960	00055A6D	013C585D	013C5850	C3AED51F	50006000	4770C202	488D0144
003020	12884720	C28C4540	C1FA47F0	C1A4487D	014A4177	0001407D	014A0680	408D0144
003040	47F0C28C	487D014A	12774780	C2F44540	C1FA488D	01441288	4780C1A4	1B884080
003060	014A47F0	C2F44550	C30A455D	00604880	01440680	408D0144	47F0C1EC	41900008

003080	586D013C	4B6D0148	506D0154	416D0184	1876584D	013CF363	D14CD155	DC05D14C
0030A0	C2A8D205	D177D14C	488D0148	88800002	1B981288	4780C34F	1B224328	C3901A62
0030C0	581A0008	5B10C3AA	194147A0	C382F384	D14C4000	DC07D14C	C2A8D207	6000D14C
0030E0	41440004	41880001	18674690	C3465040	013C07F5	D203D14C	4000414D	014C47F0
003100	C35C0008	16213B46	515CF0F1	F2F3F4F5	F6F7F8F9	C1C2C3C4	C5C65040	00000004
003120	00000020	FFFFFFE0	D3C9D5C5	F240F2C1	D4C540C1	E240C1C2	D6E5C5D9	C5C7E240
003140	C1E340C5	D5E3D9F8	40F3D640	C1C2C5D5	C4D9C5C7	40F060F7	D9C5C740	F860F1F5
003160	20105000	997A1800	000095A0	F0F1F97F	0001FE40	00004CD0	00020000	00000000
003180	00000000	83000180	00000000	00000000	00000000	00000000	00000000	00000000
0031A0	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
LINE 0031C0 SAME AS ABOVE								
0031E0	00000000	00000000	00000000	00000000	00000000	00000000	05401851	98795000
003200	41000001	47F04010	18D90540	9603303C	5030304C	50703050	5817002C	41204344
003220	5021001C	9204101C	41103038	50103040	D7013058	30584110	305E5010	30009231
003240	30005030	30080204	30044388	D20F3028	438D0203	30143004	41103067	50103028
003260	929F3028	D2073018	3028181D	46104070	58750010	41770000	47F04090	58780000
003280	580D8004	12004780	43104308	00071857	45C0423E	45C04230	47F04128	91209016
0032A0	478040D4	98019010	8D000010	43090008	45C0423F	41180008	50103030	92063030
0032C0	18114319	00158910	00024010	303645C0	423045C0	41425078	00000200	80079008
0032E0	9801900C	8D000010	43090008	45C0423E	41B03020	45C04234	91409017	478040FC
003300	50703020	47F0410A	58190020	88100008	1A175010	30209206	30200201	30269018
003320	91019016	47804128	92003024	92FF3098	47F0413E	92403024	41103098	50103030
003340	92063030	D2023035	439A41C0	4182D206	30503065	92003038	4110303C	0A0080FF
003360	41539140	30384710	41761810	4610416C	91FF500C	47104156	41103038	41000001
003380	0A019120	3038071C	41F0000F	07FE91FF	30984710	431045C0	41E60203	30344399
0033A0	91023098	47104292	91013098	471041AA	41F00000	07FE9104	30984780	418A9200
0033C0	302492FF	30985810	30A04117	10001821	45C04264	4A2030A6	45C04264	50103020
0033E0	92063020	D2023025	30A59203	301047F0	413E4810	304A1211	078C4120	01001821
003400	41100010	4A10309E	4A10309C	1912078C	41110000	50103034	45C04230	47F0413E
003420	91013098	471041AA	91043098	47104310	41B03028	45C04234	47F0413F	41B03030
003440	50B03010	92083010	07FC909F	307C5815	00005811	002C4120	306458F0	426005EF
003460	D200305C	3064989F	307C07FC	0000392C	18AD46A0	427091FF	9010078C	907A307C
003480	18725880	00105388	00181B99	05A84780	428C41F0	000E07FE	987A307C	07FC4110
0034A0	30A81801	4A00309F	41110004	91F01000	477042EC	58210000	41272000	45C04264
0034C0	18AA50A0	3070940F	100043A1	000088A0	00024180	307318BA	44A04304	58C03070
0034E0	91021000	478042F2	18C747F0	42E41AC7	50C03070	44A0430A	18B14111	00041910
003500	47804214	91018000	471042A0	47F0429C	D2008000	20000200	20008000	18FF06DE
003520	91209016	4780432E	D2077000	50009110	90164780	432E9640	70009120	90174710
003540	433C5819	001C1A71	50750014	07FE0000	00003564	00003592	00003592	0000358C
003560	00003592	18CC43C7	003041CC	000142C7	00300500	30107030	07CE89C0	000441CC
003580	3020D205	7031C004	47FE0008	D2002020	703007FF	60000005	089E0000	00A00000
0035A0	08060000	00200001	00000000	00000000	C14E92F0	80004830	21144B30	C19E4720
0035C0	C03A4130	003492F1	80004030	21140277	80028001	00050500	C8324580	000035E4
0035E0	800092F1	00000000	00000000	00000000	00000000	01000000	00000000	0F003580
003600	000010F0	1000132C	00000001	0000000C	00090078	00050400	00030077	0F000000
003620	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
003640	0F00362C	000010F0	00001320	00000067	00050067	00090005	00003628	00000000
003660	00000000	00000000	05C08000	C1EB1820	18314100	01784510	C0100A0A	18D11213
003680	47A0C058	1311D203	D168C234	D207D16C	20004100	D16845E0	C05E12FF	4720E01A
0036A0	181BD203	B000D174	180158F0	805445EF	00041BFF	182F4100	01781810	0A0A18F2
0036C0	0A0341E0	C04A1802	05F01822	5020D164	12B14720	F02A9202	D1675820	F1DE5822
0036E0	00045882	00281288	4720F02A	5880F1E2	9201D167	18C0906B	D0009808	F1E61E0D
003700	1E2D1A4D	1A8D1AA0	900BD108	18004120	D1384150	D1081B88	9008D138	9202D13C
003720	986BD000	417C0004	4A0C0000	4780F1C4	182C9200	200E4A2C	00024600	F068488C
003740	00001B00	43000166	5810B02C	4120D15C	1B30908F	D00041F0	F26205EF	98BF3000

0037	189718A8	50B0D150	5A90F1FF	5090D12C
003780	471020C4	41100138	41000001	0A019160
0037A0	06304A30	00004110	00024100	001ED507
0037C0	14204122	200C8712	F0E4D204	D15ED100
0037E0	485C0002	4850F108	4740F132	8744F128
003800	42490008	46A0F17A	18AF48E0	D16412FF
003820	9502D167	076E4140	00FF9201	D1675830
003840	47F0F078	4A9C0002	0500900A	4780F0E4
003860	10004740	F1AED203	D1741008	5800D174
003880	41790000	188A9204	D16547E0	E1324180
0038A0	000C000E	00000026	00000480	00002940
0038C0	92000100	40000008	69000000	40000008
0038E0	1B001801	18CC43C2	000012CC	4780E01C
003900	18AA43A2	000443A0	D0264CA8	C0021BB8
003920	43020007	89000008	13FE07FF	18994390
003940	89C00004	1AC043DC	101E18A0	89000004
003960	D02E4740	E0484100	001046A0	E03241E0
003980	02052001	0024078E	41A00001	58B0D020
0039A0	43BBC000	06AA489B	C0021BB0	4A80D028
0039C0	00004C60	00000000	05B01220	078E5510
0039E0	181E112E	057080FF	70011883	186548C1
003A00	00001899	43910008	18AA41E0	704A0A06
003A20	005C0A03	8910000C	5A107026	0A0D0000
003A40	E906E509	00000000	05A03200	A00E41E0
003A60	00003A68	00000000	C9C5C7E3	E3D9D6E3
003A80	902047E0	9018D207	905E0038	4590901C
003AA0	0048D207	905C0040	58A00484	9500A01D
003AC0	903A94E0	904E58A0	904CD20E	A0009054
003AE0	00004780	FF06000E	0001E36C	0001E438
003B00	FF041003	400016E6	0001E550	0001E634
003B20	FF05100A	700050F4	000001F4	0001E5E0
003B40	0004100A	500022CE	00000148	00005008
003B60	0000000E	0001EC70	00005188	0C000000
003B80	FF051000	4001E80E	0001EC18	0001EC18
003BA0	FF05000C	0001E80E	0001EC40	08000000
003BC0	0004100A	50002164	FF000060	FFFFFFD0
003BE0	FF041000	60003778	00000000	0001E4A4
003C00	FF041001	4000378E	00000001	0001E4A0
003C20	FF060192	0000378E	00000000	04000000
003C40	FF06000C	0000378E	00000000	04000000
003C60	FF04100A	40002784	00000142	80000000
003C80	00000192	000010C0	0001E4A0	0C000000
003CA0	FF060192	00003382	00000000	04000000
003CC0	FF060192	00003382	0001E3A0	0C0000E4
003CE0	00041003	4000253A	FFFFFFFF	00004F58
003D00	FF05100A	70005042	000001F4	B0005040
003D20	0004100A	50002164	FF000080	FFFFFFC0
003D40	0004100A	700022CF	00000080	0001F4A8
003D60	0004100A	50002164	FF000060	FFFFFFD0
003D80	0004100A	700022CF	00000060	0001FD48
003DA0	0004100A	50002164	FF000060	FFFFFFD0
003DC0	0004100A	700022CF	00000060	0001FD48
003DE0	FF05100A	6901F5CA	00000048	0001FD60
003E00	FF05100F	690050E6	0001F550	00000000
003E20	FF041003	400016E6	0001F550	0001F634

182F4110	013C0A00	58F021DA	01F0F001
D1384780	20C441F0	0008074E	18F2183D
10009000	4780F10A	4720F18A	43210008
47F0F0A2	D2029008	10084341	00081440
18454440	F1CED200	900CD167	4340D166
078E5820	B02CD500	20040166	4720A168
A1E24144	00014240	D1669200	D16518FA
47F0F13A	95FF1000	4740F1AE	D5061001
4B00F214	47A0F07A	9504D165	4780F132
00011817	47F0F19C	02009000	10080001
3100015F	40000005	08000108	00000000
08000118	00000000	06000000	00000100
4A00D02E	41DD0010	46C0E010	45A0F0AC
43B20006	1AA84BA0	00281A0A	89000008
101018A9	410000FF	14004780	F02418C9
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43B80013	41C0000F	14BC05C0	58C0C024
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05701831	121F4770	70129801	602058F6
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D2079074	00209610	90769001	907C4190
50609054	42A09054	94309C54	D2039058
077B58A0	904841AA	0010554A0	90504740
50A09048	07FB43B7	00004190	00003B00
08000000	8FA00002	48B00008	16AB40AD
0004100A	700022CF	00000080	00J1F4A8
FF051003	7000240A	FFFFFFFF	00004F60
FF051000	4001F98A	0001EC48	0001EC48
FF05000E	0001F98A	0001EC78	08000000
0000000C	0001EC38	0001EC78	08000000
FF051006	70004E52	FFFFFFFF	00004F58
00041004	4000268C	FFFFFFFF	00002934
00000192	000010C0	0001EC40	08000000
FF06000E	0000378E	00000000	04000000
00000192	000010C8	00000000	04000000
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FF041000	4000335E	0000003C	0001F3A4
FF041001	40003382	00000001	0001F3A0
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0004100A	400028CA	00000200	0001F328
0004100A	700022CF	00000060	0001FD48
FF05100F	70005062	000001F4	0001F634
FF041003	400016E6	000001F4	00000000
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00041003	4000253A	0001F550	0001F628
FF05100A	6901F582	00000048	A901F580
FF051003	6900240A	0001F550	0001F630
0004100A	50002164	FF000080	FFFFFFC0
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003E40	FF05100A	700050F4	000001F4	0001F5E0
003E60	0004100A	500022CF	00000148	00005008
003E80	0000000F	0001FC70	0001F3A0	0C0000E4
003EA0	FF051000	4001F80E	0001FC18	0001FC18
003EC0	FF05000C	0001F80F	0001FC40	08000000
003EE0	0004100A	50002164	FF000060	FFFFFFD0
003F00	FF041000	60003778	00000000	0001F4A4
003F20	FF041001	4000378E	00000001	0001F4A0
003F40	FF060192	0000378F	00000000	04000000
003F60	FF060192	0000378F	0001F4A0	0C000000
003F80	FF04100A	40002784	00000142	80000000
003FA0	00000192	000010C0	00000000	04000000
003FC0	FF060192	00003382	00000000	04000000
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004000	00041003	4000253A	FFFFFFFF	00004F58
004020	FF05100A	70005042	000001F4	80005040
004040	0004100A	50002164	FF000080	FFFFFFC0
004060	0004100A	700022CE	00000080	0001F4A8
004080	0004100A	50002164	FF000060	FFFFFFD0
0040A0	0004100A	700022CF	00000060	0001FD48
0040C0	0004100A	50002164	FF000060	FFFFFFD0
0040E0	0004100A	700022CF	00000060	0001FD48
004100	FF051000	4901F58E	00000048	8000018C
004120	00041004	4000268C	FF000060	00002934
004140	00000190	000010C0	0001F3A0	0C0000E4
004160	FF060190	00003382	00000000	04000000
004180	FF060190	00003382	0001F390	0C000000
0041A0	FF041000	7000335F	00000015	00002A5C
0041C0	00000190	000010C8	000010C8	0C000000
0041E0	00041003	6000253A	0001F7F0	0000297C
004200	FF041007	60002FFA	00003124	80002F74
004220	00041004	7000268C	00003124	00002934
004240	00000190	000010C0	00002A48	0C000000
004260	FF060190	00003382	00000000	04000000
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0043C0	FF051000	5001F8D2	FFFFFFFF	0001FC48
0043E0	FF051001	4001F8E0	00000001	0001FC44
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004420	FF051006	70004F52	FFFFFFFF	00004F58
004440	00041004	4000268C	FFFFFFFF	00002934
004460	00000192	000010C0	0001FC40	08000000
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00041004	4000268C	FFFFFFFF	00002934
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004B40	F0F0F040	40404040	40404040	40404015
004B60	40D6D540	F0F0C340	40404040	40404040
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LINE 004F20 SAME AS ABOVE
004F40  40404040 40404040 00000000 0000001F  00000000 0000001F 00000001 00000001
004F60  00388083 00000000 00000000 3702963C  40202020 68202020 F1F1F1F1 F1F1F1F1
004F80  40404040 40404040 F2F2F2F2 40404040  40404040 404040F3 6BF7F0F2 6BF9F6F3
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LINE 004FC0 SAME AS ABOVE
004FE0  40404040 40404040 40404040 40404040  40404040 40404040 00000000 00000000
005000  00000000 42204034 C2C1D2C5 D9404040  00290040 00005028 FF050006 690050A6
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005320	00814040	00704040	40404040	404040F0	F0F5F3F2	F0404040	40404040	F0F0F8F1
005340	40404040	40404040	F0F4F0F4	F0F4F040	4040C6F0	C6F4C6F0	C6F44040	40C6F0C6
LINES 005360-005380 SAME AS ABOVE								
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01F680	06000307	03001C40	00005110	003C0B00	00000000	00005028	00005028	0001F5F4
01F6A0	00000000	00000001	4000284C	000031E8	0E000000	00000000	00000000	00000000
01F6C0	03010001	0D03006C	080000E1	00000000	C5E2C6D6	D9E34040	00310428	00320100
01F6E0	00000000	02C00043	EC013200	00080000	0000C7C5	D6D9C7C5	40400020	0428002E
01F700	01000000	00003200	001E0001	88000008	00000000	00000000	00000003	01080100
01F720	3101E777	40000005	0801E720	00000000	9201E718	40000008	6901E5E4	40000008
01F740	0801E730	00000000	0601E618	00000100	7E000000	02000000	7E01E750	0001E750
01F760	0C000000	4001E720	0C01EED0	40000008	00000000	00000000	00000300	00000002
01F780	41220000	41A00008	182A9180	20004780	F036947F	200043A2	002E44A0	F03C4780
01F7A0	F0369288	202894CF	402C41A2	002850A2	001850A0	00004CD0	000023B8	00000180
01F7C0	0001ED68	0001E5D8	000024A8	80002400	FE000000	00005008	0001E810	0001E528
01F7E0	C9C7C7F0	F1F9C3C3	0006E010	0101E7E0	91202011	47E0E018	05022045	30014770
01F800	F0180204	302B2008	41130008	0A0007FE	0001E858	0001E7D8	C9C7C7F0	F1F9C3D2
01F820	0008E010	0101E828	077E4390	40424140	00081B9A	41A92000	58AA0000	D501A000
01F840	E02A077F	9601200C	96C0402C	96042000	07FE615C	07000700	0001E908	0001E810
01F860	C9C7C7F0	F1F9C3C2	0015E010	0101E870	90E6D014	186F1840	18515820	50445822
01F880	00009101	50304780	60845812	000C9140	10004710	602C4100	00010A01	12444740
01F8A0	603E8840	00034144	000347E0	60481344	88400003	41440083	41320028	94803004
01F8C0	50320018	96042000	42430000	41120008	0A009148	50284780	60764740	609091FE
01F8E0	50144740	60904112	00044100	00010A01	47E06090	41120004	5012000C	47E0602C
01F900	98E6D014	07FE0700	0001E990	0001E858	C9C7C7F0	F1F9C3C5	0010E010	0101E920
01F920	58403028	48503025	43603030	91C02024	4780E024	91402024	4780E024	4B50E022
01F940	41440008	91022024	4780E036	06504364	00004144	00015040	30304050	30364260
01F960	30304150	30305050	30189130	20124780	E064D200	302E2012	9240302C	92002012
01F980	96803000	41103008	0A0007FE	07000700	0001E9E8	0001E908	C9C7C7F0	F1F9C3D3
01F9A0	003AE010	0101E9A8	41220000	41A00008	182A9180	20004780	F036947F	200043A2
01F9C0	002E44A0	F03C4780	F0369288	202894CF	402C41A2	002850A2	001850A0	00484122
01F9E0	000807FF	91004020	0001E840	0001E990	C9C7C7F0	F1F9C2C1	002AE010	0201FA00
01FA00	90E8D014	188E5821	00085830	20445833	00004140	00014043	0024948F	20304103
01FA20	00085001	00105013	000C1855	91C01005	4740800C	91202011	47808044	91802030
01FA40	4780812A	96802030	58E0204C	43402040	1A435043	00189401	30009640	30001B44
01FA60	43402043	18741A43	91202011	47E08074	43502010	91C02024	478080A0	91402024
01FA80	47808080	91201025	47E08080	5861000C	1A65D201	30066000	48630006	47F08084
01FAA0	91801004	47108080	48610006	47F08084	4860203E	1A654064	0006D202	4001100D
01FAC0	50302044	05EE98E8	001407FF	43402042	18741A43	58E02048	94013000	96203000
01FAE0	91202011	47E08100	41030030	50330018	91082024	47108070	947E2030	47F08070
01FB00	94E04000	50430018	91401005	47108118	96024000	47F08074	960C4000	D2013024
01FB20	813C9640	203047E0	80741851	18120A19	18151855	5013000C	47F08044	FFFF0700
01FB40	0001EE60	0001E9E8	C9C7C7F0	F1F9C2C2	000DE010	0201E858	90E8D014	185F5821
01FB60	00085831	00101841	917F4000	4710504C	47405028	18144100	00010A01	47F05010
01FB80	18121803	48005008	90010040	41110000	0A3712EE	47805010	05EE9801	D0404111
01FBA0	00000A37	98E8D014	07FE0700	07000700	002E0800	E4E0E1C3	000CD072	00002D70
01FBC0	EE040033	40002E14	03A103A1	0001E530	00000048	8000018C	0001E630	00000002
01FBE0	00000008	00000002	00002388	00000080	0000003C	4000AC7A	0001E5E0	00000000
01FC00	6901E576	0001ED60	00002408	00000000	2101EC10	7E000000	00000000	7E004DE8
01FC20	0001EC40	08000000	4001EC38	0000D6C	00000000	00010000	02004EE8	20000050
01FC40	4101EC40	7E000000	00000000	7E004E88	0001EC78	08000000	4001EC70	00004D24
01FC60	00000000	00010000	88004E7C	40000093	11004E7C	20000078	00000EFC	00000EFC
01FC80	00000EFC	0001E828	00000EEC	00000000	00000000	00002AE0	0C000000	04000180
01FCA0	0401ECEC	48000000	00000000	01000000	00000000	0E004D6C	0201EC78	33001254
01FCC0	00010000	C2C2C2C1	C3D2C3C3	8000254E	3E000000	0001ED38	00000EFC	0001F9A8
01FCE0	00000EFC	00000EFC	00000EFC	00000000	00000000	00002AC0	0C000000	05000180
01FD00	0401EDEC	C8000000	0E000000	01000000	00000000	0E004D24	0201EC08	93001284
01FD20	00010000	C2C2C2C1	C3D3C3C5	C3C2306A	00003039	60002D70		
01FD60	EE05691C	0001E5E0	0001E550	0001E628	00004E58	00000002	00004C40	0001FF4C

01FD80	00002388	00000080	0000003C	4000AC7A	0001FE0C	00000000	70005038	0001F5E0
01FDA0	00002408	6901F550	0001F634	00000000	00000000	00000000	00000000	00000000
01FDC0	00000000	00000000	00000EEC	00000EEC	00000EEC	00000EEC	00000EEC	00000000
01FDE0	00000103	00000000	0E000000	00000180	00000000	40000000	00000000	01000000
01FE00	00000000	0E01FED0	94003550	580013EC	00000000	00030028	00020190	0001FE88
01FE20	00008E80	0001FE4C	800013EC	000030E8	0001FE74	00008E48	00000180	60002D70
01FE40	00000000	0001FE40	E7D9C1E8	40404040	0004E000	00005000	00000000	00000000
01FE80	00000000	00000000	FE054000	0001FE88	0001F5E0	00002408	70005028	FFFFFFFF
01FEA0	00004F58	0001FE1C	00000001	00004C40	0001FE4C	00002388	00000080	0000003C
01FEC0	4000AC7A	0001FE0C	0001FE4C	40004D00	00000000	00000000	00000000	00000000
01FEE0	00000000	00000000	00000000	00000000	00000000	00000000	00188000	0001FDEC
01FF00	12008000	00000000	00000000	0001FF14	00000000	C1C2D3C5	40404040	8001FF22
01FF20	00010000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
01FF40	00000000	00000000	00000000	D1D7D340	40404040	C7D6C7D6	40404040	40404040
01FF60	40404040	14040100	D1D6C2D3	C9C24040	00030900	800013EC	14000000	E2E8E2C1
01FF80	C2C5D5C4	00030A00	80001284	14000000	D7D9C9D5	E3C5D940	00040400	80001284
01FFA0	14000100	D9C5C1C4	C5D94040	00040700	80001254	00000000	00000181	00000000
01FFC0	0001FE88	00002408	40004CF0	00000030	0001FF1C	0000006C	00000181	00004C40
01FFE0	0001FE4C	00002388	00000080	0000003C	4000AC7A	0001FE0C	0001FE4C	00000180

END OF DUMP

```
COMPLETION CODE - SYSTEM=000  USER=0444
IEF285I    SYS1.JOBLIB                                    KEPT
IEF285I    VOL SER NOS= DLIB02.
IEF285I    SYSOUT                                         SYSOUT
IEF285I    VOL SER NOS=       .
IEF285I    SYSOUT                                         SYSOUT
IEF285I    VOL SER NOS=       .
```

ANSWERS TO

DEBUGGING CONCEPTS QUESTIONS

1. Requirements

   Need a "SYSABEND DD" card

   3 ways to initiate

   a. Issuing a "CANCEL jobname, DUMP?" command.

   b. Executing an "ABEND" id, DUMP" macro.

   c. Executing an operation that cause a program interrupt or violates OS requirements.

2. a. The user

   b. The 0444 is first positional parameter of the user's ABEND macro.

3. One should look at the TIOT

4. JOBLIB
   SYSABEND
   PRINTER
   READER

5. a. 1284

   b. 1254

   c. 1284

   d. 13FC

6. a. 00E

   b. 00C

   c. 00E

   d. 192

7. The DEB's in the DEB chain reflect opened data sets. Each of these DEB's points to a DCB. After "OPEN," the DCB points to the TIOT. From the TIOT one can determine the DD names associated with the data set. (The address is as close as one can get to identifying the data set from the dump).

8.

DEB	DCB	ddname in TIOT
1F45C	5150 (+16)	SYSABEND
1FC9C	4D6C (+16)	READER
1FCFC	4D24 (+16)	PRINTER
1FDEC	1FED0	JOBLIB

9. 4CD0 (obtained from bytes 128-131 of CVT).

10. 1FFFF (obtained from bytes 164-167 of CVT).

11. a. 176 bytes

    b. LPLB

    c. 40 bytes

    d. A001 and A002 are PRB's. A LPRB needs two extra words to facilitate the forward and backward chainning of the Load List.

12. a. It points to the address of an LPRB describing an entry identified via the IDENTIFY macro.

    b. Because the IDENTIFY macro was used in CSECT ABLE.

13. It is "b3" because there have been 3 less DELETES for CHARLIE than there were LOADS.

14. RB for A005

15. For SVC B (ABEND).

16. CHARLIE

17. No (If it had a ESA the RB would have been longer than 96 bytes).

18. 920 bytes (it goes into the svctransient area which is 1024 bytes in length.

19. 1024 bytes

20. 2D70 (Can determine this by looking at the Entry Point for any SVC routine).

21. a. The "PSW" is all zero's because no program has either used this module of if it was used it never was interrupted which would require storing of the Resume PSW.

    b. These can only operate under the RB of the module which calls L002-L008. These modules are branched to by a type 1 linkage.

22. These are all data management modules which were loaded because of an OPEN.

23. a. The programmer who produced the module (although) asembler For Testran can determine that the module have this attribute, it is the programmer who must assign it).

    b. Linkage Editor time (Parm field of the EXEX statement).

24. Start with the pointer to the CVT in location Hex 10. The first word in CVT points to the TCB. The forst wprd om tje TCB points to top RB of the list.

25. 1FE88

26. a. Into the second word.

    b. The High Save Area (HSA).

    c. 0001FE88.

27. a. "They" knew INFOFROMIDFIELDOF SAVE MACRO was the entry point because it was so specified in the SAVE macro in CSECT CHARLIE.

    b. The "00222" cane form the LINK macro in CSECT BAKER

28. a. Six.

    b. Operation, Addressing, Specification, Data, Fixed-point overflow significance.

    c. Hex 5110

    d. Module BAKER.

29. Location Hex 14 contains address 3ADB which is pointer to trace table description.

    Hex 4190 Last Entry
    Hex 3B00 Table Begin
    Hex 4780 Table End

    Table End - Table Begin = Hex C80 = 3200 bytes.
    AT 32 bytes/entry the table can hold 100 entries.

30. Bit 13=1
    Bit 16-19= 0001
    Result is that the last entry is an SVC 10. Register 1 contains and address at the top of core and not with in the limits of any RB so that is a FREEMAIN.

31. a. BASM

    b. 1FC40

    c. 1FC70

    d. Channel End

    e. 120

32. a. No. The contents of DCBBUFNO contains 00 in the DCB for the READER (location 4D80).

    b. F0 (location 4EF8).

```
  * * * A B D U M P  R E Q U E S T E D * * *

JOB JPL              STEP GOGO            DATE 66179                                                    PAGE 0001

COMPLETION CODE      USER = 0444

PSW UPON ENTRY TO ABEND FF050000 4901F5BE

TCB  000180            RB 01F4C8  PIE 01FDA8  DEB 01F45C        TIOT 01FF4C     CMP 0001BC      TRN 00000000
MSS  00003170    PK/FLGS 00910400       FLGS/LDP 00000000        LLS  01F528     JLB 01FED0      JSE 00000000
ID/FSA  0401FFB8       TCB 000000              TME 003184

PIE     PICA 0001F634  PSW 00000000 00000000  14 00000000  15 00000000  00 00000000  01 00000000  02 00000000


ACTIVE RBS

A001 004CD0  NM ABLE      SZ/STAB 006710C0  USE/EP 00004CF0  PSW FF050006 70004E52  Q 01FE60  WT/LNK 00000180  UB 005008

A002 005008  NM BAKER     SZ/STAB 00290040  USE/EP 00005028  PSW FF050006 690050A6  Q 000000  WT/LNK 00004CD0  UB 005150

A003 01F530  NM CHARLIE   SZ/STAB 00162040  USE/EP 0301F550  PSW FF05000D 4901F5BE  Q 000000  WT/LNK 00005008  UB 01F5E0

A004 01FBB0  NM SVC-401C  SZ/STAB 000CD072  USE/EP 00002D70  PSW FF040033 40002F14  Q A103A1  WT/LNK 0001F530
REGS 0-7     00000048  8000018C  0001F630  00000002  00000008  00000002  000023B8  00000080
REGS 8-15    0000003C  4000AC7A  0001F5E0  00000000  6901F576  0001FD60  00002408  00000000

A005 01F4C8  NM SVC-105A  SZ/STAB 000CD072  USE/EP 00002D70  PSW FF04000E 0001F36C  Q DF03DF  WT/LNK 0001FBB0
REGS 0-7     000000E0  00005148  00000878  40002D72  00000000  0001F098  00005150  80002EF0
REGS 8-15    00003170  0000521F  00020000  00000180  00000180  000051B8  50002F9A  0001F348


LOAD LIST

L001 01FF68  NM XRAY      SZ/STAB 0004E000  USE/EP 00005000  PSW 00000000 00000000  Q 000000  WT/LNK 00000000

L002 01FB48  NM IGG019BB  SZ/STAB 000DF010  USE/EP 0201F858                                          UB 01FBB0

L003 01F9F0  NM IGG019BA  SZ/STAB 002AF010  USE/EP 0201FA00                                          UB 01FB40

L004 01F998  NM IGG019CL  SZ/STAB 000AF010  USE/EP 0101F9A8                                          UB 01F9F8

L005 01F910  NM IGG019CE  SZ/STAB 0010F010  USE/EP 0101F920                                          UB 01F990

L006 01F860  NM IGG019CB  SZ/STAB 0015F010  USE/EP 0101F870                                          UB 01F908

L007 01F818  NM IGG019CK  SZ/STAB 0008F010  USE/EP 0101F828                                          UB 01F858

L008 01F7E0  NM IGG019CC  SZ/STAB 0006F010  USE/EP 0101F7F0                                          UB 01F810

L009 01F530  NM CHARLIE   SZ/STAB 00162040  USE/EP 0301F550  PSW FF05000D 4901F5BE  Q 000000  WT/LNK 00005008  UB 01F5E0
```

```
SAVE AREA TRACE

ABLE     WAS ENTERED                    AT EP ABLE

SA 0001FF88  WD1 00000181  HSA 00000000  LSA 0001FF88  RET 00002408   EP 40004CF0
00 00000030   01 0001FF1C   02 0000006C   03 00000181   04 00004C40   05 0001FF4C   06 00002388
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 0001FF4C   12 00000180

BAKER    WAS ENTERED, VIA LINK 00111, AT EP BAKER

SA 0001FE88  WD1 FF05400C  HSA 0001FF88  LSA 0001F5E0  RET 00002408   EP 70005028
00 FFFFFFFF   01 00004F58   02 0001FF1C   03 00000001   04 00004C40   05 0001FF4C   06 00002388
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 0001FF4C   12 40004D00

CHARLIE  WAS ENTERED, VIA LINK 00222, AT EP INFOFROMIDFIELDOFSAVEMACRO

SA 0001F5E0  WD1 00005150  HSA 0001FF88  LSA 0001FD60  RET 00002408   EP 6901F550
00 0001F550   01 0001F630   02 00004F58   03 00000002   04 00004C40   05 0001FF4C   06 00002388
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 00000000   12 70005038

ABLE     WAS ENTERED, VIA CALL

SA 0001FD60  WD1 FF05691C  HSA 0001F5E0  LSA 0001F550  RET 0001F628   EP 00004F58
00 00000002   01 00004C40   02 0001FF4C   03 00002388   04 00000080   05 0000003C   06 4000AC7A
07 0001FF0C   08 00000000   09 70005038   10 0001F5E0   11 00002408   12 6901F550

INCORRECT BACK CHAIN

SA 0001F550  WD1 47F0F020  HSA 1AC9D5C6  LSA D6C6D9D6  RET D4C9C4C6   EP C9C5D3C4
00 D6C6E2C1   01 E5C5D4C1   02 C3D9D600   03 90ECD00C   04 05C01821   05 41000048   06 4510C00A
07 0A0A50D1   08 00045010   09 00081801   10 58520000   11 5C420004   12 50520000

INTERRUPT AT 01F5BE

PROCEEDING BACK VIA REG 13

ABLE     WAS ENTERED, VIA CALL

SA 0001FD60  WD1 FF05691C  HSA 0001F5E0  LSA 0001F550  RET 0001F628   EP 00004F58
00 00000002   01 00004C40   02 0001FF4C   03 00002388   04 00000080   05 0000003C   06 4000AC7A
07 0001FF0C   08 00000000   09 70005038   10 0001F5E0   11 00002408   12 6901F550

CHARLIE  WAS ENTERED, VIA LINK 00222, AT EP INFOFROMIDFIELDOFSAVEMACRO

SA 0001F5E0  WD1 00005150  HSA 0001FF88  LSA 0001FD60  RET 00002408   EP 6901F550
00 0001F550   01 0001F630   02 00004F58   03 00000002   04 00004C40   05 0001FF4C   06 00002388
07 00000080   08 0000003C   09 4000AC7A   10 0001FF0C   11 00000000   12 70005038
```

Save Area provided by System

Save Area provided by ABLE

Save Area provided by BAKER

Save Area provided by CHARLIE

The Dump assumed that ABLE was entered & used this Save area because Word 5 (EP location of Save area) contains a valid address which falls within the boundary limits described by the Request Block for ABLE. This Save area was allocated from the top of core (from the free area) to satisfy a GETMAIN request. The allocated core storage is not cleared and therefore may contain the residual information.

REGISTER ENTRY TO ABEND

REG 0-7	00000048	800001BC	0001F630	00000002	00000008	00000002	00002388	00000080
REG 8-15	0000003C	4000AC7A	0001F5E0	00000000	6901F576	0001FD60	00002408	00000000
					CVT↑	Trace Table↑		
000000	00000000	0000051C	F0F0F5C1	0C0D0E17	00002388	00003AD8	00000000	00000000
000020	FF040001	4001F36C	FF050006	40000003	0000FF00	00000000	FF06000F	0001F36C
000040	0001F438	08000000	0001F428	00002388	6309109E	00000000	00040000	00000284
000060	00040000	00000346	00040000	000002FE	00020000	000000E2	00040000	0000025E
000080	01000007	00000000	00050000	00000000	00000000	00000000	00000000	00000000
0000A0	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
LINES 0000C0-000120 SAME AS ABOVE								
000140	00000000	00000000	00000000	00000000	00003134	00000000	00000000	00000000
000160	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
000180	0001F4C8	0001FDA8	0001F45C	0001FF4C	800001BC	00000000	00003170	00910400
0001A0	00000000	0001F528	0001FED0	00000000	00003170	000051A8	50002D72	00005188
0001C0	5000526E	50002002	00000001	00005200	00005150	0001F408	00005200	0001F348
0001E0	0000533C	0000533C	00000008	00000000	0401FFB8	00000000	00003184	0001FEE4
000200	0001FF24	60005706	00005DF8	6001FA0A	00000001	00002410	00005078	0001F0A0
000220	00002A40	0000338E	00000001	4000284C	00003592	00000180	00000000	0000207D
000240	0000203A	00002138	00002000	00001000	000019C8	00003A86	00003A70	00174700
000260	028096F0	025F9029	01D04700	028E5840	01800207	40100038	94FD4011	90A10180
000280	58900254	05B95850	024C47F0	0BC690A1	021CD207	04400038	47F00280	940F025F
0002A0	98290100	91F00268	47800448	98A1021C	82000440	90290100	91F00268	478002CE
0002C0	90A1021C	D2070440	001847F0	02E45890	048490A1	90305899	0000D207	90100018
0002E0	94FD9011	91800018	478002F2	582002F8	052247F0	029C0000	00001C58	0A0390A9
000300	01FC98CD	00285880	02509101	00290788	58A00184	12AA07CB	90C2A004	181A58A0
000320	100012AA	07CB9280	100098F0	A0008900	C0001200	078B50F0	002C41E0	02FC98AD
000340	01FC8200	00284700	03D6900F	04005890	02580589	18AA43A0	00239546	002347A0
000360	03EA9889	023C43A9	A000418A	A0001ABA	478003EA	58300010	58400484	58504000
000380	49A0025C	47A003DE	1E880202	02498000	9107B002	477003DE	96F00347	58600248
0003A0	05E6D400	03470022	477003B8	982E0408	95000482	478003BC	82000020	95FF0020
0003C0	47400388	90A10180	58A00180	D207A010	002047F0	044892FF	002247F0	034ED23F
0003E0	40300400	58C00244	07FC4810	00224110	1F008910	000C9888	04200A0D	00000000
000400	00000001	00005200	00005150	0001F408	00005200	0001F348	0000533C	0000533C
000420	00000008	00000000	00003170	000051A8	50002D72	00005188	5000526E	0001F348
000440	FF04000E	0001F36C	47000504	58C00180	D2070440	C0109500	C01C4770	047C5810
000460	01F89181	10004790	049A9029	01D05830	04A80523	98290100	47F0049A	96020441
000480	581001F8	91881000	4770049A	90290100	583004AC	05239829	01D098A1	01B0D201
0004A0	04B204B6	82000440	00001D84	00001C10	00000180	00000180	000004BA	048A04BA
0004C0	FF0004C0	FF0004C0	12114740	04EC48A0	04BCD201	1000A000	4010A000	401004BC
0004E0	92F00449	D70204B1	048107FE	131158A0	04C4D203	1000A000	5010A000	501004C4
000500	47F004F0	90290400	91400628	4770044C	902901D0	581004C0	12114740	053A5510
000520	04C4D203	04C01000	47700532	D20304C4	10004590	059E47F0	05144810	04BA4910
000540	048E4780	06144910	04BCD201	04BA1000	4770055A	D20104BC	10005820	10089101
000560	10034780	056E94FE	100347F0	06844190	053A5840	20084150	401A4860	50001266
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001E60	12114780	E04C9283	A0001814	5820E1CE
001E80	05E09130	502047C0	E0321821	18991811
001EA0	20004E05	00605CC9	E1621E1D	41220002
001EC0	47D0E046	5810E15E	5C00E156	5000E15A
001EE0	00508AD0	000113D0	5ED90000	5ED90004
001F00	150A4740	E0861E0A	1E1D4730	E08E1E1A
001F20	91802000	4710E0C0	90E55060	18A51812
001F40	E0D09110	200047C0	E0D09140	2008A710
001F60	4780E0E2	4710E0EE	96862000	47E0E0E6
001F80	41DD0000	12DD4780	E1325002	001C58A0
001FA0	55002064	4740E132	111018AE	0A0A18EA
001FC0	A00047CE	00004110	A0600703	A060A060
001FE0	0083D5EE	C6122138	00057E40	00001770
002000	05E01200	078E92EE	00205880	E02E9140
002020	42210000	96801000	18665068	000007EE
002040	08090A08	0C0D0E17	0F101819	111A1B1C
002060	1300292A	2B2C0214	15160220	022E0200
002080	0006C800	20380020	00002468	00222000
0020A0	E8001788	0014C800	16690016	A0000E98
0020C0	1E850000	08415861	01C45FB1	0200C171
0020E0	09C06007	064148E9	04015082	04805261
002100	02419909	01011BA6	01021E1E	08C242A1
002120	0AC15CE9	06806007	0CC1D401	0980E007
002140	02075010	00204180	000758A0	0248148A
002160	13000A0A	12EE4780	C04858E0	40189602
002180	50A0100C	40801008	92C0100A	92621008
0021A0	07E248A0	025C1EAA	1EAA5EA0	C0D45860
0021C0	06B818D6	9869C008	88D00003	418007EE
0021E0	900E1000	50901000	15E84780	C08C18A5
002200	58605000	05E60A03	00000D0C	000020C4

00001A58	90A0E08A	18C041CC	00009180
00000EEE	9180C01D	4770E03E	9120C01D
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100C101C	5071006C	50110068	18775071
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5878000C	1E745078	000C47E0	E0AA5870
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4740D01A	5E40D062	5040D062	1E665060
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002280	12BB4770	C13AD203	40680D14	94BFA00B		15D44770	C1689640	401D1811	06100A0D
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002320	A0189823	10045850	024C58B0	C0D0186A		058B18C4	58C00244	18A61217	4780C254
002340	58E0A00C	50E00024	41E0C0CE	5800A000		91010021	4770C224	92000020	82000020
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0023A0	55708016	072A1377	07EA0000	0001FFFF		0A2807EE	00000000	00000480	000004C8
0023C0	00002940	00003580	00000000	000010E0		00002396	0000392C	000038E0	000011FA
0023E0	00001206	0000069A	00000000	00001868		0066179F	00004818	00004C60	00004C78
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002420	00001084	00001C36	000015E2	0000362C		000014E0	00001050	00004CD0	00003208
002440	00000448	000011E2	000004BA	00000000		00002472	00000000	00000180	0001FFFF
002460	00002380	00000000	05E018A0	188147E0		E0124700	E00A4190	000818E9	9140B600
002480	4710E032	91808000	4780E02A	58080000		9400D01C	50AB0000	96408000	947F8000
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002540	47C07080	02035004	30544580	71C60008		9600A00A	47F0706C	91C0200A	47707456
002560	02025010	20109180	20084780	70CA9680		5008943F	20084182	00009120	200A4710
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0025A0	71044108	00080A09	47E070E0	4580718C		47F07112	458071C6	000691E0	A00A4710
0025C0	744E9140	A0084710	710C47E0	704E10E0		54007480	160F9001	50004580	718C47F0
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002660	00105843	00005844	00041BEE	18634898		00004899	74968990	00104110	748C8799
002680	71E28799	71EA9200	10090A04	92801009		58607488	12FF8799	71F64770	74464780
0026A0	720C4160	75380200	600D026B	92F0026B		47F07210	9200600C	4186001C	50B60008
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0026E0	60208000	73AB5016	00001200	47A0725E		47F07282	800073AB	8799733E	58130054
002700	D2076010	A00D0203	601874AC	41060018		902A610C	58B3005C	41D60040	05EB982A
002720	D19C18EE	12FF4770	743E8799	73549102		60324780	74425886	00348880	000841C0
002740	00109108	60324770	72A641C0	00201B0D		91206032	478072BC	43060031	41DD0003
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0027A0	50C60010	92FF6010	4A007294	06008800		00038799	73100600	400A0008	D207A000
0027C0	601C9102	60284780	73280202	60014029		91016028	47807336	D2026001	30098000
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002860	59507484	478073C8	88900001	47E07384		9610A00A	58B0747C	D2078000	A000D202
002880	A00D6015	91C06032	478073E8	9610A00B		91FF600C	47807402	D2000268	600D9130
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0028C0	60321816	5800748C	0A0A4780	742E4100		74881811	0A088799	8002581A	001841F0
0028E0	773805EF	0A0341FE	010041EE	010041EF		010041EE	010041EE	00FE41EE	010141EE
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002980  00000000  01000000  00000000  0F002940  04003550  C000132C  00000017  00000052
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002A20  31002A7F  60000005  08002A20  00000000  08002A40  60000005  9E002A87  A0000008
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LINES 002B00-002B80 SAME AS ABOVE
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Boundary Box (boxed: 0001FE40 00004CD0 00020000)

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0030C0	581A0008	5810C3AA	194147A0	C382F384	D14C4000	DC07D14C	C2A8D207	6000D14C
0030E0	41440004	41880001	18674690	C346504D	013C07F5	D203D14C	4000414D	014C47F0
003100	C35C0008	16213846	515CF0F1	F2F3F4F5	F6F7F8F9	C1C2C3C4	C5C65040	00000004
003120	00000020	FFFFFFF0	D3C9D5C5	F240F2C1	D4C540C1	F240C1C2	D6E5C5D9	C5C7F240
003140	C1E340C5	D5E309F8	40F3D640	C1C2C5D5	C4D9C5C7	40F060F7	D9C5C740	F860F1F5
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0032C0	18114319	00158910	00024010	303645C0	423045C0	41425078	0000D200	8007900B
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003300	50703020	47F0410A	58190020	88100008	1A175010	30209206	3020D201	3026901B
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003340	92063030	D2023035	439A41C0	4182D206	30503065	92003038	4110303C	0A0080FF
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003380	0A019120	3038071C	41F0000F	07FF91FF	30984710	431045C0	41E6D203	30344399
0033A0	91023098	47104292	91013098	471041AA	41F0000D	07FF9104	30984780	418A9200
0033C0	302492FF	3098581D	30A04117	10001821	45C04264	4A2030A6	45C04264	50103020
0033E0	92063020	D2023025	30A59203	301047F0	413E4810	304A1211	078C4120	01001821
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003420	91013098	471041AA	91043098	47104310	41B03028	45C04234	47F0413E	41B03030
003440	50B03010	92083010	07FC909F	307C5815	00005811	002C4120	306458F0	426005EF
003460	D200305C	3064989F	307C07FC	0000392C	18AD46A0	427091FF	9010078C	907A307C
003480	18725880	00105888	00181B99	05A84730	428C41F0	000E07FE	987A307C	07FC4110
0034A0	30A81801	4A00309F	41110004	91F01000	477042EC	58210000	41272000	45C04264
0034C0	1BAA50A0	3070940F	100043A1	000088A0	00024180	30731BBA	44A04304	58C03070
0034E0	91021000	478042F2	1BC747F0	42E41AC7	50C03070	44A0430A	18B14111	00041910
003500	47804214	91018000	471042A0	47F0429C	D2008000	2000D200	20008000	1BFF06DE
003520	91209016	4780432E	D2077000	50009110	90164780	432E9640	70009120	90174710
003540	433C5819	001C1A71	50750014	07FE0000	00003564	00003592	00003592	0000358C
003560	00003592	18CC43C7	003041CC	000142C7	0030D500	30107030	07CE89C0	000441CC
003580	3020D205	7031C004	47FE0008	D2002020	703007FF	60000005	089E0000	00A00000
0035A0	08060000	00200001	00000000	00000000	C14F92F0	80004830	21144B30	C19F4720
0035C0	C03A4130	003492F1	80004030	2114D277	80028001	00050500	C83245B0	000035E4
0035E0	800092F1	00000000	00000000	00000000	00000000	01000000	00000000	0F0035B0
003600	000010F0	1000132C	00000001	0000000C	00090078	00050400	00030077	0F000000
003620	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
003640	0F00362C	000010F0	0000132C	00000067	00050067	00090005	00003628	00000000
003660	00000000	00000000	05C08000	C1EB1820	18314100	01784510	C0100A0A	18D11213
003680	47A0C058	1311D203	D168C234	D207D16C	20004100	D16845E0	C05E12FF	4720E01A
0036A0	181BD203	8000D174	180158F0	805445EF	00041BFF	182F4100	0178181D	0A0A18F2
0036C0	0A0341E0	C04A1802	05F01B22	5020D164	12B14720	F02A9202	D1675820	F1DE5822
0036E0	00045882	00281288	4720F02A	58B0F1E2	9201D167	18C0906B	D000980B	F1E61E0D
003700	1E2D1A4D	1A8D1AAD	900BD108	18004120	D1384150	D1081888	9008D138	9202D13C
003720	986BD000	417C0004	4A0C0000	4780F1C4	182C9200	200E4A2C	00024600	F068488C
003740	00001800	43000166	5810802C	4120D15C	1830908F	D00041F0	F26205EF	98BF3000

003760	189718A8	50B0D150	5A90F1FE	5090D120		182F4110	013C0A00	58F021DA	91F0F001
003780	47102004	4110D138	41000001	0A019160		D1384780	20C441F0	0008074E	18F2183D
0037A0	06304A30	D0004110	D0024100	001ED507		10009000	4780F10A	4720F18A	43210008
0037C0	14204122	200C8712	F0E40204	D15ED100		47F0F0A2	D2029008	10084341	00081440
0037E0	485C0002	4850E1D8	4740F132	8744F128		18454440	F1CED200	900CD167	43400166
003800	42490008	46A0F17A	18AF48F0	D16412FF		078E5820	B02CD500	20040166	4720A168
003820	95020167	076F4140	00FF9201	D1675830		A1E24144	00014240	D1669200	D16518FA
003840	47F0F078	4A9C0002	9500900A	4780F0E4		47F0F13A	95FF1000	4740F1AE	D5061001
003860	10004740	F1AED203	D1741008	5800D174		4B00F214	47A0F07A	95040165	4780F132
003880	41790000	188A9204	D16547F0	F1324180		00011817	47F0F19C	D2009000	10080001
0038A0	000C000E	0000026A	00000480	00002940		3100015F	40000005	08000108	00000000
0038C0	92000100	40000008	69000000	40000008		08000118	00000000	06000000	00000100
0038E0	180018D1	18CC43C2	000012CC	4780F01C		4A00D02E	41DD0010	46C0F010	45A0F0AC
003900	18AA43A2	000443A0	D0264CA8	C0021B88		43820006	1AAB4BA0	D0281A0A	89000008
003920	43020007	89000008	18FE07FE	18994390		101018A9	410000FF	14D04780	F02418C9
003940	89C00004	1AC043DC	101F18A0	89000004		1AD18800	00084202	00078800	00084B00
003960	D02E4740	F04841DD	001046A0	F03241F0		000407FF	18FE189A	4A00002F	42920000
003980	02052001	0024078E	41A00001	58B0D020		43B80013	41C0000F	14BC05C0	58C0C024
0039A0	438BC000	06AA489B	C0021B80	4A80D028		1DA942A2	00064AB0	00264282	000407FE
0039C0	00004C60	00000000	05801220	078E5510		B00E47B0	B01A0A03	00FFFFFF	003492F1
0039E0	181F112E	057080FF	70011883	186548C1		000288C0	000289C0	000241CC	100858CC
003A00	00001899	43910008	18AA41F0	704A0A06		05701831	121F4770	70129801	602058F6
003A20	005C0A03	8910000C	5A107026	0A0D0000		00003A3C	00000000	80000000	C9C5E6E2
003A40	E9D6E5D9	00000000	05A08200	A00F41F0		A0160A06	0A034720	FF040000	00003A4E
003A60	00003A68	00000000	C9C5C7E3	E3D9D6E3		02079074	00209610	90769001	907C4190
003A80	902047F0	9018D207	905E0038	4590901C		50609054	42A09054	94309054	D2039058
003AA0	0048D207	905C0040	58A004B4	9500A01D		077B58A0	904841AA	001055A0	90504740
003AC0	903A94F0	904F58A0	904CD20F	A0009054		50A09048	07FB43B7	00004190	00003B00
003AE0	00004780	FF06000E	0001F36C	0001F438		08000000	8FA00002	48B0D008	16AB40AD
003B00	FF041003	400016E6	0001F550	0001F634		0004100A	700022CF	00000080	0001F4A8
003B20	FF05100A	700050F4	000001F4	0001F5E0		FF051003	7000240A	FFFFFFFF	00004F60
003B40	0004100A	500022CF	00000148	00005008		FF051000	4001F98A	0001FC48	0001FC48
003B60	0000000E	0001FC70	00005188	0C000000		FF05000E	0001F98A	0001FC78	08000000
003B80	FF051000	4001F80F	0001FC18	0001FC18		0000000C	0001FC38	0001FC78	08000000
003BA0	FF05000C	0001F80E	0001FC40	08000000		FF051006	70004E52	FFFFFFFF	00004F58
003BC0	0004100A	50002164	FF000060	FFFFFFD0		00041004	4000268C	FFFFFFFF	00002934
003BE0	FF041000	60003778	00000000	0001F4A4		00000192	000010C0	0001FC40	08000000
003C00	FF041001	4000378E	00000001	0001F4A0		FF06000E	0000378E	00000000	04000000
003C20	FF060192	0000378E	00000000	04000000	Trace Table	00000192	000010C8	00000000	04000000
003C40	FF06000C	0000378E	00000000	04000000		FF060192	0000378E	0001F4A0	0C000000
003C60	FF04100A	40002784	00000142	80000000		FF041000	4000335E	0000003C	0001F3A4
003C80	00000192	000010C0	0001F4A0	0C000000		FF041001	40003382	00000001	0001F3A0
003CA0	FF060192	00003382	00000000	04000000		00000192	000010C8	00000000	04000000
003CC0	FF060192	00003382	0001F3A0	0C0000F4		0004100A	400028CA	00000200	0001F328
003CE0	00041003	4000253A	FFFFFFFF	00004F58		0004100A	700022CF	00000060	0001FD48
003D00	FF05100A	70005042	000001F4	B0005040		FF05100F	70005062	000001F4	0001F634
003D20	0004100A	50002164	FF000080	FFFFFFC0		FF041003	400016F6	000001F4	00000000
003D40	0004100A	700022CF	00000080	0001F4A8		FF051008	49005086	0000507A	00000000
003D60	0004100A	50002164	FF000060	FFFFFFD0		00041003	4000253A	0001F550	00000000
003D80	0004100A	700022CF	00000060	0001FD48		FF051006	690050A6	0001F550	0001F628
003DA0	0004100A	50002164	FF000060	FFFFFFD0		00041003	4000253A	0001F550	0001F628
003DC0	0004100A	700022CF	00000060	0001FD48		FF05100A	6901F582	00000048	A901F580
003DE0	FF05100A	6901F5CA	00000048	0001FD60		FF051003	6900240A	0001F550	0001F630
003E00	FF05100F	690050E6	0001F550	00000000		0004100A	50002164	FF000080	FFFFFFC0
003E20	FF041003	400016E6	0001F550	0001F634		0004100A	700022CE	00000080	0001F4A8

Trace Table Description

003E40	FF05100A	700050F4	000001F4	0001F5E0		FF051003	7000240A	FFFFFFFF	00004F60
003E60	0004100A	500022CF	00000148	00005008		FF051000	5001F98A	0001FC48	0001FC48
003E80	0000000E	0001FC70	0001F3A0	0C0000E4		FF05000E	1001F98A	0001FC78	08000000
003EA0	FF051000	4001F80E	0001FC18	0001FC18		0000000C	0001FC38	0001FC78	08000000
003EC0	FF05000C	0001F80F	0001FC40	08000000		FF051006	70004E52	FFFFFFFF	00004F58
003EE0	0004100A	50002164	FF000060	FFFFFFD0		00041004	4000268C	FFFFFFFF	00002934
003F00	FF041000	60003778	00000000	0001F4A4		00000192	000010C0	0001FC40	08000000
003F20	FF041001	4000378E	00000001	0001F4A0		FF06000E	0000378E	00000000	04000000
003F40	FF060192	0000378E	00000000	04000000	Trace Table	00000192	000010C8	00000000	04000000
003F60	FF060192	0000378F	0001F4A0	0C000000		FF04000C	000037DA	00000000	04000000
003F80	FF04100A	40002784	00000142	80000000		FF041000	4000335E	0000003C	0001F3A4
003FA0	00000192	000010C0	00000000	04000000		FF041001	40003382	00000001	0001F3A0
003FC0	FF060192	00003382	00000000	04000000		00000192	000010C8	00000000	04000000
003FE0	FF060192	00003382	0001F3A0	0C0000E4		0004100A	400028CA	00000200	0001F328
004000	00041003	4000253A	FFFFFFFF	00004F58		0004100A	700022CF	00000060	0001FD48
004020	FF05100A	70005042	000001F4	80005040		FF05100E	70005062	000001F4	0001F634
004040	0004100A	50002164	FF000080	FFFFFFC0		FF041003	400016E6	000001F4	00000000
004060	0004100A	700022CE	00000080	0001F4A8		FF051008	49005086	0000507A	00000000
004080	0004100A	50002164	FF000060	FFFFFFD0		00041003	4000253A	0001F550	00000000
0040A0	0004100A	700022CF	00000060	0001FD48		FF051006	690050A6	0001F550	0001F628
0040C0	0004100A	50002164	FF000060	FFFFFFD0		00041003	4000253A	0001F550	0001F628
0040E0	0004100A	700022CE	00000060	0001FD48		FF05100A	6901F582	00000048	A901F580
004100	FF051000	4901F58E	00000048	80001B8C		0004100A	50002164	FF000060	FFFFFFD0
004120	00041004	4000268C	FF000060	00002934		00041000	7000335E	0000002D	0001F3A4
004140	00000190	000010C0	0001F3A0	0C0000E4		FF041001	40003382	00000001	0001F3A0
004160	FF060190	00003382	00000000	04000000		00000190	000010C8	00000000	04000000
004180	FF060190	00003382	0001F390	0C000000	Last Entry	0004100A	400028CA	00000200	0001F328
0041A0	FF041000	7000335E	00000015	00002A5C		00000190	000010C0	00002A48	0C000000
0041C0	00000190	000010C8	000010C8	0C000000		FF040190	30003374	00002A48	0C000000
0041E0	00041003	6000253A	0001F7F0	0000297C		0004100A	700022CE	00000060	0001F8B0
004200	FF041007	60002FEA	00003124	80002F74		0004100A	50002164	FF000060	FFFFFFD0
004220	00041004	7000268C	00003124	00002934		00041000	7000335E	00000024	0001F654
004240	00000190	000010C0	00002A48	0C000000		FF041001	40003382	00000001	0001F650
004260	FF060190	00003382	00000000	04000000		00000190	000010C8	00000000	04000000
004280	FF060190	00003382	0001F640	0C000000		0004100A	400028CA	00000200	0001F5D8
0042A0	00041003	4000253A	00003124	80002F74		0004100A	700022CE	00000060	0001F8B0
0042C0	FF041000	50002FDE	00003124	00005120		00000190	000010C0	0001F640	0C000000
0042E0	FF041001	50002FE8	00000001	0000511C		FF060190	10002FF8	00000000	04000000
004300	00000190	000010C8	00000000	04000000		FF060190	10002FE8	00005190	0C000000
004320	FF04100A	4000306C	000001E8	00005008		FF041000	50002FDE	000001E8	00005308
004340	00000190	000010C0	00005190	0C000000		00000190	000010C8	000010C8	0C000000
004360	FF041001	50002FE8	00000001	00005304		FF060190	10002FE8	00005378	0C000000
004380	FF04100A	4000306C	000001F8	000051F0		FF04100A	40002DA6	00000038	00005308
0043A0	FF041003	40002DAA	00000038	00005308		0004100A	700022CE	00000090	0001FD38
0043C0	FF051000	5001F8D2	FFFFFFFF	0001FC48		1000000E	0001FC68	00005378	08000000
0043E0	FF051001	4001F8F0	00000001	0001FC44		FF051000	4001F80E	0001FC18	0001FC18
004400	0000000C	0001FC38	00005378	08000000		FF05000C	0001F80E	0001FC40	08000000
004420	FF051006	70004F52	FFFFFFFF	00004F58		0004100A	50002164	FF000060	FFFFFFD0
004440	00041004	4000268C	FFFFFFFF	00002934		FF041000	60003778	00000000	0001F754
004460	00000192	000010C0	0001FC40	08000000		FF041001	4000378E	00000001	0001F750
004480	FF060192	0000378F	00000000	04000000		00000192	000010C8	00000000	04000000
0044A0	FF060192	0000378E	0001F750	0C000000		FF04100A	40002784	00000142	80000000
0044C0	FF04000C	000032E0	00000000	04000000		FF041000	4000335F	0000003C	0001F654
0044E0	00000192	000010C0	00000000	04000000		FF041001	40003382	00000001	0001F650
004500	FF060192	00003382	00000000	04000000		00000192	000010C8	00000000	04000000

Trace Table

004520	FE060192	00003382	0001E650	0C0000E4		0004100A	400028CA	0C000200	0001E5D8
004540	00041003	4000253A	FFFFFFFF	00004E58		0004100A	700022CE	00000060	0001ED68
004560	FE05100A	70005042	000001E4	B0005040		FE05100E	70005062	000001E4	0001E634
004580	0004100A	50002164	FE000080	FFFFFFC0		FE041003	400016E6	000001E4	00000000
0045A0	0004100A	700022CE	00000060	0001ED48		FE051008	49005086	0000507A	00000000
0045C0	0004100A	50002164	FE000060	FFFFFFD0		00041004	6000268C	0000507A	00002934
0045E0	FE04000F	000026E6	00000000	04000000	Trace Table	FE041000	60003778	00000000	000052CC
004600	00000192	0000100C0	00000000	04000000		FE041001	4000378E	00000001	000052C8
004620	FE060192	0000378E	00000000	04000000		00000192	0000100C8	00000000	04000000
004640	FE060192	0000378F	000052C8	0C000000		FE04100A	50002794	80000084	80000000
004660	FE041000	7000335F	00000030	000051CC		00000192	000010C0	000052C8	0C000000
004680	FE041001	40003382	00000001	000051C8		FE060192	00003382	00000000	04000000
0046A0	00000192	0000100C8	00000000	04000000		FE060192	00003382	00005188	0C000000
0046C0	0004100A	400028CA	00000200	00005150		00041003	6000253A	0001E550	00000000
0046E0	0004100A	700022CE	00000060	0001ED48		FE051006	69005046	0001E550	0001E628
004700	0004100A	50002164	FE000060	FFFFFFD0		00041003	4000253A	0001E550	0001E628
004720	0004100A	700022CE	00000060	0001ED48		FE05100A	6901E582	00000048	A901E580
004740	FE05100A	6901E5CA	00000048	0001ED60		FE051003	69002404	0001E550	0001E630
004760	FE05100E	690050E6	0001E550	00000000		0004100A	50002164	FE000080	FFFFFFC0
004780	00000000	00000000	94FE2000	96242000		91022000	4710F05C	91712000	4750F27A
0047A0	91082008	4710F052	91402008	4780F2A4		D2062009	705CD201	2002705A	91042008
0047C0	4710F332	94FE2001	D5017040	70334770		F0C89120	20084780	F2309497	200894EF
0047E0	200107FF	58D00010	58DD0070	18884387		00094C80	E36A1A0B	48A70016	8EA00002
004800	88A00002	43A70018	8AA00002	8EA00002		48BD2008	16AB40AD	000894BA	D00918A2
004820	189E58D0	001058E0	004405CE	032C0C46		07180136	02540462	05880E3A	0028063A
004840	092C0A96	0DB82F1A	91802002	4710F0DC		91A0201E	47C0F2EA	91102001	4710F282
004860	96012008	96042008	47F0F28A	96802008		47F0F28A	47F0F1DC	D206705C	2009D201
004880	705A2002	47F0F1FC	91102008	4710F000		96102008	47F0F1C0	910A201E	4710F0D0
0048A0	4500F344	9101A000	4780F128	9680201E		43D2001E	41DD0001	42D2001E	47F0F1C0
0048C0	91502012	4710F0D0	43D2001E	41DD0010		42D2001E	47F0F1C0	43070034	41DD0001
0048E0	42D70034	92007036	96042001	4500F352		4500F344	50A70044	47F0F180	4500F344
004900	96042001	9180A000	4710F24A	9507A000		4780F298	58DA0000	D2057031	D00045D0
004920	F3524AA0	F368D207	7044A000	91E7A000		4780F184	50A70044	92087044	4107003C
004940	50D20018	96012000	91082008	4710F1CE		91102001	078E9601	20005800	F36405CD
004960	47FE000C	910A201E	4710F0D8	43D2001E		41DD0001	42D2001E	91022003	4710F0C8
004980	96202008	96402008	96102001	96017006		4187004C	50870030	4500F352	94EF7040
0049A0	41870054	50870044	92167044	92207048		92047048	47F0F184	D2037033	7054948F
0049C0	20089102	704C47C0	F24A9208	200147F0		F1644307	00364100	00014207	00369104
0049E0	30084710	F2C6910A	70364700	F1649200		70364307	00344100	00014207	003447F0
004A00	F1649110	20014780	F28A924E	200447F0		F2985800	00100502	D0552015	4760F32A
004A20	940F2000	94EF2001	47F0F2C2	91012000		4710F28A	58000010	D5020055	20154760
004A40	F312943E	402C94DA	200047FE	00041838		43820020	89800004	41883020	D5007036
004A60	B00D47C0	F1644383	00094287	003647F0		F26A4302	001E41D0	00104202	001E9608
004A80	20089213	703C9220	70409201	70439610		20019601	700647F0	F1845800	00701888
004AA0	43870009	4C80E36A	1AD8917E	D0084780		F28A9101	20084710	F0F00203	20187040
004AC0	5530E360	477E0008	47F0F298	58A20008		41AA0000	48A0E368	07FD921A	703C9270
004AE0	70409205	704307F0	00003628	00000720		0008000A	00000000	58B00010	58B0B03C
004B00	5830B0AC	91408000	071F18AA	18CC58F0		F01C07FF	00002472	00360000	00320000
004B20	C9C5C1F0	F0F0C140	40C9D5E3	4009C5D8		404040F0	F0C540F0	F040F0F2	F0F040F4
004B40	F0F0F040	40404040	40404040	40404015		C9C5C6F2	F3F7C940	D9C5C1C4	C5D94040
004B60	40D6D540	F0F0C340	40404040	40404040		40404040	40404040	40404040	40404040
004B80	40404040	40404040	40404040	40404040		40404040	40404040	40404040	4040E0E0
004BA0	63108050	8100E2F3	C1D9E340	40404040		40404040	40400000	00005370	40000000
004BC0	00000000	00004C48	00000026A	00000000		0000026A	00000180	00000180	80004090
004BE0	02000000	7E004C14	00004C08	08000000		40004C00	00004BE0	00000000	00000000

004C00	09004820	2000002F	00000000	0C004C18		00000000	7F000000	00000000	00000000
004C20	12000000	00000000	00000000	00000000		0F004BE0	020010F0	0000123C	C24047F0
004C40	D1D7D340	40404040	00000001	FF6058D2		8000123C	8000123C	0000123C	0000123C
004C60	02080000	00001820	00CB000A	0E295114		14010219	30000000	47F0F008	41CC0002
004C80	18DD43DC	00009110	C0004710	F03C488A		00021100	41000001	88000005	4710F02E
004CA0	140B4780	F00418DD	43DC0001	18F91B99		47FDC000	48BA000C	54D0F048	47F0F01A
004CC0	0000000F	00000000	00000000	00000000	End of Nucleus				
004CC0						C1C2D3C5	40404040	00671CC0	00004CF0
004CE0	FF050006	70004E52	0001FF60	00000180		47F0F00A	04C1C2D3	C50090EC	D00C05C0
004D00	41000048	4510C008	0A0A50D1	00045010		00081801	581D0004	58110018	18214500
004D20	C02AE7D9	C1E84040	40404110	C3000A29		47F0C0C4	11481000	00000001	00004000
004D40	00000001	02000001	90000000	00400022		0001FCFC	9201FA00	0001FB58	07004ECA
004D60	00000078	28282828	4101FC40	0101F920		0001F920	00000078	0001F870	00410000
004D80	00000001	00504000	00000001	02004ECC		90000000	00542000	0001EC9C	1201FA00
004DA0	0001FB58	06004EC8	00000050	28282828		2101FC10	0101F7F0	0001F7F0	00000004
004DC0	00000001	4510C0D0	0E004D24	80004D6C		0A134110	C0244100	00011300	58E10054
004DE0	05EF0700	4510C0EC	7F000000	00800000		00004D6C	00004EE8	0001EC18	58E10008
004E00	58F0F030	05EF4110	C0E858E0	100858F0		E03405EF	0207C248	C2F8F273	C248C1F8
004E20	4F30C248	5030C258	F273C250	C1FC4F30	ABLE	C2505030	C25C4110	C2580700	45F0C150
004E40	00004E48	00000000	C2C1D2C5	D9404040		0A064700	006F0203	C27CC2F4	D276C27D
004E60	C27C5831	00004E30	C268D203	C27CC1F8		D203C288	C1FC0208	C294C270	DE08C294
004E80	C26B0700	4510C19C	7F000000	00200000		00004D24	00004F7C	0001EC48	58E10008
004EA0	58F0F030	05EF4110	C18858E0	100858F0		E03405EF	4110C024	91481011	47E0C1C4
004EC0	96101012	47F0C0E4	07FE07FE	4510C108		00004D24	80004D6C	0A14181D	58DD0004
004EE0	41000048	0A0A98EC	D00C92FF	D00C41F0		000007FE	00000000	F0F0F0F1	F0F0F0F1
004F00	40404040	40404040	40404040	40404040		40404040	40404040	40404040	40404040
LINE 004F20	SAME AS ABOVE								
004F40	40404040	40404040	00000000	0000001F		00000000	0000001F	00000001	00000001
004F60	00388083	00000000	00000000	3702963C		40202020	68202020	68202020	F1F1F1F1
004F80	40404040	40404040	F2F2F2F2	40404040		40404040	404040F3	68F7F0F2	68F9F6F3
004FA0	40404040	40404040	40404040	40404040		40404040	40404040	40404040	40404040
LINE 004FC0	SAME AS ABOVE								
004FE0	40404040	40404040	40404040	40404040		40404040	40404040	00000000	00000000
005000	00000000	42204034	C2C1D2C5	D9404040		00290040	00005028	FF050006	690050A6
005020	00000000	00004CD0	47F0F00A	05C2C1D2		C5D990EC	D00C05C0	410001F4	4510C008
00504C	0A0A50D1	00045010	000818D1	581D0004		58110018	18210205	D054C0D0	4110D054
005060	0A0E1881	18335A32	00005030	D0485A32		00044100	C04247F0	C04AC3C8	C1D9D3C9
005080	C5401811	0A085030	D04C4110	00481A10	BAKER	45F0C06C	0000509C	00000000	C3C8C1D9
0050A0	D3C9C540	0A064700	00DE1851	18991A9F		4780C096	4510C094	00140000	D4C1E740
0050C0	C8C1C440	C1D540C5	D9D9D6D9	0A23D203		20085000	41400008	1A2458AD	0004502A
0050E0	00181818	0A0E04C0	181D58DD	00044100		01F40A0A	98ECD00C	92FFD00C	41F00000
005100	07FF0000	00000000	09005110	47820700		4510C102	00250000	D7D9D6C7	D9C1D440
005120	C5D9D9D6	D96B40C1	C2C5D5C4	40C4E4D4		D740C6D6	D3D3D6E6	E2000A23	47F0C10C
005140	80000378	5810C108	0A0D0000	00000000		00000000	00000000	00000000	00000000
005160	00488300	00000001	00004000	00000001		00000001	54000000	002C0020	1001F45C
005180	9201F1F0	0001F348	070052EA	00000660		28282828	4101F400	0101F0B0	0001F0B0
0051A0	0000007D	00000001	00005150	00000000		00004CD0	0001A378	00000000	00019EE0
0051C0	40404040	40404040	40404040	5000526E		0001F348	00002214	00005200	0000005C
0051E0	000053A8	000051E0	9000306F	0000533C	ABDUMP	0000533C	00000008	40404040	40404040
005200	7F000000	40204040	00005150	00005320		0001F408	0033000E	98E0D158	12EE4780
005220	D096D27C	F000D16C	41FF007D	50FD015C		411F007D	191047C0	D0B618FE	40FD0168
005240	D203E000	D16841FE	000450F0	015C411D		00489220	100558F1	000858F0	F03005EF
005260	411D0048	58E01008	58F0E034	05FF4110		00014800	005C9560	D1704740	D0CE4720
005280	D0CC1A01	1A011A01	92400170	D277D171		D1704110	00381901	47A0D0EA	400D005C

```
0052A0   07F5481D 005E4111 00014010 005F92F1   D170D203 01D0012C 4F100150 F333D1E2
0052C0   015496F0 01E50201 D05CD130 47F0D060   98E00158 12EF0785 411F0004 191F0785
0052E0   47F00082 07C1C7C5 FFFF07FE 00000000   00000000 000052F0 000006D8 00060008
005300   00000000 F0F0F0F0 FFFFFFF0 00005300   00000000 0001F4C8 00002214 A0002E3E
005320   00814040 00704040 40404040 404040F0   F0F5F3F2 F0404040 40404040 F0F0F8F1
005340   40404040 40404040 F0F4F0F4 F0F4F040   4040C6F0 C6F4C6F0 C6F44040 40C6F0C6
LINES 005360-005380 SAME AS ABOVE
0053A0   4040C7F0 F1F9F0F2

01F080                                                           0001F180 000001A4
01F0A0   C9C7C7F0 F1F9C3C6 001CF010 0101F080   58503028 4860302E 91C02024 4780F020
01F0C0   91402024 4780F020 41550008 4860F01A   4140F0AC 4110F0CF 41000002 D5005000
01F0E0   40004780 F04E8740 F02C9148 20114710   F04A4140 F0CC47F0 F04F4140 F0AC4155
01F100   00014310 30305050 30304210 30304860   F0504060 30369130 20124780 F07CD200
01F120   302F2012 92002012 96803000 91482011   4710F09A 948F3030 D6003030 40014140
01F140   30305040 301847F0 F0A49640 302CD200   30284001 41103008 0A0007FE 400BF013
01F160   60184F03 F188F293 F398F4A3 F5A8F6B3   F788F8C3 F9C8C1D3 C2DBC3F3 E501E641
01F180   0001F1D8 0001F098 C9C7C7F0 F1F9C3D3   000AF010 0101F198 41220000 41A00008
01F1A0   182A9180 20004780 F036947F 200043A2   002F44A0 F03C4780 F036928B 202894CF
01F1C0   402C41A2 002850A2 001850A0 00484122   000807FE 9100402C 0001F330 0001F180
01F1E0   C9C7C7F0 F1F9C2C1 002AF010 0101F1F0   90E8D014 188F5821 00085830 20445833
01F200   00004140 00014043 002494BF 20304103   00085001 00105013 000C1855 91C01005
01F220   474080CC 91202011 47808044 91802030   4780812A 96802030 58F0204C 43402040
01F240   1A435043 00189401 30009640 30001844   43402043 18741A43 91202011 47E08074
01F260   43502010 91C02024 478080A0 91402024   47808080 91201005 47F08080 5861000C
01F280   1A65D201 30066000 48630006 47F08084   91801004 47108080 48610006 47F08084
01F2A0   4860203E 1A654064 00060202 4001100D   50302044 05EF98E8 001407FE 43402042
01F2C0   18741A43 58F02048 94013000 96203000   91202011 47F08100 41030030 50030018
01F2E0   91082024 47108070 947F2030 47F08070   94F04000 50430018 91401005 47108118
01F300   96024000 47F08074 960C4000 D2013024   813C9640 203047F0 80741851 18120A19
01F320   18151855 5013000C 47F08044 FFFFC700   00000000 0001F1D8 C9C7C7F0 F1F9C2C2
01F340   000DF010 0101F348 90E8D014 185F5821   00085831 00101841 917F4000 4710504C
01F360   47405028 18144100 00010A01 47F05010   18121803 48005008 9001D040 41110000
01F380   0A3712FF 47805010 05EF9801 D0404111   00000A37 98E8D014 07FE0700 07000700

01F400   4101F400 7F000081 40000000 7F005200   0001F438 08000000 4001F428 00005150
01F420   0001F430 00010000 13005320 40000081   01005329 20000078 00000FFC 0001F198
01F440   00000FFC 00000FFC 00000EFC 00000000   00000000 000028E0 0C000000 04000180
01F460   0401FC9C C8000000 0F000000 01000000   00000000 0F005150 0201F438 83001284
01F480   00010000 C2C2C2C1 C3D3C3C6 0000306A   00003039 60002D70

01F4C0                     002D0100 F3F0F5C1   000CD072 00002D70 FF04C00E 0001F36C
01F4E0   03F003F0 0001F880 000000E0 000051A8   00000878 40002D72 00000000 0001F098
01F500   00005150 80002EF0 00003170 0000521F   00020000 00000180 00000180 000051B8
01F520   50002F9A 0001F348 0001F7D8 000001A4   C3C8C1D9 D3C9C540 00162040 0301F550
01F540   FF05000D 4901F5BE 00000000 00005008   47F0F020 1AC9D5C6 D6C6D9D6 D4C9C4C6
01F560   C9C5D3C4 D6C6F2C1 F5C5D4C1 C3D9D600   90ECD00C 05C01821 41000048 4510C00A
01F580   0A0A50D1 0004501D 000818D1 58520000   5C420004 50520008 41400008 1A2458AD
01F5A0   0004502A 00185550 C0624770 C0480700   47F0C042 8000018C 5810C03E 0A0D181D
01F5C0   58D00004 41000048 0A0A98FC D00C92FF   D00C41F0 000007FE 00000002 00005028
01F5E0   00005150 0001FE88 0001FD60 00002408   6901F550 0001F550 0001F630 00004F58
01F600   00000002 00004C40 0001FF4C 00002388   00000080 -0000003C 4000AC7A 0001FF0C
01F620   00000000 70005038 00000001 00000002   00000002 09005110 47825028 40C10122
01F640   9E01F67F 10000008 0601F680 20000100   7F000000 02010000 7F01F650 0001F650
01F660   0C0000E4 4001F618 0001FED0 03000000   00000000 00000000 06000306 00000000
```

CHARLIE

[illegible]	[illegible]	[illegible]	00005110	003C0B00	00000000	00005028	00005028	0001F5F4
01F6A0	00000000	00000001	4000284C	000031E8	0E000000	0000000C	00000000	00000000
01F6C0	00010001	0D00006C	080000E1	00000000	C5E2C6D6	D9E34040	00310428	00320100
01F6E0	00000000	02C00043	EC013200	00080000	0000C7C5	D6D9C7C5	40400020	0428002E
01F700	01000000	000002C0	001E0001	88000008	00000000	00000000	00000003	01080100
01F720	3101E777	40000005	0801E720	00000000	9201E718	40000008	6901E5E4	40000008
01F740	0801E730	00000000	0601E618	00000100	7E000000	02000000	7E01E750	0001E750
01F760	0C000000	4001E720	0C01EED0	40000008	00000000	00000000	00000300	00000002
01F780	41220000	41A00008	182A9180	20004780	F036947E	200043A2	002E44A0	F03C4780
01F7A0	F0369288	202894CE	402C41A2	002850A2	001850A0	00004CD0	000023B8	00000180
01F7C0	0001ED68	0001E5D8	00002AB8	80002A0C	FE000000	00005008	0001E810	0001E528
01F7E0	C9C7C7E0	E1E9C3C3	0006E010	0101E7E0	91202011	47E0E018	D5022045	30014770
01F800	E0180204	302B2008	41130008	0A0007EE	0001E858	0001E7D8	C9C7C7E0	E1E9C3D2
01F820	0008E010	0101E828	077E4390	40424140	00081B9A	41A92000	58AA0000	D501A000
01F840	E02A077E	96012000	96C0402C	96042000	07EE615C	07000700	0001E908	0001E810
01F860	C9C7C7E0	E1E9C3C2	0015E010	0101E870	90E6D014	186E1840	18515820	50445822
01F880	00009101	50304780	60845812	000C9140	10004710	602C4100	00010A01	12444740
01F8A0	603E8840	00034144	000347E0	60481344	8B400003	41440083	41320028	94803004
01F8C0	50320018	96042000	42430000	41120008	0A009148	50284780	60764740	609091FE
01F8E0	50144740	60904112	00044100	0001CA01	47F06090	41120004	5012000C	47F0602C
01F900	98E6D014	07EE0700	0001E990	0001E858	C9C7C7E0	E1E9C3C5	0010E010	0101E920
01F920	58403028	4850302E	43603030	91C02024	4780E024	91402024	4780E024	4850E022
01F940	41440008	91022024	4780E036	06504364	00004144	00015040	30304050	30364260
01F960	30304150	30305050	30189130	20124780	E0640200	302E2012	9240302C	92002012
01F980	96803000	41103008	0A0007EE	07000700	0001E9E8	0001E908	C9C7C7E0	E1E9C3D3
01F9A0	000AE010	0101E9A8	41220000	41A00008	182A9180	20004780	F036947E	200043A2
01F9C0	002E44A0	E03C4780	F0369288	202894CE	402C41A2	002850A2	001850A0	00484122
01F9E0	000807EE	91004020	0001E840	0001E990	C9C7C7E0	E1E9C2C1	002AE010	0201EA00
01EA00	90E8D014	188E5821	00085830	20445833	00004140	00014043	0024948E	20304103
01EA20	00085001	00105013	000C1855	91C01005	4740800C	91202011	47808044	91802030
01EA40	4780812A	96802030	58E0204C	43402040	1A435043	00189401	30009640	30001844
01EA60	43402043	18741A43	91202011	47E08074	43502010	91C02024	478080A0	91402024
01EA80	47808080	91201005	47E08080	5861000C	1A650201	30066000	48630006	47F08084
01EAA0	91801004	47108080	48610006	47E08084	4860203E	1A654064	00060202	4001100D
01EAC0	50302044	05EE93E8	001407EE	43402042	18741A43	58E02048	94013000	96203000
01EAE0	91202011	47E08100	41030030	50030018	91082024	47108070	947E2030	47F08070
01EB00	94E04000	50430018	91401005	47108118	96024000	47E08074	960C4000	D2013024
01EB20	813C9640	203047E0	80741851	18120A19	18151855	5013000C	47E08044	FFFF0700
01EB40	0001EE60	0001E9E8	C9C7C7E0	E1E9C2C2	000DE010	0201E858	90E80C14	185F5821
01EB60	00085831	00101841	917E4000	4710504C	47405028	18144100	00010A01	47F05010
01EB80	18121803	48005008	90010040	41110000	0A3712EE	47805010	05EE9801	D0404111
01EBA0	00000A37	98E80014	07EE0700	07000700	002E0800	E4E0E1C3	000C0072	00002D70
01EBC0	EE040033	40002E14	03A103A1	0001E530	00000048	800001BC	0001E630	00000002
01EBE0	00000008	00000002	00002388	00000080	0000003C	4000AC7A	0001E5E0	00000000
01EC00	6901E576	0001ED60	00002408	00000000	2101EC10	7E000000	00000000	7E004DE8
01EC20	0001EC40	08000000	4001EC38	00004D6C	00000000	00010000	02004EE8	20000050
01EC40	4101EC40	7E000000	00000000	7E004E88	0001EC78	08000000	4001EC70	00004D24
01EC60	00000000	00010000	88004E7C	40000093	11004E7C	20000078	00000EEC	00000EEC
01EC80	00000EEC	0001E828	00000EEC	00000000	00000000	00002AE0	0C000000	04000180
01ECA0	0401ECEC	48000000	00000000	01000000	00000000	0E004D6C	0201EC78	33001254
01ECC0	00010000	C2C2C2C1	C3D2C3C3	80002540	3E000000	0001ED38	00000EEC	0001E9A8
01ECE0	00000EEC	00000EEC	00000EEC	00000000	00000000	00002AC0	0C000000	05000180
01ED00	0401EDEC	C8000000	0E000000	01000000	00000000	0E004D24	0201EC08	93001284
01ED20	00010000	C2C2C2C1	C3D3C3C5	C3C2306A	00003039	60002070		
01ED60	EE05691C	0001E5E0	0001E550	0001E628	00004E58	00000002	00004C40	0001EE4C

01FD80	00002388	00000080	0000003C	4000AC7A		0001FE0C	00000000	70005038	0001F5E0
01FDA0	00002408	6901F550	0001F634	00000000		00000000	00000000	00000000	00000000
01FDC0	00000000	00000000	00000EEC	00000EEC		00000EEC	00000EEC	00000EEC	00000000
01FDE0	00000103	00000000	0E000000	00000180		00000000	40000000	00000000	01000000
01FE00	00000000	0E01FED0	04003550	580013EC		00000000	00030028	00020190	0001FE88
01FE20	0000BE80	0001FE4C	800013EC	000030E8		0001FE74	0000BE48	00000180	60002D70
01FE60	00000000	0001E840	E7D9C1E8	40404040		0004E000	00005000	00000000	00000000
01FE80	00000000	07000000	FE054000	0001FE88		0001F5E0	00002408	70005028	FFFFFFFF
01FEA0	00004E58	0001FE1C	00000001	00004C40		0001FE4C	00002388	00000080	0000003C
01FEC0	4000AC7A	0001FE0C	0001FE4C	40004D00		00000000	00000000	00000000	00000000
01FEE0	00000200	00000000	00000000	00000000		00000000	00000000	00188000	0001FDEC
01FF00	12008000	00000000	00000000	0001FF14		00000200	C1C2D3C5	40404040	8001FF22
01FF20	00010000	00000000	00000000	00000000		00000000	00000000	00000000	00000000
01FF40	00000000	00000000	00000000	D1D7D340		40404040	C7D6C7D6	40404040	40404040
01FF60	40404040	14040100	D1D6C2D3	C9C24040	TIOT	00030900	800013EC	14000000	E2E8E2C1
01FF80	C2C5D5C4	00030A00	80001284	14000000		D7D9C9D5	E3C50940	00040400	80001284
01FFA0	14000100	09C5C1C4	C5D94040	00040700		80001254	00000000	00000181	00000000
01FFC0	0001FE88	00002408	40004CE0	00000030		0001FE1C	0000006C	00000181	00004C40
01FFE0	0001FE4C	00002388	00000080	0000003C		4000AC7A	0001FE0C	0001FE4C	00000180

END OF DUMP

```
COMPLETION CODE - SYSTEM=000  USER=0444
IEF285I    SYS1.JOBLIB                                   KEPT
IEF285I    VOL SER NOS= DLI802.
IEF285I    SYSOUT                                        SYSOUT
IEF285I    VOL SER NOS=       .
IEF285I    SYSOUT                                        SYSOUT
IEF285I    VOL SER NOS=       .
```

Appendix 16

DIRECT ACCESS ROUTINE (DAROUT)

A. Abstract

1. Program name - DAROUT (Direct Access Routine)

2. Purpose of the program - DAROUT is a program written for updating a data set on a DASD previously loaded with BSAM. Updating can be done randomly.

3. Machine configuration - System/360, working with the preliminary version BETA 1-J of the Operating System.

4. Check-out status - DAROUT was fully tested.

All questions regarding this program should be directed to the author. The Programming Systems Information Center should be copied on all correspondence.

B. Program Description

1. Purpose of the Program

   DAROUT - Direct Access Routine - was written as a program for updating a data set on a DASD. Updating can be done randomly for one data set.

2. Method

   a. The DAROUT program has to be placed by the user either into LINKLIB or a private library.

   b. Before each CALL macro issued for the DAROUT program, the user has to supply the specific I/O code, the track seek address and the updated data, if applicable, into previously defined fields.

      The DAROUT program expects the relative track seek address to be given at execution time and will OPEN, READ, WRITE, or CLOSE according to the specified I/O code and key.

3. Programming Requirements

   a. The data set to be updated with DAROUT must have been loaded previously with BSAM. It must have one extent only.

b. The user must either use a CALL macro to include the DAROUT load module at linkedit time or use a LOAD macro and a CALL macro to bring in the module at object time.

c. The user has to follow the standard linkage conventions. The entry point to DAROUT is DAENTRY.

d. The user has to define the standard sequential order of parameters in the parameter list, as specified below in Figures 1 and 2, which is passed on to the DAROUT program.

e. The user must build one buffer (BUFAREA) of fixed format F and of a length large enough to hold KEY+DATA, aligned to a double word boundary. For example, if the data area is 80 characters and includes a 5 character key, the buffer then has to be 85 characters.

f. The DAROUT program expects the following information to be prepared before issuing the CALL macro:

   1) Relative seek address.

   2) Operation to do (OPEN, CLOSE, READ, WRITE). The other parameters may be given initial value which will not be changed.

g. There are no restrictions on the length of the buffer (BUFSIZE); the length of the key (KEYSIZE) has to be $\leq$ 256.

h. Synonym keys are not allowed on the same track. Track synonyms for the track seek address are allowed.

i. The parameters passed on to DAROUT program by the CALL macro must be of the following form and coded in the same manner and sequence as listed.

1) Using COBOL

```
WORKING-STORAGE SECTION

77BUFSIZE VALUE...PICTURE S9(4)
          COMPUTATIONAL.
77KEYSIZE VALUE...PICTURE S9(4)
          COMPUTATIONAL.
77SEEKTRAK        PICTURE S9(3)
          COMPUTATIONAL-3.
77IOCODE PICTURE A.

01 BUFAREA.
     02    Pictures as on Disk
     02
     .
     .
     .
```

FIGURE 1

2) Using ASSEMBLER Language

```
BUFSIZE   DC XL n          (any length)
KEYSIZE   DC XL2'nn'       (length<256)
SEEKTRAK  DC PL3'000'      (for CCCH)
IOCODE    DS CL1           (for Read or Write
          DS OD                Open or Close)
BUFAREA   DS .             (any length for
             .                    Key+Data)
             .
             .
             .
```

FIGURE 2

j. Standard Calling Sequence

1) COBOL

DAROUT to be included at linkedit time:

```
ENTER LINKAGE
CALL DAENTRY USING BUFSIZE, KEYSIZE, SEEKTRAK,
IOCODE, BUFAREA.
```

2) ASSEMBLER

DAROUT to be included:

a) At linkedit:

```
anyname CALL DAENTRY, (BUFSIZE,KEYSIZE,
SEEKTRAK, IOCODE,BUFAREA)
```

OR

b) At execution time:

```
LOAD EP=DAROUT
L 15, 0
CALL (15), (BUFSIZE,KEYSIZE,SEEKTRAK,
           IOCODE,BUFAREA)
```

k. Before issuing the CALL-macro, the following data has to be prepared:

1) Relative seek address to be moved into the key area (first bytes of BUFAREA).

2) A specific constant to be moved to the field IOCODE.

l. The user must move the track seek address in packed format into the field SEEKTRAK as if his data set was to begin on track zero (0000).

Example: If the data set is contained on 1000 tracks, i.e. from 0000 to 0999, then when addressing the last track of this data set, the user has to fill in SEEKTRAK with the packed result of:

|0|9|9|9| , i.e., |00|99|9S|

1 byte 1 byte

The beginning address of the data set will be taken by DAROUT from the DSCB and added to it.

m. The constant giving the specific I/O-operation is as follows:

for	OPEN	hex. represent. of O i.e.,	'D6'
	CLOSE	C	'C3'
	READ	R	'D9'
	WRITE	W	'E6'

When calling for OPEN and CLOSE, the user need not fill in the track seek address and the key area, but all other parameters must be filled and passed.

D. Operating Procedures

In order to use the DAROUT program, the following is a pre-requisite:

1. Place the DAROUT program as a member of LINKLIB or a private library. Use the member name DAROUT.

2. Use DDDISK as the DD-name for the data set to be updated.

The following page gives a listing of the control cards needed to place DAROUT into a private library called TESTDA.

JOB CONTROL CARDS FOR PLACING DAROUT AS A

MEMBER OF THE PRIVATE LIBRARY TESTDA

```
//LINKEXEC JOB 0234,HUET,MSGLEVEL=1
//LINK  EXEC  PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSPRINT DD                    SYSOUT=A
//SYSUT1 DD  DSNAME=MYWORK,UNIT=ID,SPACE=(TRK,(10,10)),     C
//           DISP=(NEW,DELETE),LABEL=(,NL),                 C
//           VOLUME=       SER=(111111))
//SYSLMOD DD DSNAME=TESTDA(DAROUT),DISP=(OLD,KEEP),UNIT=ID, C
//           VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL)
//SYSLIN DD  *
IEF236I ALLOCATION FOR LINKEXEC LINK
IEF237I SYSPRINT ON 00E
IEF237I SYSUT1   ON 190
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 000
****MLEA OPTIONS SPECIFIED-NCAL,XREF
****MLEB**** DAROUT  NOW ADDED TO PARTITIONED DATA SET
                     ORGANIZATION AS A MEMBER.
```

E. DAROUT ERROR MESSAGES

MESSAGE	MEANING
'IO COMPLETED WITH ERROR'	Post code in ECB is not '7F'. The routine will process the next record unless there is an unrecoverable error for which IOS displays its own error message with sense and status flags.
'IOCODE INVALID. NOT R.W.C.O'	Initialization of IO code by the user is invalid.

F. SAMPLE

The sample consists of two parts:

1. PART 1 - Program ITLOAD. This program loads records used as test data to a DASD. It is documented by the symbolic cards, listing, and a listing of the control cards to load and execute this program which is a member of the private library TESTDA. Listing and card deck of the input records are included.

2. PART 2 - Program TESTROUT, to call the DAROUT program for updating the test data. This part is documented by the symbolic cards, listing and by the listing of the control cards to load and execute this program which is a member of the private library, TESTDA. Listing and card deck of the records to update are included. The TESTROUT program will, when executed, list each record before it is updated. This listing as well as a listing of the updated records is shown.

3. Data Preparation for Sample

   The format of the records to load to a DASD using ITLOAD as well as updating these records using DAROUT, called by TESTROUT is shown in Figure 3.

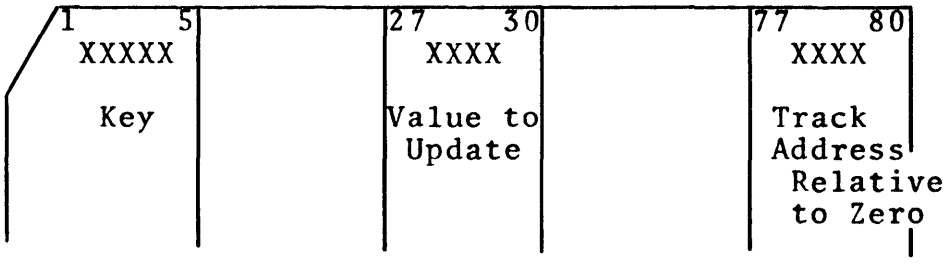


FIGURE 3

G. Listings

The following listings are attached:

1. Source listing of DAROUT.
2. Listing of control cards for linkedit DAROUT.
3. Source listing of ITLOAD.
4. Listing of control cards for linkedit ITLOAD.
5. Listing of control cards for execute ITLOAD.
6. Listing of input records to be loaded by ITLOAD.
7. Source listing of TESTROUT.
8. Listing of control cards for linkedit TESTROUT.
9. Listing of control cards for executing TESTROUT.
10. Listing of data records to be used as input for updating.
11. Listing of data records before updating by DAROUT.
12. Listing of data records after updating by DAROUT.

1. DAROUT SYMBOLIC LISTING

```
$JOB
MODE-ASSEMBLE
EXECUTE,ASSEMBLER
DAENTRY  START 0
         SAVE  (14,12)
         BALR  2,0
         USING *,2,3
         ST    13,MYSAV+4
         LA    13,MYSAV
         LM    4,9,0(1)            PUT PASSED ADDR IN REG 4 TO 9
         CLI   0(7),X'D6'          TEST IF OPEN
         BE    OPENME
         CLI   0(7),X'C3'         TEST IF CLOSE
         BE    CLOSEME
         B     RW                 TO READ-WRITE ROUTINE
OPENME   OPEN  (DCBREAD,(INPUT))   OPEN DISK DATA SET
         OPEN  (DCBWRITE,(OUTPUT))
         L     10,DCBREAD+44        ADDRESS OF DEB IN REG 10
         MVC   BEGINAD(6),36(10)    GET BBCCTT OF BEGINNING OF DATA
         MVC   DCBREAD+16(1),1(5)  INITIALIZE KEYLEN IN DCB
         MVC   DCBWRITE+16(1),1(5)INITIALIZE KEYLEN IN DCB
         MVC   SCHREAD+6(2),0(5)  MOVE KEYLEN TO
         MVC   SCHWRITE+6(2),0(5)       COUNT FIELDS OF FIRST CCW
         MVC   WORD2+2(2),0(4)
         L     12,WORD2             BUFSIZE IN REG 12
         MVC   WORD2+2(2),0(5)
         S     12,WORD2             SUBTRACT KEYSIZE FROM BUFSIZE
         STH   12,WRITOUT+6         STORE DATA LENGTH IN
         STH   12,READIN+6         COUNT FIELD OF LAST CCW
         ST    8,WORD
         MVC   SCHREAD+1(3),WORD+1  MOVE BUFAREA ADDRESS TO
         MVC   SCHWRITE+1(3),WORD+1 DATA ADDR FIELD OF FIRST CCW
         A     8,WORD2                ADD KEYSIZE TO BUFAREA ADDR
         ST    8,WORD
         MVC   READIN+1(3),WORD+1   MOVE ADDR OF DATA AREA TO
         MVC   WRITOUT+1(3),WORD+1  DATA ADDR FIELD OF LAST CCW
GOBACK   L     13,MYSAV+4
         RETURN (14,12)               RETURN TO CALLER
CLOSEME  CLOSE (DCBREAD)
         CLOSE (DCBWRITE)
         B     GOBACK
*********ROUTINE TO MOVE SEEKTRAK INFORMATION TO BBCCTTR OF IOB****
RW       MVC   BIN+7(1),2(6)
         CVB   11,BIN
         STH   11,CYLTRK+2
         MVO   PK,0(2,6)
         MVC   BIN+6(2),PK
         CVB   11,BIN
         STH   11,CYLTRK
         L     9,BEGINAD+2
         L     10,CYLTRK
         AR    10,9
         ST    10,RESULT+2
         CLI   RESULT+5,X'09'
         BH    EXIT
         B     GO
```

```
1.                          DAROUT SOURCE LISTING                          213
EXIT     LA    4,10
         SR    10,4
         ST    10,RESULT+2
         SRL   10,16
         LA    4,1
         AR    10,4
         STH   10,RESULT+2
GO       MVC   SKWRITE,RESULT
         MVC   SKREAD,RESULT
         CLI   0(7),X'D9'            TEST IF READ WANTED
         BNE   WRITE
         EXCP  IOBREAD               READ DISK
         WAIT  1,ECB=ECBREAD
         CLI   ECBREAD,X'7F'         CHECK FOR READ ERROR
         BNE   ERROR
         B     GOBACK
WRITE    CLI   0(7),X'E6'            TEST IF WRITE WANTED
         BNE   CODE                  TEST FOR INVALID IO CODE
         EXCP  IOBWRITE             DISK WRITE
         WAIT  1,ECB=ECBWRITE
         CLI   ECBWRITE,X'7F'        CHECK FOR WRITE ERROR
         BNE   ERROR
         B     GOBACK
CODE     WTO   'IOCODE INVALID.  NOT R W C D .'
         B     GOBACK
ERROR    WTO   'IO COMPLETED WITH ERROR'
         B     GOBACK
         DS    4F
DCBREAD  DCB   DSORG=DA,MACRF=(E),DDNAME=DDDISK,IOBAD=IOBREAD,     C
               DEVD=DA,KEYLEN=10
         DS    4F
DCBWRITE DCB   DSORG=DA,MACRF=(E),DDNAME=DDDISK,IOBAD=IOBWRITE,    C
               DEVD=DA,KEYLEN=10
         DS    OF
IOBREAD  DC    X'42'
         DC    X'00'
         DC    XL2'0'
         DC    X'00'
         DC    AL3(ECBREAD)
         DC    X'00'
         DC    XL7'0'
         DC    X'00'
         DC    AL3(SCHREAD)          ADDRESS OF CCW LIST
         DC    X'00'
         DC    AL3(DCBREAD)
         DC    X'00'
         DC    XL3'0'
         DC    X'0000'
         DC    X'0000'
         DC    X'00'
SKREAD   DC    XL6'0'                IOB BBCCTT BIN,CYL,TRACK
         DC    X'00'                 IOB R----RECORD
ECBREAD  DC    XL4'0'                ECB
SCHREAD  CCW   X'29',0,X'60',0       SEARCH KEY EQUAL
         CCW   X'08',*-8,X'00',0     TIC
READIN   CCW   X'06',0,X'20',0       READ DATA
IOBWRITE DC    X'42'
         DC    X'00'
         DC    XL2'0'
```

```
         DC    X'00'
         DC    AL3(ECBWRITE)
         DC    X'00'
         DC    XL7'0'
         DC    X'00'
         DC    AL3(SCHWRITE)        ADDRESS OF CCW LIST
         DC    X'00'
         DC    AL3(DCBWRITE)
         DC    X'00'
         DC    XL3'0'
         DC    X'0000'
         DC    X'0000'
         DC    X'00'
SKWRITE  DC    XL6'0'               IOB BBCCTT   BIN,CYL,TRACK
         DC    X'00'                IOB R----RECORD
ECBWRITE DC    XL4'0'
SCHWRITE CCW   X'29',0,X'60',0      SEARCH KEY EQUAL
         CCW   X'08',*-8,X'00',0    TIC
WRITOUT  CCW   X'05',0,X'20',0      WRITE DATA
         DS    H
BEGINAD  DC    XL6'0'
         DS    H
RESULT   DC    XL6'0'
WORD     DC    F'0'
BIN      DC    D'0'
CYLTRK   DC    F'0'
PK       DC    X'000C'
MYSAV    DS    18F
WORD2    DC    F'0'
         END   DAENTRY
PUNCH
```

2. CONTROL CARDS FOR LINKEDIT DAROUT

```
//LINKEXEC JOB 0234,HUET,MSGLEVEL=1
//LINK  EXEC  PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSPRINT DD DSNAME=PRTR,DISP=SYSOUT=A
//SYSUT1 DD   DSNAME=MYWORK,UNIT=ID,SPACE=(TRK,(10,10)),          C
//          DISP=(NEW,DELETE),LABEL=(,NL),                       C
//          VOLUME=(,,1,1,SER=(111111))
//SYSLMOD DD DSNAME=TESTDA(DAROUT),DISP=(OLD,KEEP),UNIT=ID,       C
//          VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL)
//SYSLIN DD  *
IEF2361 ALLOCATION FOR LINKEXEC LINK
IEF2371 SYSPRINT ON 00E
IEF2371 SYSUT1   ON 190
IEF2371 SYSLMOD  ON 190
IEF2371 SYSLIN   ON 00C
****MLEA OPTIONS SPECIFIED - NCAL,XREF
****MLEB**** DAROUT  NOW ADDED TO PARTITIONED DATA SET ORGANIZATION
                     AS A MEMBER
```

NOTE: DAROUT WILL BE A MEMBER OF THE PRIVATE LIBRARY TESTDA.

3. ITLOAD SOURCE LISTING

```
EXECUTE,ASSEMBLER
START   START   0
        SAVE    (14,12)
        BALR    2,0
        USING   *,2,3
        ST      13,MYSAV+4
        LA      13,MYSAV
        BUILD   POOLA,2,85
        BUILD   POOLB,2,80
        OPEN    (DCBIN,(INPUT),DCBOUT,(OUTPUT))
FIRST   GET     DCBIN,WORK+5
AGAIN   MVC     WORK(5),WORK+5
        PACK    ZONE+1(3),WORK+31(4)
        MVC     WORK+31(4),ZONE
        AP      CTR,ONE
        MVC     SAVIT,WORK+81
        GETBUF  DCBOUT,(5)
        MVC     0(85,5),WORK
        WRITE   DECBOUT,SF,DCBOUT,(5)
        CHECK   DECBOUT
        FREEBUF DCBOUT,(5)
        GET     DCBIN,WORK+5
        CLC     SAVIT,WORK+81
        BE      AGAIN
FULTRK  CLC     CTR,TWONE
        BNE     DUMY
        MVC     CTR,ZERO
        CLC     CTE,ONE
        BNE     AGAIN
        CLOSE   (DCBIN,,DCBOUT)
        L       13,MYSAV+4
        RETURN  (14,12)
DUMY    WRITE   DECBY,SD,DCBOUT,DUMKEY
        CHECK   DECBY
        AP      CTR,ONE
        B       FULTRK
EDC     AP      CTE,ONE
        B       FULTRK
ZONE    DC      CL4'
ONE     DC      P'1'
CTE     DC      P'0'
CTR     DC      PL2'+00'
SAVIT   DS      CL4
TWONE   DC      PL2'+21'
ZERO    DC      PL2'+00'
DUMKEY  DC      XL6'FFFFFFFFFFFF'
        DS      4F
DCBOUT  DCB     DSORG=PS,MACRF=(WL),DDNAME=DDOUT,DEVD=DA,          C
                 KEYLEN=5,RECFM=F,BLKSIZE=80,BUFNO=2,BUFCB=POOLA
        DS      OD
POOLA   DS      CL184
        DS      4F
DCBIN   DCB     DSORG=PS,MACRF=(GM),DDNAME=DDIN,DEVD=RD,          C
                 RECFM=F,LRECL=80,MODE=E,BLKSIZE=80,BFTEK=S,      C
                 BUFNO=2,BUFCB=POOLB,EODAD=EOC
        DS      OD
POOLB   DS      CL168
        DS      OD
WORK    DS      CL85
MYSAV   DS      18F
        END     START
PUNCH
```

4. CONTROL CARDS FOR LINKEDIT ITLOAD

```
//LINKEXEC JOB 0234,HUET,MSGLEVEL=1
//LINK  EXEC   PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSPRINT DD  DSNAME=PRTR,DISP=SYSOUT=A
//SYSUT1 DD    DSNAME=MYWORK,UNIT=ID,SPACE=(TRK,(10,10)),        C
//            DISP=(NEW,DELETE),LABEL=(,NL),                    C
//            VOLUME=(,,1,1,SER=(111111))
//SYSLMOD DD   DSNAME=TESTDA(ITLOAD),DISP=(NEW,KEEP),UNIT=ID,    C
//            VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL),          C
//            SPACE=(TRK.(50.,1))
//SYSLIN DD    *
IEF236I ALLOCATION FOR LINKEXEC LINK
IEF237I SYSPRINT ON OOE
IEF2371 SYSUT1   ON 190
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 000
****MLEA OPTIONS SPECIFIED - NCAL,XREF
****MLEB**** ITLOAD NOW ADDED TO PARTITIONED DATA SET ORGANIZATION
                  AS A MEMBER.
```

NOTE: ITLOAD WILL BE A MEMBER OF THE PRIVATE LIBRARY TESTDA.

5. CONTROL CARDS FOR EXECUTING ITLOAD

```
//ITLOAD  JOB  1234,ABC,MSGLEVEL=1
//JOBLIB  DD   DSNAME=TESTDA,UNIT=ID,DISP=(OLD,KEEP),                C
//            VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL)
//STEPA   EXEC PGM=ITLOAD
//DDDISK  DD   DSNAME=DATA,UNIT=ID,DISP=(OLD,KEEP),LABEL=(,SL),      C
//            VOLUME=(,,1,1,SER=(111111))
//OUTPUT  DD   DSNAME=PRTR,DISP=SYSOUT=A
//INPUT   DD   *
```

6. LISTING OF CARD INPUT RECORDS FOR ITLOAD

```
00001    0001    0000
00002    0001    0000
00011    0001    0001
00012    0001    0001
00021    0001    0002
00022    0001    0002
00031    0001    0003
00032    0001    0003
00041    0001    0004
00042    0001    0004
00051    0001    0005
00052    0001    0005
00061    0001    0006
00062    0001    0006
00071    0001    0007
00072    0001    0007
00081    0001    0008
00082    0001    0008
00091    0001    0009
00092    0001    0009
00101    0001    0010
00102    0001    0010
00111    0001    0011
00112    0001    0011
00121    0001    0012
00122    0001    0012
00131    0001    0013
00132    0001    0013
00141    0001    0014
00142    0001    0014
00151    0001    0015
00152    0001    0015
00161    0001    0016
00162    0001    0016
00171    0001    0017
00172    0001    0017
00181    0001    0018
00182    0001    0018
00191    0001    0019
00192    0001    0019
00201    0001    0020
00202    0001    0020
00211    0001    0021
00212    0001    0021
```

7. TESTROUT SOURCE LISTING

```
EXECUTE,ASSEMBLER
ZOOM     START   0
         SAVE    (14,12)
         BALR    2,0
         USING   *,2,3
         ST      13,SAVEAREA+4
AROUND   BUILD   POOL,4,80
         OPEN    (DCBCARD,(INPUT),DCBPRINT,(OUTPUT))
         LOAD    EP=DAROUT          LOAD DAROUT INTO CORE
         LR      15,0               ADDR OF ENTRY POINT TO REG 15
         ST      0,EPT              STORE ENTRY POINT TO EPT
         LA      13,SAVEAREA
         MVI     IOCODE,X'D6'       PREPARE FOR OPEN
AA       CALL    (15),(BUFSIZE,KEYSIZE,SEEKTRAK,IOCODE,BUFAREA) OPEN
AGAIN    GET     DCBCARD,WORK       GET RECORD
         MVC     BUFAREA(5),WORK    GET KEY
         PACK    SEEKTRAK,WORK+76(4)  INSERT TRACK SEEK ADDRESS
         MVI     IOCODE,X'D9'       PREPARE FOR READ
         LA      13,SAVEAREA
         L       15,EPT             LOAD ENTRY POINT ADDR TO REG 15
BB       CALL    (15),(BUFSIZE,KEYSIZE,SEEKTRAK,IOCODE,BUFAREA) READ
         MVC     MASKC,MASKD
         MVC     MASKA,BUFAREA
         MVC     MASKB,BUFAREA+5    PREPARE FOR PRINT
         ED      MASKC,BUFAREA+32 RECORD BEFORE UPDATING
         MVC     ADDRES+36(4),BUFAREA+81
         PUT     DCBPRINT,OUTPUT    PRINT
         AP      BUFAREA+32(3),VALUE  UPDATE BY ADDING
         LA      13,SAVEAREA
         L       15,EPT             LOAD ENTRY POINT ADDR TO REG 15
         MVI     IOCODE,X'E6'       PREPARE FOR WRITE
CC       CALL    (15),(BUFSIZE,KEYSIZE,SEEKTRAK,IOCODE,BUFAREA)CLOSE
         CLOSE   (DCBCARD,,DCBPRINT)
         L       13,SAVEAREA+4
         RETURN  (14,12)
         DS      4F
DCBCARD  DCB     DSORG=PS,MACRF=(GM),DDNAME=INPUT,DEVD=RD,MODE=E, C
                   RECFM=F,LRECL=80,BLKSIZE=80,BFTEK=S,BUFNO=2,   C
                   BUFCB=POOL,EODAD=ENDC CARD
         DS      OD
POOL     DS      CL328
         DS      4F
DCBPRINT DCB     DSORG=PS,MACRF=(PM),DDNAME=OUTPUT,DEVD=PR,       C
                   RECFM=F,LRECL=80,BLKSIZE=80,BFTEK=S,BUFNO=2,   C
                   BUFCB=POOL
WORK     DS      CL80
SAVEAREA DS      18F
BUFSIZE  DC      XL2'55'            X   FIELDS TO BE SET UP BY THE
KEYSIZE  DC      XL2'5'             X   USER IN THIS SEQUENCE ONLY.
SEEKTRAK DC      PL3'000'           X
IOCODE   DS      CL1                X
         DS      OD
```

TESTROUT SOURCE LISTING (Cont'd.)

```
BUFAREA  DS      CL85                X
         DS      OD                  X
OUTPRINT DS      OCL80
MASKA    DS      CL5
         DC      CL5' '
MASKB    DS      CL5
         DC      CL20' '
MASKC    DC      X'2020202020'
ADDRES   DC      CL40' '
DEPAK    DS      CL4
VALUE    DC      P'1'
EPT      DS      F
MASKD    DC      X'2020202020'
         END     ZOOM
PUNCH
```

8. CONTROL CARDS FOR LINKEDIT TESTROUT

```
//LINKEXEC JOB 0234,HUET,MSGLEVEL=1
//LINK  EXEC   PGM=LINKEDIT,PARM='NCAL,XREF'
//SYSPRINT DD  DSNAME=PRTR,DISP=SYSOUT=A
//SYSUT1 DD    DSNAME=MYWORK,UNIT=1D,SPACE=(TRK,(10,10)),          C
//            DISP=(NEW,DELETE),LABEL=(,NL),                      C
//            VOLUME=(,,1,1,SER=(111111))
//SYSLMOD DD   DSNAME=TESTDA(TESTROUT),DISP=(OLD,KEEP),UNIT=ID,    C
//            VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL)
//SYSLIN DD    *
IEF236I ALLOCATION FOR LINKEXEC LINK
IEF237I SYSPRINT ON 00E
IEF237I SYSUT1   ON 190
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 000
****MLEA OPTIONS SPECIFIED - NCAL,XREF
****MLEB****TESTROUT NOW ADDED TO PARTITIONED DATA SET ORGANIZATION
                    AS A MEMBER.
```

NOTE: TESTROUT WILL BE A MEMBER OF THE PRIVATE LIBRARY TESTDA.

9. CONTROL CARDS FOR EXECUTING TESTROUT

```
//TESTIN JOB    0234,ABC,MSGLEVEL=1
//JOBLIB DD     DSNAME=TESTDA,UNIT=1D,DISP=(OLD,KEEP),              C
//              VOLUME=(,,1,1,SER=(111111)),LABEL=(,NL)
//STEPA  EXEC   PGM=TESTROUT
//OUTPUT DD     DSNAME=PRTR,DISP=SYSOUT=A
//DDDISK DD     DSNAME=DATA,UNIT=ID,DISP=(OLD,KEEP),LABEL=(,SL),    C
//              VOLUME=(,,1,1,SER=(111111))
//INPUT  DD     *
IEF236I ALLOCATION FOR TESTIN STEPA
IEF237I  JOBLIB ON 190
IEF237I  OUTPUT ON 00E
IEF237I  DDDISK ON 190
IEF237I  INPUT  ON 00C
```

NOTE: 'TESTROUT' CALLS 'DAROUT'
DD-NAME DDDISK IS REQUIRED FOR THE DATA SET
TO BE UPDATED BY 'DAROUT'.

10. LISTING OF RECORDS USED FOR UPDATING WITH DAROUT

00031	00031	----1	0003
00041	00041	----1	0004
00062	00062	----1	0006
00072	00072	----1	0007
00071	00071	----1	0007
00081	00081	----1	0008
00082	00082	----1	0008
00091	00091	----1	0009
00101	00101	----1	0010
00111	00111	----1	0011
00112	00112	----1	0011
00121	00121	----1	0012
00122	00122	----1	0012
00131	00131	----1	0013
00032	00032	----1	0003
00011	00011	----1	0001
00132	00132	----1	0013
00141	00141	----1	0014
00142	00142	----1	0014
00102	00102	----1	0010
00152	00152	----1	0015
00151	00151	----1	0015
00182	00182	----1	0018
00161	00161	----1	0016
00162	00162	----1	0016
00171	00171	----1	0017
00172	00172	----1	0017
00181	00181	----1	0018
00191	00191	----1	0019
00021	00021	----1	0002
00022	00022	----1	0002
00192	00192	----1	0019
00201	00201	----1	0020
00202	00202	----1	0020
00211	00211	----1	0021
00212	00212	----1	0021
00051	00051	----1	0005
00052	00052	----1	0005
00092	00092	----1	0009
00061	00061	----1	0006
00001	00001	----1	0000
00002	00002	----1	0000
00012	00012	----1	0001
00042	00042	----1	0004

11. DATA RECORDS TO BE UPDATED WITH DAROUT

```
IEF236I ALLOCATION FOR TESTIN  STEPA

IEF237I JOBLIB  ON 190                    NOTE:  THIS PRINTOUT IS
                                                 PRODUCED BY TESTROUT.  IT
IEF237I OUTPUT  ON 00E                           SHOWS THE DATA RECORDS ON
                                                 DISK BEFORE THEY ARE UPDATED.
IEF237I DDDISK  ON 190

IEF237I INPUT   ON 00C
00031           00031                ----1                0003
00041           00041                ----1                0004
00062           00062                ----1                0006
00072           00072                ----1                0007
00071           00071                ----1                0007
00081           00081                ----1                0008
00082           00082                ----1                0008
00091           00091                ----1                0009
00101           00101                ----1                0010
00111           00111                ----1                0011
00112           00112                ----1                0011
00121           00121                ----1                0012
00122           00122                ----1                0012
00131           00131                ----1                0013
00032           00032                ----1                0003
00011           00011                ----1                0001
00132           00132                ----1                0013
00141           00141                ----1                0014
00142           00142                ----1                0014
00102           00102                ----1                0010
00152           00152                ----1                0015
00151           00151                ----1                0015
00182           00182                ----1                0018
00161           00161                ----1                0016
00162           00162                ----1                0016
00171           00171                ----1                0017
00172           00172                ----1                0017
00181           00181                ----1                0018
00191           00191                ----1                0019
00021           00021                ----1                0002
00022           00022                ----1                0002
00192           00192                ----1                0019
00201           00201                ----1                0020
00202           00202                ----1                0020
00211           00211                ----1                0021
00212           00212                ----1                0021
00051           00051                ----1                0005
00052           00052                ----1                0005
00092           00092                ----1                0009
00061           00061                ----1                0006
00001           00001                ----1                0000
00002           00002                ----1                0000
00012           00012                ----1                0001
00042           00042                ----1                0004
                NORMAL END OF TASK
```

12. DATA RECORD UPDATED WITH DAROUT

```
IEF236I ALLOCATION FOR TESTIN  STEPA
                                        NOTE:  THIS IS A PRINTOUT
IEF237I JOBLIB  ON 190                  PRODUCED BY A RERUN OF TESTROUT
                                        AFTER UPDATING THE RECORDS.
IEF237I OUTPUT  ON 00E

IEF237I DDDISK  ON 190

IEF237I INPUT   ON 00C
00031           00031                   ----2                   0003
00041           00041                   ----2                   0004
00062           00062                   ----2                   0006
00072           00072                   ----2                   0007
00071           00071                   ----2                   0007
00081           00081                   ----2                   0008
00082           00082                   ----2                   0008
00091           00091                   ----2                   0009
00101           00101                   ----2                   0010
00111           00111                   ----2                   0011
00112           00112                   ----2                   0011
00121           00121                   ----2                   0012
00122           00122                   ----2                   0012
00131           00131                   ----2                   0013
00032           00032                   ----2                   0003
00011           00011                   ----2                   0001
00132           00132                   ----2                   0013
00141           00141                   ----2                   0014
00142           00142                   ----2                   0014
00102           00102                   ----2                   0010
00152           00152                   ----2                   0015
00151           00151                   ----2                   0015
00182           00182                   ----2                   0018
00161           00161                   ----2                   0016
00162           00162                   ----2                   0016
00171           00171                   ----2                   0017
00172           00172                   ----2                   0017
00181           00181                   ----2                   0018
00191           00191                   ----2                   0019
00021           00021                   ----2                   0002
00022           00022                   ----2                   0002
00192           00192                   ----2                   0019
00201           00201                   ----2                   0020
00202           00202                   ----2                   0020
00211           00211                   ----2                   0021
00212           00212                   ----2                   0021
00051           00051                   ----2                   0005
00052           00052                   ----2                   0005
00092           00092                   ----2                   0009
00061           00061                   ----2                   0006
00001           00001                   ----2                   0000
00002           00002                   ----2                   0000
00012           00012                   ----2                   0001
00042           00042                   ----2                   0004
                NORMAL END OF TASK
TESTDA                                                  KEPT
VOL SER NOS=111111.END
```

H. Card Decks

The following card decks are included in this documentation:

1. Source deck of DAROUT.
2. Source deck of ITLOAD.
3. Source deck of TESTROUT.
4. Object deck of DAROUT.
5. Data for ITLOAD.
6. Data for TESTROUT.

Appendix 17

PRELIMINARY INDEXED SEQUENTIAL ACCESS METHOD (PISAM) VERSION 0, MODIFICATION LEVEL 0

A. Abstract

PISAM consists of a group of macros which are similar to the macros of BISAM/QISAM. The use of PISAM requires no special education for people who know BISAM/QISAM. PISAM itself uses BSAM and EXCP macros, but the PISAM programmer does not require any knowledge of them.

1. Authors: Michael Faix, IBM Germany
Albert Henne, IBM Germany
Peter Daendliker, IBM Switzerland

2. Facilities

PISAM creates and processes Indexed Sequential data sets on the 2311 under Pre-Beta or released OS. Processing may be sequential or random and additions can be inserted.

3. Availability

First released version, February 1, 1966.

4. Restrictions

When being used under Pre-Beta OS, all Pre-Beta OS restrictions apply to PISAM. The use of PISAM does not involve internal changes to Pre-Beta or released OS. PISAM can only create and process single volume data sets.

5. Record Formats

Only blocked or unblocked records of fixed length are allowed.

6. Compatibility

Data sets created by PISAM are not compatible with BISAM/QISAM data sets. Also, the macros used by PISAM are not compatible with BISAM/QISAM macros.

7. Conversion

a. To convert PISAM data sets to BISAM/QISAM data sets, the user should retrieve the entire PISAM data set sequentially and create a new data set with QISAM.

b. To facilitate conversion of programs containing PISAM macros to subsequent levels of PISAM or to BISAM/QISAM, the user should put all PISAM macros in one separate control section and branch to these

macros using BAL-instructions. To convert, he must only reassemble this one control section, not the entire program.

8. Program Distribution

Through Early Installation Centers.

B. General Description

1. PISAM provides the following macros:

Macro Instruction	
IDCB	Data control block, which describes the data set to be processed. In addition, the IDCB contains all the necessary codes to perform one specific function. (See PROCES entry in IDCB macro description.)
IOPEN	Initializes one data control block so that its associated data set can be processed. Only one data set can be opened by one IOPEN macro.
IPUT	Moves one logical record from the user's work area into an output buffer for writing (used only in loading an indexed sequential data set.)
IGET	Gets a logical record from an indexed sequential data set (sequential input).
IPUTX	Returns an updated logical record to an indexed sequential data set (sequential update).
IREAD	Retrieves randomly a logical record from an indexed sequential data set (random input).
IWRITE	Returns an updated logical record to an indexed sequential data set (random update).
IADD	Adds a new logical record to an indexed sequential data set (insertion of additions).
ICLOSE	Disconnects one data set from the user's problem program. Only one data set can be closed by one ICLOSE macro.

There is no overlap of I/O operations in the PISAM macros for loading and processing. In other words, after having issued a PISAM macro program, control is returned to the user only when all I/O operations concerning this macro have been terminated.

A write validity check is performed for all 2311 output operations. A key containing all X'FF' must not be used. Multiple IOPEN's may not be executed during the loading of an indexed sequential data set even if the data set was closed by ICLOSE prior to issuing the second IOPEN.

2. Deletions

a. The user can flag records to be deleted. To do this, he must insert X'FF' in the first byte after the key in the logical record (RKP+KEYLEN+1). This byte must never contain X'FF' as data. Also, because of the position of the deletion code, the key of the record must not extend to the last byte of the record.

b. Flagging a record as deleted accomplishes the following:

1) IGET will not supply the user with this record.

2) IREAD with a key equal to the key of the record will result in a branch to the NOREC address.

3) IADD with a key equal to the key of the record will result in the deleted record being physically replaced by the added record.

C. The PISAM Macros

1. IDCB

The IDCB macro has the same function as the DCB macro. Its operands are all keyword operands. They must be specified in the IDCB macro; they cannot be inserted from any other source. The operands are:

PROCES

The type of processing required:

LOAD	loading a data set
SEQIN	sequential input processing
SEQUP	sequential update
ADD	insertion of additions
RANDIN	random input
RANDUP	random update
RANDADD	random update and additions

DDNAME Specifies the name of the DD statement that will be used to describe the data set to be processed.

INTLAB Internal label, which is one alphanumeric character. This character is the only operand of

all loading and processing macros. It is used by these macros to refer to the data set. Also, all labels generated in the PISAM macro expansions for the data set will end with this character.

BLKSIZE Equals LRECL for unblocked records. Equals a multiple of LRECL for blocked records. It includes dummy record space in blocked records (see DUMREC below). The maximum BLKSIZE is:

-with unblocked records: 3600 bytes-2*KEYLEN
-with blocked records: 3600 bytes-KEYLEN-(BLKSIZE/LRECL)*5

With blocked records, there must be at least two primary records per block, i.e. the difference between the blocking factor and the value specified in DUMREC must be greater than or equal to 2. (For example, ((BLKSIZE/LRECL)-DUMREC)$\geq$2.

LRECL Length of the logical record, in bytes, including actual key and data. It must be equal to the length of the work area.

RKP Relative key position of the actual key in the logical record. For example, if the key begins at position 0 (at beginning of record), specify 0.

The key must not extend to the last position of the logical record. This is because the first byte after the key is used for a deletion code (X'FF') if the record is flagged as deleted. Thus, the highest allowable relative key position is LRECL-KEYLEN-1.

KEYLEN Key length in bytes.

KEYADDR Address of the field which contains the key of records to be retrieved randomly.

For PROCES ADD OR RANDADD, KEYADDR must be equal to the address WORKAR+RKP.

For PROCES RANDIN or RANDUP, KEYADDR may be anywhere.

WORKAR Address of the area in which the user presents his logical record to PISAM and into which PISAM brings the logical record to the user. It must be equal in length to LRECL.

CYLOFL Number of overflow tracks per cylinder, inclusive of track 0. The minimum number which can be specified for CYLOFL is 1.

DUMREC Number of dummy records in a block. These dummy records provide a fast means for inserting additions and retrieving them. The minimum DUMREC is 0; it must be 0 for unblocked records.

CYLTOT Number of cylinders for this data set. PISAM needs this information for the formatting of the cylinder index. The actual extent of the data set, as specified in the DD statement, may be lower. The data set must be on contiguous tracks. In calculating the value of CYLTOT for a specific data set, the fact should be taken into account that the EOF record occupies one entire track.

EODAD Address of the end of data routine. The user must provide this with sequential processing.

SYNAD Address of the user's synchronous error exit routine. A branch to this is the result of an unrecoverable (i.e., uncorrectable) I/O error during the execution of a PISAM macro. PISAM provides the address of a parameter list in register 1 upon entry to the SYNAD routine. This list contains 5 full word addresses, as follows:

Displacement	Register	Address is Pointing to:
0	(1)	Channel program in use when the uncorrectable disk error occurred.
4	(1)	Seek address in a double word in the form MBBCCHHR.
8	(1)	First two sense bytes.
12	(1)	Channel status word (last 7 bytes).
16	(1)	Completion code: X'41' Permanent error X'42' Extent error X'44' IO request has been intercepted X'48' Not started or purged X'4F' Unable to read Home Address and RO during error correction

The user should make no attempt to continue processing in order to avoid unpredictable results. He should terminate the task by an ABEND macro requesting a core storage dump.

NOREC — Address of user's "no record found" routine. A branch to this is the result of an IREAD macro being issued with a key which is not in the data set. It is the user's responsibility to ensure that no IWRITE macro is executed for a logical record which was not found by a previous IREAD macro. Any attempt to do so will result in PSAM terminating the task by issuing an ABEND macro.

2. IDCB Operand Summary

PROCES=	LOAD	SEQIN	SEQUP	RANDIN	RANDUP	ADD	RANDADD
DDNAME	X	X	X	X	X	X	X
INTLAB	X	X	X	X	X	X	X
BLKSIZE	X	X	X	X	X	X	X
LRECL	X	X	X	X	X	X	X
RKP	X	X	X	X	X	X	X
KEYLEN	X	X	X	X	X	X	X
KEYADDR	-	-	-	X	X	X	X
WORKAR	X	X	X	X	X	X	X
CYLOFL	X	X	X	X	X	X	X
DUMREC	X	X	X	X	X	X	X
CYLTOT	X	X	X	X	X	X	X
EODAD	-	X	X	-	-	-	-
SYNAD	X	X	X	X	X	X	X
NOREC	-	-	-	X	X	-	X

X (REQUIRED) - (NOT REQUIRED)

3. Loading (PROCES=LOAD)

Records are loaded into the primary area from the user's work area by IPUT macros. Indexes are built during loading. The track index is always the first block in each

The user should make no attempt to continue processing in order to avoid unpredictable results. He should terminate the task by an ABEND macro requesting a core storage dump.

NOREC — Address of user's "no record found" routine. A branch to this is the result of an IREAD macro being issued with a key which is not in the data set. It is the user's responsibility to ensure that no IWRITE macro is executed for a logical record which was not found by a previous IREAD macro. Any attempt to do so will result in PSAM terminating the task by issuing an ABEND macro.

2. IDCB Operand Summary

PROCES=	LOAD	SEQIN	SEQUP	RANDIN	RANDUP	ADD	RANDADD
DDNAME	X	X	X	X	X	X	X
INTLAB	X	X	X	X	X	X	X
BLKSIZE	X	X	X	X	X	X	X
LRECL	X	X	X	X	X	X	X
RKP	X	X	X	X	X	X	X
KEYLEN	X	X	X	X	X	X	X
KEYADDR	-	-	-	X	X	X	X
WORKAR	X	X	X	X	X	X	X
CYLOFL	X	X	X	X	X	X	X
DUMREC	X	X	X	X	X	X	X
CYLTOT	X	X	X	X	X	X	X
EODAD	-	X	X	-	-	-	-
SYNAD	X	X	X	X	X	X	X
NOREC	-	-	-	X	X	-	X

X (REQUIRED) - (NOT REQUIRED)

3. Loading (PROCES=LOAD)

Records are loaded into the primary area from the user's work area by IPUT macros. Indexes are built during loading. The track index is always the first block in each

cylinder. The cylinder index is the second block of the first cylinder of the data set.

After the index(es) the remainder of track 0 is filled with dummy records (if there is space) to be used for future additions. Track 0 of each cylinder can never be a primary track. If CYLOFL=n>1, then n-1 additional tracks are also filled with dummy records. The tracks used exclusively for dummy records in this case will be tracks 1 through n-1. These dummy records are always unblocked, regardless of whether or not blocking is specified for the records in the primary area.

The highest key in the data set is placed into the cylinder index. Additional records with keys higher than this key cannot be inserted into the data set. In order to allow these additions to be inserted, the user has to load some dummy records with higher keys. These dummy records should have X'FF' in the first byte after the key to flag them as deleted records (see "Deletions").

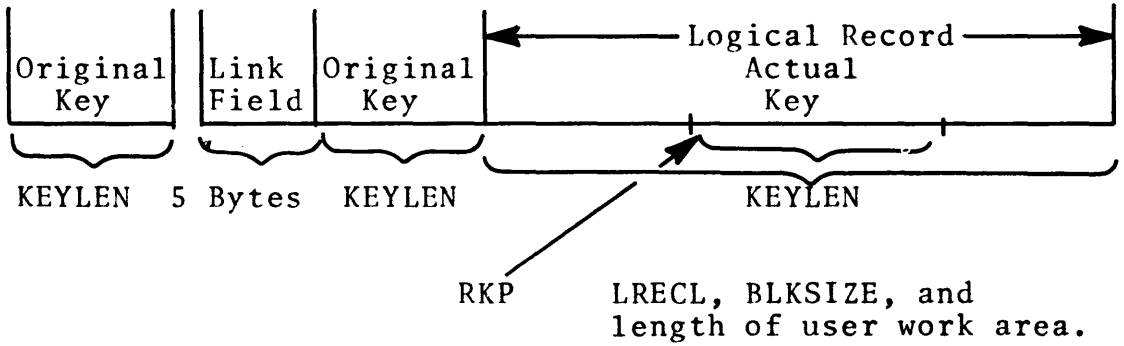
During loading, the IOPEN macro may be used only once. In other words, you cannot begin loading, close the data set, and resume loading later.

The track index-and cylinder index must fit within one track. For key lengths up to 16 bytes, this causes no restriction. For keys longer than 16 bytes, the key length which can be used depends on the value specified by CYLTOT.

4. Record Format

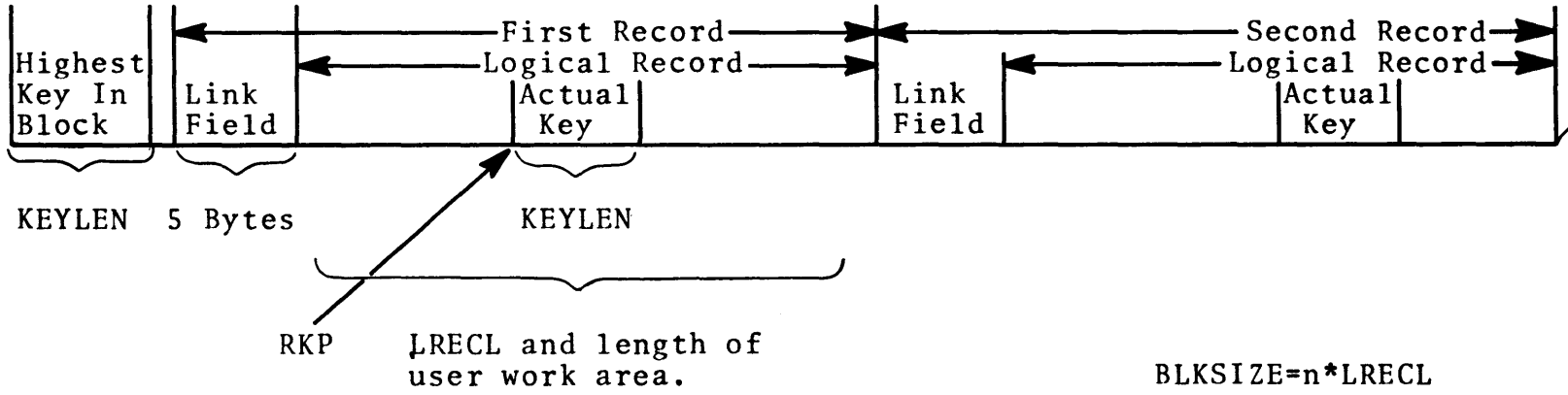
Records are loaded in the following format:

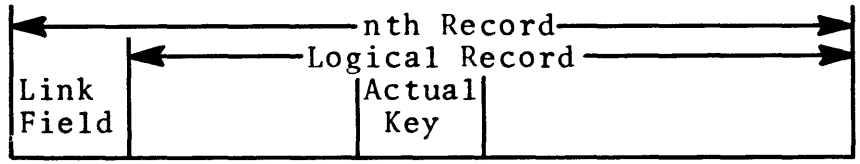
a. Fixed Length Unblocked:



NOTE: When the data set is first loaded, the actual key in the logical record is the same as the original key.

b. Fixed Length Blocked:





5. Cylinder Layout

This example shows the cylinder layout for a data set with unblocked records and CYLOFL=3.

a. Cylinders other than the first cylinder of the data set:

Track 0	FF	Track Index	FF	FF	FF	FF			Overflow Area
Track 1	FF	FF	FF	FF	FF	FF			
Track 2	FF	FF	FF	FF	FF	FF			
Track 3	08	08	10	10	20	20			Primary Area
Track 4	21	21	22	22	40	40			
Track 9	83	83	90	90	97	97			

b. For the first cylinder of the data set, only track zero differs from the above:

Track 0	FF	Track Index	FF	Cylinder Index	FF	FF

6. Track Index Format

Track Index Key	Track Format Directory	Highest Key 1st Primary Track	Highest Key 2nd Primary Track		Highest Key nth Primary Track

KEYLEN 10 bytes

7. Cylinder Index Format

Cylinder Index Key	Cylinder Format Directory	Lowest Key In Data Set	Highest Key In Data Set	Highest Key 1st Cylinder	Highest Key 2nd Cylinder		Highest Key Last Cylinder

KEYLEN 12 bytes

8. Sequential Input (PROCES=SEQIN)

IGET: Provides one logical record in the user's work area. Records are provided in sequential order by actual key. Records with deletion codes are not provided.

9. Sequential Update (PROCES=SEQUP)

IGET: Same as in Sequential Input.

IPUTX: Moves one logical record from the user's work area to the output buffer for eventual writing. This record is always the record for which the last previous IGET macro was issued.

IPUTX need only be issued if the contents of the logical record provided by IGET is altered (updated). Thus, several IGET's may be issued before issuing an IPUTX.

The user must not change the actual key when updating. There is no built-in check to detect this.

10. Random Input (PROCES=RANDIN)

IREAD: Provides a logical record in the user's work area with an actual key equal to the key at KEYADDR. If no record is found with this key, a branch is taken to the NOREC address.

11. Random Update (PROCES=RANDUP)

IREAD: Same as in Random Input.

IWRITE: Moves one logical record from the user's work area and writes the block containing it. This record is always the record for which the last previous IREAD macro was issued.

IWRITE need only be issued if the contents of the logical record provided by IREAD is altered (updated). Thus, several IREAD's may be issued before issuing an IWRITE.

The user must not change the actual key when updating. There is no built-in check to detect this. The last previous IREAD must have been successfully completed for the IWRITE to be effective. There is a check for this and if the IREAD was not successful, an abnormal end of job termination will result when IWRITE is issued.

12. Insertion of Additions (PROCES=ADD)

IADD: Adds one logical record to the data set.

The data set is searched randomly for an original key higher than or equal to the key of the

addition. The addition or the primary record is then moved to the first available dummy record. Logical records are always linked in actual key order via the link field.

The search for a dummy record in the overflow area to provide space for the record which must be moved begins in that cylinder where the high or equal condition occurs. If no space is found there, the search proceeds to the following cylinders and wraps around to the beginning of the data set.

The address specified by KEYADDR must be equal to WORKAR+RKP.

13. Random Update and Additions (PROCES=RANDADD)

IREAD: Same as in Random Input.

IWRITE: Same as in Random Update.

IADD: Same as in Insertion of Additions.

The user must not issue an IADD macro between the issuing of an IREAD macro and an IWRITE macro for the corresponding record. There is a check for this and if this rule is violated, an abnormal end of job termination will result when IWRITE is issued.

The address specified by KEYADDR must be equal to WORKAR+RKP.

14. Summary of Loading and Processing Macros

PROCES=

LOAD	SEQUIN	SEQUP	RANDIN	RANDUP	ADD	RANDADD
IOPEN ch	IOPEN ch	IOPEN ch	IOPEN ch	IOPEN ch	IOPEN ch	IOPEN ch
IPUT ch						
	IGET ch	IGET ch				
		IPUTX ch				
					IADD ch	IADD ch
			IREAD ch	IREAD ch		IREAD ch
				IWRITE ch		IWRITE ch
ICLOSE ch	ICLOSE ch	ICLOSE ch	ICLOSE ch	ICLOSE ch	ICLOSE ch	ICLOSE ch

ch (Character, same as INTLAB)

Core Storage Requirements - The macro expansion of each PISAM macro, with the exception of the IDCB macro, is 12 bytes in length. The IDCB macro itself contains all the necessary code for performing the function defined by PROCES in the IDCB macro. The figures given in the following table represent maximum core storage requirements for the indicated function to be performed. The core storage requirements for BSAM are not included here. In some cases (LRECL less than 257 bytes or DUMREC=0 when inserting additions into a data set with blocked records) the actual core storage requirements are less than those given in the table.

D. Core Storage Requirements In Bytes

PROCES=	BLOCKED RECORDS	UNBLOCKED RECORDS
LOAD	2150+((17+CYLTOT-CYLOFL)*KEYLEN)+ +BLKSIZE+((BLKSIZE/LRECL)*5)	2150+((18+CYLTOT=CYLOFL)*KEYLEN)+ +LRECL
SEQIN or SEQUP	1450+BLKSIZE+LRECL+(5*KEYLEN)+ +((BLKSIZE/LRECL)*5)	1450+BLKSIZE+LRECL+(7*KEYLEN)
RANDIN	1300+((15+CYLTOT=CYLOFL)*KEYLEN)+ +BLKSIZE+((BLKSIZE/LRECL)*5)	1250+((16+CYLTOT-CYLOFL)*KEYLEN)+ +BLKSIZE
RANDUP	1750+((15+CYLTOT=CYLOFL)*KEYLEN)+ +BLKSIZE+((BLKSIZE/LRECL)*5)	1650+((16+CYLTOT-CYLOFL)*KEYLEN)+ +BLKSIZE
ADD	2850+((16+CYLTOT=CYLOFL)*KEYLEN)+ +BLKSIZE+LRECL+((BLKSIZE/LRECL)*5)	2200+((16+CYLTOT-CYLOFL)*KEYLEN)+ +BLKSIZE
RANDADD	3350+((16+CYLTOT=CYLOFL)*KEYLEN)+ +BLKSIZE+LRECL+((BLKSIZE/LRECL)*5)	2500+((16+CYLTOT-CYLOFL)*KEYLEN)+ +BLKSIZE

E. Calculating Auxiliary Storage Requirements for the 2311

As the number of cylinders for one data set must be defined in the IDCB macro by the CYLTOT entry, the following formulas are provided in order to enable the user to calculate the value of CYLTOT for a given number of logical records to be loaded.

1. The capacity calculations are based on the following formulas:

   Capacity per track: 3625
   Bytes required by a data record

   a. Data record (except the last record)
      $81+1,05(K_L+D_L)$

   b. Data record (last record)
      $20+(K_L+D_L)$

      Where:

      K_L = key length

      D_L = data length

2. Calculation of CYLTOT

$$CYLTOT = \frac{N}{R*(10-CYLOFL)*((BLKSIZE/LRECL)-D\ MREC)}$$

Where R is calculated as follows and rounded down to the next smallest integer.

a. Unblocked

$$R = \frac{3686+(0.05*(2*KEYLEN+LRECL+5))}{81+(1.05*(2*KEYLEN+LRECL+5))}$$

b. Blocked

$$R = \frac{3686+(0.05*(KEYLEN+((BLKSIZE/LRECL)*(LRECL+5))))}{81+(1.05*(KEYLEN+((BLKSIZE/LRECL)*(LRECL+5))))}$$

N = Total number of logical records to be loaded.

CYLTOT
BLKSIZE
LRECL
DUMREC
CYLOFL
KEYLEN

} See IDCB macro description

F. Messages

The following messages can occur. All messages are printed on the 1052 console typewriter.

1. Error condition which can occur during execution of any PISAM macro.

   EXCP - PERM DISK ERROR

   Reason: This can occur during the execution of each macro for loading and processing. This is the result of an uncorrectable disk error. The standard error recovery procedures have been executed prior to the printing of the message.

   Action: Program control is transferred to the user's synchronous error routine specified in the SYNAD entry of the IDCB macro.

   Note: Extent error during loading may imply that non-contiguous cylinders were allocated.

2. PROCES=LOAD

   a. MULTIPLE IOPEN

      Reason: An attempt was made to open a data set for loading which was already opened once. The message is issued even if the data set was closed (ICLOSE) prior to issuing the second IOPEN.

      Action: Termination of the task by an ABEND macro requesting a core storage dump. ABEND code is 4.

   b. SEQCHECK KEY
      AA...A
      AFTER
      BB...B
      RECORD BYPASSED

      Reason: Sequence check or duplicate key check occurred during loading.

      Action: Record AA...A is bypassed and processing continues.

   c. LAST ENTRY IN CYL INDEX FILLED

      Reason: All entries in the cylinder index (limited by CYLTOT) are filled.

Action: The logical record in the work area is not loaded into the data set. After closing the data set, message 4 is printed and the task is terminated by an ABEND macro. ABEND code is 16.

d. LAST KEY IS
AA...A

Reason: Data set has been closed. AA...A is the key of the last logical record loaded into the data set.

Action: Return to caller (user program).

3. PROCES = ADD
RANDIN
RANDUP
RANDADD

a. RECORD WITH KEY
AA...A
CANNOT BE ADDED. ADDIT REC BYPASSED.

Reason: This occurs during an IADD macro. The logical record has a key higher than the highest key in the data set.

Action: The addition record is not inserted and processing continued.

b. RECORD WITH KEY
AA...A
EXISTS ALREADY. ADDIT REC BYPASSED.

Reason: This occurs during an IADD macro. An attempt is being made to insert a logical record into the data set when a logical record with the same key already exists.

Action: The addition record is not inserted and processing continues.

c. DATA SET IS FILLED.
RECORD WITH KEY
AA...A
WAS NOT INSERTED.

Reason: This occurs during an IADD macro. All overflow areas were filled with addition records. The logical record indicated by the message could not be inserted into the data set.

Action: Termination of the task by an ABEND macro. ABEND code is 104.

d. WRONG MACRO SEQUENCE

Reason: This occurs during an IWRITE macro. An IWRITE macro was given which was not immediately preceded by a successfully executed IREAD macro.

Action: Termination of the task by an ABEND macro requesting a core storage dump. ABEND code is 108.

G. Maintenance

While no maintenance commitments are implied, problem reports with full documentation should be sent to the authors c/o IBM Germany:

IBM Germany
7032 Sindelfingen
Postfach 66
Germany

To the attention of:

Mr. Michael Faix, Dept. 427 Early Installation Group	[random input random update insertion of additions random update & additions]
Mr. Albert Henne, Dept. 429 Systems Support Group	[loading a data set]
Mr. Peter Daendliker,Dept.427 Early Installation Group	[sequential input sequential update]

Full documentation must include:

1. Console status at the time the problem was encountered.
2. Full core dump.
3. Assembly listing of program.
4. Listing of all data used including a disk dump of the ISAM data set.
5. Narrative of the expected performance of the program.

H. Restrictions, Version 0, Modification Level 0

1. Programs can be assembled only in Early Installation Centers under Protios V5 L5 (Macro Library V5 L4). The minimum system configuration is 128K plus one 7-track and four 9-track tape units.

2. While the PISAM routines have been tested for many combinations of situations, it is almost certain that some errors remain. You should test your own special case very carefully.

I. Creation of PISAM (under Protios)

1. Punch two card decks from the DTR. The DTR is a 9-track tape containing:

   a. A tape mark.

   b. The PISAM package 80/80 unblocked.

   c. A tape mark.

   d. A sample program 80/80 unblocked.

   e. A tape mark.

2. Place the PISAM package (card deck) in the 2540 read hopper.

3. Mount a disk pack containing the Protios Macro Library (Version 5 Level 4) on 190.

4. Mount Protios tape (Version 5 Level 5) on 282.

5. IPL from 282. Perform device switching. Protios will insert all PISAM macros into the Protios macro library.

J. Sample Program Description

1. The purpose of this sample is:

   a. To show the user how to use the PISAM macros.

   b. To provide a source deck for an assembly so that the user can check if he has received a correct version of PISAM.

   c. To show how PISAM works during execution.

2. The significant characteristics of the data set to be processed are:

.Block size BLKSIZE=700
.Logical record length LRECL =100
.Key length KEYLEN = 6
.Relative key position RKP = 9
.Total number of cylinders CYLTOT = 10
.Number of dummy records per block DUMREC = 4
.Number of overflow tracks per cylinder CYLOFL = 2
.The ddname of the DD control statement describing the data set to be created and processed is DDPISAM.
.PRINT is the ddname of the DD control statement defining output on the line printer.

3. The sample program is divided into the following parts:

a. Loading the indexed sequential data set (PROCES=LOAD).

This part starts at the label LOAD. The IDCB describing the data set to be created is named DCBLOAD. As the keys of the logical records are generated by the sample program itself the user is not concerned with the handling of data cards. All logical records contain the words 'LOAD REC' in the data area to distinguish them from addition records which will be inserted later. In order to provide space and linkage facilities for higher additions, a number of logical records with delete codes (containing X'FF' in the first position after the key) and with keys higher than 003600 are also loaded. The key of the last logical record that is not delete-coded record is 003600; however, the highest key of the data set is 003792. By loading these deleted logical records, addition records with keys up to 003792 can be inserted.

b. Random processing (PROCES=RANDADD)

This part starts at the label RANDADD. The IDCB describing the data set to be processed is named DCBRAND. In this portion of the sample program addition records are inserted into the data set and all logical records with an even-numbered key are randomly updated by inserting 'UPDATED' into the data portion. The keys are generated in alternating sequence starting from 000001 and 003790. Each addition record and each updated record (after it has been retrieved again) is printed. The addition records are marked by 'ADDITION' in the data portion.

c. Sequential processing (PROCES=SEQUP)

This is the last part and starts with the label SEQ. The IDCB describing the data set to be sequentially updated is named DCBSEQ. All logical records in the data set are sequentially retrieved, updated (by inserting 'SEQ' into the data portion of the record) and printed. The logical records with keys from 000001 to 000300 appear consecutively without gaps. The highest key which appears at the end of sequential updating is 003790 (the logical record with the key 003792 exists still in the data set but it is not retrieved because it is a deleted record).

At the end of each type of processing, a message is printed on the 1052 console printer. The output on the printer will consist of approximately 70 pages.

```
&JOB                                                                    0000010
MODE-ASSEMBLE                                                           0000020
EXECUTE,ASSEMBLER                                                       0000030
         TITLE 'PISAM EXAMPLE'                                          0000040
*                                                                       0000050
***EXAMPLE FOR PROGRAMMING PISAM                                        0000060
***                                                                     0000070
START    START                                                          0000080
         SAVE   (14,12)                                                 0000090
*                                                                       0000100
*LOAD BASIS REGISTER                                                    0000110
         BALR   2,0                                                     0000120
         USING  *,2                                                     0000130
         USING  *+4000,3                                                0000140
         USING  *+8000,4                                                0000150
         USING  *+12000,5                                               0000160
         LA     3,4000(2)                                               0000170
         LA     4,4000(3)                                               0000180
         LA     5,4000(4)                                               0000190
*                                                                       0000200
*OPEN PRINTER                                                           0000210
         OPEN   (PRINT,(OUTPUT))                                        0000220
***                                                                     0000230
***                                                                     0000240
*LOAD PISAM DATA SET                                                    0000250
***                                                                     0000260
LOAD     IOPEN  L               OPEN FOR LOADING                        0000270
         L      11,F900         NBR OF RECORDS TO BE LOADED             0000280
         LA     8,4(0)          LOAD REG FOR KEY CREATION               0000290
*                                                                       0000300
*LOOP FOR LOADING                                                       0000310
LOADLP   CVD    8,CON           CONVERT TO DECIMAL                      0000320
         UNPK   KEY(6),CON+4(4) UNPACK KEY INTO RECORD                  0000330
         OI     KEY+5,X'F0'                                             0000340
         MVC    WORK+92(6),KEY  KEY TWICE IN RECORD                     0000350
         MVC    KEY+8(8),KLOAD  MARK REC AS LOADED                      0000360
         IPUT   L               LOAD RECORD                             0000370
         LA     8,4(8)          INCREASE KEY BY 4                       0000380
         BCT    11,LOADLP       LOOPING                                 0000390
*                                                                       0000400
*LOAD DELETED RECORDS TO RESERVE SPACE FOR HIGHER ADDITIONS              0000410
LOADSW   NOP    LOADEND                                                 0000420
         MVI    LOADSW+1,X'F0'  SET PREVIOUS SWITCH                     0000430
         MVI    KEY+6,X'FF'     MARK RECORD AS DELETED                  0000440
         L      11,F48          LOAD LOOP COUNT                         0000450
         B      LOADLP          LOOP FOR LOADING DELETED                0000460
*                                 RECS                                  0000470
*END OF LOADING                                                         0000480
LOADEND  ICLOSE L                                                       0000490
         WTO    'END OF LOADING'                                        0000500
         MVI    KEY+6,C' '      CLEAR DELET CODE IN WORKAREA            0000510
***                                                                     0000520
***                                                                     0000530
*ADD AND UPDATE RECORDS RANDOMLY                                        0000540
*                                                                       0000550
RANDADD  IOPEN  R               OPEN FOR ADDING AND UPDATING            0000560
         CNTRL PRINT,SK,1                                               0000570
```

```
         L      11,F536          LOAD LOOP COUNTER                0000580
         SR     8,8              PREPARE REGISTERS FOR            0000590
         LA     9,2(0)              KEY CREATION                  0000600
         L      10,F3795                                          0000610
*LOOP FOR ADDING AND UPDATING                                     0000620
ADDLP    LA     8,3(8)           INCREASE KEY=N*3                 0000630
         LR     1,8                                               0000640
         MVI    FIVE+1,X'00'     ALLOW TEST FOR KEY DIV BY 5      0000650
         BAL    6,ADDROUT        GO TO ADD AND/OR UPDATE          0000660
         LR     1,9                                               0000670
         BAL    6,ADDROUT        GO TO ADD AND/OR UPDATE          0000680
         LA     9,3(9)           INCREASE KEY=2+N*3               0000690
         MVI    FIVE+1,X'F0'     NO TEST FOR KEY DIV BY 5         0000700
         S      10,F5            REDUCE KEY=N*5 BY 5              0000710
         BC     12,ADDLP1        IF KEY NOT GT 0,BYPASS KEY       0000720
         LR     1,10                                              0000730
         BAL    6,ADDROUT        GO TO ADD AND/OR UPDATE          0000740
ADDLP1   BCT    11,ADDLP         END OF ADDLOOP                   0000750
         LA     8,1(0)           CREATE KEY=1                     0000760
         LA     9,5(0)           CREATE KEY=5                     0000770
ADDLP2   MVI    FIVE+1,X'00'     ALLOW TEST FOR KEY DIV BY 5      0000780
         LR     1,8              CREATE KEY=1+N*3                 0000790
         BAL    6,ADDROUT        GO TO ADD AND/OR UPDATE          0000800
         C      8,F300           CREATE NO KEY GT 300             0000810
         BH     ADDEND              IN THIS LOOP                  0000820
         LA     8,3(8)                                            0000830
         C      9,F300           CREATE NO KEY GT 300             0000840
         BH     ADDLP2              IN THIS LOOP                  0000850
         MVI    FIVE+1,X'F0'     NO TEST FOR KEY DIV BY 5         0000860
         LR     1,9              CREATE KEY=N*5                   0000870
         BAL    6,ADDROUT        GO TO ADD AND/OR UPDATE          0000880
         LA     9,5(9)                                            0000890
         B      ADDLP2                                            0000900
*                                                                  0000910
*SUBROUTINE FOR ADD AND/OR UPDATE RECORDS                         0000920
ADDROUT  ST     6,SAVE6          SAVE RETURN ADDRESS              0000930
         ST     1,FWORD          STORE KEY FOR CHECKING           0000940
         CVD    1,CON            CONVERT TO DECIMAL               0000950
         UNPK   KEY(6),CON+4(4)  UNPACK KEY INTO RECORD           0000960
         OI     KEY+5,X'F0'                                       0000970
         MVI    ADDSW+1,X'00'       ALLOW ADDING                  0000980
FIVE     NOP    ADDROUT0                                          0000990
         CLI    KEY+5,X'F0'      IF KEY DIV BY 10                 0001000
         BE     FIVE1               ALLOW NO ADDING               0001010
         CLI    KEY+5,X'F5'      IF KEY NOT DIV BY 5              0001020
         BNE    ADDROUT0            ALLOW ADDING                  0001030
FIVE1    MVI    ADDSW+1,X'F0'                                     0001040
ADDROUT0 C      1,F3600          HIGHER ADDITION                  0001050
         BH     ADDSW            YES                              0001060
         TM     FWORD+3,X'03'    RECORD LOADED                    0001070
         BC     8,ADDROUT1       YES, NO ADDING                   0001080
ADDSW    NOP    ADDROUT2         IF SET NOR ADD NEITH UPDATE      0001090
         MVC    WORK+92(6),KEY   KEY TWICE IN RECORD              0001100
         MVC    KEY+8(8),KBLANK  CLEAR WORKAREA                   0001110
         MVC    KEY+12(8),KADD   MARK REC AS ADDITION             0001120
         IADD   R                ADD RECORD                       0001130
         WRITE  DECP1,SF,PRINT,WORK   PRINT ADD REC               0001140
```

```
         CHECK  DECP1                                                  0001150
         PRTOV  PRINT,12                                               0001160
ADDROUT1 IREAD  R                 READ RECORD RANDOMLY                 0001170
         TM     FWORD+3,X'01'     KEY EVEN                             0001180
         BC     1,ADDROUT2        NO, NO UPDATING                      0001190
         MVC    WORK+50(7),KUPD   UPDATE RECORD RANDOMLY               0001200
         IWRITE R                 WRITE UPDATED RECORD                 0001210
         IREAD  R                 READ UPDATED RECORD                  0001220
         WRITE  DECP2,SF,PRINT,WORK    PRINT UPDATED REC               0001230
         CHECK  DECP2                                                  0001240
         PRTOV  PRINT,12                                               0001250
         MVC    WORK+50(7),KBLANK      CLEAR WORKAREA                 0001260
ADDROUT2 L      6,SAVE6           RESTORE RETURN ADDR                  0001270
         BR     6                 GO BACK                              0001280
*                                                                      0001290
*END OF ADDING AND UPDATING                                            0001300
ADDEND   ICLOSE R                                                      0001310
         WTO    'END OF ADDING AND UPDATING'                           0001320
***                                                                    0001330
***                                                                    0001340
*SEQUENTIAL RETRIEVING AND UPDATING                                    0001350
***                                                                    0001360
SEQ      IOPEN  S                 OPEN FOR SEQUENTIAL                  0001370
         CNTRL  PRINT,SK,1            PROCESSING                       0001380
SEQLP    IGET   S                 READ RECORD SEQUENTIALLY             0001390
         MVC    WORK+70(3),KSEQ   UPDATE RECORD                        0001400
         WRITE  DECP3,SF,PRINT,WORK                                    0001410
         CHECK  DECP3                                                  0001420
         PRTOV  PRINT,12                                               0001430
         IPUTX  S                 WRITE BACK SEQUENTIALLY              0001440
         B      SEQLP             GO ON                                0001450
*                                                                      0001460
*END OF SEQUENTIAL PROCESSING                                          0001470
SEND     WTO    'END OF SEQUENTIAL PROCESSING'                         0001480
         ICLOSE S                                                      0001490
         RETURN (14,12)           END OF PROGRAM                       0001500
***                                                                    0001510
*HANDLING OF PERMANENT I/O ERROR                                       0001520
*                                                                      0001530
IOERR    WTO    'I/O-ERROR'                                            0001540
         ABEND  808,DUMP          ABNORMAL END WITH CORE DUMP          0001550
*RECORD NOT FOUND BY RANDOM PROCESSING                                 0001560
NOTFD    MVC    WTO1+8(6),KEY     MOVE KEY TO MESSAGE                  0001570
WTO1     WTO    '       NOT FOUND'  WRITE KEY                          0001580
         B      ADDLP             GO BACK TO RANDOM                    0001590
***                                                                    0001600
***                                                                    0001610
*RECORD AREA                                                           0001620
*                                                                      0001630
WORK     DC     C'PISAMSET'                                            0001640
KEY      DC     CL6' '            KEY FIELD WITHIN RECORD              0001650
         DC     5CL16' '                                               0001660
         DC     CL5'    *'        END OF RECORD                        0001670
*                                                                      0001680
*CONSTANTS                                                             0001690
*                                                                      0001700
KLOAD    DC     C'LOAD REC'                                            0001710
```

```
KADD     DC     C'ADDITION'                                          0001720
KUPD     DC     C'UPDATED'                                           0001730
KSFQ     DC     C'SEQ'                                               0001740
KBLANK   DC     CL8' '                                               0001750
CON      DC     D'0'                                                 0001760
F900     DC     F'900'          NBR OF VALID LOADED RECORDS          0001770
F48      DC     F'48'           NBR OF DELETED LOADED RECS           0001780
F3600    DC     F'3600'         HIGHEST VALID LOADED KEY             0001790
F3795    DC     F'3795'         HIGHEST DELETED KEY+5                0001800
F536     DC     F'536'                                               0001810
F300     DC     F'300'                                               0001820
FWORD    DC     F'0'                                                 0001830
SAVE6    DC     A(0)                                                 0001840
F3       DC     F'3'                                                 0001850
F5       DC     F'5'                                                 0001860
***                                                                  0001870
*DATA CONTROL BLOCKS                                                 0001880
*                                                                    0001890
DCBLOAD  IDCB   DDNAME=DDPISAM,LRECL=100,BLKSIZE=700,      C         0001900
                KEYLEN=6,RKP-9,DUMREC=4,CYLOFL=2,          C         0001910
                CYLTOT=10,WORKAR=WORK,SYNAD=IOERR,         C         0001920
                INTAB=L,PROCES=LOAD                                  0001930
DCBRAND  IDCB   DDNAME=DDPISAM,LRECL=100,BLKSIZE=700,      C         0001940
                KEYLEN=6,RKP=9,DUMREC=4,CYLOFL=2,          C         0001950
                CYLTOT=10,WORKAR=WORK,SYNAD=IOERR,         C         0001960
                NORFC=NOTFD,KEYADDR=KEY,INTLAB=R,          C         0001970
                PROCES=RANDADD                                       0001980
DCBSEQ   IDCB   DDNAME=DDPISAM,LRECL=100,BLKSIZE=700,      C         0001990
                KEYLEN=6,RKP=9,DUMREC=4,CYLOFL=2,          C         0002000
                CYLTOT=10,WORKAR=WORK,SYNAD=IOERR,         C         0002010
                EODAD=SEND,INTLAB=S,PROCES=SEQUP                     0002020
PRINT    DCB    DDNAME=PRINT,DSORG=PS,MACRF=(WC),DEVD=PR,  C         0002030
                RECFM=F,LRECL=100,BLKSIZE=100                        0002040
         END    START                                                0002050
PUNCH
```

PRELIMINARY INDEXED SEQUENTIAL ACCESS METHOD (PISAM) VERSION 1, MODIFICATION LEVEL 0

A. Restrictions

While the PISAM routines have been tested for many combinations of situations, it is almost certain that some errors remain. You should test your own special case very carefully.

B. Creation of PISAM

1. Punch a card deck from the DTR. The DTR is a 9-track tape containing the PISAM package and a sample program in 80/80 unblocked format.

2. The cards punched will include sample JCL cards for placing the PISAM package in the Macro Library and for assembling, linkediting, and executing the sample program. See the listing to determine whether you need to change some of these cards for your system.

C. Sample Program Description

1. The purpose of this sample is:

   a. To show the user how to use the PISAM macros.

   b. To provide a source deck for an assembly so that the user can check if he has received a correct version of PISAM.

   c. To show how PISAM works during execution.

2. The significant characteristics of the data set to be processed are:

.Block size BLKSIZE=700
.Logical record length LRECL =100
.Key length KEYLEN = 6
.Relative key position RKP = 9
.Total number of cylinders CYLTOT = 10
.Number of dummy records per block DUMREC = 4
.Number of overflow tracks per cylinder CYLOFL = 2
.The ddname of the DD control statement describing the data set to be created and processed is DDPISAM.
.PRINT is the ddname of the DD control statement defining output on the line printer.

3. The sample program is divided into the following parts:

   a. Loading the Indexed Sequential Data Set(PROCES=LOAD).

      This part starts at the label LOAD. The IDCB describing the data set to be created is named DCBLOAD.

As the keys of the logical records are generated by the sample program itself, the user is not concerned with handling of data cards. All logical records contain the words 'LOAD REC' in the data area to distinguish them from addition records which will be inserted later. In order to provide space and linkage facilities for higher additions, a number of logical records with delete codes (containing X'FF' in the first position after the key) and with keys higher than 003600 are also loaded. The key of the last logical record that is not delete-coded record is 003600; however, the highest key of the data set is 003792. By loading these deleted logical records, addition records with keys up to 003792 can be inserted.

b. Random Processing (PROCES=RANDADD)

This part starts at the label RANDADD. The IDCB describing the data set to be processed is named DCBRAND. In this portion of the sample program addition records are inserted into the data set and all logical records with an even-numbered key are randomly updated by inserting 'UPDATED' into the data portion. The keys are generated in alternating sequence starting from 000001 and 003790. Each addition record and each updated record (after it has been retrieved again) is printed. The addition records are marked by 'ADDITION' in the data portion.

Appendix 18

EXCP STUDENT PRACTICE PROBLEM

Use of the scan (search key and data) special feature on the direct access device control units. This feature is not supported by O/S data management.

Problem Definition:

1. Input data set named "SCANDATA" on disk volume serial "WORK 11" (multi-extent, single volume data set).

   a. Key length is 5 bytes

      "hit" records are ZBCD "99999"
      "no hit" records are ZBCD "11111"

   b. Data length is 500 bytes

1 - 5	Record sequence number is ZBCD
6 - 10	Blank
11 -500	Filler

   c. There is an EOD record after the last record in the last extent on the volume.

2. Using the scan sequence in the 2841 control unit manual on page 20, write an EXCP program to scan for records with all 9's in the Key. Read in key and data on a hit.

   The key and sequence number of hit records are to be printed in print positions 1-10 (moved to the print area without alteration).

   Every 15th record is a hit. There are 350 records in the data set.

```
*
*INITIALIZE SEEK ADDRESS IN IOB AND SRCH ID IN CCWLIST TO BEGINNING EX
*
DISKINIT  MVC   SEEKADDR+2(4),0(10)     CCHH IN DEB TO IOB SEEKADDR
*UPDATE TO ORIENT TO R0
          MVC   DISKDCB+21(5),SEEKADDR+2    CCHHR TO SRCH LAST REC ID
          MVI   DISKDCB+25,X'00'        SET R TO BEGIN SCAN AT R
*UPDATE CCW LIST ADDRESS TO READ R0
          MVC   CCWLIST+1(3),ADDRBEG    EXEC BEGINCYL CCW'S
          B     DISKEXCP
DONE      WTO   'NICELY DONE'
          CLOSE (DISKDCB,,PRTDCB)
          FREEPOOL  PRTDCB
          L     13,SAVEAREA+4
          RETURN (14,12)
DISKECB   DC    F'0'
DISKIOB   DC    X'42000000'             COMM CHAIN AND UNRELATED
          DC    A(DISKECB)
DISKCSW   DC    2F'0'
CCWLIST   DC    A(BEGINCYL)
DCBADDR   DC    A(DISKDCB)
          DC    2F'0'
EXTENTM   DC    X'00'
SEEKADDR  DC    XL7'00'                 BBCCHHR
ADDRBEG   DC    AL3(BEGINCYL)           CCW FOR E O EXTENT
ADDRHIT   DC    AL3(HITLIST)            CCW FOR AFTER A HIT
*ORIENT TO R0 ON END OF EXTENT
BEGINCYL  CCW   X'16',RDRO,X'70',16      RD RO   CC,SLI,SKIP
          CCW   X'08',RDCOUNT,0,0       TIC RD R1 COUNT
*ORIENT TO HIT RECORD
HITLIST   CCW   X'31',DISKDCB+21,X'40',5   SRCH ID EQ  CC
          CCW   X'08',HITLIST,0,0       TIC *-8
RDCOUNT   CCW   X'92',SAVCOUNT,X'40',8  RD COUNT  MT,CC
          CCW   X'A9',SRCHARG,X'40',5   SCAN-SRCH KEY EQ  MT,CC
          CCW   X'08',RDCOUNT,0,0       TIC *-16
          CCW   X'1B',SEEKBIN,X'40',6   SEEK HEAD CC
SRCHHIT   CCW   X'31',SAVCOUNT,X'40',5  SRCH ID EQ  CC
          CCW   X'08',SRCHHIT,0,0       TIC *-8
          CCW   X'0E',INPUTKEY,0,505    READ KEY AND DATA
RDR0      DS    CL16                    INPUT AREA FOR RD R0
SRCHARG   DC    C'99999'
SEEKBIN   DC    XL2'00'                 FOR SEEK HEAD BB
SAVCOUNT  DS    CL8                     CCHHRKLDLDL TO LOCATE HIT REC
INPUTKEY  DS    CL5
SEQ       DS    CL5
          DS    CL5
          DS    49CL10
PRINT     DS    0CL18
PKEYSEQ   DS    CL10
BLK       DC    C' '
PCCHHR    DC    CL7' '
DBL       DS    D
SAVEAREA  DS    18F
DISKDCB   DCB   DDNAME=INDISK,MACRF=(E),DSORG=PS,DEVC=DA,BUFNO=1
PRTDCB    DCB   DDNAME=PRINTOUT,DSORG=PS,MACRF=PM,DEVD=PR,PRTSP=2, X
                RECFM=F,LRECL=18,BLKSIZE=18,BFTEK=S,EROPT=ACC
          END
```

EXCP SOLUTION TO SCAN PROBLEM

NOTE: SINCE SCAN FEATURE WAS NOT AVAILABLE, A SEARCH KEY EQUAL COMMAND WAS USED.

```
EXCPSCAN  START 0
          SAVE (14,12)
          BALR 12,0
          USING *,12
          ST    13,SAVEAREA+4
          LA    13,SAVEAREA
          OPEN  (DISKDCB,,PRTDCB,(OUTPUT))
          L     11,DISKDCB+44           GET DEB ADDR
          LA    10,38(0,11)          CCHHR ADDR FROM DEB FIRST EXTNT
          B     DISKINIT
DISKEXCP  MVI   DISKECB,X'00'           INITIALIZE ECB CODE
          EXCP  DISKIOB
          WAIT  ECB=DISKECB
          CLI   DISKECB,X'7F'           TEST HIT SUCCESSFUL
          BNE   TESTEXT
          MVC   PKEYSEQ,INPUTKEY        MOVE KEY,SEQ TO PRINT
* CONVERT TRACK ADDRESS
          SR    2,2
          IC    2,SAVCOUNT+4
NOT       CVD   2,DBL
NECESSARY UNPK  PCCHHR+6(1),DBL+7(1)    CONVERT REC NUM
IN        OI    PCCHHR+6,X'F0'          SET ZONE TO F
STUDENT   IC    2,SAVCOUNT+3
ANSWER    CVD   2,DBL
          UNPK  PCCHHR+4(1),DBL+7(1)    CONVERT HEAD
          OI    PCCHHR+4,X'F0'
          IC    2,SAVCOUNT+1
          CVD   2,DBL
          UNPK  PCCHHR(3),DBL+6(2)
          OI    PCCHHR+2,X'F0'
*
          PUT   PRTDCB,PRINT            PRINT HIT
          PRTOV PRTDCB,12
          MVC   DISKDCB+21(5),SAVCOUNT  INIT SRCH ID TO HIT ID
          MVC   SEEKADDR+2(5),SAVCOUNT    INIT CCHHR IN IOB SEEKADDR
          MVC   CCWLIST+1(3),ADDRHIT    EXEC HITLIST CCW'S
          B     DISKEXCP
TESTEXT   CLI   DISKECB,X'42'           WAS IT END OF EXTENT
          BE    NEXTEXT
          CLC   SAVCOUNT+5(3),=X'000000'  IS IT EOD RECORD
          BE    DONE
          ABEND 256,DUMP                OTHER ERRORS
NEXTEXT   IC    2,16(0,11)              NUM EXTENTS FROM DEB
          SR    3,3
          IC    3,EXTENTM               CURRENT EXTENT IN IOB&32
          LA    3,1(0,3)                INCREM IOB NUM EXTENTS
          CR    2,3                     TEST ALL EXTENTS PROCESSED
          BE    DONE
          STC   3,EXTENTM               UPDATE EXTENT COUNT INIOB
          LA    10,16(0,10)             GET NEXT EXTENT FROM DEB
```

Appendix 19

APPENDIX 19

This appendix consists of two parts:

1. The listings of the cards used before, during and after the NSL problem.

2. The listings produced by actually running the cards in Part 1. (In this part job DDDD was run twice, once with the macros IEFUCBOB and IECDSECT, and the second time with the macros EBC1 and EBC2.) The instructor should note the difference in assembly time and line items produced

   Job HHHH was also run twice, the first time with NSL that checked and the second time with HSL that did not check (User Completion Code 256).

```
//GGGG  JOB    0,EBCGO,MSGLEVEL=1
//       EXEC  PGM=GO
//A   DD DSNAME=EBCLIB,SPACE=(CYL,(1,1,1)),VOLUME=SER=111111,                C
//                DISP=(NEW,CATLG),UNIT=2311
/*
```

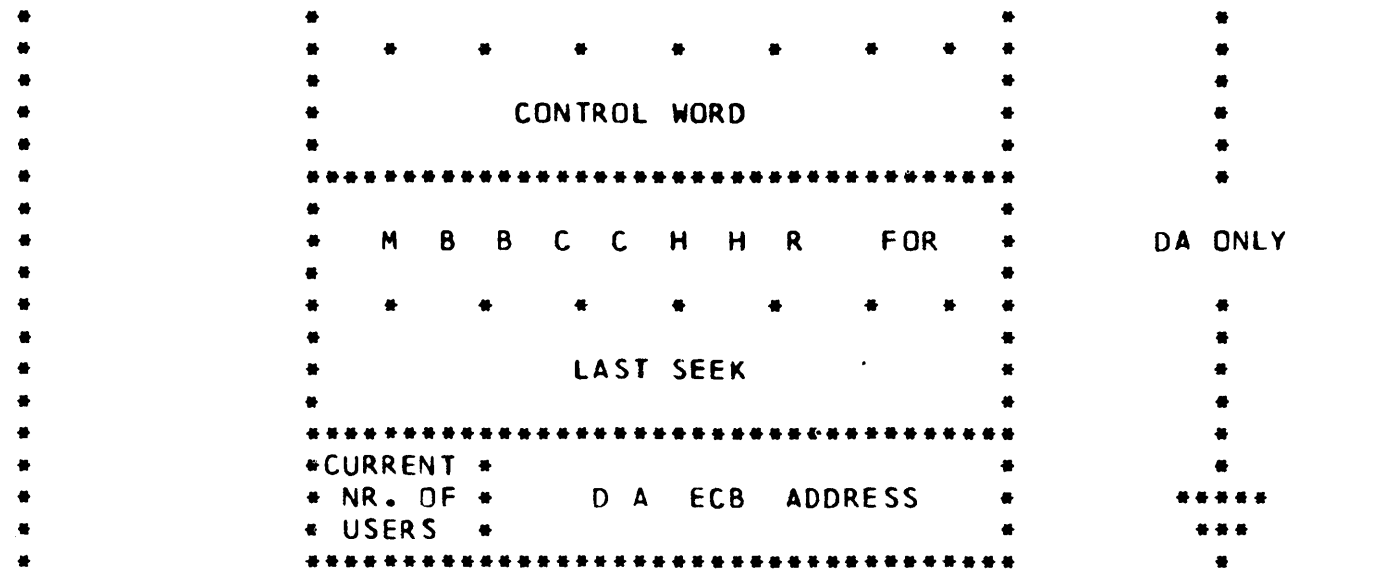
Create a Library (EBCLIB) for the Test Program (EBC3)

```
//BBBB   JOB    0,EBCUBC,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD   SYSOUT=A
//SYSUT2 DD     DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD     DATA
./        ADD   EBC1,00,0,1
          MACRO
          EBC1
          DS    CL13
UCBNAME   DS    CL3             UNIT NAME IN EBCDIC CHARACTERS
UCBTYP    DS    XL4             DEVICE TYPE
          DS    CL15
SRTEDMCT  DS    XL1             MOUNT BIT IN HIGH ORDER BIT
          DS    CL32
          MEND
./        ENDUP
/*
```

Put EBC1 in SYS1.MACLIB

```
//CCCC    JOB   0,EBCWACBA,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD   SYSOUT=A
//SYSUT2  DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN   DD    DATA
./        ADD   EBC2,00,0,1
          MACRO
          .EBC2
          SPACE 1
*                     VOLUME LABEL
          SPACE 1
DXLBL     DS    CL80
          DS    CL20
          SPACE 1
*                     JOB FILE CONTROL BLOCK
JFCBDSNM  DS    CL44 DATA SET NAME
          DS    CL22
JFCBLTYP  DS    CL1 LABEL TYPE
          DS    CL51
JFCBVOLS  DS    CL30 VOLUME SERIAL NUMBERS
          DS    CL28
          SPACE 1
*                     EVENT CONTROL BLOCK
          SPACE 1
DXECB     DS    0CL4
          DC    X'C0000CC0'
          SPACE 1
*                     INPUT/OUTPUT BLOCK
          SPACE 1
DXIOB     DS    CL40
          SPACE 1
*                     DATA EXTENT BLOCK
          SPACE 1
          DS    CL28
DXDEBUCB  DS    F
          DS    CL12
          SPACE 1
*                     DATA CONTROL BLOCK
          SPACE 1
          DS    CL4
          SPACE 1
*                     CHANNEL CONTROL WORDS
          SPACE 1
          CNOP  0,8
DXCCW1    DS    D
          DS    CL16
DXCCW4    DS    D
DXCCW5    DS    D
DXCCW6    DS    D
          DS    CL40
DXCCW12   DS    D
          SPACE 1
          MEND
./        ENDUP
/*
```

```
//JJJJ         JOB 0,EBCUBC,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT2 DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD    DATA
./       ADD   IEFUCBOB,00,0,1
         MACRO
         IEFUCBOB
*            DATE OF THIS UPDATE  13 JULY 65
*
*
*       THE INDIVIDUAL UCB S LOOK LIKE THIS.
*
*             ****************************************          *
*             *   JOB  * ALLOC. *   UCB  * STATUS *          ***
*             *INTERNAL*CHANNEL *   ID   *    A   *         *****
*             * NUMBER *  MASK  *        *        *           *
*             ****************************************          *
*             *  FLAG1 *  UNIT  *        *        *           *
*             *   AND  *ADDRESS *  FLAG2 * DEVTAB *           *
*             *CHAN.ADD*        *        *        *           *
*             ****************************************          *
*             *       *        *        *        *           *
*             * ERRTAB * STATAB * LCHTAB * ATNTAB *           *
*             *       *        *        *        *
*             ****************************************      ALL DEVICES
*             *SCH  IOS*                              *
*             *FLG  FLG*             UNIT NAME        *          *
*             *       *                               *          *
*             ****************************************          *
*             *                                       *          *
*             *                 TYPE                  *          *
*             *                                       *          *
*             ****************************************          *
*             *                    *                  *          *
*             *     LAST 12*       *      SENSE       *         *****
*             *                    *                  *          ***
*             ****************************************          *
*             ****************************************          *
*             *                                       *          *
*             *                SENSE                  *         *****
*             *                                       *          *
*             ****************************************          *
*             *                                       *          *
*             *      VOLUME    SERIAL                 *          *
*             *                                       *
*             *   *    *    *   ********************     TAPE AND DA
*             *                  * STATUS *  DATA  *
*             *                  *    B   *MANAGMNT*          *
*             *                  *        *  COUNT *          *
*             ****************************************          *
*             *  VTOC  TT        * VTOC R * SPARE   *          *
*             *      OR          *        OR        *         *****
*             *FILE SEQ. COUNT   * FILE SEQ.NUMBER *          ***
*             ****************************************          *
*
*             ****************************************          *
*             *                                       *          *
*             *                                       *         ***
*             *            SEEK QUEUE                 *         *****
```




```
UCBOB    EQU *              UNIT CONTROL BLOCKS
         DS    0F
SRTEJBNR DS    XL1                JOB INTERNAL NUMBER
SRTECHAN DS    XL1          ALLOC.CHANNEL MASK
UCBID    DS    XL1          UCB IDENTIFICATION
SRTESTAT DS    XL1          STATUS BITS
SRTEONLI EQU   128                ONLINE
SRTECHGS EQU   64                 CHANGE ONLINE/OFFLINE
SRTERESV EQU   32                 RESERVED DEVICE
SRTEUNLD EQU   16                 UNLOAD THIS DEVICE
SRTEALOC EQU   8                  BIT 4 ALLOCATED
SRTEPRES EQU   4                  BIT 5 PERMANENTLY RESIDENT
SRTESYSR EQU   2                  BIT 6 SYSRES
*                                       OR PRIMARY CONSOLE
SRTEDADI EQU   1                  BIT 7 DADSM INTERLOCK
*                                       OR TAPE CONTAINS
*                                       STANDARD LABELS,OR
*                                       ALTERNATE CONSOLE
UCBCHA   DS    XL1          FLAG1 AND CHANNEL ADDRESS
UCBUA    DS    XL1          UNIT ADDRESS
UCBFL2   DS    XL1          FLAG2
UCBDTI   DS    XL1          DEVICE TABLE
UCBETI   DS    XL1          ERROR TABLE
UCBSTI   DS    XL1          STATUS TABLE
UCBLCI   DS    XL1          LOGICAL CHANNEL TABLE
UCBATI   DS    XL1          ATTENTION TABLE
UCBWGT   DS    XL1          WEIGHT
UCBNAME  DS    CL3          UNIT NAME IN EBCDIC CHARACTERS
UCBTYP   DS    XL4          DEVICE TYPE
UCBTBYT1 EQU   UCBTYP             BYTE 1 OF UCBTYPE-MODEL
UCB1FEA0 EQU   128                BIT 0 OF OPTION FIELD
UCB1FEA1 EQU   64                 BIT 1 OF OPTION FIELD
UCB1FEA2 EQU   32                 BIT 2 OF OPTION FIELD
UCB1FEA3 EQU   16                 BIT 3 OF OPTION FIELD
UCB1FEA4 EQU   8                  BIT 4 OF OPTION FIELD
UCB1FEA5 EQU   4                  BIT 5 OF OPTION FIELD
UCB1FEA6 EQU   2                  BIT 6 OF OPTION FIELD
UCB1FEA7 EQU   1                  BIT 7 OF OPTION FIELD
UCBTBYT2 EQU   UCBTYP 1           BYTE 2 OF UCBTYPE-OPTIONS
UCBTBYT3 EQU   UCBTYP 2           BYTE 3 OF UCBTYPE-CLASS
```

```
UCB3TAPE EQU   128                    BIT 0 OF CLASS - TAPE
UCB3COMM EQU   64                     BIT 1 OF CLASS - COMMUNIC.
UCB3DACC EQU   32                     BIT 2 OF CLASS - DIRECT AC
UCB3DISP EQU   16                     BIT 3 OF CLASS - DISPLAY
UCB3UREC EQU   8                      BIT 4 OF CLASS - UNIT REC.
UCB3CHAR EQU   4                      BIT 5 OF CLASS - CHAR.READ
UCBTBYT4 EQU   UCBTYP 3               BYTE 4 OF UCBTYPE-DEVICE
UCBLTS   DS    XL2                 LAST 12*
UCBSNS   DS    XL6                 SENSE INFORMATION
SRTEVOLI DS    CL6                 VOLUME SERIAL
SRTESTAB DS    XL1                 STATUS B
SRTEBSVL EQU   128                    BIT 0 SHARED VOLUME
SRTEBVSC EQU   64                     BIT 1 VOLUME SECURITY
SRTEBALB EQU   32                     BIT 2 ADDIT.VOL.LABEL PROC
SRTEBPRV EQU   16                     BIT 3 PRIVATE
SRTEBPUB EQU   2                      BIT 4 PUBLIC
SRTEBVQS EQU   4                      BIT 5 VOLUME TO BE QUIESCE
*                                     BIT   TO MOUNT ANCTHER
SRTEBJLB EQU   2                      BIT 6 JOBLIB VOLUME
SRTEBNUL EQU   1                      BIT 7 CONTROL VOLUME
SRTEDMCT DS    XL1                 DATA MANAGEMENT COUNT
SRTEFSCT DS    XL2                 FILE SEQ. COUNT
SRTEFSEQ DS    XL2                 FILE SEQ. NUMBER
UCBSQC   DS    2F                  SEEK QUEUE CONTROL WORD
UCBSKA   DS    2F                  MBBCCHHR FOR LAST SEEK
SRTEUSER DS    XL1                 CURRENT NUMBER OF USERS
SRTEECBA DS    XL3                 DA ECB ADDRESS
DATACELL EQU *                  9 OF THESE BLOCKS WILL BE PRESENT
DCELJBNR DS    XL1                 JOB INTERNAL
DCELUSER DS    XL1                 CURRENT NUMBER OF USERS
DCELSTAB DS    XL1                 STATUS B
DCELSTAT DS    XL1                 STATUS A
DCELVOLI DS    CL6                 VOLUME SERIAL
DCELVTOC DS    XL3                 VTOC ADDRESS
DCELECBA DS    XL3                 DA ECB ADDRESS
         MEND
./       ENDUP
/*
```

Put IECDSECT in SYS1.MACLIB

```
//IIII  JOB 0,ECBL,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT2 DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD    DATA
./       ADD   IECDSECT,00,0,1
         MACRO
         IECDSECT
         SPACE 1
*                    THIS MACRO IS USED TO DEFINE THE WORK AREA
*                         FOR ALL MODULES OF OPEN,CLOSE,TCLOSE
*                         AND END OF VOLUME FOR O/S 360
         SPACE 1
*                    THIS MACRO DEFINES A WORK AREA WITH THE
*                         FOLLOWING FORMAT
         SPACE 1
*                              1.LABELS AND DSCB
*                                   LABELS
*                                        VOLUME LABEL
*                                        FILE LABEL 1
*                                        FILE LABEL 2
*                                   DSCB
*                                        FORMAT 1
*                                        FORMAT 3 KEY
*                                        FORMAT 3 DATA
*                                        CORE ADDRESS OF NEXT DSCB
*                                   MESSAGE AREA
*                                                          100 BYTES
*                              2.JFCB
*                                                          176 BYTES
*                              3.ECB
*                                                            4 BYTES
*                              4.IOB
*                                                           40 BYTES
*                              5.DEB
*                                                           44 BYTES
*                              6.DCB
*                                                            4 BYTES
*                              7.CCW S
*                                                           96 BYTES
         SPACE 1
*                                                TOTAL *** 464 BYTES
         SPACE 2
* ***
* ***
* ***
* ***
         SPACE 1
*                         VOLUME LABEL
         SPACE 1
CXLBL    DS    0CL80
VOLLABI  DS    CL3                 LABEL IDENTIFIER
VOLNO    DS    CL1                 VOLUME LABEL NUMBER
VOLSERNO DS    CL6
VOLSEC   DS    CL1
         DS    0CL10               RESERVED
VOLVTOC  DS    CL5
         DS    CL5
         DS    CL10                RESERVED
```

```
          DS    CL10                RESERVED
VOLOWNER  DS    CL10                OWNER NAME AND ADDRESS CODE
          DS    CL29                RESERVED
          SPACE 1
*                    FILE LABEL 1
          SPACE 1
          ORG   DXLBL
FL1LABI   DS    CL3                 LABEL IDENTIFIER
FL1NO     DS    CL1                 FILE LABEL NUMBER
FL1ID     DS    CL17                FILE IDENTIFIER
FL1FILSR  DS    CL6                 FILE SERIAL NUMBER
FL1VOLSQ  DS    CL4                 VOLUME SEQUENCE NUMBER
FL1FILSQ  DS    CL4                 FILE SEQUENCE NUMBER
FL1GNO    DS    CL4                 GENERATION NUMBER
FL1VNG    DS    CL2                 VERSION NUMBER OF GENERATION
FL1CREDT  DS    CL6                 CREATION DATE
FL1EXPDT  DS    CL6                 EXPIRATION DATE
FL1FSEC   DC    C'0'                FILE SECURITY INDICATOR
FL1BLKCT  DS    CL6                 BLOCK COUNT
FL1SYSCD  DS    CL13                SYSTEM CODE
FL1RES    DS    OCL7                RESERVED FOR FUTURE USE
          DS    CL1
FL1RES1   DS    CL6
          SPACE 1
*                    FILE LABEL 2
          SPACE 1
          ORG   FL1ID
FL2RECFM  DS    CL1                 RECORD FORMAT
FL2BLKL   DS    CL5                 BLOCK LENGTH
FL2LRECL  DS    CL5                 BLOCKING FACTOR/RECORD LENGTH
FL2DEN    DS    CL1                 DENSITY
FL2FILP   DS    CL1                 FILE POSITION
FL2JSID   DS    OCL17               JOB/STEP IDENTIFICATION
FL2JOBD   DS    CL8                 JOB IDENTIFICATION
FL2JSSP   DC    C'/'                SLASH
FL2STEPD  DS    CL8                 STEP IDENTIFICATION
FL2TRTCH  DS    CL2                 TAPE RECORDING TECHNIQUE
FL2CNTRL  DS    CL1                 CARRAIGE CONTROL CHARACTER
FL2RES    DS    CL43                RESERVED FOR FUTURE USE
          SPACE 1
*                    DATA SET CONTROL BLOCK
          SPACE 1
          ORG   DXLBL
DXDSCB    DS    OCL96
DSCFMTID  DC    C'1'
DSCFILSR  DS    CL6                 FILE SERIAL NUMBER
DSCVOLSR  DS    CL2
DSCCREDT  DS    CL3                 CREATION DATE IN DISCONTINOUS BIN
DSCEXPDT  DS    CL3                 EXPIRATION DATE IN DISCONTINOUS BIN
DSCNOEXT  DS    CL1
DSCBLDBL  DS    CL1
          DS    CL1
DSCSYSCD  DS    CL13                SYSTEM CODE
          DS    CL7
DSCFILTY  DS    CL2                 FILE TYPE
DSCRECFM  DS    CL1                 RECORD FORMAT
DSCOPTCD  DS    CL1                 OPTION CODE
DSCBLKL   DS    CL2                 BLOCK LENGTH
DSCLRECL  DS    CL2                 RECORD LENGTH
```

```
DSCKEYL  DS    CL1                 KEY LENGTH
DSCRKP   DS    CL2                 KEY LOCATION
DSCDSIND DS    CL1
DSCSCALO DS    CL4
DSCLSTAR DS    CL5
DSCTRBAL DS    CL2
DSCEXTYP DS    CL1                 EXTENT TYPE INDICATOR
DSCEXTSQ DS    CL1                 EXTENT SEQUENCE NUMBER
DSCLOWLM DS    CL4
DSCUPPLM DS    CL4
DSCEXT1  DS    CL10
DSCEXT2  DS    CL10
DSCNEXT  DS    CL5                 POINTER TO NEXT RECORD
DSCCORE  DS    CL4                 CORE ADDRESS OF NEXT DSCB RECORD
DSCBEND  EQU   *
         SPACE 1
*                    DATA SET CONTROL -FORMAT 3- KEY PORTION
         SPACE 1
         ORG   DXDSCB
DXDSCB3K DS    OCL40
DSCBF3C  DC    X'03030303'
DSCBEXSK DS    OCL40
DSCBEXTY DS    CL1                 EXTENT TYPE INDICATOR
DSCBEXSQ DS    CL1                 EXTENT SEQUENCE NUMBER
DSCBLLMT DS    CL4                 CCHH LOWER LIMIT
DSCBULMT DS    CL4                 CCHH UPPER LIMIT
DSCBEX2  DS    CL10                ADDITIONAL EXTENT
DSCBEX3  DS    CL10                ADDITIONAL EXTENT
DSCBEX4  DS    CL10                ADDITIONAL EXTENT
         SPACE 1
*                    DATA SET CONTROL BLOCK -FORMAT 3- RECORD PORTION
         SPACE 1
         ORG   DXDSCB
DXCBFMID DC    C'3'                FORMAT ID
DSCBEXSD DS    OCL90               ADDITIONAL EXTENTS
DSCBEX5  DS    CL10                ADDITIONAL EXTENT
DSCBEX6  DS    CL10                ADDITIONAL EXTENT
DSCBEX7  DS    CL10                ADDITIONAL EXTENT
DSCBEX8  DS    CL10                ADDITIONAL EXTENT
DSCBEX9  DS    CL10                ADDITIONAL EXTENT
DSCBEXA  DS    CL10                ADDITIONAL EXTENT
DSCBEXB  DS    CL10                ADDITIONAL EXTENT
DSCBEXC  DS    CL10                ADDITIONAL EXTENT
DSCBEXD  DS    CL10                ADDITIONAL EXTENT
DSCBNEXT DS    CL5                 CCHHR OF NEXT FORMAT 3 DSCB
         SPACE 1
*                    MESSAGE AREA
         SPACE 1
         ORG   DXDSCB
REPLYLTH DS    CL1
REPLYADR DS    CL3
REPLYECB DS    CL4
MSGLSTSZ DS    CL4
MESSAGEA DS    CL60
REPLY    DS    CL10
*
         ORG   MESSAGEA
*        DEFINITION OF LENGTH OF MESSAGE COMPONENTS
*
```

```
MSERL    EQU   3                    MESSAGE SERIAL NUMBER LENGTH
MINSTL   EQU   6                    MSG INSTRUCTION LTH INC MSG SER
MUNL     EQU   3                    MESSAGE UNIT NAME LENGTH
MVOLL    EQU   6                    MESSAGE VOLUME SERIAL LENGTH
* MTXTL        LENGTH MAY BE DEFINED BY EACH MODULE TC FIT REQUIREMENT
* MSGLTH       LENGTH OF FULL MSG DEFINED BY EACH MODULE
*              MESSAGE FORMAT IS IEC000A M 000,00000  TEXT
MSGIOSUP DC    CL3'IEC'             I/O SUPPORT MESSAGE IDENTITY
MSGSER   DS    0CL3                 MESSAGE SERIAL NUMBER
         ORG   MSGSER MSERL-1
MSGSERLO DS    CL1                  VOLUME SERIAL LO ORDER BYTE
         ORG   MSGSER
MSGINSTR DC    CL6'000A M'          MESSAGE INSTRUCTION INCL MSGSER
         ORG   MSGINSTR MINSTL-1
MSGACTN  DS    CL1                  MESSAGE ACTION REQD BY OPERATOR
         DC    C' '
MSGUN    DC    CL3'000'             UNIT NAME THAT MSG REFERS TO
         DC    C','
MSGVOLSR DC    CL6'000000'          VOLUME SERIAL THAT MSG REFRS TO
         DC    C','
MSGTEXT  DS    0CL38
         SPACE 1
*                    JOB FILE CONTROL BLOCK
         ORG   DSCBEND
DXJBF    DS    0CL176
*********************************************************************
*
*                   JFCB
*
*********************************************************************
INFMJFCB EQU   *
JFCBDSNM DS    CL44 DATA SET NAME
JFCBELNM DS    CL8 ELEMENT NAME OR VERSION
JFCBTSDM DS    CL1 TASK SCHEDULER - DATA
*                                        MANAGEMENT INFERFACE BYTE
JFCBSYSC DS    CL13 SYSTEM CODE
JFCBLTYP DS    CL1 LABEL TYPE AND USER'S-LABEL
*                                       INDICATOR
         DS    CL1 NOT USED
JFCBFLSQ DS    CL2 FILE SEQUENCE NUMBER
JFCBVLSQ DS    CL2 VOLUME SEQUENCE NUMBER
JFCBMASK DS    CL8 DATA MANAGEMENT MASK
JFCBCRDT DS    CL3 DATA SET CREATION DATE
JFCBXPDT DS    CL3 DATA SET EXPIRATION DATE
JFCBIND1 DS    CL1 INDICATOR BYTE 1
JFCBRLSE EQU   64 BITS 0 AND 1 - EXTERNAL
*                                         STORAGE RELEASE INDICATOR
JFCBLOCT EQU   16 BITS 2 AND 3 - DATA SET
*                                        HAS BEEN LOCATED
JFCBNEWV EQU   4 BITS 4 AND 5 - NEW VOLUME
*                                        ADDED TO DATA SET
JFCBPMEM EQU   1 BITS 6 AND 7 - DATA SET IS
*                                        A MEMBER OF A PODS OR GDG
JFCBIND2 DS    CL1 INDICATOR BYTE 2
JFCBSTAT EQU   64 BITS 0 AND 1 - DATA SET
*                                       STATUS (NEW, OLD, OR MOD)
JFCBSCTY EQU   16 BITS 2 AND 3 - DATA SET
*                                        SECURITY INDICATOR
JFCBUFNO DS    0AL1
```

```
JFCBUFRQ DS    AL1
JFCBFTEK DS    OBL1
JFCBFALN DS    BL1
JFCBUFL  DS    AL2
JFCEROPT DS    BL1
JFCTRTCH DS    OBL1
JFCKEYLE DS    OAL1
JFCMODE  DS    OBL1
JFCCODE  DS    OBL1
JFCSTACK DS    OBL1
JFCPRTSP DS    BL1
JFCDEN   DS    BL1
JFCLIMCT DS    AL3
JFCDSORG DS    BL2
JFCRECFM DS    BL1
JFCOPTCD DS    BL1
JFCBLKSI DS    AL2
JFCLRECL DS    AL2
JFCNCP   DS    AL1
JFCNTM   DS    AL1
JFCRKP   DS    AL2
JFCCYLOF DS    AL1
JFCDBUFN DS    AL1
JFCINTVL DS    AL1
JFCCPRI  DS    BL1
JFCSOWA  DS    AL2
JFCBNTCS DS    CL1 NUMBER OF OVERFLOW TRACKS
JFCBNVOL DS    CL1 NUMBER OF VOLUME SERIAL
*                                          NUMBERS
JFCBVOLS DS    CL30 VOLUME SERIAL NUMBERS (THE
*                                          FIRST FIVE)
JFCBEXTL DS    CL1 LENGTH OF BLOCK OF EXTRA
*                                          VOLUME SERIAL NUMBERS
*                                          (BEYOND FIVE)
JFCBEXAD DS    CL3 TRACK ADDRESS OF BLOCK OF
*                                          EXTRA VOLUME SERIAL NUMBERS
JFCBPQTY DS    CL3 PRIMARY QUANTITY OF D.A.
*                                          STORAGE REQUIRED
JFCBCTRI DS    CL1 INDICATES WHETHER CYLINDERS
*                                          TRACKS, OR RECORDS ARE
*                                          SPECIFIED IN JFCBPQTY AND
*                                          JFCBSQTY
JFCBSQTY DS    CL3 SECONDARY QUANTITY OF D.A.
*                                          STORAGE REQUIRED
JFCBIND3 DS    CL1 INDICATOR BYTE 3
JFCBCNTG EQU   64 BITS 0 AND 1 - CONTIGUOUS
*                                           STORAGE INDICATOR
JFCBMXIG EQU   16 BITS 2 AND 3 - MAXIMUM
*                                           AVAILABLE EXTENT INDICATOR
JFCBALXI EQU   4 BITS 4 AND 5 - ALL EXTENTS
*                                           INDICATOR
JFCBRNDC EQU   1 BIT 6 AND 7 - ROUND
*                                           CYLINDER INDICATOR
JFCBDQTY DS    CL3 QUANTITY OF D.A. STORAGE
*                                          REQUIRED FOR A DIRECTORY
JFCBSPNM DS    CL3 CORE ADDRESS OF THE JFCB
*                                          WITH WHICH CYLINDERS ARE
*                                          SPLIT
JFCBABST DS    CL2 RELATIVE ADDRESS OF FIRST
```

```
*                                                    TRACK TO BE ALLOCATED
JFCBSBNM DS    CL3 CORE ADDRESS OF THE JFCB
*                                                    FROM WHICH SPACE IS TO BE
*                                                    SUBALLOCATED
JFCBDRLA DS    CL3 AVERAGE DATA RECORD LENGTH
JFCBVLCT DS    CL1 VOLUME COUNT
JFCBSPTN DS    CL1 NUMBER OF TRACKS PER
*                                                    CYLINDER TO BE USED BY THIS
*                                                    DATA SET WHEN SPLIT
*                                                    CYLINDERS IS INDICATED
JFCBLGTH EQU   176 LENGTH OF JFCB
JFCBEND  EQU   *
*                    EVENT CONTROL BLOCK
         SPACE 1
DXECB    DS    0CL4
         DC    X'00000000'
         SPACE 1
*                    INPUT/OUTPUT BLOCK
         SPACE 1
DXIOB    DS    0CL32
IOBFLAG1 DC    X'00'
IOBFLAG2 DC    X'00'
IOBSENSE DS    0H
IOBSENSO DS    CL1
*                                                      Q Q
IOBSENS1 DS    CL1                  SENSE BYTE 1 1 T
IOBECBPT DS    XL1
         DC    AL3(DXECB)
IOBCSW   DS    0D
IOBCOMAD DC    X'CCCCCCCC'          KEY,0000,COMMAND ADDRESS
IOBSTAT0 DC    X'CC'                STATUS BYTE 0
IOBSTAT1 DC    X'CC'                STATUS BYTE 1
IOBCNT   DC    X'CCCC'              COUNT
IOBSIOCC DS    XL1
IOBSTART DC    AL3(DXCCW)
IOBWGHT  DS    XL1
IOBDCBPT DC    AL3(DXDCB)
         DS    XL1
         DS    XL3
IOBINCAM DC    X'0000'
IOBERRCT DS    XL2
DXCAADDR DS    D                    DIRECT ACCESS ADDRESS MBBCCHHR
         SPACE 1
*                    DATA EXTENT BLOCK
         SPACE 1
DYYYY    DS    0CL44
DXDEB    EQU   DYYYY-4
DXDEBDEB DC    X'0C0CCCCC'
DXDEBDFL DS    0CL1
DXDEBIRB DC    X'CCCCCCCC'
DXDEBSYS DC    X'CC0CCCCC'
DXDEBUSR DC    X'0C0CCCCC'
DXDEBECB DC    X'CCCC0CCC'
DXDEBID  DS    0CL1
DXDEBDCB DC    AL4(DXDCB)
DXDCBAD  EQU   DXDEBDCB
DXDEBAPP DS    CL4
DXDEBMOD DS    0CL1
DXDEBUCB DS    F
```

```
DXDEBBIN DS     H
DXDEBSCC DS     H
DXDEBSHH DS     H
DXDEBECC DS     H
DXDEBEHH DS     H
DXDEBNTR DS     H
         SPACE  1
*                     DATA CONTROL BLOCK
         SPACE  1
DXXXX    DS     0F
DXDCB    EQU    DXXXX-44              POINTER TO RELATIVE BEGINNING OF DCB
DXDCBDEB DC     A(DXDEB)
*                     CHANNEL CONTROL WORDS
         SPACE  1
         CNOP   0,8
DXCCW    DS     0CL96
DXCCW1   DS     D
DXCCW2   DS     D
DXCCW3   DS     D
DXCCW4   DS     D
DXCCW5   DS     D
DXCCW6   DS     D
DXCCW7   DS     D
DXCCW8   DS     D
DXCCW9   DS     D
DXCCW10  DS     D
DXCCW11  DS     D
DXCCW12  DS     D
         SPACE  1
DSECTSIZ EQU    464                   CORE AREA REQUIRED FOR THIS MACRO
         MEND
./       ENDUP
/*
```

```
//AAAA   JOB   0,EBC,MSGLEVEL=1
//AA     EXEC  PGM=IEUASM,PARM=(DECK)
//SYSLIB DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT2  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT3  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSPRINT  DD SYSOUT=A
//SYSPUNCH DD UNIT=2311,DSNAME=&E,SPACE=(80,(200,50)),DISP=(NEW,PASS)
//SYSIN  DD    *
         TITLE 'TO TEST NSLOHDRI'
NSLTEST  START 0
         SAVE  (1,12),T            SAVE REGISTERS IN HIS SAVE AREA
         BALR  3,0
         USING *,3
         LA    4,SAVEAREA          MY SAVE AREA ADDR TO GR 4
         ST    4,8(0,13)           MY SAVE AREA ADDR TO HIS WD3
         ST    13,SAVEAREA+4       HIS SAVE AREA ADDR TO WD 2
         LA    13,SAVEAREA         MY SAVE AREA ADDR TO GR 13
         OPEN  (DATA1,(OUTPUT),DATA2,,DATA3)
         B     LAST
DATA1    DCB   DSORG=PS,MACRF=(PL),DDNAME=TAPE1,DEVD=TA,RECFM=FBS,      X
               LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
DATA2    DCB   DSORG=PS,MACRF=(GL),DDNAME=TAPE2,DEVD=TA,RECFM=FBS,      X
               LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
DATA3    DCB   DSORG=PS,MACRF=(GL),DDNAME=TAPE3,DEVD=TA,RECFM=FBS,      X
               LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
LAST     CLOSE (DATA1,REREAD,DATA2,REREAD,DATA3,REREAD)
         L     13,SAVEAREA+4
         RETURN (14,12)
SAVEAREA DS    18F
         END   NSLTEST
/*
//AAA   EXEC  PGM=IEWL,PARM=(XREF,LIST,LET,NCAL)
//SYSUT1 DD             UNIT=2311,SPACE=(TRK,(20,10)),DISP=(,DELETE)
//SYSLMOD DD  DSNAME=EBCLIB(EBC3),DISP=(OLD,KEEP)
//SYSPRINT DD SYSOUT=A
//SYSLIN DD DSNAME=&E,DISP=(OLD,DELETE)
//          DD  DDNAME=SYSIN
//SYSIN  DD *
 NAME    EBC3(R)
/*
```

Assemble Test Program (EBC3) and Link Edit into EBCLIB

```
1HDR                    TAPE181
1HDR                    TAPE182
```

80 Character Labels Used on Tapes 181 and 182

```
//GENE   JOB  0,GENECLARK,MSGLEVEL=1
//STEP    EXEC  PGM=IEHLIST
//VOL       DD  UNIT=2311,DISP=OLD,VOLUME=(,RETAIN,SER=111111)
//VOL2      DD  UNIT=2311,DISP=OLD,VOLUME=(,RETAIN,SER=222222)
//SYSPRINT DD   SYSOUT=A
//SYSIN     DD  *
          LISTCTLG  VOLUME=2311=111111
          LISTVTOC  DUMP,VOLUME=2311=111111
          LISTVTOC  DUMP,VOLUME=2311=222222
          LISTPDS   VOLUME=2311=111111,DSNAME=SYS1.MACLIB
          LISTPDS   VOLUME=2311=111111,DSNAME=SYS1.SVCLIB
/*
```

Used for Before and After Pictures of:

1. Catalogue
2. VTOC's
3. MACLIB Directory
4. SVCLIB Directory

```
//CDDD     JOB   0,EBCNSL,MSGLEVEL=1
//GENE1  EXEC  PGM=IEUASM,PARM=(DECK,RENT)
//SYSLIB DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT2  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT3  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSPRINT  DD SYSOUT=A
//SYSPUNCH DD DSNAME=&EBC,UNIT=2311,SPACE=(80,(200,50)),DISP=(NEW,PASS)
//SYSIN  DD    *
         TITLE ' MY ROUTINE AT OPEN TO HANDLE INPUT HDR '
NSLOHDRI START 0
***
***          NOTE THAT THE GETMAIN MACRO REQUIRES BASE REGISTER
***          ADDRESSIBILITY FOR ITS GENERATION -
***
         BALR  15,0                        PROVIDE ADDRESSABILITY
         USING *,15
***
         GETMAIN R,LV=240
         STM   2,14,0(1)                   STORE REGISTERS
         DROP  15
***
***          REGISTERS 2 TO 14 ARE SAVED IN AN AREA OF CORE ACQUIRED
***          BY WAY OF A GETMAIN MACRO   -   BASE REGISTER 1 HAS THE
***          ADDRESS OF THE AREA ACQUIRED
***
***          'DYNAMIC' IS THE NAME WE'VE GIVEN TO THE GETMAIN AREA
***          WE'VE DESCRIBED IN THE DSECT IN THIS PROGRAM
***
         BALR  3,0
         USING *,3
***
***          REGISTER 1 MUST BE DROPPED AS THE BASE REGISTER OF THE
***          DYNAMIC AREA BECAUSE WE ARE ABOUT TO 'EXCP' AND IT USES
***          REGISTER 1
***
         LR    4,1       RELEASE 1 FOR MACRO USE
         USING DYNAMIC,4
         USING IHADCB,10           GR10=ADDR OF DCB
         USING SYMWACBA,11         GR11=ADDR OF WACBA
         USING SYMUCB,12           GR12=ADDR OF UCB
***          INITIALIZE REGISTER 7 TO ZERO - THIS REGISTER IS USED
***          TO PASS OVER 4 BYTE ADDRESSES - THESE ADDRESSES ARE IN A
***          LIST OF ADDRESSES (WHICH ARE POINTERS TO ALL THE DCB'S
***          IN THE PROBLEM PROGRAM AREA) - THERE IS ONE ADDRESS FOR
***          EACH DCB ENTRY IN THE OPEN OR CLOSE  - WE GET THE ADDR OF
***          THE BEGINNING OF THIS LIST IN REG 5 DURING OPEN
         LA    7,0                 XR7 FOR DCB'S
***          INITIALIZE REGISTER 8 TO 36 - THIS REG IS USED TO PASS
***          OVER 8 BYTES AT A TIME - AFTER THE 1ST 32 BYTES EACH 8
***          BYTES CONTAINS (IN THE LOW ORDER BYTES) THE ADDRESS
***          OF THE 'WORK AND CONTROL BLOCK AREA' - ONE 'WORK AND
***          CONTROL BLOCK AREA' IS BUILT FOR EACH DCB IN THE OPEN OR
***          CLOSE MACRO - WE GET THE STARTING ADDR OF THE TABLE THAT
***          CONTAINS THE ADDR FOR EACH 'WORK AND CONTROL BLOCK AREA'
***          IN REG 6 DURING OPEN
***
         LA    8,36                XR8 FOR WACBA'S
DLOGIC   L     10,0(7,5)           ADDR OF DCB IN GR10
```

```
         L      11,0(8,6)          ADDR OF WACBA IN GR11
         L      12,DXDEBUCB        ADDR OF UCB IN GR12
***
*             IS THIS AN 'OUTPUT' DCB              YES IGNORES THIS DCB
*             AND CHECKS THE NEXT DCB
***
         TM     DCBOFLGS,X'80'      BIT 0 = 0 IF INPUT
         BO     MOUNT
***
*             IS THIS DCB ALREADY OPENED           YES IGNORES THIS DCB
*             AND CHECKS THE NEXT DCB
***
         TM     DCBOFLGS,X'10'          BIT 3 = 1 IF OPEN
         BO     MOUNT
***
*             IS THIS DCB FOR OTHER THAN TAPE      YES IGNORES THIS DCB
*             AND CHECKS THE NEXT DCB.
***
         TM     UCBTYP+2,X'80'     TEST UCB3 TAPE FOR 1
         BZ     MOUNT
***
         TM     SRTEDMCT,X'80'           IS MOUNT MSG BIT ON
         BZ     MOUNT
***
*             IS NSL BIT IN JFCB ON                YES GOES TO RD LABEL
*                                                  NO IGNORES THIS DCB
*             AND CHECKS THE NEXT DCB
***
         CLI    JFCBLTYP,X'04'      CHECK NSL BIT IN JFCB
         BE     BLOGIC              GOES TO ' MY ' ROUTINE
***
*** SET UP THE MOUNT MSG TO BE USED IN IGG0190B  - SEE WTO MACRO
***
MOUNT    MVC    DXCCW4(18),MSSG     MOVE IN SKELETON MSG
         MVC    DXCCW5+6(3),UCBNAME      MOVE  UNIT NAME TO MSG
         MVC    DXCCW6+2(6),JFCBVOLS     MOVE VOL SER NO FROM JFCB
***
******        TEST TO SEE IF THERE ARE MORE DCB'S OR IF WE'RE FINISHED
***
ALOGIC   LTR    10,10               FIRST BYTE IN CURRENT DCB
         BM     ELOGIC
***
*             INCREMENT GEN PURPOSE REG 7 AND 8 BY 4 AND 8 TO GET TO
*             NEXT 'DCB' IN THE LIST OF DCB'S AND THE
*             NEXT 'WORK AND CONTROL BLOCK AREA' RESPECTIVELY
***
         LA     7,4(0,7)           INCREMENT XR7 BY 4
         LA     8,8(0,8)           INCREMENT XR8 BY 8
         B      DLOGIC              GO TO CHECK NEXT DCB
MODNAME  DC     CL8'IGG0190B'
WTO      WTO    'HDR ON XXX CHECKS',MF=L
***
*             MY ROUTINE
*
*             WE SET THE HIGH ORDER BIT IN 'STREDMCT' IN THE DCB TO ZERO
*             IF WE DETERMINE VIA 'DS NAME' AND 'IHDR' THAT WE'VE WRONG
*             TAPE MOUNTED WE WILL PUT A ONE IN THIS BIT WHICH INDICATES
*             TO THE CONTROL PROGRAM THAT A MOUNT MSG IS IN ORDER
***
```

```
BLOGIC   NI    SRTEDMCT,X'7F'       TURN BIT 0 TO 0
***
*       BUILD THE CCW
*       NOTE THAT THIS IS NOT A GENERALIZED ROUTINE TO BUILD CCWS
***
         ST    11,DXCCW1       READ ADDR TO CCW
         MVI   DXCCW1,X'02'              READ
         MVI   DXCCW1+4,X'20'            FLAGS
         MVC   DXCCW1+6(2),=H'80'        COUNT
         XC    DXECB,DXECB               RESET ECB
         EXCP  DXIOB
         WAIT  ECB=DXECB                 WAIT FOR COMPLETION
         CLI   DXECB,X'7F'               ERROR CHECK
         BE    CHECK                     READ OK
         ABEND 256,DUMP                  ERROR ON READ
CHECK    CLC   DXLBL(5),=CL5'1HDR '
         BNE   ERROR1
         CLC   DXLBL+20(10),JFCBDSNM     COMPARE TO DSNAME
         BNE   ERROR2
         MVC   MSG,WTO
         MVC   MSG+11(3),UCBNAME
         LA    1,MSG
         WTO   MF=(E,(1))                EXECUTABLE INSTRUCTIONS
         MVC   DXCCW1+6(2),=H'1'         COUNT
         XC    DXECB,DXECB               RESET ECB
         EXCP  DXIOB                     TO POSITION TAPE PAST TAPE MARK
         WAIT  ECB=DXECB                 WAIT FOR COMPLETION
         B     ALOGIC                    READ OK
*
***
***          SET THE 'MOUNTING MESSAGE' BIT ON
***
ERROR2   OI    SRTEDMCT,X'80'            TURN BIT 0 TO ONE
ERROR1   EQU   ERROR2
         B     MOUNT
*
***
***          RETURN
***
ELOGIC   LA    15,DXCCW12   PTR TO SUPV PARAM LIST
         LA    11,MODNAME    PTR TO XCTL MODNAME
         LR    1,4         AREA TO BE FREED
         LM    12,14,REGSTOR+40        RESTORE REGISTERS
         LM    2,10,REGSTOR       RESTORE REGISTERS
         FREEMAIN R,LV=240,A=(1)    USES REGISTERS 0 AND 1
         XCTL  EPLOC=(11),SF=(E,(15))  USES REGISTERS SPECIFIED
***
*** CONSTANTS - - MSG TO BE MOVED TO DXCCW4 AND THEN USED BY IGG0190B
***
MSSG     DC    X'C0180CCC'
         DC    C'IEC101A M YYY,'
***
DYNAMIC  DSECT
REGSTOR  DS    13F
MSG      DS    CL21
***
***
***
         DCBD  DSORG=PS,DEVD=TA
```

```
***
***
***
SYMWACBA DSECT                    <-- or EBC2
         IECDSECT
SYMUCB   DSECT                    <-- or EBC1
         IEFUCBOB
         END   NSLOHDRI
/*
//            EXEC   PGM=IEWL,PARM='NCAL'
//SYSUT1 DD                UNIT=2311,SPACE=(TRK,(20,10)),DISP=(,DELETE)
//SYSLMOD    DD      DSNAME=SYS1.SVCLIB(NSLOHDRI),DISP=(OLD,KEEP)
//SYSPRINT   DD      SYSOUT=A
//SYSLIN DD DSNAME=&EBC,DISP=(OLD,DELETE)
//            DD      DDNAME=SYSIN
//SYSIN    DD    *
 NAME  NSLOHDRI(R)
/*
```

```
//HHHH  JOB    0,EBCGO,MSGLEVEL=1
//JOBLIB DD DSNAME=EBCLIB,DISP=(OLD,PASS)
//GE      EXEC  PGM=EBC3
//TAPE1 DD  UNIT=180,LABEL=(,NL),DSNAME=TAPE180
//TAPE2 DD UNIT=181,LABEL=(,NSL),VOLUME=SER=TAPE2,DSNAME=TAPE181
//TAPE3 DD UNIT=182,LABEL=(,NSL),VOLUME=SER=TAPE3,DSNAME=TAPE182
//SYSABEND  DD  SYSOUT=A
/*
```

Execute The Test Program

```
//SCRATCH  JOB   1,EBC1,MSGLEVEL=1
//         EXEC  PGM=IEHPROGM
//DLIB1    DD   UNIT=2311,VOLUME=SER=111111,DISP=(OLD)
//DLIB2    DD   UNIT=2311,VOLUME=SER=222222,DISP=(OLD)
//SYSPRINT DD   SYSOUT=A
//SYSABEND DD  SYSOUT=A
//SYSIN    DD   *
         SCRATCH VTOC,VOL=2311=111111,SYS,PURGE
         SCRATCH VTOC,VOL=2311=222222,SYS,PURGE
         SCRATCH DSNAME=EBC.DDDD,VOL=2311=222222,PURGE
/*
```

Used to regain the space the system has used for Scratch Data Sets

-or-

To avoid a duplicate name running job DDDD.

```
//GGGG  JCB    0,EBCGO,MSGLEVEL=1
//      EXEC   PGM=GO
//A   DD DSNAME=EBCLIB,SPACE=(CYL,(1,1,1)),VOLUME=SER=111111,          C
//               DISP=(NEW,CATLG),UNIT=2311
// VARY 192,OFFLINE
IEF236I ALLOC. FOR GGGG
IEF237I A         ON 190
IEF285I   EBCLIB                                          CATALOGED
IEF285I   VOL SER NOS= 111111.
```

Create a Library (EBCLIB) for the Test Program (EBC3)

```
//BBBB   JOB   0,EBCUBC,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT2 DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD    DATA
IEF236I ALLOC. FOR BBBB      STEPNAME
IEF237I SYSUT2   ON 190
IEF237I SYSIN    ON 00C
```

Put EBC1 in SYS1.MACLIB

```
./        ADD    EBC1,00,0,1
          MACRO
          EBC1
          DS     CL13
UCBNAME   DS     CL3            UNIT NAME IN EBCDIC CHARACTERS
UCBTYP    DS     XL4            DEVICE TYPE
          DS     CL15
SRTEDMCT  DS     XL1            MOUNT BIT IN HIGH ORDER BIT
          DS     CL32
          MEND
ABOVE NAME(EBC1    )FOUND IN   NM DIRECTORY,TTR IS NOW ALTERED
./        ENDUP
HIGHEST CONCODE WAS          00000000
```

```
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   SYS1.MACLIB                             KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//CCCC    JOB    0,EBCWACBA,MSGLEVEL=1
//STEPNAME EXEC  PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD    SYSOUT=A
//SYSUT2   DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN    DD    DATA
IEF236I ALLOC. FOR CCCC      STEPNAME
IEF237I SYSUT2   ON 190
IEF237I SYSIN    ON 00C
```

Put EBC2 in SYS1.MACLIb

```
./        ADD   EBC2,00,0,1
          MACRO
          EBC2
          SPACE 1
*                     VOLUME LABEL
          SPACE 1
DXLBL     DS    CL80
          DS    CL20
          SPACE 1
*                     JOB FILE CONTROL BLOCK
JFCBDSNM  DS    CL44 DATA SET NAME
          DS    CL22
JFCBLTYP  DS    CL1 LABEL TYPE
          DS    CL51
JFCBVOLS  DS    CL30 VOLUME SERIAL NUMBERS
          DS    CL28
          SPACE 1
*                     EVENT CONTROL BLOCK
          SPACE 1
DXECB     DS    0CL4
          DC    X'00000000'
          SPACE 1
*                     INPUT/OUTPUT BLOCK
          SPACE 1
DXIOB     DS    CL40
          SPACE 1
*                     DATA EXTENT BLOCK
          SPACE 1
          DS    CL28
DXDEBUCB  DS    F
          DS    CL12
          SPACE 1
*                     DATA CONTROL BLOCK
          SPACE 1
          DS    CL4
          SPACE 1
*                     CHANNEL CONTROL WORDS
          SPACE 1
          CNOP  0,8
DXCCW1    DS    D
          DS    CL16
DXCCW4    DS    D
DXCCW5    DS    D
DXCCW6    DS    D
          DS    CL40
DXCCW12   DS    D
          SPACE 1
```

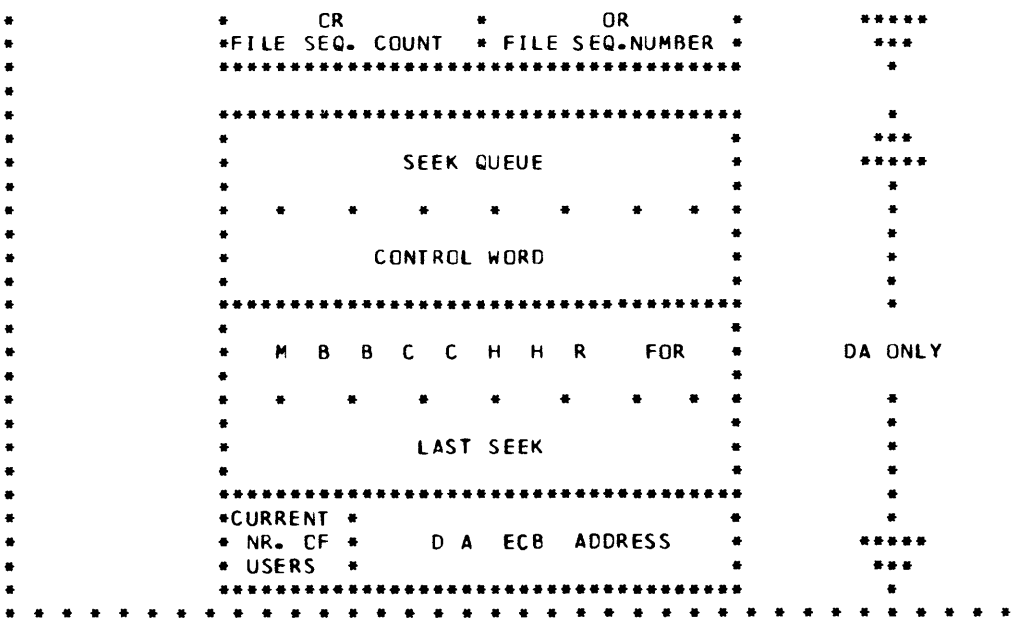
```
                                                    MEND
ABOVE NAME(EBC2     )FOUND IN    NM DIRECTORY,TTR IS NOW ALTERED
                                              ./       ENDUP
HIGHEST CONCODE WAS                  0CCCC000
```

```
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=        .
IEF285I   SYS1.MACLIB                             KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//JJJJ         JOB 0,EBCUBC,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT2 DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD    DATA
IEF236I ALLOC. FOR JJJJ      STEPNAME
IEF237I SYSUT2   ON 190
IEF237I SYSIN    ON 00C
```

Put IEFUCBOB IN SYS1.MACLIB

```
./       ADD   IEFUCBOB,00,0,1
         MACRO
         IEFUCBOB
*              DATE OF THIS UPDATE  13 JULY 65
*
*
*        THE INDIVIDUAL UCB S LOOK LIKE THIS.
*
*              ************************************          *
*              *   JOB  * ALLOC. *   UCB  * STATUS *         ***
*              *INTERNAL*CHANNEL *   ID   *    A   *        *****
*              * NUMBER *  MASK  *        *        *         *
*              ************************************          *
*              *  FLAG1 *  UNIT  *        *        *         *
*              *   AND  *ADDRESS *  FLAG2 * DEVTAB *         *
*              *CHAN.ADD*        *        *        *         *
*              ************************************          *
*              *        *        *        *        *         *
*              * ERRTAB * STATAB * LCHTAB * ATNTAB *         *
*              *        *        *        *        *
*              ************************************        ALL DEVICES
*              *SCH  IOS*                          *
*              *FLG  FLG*             UNIT NAME    *         *
*              *        *                          *         *
*              ************************************          *
*              *                                   *         *
*              *               TYPE                *         *
*              *                                   *         *
*              ************************************          *
*              *                 *                 *         *
*              *     LAST 12*    *      SENSE      *        *****
*              *                 *                 *         ***
*              ************************************          *
*              ************************************          *
*              *                                   *         *
*              *               SENSE               *        *****
*              *                                   *         *
*              ************************************          *
*              *                                   *         *
*              *      VOLUME    SERIAL             *         *
*              *                                   *
*              *   «    *    *   ******************       TAPE AND DA
*              *                * STATUS *  DATA   *
*              *                *    B   *MANAGMNT*         *
*              *                *        *  COUNT  *         *
*              ************************************          *
*              *  VTOC  TT      * VTOC R * SPARE  *          *
```




```
UCBOB     EQU *                UNIT CONTROL BLOCKS
          DS    0F
SRTEJBNR  DS    XL1                  JOB INTERNAL NUMBER
SRTECHAN  DS    XL1            ALLOC.CHANNEL MASK
UCBID     DS    XL1            UCB IDENTIFICATION
SRTESTAT  DS    XL1            STATUS BITS
SRTEONLI  EQU   128                  ONLINE
SRTECHGS  EQU   64                   CHANGE ONLINE/OFFLINE
SRTERESV  EQU   32                   RESERVED DEVICE
SRTEUNLD  EQU   16                   UNLOAD THIS DEVICE
SRTEALOC  EQU   8                    BIT 4 ALLOCATED
SRTEPRES  EQU   4                    BIT 5 PERMANENTLY RESIDENT
SRTESYSR  EQU   2                    BIT 6 SYSRES
*                                         OR PRIMARY CONSOLE
SRTEDADI  EQU   1                    BIT 7 DADSM INTERLOCK
*                                         OR TAPE CONTAINS
*                                         STANDARD LABELS,OR
*                                         ALTERNATE CONSOLE
UCBCHA    DS    XL1            FLAG1 AND CHANNEL ADDRESS
UCBUA     DS    XL1            UNIT ADDRESS
UCBFL2    DS    XL1            FLAG2
```

```
UCBDTI   DS    XL1          DEVICE TABLE
UCBETI   DS    XL1          ERROR TABLE
UCBSTI   DS    XL1          STATUS TABLE
UCBLCI   DS    XL1          LOGICAL CHANNEL TABLE
UCBATI   DS    XL1          ATTENTION TABLE
UCBWGT   DS    XL1          WEIGHT
UCBNAME  DS    CL3          UNIT NAME IN EBCDIC CHARACTERS
UCBTYP   DS    XL4          DEVICE TYPE
UCBTBYT1 EQU   UCBTYP             BYTE 1 OF UCBTYPE-MODEL
UCB1FEA0 EQU   128                BIT 0 OF OPTION FIELD
UCB1FEA1 EQU   64                 BIT 1 OF OPTION FIELD
UCB1FEA2 EQU   32                 BIT 2 OF OPTION FIELD
UCB1FEA3 EQU   16                 BIT 3 OF OPTION FIELD
UCB1FEA4 EQU   8                  BIT 4 OF OPTION FIELD
UCB1FEA5 EQU   4                  BIT 5 OF OPTION FIELD
UCB1FEA6 EQU   2                  BIT 6 OF OPTION FIELD
UCB1FEA7 EQU   1                  BIT 7 OF OPTION FIELD
UCBTBYT2 EQU   UCBTYP+1           BYTE 2 OF UCBTYPE-OPTIONS
UCBTBYT3 EQU   UCBTYP+2           BYTE 3 OF UCBTYPE-CLASS
UCB3TAPE EQU   128                BIT 0 OF CLASS - TAPE
UCB3COMM EQU   64                 BIT 1 OF CLASS - COMMUNIC.
UCB3DACC EQU   32                 BIT 2 OF CLASS - DIRECT AC
UCB3DISP EQU   16                 BIT 3 OF CLASS - DISPLAY
UCB3UREC EQU   8                  BIT 4 OF CLASS - UNIT REC.
UCB3CHAR EQU   4                  BIT 5 OF CLASS - CHAR.READ
UCBTBYT4 EQU   UCBTYP+3           BYTE 4 OF UCBTYPE-DEVICE
UCBLTS   DS    XL2          LAST 12*
UCBSNS   DS    XL6          SENSE INFORMATION
SRTEVOLI DS    CL6          VOLUME SERIAL
SRTESTAB DS    XL1          STATUS B
SRTEBSVL EQU   128                BIT 0 SHARED VOLUME
SRTEBVSC EQU   64                 BIT 1 VOLUME SECURITY
SRTEBALB EQU   32                 BIT 2 ADDIT.VOL.LABEL PROC
SRTEBPRV EQU   16                 BIT 3 PRIVATE
SRTEBPUB EQU   2                  BIT 4 PUBLIC
SRTEBVQS EQU   4                  BIT 5 VOLUME TO BE QUIESCE
*                                 BIT   TO MOUNT ANOTHER
SRTEBJLB EQU   2                  BIT 6 JOBLIB VOLUME
SRTEBNUL EQU   1                  BIT 7 CONTROL VOLUME
SRTEDMCT DS    XL1          DATA MANAGEMENT COUNT
SRTEFSCT DS    XL2          FILE SEQ. COUNT
SRTEFSEQ DS    XL2          FILE SEQ. NUMBER
UCBSQC   DS    2F           SEEK QUEUE CONTROL WORD
UCBSKA   DS    2F           MBBCCHHR FOR LAST SEEK
SRTEUSER DS    XL1          CURRENT NUMBER OF USERS
SRTEECBA DS    XL3          DA ECB ADDRESS
DATACELL EQU *           9 OF THESE BLOCKS WILL BE PRESENT
```

```
DCELJBNR DS    XL1          JOB INTERNAL
DCELUSER DS    XL1          CURRENT NUMBER OF USERS
DCELSTAB DS    XL1          STATUS B
DCELSTAT DS    XL1          STATUS A
DCELVOLI DS    CL6          VOLUME SERIAL
DCELVTOC DS    XL3          VTOC ADDRESS
DCELECBA DS    XL3          DA ECB ADDRESS
         MEND

ABOVE NAME(IEFUCBUR)NOT FOUND  IN NM DIRECTORY STOWED WITH TTR
                        ./       ENDUP
HIGHEST CONCODE WAS          00CC0000
```

```
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=
IEF285I   SYS1.MACLIB                             KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//IIII  JOB 0,ECBL,MSGLEVEL=1
//STEPNAME EXEC PGM=IEBUPDAT,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT2 DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSIN  DD    DATA
IEF236I ALLOC. FOR IIII     STEPNAME
IEF237I SYSUT2   ON 190
IEF237I SYSIN    ON 00C
```

Put IECDSECT in SYS1.MACLIB

```
./       ADD   IECDSECT,00,0,1
         MACRO
         IECDSECT
         SPACE 1
*                    THIS MACRO IS USED TO DEFINE THE WORK AREA
*                         FOR ALL MODULES OF OPEN,CLOSE,TCLOSE
*                         AND END OF VOLUME FOR O/S 360
         SPACE 1
*                    THIS MACRO DEFINES A WORK AREA WITH THE
*                         FOLLOWING FORMAT
         SPACE 1
*                              1.LABELS AND DSCB
*                                   LABELS
*                                        VOLUME LABEL
*                                        FILE LABEL 1
*                                        FILE LABEL 2
*                                   DSCB
*                                        FORMAT 1
*                                        FORMAT 3 KEY
*                                        FORMAT 3 DATA
*                                        CORE ADDRESS OF NEXT DSCB
*                                   MESSAGE AREA
*                                                          100 BYTES
*                              2.JFCB
*                                                          176 BYTES
*                              3.ECB
*                                                            4 BYTES
*                              4.IOB
*                                                           40 BYTES
*                              5.DEB
*                                                           44 BYTES
*                              6.DCB
*                                                            4 BYTES
*                              7.CCW S
*                                                           96 BYTES
         SPACE 1
*                                                  TOTAL *** 464 BYTES
         SPACE 2
* ***
* ***
* ***
* ***
         SPACE 1
*                         VOLUME LABEL
         SPACE 1
DXLBL    DS    0CL80
VOLLABI  DS    CL3                 LABEL IDENTIFIER
```

```
VOLNO    DS    CL1                VOLUME LABEL NUMBER
VOLSERNO DS    CL6
VOLSEC   DS    CL1
         DS    0CL10              RESERVED
VOLVTOC  DS    CL5
         DS    CL5
         DS    CL10               RESERVED
         DS    CL10               RESERVED
VOLOWNER DS    CL10               OWNER NAME AND ADDRESS CODE
         DS    CL29               RESERVED
         SPACE 1
*                    FILE LABEL 1
         SPACE 1
         ORG   DXLBL
FL1LABI  DS    CL3                LABEL IDENTIFIER
FL1NO    DS    CL1                FILE LABEL NUMBER
FL1ID    DS    CL17               FILE IDENTIFIER
FL1FILSR DS    CL6                FILE SERIAL NUMBER
FL1VOLSQ DS    CL4                VOLUME SEQUENCE NUMBER
FL1FILSQ DS    CL4                FILE SEQUENCE NUMBER
FL1GNO   DS    CL4                GENERATION NUMBER
FL1VNG   DS    CL2                VERSION NUMBER OF GENERATION
FL1CREDT DS    CL6                CREATION DATE
FL1EXPDT DS    CL6                EXPIRATION DATE
FL1FSEC  DC    C'0'               FILE SECURITY INDICATOR
FL1BLKCT DS    CL6                BLOCK COUNT
FL1SYSCD DS    CL13               SYSTEM CODE
FL1RES   DS    0CL7               RESERVED FOR FUTURE USE
         DS    CL1
FL1RES1  DS    CL6
         SPACE 1
*                    FILE LABEL 2
         SPACE 1
         ORG   FL1ID
FL2RECFM DS    CL1                RECORD FORMAT
FL2BLKL  DS    CL5                BLOCK LENGTH
FL2LRECL DS    CL5                BLOCKING FACTOR/RECORD LENGTH
FL2DEN   DS    CL1                DENSITY
FL2FILP  DS    CL1                FILE POSITION
FL2JSID  DS    0CL17              JOB/STEP IDENTIFICATION
FL2JOBD  DS    CL8                JOB IDENTIFICATION
FL2JSSP  DC    C'/'               SLASH
FL2STEPD DS    CL8                STEP IDENTIFICATION
FL2TRTCH DS    CL2                TAPE RECORDING TECHNIQUE
FL2CNTRL DS    CL1                CARRAIGE CONTROL CHARACTER
FL2RES   DS    CL43               RESERVED FOR FUTURE USE
         SPACE 1
```

```
*                    DATA SET CONTROL BLOCK
          SPACE 1
          ORG   DXLBL
DXDSCB    DS    0CL96
DSCFMTID  DC    C'1'
DSCFILSR  DS    CL6                 FILE SERIAL NUMBER
DSCVOLSR  DS    CL2
DSCCREDT  DS    CL3                 CREATION DATE IN DISCONTINOUS BIN
DSCEXPDT  DS    CL3                 EXPIRATION DATE IN DISCONTINOUS BIN
DSCNOEXT  DS    CL1
DSCBLDBL  DS    CL1
          DS    CL1
DSCSYSCD  DS    CL13                SYSTEM CODE
          DS    CL7
DSCFILTY  DS    CL2                 FILE TYPE
DSCRECFM  DS    CL1                 RECORD FORMAT
DSCOPTCD  DS    CL1                 OPTION CODE
DSCBLKL   DS    CL2                 BLOCK LENGTH
DSCLRECL  DS    CL2                 RECORD LENGTH
DSCKEYL   DS    CL1                 KEY LENGTH
DSCRKP    DS    CL2                 KEY LOCATION
DSCDSIND  DS    CL1
DSCSCALO  DS    CL4
DSCLSTAR  DS    CL5
DSCTRBAL  DS    CL2
DSCEXTYP  DS    CL1                 EXTENT TYPE INDICATOR
DSCEXTSQ  DS    CL1                 EXTENT SEQUENCE NUMBER
DSCLOWLM  DS    CL4
DSCUPPLM  DS    CL4
DSCEXT1   DS    CL10
DSCEXT2   DS    CL10
DSCNEXT   DS    CL5                 POINTER TO NEXT RECORD
DSCCORE   DS    CL4                 CORE ADDRESS OF NEXT DSCB RECORD
DSCBEND   EQU   *
          SPACE 1
*                    DATA SET CONTROL -FORMAT 3- KEY PORTION
          SPACE 1
          ORG   DXDSCB
DXDSCB3K  DS    0CL40
DSCBF3C   DC    X'03030303'
DSCBEXSK  DS    0CL40
DSCBEXTY  DS    CL1                 EXTENT TYPE INDICATOR
DSCBEXSQ  DS    CL1                 EXTENT SEQUENCE NUMBER
DSCBLLMT  DS    CL4                 CCHH LOWER LIMIT
DSCBULMT  DS    CL4                 CCHH UPPER LIMIT
DSCBEX2   DS    CL10                ADDITIONAL EXTENT
DSCBEX3   DS    CL10                ADDITIONAL EXTENT
```

```
DSCBEX4  DS    CL10                ADDITIONAL EXTENT
         SPACE 1
*                  DATA SET CONTROL BLOCK -FORMAT 3- RECORD PORTION
         SPACE 1
         ORG   DXDSCB
DXCBFMID DC    C'3'                FORMAT ID
DSCBEXSD DS    0CL90               ADDITIONAL EXTENTS
DSCBEX5  DS    CL10                ADDITIONAL EXTENT
DSCBEX6  DS    CL10                ADDITIONAL EXTENT
DSCBEX7  DS    CL10                ADDITIONAL EXTENT
DSCBEX8  DS    CL10                ADDITIONAL EXTENT
DSCBEX9  DS    CL10                ADDITIONAL EXTENT
DSCBEXA  DS    CL10                ADDITIONAL EXTENT
DSCBEXB  DS    CL10                ADDITIONAL EXTENT
DSCBEXC  DS    CL10                ADDITIONAL EXTENT
DSCBEXD  DS    CL10                ADDITIONAL EXTENT
DSCBNEXT DS    CL5                 CCHHR OF NEXT FORMAT 3 DSCB
         SPACE 1
*                  MESSAGE AREA
         SPACE 1
         ORG   DXDSCB
REPLYLTH DS    CL1
REPLYADR DS    CL3
REPLYECB DS    CL4
MSGLSTSZ DS    CL4
MESSAGEA DS    CL60
REPLY    DS    CL10
*
         ORG   MESSAGEA
*        DEFINITION OF LENGTH OF MESSAGE COMPONENTS
*
MSERL    EQU   3                   MESSAGE SERIAL NUMBER LENGTH
MINSTL   EQU   6                   MSG INSTRUCTION LTH INC MSG SER
MUNL     EQU   3                   MESSAGE UNIT NAME LENGTH
MVOLL    EQU   6                   MESSAGE VOLUME SERIAL LENGTH
* MTXTL         LENGTH MAY BE DEFINED BY EACH MODULE TO FIT REQUIREMENT
* MSGLTH        LENGTH OF FULL MSG DEFINED BY EACH MODULE
*               MESSAGE FORMAT IS IEC000A M 000,00000  TEXT
MSGIOSUP DC    CL3'IEC'            I/O SUPPORT MESSAGE IDENTITY
MSGSER   DS    0CL3                MESSAGE SERIAL NUMBER
         ORG   MSGSER MSERL-1
MSGSERLO DS    CL1                 VOLUME SERIAL LO ORDER BYTE
         ORG   MSGSER
MSGINSTR DC    CL6'000A M'         MESSAGE INSTRUCTION INCL MSGSER
         ORG   MSGINSTR MINSTL-1
MSGACTN  DS    CL1                 MESSAGE ACTION REQD BY OPERATOR
         DC    C' '
```

```
MSGUN     DC    CL3'000'            UNIT NAME THAT MSG REFERS TO
          DC    C','
MSGVOLSR  DC    CL6'000000'         VOLUME SERIAL THAT MSG REFRS TO
          DC    C','
MSGTEXT   DS    0CL38
          SPACE 1
*                    JOB FILE CONTROL BLOCK
          ORG   DSCBEND
DXJBF     DS    0CL176
*********************************************************************
*
*                   JFCB
*
*********************************************************************
INFMJFCB  EQU   *
JFCBDSNM  DS    CL44 DATA SET NAME
JFCBELNM  DS    CL8 ELEMENT NAME OR VERSION
JFCBTSDM  DS    CL1 TASK SCHEDULER - DATA
*                                          MANAGEMENT INFERFACE BYTE
JFCBSYSC  DS    CL13 SYSTEM CODE
JFCBLTYP  DS    CL1 LABEL TYPE AND USER'S-LABEL
*                                         INDICATOR
          DS    CL1 NOT USED
JFCBFLSQ  DS    CL2 FILE SEQUENCE NUMBER
JFCBVLSQ  DS    CL2 VOLUME SEQUENCE NUMBER
JFCBMASK  DS    CL8 DATA MANAGEMENT MASK
JFCBCRDT  DS    CL3 DATA SET CREATION DATE
JFCBXPDT  DS    CL3 DATA SET EXPIRATION DATE
JFCBIND1  DS    CL1 INDICATOR BYTE 1
JFCBRLSE  EQU   64 BITS 0 AND 1 - EXTERNAL
*                                          STORAGE RELEASE INDICATOR
JFCBLOCT  EQU   16 BITS 2 AND 3 - DATA SET
*                                          HAS BEEN LOCATED
JFCBNEWV  EQU   4 BITS 4 AND 5 - NEW VOLUME
*                                          ADDED TO DATA SET
JFCBPMEM  EQU   1 BITS 6 AND 7 - DATA SET IS
*                                          A MEMBER OF A PODS OR GDG
JFCBIND2  DS    CL1 INDICATOR BYTE 2
JFCBSTAT  EQU   64 BITS 0 AND 1 - DATA SET
*                                         STATUS (NEW, OLD, OR MOD)
JFCBSCTY  EQU   16 BITS 2 AND 3 - DATA SET
*                                          SECURITY INDICATOR
JFCBUFNO  DS    0AL1
JFCBUFRQ  DS    AL1
JFCBFTEK  DS    0BL1
JFCBFALN  DS    BL1
JFCBUFL   DS    AL2
```

```
JFCEROPT DS    BL1
JFCTRTCH DS    OBL1
JFCKEYLE DS    OAL1
JFCMODE  DS    OBL1
JFCCODE  DS    OBL1
JFCSTACK DS    OBL1
JFCPRTSP DS    BL1
JFCDEN   DS    BL1
JFCLIMCT DS    AL3
JFCDSORG DS    BL2
JFCRECFM DS    BL1
JFCOPTCD DS    BL1
JFCBLKSI DS    AL2
JFCLRECL DS    AL2
JFCNCP   DS    AL1
JFCNTM   DS    AL1
JFCRKP   DS    AL2
JFCCYLOF DS    AL1
JFCDBUFN DS    AL1
JFCINTVL DS    AL1
JFCCPRI  DS    BL1
JFCSOWA  DS    AL2
JFCBNTCS DS    CL1 NUMBER OF OVERFLOW TRACKS
JFCBNVOL DS    CL1 NUMBER OF VOLUME SERIAL
*                                          NUMBERS
JFCBVOLS DS    CL30 VOLUME SERIAL NUMBERS (THE
*                                          FIRST FIVE)
JFCBEXTL DS    CL1 LENGTH OF BLOCK OF EXTRA
*                                          VOLUME SERIAL NUMBERS
*                                          (BEYOND FIVE)
JFCBEXAD DS    CL3 TRACK ADDRESS OF BLOCK OF
*                                          EXTRA VOLUME SERIAL NUMBERS
JFCBPQTY DS    CL3 PRIMARY QUANTITY OF D.A.
*                                          STORAGE REQUIRED
JFCBCTRI DS    CL1 INDICATES WHETHER CYLINDERS
*                                          TRACKS, OR RECORDS ARE
*                                          SPECIFIED IN JFCBPQTY AND
*                                          JFCBSQTY
JFCBSQTY DS    CL3 SECONDARY QUANTITY OF D.A.
*                                          STORAGE REQUIRED
JFCBIND3 DS    CL1 INDICATOR BYTE 3
JFCBCNTG EQU   64 BITS 0 AND 1 - CONTIGUOUS
*                                           STORAGE INDICATOR
JFCBMXIG EQU   16 BITS 2 AND 3 - MAXIMUM
*                                           AVAILABLE EXTENT INDICATOR
JFCBALXI EQU   4 BITS 4 AND 5 - ALL EXTENTS
*                                           INDICATOR
```

```
JFCBRNDC EQU   1 BIT 6 AND 7 - ROUND
*                                          CYLINDER INDICATOR
JFCBDQTY DS    CL3 QUANTITY OF D.A. STORAGE
*                                          REQUIRED FOR A DIRECTORY
JFCBSPNM DS    CL3 CORE ADDRESS OF THE JFCB
*                                          WITH WHICH CYLINDERS ARE
*                                          SPLIT
JFCBABST DS    CL2 RELATIVE ADDRESS OF FIRST
*                                          TRACK TO BE ALLOCATED
JFCBSBNM DS    CL3 CORE ADDRESS OF THE JFCB
*                                          FROM WHICH SPACE IS TO BE
*                                          SUBALLOCATED
JFCBDRLA DS    CL3 AVERAGE DATA RECORD LENGTH
JFCBVLCT DS    CL1 VOLUME COUNT
JFCBSPTN DS    CL1 NUMBER OF TRACKS PER
*                                          CYLINDER TO BE USED BY THIS
*                                          DATA SET WHEN SPLIT
*                                          CYLINDERS IS INDICATED
JFCBLGTH EQU   176 LENGTH OF JFCB
JFCBEND  EQU   *
*                    EVENT CONTROL BLOCK
         SPACE 1
DXECB    DS    0CL4
         DC    X'00000000'
         SPACE 1
*                    INPUT/OUTPUT BLOCK
         SPACE 1
DXIOB    DS    0CL32
IOBFLAG1 DC    X'00'
IOBFLAG2 DC    X'00'
IOBSENSE DS    0H
IOBSENS0 DS    CL1                                Q Q
*
IOBSENS1 DS    CL1                 SENSE BYTE T1T
IOBECBPT DS    XL1
         DC    AL3(DXECB)
IOBCSW   DS    0D
IOBCOMAD DC    X'00000000'         KEY,0000,COMMAND ADDRESS
IOBSTAT0 DC    X'00'               STATUS BYTE 0
IOBSTAT1 DC    X'00'               STATUS BYTE 1
IOBCNT   DC    X'0000'             COUNT
IOBSIOCC DS    XL1
IOBSTART DC    AL3(DXCCW)
IOBWGHT  DS    XL1
IOBDCBPT DC    AL3(DXDCB)
         DS    XL1
         DS    XL3
```

```
IOBINCAM DC    X'0000'
IOBERRCT DS    XL2
DXDAADDR DS    D                    DIRECT ACCESS ADDRESS MBBCCHHR
         SPACE 1
*                    DATA EXTENT BLOCK
         SPACE 1
DYYYY    DS    0CL44
DXDEB    EQU   DYYYY-4
DXDEBDEB DC    X'00000000'
DXDEBDFL DS    0CL1
DXDEBIRB DC    X'00000000'
DXDEBSYS DC    X'00000000'
DXDEBUSR DC    X'00000000'
DXDEBECB DC    X'00000000'
DXDEBID  DS    0CL1
DXDEBDCB DC    AL4(DXDCB)
DXDCBAD  EQU   DXDEBDCB
DXDEBAPP DS    CL4
DXDEBMOD DS    0CL1
DXDEBUCB DS    F
DXDEBBIN DS    H
DXDEBSCC DS    H
DXDEBSHH DS    H
DXDEBECC DS    H
DXDEBEHH DS    H
DXDEBNTR DS    H
         SPACE 1
*                    DATA CONTROL BLOCK
         SPACE 1
DXXXX    DS    0F
DXDCB    EQU   DXXXX-44             POINTER TO RELATIVE BEGINNING OF DCB
DXDCBDEB DC    A(DXDEB)
*                    CHANNEL CONTROL WORDS
         SPACE 1
         CNOP  0,8
DXCCW    DS    0CL96
DXCCW1   DS    D
DXCCW2   DS    D
DXCCW3   DS    D
DXCCW4   DS    D
DXCCW5   DS    D
DXCCW6   DS    D
DXCCW7   DS    D
DXCCW8   DS    D
DXCCW9   DS    D
DXCCW10  DS    D
DXCCW11  DS    D
```

```
                         DXCCW12  DS    D
                                  SPACE 1
                         DSECTSIZ EQU   464          CORE AREA REQUIRED FOR THIS MACRO
                                  MEND

ABOVE NAME(IECDSECT)NOT FOUND  IN NM DIRECTORY STOWED WITH TTR
                                  ./      ENDUP
HIGHEST CONCODE WAS                00CCC000
```

```
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=
IEF285I   SYS1.MACLIB                             KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//AAAA   JOB   0,EBC,MSGLEVEL=1
//AA     EXEC  PGM=IEUASM,PARM=(DECK)
//SYSLIB DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT2  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSUT3  DD   UNIT=2311,SPACE=(1700,(400,50))
//SYSPRINT  DD SYSOUT=A
//SYSPUNCH DD UNIT=2311,DSNAME=&E,SPACE=(80,(200,50)),DISP=(NEW,PASS)
//SYSIN  DD    *
IEF236I ALLOC. FOR AAAA     AA
IEF237I SYSLIB   ON 190
IEF237I SYSUT1   ON 190
IEF237I SYSUT2   ON 190
IEF237I SYSUT3   ON 191
IEF237I SYSPUNCH ON 190
IEF237I SYSIN    ON 00C
```

Assemble Test Program (EBC3) and Link Edit Into EBCLIB

EXTERNAL SYMBOL DICTIONARY

SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
NSLTEST	SD	01	000000	000184	

```
  LOC   OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                  F24JUNE66 10/07/66
000000                                  2 NSLTEST  START 0
                                        3          SAVE  (1,12),T          SAVE REGISTERS IN HIS SAVE AREA
000000                                  4+         DS    0H
000000 90EC D00C              0000C     5+         STM   14,12,12(13) SAVE REGISTERS
000004 0530                             6          BALR  3,0
000006                                  7          USING *,3
000006 4140 3166              0016C     8          LA    4,SAVEAREA          MY SAVE AREA ADDR TO GR 4
00000A 5040 D008              00008     9          ST    4,8(0,13)           MY SAVE AREA ADDR TO HIS WD3
00000E 50D0 316A              0017C    10          ST    13,SAVEAREA+4       HIS SAVE AREA ADDR TO WD 2
000012 41D0 3166              0016C    11          LA    13,SAVEAREA         MY SAVE AREA ADDR TO GR 13
                                       12          OPEN  (DATA1,(OUTPUT),DATA2,,DATA3)
000016 0700                            13+         CNOP  0,4
000018 4510 3022              00028    14+         BAL   1,*+16 LOAD REG1 W/LIST ADDR.
00001C 0F                              15+         DC    AL1(15) OPTION BYTE
00001D 000030                          16+         DC    AL3(DATA1) DCB ADDRESS
000020 00                              17+         DC    AL1(0) OPTION BYTE
000021 000090                          18+         DC    AL3(DATA2) DCB ADDRESS
000024 80                              19+         DC    AL1(128) OPTION BYTE
000025 0000F0                          20+         DC    AL3(DATA3) DCB ADDRESS
000028 0A13                            21+         SVC   19 ISSUE OPEN SVC
00002A 47F0 314A              0015C    22          B     LAST
                                       23 DATA1    DCB   DSORG=PS,MACRF=(PL),DDNAME=TAPE1,DEVD=TA,RECFM=FBS,      X
                                                         LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
                                       24                *,***  IH8063  DDNAME SHORT-PADDED TO 8 CHAR


                                       26+*                      DATA CONTROL BLOCK
                                       27+*
00002E                                 28+        ORG   *-0 TO ELIMINATE UNUSED SPACE
000030                                 29+DATA1   DS    0F ORIGIN ON WORD BOUNDRY
000030                                 30+        ORG   *+0 TO ORIGIN GENERATION

                                       32+*                      MAGNETIC TAPE DEVICE INTERFACE

000030 0000000000000000                34+        DC    BL16'0' NERRS,NOISE,UERRS,BLKCT
000040 00                              35+        DC    BL1'00000000' TRTCH
000041 000000                          36+        DC    BL3'000000000000000000000000' DEVT,DEN

                                       38+*                      COMMON ACCESS METHOD INTERFACE

000044 01                              40+        DC    AL1(1) BUFNO
000045 000001                          41+        DC    AL3(1) BUFCB
000048 0000                            42+        DC    AL2(0) BUFL
00004A 4000                            43+        DC    BL2'0100000000000000' DSORG
00004C 00000001                        44+        DC    A(1) ICBAD

                                       46+*                      FOUNDATION EXTENSION

000050 42                              48+        DC    BL1'01000010' BFTEK,BFALN
000051 000001                          49+        DC    AL3(1) ECDAD
000054 98                              50+        DC    BL1'10011000' RECFM
000055 000000                          51+        DC    AL3(0) EXLST

                                       53+*                      FOUNDATION BLOCK

000058 E3C1D7C5F1404040                55+        DC    CL8'TAPE1' DDNAME
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                        F24JUNE66 10/07/66
000060 02                           56+          DC     BL1'00000010' OFLGS
000061 00                           57+          DC     BL1'00000000' IFLG
000062 0048                         58+          DC     BL2'0000000001001000' MACR

                                    60+*                             BSAM-BPAM-QSAM INTERFACE

000064 00                           62+          DC     BL1'00000000'
000065 000001                       63+          DC     AL3(1) CHECK, GERR, PERR
000068 00000001                     64+          DC     A(1) SYNAD
00006C 0000                         65+          DC     H'0' CIND1, CIND2
00006E 0050                         66+          DC     AL2(80) BLKSIZE
000070 00000000                     67+          DC     F'0' WCPC, WCPL, OFFSR, OFFSW
000074 00000001                     68+          DC     A(1) ICBA
000078 00                           69+          DC     AL1(0) NCP
000079 000001                       70+          DC     AL3(1) EOBR, EOBAD

                                    72+*                                  QSAM INTERFACE

00007C 00000001                     74+          DC     A(1) RECAD
000080 0000                         75+          DC     H'0' QSWS
000082 0050                         76+          DC     AL2(80) LRECL
000084 20                           77+          DC     BL1'00100000' EROPT
000085 000001                       78+          DC     AL3(1) CNTRL
000088 00000000                     79+          DC     F'0' PRECL
00008C 00000001                     80+          DC     A(1) EOB
                                    81 DATA2     DCB    DSORG=PS,MACRF=(GL),DDNAME=TAPE2,DEVD=TA,RECFM=FBS,       X
                                                        LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
                                    82                  *,***  IHB063  DDNAME SHORT-PADDED TO 8 CHAR


                                    84+*                             DATA CONTROL BLOCK
                                    85+*
000090                              86+          ORG    *-0 TO ELIMINATE UNUSED SPACE
000090                              87+DATA2     DS     OF ORIGIN ON WORD BOUNDRY
000090                              88+          ORG    *+0 TO ORIGIN GENERATION

                                    90+*                             MAGNETIC TAPE DEVICE INTERFACE

000090 0000000000000000             92+          DC     BL16'0' NERRS,NOISE,UERRS,BLKCT
0000A0 00                           93+          DC     BL1'00000000' TRTCH
0000A1 000000                       94+          DC     BL3'000000000000000000000000' DEVT,DEN

                                    96+*                             COMMON ACCESS METHOD INTERFACE

0000A4 01                           98+          DC     AL1(1) BUFNO
0000A5 000001                       99+          DC     AL3(1) BUFCB
0000A8 0000                        100+          DC     AL2(0) BUFL
0000AA 4000                        101+          DC     BL2'0100000000000000' DSORG
0000AC 00000001                    102+          DC     A(1) ICBAD

                                   104+*                             FOUNDATION EXTENSION

0000B0 42                          106+          DC     BL1'01000010' BFTEK,BFALN
0000B1 000001                      107+          DC     AL3(1) EODAD
0000B4 98                          108+          DC     BL1'10011000' RECFM
0000B5 000000                      109+          DC     AL3(0) EXLST
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT    SOURCE STATEMENT                                                F24JUNE66 10/07/66

                                  111+*                           FOUNDATION BLOCK

 0000B8 E3C1D7C5F2404040          113+          DC      CL8'TAPE2' DDNAME
 0000C0 02                        114+          DC      BL1'00000010' OFLGS
 0000C1 00                        115+          DC      BL1'00000000' IFLG
 0000C2 4800                      116+          DC      BL2'0100100000000000' MACR

                                  118+*                           BSAM-BPAM-QSAM INTERFACE

 0000C4 00                        120+          DC      BL1'00000000'
 0000C5 000001                    121+          DC      AL3(1) CHECK, GERR, PERR
 0000C8 00000001                  122+          DC      A(1) SYNAD
 0000CC 0000                      123+          DC      H'0' CIND1, CIND2
 0000CE 0050                      124+          DC      AL2(80) BLKSIZE
 0000D0 00000000                  125+          DC      F'0' WCPC, WCPL, OFFSR, OFFSW
 0000D4 00000001                  126+          DC      A(1) IOBA
 0000D8 00                        127+          DC      AL1(0) NCP
 0000D9 000001                    128+          DC      AL3(1) EOBR, EOBAD

                                  130+*                                QSAM INTERFACE

 0000DC 00000001                  132+          DC      A(1) RECAD
 0000E0 0000                      133+          DC      H'0' QSWS
 0000E2 0050                      134+          DC      AL2(80) LRECL
 0000E4 20                        135+          DC      BL1'00100000' EROPT
 0000E5 000001                    136+          DC      AL3(1) CNTRL
 0000E8 00000000                  137+          DC      F'0' PRECL
 0000EC 00000001                  138+          DC      A(1) ECB
                                  139 DATA3     DCB     DSORG=PS,MACRF=(GL),DDNAME=TAPE3,DEVD=TA,RECFM=FBS,        X
                                                        LRECL=80,BLKSIZE=80,BUFNO=1,BFALN=D,BFTEK=S,EROPT=ABE
                                  140                   *,*** IHB063  DDNAME SHORT-PADDED TO 8 CHAR


                                  142+*                           DATA CONTROL BLOCK
                                  143+*
 0000F0                           144+          ORG     *-0 TO ELIMINATE UNUSED SPACE
 0000F0                           145+DATA3     DS      0F ORIGIN ON WORD BOUNDRY
 0000F0                           146+          ORG     *+0 TO ORIGIN GENERATION

                                  148+*                           MAGNETIC TAPE DEVICE INTERFACE

 0000F0 0000000000000000          150+          DC      BL16'0' NERRS,NOISE,UERRS,BLKCT
 000100 00                        151+          DC      BL1'00000000' TRTCH
 000101 000000                    152+          DC      BL3'000000000000000000000000' DEVT,DEN

                                  154+*                           COMMON ACCESS METHOD INTERFACE

 000104 01                        156+          DC      AL1(1) BUFNO
 000105 000001                    157+          DC      AL3(1) BUFCB
 000108 0000                      158+          DC      AL2(0) BUFL
 00010A 4000                      159+          DC      BL2'0100000000000000' DSORG
 00010C 00000001                  160+          DC      A(1) IOBAD

                                  162+*                           FOUNDATION EXTENSION

 000110 42                        164+          DC      BL1'01000010' BFTEK,BFALN
```

```
 LOC   OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000111 000001                      165+          DC    AL3(1) ECBAD
000114 98                          166+          DC    BL1'10011000' RECFM
000115 000000                      167+          DC    AL3(0) EXLST

                                   169+*                       FOUNDATION BLOCK

000118 E3C1D7C5F3404040            171+          DC    CL8'TAPE3' DDNAME
000120 02                          172+          DC    BL1'00000010' OFLGS
000121 00                          173+          DC    BL1'00000000' IFLG
000122 4800                        174+          DC    BL2'0100100000000000' MACR

                                   176+*                       BSAM-BPAM-QSAM INTERFACE

000124 00                          178+          DC    BL1'00000000'
000125 000001                      179+          DC    AL3(1) CHECK, GERR, PERR
000128 00000001                    180+          DC    A(1) SYNAD
00012C 0000                        181+          DC    H'0' CIND1, CIND2
00012E 0050                        182+          DC    AL2(80) BLKSIZE
000130 00000000                    183+          DC    F'0' WCPC, WCPL, OFFSR, OFFSW
000134 00000001                    184+          DC    A(1) ICBA
000138 00                          185+          DC    AL1(0) NCP
000139 000001                      186+          DC    AL3(1) ECBR, EOBAD

                                   188+*                            QSAM INTERFACE

00013C 00000001                    190+          DC    A(1) RECAD
000140 0000                        191+          DC    H'0' QSWS
000142 0050                        192+          DC    AL2(80) LRECL
000144 20                          193+          DC    BL1'00100000' EROPT
000145 000001                      194+          DC    AL3(1) CNTRL
000148 00000000                    195+          DC    F'0' PRECL
00014C 00000001                    196+          DC    A(1) ECB
                                   197 LAST      CLOSE (DATA1,REREAD,DATA2,REREAD,DATA3,REREAD)
000150                             198+          CNOP  0,4
000150 4510 315A           0016C   199+LAST      BAL   1,*+16 BRANCH AROUND LIST
000154 10                          200+          DC    AL1(16) OPTION BYTE
000155 000030                      201+          DC    AL3(DATA1) DCB ADDRESS
000158 10                          202+          DC    AL1(16) OPTION BYTE
000159 000090                      203+          DC    AL3(DATA2) DCB ADDRESS
00015C 90                          204+          DC    AL1(144) OPTION BYTE
00015D 0000F0                      205+          DC    AL3(DATA3) DCB ADDRESS
000160 0A14                        206+          SVC   20 ISSUE CLOSE SVC
000162 58D0 316A           0017C   207           L     13,SAVEAREA+4
                                   208           RETURN (14,12)
000166 98EC C00C           C000C   209+          LM    14,12,12(13) RESTORE THE REGISTERS
00016A 07FE                        210+          BR    14 RETURN
00016C                             211 SAVEAREA  DS    18F
000000                             212           END   NSLTEST
```

POS.ID	REL.ID	FLAGS	ADDRESS
01	01	08	CCCC1D
01	01	08	CCCC21
01	01	08	CCCC25
01	01	08	CC0155
01	01	08	CC0159
01	01	08	CC015D

SYMBOL	LEN	VALUE	DEFN	REFERENCES			
DATA1	00004	000030	0029	0016	0201		
DATA2	00004	000090	0087	0018	0203		
DATA3	00004	0000F0	0145	002C	0205		
LAST	00004	000150	0199	0022			
NSLTEST	00001	000000	0002	0212			
SAVEAREA	00004	00016C	0211	0008	0010	0011	0207

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
205 PRINTED LINES

```
IEF285I   SYS1.MACLIB                                          KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00000001 DELETED
IEF285I   VOL SER NOS= 111111.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00000002 DELETED
IEF285I   VOL SER NOS= 111111.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCCC0003 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   SYSOUT                                               SYSOUT
IEF285I   VOL SER NOS=
IEF285I   E.AAAA                                               PASSED
IEF285I   VOL SER NOS= 111111.
//AAA   EXEC  PGM=IEWL,PARM=(XREF,LIST,LET,NCAL)
//SYSUT1 DD             UNIT=2311,SPACE=(TRK,(20,10)),DISP=(,DELETE)
//SYSLMOD DD  DSNAME=EBCLIB(EBC3),DISP=(OLD,KEEP)
//SYSPRINT DD SYSOUT=A
//SYSLIN DD DSNAME=&E,DISP=(OLD,DELETE)
//         DD  DDNAME=SYSIN
//SYSIN  DD *
IEF236I ALLOC. FOR AAAA     AAA
IEF237I SYSUT1   ON 191
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 190
IEF237I          ON 00C
```

```
   F-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED--XREF,LIST,LET,NCAL
IEW0000     NAME     EBC3(R)
IEW0000    EBC3       NOW REPLACED IN DATA SET


                                          ----  CROSS REFERENCE TABLE  ----

  CONTROL SECTION                          ENTRY

    NAME     ORIGIN  LENGTH                  NAME    LOCATION      NAME    LOCATION      NAME    LOCATION      NAME    LOCATION

  NSLTEST         00      1B4


  LOCATION  REFERS TO SYMBOL   IN CONTROL SECTION

 ENTRY ADDRESS         00
 TOTAL LENGTH         1B4
```

```
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCCCCCC6 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   EBCLIB                                        KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   SYSOUT                                        SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   E.AAAA                                        DELETED
IEF285I   VOL SER NOS= 111111.
```

```
//GENE   JOB  0,GENECLARK,MSGLEVEL=1
//STEP    EXEC  PGM=IEHLIST
//VOL       DD  UNIT=2311,DISP=OLD,VOLUME=(,RETAIN,SER=111111)
//VOL2      DD  UNIT=2311,DISP=OLD,VOLUME=(,RETAIN,SER=222222)
//SYSPRINT  DD  SYSOUT=A
//SYSIN     DD  *
IEF236I ALLOC. FOR GENE      STEP
IEF237I VOL       ON 190
IEF237I VOL2      ON 191
IEF237I SYSIN     ON 00C
```

Print

1. Catalogue
2. VTOC's
3. MACLIB Directory
4. SVCLIB Directory

SYSTEMS SUPPORT UTILITIES---IEHLIST PAGE 0001

GENERAL INFORMATION FOR CATALOG ON VOL 111111

DS OR INDEX NAME	ENTRY TYPE	VOL.ID.	SEQ.NO.	DEV.TYPE	ALIAS OF
EBCLIB	DATA SET	111111	000000	30002001	
UT1	DATA SET	222222	000000	30002001	
UT2	DATA SET	222222	000000	30002001	
UT3	DATA SET	111111	000000	30002001	

LISTING OF ENTIRE CATALOG

SYS1.COBLIB	111111	000000	30002001	
SYS1.DASDUM	111111	000000	30002001	
SYS1.FORTLIB	111111	000000	30002001	
SYS1.JOBLIB	222222	000000	30002001	
SYS1.LINKLIB	222222	000000	30002001	
SYS1.MACLIB	111111	000000	30002001	
SYS1.NUCLEUS	111111	000000	30002001	
SYS1.PLILIB	111111	000000	30002001	
SYS1.PROCLIB	222222	000000	30002001	
SYS1.SORTLIB	111111	000000	30002001	
SYS1.SVCLIB	111111	000000	30002001	
SYS1.SYSJOBQE	111111	000000	30002001	
TEST.LOAD	TESTVL	000000	30002001	
TEST.OBJECT	TESTVL	000000	30002001	
TEST.SOURCE	TESTVL	000000	30002001	

```
                 CONTENTS OF VTOC ON VOL 111111
LINE 1 = DSNAME                    . . . . 5 . . . .10 . . . .15 . . . .20 . . . .25 . . . .30 . . . .35 . . . .40 . . . .
LINE 2 = 45 . . . .50 . . . .55 . . . .60 . . . .65 . . . .70 . . . .75 . . . .80 . . . .85 . . . .90 . . . .95 . . . .
LINE 3 =100 . . . 105 . . . 110 . . . 115 . . . 120 . . . 125 . . . 130 . . . 135 . . . 140           DSCB ADDR (CCHHR)
FORMAT 4 DSCB           04040404040404040404040404040404040404040404040404040404040404040404040404040404040404040404
         F4005F000104008000C80000001E0001000000CB000A0E29523714010219100A0000000000000000000000000000000000000000000000
         0000000000010000 5F0000005F000800000000000000000000000000000000000000000000000000000           005F000001
FORMAT 5 DSCB           0505050500060000040 01E005A0003BF00000107C300000C00000000000000000000000000000000000000000
         F5000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
         0000000000000000000000000000000000000000000000000000000000000000000000000000000000           005F000002
SYS1.DASDUM
         F1F1F1F1F1F1F1000163016E63015E01000000000000000000000000000000000000000000004000900000E10005000000000C000000000
         0701017800008100000100000002000900000000000000000000000000000000000000000000000000           005F000003
SYS1.LOGREC
         F1F1F1F1F1F1F1000163016E63016E01000000000000000000000000000000000000000000004000880002600260200000008800000000
         010F0703000001000000000100000005000000000000000000000000000000000000000000000000000           005F000004
SYS1.SYSJOBQE
         F1F1F1F1F1F1F1000111111111111101000000000000000000000000000000000000000000000000000000000000000000000C000000100
         270FFFCE0000810000C0000000C3000900000000000000000000000000000000000000000000000000           005F000005
SYSCTLG
         F1F1F1F1F1F1F1000163016E63015E0100000000000000000000000000000000000000000000000000000000000000000000C000000100
         00FF0E290000810000 5D0000005E000900000000000000000000000000000000000000000000000000           005F000006
SYS1.SVCLIB
         F1F1F1F1F1F1F1000163016E63015E010000000000000000000000000000000000000000000000200C0000E29000000000000C000000000
         380E0484000081000060000000 6C000900000000000000000000000000000000000000000000000000           005F000007
SYS1.MACLIB
         F1F1F1F1F1F1F100014201184201180100000000000000000000000000000000000000000000020090000D2000500000000C000000201
         2D020C0C00008100006D00000098000900000000000000000000000000000000000000000000000000           005F000008
SYS1.COBLIB
         F1F1F1F1F1F1F1000163016E63015E010000000000000000000000000000000000000000000000200C0000E290E2900000000C000000200
         07080AE6000081000099000000 9C000900000000000000000000000000000000000000000000000000           005F000009
SYS1.FORTLIB
         F1F1F1F1F1F1F1000163016E63015E010000000000000000000000000000000000000000000000200C0000E29000000000000C000000200
         080A097C00008100009D000000A0000900000000000000000000000000000000000000000000000000           005F00000A
SYS1.SORTLIB
         F1F1F1F1F1F1F1000163016E63015E01000000000000000000000000000000000000000000000200000000000000000000000C000000200
         28070AF7000081 0000A1000000A5000900000000000000000000000000000000000000000000000000           005F00000B
SYS1.PL1LIB
         F1F1F1F1F1F1F1000163016E63015E010000000000000000000000000000000000000000000000200C0000E290E2900000000C000000000
         3D080A850000810000A6000000B4000900000000000000000000000000000000000000000000000000           005F00000C
SYS1.NUCLEUS
         F1F1F1F1F1F1F1000163016E63016E010000000000000000000000000000000000000000000000200C0000E290000000000008000000000
         0C0A064B0000810000B5000000BA000900000000000000000000000000000000000000000000000000           005F00000D
UT3
         F1F1F1F1F1F1F1000142010E42010E010000000000000000000000000000000000000000000000000000000000000000000008000000A00
         00000E290000810000BB000000BF000900000000000000000000000000000000000000000000000000           005F00000E
EBCLIB
         F1F1F1F1F1F1F10001420118420118010000000000000000000000000000000000000000000000200C0000E29000000000000C000000100
         000C05BF0000810000C4000000C4000900000000000000000000000000000000000000000000000000           005F00000F
GOSET.FORTGO
         F14040404040400001420102420102010000000000000000000000000000000000000000000000200C0000E290000000000004000001400
         00020C690000010000C5000000C6000600000000000000000000000000000000000000000000000000           005F000010
THERE ARE 0090 EMPTY CYLINDERS PLUS 0017 EMPTY TRACKS ON THIS VOLUME
THERE ARE 0128 BLANK DSCBS IN THE VTOC ON THIS VOLUME
```

```
                CONTENTS OF VTOC ON VOL 222222
 LINE 1 = DSNAME                  . . . . 5 . . . .10 . . . .15 . . . .20 . . . .25 . . . .30 . . . .35 . . . .40 . . . .
 LINE 2 = 45 . . . .50 . . . .55 . . . .60 . . . .65 . . . .70 . . . .75 . . . .80 . . . .85 . . . .90 . . . .95 . . . .
 LINE 3 =100 . . . 105 . . . 110 . . . 115 . . . 120 . . . 125 . . . 130 . . . 135 . . . 140           DSCB ADDR (CCHHR)
 FORMAT 4 DSCB                   0404040404040404040404040404040404040404040404040404040404040404040404040404040404040404
          F4004100000C008800C80000001E0001000000CB000A0E29523714010219100A0000000000000000000000000000000000000000000000
          0000000000000100004100000041000800000000000000000000000000000000000000000000000000           0041000001
 FORMAT 5 DSCB                   0505050500010030D09029300000107C30001030000000000000000000000000000000000000000000000000
          F5000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
          0000000000000000000000000000000000000000000000000000000000000000000000000000000000           0041000002
UT1
          F1F2F2F2F2F2F2000142010E42010E0100000000000000000000000000000000000000000000000000000000000000000000008000000A00
          00000E290000810000BA000000BE000900000000000000000000000000000000000000000000000000           0041000003
SYS1.PROCLIB
          F1F2F2F2F2F2F2000163016E63015E0100000000000000000000000000000000000000000000020080000050005000000000C000000000
          0D14038F00008100003E00000040000900000000000000000000000000000000000000000000000000           0041000004
SYS1.LINKLIB
          F1F2F2F2F2F2F2000163016E63015E01000000000000000000000000000000000000000000000200C0000E29000000000000C800000002
          8508004F000081000042000000B9000900000000000000000000000000000000000000000000000000           0041000005
UT2
          F1F2F2F2F2F2F2000142010E42010E0100000000000000000000000000000000000000000000000000000000000000000000008000000A00
          00000E290000810000BF000000C3000900000000000000000000000000000000000000000000000000           0041000006
SYS1.JOBLIB
          F140404040404000014201184201180100000000000000000000000000000000000000000000000200C0000E290000000000004000001400
          000709140000010000C4000000C5000600000000000000000000000000000000000000000000000000           0041000007
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00000001
          F14040404040400001420102420102010000000000000000000000000000000000000000000000004000C00000000000000000004000001400
          00000E290000010000C5000700C6000600000000000000000000000000000000000000000000000000           0041000008
 THERE ARE 0062 EMPTY CYLINDERS PLUS 0013 EMPTY TRACKS ON THIS VOLUME
 THERE ARE 0136 BLANK DSCBS IN THE VTOC ON THIS VOLUME
```

DIRECTORY INFO FOR SPECIFIED PDS ON VOL 111111
SYS1.MACLIB

MEMBERS	TTRC	VARIABLE USER DATA ---(USER DATA AND TTRC ARE IN HEX)
ABEND	00020702	00012025
ANALYZ	00960302	00012037
ATTACH	00030302	00016031
BLDL	000B0302	00014165
BSP	000C0202	00011077
BUILD	000C0402	00018006
CALL	000E0302	00014154
CAMLST	000E0502	00014163
CATALOG	00110302	00010034
CHAP	00110502	00016031
CHECK	00110702	00012625
CLOSE	00120302	00012025
CNTRL	00160302	00012025
DCB	00E30302	02014074
DCBD	00D60502	02014074
DELETE	00180302	00014151
DEQ	00180502	00014164
DETACH	00180702	00014142
DEVTYPE	01080302	00014074
DUMP	01090302	01016078
EBC1	01280300	
EBC2	01280500	
ENQ	00190302	00014168
EOV	00190502	00012625
EXCP	00190702	00014156
EXTRACT	00190902	00012025
FEOV	001C0302	00012625
FIND	001C0502	00012031
FREEBUF	001D0302	00014090
FREEDBUF	00D60302	00014074
FREEMAIN	001E0302	00012031
FREEPOOL	00240302	00012031
GBFLM	00990302	00012037
GBINF	009B0302	00012037
GBPOS	009C0302	00012037
GBPST	009D0302	00012037
GCNL	009D0502	00012037
GCNUP	009F0302	00012037
GCNTRL	009F0502	00012037
GDCDS	00A60302	00012037
GDV	00A70302	00012037
GECF	00AD0302	00012037
GECP	00AE0202	00012037
GEOS	00AE0402	00012037
GEPM	00AF0302	00012037
GET	00240502	00012625
GETBUF	00250202	00012031
GETMAIN	00250402	00012031
GETPOOL	002C0302	00018006
GEVM	00B00302	00012037
GIBLC	00B10302	00012037
GINIT	00B20302	00012037

GNOP2	00B40302	00012037
GNOP4	00B40502	00012037
GO	002E0302	00013025
GODEL	00B50302	00012037
GREAD	00B60302	00012037
GREADR	00BF0302	00012037
GSBLC	00C30302	00012037
GSBPOS	00C30502	00012037
GSERV	00C40302	00012037
GSRT	00C50302	00012037
GTRU	00C60302	00012037
GTXT	00C70302	00012037
GUSTOR	00C90302	00012037
GWRITE	00CA0302	00012037
IDENTIFY	00310302	00014152
IECDSECT	01210200	
IEFUCBOB	011B0300	
IHBERMAC	00F00302	02014074
IHBINNRA	00320302	00014144
IHBINNRB	00320502	00014169
IHBOPLST	01140302	01016083
IHBRDWRD	01020302	01014074
IHBRDWRK	00350302	00014006
IHBRDWRS	003A0302	00014006
IHBRDWRT	00FC0302	01014074
IHB01	008C0302	01011079
IHB02	00F70302	01014074
INDEX	003E0302	00010034
IOHALT	01180302	00014074
LCTRL	00D40302	00014660
LINK	003E0502	00013781
LOAD	003F0302	00014140
LOCATE	00400302	00014147
NOTE	00400502	00013781
OACB	00D30302	00012037
OBTAIN	00400702	00014146
OPEN	00410302	00014029
POINT	00460302	00014029
POST	00470302	00014029
PRTOV	00470502	00014029
PUT	00490302	00013781
PUTX	00490502	00010691
RDJFCB	00490702	00011106
READ	004A0302	00012625
RELSE	004B0302	00018040
RENAME	004C0302	00014148
RETURN	004C0502	00013005
SAVE	004E0302	00013005
SCRATCH	00500302	00014141
SEGLD	00510302	00012625
SEGWT	00510502	00013005
SET	00510702	00013028
SPIE	005B0302	00013005
STAE	005F0302	00014150
STIMER	005F0502	00013005

STOW	00600302	00014048
TEST	007A0302	00010032
TIME	00610302	00014048
TRACE	00610502	00013028
TRUNC	006A0302	00010691
TTIMER	006A0502	00014048
WAIT	006A0702	00014048
WAITR	006B0302	00014048
WRITE	006B0502	00012625
WTL	006C0302	00013017
WTO	006D0302	00013017
WTOR	006E0302	00013017
XCTL	00710302	00014048
XDAP	00720302	00015004

DIRECTORY INFO FOR SPECIFIED PDS ON VOL 111111
SYS1.SVCLIB

MEMBERS	TTRC	VARIABLE USER DATA ---(USER DATA AND TTRC ARE IN HEX)					
IGC0001C	002F072D	002F090000	0000000370	0003000300	0000000000	0000010130	67
IGC0001E	0009052D	0009070000	0000000370	0003FE03FE	0000000000	0000010171	99
IGC0001G	0009092D	00090B0000	0000000370	00002E002E	0000000000	0000000100	11
IGC00011	0021072D	0022010000	000000C378	0004000400	0000000000	0000010140	95
IGC00021	0025052D	0025050000	000000C378	0004000400	0000000000	0000020190	49
IGC0002A	0010072D	0011010000	000000C378	0003DC03DC	0000000000	0000000190	05
IGC0002B	0027072D	0028010000	000000C378	0004000400	0000000000	0000010140	95
IGC0002C	0028032D	0028030000	000000C378	0004000400	0000000000	0000000180	33
IGC0002D	002D052D	002D050000	000000C378	0000EC00EC	0000000000	0000000110	61
IGC0002F	001A072D	001B010000	000000C378	000120011D	0000000000	0000020160	82
IGC0002H	0011072D	0012010000	000000C378	0003B603B6	0000000000	0000000130	15
IGC0002G	0013032D	0013030000	000000C378	00024C024C	0000000000	0000000140	23
IGC0002H	0011032D	0011030000	000000C378	0003D803D8	0000000000	0000010130	19
IGC00021	000C092D	000D010000	000000C378	0003800380	0000000000	0000010150	05
IGC00036	000E032D	000E030000	000000C378	0003780378	0000000000	0000000140	23
IGC0003A	001A052D	001A050000	000000C378	0004000400	0000000000	0000000190	09
IGC0003B	000A162D	000B010000	000000C378	0003380338	0000000000	0000010150	06
IGC0003C	002D072D	002D070000	000000C378	0000DB00DB	0000000000	0000000110	61
IGC0003D	0005022B	0005040000	00000003F0	0003740374	0000000000	0000	
IGC0003E	0005062B	0005080000	00000003F0	0003C303C3	0000000000	0000	
IGC0003F	00050A2B	00050C0000	00000003F0	0000020002	0000000000	0000	
IGC00031	000E072D	000E070000	000000C378	000310030A	0000000000	0000010140	90
IGC0004C	0031072D	0031090000	0000000370	0000920092	0000000000	0000010130	15
IGC00041	0006032B	0006050000	00000043F0	00035A035A	0000000000	0000	
IGC0005A	002D0B2D	002E010000	0000000370	00039F039F	0000000000	0000000131	87
IGC0005B	001B052D	001B050000	000000C378	0004000400	0000000000	0000010130	19
IGC0005G	002D092D	002D090000	000000C378	00003C003C	0000000000	0000000110	61
IGC0006A	0035102D	0036010000	0000000370	0002800280	0000000000	0000000190	06
IGC0006D	0027052D	0027050000	000000C378	0004000400	0000000000	0000000100	34
IGC00061	001B032D	001B030000	000000C378	0002730273	0000000000	0000010130	19
IGC0101C	002F0B2D	0030030000	0000000370	0003CD03CD	0000000000	0000000131	80
IGC0103D	00050E2B	0006010000	00000003F0	0003740374	0000000000	0000	
IGC0105A	002E032D	002E050000	0000000370	0003DF03DF	0000000000	0000000131	88
IGC0201C	0030052D	0030070000	0000000370	0003DE03DE	0000000000	0000000131	81
IGC0205A	002E072D	002F010000	0000000370	0003E803E8	0000000000	0000010130	15
IGC0301C	0030092D	00300B0000	0000000370	0001A801A4	0000000000	0000000131	82
IGC0305A	002F032D	002F050000	0000000370	0003F003F0	0000000000	0000010130	15
IGC0401C	00300D2D	0031010000	0000000370	0003A103A1	0000000000	0000000160	07
IGC0501C	0031032D	0031050000	0000000370	0002400240	0000000000	0000020100	44
IGE0000A	0007062D	0007080000	0000000370	0000EE00EE	0000000000	0000000100	11
IGE0000D	00070A2D	00070C0000	0000000370	0001500150	0000000000	0000000100	11
IGE0000G	0008052D	0008070000	0000000370	00014C014C	0000000000	0000000120	56
IGE00001	0006072D	0006090000	0000000370	00018E018E	0000000000	0000020160	82
IGE0001C	0008092D	00080B0000	0000000370	0001460146	0000000000	0000000100	11
IGE0010A	00070E2D	0007100000	000000C370	0001900190	0000000000	0000000120	37
IGE0010B	0007122D	0007140000	000000C370	0001900190	0000000000	0000000120	37
IGE0025C	0008112D	0008130000	0000000370	00013C013C	0000000000	0000000100	11
IGE0025D	0008152D	0008170000	0000000370	00014C014C	0000000000	0000020160	82
IGE0025E	0008192D	0009030000	0000000370	0000F400F4	0000000000	0000000180	26
IGE0025F	00090D2D	00090F0000	0000000260	0001360136	0000000000	0000000170	54
IGE01001	00060B2D	00060D0000	0000000370	00018A018A	0000000000	0000000110	35
IGE0101C	00080D2D	00080F0000	0000000370	0000CC00CC	0000000000	0000000100	11

IGC00019 †

```
IGE0110R  0007162D  0008030000  000000C370  0000500050  0000000000  0000000120  37
IGE0125F  0009122D  000A010000  0000000370  00014F014F  0000000000  0000000170  16
IGE0200I  0007022D  0007040000  0000000370  0001880188  0000000000  0000020160  82
IGE0225F  000A032D  000A050000  0000000260  0000C900C9  0000000000  0000000170  17
IGE0425F  000A082D  000A0A0000  0000000370  0000CC00CC  0000000000  0000000170  18
IGE0525F  000A0C2D  000A0E0000  0000000260  0000EC00EC  0000000000  0000000170  61
IGE0625F  000A112D  000A130000  0000000260  0000F200F2  0000000000  0000000170  13
IGG0CLC2  0012032D  0012030000  000000C378  0003E203E2  0000000000  0000000100  31
IGG0CLC3  0012052D  0012050000  000000C378  00040003FA  0000000000  0000010160  82
IGG0CLC4  0013072D  0014010000  000000C378  0003AC03AC  0000000000  0000000100  31
IGG0CLC5  0014032D  0014030000  000000C378  0003FA03FA  0000000000  0000010160  83
IGG0CLF2  0011052D  0011050000  000000C378  0002E802E8  0000000000  0000010150  06
IGG019AA  0014052D  0014050000  000000CB78  0000680068  0000000000  0000000190  05
IGG019AB  0014072D  0014070000  000000CB78  0000600060  0000000000  0000000190  05
IGG019AC  0014092D  0014090000  000000CB78  0000D800D8  0000000000  0000000190  05
IGG019AD  00140B2D  00140B0000  000000CB78  0000C000C0  0000000000  0000000190  05
IGG019AG  00140D2D  00140D0000  000000CB78  0000900090  0000000000  0000000190  05
IGG019AH  0015022D  0015020000  000000CB78  0000880088  0000000000  0000000190  05
IGG019AI  0015042D  0015040000  000000CB78  0000800080  0000000000  0000010160  83
IGG019AJ  0015062D  0015060000  000000CB78  0000B000B0  0000000000  0000000190  05
IGG019AK  0015082D  0015080000  000000CB78  0000D800D8  0000000000  0000000190  05
IGG019AL  00150A2D  00150A0000  000000CB78  0000F800F8  0000000000  0000000190  05
IGG019AM  00150C2D  00150C0000  000000CB78  0000700070  0000000000  0000000190  05
IGG019AN  00150E2D  00150E0000  000000CB78  0000D000D0  0000000000  0000000190  05
IGG019AQ  0015102D  0015100000  000000CB78  0000700070  0000000000  0000000190  05
IGG019AR  0015122D  0015120000  000000CB78  0000600060  0000000000  0000000190  05
IGG019AT  002A032D  002A030000  000000CB78  0002C002C0  0000000000  0000000190  05
IGG019AV  0015142D  0015140000  000000CB78  0000480048  0000000000  0000000190  05
IGG019BA  0015162D  0015160000  000000CB78  0001400140  0000000000  0000000190  04
IGG019BB  0015182D  0015180000  000000CB78  0000580058  0000000000  0000000190  04
IGG019BC  00151A2D  0016010000  000000CB78  0000E800E8  0000000000  0000000190  04
IGG019BD  0016032D  0016030000  000000CB78  0001200120  0000000000  0000000110  07
IGG019BE  0016052D  0016050000  000000CB78  0001780178  0000000000  0000000190  04
IGG019BF  002A052D  002A050000  000000CB78  0001E801E8  0000000000  0000000190  04
IGG019BG  002A072D  002A070000  000000CB78  0000F000F0  0000000000  0000000190  04
IGG019CA  0016072D  0016070000  000000CB78  0000880088  0000000000  0000000190  04
IGG019CB  0016092D  0016090000  000000CB78  0000980098  0000000000  0000000190  04
IGG019CC  00160B2D  00160B0000  000000CB78  0000200020  0000000000  0000000190  04
IGG019CD  00160D2D  00160D0000  000000CB78  0001680168  0000000000  0000000190  04
IGG019CF  00160F2D  00160F0000  000000CB78  0000700070  0000000000  0000000190  04
IGG019CF  0016112D  0016110000  000000CB78  0000D000D0  0000000000  0000000190  04
IGG019CH  0016132D  0016130000  000000CB78  0000700070  0000000000  0000000190  04
IGG019CI  0016152D  0016150000  000000CB78  0000800080  0000000000  0000000160  07
IGG019CJ  0016172D  0017010000  000000CB78  0000680068  0000000000  0000000190  04
IGG019CK  0017032D  0017030000  000000CB78  0000300030  0000000000  0000000190  04
IGG019CL  0017052D  0017050000  000000CB78  0000400040  0000000000  0000000190  04
IGG019CM  002A092D  002B010000  000000CB78  0003000300  0000000000  0000000190  05
IGG019CN  002B032D  002B030000  000000CB78  0002000200  0000000000  0000000190  05
IGG019CO  002B052D  002B050000  000000CB78  0002000200  0000000000  0000000190  05
IGG019CP  002B072D  002B070000  000000CB78  0003000300  0000000000  0000000190  05
IGG019CQ  002B092D  002C010000  000000CB78  0003000300  0000000000  0000000190  05
IGG019CR  002C032D  002C030000  000000CB78  0003000300  0000000000  0000000190  05
IGG019CS  002C052D  002C050000  000000CB78  0000180018  0000000000  0000000190  04
IGG019DA  0033072D  0034010000  000000CB78  0002200220  0000000000  0000010170  46
IGG019DB  0034032D  0034030000  000000CB78  0002A802A8  0000000000  0000010170  46
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IGG019DC  0034052D  0034050000 0C00000CB78 0000980096 0000000000 0000010170 46
IGG019KA  00310B2D  00310B0000 000000CA78 0004C80400 0000000000 0000010140 93
IGG019KC  0032042D  0032040000 000000CB78 0000F800F8 0000000000 0000010140 93
IGG019KF  0032062D  0032060000 000000C378 0001080108 0000000000 0000010180 31
IGG019KG  00320B2D  0032080000 000000CB78 0000A800A8 0000000000 0000010140 93
IGG019KI  00320A2D  00320A0000 000000CB78 0000880088 0000000000 0000010140 93
IGG019KK  00320C2D  00320C0000 000000CB78 0000A000A0 0000000000 0000010140 93
IGG019KM  0034092D  0034090000 000000CB78 0002400240 0000000000 0000010140 92
IGG019KO  00320E2D  00320E0000 000000CB78 0000F000F0 0000000000 0000010140 92
IGG019KQ  0032102D  0032100000 000000CB78 0000780078 0000000000 0000010140 92
IGG019KS  0032122D  0032120000 000000CB78 0000D800D8 0000000000 0000010140 40
IGG019KU  0032142D  0032140000 000000CB78 0000780078 0000000000 0000010140 92
IGG019KW  0035022D  0035020000 000000CB78 0000B000B0 0000000000 0000000140 92
IGG019KY  0035042D  0035040000 000000CB78 0000B800B8 0000000000 0000000140 92
IGG019LA  0035062D  0035060000 000000CB78 0000B000B0 0000000000 0000000140 92
IGG019LC  0035082D  0035080000 000000CB78 0000C800C8 0000000000 0000000140 92
IGG019LE  00350C2D  00350C0000 000000CB78 0001B801B8 0000000000 0000000140 92
IGG019LI  00350A2D  00350A0000 000000CB78 0000D800D8 0000000000 0000000190 38
IGG0190A  0036072D  0036090000 0000000270 0004580400 0000000000 0000000120 37
IGG0190B  00360D2D  00360F0000 0000000370 0001080108 0000000000 0000000120 37
IGG0190C  0036032D  0036050000 000000C370 0000E800E8 0000000000 0000000130 32
IGG0190A  0022032D  0022030000 000000C378 0004000400 0000000000 0000020141 10
IGG0190E  0029032D  0029030000 000000C378 0004000400 0000000000 0000010141 10
IGG0190C  0022052D  0022050000 000000C378 0004000400 0000000000 0000000180 29
IGG0190D  0022072D  0023010000 000000C378 0004000400 0000000000 0000000180 29
IGG0190F  0023032D  0023030000 000000C378 0004000400 0000000000 0000010130 30
IGG0190I  0023052D  0023050000 000000C378 0004000400 0000000000 0000020140 95
IGG0190J  0023072D  0024010000 000000C378 0004000400 0000000000 0000000180 29
IGG0190L  0024032D  0024030000 000000C378 0004000400 0000000000 0000020140 95
IGG0190M  0024052D  0024050000 000000C378 0004000400 0000000000 0000030160 68
IGG0190P  0024072D  0025010000 000000C378 0004000400 0000000000 0000010140 95
IGG0190R  0029052D  0029050000 000000C378 0004000400 0000000000 0000010140 95
IGG0190S  0025032D  0025030000 000000C378 0004000400 0000000000 0000020140 15
IGG0190V  002D032D  002D030000 000000C378 0004000400 0000000000 0000000140 95
IGG0190W  002C092D  002D010000 000000C378 0004000400 0000000000 0000000140 95
IGG0190X  0029072D  002A010000 000000C378 0004000400 0000000000 0000000180 29
IGG0191A  0017072D  0017070000 000000C378 0004000400 0000000000 0000010130 20
IGG0191B  0017092D  0017090000 000000C378 0004000400 0000000000 0000010130 20
IGG0191C  0017082D  0018010000 000000C378 0004000400 0000000000 0000000190 05
IGG0191D  0018032D  0018030000 000000C378 0004000400 0000000000 0000000190 05
IGG0191G  0018072D  0019010000 000000C378 0004000400 0000000000 0000000190 05
IGG0191J  0019032D  0019030000 000000C378 0004000400 0000000000 0000010130 20
IGG0191L  0034072D  0034070000 000000C378 0004000400 0000000000 0000010170 46
IGG0191O  0019052D  0019050000 000000C378 0004000400 0000000000 0000000190 05
IGG01911  0018052D  0018050000 000000C378 0004000400 0000000000 0000000130 26
IGG01912  002C072D  002C070000 000000C378 0004000400 0000000000 0000000190 05
IGG0193A  0032162D  0033010000 000000CB78 0004000400 0000000000 0000010170 44
IGG0193C  0033032D  0033030000 000000CB78 0004000400 0000000000 0000010140 91
IGG0193E  00350E2D  00350E0000 000000CB78 0004000400 0000000000 0000000140 91
IGG0193Y  0036112D  0037030000 000000C370 0004000400 0000000000 0000000120 37
IGG020D1  0010052D  0010050000 000000C378 0004000400 0000000000 0000010140 89
IGG020P1  000F082D  0010010000 000000C378 0004000400 0000000000 0000010140 89
IGG020P2  0010032D  0010030000 000000C378 0004000400 0000000000 0000010140 89
IGG0200A  0025072D  0026010000 000000C378 0004000400 0000000000 0000010140 93
IGG0200B  0026032D  0026030000 000000C378 0004000400 0000000000 0000020130 31
```

```
IGG0200C  0026052D  0026050000  000000C378  0004000400  0000000000  0000010140  93
IGG0200F  0026072D  0027010000  000000C378  0004000400  0000000000  0000010121  09
IGG0200G  0027032D  0027030000  000000C378  0004000400  0000000000  0000010140  93
IGG0201A  0019072D  001A010000  000000C378  0004000400  0000000000  0000010100  61
IGG0203A  0033052D  0033050000  000000C378  0004000400  0000000000  0000010150  06
IGG0203Y  0037052D  0037070000  000000C370  0004000400  0000000000  0000000120  37
IGG0230C  0028052D  0028050000  000000C378  0004000400  0000000000  0000010140  93
IGG0230D  0028072D  0029010000  000000C378  0004000400  0000000000  0000010121  09
IGG029D1  000D072D  000E010000  000000C378  0003E803E8  0000000000  0000010140  89
IGG029F6  000D052D  000D050000  000000C378  000330330C  0000000000  0000000140  23
IGG02901  000D032D  000D030000  000000C378  0003B403B4  0000000000  0000010150  05
IGG03001  000E052D  000E050000  000000C378  0001A801A8  0000000000  0000000140  23
IGG032A1  000B052D  000B050000  000000C378  00018E018E  0000000000  0000010150  06
IGG032A2  000B072D  000B070000  000000C378  00039C039C  0000000000  0000010140  15
IGG032A3  000B092D  000C010000  000000C378  000320032C  0000000000  0000010170  44
IGG032D1  0012072D  00130100000  000000C378  0003820382  0000000000  0000010140  90
IGG032D2  000C052D  000C050000  000000C378  0000E800E8  0000000000  0000010140  90
IGG032F6  000C032D  000C030000  000000C378  0001C001C0  0000000000  0000010140  90
IGG03251  000C072D  000C070000  000000C378  0003D003D0  0000000000  0000010140  90
IGG03201  000B032D  000B030000  000000C378  0003480348  0000000000  0000010150  06
IGG039D1  00130520  0013050000  000000C378  0003D803D8  0000000000  0000010140  90
IGG039D2  000F062D  000F060000  000000C378  0001701701  0000000000  0000010140  90
IGG03901  000F022D  000F020000  000000C378  000390038C  0000000000  0000010140  90
IGG03902  000F042D  000F040000  000000C378  0003400330  0000000000  0000010140  90
IGG0550A  001B072D  001B070000  000000C378  0004000400  0000000000  0000010140  89
IGG0550B  001B092D  001C010000  000000C378  0004000400  0000000000  0000010140  89
IGG0550C  001C032D  001C030000  000000C378  0004000400  0000000000  0000010140  89
IGG0550D  001C052D  001C050000  000000C378  0004000400  0000000000  0000010140  89
IGG0550E  001C072D  001D010000  000000C378  0004000400  0000000000  0000010140  89
IGG0550F  001D032D  001D030000  000000C378  0004000400  0000000000  0000020130  30
IGG0550G  001D052D  001D050000  000000C378  0004000400  0000000000  0000010140  89
IGG0550H  001D072D  001E010000  000000C378  0004000400  0000000000  0000010140  89
IGG0550I  001E032D  001F030000  000000C378  0004000400  0000000000  0000010140  89
IGG0550J  001E052D  001E050000  000000C378  0004000400  0000000000  0000010140  94
IGG0550K  001E072D  001F010000  000000C378  0004000400  0000000000  0000010170  44
IGG0550L  001F032D  001F030000  000000C378  0004000400  0000000000  0000010121  44
IGG0550M  001F052D  001F050000  000000C378  0004000400  0000000000  0000010140  94
IGG0550N  001F072D  0020010000  000000C378  0004000400  0000000000  0000010170  44
IGG0550P  00200320  0020030000  000000C378  0004000400  0000000000  0000010121  44
IGG0550V  00200520  0020050000  000000C378  0004000400  0000000000  0000010121  44
IGG0550X  00200720  0021010000  000000C378  0004000400  0000000000  0000010121  44
IGG0550Y  00210520  0021050000  000000C378  0004000400  0000000000  0000010130  67
IGG0550Z  00210320  0021030000  000000C378  0004000400  0000000000  0000010121  44
IGG0551A  001A032D  001A030000  000000C378  0004000400  0000000000  0000010140  94
NSLOHDR1  00380B2B  00380D0000  00000003F0  0001610161  0000000000  0000
```

```
IEF285I   SYS1.SVCLIB                                          KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   DDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD KEPT
IEF285I   VOL SER NOS= 222222.
IEF285I   SYSOUT                                               SYSOUT
IEF285I   VOL SER NOS=
```

```
//CCCC     JOB   0,EBCNSL,MSGLEVEL=1
//GENE1   EXEC   PGM=IFUASM,PARM=(DECK,RENT)
//SYSLIB DD      DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1   DD    UNIT=2311,SPACE=(17CC,(400,50))
//SYSUT2   DD    UNIT=2311,SPACE=(17CC,(400,50))
//SYSUT3   DD    UNIT=2311,SPACE=(17CC,(400,50))
//SYSPRINT   DD SYSOUT=A
//SYSPUNCH DD DSNAME=&EBC,UNIT=2311,SPACE=(80,(200,50)),DISP=(NEW,PASS)
//SYSIN   DD     *
IEF236I ALLOC. FOR CCCC      GENE1
IEF237I SYSLIB    ON 190
IEF237I SYSUT1    ON 191
IEF237I SYSUT2    ON 191
IEF237I SYSUT3    ON 191
IEF237I SYSPUNCH  ON 191
IEF237I SYSIN     ON 00C
```

Assemble NSLOHDRI and Link Edit into SYS1.SVCLIB -
(Used IEFUCBOB and IECDSECT Macro's in this run.)

EXTERNAL SYMBOL DICTIONARY

SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
NSLCHDRI	SD	01	000000	CC0161	

```
MY ROUTINE AT OPEN TO HANDLE INPUT HDR                                  PAGE    1

  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                    F24JUNE66 10/07/66
000000                              2 NSLOHDRI START 0
                                    3 ***
                                    4 ***          NOTE THAT THE GETMAIN MACRO REQUIRES BASE REGISTER
                                    5 ***          ADDRESSIBILITY FOR ITS GENERATION -
                                    6 ***
000000 05F0                         7          BALR  15,0                    PROVIDE ADDRESSABILITY
000002                              8          USING *,15
                                    9 ***
                                   10          GETMAIN R,LV=240
000002 4100 00F0           00CFC   11+         LA    0,240(0,0) LOAD LENGTH
000006 4510 F008           00CCA   12+         BAL   1,*+4 INDICATE GETMAIN
00000A 0A0A                        13+         SVC   10 ISSUE GETMAIN SVC
00000C 902E 1000           00CCC   14          STM   2,14,0(1)               STORE REGISTERS
                                   15          DROP  15
                                   16 ***
                                   17 ***          REGISTERS 2 TO 14 ARE SAVED IN AN AREA OF CORE ACQUIRED
                                   18 ***          BY WAY OF A GETMAIN MACRO   -   BASE REGISTER 1 HAS THE
                                   19 ***          ADDRESS OF THE AREA ACQUIRED
                                   20 ***
                                   21 ***          'DYNAMIC' IS THE NAME WE'VE GIVEN TO THE GETMAIN AREA
                                   22 ***          WE'VE DESCRIBED IN THE DSECT IN THIS PROGRAM
                                   23 ***
000010 0530                        24          BALR  3,0
000012                             25          USING *,3
                                   26 ***
                                   27 ***          REGISTER 1 MUST BE DROPPED AS THE BASE REGISTER OF THE
                                   28 ***          DYNAMIC AREA BECAUSE WE ARE ABOUT TO 'EXCP' AND IT USES
                                   29 ***          REGISTER 1
                                   30 ***
000012 1841                        31          LR    4,1       RELEASE 1 FOR MACRO USE
000000                             32          USING DYNAMIC,4
000000                             33          USING IHADCB,10           GR10=ADDR OF DCB
000000                             34          USING SYMWACBA,11         GR11=ADDR OF WACBA
000000                             35          USING SYMUCB,12           GR12=ADDR OF UCB
                                   36 ***          INITIALIZE REGISTER 7 TO ZERO - THIS REGISTER IS USED
                                   37 ***          TO PASS OVER 4 BYTE ADDRESSES - THESE ADDRESSES ARE IN A
                                   38 ***          LIST OF ADDRESSES (WHICH ARE POINTERS TO ALL THE DCB'S
                                   39 ***          IN THE PROBLEM PROGRAM AREA) - THERE IS ONE ADDRESS FOR
                                   40 ***          EACH DCB ENTRY IN THE OPEN OR CLOSE  - WE GET THE ADDR OF
                                   41 ***          THE BEGINNING OF THIS LIST IN REG 5 DURING OPEN
000014 4170 0000           00CCC   42          LA    7,0                 XR7 FOR DCB'S
                                   43 ***          INITIALIZE REGISTER 8 TO 36 - THIS REG IS USED TO PASS
                                   44 ***          OVER 8 BYTES AT A TIME - AFTER THE 1ST 32 BYTES EACH 8
                                   45 ***          BYTES CONTAINS (IN THE LOW ORDER BYTES) THE ADDRESS
                                   46 ***          OF THE 'WORK AND CONTROL BLOCK AREA' - ONE 'WORK AND
                                   47 ***          CONTROL BLOCK AREA' IS BUILT FOR EACH DCB IN THE OPEN OR
                                   48 ***          CLOSE MACRO - WE GET THE STARTING ADDR OF THE TABLE THAT
                                   49 ***          CONTAINS THE ADDR FOR EACH 'WORK AND CONTROL BLOCK AREA'
                                   50 ***          IN REG 6 DURING OPEN
                                   51 ***
000018 4180 0024           00C24   52          LA    8,36                XR8 FOR WACBA'S
00001C 58A7 5000           00000   53 DLOGIC   L     10,0(7,5)           ADDR OF DCB IN GR10
000020 5888 6000           00CCC   54          L     11,0(8,6)           ADDR OF WACBA IN GR11
000024 58C0 B15C           00158   55          L     12,DXDEBUCB         ADDR OF UCB IN GR12
                                   56 ***
                                   57 *            IS THIS AN 'OUTPUT' DCB              YES IGNORES THIS DCB
```

```
  LOC   OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
                                      58 *            AND CHECKS THE NEXT DCB
                                      59 ***
000028 9180 A030        0003C         60          TM    DCBOFLGS,X'80'      BIT 0 = 0 IF INPUT
00002C 4710 303E              C005C   61          BO    MOUNT
                                      62 ***
                                      63 *            IS THIS DCB ALREADY OPENED          YES IGNORES THIS DCB
                                      64 *            AND CHECKS THE NEXT DCB
                                      65 ***
000030 9110 A030        C0030         66          TM    DCBOFLGS,X'10'          BIT 3 = 1 IF OPEN
000034 4710 303E              C005C   67          BO    MOUNT
                                      68 ***
                                      69 *            IS THIS DCB FOR OTHER THAN TAPE     YES IGNORES THIS DCB
                                      70 *            AND CHECKS THE NEXT DCB.
                                      71 ***
000038 9180 C012        C0012         72          TM    UCBTYP+2,X'80'     TEST UCB3 TAPE FOR 1
00003C 4780 303E              C005C   73          BZ    MOUNT
                                      74 ***
000040 9180 C023        00023         75          TM    SRTEDMCT,X'80'           IS MOUNT MSG BIT ON
000044 4780 303E              CC050   76          BZ    MOUNT
                                      77 ***
                                      78 *            IS NSL BIT IN JFCB ON               YES GOES TO RD LABEL
                                      79 *                                                NO IGNORES THIS DCB
                                      80 *            AND CHECKS THE NEXT DCB
                                      81 ***
000048 9504 B0A6        000A6         82          CLI   JFCBLTYP,X'04'      CHECK NSL BIT IN JFCB
00004C 4780 3080              00C92   83          BE    BLOGIC              GOES TO ' MY ' ROUTINE
                                      84 ***
                                      85 *** SET UP THE MOUNT MSG TO BE USED IN IGG0190B  - SEE WTO MACRO
                                      86 ***
000050 D211 B188 3130 00188 C0142     87 MOUNT    MVC   DXCCW4(18),MSSG     MOVE IN SKELETON MSG
000056 D202 B196 C00D 00196 CC00D     88          MVC   DXCCW5+6(3),UCBNAME     MOVE  UNIT NAME TO MSG
00005C D205 B19A B0DA C019A C00DA     89          MVC   DXCCW6+2(6),JFCBVOLS    MOVE VOL SER NO FROM JFCB
                                      90 ***
                                      91 ******       TEST TO SEE IF THERE ARE MORE DCB'S OR IF WE'RE FINISHED
                                      92 ***
000062 12AA                           93 ALOGIC   LTR   10,10                FIRST BYTE IN CURRENT DCB
000064 4740 3112              C0124   94          BM    ELOGIC
                                      95 ***
                                      96 *            INCREMENT GEN PURPOSE REG 7 AND 8 BY 4 AND 8 TO GET TO
                                      97 *            NEXT 'DCB' IN THE LIST OF DCB'S AND THE
                                      98 *            NEXT 'WORK AND CONTROL BLOCK AREA' RESPECTIVELY
                                      99 ***
000068 4170 7004              CC004  1C0          LA    7,4(0,7)            INCREMENT XR7 BY 4
00006C 4180 8008              C00C8  101          LA    8,8(0,8)            INCREMENT XR8 BY 8
000070 47F0 300A              0001C  102          B     DLOGIC               GO TO CHECK NEXT DCB
000074 C9C7C7F0F1F9F0C2               1C3 MODNAME  DC    CL8'IGG0190B'
                                      104 WTO     WTO   'HDR ON XXX CHECKS',MF=L
00007C
00007C 0015                           105+WTO     DS    OF
00007E 0000                           106+        DC    AL2(IHB0002-*) MESSAGE LENGTH
000080 C8C4D940D6D540E7               107+        DC    AL2(0)
000091                                108+        DC    C'HDR ON XXX CHECKS' MESSAGE
                                      109+IHB0002 EQU   *
                                      110 ***
                                      111 *           MY ROUTINE
                                      112 *
                                      113 *           WE SET THE HIGH ORDER BIT IN 'STREDMCT' IN THE DCB TO ZERO
```

NECESSARY IN RELEASE 1, 2 and 3 OF O/S.

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
                                   114 *            IF WE DETERMINE VIA 'DS NAME' AND 'IHDR' THAT WE'VE WRONG
                                   115 *            TAPE MOUNTED WE WILL PUT A ONE IN THIS BIT WHICH INDICATES
                                   116 *            TO THE CONTROL PROGRAM THAT A MOUNT MSG IS IN ORDER
                                   117 ***
000091 00
000092 947F C023       C0023       118 BLOGIC   NI    SRTEDMCT,X'7F'      TURN BIT 0 TO 0
                                   119 ***
                                   120 *       BUILD THE CCW
                                   121 *       NOTE THAT THIS IS NOT A GENERALIZED ROUTINE TO BUILD CCWS
                                   122 ***
000096 5080 B170             0017C 123          ST    11,DXCCW1       READ ADDR TO CCW
00009A 9202 B170       00170       124          MVI   DXCCW1,X'02'            READ
00009E 9220 B174       00174       125          MVI   DXCCW1+4,X'20'          FLAGS
0000A2 D201 B176 3146  0C176 00158 126          MVC   DXCCW1+6(2),=H'80'      COUNT
0000A8 D703 B114 B114  00114 00114 127          XC    DXECB,DXECB             RESET ECB
                                   128          EXCP  DXIOB
0000AE 4110 B118             00118 129+         LA    1,DXIOB LOAD PARAMETER REG 1
0000B2 0A00                        130+         SVC   0 ISSUE SVC FOR EXCP
                                   131          WAIT  ECB=DXECB               WAIT FOR COMPLETION
0000B4 4110 B114             00114 132+         LA    1,DXECB LOAD PARAMETER REG 1
0000B8 4100 0001             00001 133+         LA    0,1(0,0) COUNT OMITTED,1 USED
0000BC 0A01                        134+         SVC   1 LINK TO WAIT ROUTINE
0000BE 957F B114       00114       135          CLI   DXECB,X'7F'             ERROR CHECK
0000C2 4780 30C4             00CD6 136          BE    CHECK                   READ OK
                                   137          ABEND 256,DUMP                ERROR ON READ
0000C6 0700                        138+         CNOP  0,4
0000C8 47F0 30BE             00ODC 139+         B     **8 BRANCH AROUND CONSTANT
0000CC 80                          140+         DC    AL1(128) DUMP/STEP CODE
0000CD 000100                      141+         DC    AL3(256) COMPLETION CODE
0000D0 5810 30BA             00CCC 142+         L     1,*-4 LOAD CODES INTO REG 1
0000D4 0A0D                        143+         SVC   13 LINK TO ABEND ROUTINE
0000D6 D504 B000 314A  00000 0015C 144 CHECK    CLC   DXLBL(5),=CL5'1HDR '
0000DC 4770 310A             0011C 145          BNE   ERROR1
0000E0 D509 B014 B064  0C014 00064 146          CLC   DXLBL+20(10),JFCBDSNM   COMPARE TO DSNAME
0000E6 4770 310A             0011C 147          BNE   ERROR2
0000EA D214 4034 306A  00034 0007C 148          MVC   MSG,WTO
0000F0 D202 403F C00D  0003F 00C0D 149          MVC   MSG+11(3),UCBNAME
0000F6 4110 4034             00C34 150          LA    1,MSG
                                   151          WTO   MF=(E,(1))              EXECUTABLE INSTRUCTIONS
0000FA 0A23                        152+         SVC   35 ISSUE SVC
0000FC D201 B176 3148  00176 0015A 153          MVC   DXCCW1+6(2),=H'1'       COUNT
000102 D703 B114 B114  00114 00114 154          XC    DXECB,DXECB             RESET ECB
                                   155          EXCP  DXIOB                   TO POSITION TAPE PAST TAPE MARK
000108 4110 B118             00118 156+         LA    1,DXIOB LOAD PARAMETER REG 1
00010C 0A00                        157+         SVC   0 ISSUE SVC FOR EXCP
                                   158          WAIT  ECB=DXECB               WAIT FOR COMPLETION
00010E 4110 B114             00114 159+         LA    1,DXECB LOAD PARAMETER REG 1
000112 4100 0001             00001 160+         LA    0,1(0,0) COUNT OMITTED,1 USED
000116 0A01                        161+         SVC   1 LINK TO WAIT ROUTINE
000118 47F0 3050             00C62 162          B     ALOGIC                  READ OK
                                   163 *
                                   164 ***
                                   165 ***          SET THE 'MOUNTING MESSAGE' BIT ON
                                   166 ***
00011C 9680 C023       00023       167 ERROR2   OI    SRTEDMCT,X'80'          TURN BIT 0 TO ONE
00011C                             168 ERROR1   EQU   ERROR2
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                          F24JUNE66 10/07/66
000120 47F0 303E             0005C   169           B      MOUNT
                                     170 *
                                     171 ***
                                     172 ***           RETURN
                                     173 ***
000124 41F0 B1C8             001C8   174 ELOGIC    LA     15,DXCCW12    PTR TO SUPV PARAM LIST
000128 41B0 3062             00074   175           LA     11,MODNAME     PTR TO XCTL MODNAME
00012C 1814                          176           LR     1,4          AREA TO BE FREED
00012E 98CE 4028             00028   177           LM     12,14,REGSTOR+40          RESTORE REGISTERS
000132 982A 4000             00000   178           LM     2,10,REGSTOR         RESTORE REGISTERS
                                     179           FREEMAIN R,LV=240,A=(1)    USES REGISTERS 0 AND 1
000136 4100 00F0             000FC   180+          LA     0,240(0,0) LOAD LENGTH
00013A 0A0A                          181+          SVC    10 ISSUE FREEMAIN SVC
                                     182           XCTL   EPLOC=(11),SF=(E,(15))  USES REGISTERS SPECIFIED
00013C 50B0 F000             00000   183+          ST     11,0(0,15) STORE IN SUP.PARAMLIST
000140 0A07                          184+          SVC    7 ISSUE XCTL SVC
                                     185 ***
                                     186 *** CONSTANTS - - MSG TC BE MOVED TO DXCCW4 AND THEN USED BY IGG0190B
                                     187 ***
000142 00180000                      188 MSSG      DC     X'00180000'
000146 C9C5C3F1F0F1C140              189           DC     C'IEC101A M YYY,'
                                     190 ***
000000                               191 DYNAMIC   DSECT
000000                               192 REGSTOR   DS     13F
000034                               193 MSG       DS     CL21
                                     194 ***
                                     195 ***
                                     196 ***
                                     197           DCBD   DSORG=PS,DEVD=TA


                                     199+*                        DCB SYMBOLIC DEFINITION FOR
                                     200+*                        PHYSICAL SEQUENTIAL

000000                               202+IHADCB    DSECT

                                     204+*                        DEVICE INTERFACES


                                     207+*                    MAGNETIC TAPE

000004                               209+          ORG    IHADCB+4
000004                               210+DCBNERRS  DS     F
000008                               211+DCBNOISE  DS     0BL1
000008                               212+DCBUERRS  DS     F
00000C                               213+DCBBLKCT  DS     F
000010                               214+DCBTRTCH  DS     BL1
000011                               215+          DS     BL1
000012                               216+DCBDEN    DS     BL1
                                     217+*                        ACCESS METHOD COMMON INTERFACE

000010                               219+          ORG    IHADCB+16
000010                               220+DCBKEYLE  DS     BL1
000011                               221+DCBDEVT   DS     0BL1
000011                               222+DCBREL    DS     AL3
000014                               223+DCBBUFNO  DS     0BL1
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000014                           224+DCBBUFCB DS    A
000018                           225+DCBBUFL  DS    H
00001A                           226+DCBDSORG DS    BL2
00001C                           227+DCBIOBAD DS    A

                                 229+*                       FOUNDATION EXTENSION

000020                           231+DCBBFTEK DS    OBL1
000020                           232+DCBBFALN DS    OBL1
000020                           233+DCBEODAD DS    A
000024                           234+DCBRECFM DS    OBL1
000024                           235+DCBEXLST DS    A


                                 238+*                       FOUNDATION BEFORE OPEN

000028                           240+         ORG   IHADCB+40
000028                           241+DCBDDNAM DS    CL8
000030                           242+DCBOFLGS DS    BL1
000031                           243+DCBIFLG  DS    BL1
000032                           244+DCBMACR  DS    BL2

                                 246+*                       FOUNDATION AFTER OPEN

000028                           248+         ORG   IHADCB+40
000028                           249+DCBTIOT  DS    BL2
00002A                           250+DCBMACRF DS    BL2
00002C                           251+DCBIFLGS DS    OBL1
00002C                           252+DCBDEBAD DS    A
000030                           253+DCBREAD  DS    0A
000030                           254+DCBWRITE DS    0A
000030                           255+DCBGET   DS    0A
000030                           256+DCBPUT   DS    0A

                                 258+*                       QSAM-BSAM-BPAM COMMON INTERFACE

000034                           260+         ORG   IHADCB+52
000034                           261+DCBOPTCD DS    OBL1
000034                           262+DCBGERR  DS    0A
000034                           263+DCBPERR  DS    0A
000034                           264+DCBCHECK DS    A
000038                           265+         ORG   IHADCB+56
000038                           266+DCBIOBL  DS    OBL1
000038                           267+DCBSYNAD DS    A
00003C                           268+         ORG   IHADCB+60
00003C                           269+DCBCIND1 DS    BL1
00003D                           270+DCBCIND2 DS    BL1
00003E                           271+DCBBLKSI DS    H
000040                           272+         ORG   IHADCB+64
000040                           273+DCBWCPO  DS    BL1
000041                           274+DCBWCPL  DS    BL1
000042                           275+DCBOFFSR DS    BL1
000043                           276+DCBOFFSW DS    BL1
000044                           277+DCBIOBA  DS    A

                                 279+*                       BSAM-BPAM INTERFACE
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000048                           281+DCBNCP   DS    OBL1
000048                           282+DCBEOBR  DS    A
00004C                           283+DCBEOBW  DS    A
000050                           284+DCBDIRCT DS    H
000052                           285+DCBLRECL DS    H
000054                           286+         ORG   IHADCB+84
000054                           287+DCBCNTRL DS    0A
000054                           288+DCBNOTE  DS    0A
000054                           289+DCBPOINT DS    A

                                 291+*                        QSAM INTERFACE

000048                           293+         ORG   IHADCB+72
000048                           294+DCBLCCW  DS    0A
000048                           295+DCBEOBAD DS    A
00004C                           296+DCBCCCW  DS    0A
00004C                           297+DCBRECAD DS    A
000050                           298+DCBQSWS  DS    AL2
000054                           299+         ORG   IHADCB+84
000054                           300+DCBEROPT DS    OBL1
00005A                           301+         ORG   IHADCB+90
00005A                           302+DCBPRECL DS    AL2
00005C                           303+DCBEOB   DS    A

                                 305 ***
                                 306 ***
                                 307 ***
000000                           308 SYMWACBA DSECT
                                 309          IECDSECT

                                 311+*                    THIS MACRO IS USED TO DEFINE THE WORK AREA
                                 312+*                         FOR ALL MODULES OF OPEN,CLOSE,TCLOSE
                                 313+*                         AND END OF VOLUME FOR O/S 360

                                 315+*                    THIS MACRO DEFINES A WORK AREA WITH THE
                                 316+*                         FOLLOWING FORMAT

                                 318+*                         1.LABELS AND DSCB
                                 319+*                              LABELS
                                 320+*                                   VOLUME LABEL
                                 321+*                                   FILE LABEL 1
                                 322+*                                   FILE LABEL 2
                                 323+*                              DSCB
                                 324+*                                   FORMAT 1
                                 325+*                                   FORMAT 3 KEY
                                 326+*                                   FORMAT 3 DATA
                                 327+*                                   CORE ADDRESS OF NEXT DSCB
                                 328+*                              MESSAGE AREA
                                 329+*                                                   100 BYTES
                                 330+*                         2.JFCB
                                 331+*                                                   176 BYTES
                                 332+*                         3.ECB
                                 333+*                                                     4 BYTES
                                 334+*                         4.IOB
                                 335+*                                                    40 BYTES
                                 336+*                         5.DEB
```

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
                                  337+*                                                  44 BYTES
                                  338+*                        6.DCB
                                  339+*                                                   4 BYTES
                                  340+*                        7.CCW S
                                  341+*                                                  96 BYTES
                                  343+*                                        TOTAL *** 464 BYTES


                                  345+* ***
                                  346+* ***
                                  347+* ***
                                  348+* ***

                                  350+*                VOLUME LABEL

000000                            352+DXLBL     DS     0CL80
000000                            353+VOLLABI   DS     CL3 LABEL IDENTIFIER
000003                            354+VOLNO     DS     CL1 VOLUME LABEL NUMBER
000004                            355+VOLSERNO  DS     CL6
00000A                            356+VOLSEC    DS     CL1
00000B                            357+          DS     0CL10 RESERVED
00000B                            358+VOLVTOC   DS     CL5
000010                            359+          DS     CL5
000015                            360+          DS     CL10 RESERVED
00001F                            361+          DS     CL10 RESERVED
000029                            362+VOLOWNER  DS     CL10 OWNER NAME AND ADDRESS CODE
000033                            363+          DS     CL29 RESERVED

                                  365+*                FILE LABEL 1

000000                            367+          ORG    DXLBL
000000                            368+FL1LABI   DS     CL3 LABEL IDENTIFIER
000003                            369+FL1NO     DS     CL1 FILE LABEL NUMBER
000004                            370+FL1ID     DS     CL17 FILE IDENTIFIER
000015                            371+FL1FILSR  DS     CL6 FILE SERIAL NUMBER
00001B                            372+FL1VOLSQ  DS     CL4 VOLUME SEQUENCE NUMBER
00001F                            373+FL1FILSQ  DS     CL4 FILE SEQUENCE NUMBER
000023                            374+FL1GNO    DS     CL4 GENERATION NUMBER
000027                            375+FL1VNG    DS     CL2 VERSION NUMBER OF GENERATION
000029                            376+FL1CREDT  DS     CL6 CREATION DATE
00002F                            377+FL1EXPDT  DS     CL6 EXPIRATION DATE
000035 F0                         378+FL1FSEC   DC     C'0' FILE SECURITY INDICATOR
000036                            379+FL1BLKCT  DS     CL6 BLOCK COUNT
00003C                            380+FL1SYSCD  DS     CL13 SYSTEM CODE
000049                            381+FL1RES    DS     0CL7 RESERVED FOR FUTURE USE
000049                            382+          DS     CL1
00004A                            383+FL1RES1   DS     CL6

                                  385+*                FILE LABEL 2

000004                            387+          ORG    FL1ID
000004                            388+FL2RECFM  DS     CL1 RECORD FORMAT
000005                            389+FL2BLKL   DS     CL5 BLOCK LENGTH
00000A                            390+FL2LRECL  DS     CL5 BLOCKING FACTOR/RECORD LENGTH
00000F                            391+FL2DEN    DS     CL1 DENSITY
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000010                            392+FL2FILP  DS    CL1 FILE POSITION
000011                            393+FL2JSID  DS    0CL17 JOB/STEP IDENTIFICATION
000011                            394+FL2JOBD  DS    CL8 JOB IDENTIFICATION
000019 61                         395+FL2JSSP  DC    C'/' SLASH
00001A                            396+FL2STEPD DS    CL8 STEP IDENTIFICATION
000022                            397+FL2TRTCH DS    CL2 TAPE RECORDING TECHNIQUE
000024                            398+FL2CNTRL DS    CL1 CARRAIGE CONTROL CHARACTER
000025                            399+FL2RES   DS    CL43 RESERVED FOR FUTURE USE

                                  401+*                    DATA SET CONTROL BLOCK

000000                            403+         ORG   DXLBL
000000                            404+DXDSCB   DS    0CL96
000000 F1                         405+DSCFMTID DC    C'1'
000001                            406+DSCFILSR DS    CL6 FILE SERIAL NUMBER
000007                            407+DSCVOLSR DS    CL2
000009                            408+DSCCREDT DS    CL3 CREATION DATE IN DISCONTINOUS BIN
00000C                            409+DSCEXPDT DS    CL3 EXPIRATION DATE IN DISCONTINOUS BIN
00000F                            410+DSCNOEXT DS    CL1
000010                            411+DSCBLDBL DS    CL1
000011                            412+         DS    CL1
000012                            413+DSCSYSCD DS    CL13 SYSTEM CODE
00001F                            414+         DS    CL7
000026                            415+DSCFILTY DS    CL2 FILE TYPE
000028                            416+DSCRECFM DS    CL1 RECORD FORMAT
000029                            417+DSCOPTCD DS    CL1 OPTION CODE
00002A                            418+DSCBLKL  DS    CL2 BLOCK LENGTH
00002C                            419+DSCLRECL DS    CL2 RECORD LENGTH
00002E                            420+DSCKEYL  DS    CL1 KEY LENGTH
00002F                            421+DSCRKP   DS    CL2 KEY LOCATION
000031                            422+DSCDSIND DS    CL1
000032                            423+DSCSCALO DS    CL4
000036                            424+DSCLSTAR DS    CL5
00003B                            425+DSCTRBAL DS    CL2
00003D                            426+DSCEXTYP DS    CL1 EXTENT TYPE INDICATOR
00003E                            427+DSCEXTSQ DS    CL1 EXTENT SEQUENCE NUMBER
00003F                            428+DSCLOWLM DS    CL4
000043                            429+DSCUPPLM DS    CL4
000047                            430+DSCEXT1  DS    CL10
000051                            431+DSCEXT2  DS    CL10
00005B                            432+DSCNEXT  DS    CL5 POINTER TO NEXT RECORD
000060                            433+DSCCORE  DS    CL4 CORE ADDRESS OF NEXT DSCB RECORD
000064                            434+DSCBEND  EQU   *

                                  436+*                    DATA SET CONTROL -FORMAT 3- KEY PORTION

000000                            438+         ORG   DXDSCB
000000                            439+DXDSCB3K DS    0CL40
000000 03030303                   440+DSCBF3C  DC    X'03030303'
000004                            441+DSCBEXSK DS    0CL40
000004                            442+DSCBEXTY DS    CL1 EXTENT TYPE INDICATOR
000005                            443+DSCBEXSQ DS    CL1 EXTENT SEQUENCE NUMBER
000006                            444+DSCBLLMT DS    CL4 CCHH LOWER LIMIT
00000A                            445+DSCBULMT DS    CL4 CCHH UPPER LIMIT
00000E                            446+DSCBEX2  DS    CL10 ADDITIONAL EXTENT
000018                            447+DSCBEX3  DS    CL10 ADDITIONAL EXTENT
```

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  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000022                            448+DSCBEX4  DS    CL10 ADDITIONAL EXTENT

                                  450+*                DATA SET CONTROL BLOCK -FORMAT 3- RECORD PORTION

000000                            452+         ORG   DXDSCB
000000 F3                         453+DXCBFMID DC    C'3' FORMAT ID
000001                            454+DSCBEXSD DS    0CL90 ADDITIONAL EXTENTS
000001                            455+DSCBEX5  DS    CL10 ADDITIONAL EXTENT
00000B                            456+DSCBEX6  DS    CL10 ADDITIONAL EXTENT
000015                            457+DSCBEX7  DS    CL10 ADDITIONAL EXTENT
00001F                            458+DSCBEX8  DS    CL10 ADDITIONAL EXTENT
000029                            459+DSCBEX9  DS    CL10 ADDITIONAL EXTENT
000033                            460+DSCBEXA  DS    CL10 ADDITIONAL EXTENT
00003D                            461+DSCBEXB  DS    CL10 ADDITIONAL EXTENT
000047                            462+DSCBEXC  DS    CL10 ADDITIONAL EXTENT
000051                            463+DSCBEXD  DS    CL10 ADDITIONAL EXTENT
00005B                            464+DSCBNEXT DS    CL5 CCHHR OF NEXT FORMAT 3 DSCB

                                  466+*                MESSAGE AREA

000000                            468+         ORG   DXDSCB
000000                            469+REPLYLTH DS    CL1
000001                            470+REPLYADR DS    CL3
000004                            471+REPLYECB DS    CL4
000008                            472+MSGLSTSZ DS    CL4
00000C                            473+MESSAGEA DS    CL60
000048                            474+REPLY    DS    CL10
                                  475+*
00000C                            476+         ORG   MESSAGEA
                                  477+*        DEFINITION OF LENGTH OF MESSAGE COMPONENTS
                                  478+*
000003                            479+MSERL    EQU   3 MESSAGE SERIAL NUMBER LENGTH
000006                            480+MINSTL   EQU   6 MSG INSTRUCTION LTH INC MSG SER
000003                            481+MUNL     EQU   3 MESSAGE UNIT NAME LENGTH
000006                            482+MVOLL    EQU   6 MESSAGE VOLUME SERIAL LENGTH
                                  483+* MTXTL        LENGTH MAY BE DEFINED BY EACH MODULE TO FIT REQUIREMENT
                                  484+* MSGLTH       LENGTH OF FULL MSG DEFINED BY EACH MODULE
                                  485+*              MESSAGE FORMAT IS IEC000A M 000,00000  TEXT
00000C C9C5C3                     486+MSGIOSUP DC    CL3'IEC' I/O SUPPORT MESSAGE IDENTITY
00000F                            487+MSGSER   DS    0CL3 MESSAGE SERIAL NUMBER
00000F                            488+         ORG   MSGSER MSERL-1
00000F                            489+MSGSERLO DS    CL1 VOLUME SERIAL LO ORDER BYTE
00000F                            490+         ORG   MSGSER
00000F F0F0F0C140D4               491+MSGINSTR DC    CL6'000A M' MESSAGE INSTRUCTION INCL MSGSER
00000F                            492+         ORG   MSGINSTR MINSTL-1
00000F                            493+MSGACTN  DS    CL1 MESSAGE ACTION REQD BY OPERATOR
000010 40                         494+         DC    C' '
000011 F0F0F0                     495+MSGUN    DC    CL3'000' UNIT NAME THAT MSG REFERS TO
000014 6B                         496+         DC    C','
000015 F0F0F0F0F0F0               497+MSGVOLSR DC    CL6'000000' VOLUME SERIAL THAT MSG REFRS TO
00001B 6B                         498+         DC    C','
00001C                            499+MSGTEXT  DS    0CL38

                                  501+*                JOB FILE CONTROL BLOCK
000064                            502+         ORG   DSCBEND
000064                            503+DXJBF    DS    0CL176
```

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  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                              F24JUNE66 10/07/66

                                     504+***********************************************************************
                                     505+*
                                     506+*                  JFCB
                                     507+*
                                     508+***********************************************************************
000064                               509+INFMJFCB EQU    *
000064                               510+JFCBDSNM DS     CL44 DATA SET NAME
000090                               511+JFCBELNM DS     CL8 ELEMENT NAME OR VERSION
000098                               512+JFCBTSDM DS     CL1 TASK SCHEDULER - DATA
                                     513+*                                       MANAGEMENT INFERFACE BYTE
000099                               514+JFCBSYSC DS     CL13 SYSTEM CODE
0000A6                               515+JFCBLTYP DS     CL1 LABEL TYPE AND USER'S-LABEL
                                     516+*                                      INDICATOR
0000A7                               517+        DS      CL1 NOT USED
0000A8                               518+JFCBFLSQ DS     CL2 FILE SEQUENCE NUMBER
0000AA                               519+JFCBVLSQ DS     CL2 VOLUME SEQUENCE NUMBER
0000AC                               520+JFCBMASK DS     CL8 DATA MANAGEMENT MASK
0000B4                               521+JFCBCRDT DS     CL3 DATA SET CREATION DATE
0000B7                               522+JFCBXPDT DS     CL3 DATA SET EXPIRATION DATE
0000BA                               523+JFCBIND1 DS     CL1 INDICATOR BYTE 1
000040                               524+JFCBRLSE EQU    64 BITS 0 AND 1 - EXTERNAL
                                     525+*                                        STORAGE RELEASE INDICATOR
000010                               526+JFCBLOCT EQU    16 BITS 2 AND 3 - DATA SET
                                     527+*                                        HAS BEEN LOCATED
000004                               528+JFCBNEWV EQU    4 BITS 4 AND 5 - NEW VOLUME
                                     529+*                                        ADDED TO DATA SET
000001                               530+JFCBPMEM EQU    1 BITS 6 AND 7 - DATA SET IS
                                     531+*                                        A MEMBER OF A PODS OR GDG
0000BB                               532+JFCBIND2 DS     CL1 INDICATOR BYTE 2
000040                               533+JFCBSTAT EQU    64 BITS 0 AND 1 - DATA SET
                                     534+*                                       STATUS (NEW, OLD, OR MOD)
000010                               535+JFCBSCTY EQU    16 BITS 2 AND 3 - DATA SET
                                     536+*                                        SECURITY INDICATOR
0000BC                               537+JFCBUFNO DS     0AL1
0000BC                               538+JFCBUFRQ DS     AL1
0000BD                               539+JFCBFTEK DS     0BL1
0000BD                               540+JFCBFALN DS     BL1
0000BE                               541+JFCBUFL  DS     AL2
0000C0                               542+JFCEROPT DS     BL1
0000C1                               543+JFCTRTCH DS     0BL1
0000C1                               544+JFCKEYLE DS     0AL1
0000C1                               545+JFCMODE  DS     0BL1
0000C1                               546+JFCCODE  DS     0BL1
0000C1                               547+JFCSTACK DS     0BL1
0000C1                               548+JFCPRTSP DS     BL1
0000C2                               549+JFCDEN   DS     BL1
0000C3                               550+JFCLIMCT DS     AL3
0000C6                               551+JFCDSORG DS     BL2
0000C8                               552+JFCRECFM DS     BL1
0000C9                               553+JFCOPTCD DS     BL1
0000CA                               554+JFCBLKSI DS     AL2
0000CC                               555+JFCLRECL DS     AL2
0000CE                               556+JFCNCP   DS     AL1
0000CF                               557+JFCNTM   DS     AL1
0000D0                               558+JFCRKP   DS     AL2
0000D2                               559+JFCCYLOF DS     AL1
```

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 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
0000D3                           560+JFCDBUFN DS    AL1
0000D4                           561+JFCINTVL DS    AL1
0000D5                           562+JFCCPRI  DS    BL1
0000D6                           563+JFCSOWA  DS    AL2
0000D8                           564+JFCBNTCS DS    CL1 NUMBER OF OVERFLOW TRACKS
0000D9                           565+JFCBNVOL DS    CL1 NUMBER OF VOLUME SERIAL
                                 566+*                                              NUMBERS
0000DA                           567+JFCBVOLS DS    CL30 VOLUME SERIAL NUMBERS (THE
                                 568+*                                              FIRST FIVE)
0000F8                           569+JFCBEXTL DS    CL1 LENGTH OF BLOCK OF EXTRA
                                 570+*                                              VOLUME SERIAL NUMBERS
                                 571+*                                              (BEYOND FIVE)
0000F9                           572+JFCBEXAD DS    CL3 TRACK ADDRESS OF BLOCK OF
                                 573+*                                              EXTRA VOLUME SERIAL NUMBERS
0000FC                           574+JFCBPQTY DS    CL3 PRIMARY QUANTITY OF D.A.
                                 575+*                                              STORAGE REQUIRED
0000FF                           576+JFCBCTRI DS    CL1 INDICATES WHETHER CYLINDERS
                                 577+*                                              TRACKS, OR RECORDS ARE
                                 578+*                                              SPECIFIED IN JFCBPQTY AND
                                 579+*                                              JFCBSQTY
000100                           580+JFCBSQTY DS    CL3 SECONDARY QUANTITY OF D.A.
                                 581+*                                              STORAGE REQUIRED
000103                           582+JFCBIND3 DS    CL1 INDICATOR BYTE 3
000040                           583+JFCBCNTG EQU   64 BITS 0 AND 1 - CONTIGUOUS
                                 584+*                                               STORAGE INDICATOR
000010                           585+JFCBMXIG EQU   16 BITS 2 AND 3 - MAXIMUM
                                 586+*                                               AVAILABLE EXTENT INDICATOR
000004                           587+JFCBALXI EQU   4 BITS 4 AND 5 - ALL EXTENTS
                                 588+*                                               INDICATOR
000001                           589+JFCBRNDC EQU   1 BIT 6 AND 7 - ROUND
                                 590+*                                               CYLINDER INDICATOR
000104                           591+JFCBDQTY DS    CL3 QUANTITY OF D.A. STORAGE
                                 592+*                                              REQUIRED FOR A DIRECTORY
000107                           593+JFCBSPNM DS    CL3 CORE ADDRESS OF THE JFCB
                                 594+*                                              WITH WHICH CYLINDERS ARE
                                 595+*                                              SPLIT
00010A                           596+JFCBABST DS    CL2 RELATIVE ADDRESS OF FIRST
                                 597+*                                              TRACK TO BE ALLOCATED
00010C                           598+JFCBSBNM DS    CL3 CORE ADDRESS OF THE JFCB
                                 599+*                                              FROM WHICH SPACE IS TO BE
                                 600+*                                              SUBALLOCATED
00010F                           601+JFCBDRLA DS    CL3 AVERAGE DATA RECORD LENGTH
000112                           602+JFCBVLCT DS    CL1 VOLUME COUNT
000113                           603+JFCBSPTN DS    CL1 NUMBER OF TRACKS PER
                                 604+*                                              CYLINDER TO BE USED BY THIS
                                 605+*                                              DATA SET WHEN SPLIT
                                 606+*                                              CYLINDERS IS INDICATED
0000B0                           607+JFCBLGTH EQU   176 LENGTH OF JFCB
000114                           608+JFCBEND  EQU   *
                                 609+*                   EVENT CONTROL BLOCK

000114                           611+DXECB    DS    0CL4
000114 00000000                  612+         DC    X'00000000'

                                 614+*                   INPUT/OUTPUT BLOCK
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                          F24JUNE66 10/07/66
000118                            616+DXIOB    DS    OCL32
000118 00                         617+IOBFLAG1 DC    X'00'
000119 00                         618+IOBFLAG2 DC    X'00'
00011A                            619+IOBSENSE DS    0H
00011A                            620+IOBSENSO DS    CL1
                                  621+*                                                  C Q
00011B                            622+IOBSENS1 DS    CL1 SENSE BYTE TIT
00011C                            623+IOBECBPT DS    XL1
00011D 000114                     624+         DC    AL3(DXECB)
000120                            625+IOBCSW   DS    0D
000120 00000000                   626+IOBCOMAD DC    X'00000000' KEY,0000,COMMAND ADDRESS
000124 00                         627+IOBSTAT0 DC    X'00' STATUS BYTE 0
000125 00                         628+IOBSTAT1 DC    X'00' STATUS BYTE 1
000126 0000                       629+IOBCNT   DC    X'0000' COUNT
000128                            630+IOBSIOCC DS    XL1
000129 000170                     631+IOBSTART DC    AL3(DXCCW)
00012C                            632+IOBWGHT  DS    XL1
00012D 000140                     633+IOBDCBPT DC    AL3(DXDCB)
000130                            634+         DS    XL1
000131                            635+         DS    XL3
000134 0000                       636+IOBINCAM DC    X'0000'
000136                            637+IOBERRCT DS    XL2
000138                            638+DXDAADDR DS    D DIRECT ACCESS ADDRESS MBBCCHHR

                                  640+*                    DATA EXTENT BLOCK

000140                            642+DYYYY    DS    OCL44
00013C                            643+DXDEB    EQU   DYYYY-4
000140 00000000                   644+DXDEBDEB DC    X'00000000'
000144                            645+DXDEBDFL DS    OCL1
000144 00000000                   646+DXDEBIRB DC    X'00000000'
000148 00000000                   647+DXDEBSYS DC    X'00000000'
00014C 00000000                   648+DXDEBUSR DC    X'00000000'
000150 00000000                   649+DXDEBECB DC    X'00000000'
000154                            650+DXDEBID  DS    OCL1
000154 00000140                   651+DXDEBDCB DC    AL4(DXDCB)
000154                            652+DXDCBAD  EQU   DXDEBDCB
000158                            653+DXDEBAPP DS    CL4
00015C                            654+DXDEBMOD DS    OCL1
00015C                            655+DXDEBUCB DS    F
000160                            656+DXDEBBIN DS    H
000162                            657+DXDEBSCC DS    H
000164                            658+DXDEBSHH DS    H
000166                            659+DXDEBECC DS    H
000168                            660+DXDEBEHH DS    H
00016A                            661+DXDEBNTR DS    H

                                  663+*                    DATA CONTROL BLOCK

00016C                            665+DXXXX    DS    0F
000140                            666+DXDCB    EQU   DXXXX-44 POINTER TO RELATIVE BEGINNING OF DCB
00016C 0000013C                   667+DXDCBDEB DC    A(DXDEB)
                                  668+*                    CHANNEL CONTROL WORDS

000170                            670+         CNOP  0,8
0170                              671+DXCCW    DS    0[redacted]
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  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000170                             672+DXCCW1   DS    D
000178                             673+DXCCW2   DS    D
000180                             674+DXCCW3   DS    D
000188                             675+DXCCW4   DS    D
000190                             676+DXCCW5   DS    D
000198                             677+DXCCW6   DS    D
0001A0                             678+DXCCW7   DS    D
0001A8                             679+DXCCW8   DS    D
0001B0                             680+DXCCW9   DS    D
0001B8                             681+DXCCW10  DS    D
0001C0                             682+DXCCW11  DS    D
0001C8                             683+DXCCW12  DS    D

0001D0                             685+DSECTSIZ EQU   464 CORE AREA REQUIRED FOR THIS MACRO
000000                             686 SYMUCB   DSECT
                                   687          IEFUCBOB
                                   688+*              DATE OF THIS UPDATE  13 JULY 65
                                   689+*
                                   690+*
                                   691+*        THE INDIVIDUAL UCB S LOOK LIKE THIS.
                                   692+*
                                   693+*              ****************************************          *
                                   694+*              *   JCB   * ALLOC. *   UCB   * STATUS *         ***
                                   695+*              *INTERNAL*CHANNEL *    IC   *    A    *        *****
                                   696+*              * NUMBER *  MASK  *         *         *          *
                                   697+*              ****************************************          *
                                   698+*              *  FLAG1 *  UNIT  *         *         *          *
                                   699+*              *   AND  *ADDRESS *  FLAG2 * DEVTAB *          *
                                   700+*              *CHAN.ADD*         *         *         *          *
                                   701+*              ****************************************          *
                                   702+*              *        *        *         *         *          *
                                   703+*              * ERRTAB * STATAB * LCHTAB * ATNTAB *          *
                                   704+*              *        *        *         *         *
                                   705+*              ****************************************      ALL DEVICES
                                   706+*              *SCH  ICS*                              *
                                   707+*              *FLG  FLG*             UNIT NAME        *          *
                                   708+*              *        *                              *          *
                                   709+*              ****************************************          *
                                   710+*              *                                       *          *
                                   711+*              *                TYPE                   *          *
                                   712+*              *                                       *          *
                                   713+*              ****************************************          *
                                   714+*              *                        *              *          *
                                   715+*              *     LAST 12*           *     SENSE    *         *****
                                   716+*              *                        *              *          ***
                                   717+*              ****************************************          *
                                   718+*              ****************************************          *
                                   719+*              *                                       *          *
                                   720+*              *                SENSE                  *         *****
                                   721+*              *                                       *          *
                                   722+*              ****************************************          *
                                   723+*              *                                       *          *
                                   724+*              *      VOLUME    SERIAL                 *          *
                                   725+*              *                                       *
                                   726+*              *   *    *    *   ********************      TAPE AND DA
                                   727+*              *                * STATUS *  DATA  *
```

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LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                          F24JUNE66 10/07/66

                                 728+*          *                  *    B   *MANAGMNT*        *
                                 729+*          *                  *        *  COUNT *        *
                                 730+*          **************************************        *
                                 731+*          *  VTOC  TT        * VTOC R * SPARE  *        *
                                 732+*          *      OR          *         OR      *    *****
                                 733+*          *FILE SEQ. COUNT   * FILE SEQ.NUMBER *     ***
                                 734+*          **************************************        *
                                 735+*
                                 736+*          **************************************        *
                                 737+*          *                                    *     ***
                                 738+*          *            SEEK QUEUE              *    *****
                                 739+*          *                                    *        *
                                 740+*          *   *    *    *    *    *    *   *   *        *
                                 741+*          *                                    *        *
                                 742+*          *          CONTROL WORD              *        *
                                 743+*          *                                    *        *
                                 744+*          **************************************        *
                                 745+*          *                                    *
                                 746+*          *   M  B  B  C  C  H  H  R    FOR    *      DA ONLY
                                 747+*          *                                    *
                                 748+*          *   *    *    *    *    *    *   *   *        *
                                 749+*          *                                    *        *
                                 750+*          *            LAST SEEK               *        *
                                 751+*          *                                    *        *
                                 752+*          **************************************        *
                                 753+*          *CURRENT *                           *        *
                                 754+*          * NR. OF *      D A  ECB  ADDRESS    *    *****
                                 755+*          * USERS  *                           *     ***
                                 756+*          **************************************        *
                                 757+* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
000000                           758+UCBOB     EQU   * UNIT CONTROL BLOCKS
000000                           759+          DS    0F
000000                           760+SRTEJBNR  DS    XL1 JOB INTERNAL NUMBER
000001                           761+SRTECHAN  DS    XL1 ALLOC.CHANNEL MASK
000002                           762+UCBID     DS    XL1 UCB IDENTIFICATION
000003                           763+SRTESTAT  DS    XL1 STATUS BITS
000080                           764+SRTEONLI  EQU   128 ONLINE
000040                           765+SRTECHGS  EQU   64 CHANGE ONLINE/OFFLINE
000020                           766+SRTERESV  EQU   32 RESERVED DEVICE
000010                           767+SRTEUNLD  EQU   16 UNLOAD THIS DEVICE
000008                           768+SRTEALOC  EQU   8 BIT 4 ALLOCATED
000004                           769+SRTEPRES  EQU   4 BIT 5 PERMANENTLY RESIDENT
000002                           770+SRTESYSR  EQU   2 BIT 6 SYSRES
                                 771+*                                       OR PRIMARY CONSOLE
000001                           772+SRTEDADI  EQU   1 BIT 7 DADSM INTERLOCK
                                 773+*                                       OR TAPE CONTAINS
                                 774+*                                       STANDARD LABELS,OR
                                 775+*                                       ALTERNATE CONSOLE
000004                           776+UCBCHA    DS    XL1 FLAG1 AND CHANNEL ADDRESS
000005                           777+UCBUA     DS    XL1 UNIT ADDRESS
000006                           778+UCBFL2    DS    XL1 FLAG2
000007                           779+UCBDTI    DS    XL1 DEVICE TABLE
000008                           780+UCBETI    DS    XL1 ERROR TABLE
000009                           781+UCBSTI    DS    XL1 STATUS TABLE
00000A                           782+UCBLCI    DS    XL1 LOGICAL CHANNEL TABLE
00000B                           783+UCBATI    DS    XL1 ATTENTION TABLE
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  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000000C                             784+UCBWGT   DS    XL1 WEIGHT
000000D                             785+UCBNAME  DS    CL3 UNIT NAME IN EBCDIC CHARACTERS
000010                              786+UCBTYP   DS    XL4 DEVICE TYPE
000010                              787+UCBTBYT1 EQU   UCBTYP BYTE 1 OF UCBTYPE-MODEL
000080                              788+UCB1FEA0 EQU   128 BIT 0 OF OPTION FIELD
000040                              789+UCB1FEA1 EQU   64 BIT 1 OF OPTION FIELD
000020                              79C+UCB1FEA2 EQU   32 BIT 2 OF OPTION FIELD
000010                              791+UCB1FEA3 EQU   16 BIT 3 OF OPTION FIELD
000008                              792+UCB1FEA4 EQU   8 BIT 4 OF OPTION FIELD
000004                              793+UCB1FEA5 EQU   4 BIT 5 OF OPTION FIELD
000002                              794+UCB1FEA6 EQU   2 BIT 6 OF OPTION FIELD
000001                              795+UCB1FEA7 EQU   1 BIT 7 OF OPTION FIELD
000010                              796+UCBTBYT2 EQU   UCBTYP+1             BYTE 2 OF UCBTYPE-OPTIONS
000010                              797+UCBTBYT3 EQU   UCBTYP+2             BYTE 3 OF UCBTYPE-CLASS
000080                              798+UCB3TAPE EQU   128 BIT 0 OF CLASS - TAPE
000040                              799+UCB3COMM EQU   64 BIT 1 OF CLASS - COMMUNIC.
000020                              80C+UCB3DACC EQU   32 BIT 2 OF CLASS - DIRECT AC
000010                              801+UCB3DISP EQU   16 BIT 3 OF CLASS - DISPLAY
000008                              802+UCB3UREC EQU   8 BIT 4 OF CLASS - UNIT REC.
000004                              803+UCB3CHAR EQU   4 BIT 5 OF CLASS - CHAR.READ
000010                              804+UCBTBYT4 EQU   UCBTYP 3             BYTE 4 OF UCBTYPE-DEVICE
000014                              805+UCBLTS   DS    XL2 LAST 12*
000016                              8C6+UCBSNS   DS    XL6 SENSE INFORMATION
00001C                              807+SRTEVOLI DS    CL6 VOLUME SERIAL
000022                              8C8+SRTESTAB DS    XL1 STATUS B
000080                              809+SRTEBSVL EQU   128 BIT 0 SHARED VOLUME
000040                              810+SRTEBVSC EQU   64 BIT 1 VOLUME SECURITY
000020                              811+SRTEBALB EQU   32 BIT 2 ADDIT.VOL.LABEL PROC
000010                              812+SRTEBPRV EQU   16 BIT 3 PRIVATE
000002                              813+SRTEBPUB EQU   2 BIT 4 PUBLIC
000004                              814+SRTEBVQS EQU   4 BIT 5 VOLUME TO BE QUIESCE
                                    815+*                                  BIT   TO MOUNT ANOTHER
000002                              816+SRTEBJLB EQU   2 BIT 6 JCBLIB VOLUME
000001                              817+SRTEBNUL EQU   1 BIT 7 CONTROL VOLUME
000023                              818+SRTEDMCT DS    XL1 DATA MANAGEMENT COUNT
000024                              819+SRTEFSCT DS    XL2 FILE SEQ. COUNT
000026                              820+SRTEFSEQ DS    XL2 FILE SEQ. NUMBER
000028                              821+UCBSQC   DS    2F SEEK QUEUE CONTROL WORD
000030                              822+UCBSKA   DS    2F MBBCCHHR FOR LAST SEEK
000038                              823+SRTEUSER DS    XL1 CURRENT NUMBER OF USERS
000039                              824+SRTEECBA DS    XL3 DA ECB ADDRESS
00003C                              825+DATACELL EQU   * 9 OF THESE BLOCKS WILL BE PRESENT
00003C                              826+DCELJBNR DS    XL1 JOB INTERNAL
00003D                              827+DCELUSER DS    XL1 CURRENT NUMBER OF USERS
00003E                              828+DCELSTAB DS    XL1 STATUS B
00003F                              829+DCELSTAT DS    XL1 STATUS A
000040                              830+DCELVOLI DS    CL6 VOLUME SERIAL
000046                              831+DCELVTOC DS    XL3 VTOC ADDRESS
000049                              832+DCELECBA DS    XL3 DA ECB ADDRESS
000000                              833          END   NSLOHDRI
000158 0050                         834                =H'80'
00015A 0001                         835                =H'1'
00015C F1C8C4D940                   836                =CL5'1HDR '
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ALOGIC	00002	000062	0093	0162
BLOGIC	00004	000092	0118	0083
CHECK	00006	0000D6	0144	0136
DATACELL	00001	00003C	0825	
DCBBFALN	00001	000020	0232	
DCBBFTEK	00001	000020	0231	
DCBBLKCT	00004	00000C	0213	
DCBBLKSI	00002	00003E	0271	
DCBBUFCB	00004	000014	0224	
DCBBUFL	00002	000018	0225	
DCBBUFNO	00001	000014	0223	
DCBCCCW	00004	00004C	0296	
DCBCHECK	00004	000034	0264	
DCBCIND1	00001	00003C	0269	
DCBCIND2	00001	00003D	0270	
DCBCNTRL	00004	000054	0287	
DCBDDNAM	00008	000028	0241	
DCBDEBAD	00004	00002C	0252	
DCBDEN	00001	000012	0216	
DCBDEVT	00001	000011	0221	
DCBDIRCT	00002	000050	0284	
DCBDSORG	00002	00001A	0226	
DCBEOB	00004	00005C	0303	
DCBEOBAD	00004	000048	0295	
DCBEOBR	00004	000048	0282	
DCBEOBW	00004	00004C	0283	
DCBEODAD	00004	000020	0233	
DCBEROPT	00001	000054	0300	
DCBEXLST	00004	000024	0235	
DCBGERR	00004	000034	0262	
DCBGET	00004	000030	0255	
DCBIFLG	00001	000031	0243	
DCBIFLGS	00001	00002C	0251	
DCBIOBA	00004	000044	0277	
DCBIOBAD	00004	00001C	0227	
DCBIOBL	00001	000038	0266	
DCBKEYLE	00001	000010	0220	
DCBLCCW	00004	000048	0294	
DCBLRECL	00002	000052	0285	
DCBMACR	00002	000032	0244	
DCBMACRF	00002	00002A	0250	
DCBNCP	00001	000048	0281	
DCBNERRS	00004	000004	0210	
DCBNOISE	00001	000008	0211	
DCBNOTE	00004	000054	0288	
DCBOFFSR	00001	000042	0275	
DCBOFFSW	00001	000043	0276	
DCBOFLGS	00001	000030	0242	006C 0066
DCBOPTCD	00001	000034	0261	
DCBPERR	00004	000034	0263	
DCBPOINT	00004	000054	0289	
DCBPRECL	00002	00005A	0302	
DCBPUT	00004	000030	0256	
DCBQSWS	00002	000050	0298	
DCBREAD	00004	000030	0253	
DCBRECAD	00004	00004C	0297	

SYMBOL	LEN	VALUE	DEFN	REFERENCES
DCBRECFM	00001	000024	0234	
DCBREL	00003	000011	0222	
DCBSYNAD	00004	000038	0267	
DCBTIOT	00002	000028	0249	
DCBTRTCH	00001	000010	0214	
DCBUERRS	00004	000008	0212	
DCBWCPL	00001	000041	0274	
DCBWCPC	00001	000040	0273	
DCBWRITE	00004	000030	0254	
DCELECBA	00003	000049	0832	
DCELJBNR	00001	00003C	0826	
DCELSTAB	00001	00003E	0828	
DCELSTAT	00001	00003F	0829	
DCELUSER	00001	00003D	0827	
DCELVCLI	00006	000040	0830	
DCELVTOC	00003	000046	0831	
DLOGIC	00004	00001C	0053	C1C2
DSCBEND	00001	000064	0434	C5C2
DSCBEXA	00010	000033	0460	
DSCBEXB	00010	00003D	0461	
DSCBEXC	00010	000047	0462	
DSCBEXD	00010	000051	0463	
DSCBEXSD	00090	000001	0454	
DSCBEXSK	00040	000004	0441	
DSCBEXSQ	00001	000005	0443	
DSCBEXTY	00001	000004	0442	
DSCBEX2	00010	00000E	0446	
DSCBEX3	00010	000018	0447	
DSCBEX4	00010	000022	0448	
DSCBEX5	00010	000001	0455	
DSCBEX6	00010	00000B	0456	
DSCBEX7	00010	000015	0457	
DSCBEX8	00010	00001F	0458	
DSCBEX9	00010	000029	0459	
DSCBF3C	00004	000000	0440	
DSCBLDBL	00001	000010	0411	
DSCBLKL	00002	00002A	0418	
DSCBLLMT	00004	000006	0444	
DSCBNEXT	00005	00005B	0464	
DSCBULMT	00004	00000A	0445	
DSCCORE	00004	000060	0433	
DSCCREDT	00003	000009	0408	
DSCDSIND	00001	000031	0422	
DSCEXPDT	00003	00000C	0409	
DSCEXTSQ	00001	00003E	0427	
DSCEXTYP	00001	00003D	0426	
DSCEXT1	00010	000047	0430	
DSCEXT2	00010	000051	0431	
DSCFILSR	00006	000001	0406	
DSCFILTY	00002	000026	0415	
DSCFMTID	00001	000000	0405	
DSCKEYL	00001	00002E	0420	
DSCLOWLM	00004	00003F	0428	
DSCLRECL	00002	00002C	0419	
DSCLSTAR	00005	000036	0424	
DSCNEXT	00005	00005B	0432	

SYMBOL	LEN	VALUE	DEFN	REFERENCES							
DSCNOEXT	00001	00000F	0410								
DSCOPTCD	00001	000029	0417								
DSCRECFM	00001	000028	0416								
DSCRKP	00002	00002F	0421								
DSCSCALO	00004	000032	0423								
DSCSYSCD	00013	000012	0413								
DSCTRBAL	00002	00003B	0425								
DSCUPPLM	00004	000043	0429								
DSCVOLSR	00002	000007	0407								
DSECTSIZ	00001	0001D0	0685								
DXCBFMID	00001	000000	0453								
DXCCW	00096	000170	0671	C631							
DXCCW1	00008	000170	0672	C123	C124	0125	0126	0153			
DXCCW10	00008	000188	0681								
DXCCW11	00008	0001C0	0682								
DXCCW12	00008	0001C8	0683	C174							
DXCCW2	00008	000178	0673								
DXCCW3	00008	000180	0674								
DXCCW4	00008	000188	0675	C087							
DXCCW5	00008	000190	0676	C088							
DXCCW6	00008	000198	0677	C089							
DXCCW7	00008	0001A0	0678								
DXCCW8	00008	0001A8	0679								
DXCCW9	00008	000180	0680								
DXDAACDR	00008	000138	0638								
DXDCB	00004	000140	0666	C633	C651						
DXDCBAD	00004	000154	0652								
DXDCBDEB	00004	00016C	0667								
DXDEB	00044	00013C	0643	C667							
DXDEBAPP	00004	000158	0653								
DXDEBBIN	00002	000160	0656								
DXDEBDCB	00004	000154	0651	0652							
DXDEBDEB	00004	000140	0644								
DXDEBDFL	00001	000144	0645								
DXDEBECB	00004	000150	0649								
DXDEBECC	00002	000166	0659								
DXDEBEHH	00002	000168	0660								
DXDEBID	00001	000154	0650								
DXDEBIRB	00004	000144	0646								
DXDEBMCD	00001	00015C	0654								
DXDEBNTR	00002	00016A	0661								
DXDEBSCC	00002	000162	0657								
DXDEBSHH	00002	000164	0658								
DXDEBSYS	00004	000148	0647								
DXDEBUCB	00004	00015C	0655	C055							
DXDEBUSR	00004	00014C	0648								
DXDSCB	00096	000000	0404	C438	0452	0468					
DXDSCB3K	00040	000000	0439								
DXECB	00004	000114	0611	0127	C127	0132	0135	C154	0154	0159	0624
DXIOB	00032	000118	0616	0129	C156						
DXJBF	00176	000064	0503								
DXLBL	00080	000000	0352	C144	C146	0367	0403				
DXXXX	00004	00016C	0665	C666							
DYNAMIC	00001	000000	0191	0032							
DYYYY	00044	000140	0642	0643							
ELOGIC	00004	000124	0174	C094							

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ERRCR1	00004	00011C	0168	C145
ERRCR2	00004	00011C	0167	C147 0168
FL1BLKCT	00006	000036	0379	
FL1CRECT	00006	000029	0376	
FL1EXPCT	00006	00002F	0377	
FL1FILSQ	00004	00001F	0373	
FL1FILSR	00006	000015	0371	
FL1FSEC	00001	000035	0378	
FL1GNC	00004	000023	0374	
FL1ID	00017	000004	0370	0387
FL1LABI	00003	000000	0368	
FL1NO	00001	000003	0369	
FL1RES	00007	000049	0381	
FL1RES1	00006	00004A	0383	
FL1SYSCD	00013	00003C	0380	
FL1VNG	00002	000027	0375	
FL1VOLSQ	00004	00001B	0372	
FL2BLKL	00005	000005	0389	
FL2CNTRL	00001	000024	0398	
FL2DEN	00001	00000F	0391	
FL2FILP	00001	000010	0392	
FL2JOBD	00008	000011	0394	
FL2JSID	00017	000011	0393	
FL2JSSP	00001	000019	0395	
FL2LRECL	00005	00000A	0390	
FL2RECFM	00001	000004	0388	
FL2RES	00043	000025	0399	
FL2STEPD	00008	00001A	0396	
FL2TRTCH	00002	000022	0397	
IHADCB	00001	000000	0202	0033 0209 0219 0240 0248 0260 0265 0268 0272 0286 0293 0299 0301
IHB0002	00001	000091	0109	C1C6
INFMJFCB	00001	000064	0509	
IOBCNT	00002	000126	0629	
IOBCOMAD	00004	000120	0626	
IOBCSW	00008	000120	0625	
IOBDCBPT	00003	00012D	0633	
IOBECBPT	00001	00011C	0623	
IOBERRCT	00002	000136	0637	
IOBFLAG1	00001	000118	0617	
IOBFLAG2	00001	000119	0618	
IOBINCAM	00002	000134	0636	
IOBSENSE	00002	00011A	0619	
IOBSENS0	00001	00011A	0620	
IOBSENS1	00001	00011B	0622	
IOBSICCC	00001	000128	0630	
IOBSTART	00003	000129	0631	
IOBSTAT0	00001	000124	0627	
IOBSTAT1	00001	000125	0628	
IOBWGHT	00001	00012C	0632	
JFCBABST	00002	00010A	0596	
JFCBALXI	00001	000004	0587	
JFCBCNTG	00001	000040	0583	
JFCBCRDT	00003	0000B4	0521	
JFCBCTRI	00001	0000FF	0576	
JFCBDQTY	00003	000104	0591	
JFCBDRLA	00003	00010F	0601	

SYMBOL	LEN	VALUE	DEFN	REFERENCES
JFCBDSNM	00044	000064	0510	0146
JFCBELNM	00008	000090	0511	
JFCBEND	00001	000114	0608	
JFCBEXAD	00003	0000F9	0572	
JFCBEXTL	00001	0000F8	0569	
JFCBFALN	00001	0000BD	0540	
JFCBFLSQ	00002	0000A8	0518	
JFCBFTEK	00001	0000BD	0539	
JFCBIND1	00001	0000BA	0523	
JFCBIND2	00001	0000BB	0532	
JFCBIND3	00001	000103	0582	
JFCBLGTH	00001	0000B0	0607	
JFCBLKSI	00002	0000CA	0554	
JFCBLOCT	00001	000010	0526	
JFCBLTYP	00001	0000A6	0515	0082
JFCBMASK	00008	0000AC	0520	
JFCBMXIG	00001	000010	0585	
JFCBNEWV	00001	000004	0528	
JFCBNTCS	00001	0000D8	0564	
JFCBNVOL	00001	0000D9	0565	
JFCBPMEM	00001	000001	0530	
JFCBPQTY	00003	0000FC	0574	
JFCBRLSE	00001	000040	0524	
JFCBRNDC	00001	000001	0589	
JFCBSBNM	00003	00010C	0598	
JFCBSCTY	00001	000010	0535	
JFCBSPNM	00003	000107	0593	
JFCBSPTN	00001	000113	0603	
JFCBSQTY	00003	000100	0580	
JFCBSTAT	00001	000040	0533	
JFCBSYSC	00013	000099	0514	
JFCBTSDM	00001	000098	0512	
JFCBUFL	00002	0000BE	0541	
JFCBUFNO	00001	0000BC	0537	
JFCBUFRQ	00001	0000BC	0538	
JFCBVLCT	00001	000112	0602	
JFCBVLSQ	00002	0000AA	0519	
JFCBVOLS	00030	0000DA	0567	0089
JFCBXPDT	00003	0000B7	0522	
JFCCODE	00001	0000C1	0546	
JFCCPRI	00001	0000D5	0562	
JFCCYLOF	00001	0000D2	0559	
JFCDBUFN	00001	0000D3	0560	
JFCDEN	00001	0000C2	0549	
JFCDSORG	00002	0000C6	0551	
JFCEROPT	00001	0000C0	0542	
JFCINTVL	00001	0000D4	0561	
JFCKEYLE	00001	0000C1	0544	
JFCLIMCT	00003	0000C3	0550	
JFCLRECL	00002	0000CC	0555	
JFCMODE	00001	0000C1	0545	
JFCNCP	00001	0000CE	0556	
JFCNTM	00001	0000CF	0557	
JFCOPTCD	00001	0000C9	0553	
JFCPRTSP	00001	0000C1	0548	
JFCRECFM	00001	0000C8	0552	

SYMBOL	LEN	VALUE	DEFN	REFERENCES				
JFCRKP	00002	0000D0	0558					
JFCSOWA	00002	000006	0563					
JFCSTACK	00001	0000C1	0547					
JFCTRTCH	00001	0000C1	0543					
MESSAGEA	00060	00000C	0473	0476				
MINSTL	00001	000006	0480					
MODNAME	00008	000074	0103	0175				
MOUNT	00006	000050	0087	0061	0067	0073	0076	0169
MSERL	00001	000003	0479					
MSG	00021	000034	0193	0148	0149	0150		
MSGACTN	00001	00000F	0493					
MSGINSTR	00006	00000F	0491	0492				
MSGIOSUP	00003	00000C	0486					
MSGLSTSZ	00004	000008	0472					
MSGSER	00003	00000F	0487	0488	0490			
MSGSERLC	00001	00000F	0489					
MSGTEXT	00038	00001C	0499					
MSGUN	00003	000011	0495					
MSGVOLSR	00006	000015	0497					
MSSG	00004	000142	0188	0087				
MUNL	00001	000003	0481					
MVOLL	00001	000006	0482					
NSLOHDRI	00001	000000	0002	0833				
REGSTOR	00004	000000	0192	0177	0178			
REPLY	00010	000048	0474					
REPLYADR	00003	000001	0470					
REPLYECB	00004	000004	0471					
REPLYLTH	00001	000000	0469					
SRTEALOC	00001	000008	0768					
SRTEBALB	00001	000020	0811					
SRTEBJLB	00001	000002	0816					
SRTEBNUL	00001	000001	0817					
SRTEBPRV	00001	000010	0812					
SRTEBPUB	00001	000002	0813					
SRTEBSVL	00001	000080	0809					
SRTEBVQS	00001	000004	0814					
SRTEBVSC	00001	000040	0810					
SRTECHAN	00001	000001	0761					
SRTECHGS	00001	000040	0765					
SRTEDADI	00001	000001	0772					
SRTEDMCT	00001	000023	0818	0075	0118	0167		
SRTEECBA	00003	000039	0824					
SRTEFSCT	00002	000024	0819					
SRTEFSEQ	00002	000026	0820					
SRTEJBNR	00001	000000	0760					
SRTEONLI	00001	000080	0764					
SRTEPRES	00001	000004	0769					
SRTERESV	00001	000020	0766					
SRTESTAB	00001	000022	0808					
SRTESTAT	00001	000003	0763					
SRTESYSR	00001	000002	0770					
SRTEUNLD	00001	000010	0767					
SRTEUSER	00001	000038	0823					
SRTEVOLI	00006	00001C	0807					
SYMUCB	00001	000000	0686	0035				

SYMBOL	LEN	VALUE	DEFN	REFERENCES
UCBATI	00001	00000B	0783	
UCBCHA	00001	000004	0776	
UCBDTI	00001	000007	0779	
UCBETI	00001	000008	0780	
UCBFL2	00001	000006	0778	
UCBID	00001	000002	0762	
UCBLCI	00001	00000A	0782	
UCBLTS	00002	000014	0805	
UCBNAME	00003	00000D	0785	0088 0149
UCBOB	00001	000000	0758	
UCBSKA	00004	000030	0822	
UCBSNS	00006	000016	0806	
UCBSQC	00004	000028	0821	
UCBSTI	00001	000009	0781	
UCBTBYT1	00004	000010	0787	
UCBTBYT2	00004	000010	0796	
UCBTBYT3	00004	000010	0797	
UCBTBYT4	00004	000010	0804	
UCBTYP	00004	000010	0786	0072 0787 0796 0797 0804
UCBUA	00001	000005	0777	
UCBWGT	00001	00000C	0784	
UCB1FEA0	00001	000080	0788	
UCB1FEA1	00001	000040	0789	
UCB1FEA2	00001	000020	0790	
UCB1FEA3	00001	000010	0791	
UCB1FEA4	00001	000008	0792	
UCB1FEA5	00001	000004	0793	
UCB1FEA6	00001	000002	0794	
UCB1FEA7	00001	000001	0795	
UCB3CHAR	00001	000004	0803	
UCB3COMM	00001	000040	0799	
UCB3DACC	00001	000020	0800	
UCB3DISP	00001	000010	0801	
UCB3TAPE	00001	000080	0798	
UCB3UREC	00001	000008	0802	
VOLLABI	00003	000000	0353	
VOLNO	00001	000003	0354	
VCLOWNER	00010	000029	0362	
VOLSEC	00001	00000A	0356	
VOLSERNO	00006	000004	0355	
VOLVTOC	00005	00000B	0358	
WTO	00004	00007C	0105	0148

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
1214 PRINTED LINES

```
IEF285I   SYS1.MACLIB                                          KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCCCCC04 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCCCCC05 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCCCCC06 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   SYSOUT                                               SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   EBC.DDDD                                             PASSED
IEF285I   VOL SER NOS= 222222.
//           EXEC   PGM=IEWL,PARM='NCAL'
//SYSUT1 DD             UNIT=2311,SPACE=(TRK,(20,10)),DISP=(,DELETE)
//SYSLMOD    DD      DSNAME=SYS1.SVCLIB(NSLOHDRI),DISP=(OLD,KEEP)
//SYSPRINT   DD      SYSOUT=A
//SYSLIN DD DSNAME=&EBC,DISP=(OLD,DELETE)
//           DD      DDNAME=SYSIN
//SYSIN    DD   *
IEF236I ALLOC. FOR DDDD
IEF237I SYSUT1   ON 191
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 191
IEF237I          ON 00C
```

```
   F-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED--NCAL
IEW0000   NSLCHDRI  NOW REPLACED IN DATA SET
```

```
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.OC000C09 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   SYS1.SVCLIB                                  KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   SYSOUT                                       SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   EBC.CDDD                                     DELETED
IEF285I   VOL SER NOS= 222222.
```

```
//DDDD    JOB   0,EBCNSL,MSGLEVEL=1
//GENE1   EXEC  PGM=IEUASM,PARM=(DECK,RENT)
//SYSLIB  DD    DSNAME=SYS1.MACLIB,DISP=OLD
//SYSUT1  DD    UNIT=2311,SPACE=(17CC,(400,50))
//SYSUT2  DD    UNIT=2311,SPACE=(17C0,(4C0,50))
//SYSUT3  DD    UNIT=2311,SPACE=(17CC,(400,50))
//SYSPRINT  DD SYSOUT=A
//SYSPUNCH DD DSNAME=&EBC,UNIT=2311,SPACE=(80,(200,50)),DISP=(NEW,PASS)
//SYSIN   DD    *
IEF236I ALLOC. FOR DDDD     GENE1
IEF237I SYSLIB    ON 190
IEF237I SYSUT1    ON 191
IEF237I SYSUT2    ON 191
IEF237I SYSUT3    ON 191
IEF237I SYSPUNCH ON 191
IEF237I SYSIN     ON 00C
```

Assemble NSLOHDRI and Link Edit intoSYS1.SVCLIB -
(Used EBC1 and EBC2 macros in this run.)

EXTERNAL SYMBOL DICTIONARY

SYMBOL	TYPE	ID	ADDR	LENGTH	LD ID
NSLOHDR1	SD	01	000000	000161	

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000000                             2 NSLOHDRI START 0
                                   3 ***
                                   4 ***          NOTE THAT THE GETMAIN MACRO REQUIRES BASE REGISTER
                                   5 ***          ADDRESSIBILITY FOR ITS GENERATION -
                                   6 ***
000000 05F0                        7              BALR  15,0                    PROVIDE ADDRESSABILITY
000002                             8              USING *,15
                                   9 ***
                                  10              GETMAIN R,LV=240
000002 4100 00F0          CCCFC   11+             LA    0,240(0,0) LOAD LENGTH
000006 4510 F008          CCCCA   12+             BAL   1,*+4 INDICATE GETMAIN
00000A 0A0A                       13+             SVC   10 ISSUE GETMAIN SVC
00000C 902E 1000          0000C   14              STM   2,14,0(1)               STORE REGISTERS
                                  15              DROP  15
                                  16 ***
                                  17 ***          REGISTERS 2 TO 14 ARE SAVED IN AN AREA OF CORE ACQUIRED
                                  18 ***          BY WAY OF A GETMAIN MACRO   -   BASE REGISTER 1 HAS THE
                                  19 ***          ADDRESS OF THE AREA ACQUIRED
                                  20 ***
                                  21 ***          'DYNAMIC' IS THE NAME WE'VE GIVEN TO THE GETMAIN AREA
                                  22 ***          WE'VE DESCRIBED IN THE DSECT IN THIS PROGRAM
                                  23 ***
000010 0530                       24              BALR  3,0
000012                            25              USING *,3
                                  26 ***
                                  27 ***          REGISTER 1 MUST BE DROPPED AS THE BASE REGISTER OF THE
                                  28 ***          DYNAMIC AREA BECAUSE WE ARE ABOUT TO 'EXCP' AND IT USES
                                  29 ***          REGISTER 1
                                  30 ***
000012 1841                       31              LR    4,1      RELEASE 1 FOR MACRO USE
000000                            32              USING DYNAMIC,4
000000                            33              USING IHADCB,10          GR10=ADDR OF DCB
000000                            34              USING SYMWACBA,11        GR11=ADDR OF WACBA
000000                            35              USING SYMUCB,12          GR12=ADDR OF UCB
                                  36 ***          INITIALIZE REGISTER 7 TO ZERO - THIS REGISTER IS USED
                                  37 ***          TO PASS OVER 4 BYTE ADDRESSES - THESE ADDRESSES ARE IN A
                                  38 ***          LIST OF ADDRESSES (WHICH ARE POINTERS TO ALL THE DCB'S
                                  39 ***          IN THE PROBLEM PROGRAM AREA) - THERE IS ONE ADDRESS FOR
                                  40 ***          EACH DCB ENTRY IN THE OPEN OR CLOSE  - WE GET THE ADDR OF
                                  41 ***          THE BEGINNING OF THIS LIST IN REG 5 DURING OPEN
000014 4170 0000          CCCCC   42              LA    7,0                     XR7 FOR DCB'S
                                  43 ***          INITIALIZE REGISTER 8 TO 36 - THIS REG IS USED TO PASS
                                  44 ***          OVER 8 BYTES AT A TIME - AFTER THE 1ST 32 BYTES EACH 8
                                  45 ***          BYTES CONTAINS (IN THE LOW ORDER BYTES) THE ADDRESS
                                  46 ***          OF THE 'WORK AND CONTROL BLOCK AREA' - ONE 'WORK AND
                                  47 ***          CONTROL BLOCK AREA' IS BUILT FOR EACH DCB IN THE OPEN OR
                                  48 ***          CLOSE MACRO - WE GET THE STARTING ADDR OF THE TABLE THAT
                                  49 ***          CONTAINS THE ADDR FOR EACH 'WORK AND CONTROL BLOCK AREA'
                                  50 ***          IN REG 6 DURING OPEN
                                  51 ***
000018 4180 0024          CCC24   52              LA    8,36                    XR8 FOR WACBA'S
00001C 58A7 5000          CCCCC   53 DLOGIC       L     10,0(7,5)               ADDR OF DCB IN GR10
000020 58B8 6000          CCCCC   54              L     11,0(8,6)               ADDR OF WACBA IN GR11
000024 58C0 B15C          C015C   55              L     12,DXDEBUCB             ADDR OF UCB IN GR12
                                  56 ***
                                  57 *            IS THIS AN 'OUTPUT' DCB              YES IGNORES THIS DCB
```

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
                                     58 *            AND CHECKS THE NEXT DCB
                                     59 ***
000028 9180 A030       00030         60          TM    DCBOFLGS,X'80'      BIT 0 = 0 IF INPUT
00002C 4710 303E             CCC5C   61          BO    MOUNT
                                     62 ***
                                     63 *            IS THIS DCB ALREADY OPENED          YES IGNORES THIS DCB
                                     64 *            AND CHECKS THE NEXT DCB
                                     65 ***
000030 9110 A030       00030         66          TM    DCBOFLGS,X'10'          BIT 3 = 1 IF OPEN
000034 4710 303E             0005C   67          BO    MOUNT
                                     68 ***
                                     69 *            IS THIS DCB FOR OTHER THAN TAPE     YES IGNORES THIS DCB
                                     70 *            AND CHECKS THE NEXT DCB.
                                     71 ***
000038 9180 C012       00012         72          TM    UCBTYP+2,X'80'     TEST UCB3 TAPE FOR 1
00003C 4780 303E             CCC5C   73          BZ    MOUNT
                                     74 ***
000040 9180 C023       CC023         75          TM    SRTEDMCT,X'80'           IS MOUNT MSG BIT ON
000044 4780 303E             0005C   76          BZ    MOUNT
                                     77 ***
                                     78 *            IS NSL BIT IN JFCB ON               YES GOES TO RD LABEL
                                     79 *                                                NO IGNORES THIS DCB
                                     80 *            AND CHECKS THE NEXT DCB
                                     81 ***
000048 9504 B0A6       000A6         82          CLI   JFCBLTYP,X'04'      CHECK NSL BIT IN JFCB
00004C 4780 3080             00092   83          BE    BLOGIC              GOES TO ' MY ' ROUTINE
                                     84 ***
                                     85 *** SET UP THE MOUNT MSG TC BE USED IN IGG0190B  - SEE WTO MACRO
                                     86 ***
000050 D211 B188 3130 00188 00142    87 MOUNT    MVC   DXCCW4(18),MSSG     MOVE IN SKELETON MSG
000056 D202 B196 C00D 00196 00CCD    88          MVC   DXCCW5+6(3),UCBNAME     MOVE  UNIT NAME TO MSG
00005C D205 B19A B0DA 0019A CCCDA    89          MVC   DXCCW6+2(6),JFCBVOLS    MOVE VOL SER NO FROM JFCB
                                     90 ***
                                     91 ******       TEST TO SEE IF THERE ARE MORE DCB'S OR IF WE'RE FINISHED
                                     92 ***
000062 12AA                          93 ALOGIC   LTR   10,10                FIRST BYTE IN CURRENT DCB
000064 4740 3112             00124   94          BM    ELOGIC
                                     95 ***
                                     96 *            INCREMENT GEN PURPOSE REG 7 AND 8 BY 4 AND 8 TO GET TO
                                     97 *            NEXT 'DCB' IN THE LIST OF DCB'S AND THE
                                     98 *            NEXT 'WORK AND CONTROL BLOCK AREA' RESPECTIVELY
                                     99 ***
000068 4170 7004             00004  100          LA    7,4(0,7)            INCREMENT XR7 BY 4
00006C 4180 8008             CCCC8  101          LA    8,8(0,8)            INCREMENT XR8 BY 8
000070 47F0 300A             0001C  102          B     DLOGIC               GO TO CHECK NEXT DCB
000074 C9C7C7F0F1F9F0C2             103 MODNAME  DC    CL8'IGG0190B'
                                    104 WTO      WTO   'HDR ON XXX CHECKS',MF=L
00007C                              105+WTO      DS    0F
00007C 0015                         106+         DC    AL2(IHB0002-*) MESSAGE LENGTH
00007E 0000                         107+         DC    AL2(0)
000080 C8C4D940D6D540E7             108+         DC    C'HDR ON XXX CHECKS' MESSAGE
000091                              109+IHB0002  EQU   *
                                    110 ***
                                    111 *            MY ROUTINE
                                    112 *
                                    113 *            WE SET THE HIGH ORDER BIT IN 'STREDMCT' IN THE DCB TO ZERO
```

```
LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
                                  114 *          IF WE DETERMINE VIA 'DS NAME' AND 'IHDR' THAT WE'VE WRONG
                                  115 *          TAPE MOUNTED WE WILL PUT A ONE IN THIS BIT WHICH INDICATES
                                  116 *          TO THE CONTROL PROGRAM THAT A MOUNT MSG IS IN ORDER
                                  117 ***
000091 00
000092 947F C023       00023      118 BLOGIC   NI    SRTEDMCT,X'7F'      TURN BIT 0 TO 0
                                  119 ***
                                  120 *      BUILD THE CCW
                                  121 *      NOTE THAT THIS IS NOT A GENERALIZED ROUTINE TO BUILD CCWS
                                  122 ***
000096 5080 B170             00170 123          ST    11,DXCCW1      READ ADDR TO CCW
00009A 9202 B170       00170      124          MVI   DXCCW1,X'02'           READ
00009E 9220 B174       00174      125          MVI   DXCCW1+4,X'20'         FLAGS
0000A2 D201 B176 3146  00176 00158 126          MVC   DXCCW1+6(2),=H'80'     COUNT
0000A8 D703 B114 B114  00114 00114 127          XC    DXECB,DXECB            RESET ECB
                                  128          EXCP  DXIOB
0000AE 4110 B118             00118 129+         LA    1,DXIOB LOAD PARAMETER REG 1
0000B2 0A00                        130+         SVC   0 ISSUE SVC FOR EXCP
                                  131          WAIT  ECB=DXECB              WAIT FOR COMPLETION
0000B4 4110 B114             00114 132+         LA    1,DXECB LOAD PARAMETER REG 1
0000B8 4100 0001             00001 133+         LA    0,1(0,0) COUNT OMITTED,1 USED
0000BC 0A01                        134+         SVC   1 LINK TO WAIT ROUTINE
0000BE 957F B114       00114      135          CLI   DXECB,X'7F'            ERROR CHECK
0000C2 4780 30C4             000D6 136          BE    CHECK                  READ OK
                                  137          ABEND 256,DUMP               ERROR ON READ
0000C6 0700                        138+         CNOP  0,4
0000C8 47F0 30BE             000DC 139+         B     *+8 BRANCH AROUND CONSTANT
0000CC 80                          140+         DC    AL1(128) DUMP/STEP CODE
0000CD 000100                      141+         DC    AL3(256) COMPLETION CODE
0000D0 5810 30BA             000CC 142+         L     1,*-4 LOAD CODES INTO REG 1
0000D4 0A0D                        143+         SVC   13 LINK TO ABEND ROUTINE
0000D6 D504 B000 314A  00000 0015C 144 CHECK    CLC   DXLBL(5),=CL5'1HDR '
0000DC 4770 310A             0011C 145          BNE   ERROR1
0000E0 D509 B014 B064  00014 00064 146          CLC   DXLBL+20(10),JFCBDSNM  COMPARE TO DSNAME
0000E6 4770 310A             0011C 147          BNE   ERROR2
0000EA D214 4034 306A  00034 0007C 148          MVC   MSG,WTO
0000F0 D202 403F C00D  003F  000D  149          MVC   MSG+11(3),UCBNAME
0000F6 4110 4034             00034 150          LA    1,MSG
                                  151          WTO   MF=(E,(1))             EXECUTABLE INSTRUCTIONS
0000FA 0A23                        152+         SVC   35 ISSUE SVC
0000FC D201 B176 3148  00176 0015A 153          MVC   DXCCW1+6(2),=H'1'      COUNT
000102 D703 B114 B114  00114 00114 154          XC    DXECB,DXECB            RESET ECB
                                  155          EXCP  DXIOB                  TO POSITION TAPE PAST TAPE MARK
000108 4110 B118             00118 156+         LA    1,DXIOB LOAD PARAMETER REG 1
00010C 0A00                        157+         SVC   0 ISSUE SVC FOR EXCP
                                  158          WAIT  ECB=DXECB              WAIT FOR COMPLETION
00010E 4110 B114             00114 159+         LA    1,DXECB LOAD PARAMETER REG 1
000112 4100 0001             00001 160+         LA    0,1(0,0) COUNT OMITTED,1 USED
000116 0A01                        161+         SVC   1 LINK TO WAIT ROUTINE
000118 47F0 3050             00062 162          B     ALOGIC                 READ OK
                                  163 *
                                  164 ***
                                  165 ***          SET THE 'MOUNTING MESSAGE' BIT ON
                                  166 ***
00011C 9680 C023       00023      167 ERROR2   OI    SRTEDMCT,X'80'         TURN BIT 0 TO ONE
00011C                            168 ERROR1   EQU   ERROR2
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT                                        F24JUNE66 10/07/66
000120 47F0 303E             C005C   169           B      MOUNT
                                     170 *
                                     171 ***
                                     172 ***            RETURN
                                     173 ***
000124 41F0 B1C8             001C8   174 ELOGIC    LA     15,DXCCW12    PTR TO SUPV PARAM LIST
000128 41B0 3062             C0C74   175           LA     11,MODNAME     PTR TO XCTL MODNAME
00012C 1814                          176           LR     1,4          AREA TO BE FREED
00012E 98CE 4028             C0028   177           LM     12,14,REGSTOR+40         RESTORE REGISTERS
000132 982A 4000             C0000   178           LM     2,10,REGSTOR         RESTORE REGISTERS
                                     179           FREEMAIN R,LV=240,A=(1)    USES REGISTERS 0 AND 1
000136 4100 00F0             C00FC   180+          LA     0,240(0,0) LOAD LENGTH
00013A 0A0A                          181+          SVC    10 ISSUE FREEMAIN SVC
                                     182           XCTL   EPLOC=(11),SF=(E,(15))  USES REGISTERS SPECIFIED
00013C 50B0 F000             C00C0   183+          ST     11,0(0,15) STORE IN SUP.PARAMLIST
000140 0A07                          184+          SVC    7 ISSUE XCTL SVC
                                     185 ***
                                     186 *** CONSTANTS - - MSG TO BE MOVED TO DXCCW4 AND THEN USED BY IGG019CB
                                     187 ***
000142 00180000                      188 MSSG      DC     X'00180000'
000146 C9C5C3F1F0F1C140              189           DC     C'IEC101A M YYY,'
                                     190 ***
000000                               191 DYNAMIC   DSECT
000000                               192 REGSTOR   DS     13F
000034                               193 MSG       DS     CL21
                                     194 ***
                                     195.***
                                     196 ***
                                     197           DCBD   DSORG=PS,DEVD=TA


                                     199+*                        DCB SYMBOLIC DEFINITION FOR
                                     200+*                        PHYSICAL SEQUENTIAL

000000                               202+IHADCB    DSECT

                                     204+*                        DEVICE INTERFACES


                                     207+*                    MAGNETIC TAPE

000004                               209+          ORG    IHADCB+4
000004                               210+DCBNERRS  DS     F
000008                               211+DCBNOISE  DS     0BL1
000008                               212+DCBUERRS  DS     F
00000C                               213+DCBBLKCT  DS     F
000010                               214+DCBTRTCH  DS     BL1
000011                               215+          DS     BL1
000012                               216+DCBDEN    DS     BL1
                                     217+*                        ACCESS METHOD COMMON INTERFACE

000010                               219+          ORG    IHADCB+16
000010                               220+DCBKEYLE  DS     BL1
000011                               221+DCBDEVT   DS     0BL1
000011                               222+DCBREL    DS     AL3
000014                               223+DCBBUFNO  DS     0BL1
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000014                           224+DCBBUFCB DS    A
000018                           225+DCBBUFL  DS    H
00001A                           226+DCBDSORG DS    BL2
00001C                           227+DCBIOBAD DS    A

                                 229+*                       FOUNDATION EXTENSION

000020                           231+DCBBFTEK DS    OBL1
000020                           232+DCBBFALN DS    OBL1
000021                           233+DCBEODAD DS    A
000024                           234+DCBRECFM DS    OBL1
000024                           235+DCBEXLST DS    A


                                 238+*                       FOUNDATION BEFORE OPEN

000028                           240+         ORG   IHADCB+40
000028                           241+DCBDDNAM DS    CL8
000030                           242+DCBOFLGS DS    BL1
000031                           243+DCBIFLG  DS    BL1
000032                           244+DCBMACR  DS    BL2

                                 246+*                       FOUNDATION AFTER OPEN

000028                           248+         ORG   IHADCB+40
000028                           249+DCBTIOT  DS    BL2
00002A                           250+DCBMACRF DS    BL2
00002C                           251+DCBIFLGS DS    OBL1
00002C                           252+DCBDEBAD DS    A
000030                           253+DCBREAD  DS    0A
000030                           254+DCBWRITE DS    0A
000030                           255+DCBGET   DS    0A
000030                           256+DCBPUT   DS    0A

                                 258+*                       QSAM-BSAM-BPAM COMMON INTERFACE

000034                           260+         ORG   IHADCB+52
000034                           261+DCBOPTCD DS    OBL1
000034                           262+DCBGERR  DS    0A
000034                           263+DCBPERR  DS    0A
000034                           264+DCBCHECK DS    A
000038                           265+         ORG   IHADCB+56
000038                           266+DCBIOBL  DS    OBL1
000038                           267+DCBSYNAD DS    A
00003C                           268+         ORG   IHADCB+60
00003C                           269+DCBCIND1 DS    BL1
00003D                           270+DCBCIND2 DS    BL1
00003E                           271+DCBBLKSI DS    H
000040                           272+         ORG   IHADCB+64
000040                           273+DCBWCPO  DS    BL1
000041                           274+DCBWCPL  DS    BL1
000042                           275+DCBOFFSR DS    BL1
000043                           276+DCBOFFSW DS    BL1
000044                           277+DCBIOBA  DS    A

                                 279+*                       BSAM-BPAM INTERFACE
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT
000048                           281+DCBNCP   DS    OBL1
000048                           282+DCBEOBR  DS    A
00004C                           283+DCBEOBW  DS    A
000050                           284+DCBDIRCT DS    H
000052                           285+DCBLRECL DS    H
000054                           286+         ORG   IHADCB+84
000054                           287+DCBCNTRL DS    0A
000054                           288+DCBNOTE  DS    0A
000054                           289+DCBPOINT DS    A

                                 291+*                      QSAM INTERFACE

000048                           293+         ORG   IHADCB+72
000048                           294+DCBLCCW  DS    0A
000048                           295+DCBEOBAD DS    A
00004C                           296+DCBCCCW  DS    0A
00004C                           297+DCBRECAD DS    A
000050                           298+DCBQSWS  DS    AL2
000054                           299+         ORG   IHADCB+84
000054                           300+DCBEROPT DS    0BL1
00005A                           301+         ORG   IHADCB+90
00005A                           302+DCBPRECL DS    AL2
00005C                           303+DCBEOB   DS    A

                                 305 ***
                                 306 ***
                                 307 ***
000000                           308 SYMWACBA DSECT
                                 309          EBC2

                                 311+*                    VOLUME LABEL

000000                           313+DXLBL    DS    CL80
000050                           314+         DS    CL20

                                 316+*                    JOB FILE CONTROL BLOCK
000064                           317+JFCBDSNM DS    CL44 DATA SET NAME
000090                           318+         DS    CL22
0000A6                           319+JFCBLTYP DS    CL1 LABEL TYPE
0000A7                           320+         DS    CL51
0000DA                           321+JFCBVOLS DS    CL30 VOLUME SERIAL NUMBERS
0000F8                           322+         DS    CL28

                                 324+*                    EVENT CONTROL BLOCK

000114                           326+DXECB    DS    0CL4
000114 00000000                  327+         DC    X'00000000'

                                 329+*                    INPUT/OUTPUT BLOCK

000118                           331+DXIOB    DS    CL40

                                 333+*                    DATA EXTENT BLOCK

000140                           335+         DS    CL28
00015C                           336+DXDEBUCB DS    F
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT                                F24JUNE66 10/07/66
000160                            337+          DS    CL12
                                  339+*                     DATA CONTROL BLOCK
00016C                            341+          DS    CL4
                                  343+*                     CHANNEL CONTROL WORDS
000170                            345+          CNOP  0,8
000170                            346+DXCCW1    DS    D
000178                            347+          DS    CL16
000188                            348+DXCCW4    DS    D
000190                            349+DXCCW5    DS    D
000198                            350+DXCCW6    DS    D
0001A0                            351+          DS    CL40
0001C8                            352+DXCCW12   DS    D

000000                            354 SYMUCB    DSECT
                                  355           EBC1
000000                            356+          DS    CL13
00000D                            357+UCBNAME   DS    CL3 UNIT NAME IN EBCDIC CHARACTERS
000010                            358+UCBTYP    DS    XL4 DEVICE TYPE
000014                            359+          DS    CL15
000023                            360+SRTEDMCT  DS    XL1 MOUNT BIT IN HIGH ORDER BIT
000024                            361+          DS    CL32
000000                            362           END   NSLOHDRI
000158 0050                       363                 =H'80'
00015A 0001                       364                 =H'1'
00015C F1C8C4D940                 365                 =CL5'1HDR '
```

SYMBOL	LEN	VALUE	DEFN	REFERENCES
ALOGIC	00002	000062	0093	C162
BLOGIC	00004	000092	0118	C083
CHECK	00006	0000D6	0144	C136
DCBBFALN	00001	000020	0232	
DCBBFTEK	00001	000020	0231	
DCBBLKCT	00004	00000C	0213	
DCBBLKSI	00002	00003E	0271	
DCBBUFCB	00004	000014	0224	
DCBBUFL	00002	000018	0225	
DCBBUFNO	00001	000014	0223	
DCBCCCW	00004	00004C	0296	
DCBCHECK	00004	000034	0264	
DCBCIND1	00001	00003C	0269	
DCBCIND2	00001	00003D	0270	
DCBCNTRL	00004	000054	0287	
DCBDDNAM	00008	000028	0241	
DCBDEBAD	00004	00002C	0252	
DCBDEN	00001	000012	0216	
DCBDEVT	00001	000011	0221	
DCBDIRCT	00002	000050	0284	
DCBDSORG	00002	00001A	0226	
DCBEOB	00004	00005C	0303	
DCBEOBAD	00004	000048	0295	
DCBEOBR	00004	000048	0282	
DCBEOBW	00004	00004C	0283	
DCBEODAD	00004	000020	0233	
DCBEROPT	00001	000054	0300	
DCBEXLST	00004	000024	0235	
DCBGERR	00004	000034	0262	
DCBGET	00004	000030	0255	
DCBIFLG	00001	000031	0243	
DCBIFLGS	00001	00002C	0251	
DCBIOBA	00004	000044	0277	
DCBIOBAD	00004	00001C	0227	
DCBIOBL	00001	000038	0266	
DCBKEYLE	00001	000010	0220	
DCBLCCW	00004	000048	0294	
DCBLRECL	00002	000052	0285	
DCBMACR	00002	000032	0244	
DCBMACRF	00002	00002A	0250	
DCBNCP	00001	000048	0281	
DCBNERRS	00004	000004	0210	
DCBNOISE	00001	000008	0211	
DCBNOTE	00004	000054	0288	
DCBOFFSR	00001	000042	0275	
DCBOFFSW	00001	000043	0276	
DCBOFLGS	00001	000030	0242	0060 C066
DCBOPTCD	00001	000034	0261	
DCBPERR	00004	000034	0263	
DCBPOINT	00004	000054	0289	
DCBPRECL	00002	00005A	0302	
DCBPUT	00004	000030	0256	
DCBQSWS	00002	000050	0298	
DCBREAD	00004	000030	0253	
DCBRECAD	00004	00004C	0297	
DCBRECFM	00001	000024	0234	

SYMBOL	LEN	VALUE	DEFN	REFERENCES											
DCBREL	00003	000011	0222												
DCBSYNAD	00004	000038	0267												
DCBTIOT	00002	000028	0249												
DCBTRTCH	00001	000010	0214												
DCBUERRS	00004	000008	0212												
DCBWCPL	00001	000041	0274												
DCBWCPO	00001	000040	0273												
DCBWRITE	00004	000030	0254												
DLCGIC	00004	00001C	0053	01C2											
DXCCW1	00008	000170	0346	0123	0124	0125	0126	0153							
DXCCW12	00008	0001C8	0352	0174											
DXCCW4	00008	000188	0348	0087											
DXCCW5	00008	000190	0349	0088											
DXCCW6	00008	000198	0350	0089											
DXDEBUCB	00004	00015C	0336	0055											
DXECB	00004	000114	0326	0127	0127	0132	0135	0154	0154	0159					
DXICB	00040	000118	0331	0129	0156										
DXLBL	00080	000000	0313	0144	0146										
DYNAMIC	00001	000000	0191	0032											
ELOGIC	00004	000124	0174	0094											
ERROR1	00004	00011C	0168	0145											
ERROR2	00004	00011C	0167	0147	0168										
IHADCB	00001	000000	0202	0033	0209	0219	0240	0248	0260	0265	0268	0272	0286	0293	0299	0301
IHB0002	00001	000091	0109	01C6											
JFCBDSNM	00044	000064	0317	0146											
JFCBLTYP	00001	0000A6	0319	0082											
JFCBVOLS	00030	0000DA	0321	0089											
MODNAME	00008	000074	0103	0175											
MOUNT	00006	000050	0087	0061	0067	0073	0076	0169							
MSG	00021	000034	0193	0148	0149	0150									
MSSG	00004	000142	0188	0087											
NSLOHDRI	00001	000000	0002	0362											
REGSTOR	00004	000000	0192	0177	0178										
SRTEDMCT	00001	000023	0360	0075	0118	0167									
SYMUCB	00001	000000	0354	0035											
SYMWACBA	00001	000000	0306	0034											
UCBNAME	00003	00000D	0357	0088	0149										
UCBTYP	00004	000010	0358	0072											
WTO	00004	00007C	0105	0148											

NO STATEMENTS FLAGGED IN THIS ASSEMBLY
449 PRINTED LINES

```
   F-LEVEL LINKAGE EDITOR OPTIONS SPECIFIED--NCAL
IEW0000   NSLCHORI  NOW REPLACED IN DATA SET
```

```
IEF285I   SYS1.MACLIB                                        KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCOOOOO2 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCOOOOO3 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCOOOOO4 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   SYSOUT                                             SYSOUT
IEF285I   VOL SER NOS=        .
IEF285I   EBC.CODO                                           PASSED
IEF285I   VOL SER NOS= 222222.
//            EXEC    PGM=IEWL,PARM='NCAL'
//SYSUT1 DD               UNIT=2311,SPACE=(TRK,(20,10)),DISP=(,DELETE)
//SYSLMOD     DD      DSNAME=SYS1.SVCLIB(NSLOHDR1),DISP=(OLD,KEEP)
//SYSPRINT    DD      SYSOUT=A
//SYSLIN DD DSNAME=&EBC,DISP=(OLD,DELETE)
//            DD      DDNAME=SYSIN
//SYSIN    DD   *
IEF236I ALLOC. FOR CODO
IEF237I SYSUT1   ON 191
IEF237I SYSLMOD  ON 190
IEF237I SYSLIN   ON 191
IEF237I          ON 00C
```

```
IEF285I   AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00000007 DELETED
IEF285I   VOL SER NOS= 222222.
IEF285I   SYS1.SVCLIB                                  KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   SYSOUT                                       SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   EBC.DDDD                                     DELETED
IEF285I   VOL SER NOS= 222222.
```

```
//HHHH  JOB   0,EBCGO,MSGLEVEL=1
//JCBLIB DD DSNAME=EBCLIB,DISP=(OLD,PASS)
//GE     EXEC  PGM=EBC3
//TAPE1 DD  UNIT=180,LABEL=(,NL),DSNAME=TAPE180
//TAPE2 DD UNIT=181,LABEL=(,NSL),VOLUME=SER=TAPE2,DSNAME=TAPE181
//TAPE3 DD UNIT=182,LABEL=(,NSL),VOLUME=SER=TAPE3,DSNAME=TAPE182
//SYSABEND  DD  SYSOUT=A
IEF236I ALLOC. FOR HHHH     GE
IEF237I JCBLIB   ON 190
IEF237I TAPE1    ON 180
IEF237I TAPE2    ON 181
IEF237I TAPE3    ON 182
```

Execute the Test Program

(During this run the NSL checks)

```
IEF285I   EBCLIB                                  PASSED
IEF285I   VOL SER NOS= 111111.
IEF285I   TAPE180                                 DELETED
IEF285I   VOL SER NOS= LGL001.
IEF285I   TAPE181                                 DELETED
IEF285I   VOL SER NOS= TAPE2 .
IEF285I   TAPE182                                 DELETED
IEF285I   VOL SER NOS= TAPE3 .
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=
IEF280I K 181,TAPE2 ,HHHH
IEF280I K 182,TAPE3 ,HHHH
IEF285I   EBCLIB                                  KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//HHHH  JOB    0,EBCGO,MSGLEVEL=1
//JOBLIB DD DSNAME=EBCLIB,DISP=(OLD,PASS)
//GE      EXEC  PGM=EBC3
//TAPE1 DD  UNIT=180,LABEL=(,NL),DSNAME=TAPE180
//TAPE2 DD UNIT=181,LABEL=(,NSL),VOLUME=SER=TAPE2,DSNAME=TAPE181
//TAPE3 DD UNIT=182,LABEL=(,NSL),VOLUME=SER=TAPE3,DSNAME=TAPE182
//SYSABEND  DD  SYSOUT=A
IEF236I ALLOC. FOR HHHH      GE
IEF237I JOBLIB    ON 190
IEF237I TAPE1     ON 180
IEF237I TAPE2     ON 181
IEF237I TAPE3     ON 182
```

Execute the Test Program

(During this run the NSL does not check)

```
  * * * A B C U M P  R E Q U E S T E D * * *

JOB HHHH              STEP GE              DATE 66280                                                    PAGE 0001

COMPLETION CODE       USER = 0256

PSW UPON ENTRY TO ABEND FF04000D 5000337E

TCB  000180             RB 03FCF0  PIE 000000  DEB 03FC84        TIOT 03FF34      CMP 000100       TRN 00000000
MSS  000036A8     PK/FLGS 00910400       FLGS/LDP 00000000       LLS  000000      JLB 03FE88       JSE 00000000
ID/FSA  0403FFB4        TCB 000000              TME 0036BC


ACTIVE RBS

A001 0052A8  NM EBC3       SZ/STAB C03B00C0  USE/EP 000052C8  PSW FF050013 400052F2  Q 000000  WT/LNK 00000180  UB 005480

A002 03FE28  NM SVC-HDRI   SZ/STAB C012D072  USE/EP 000032A8  PSW FF04000D 5000337E  Q 610161  WT/LNK 000052A8
REGS 0-7     00000030     800052E4     C0000080     400052CE         00005434     0003FF34     000028F0     00C00080
REGS 8-15    0000003C     40008302     0003FEF4     0003FF34         00000180     00005434     00002940     400052C8

A003 03FD50  NM SVC-401C   SZ/STAB C00CD072  USE/EP 000032A8  PSW FF040033 4000344C  Q A103A1  WT/LNK 0003FE28
REGS 0-7     00000001     80000100     80005388     700032BA         00005A78     800052E4     00005A38     00000008
REGS 8-15    00000034     0003FF34     8C005388     00005850         2B001370     00005A20     0003FF88     5000250A

A004 03FCF0  NM SVC-105A   SZ/STAB C00CD072  USE/EP 000032A8  PSW FF04000E 0003FB94  Q DF03DF  WT/LNK 0003FD50
REGS 0-7     000000E0     00005BC0     00000878     400032AA         00000000     0003F8C0     00005B68     80003428
REGS 8-15    000036A8     00005C36     00040000     00000180         00000180     00005BD0     500034D2     0003FB70


LOAD LIST


SAVE AREA TRACE

EBC3     WAS ENTERED

SA 0003FFB4  WD1 00000181  HSA 00000000  LSA 00005434  RET 00002940   EP 400052C8
00 00000030   01 0003FF04   02 00CC0080   03 00000181   04 00005218   05 0003FF34   06 000028F0
07 00000080   08 0000003C   09 40008302   10 0003FEF4   11 0003FF34   12 00000180

SA 00005434  WD1 00000000  HSA 0003FFB4  LSA 00000000  RET 00000000   EP 00000000
00 00000000   01 00000000   02 00CC0000   03 00C00000   04 00000000   05 00000000   06 00000000
07 00000000   08 00000000   09 00CC0000   10 00000000   11 00000000   12 00000000


INTERRUPT AT 0052F2


PROCEEDING BACK VIA REG 13

SA 00005434  WD1 00000000  HSA 0003FFB4  LSA 00000000  RET 00000000   EP 00000000
```

```
00 00000000   01 00000000   02 0C000000   03 00000000   04 00000000   05 00000000   06 00000000
07 00000000   08 00000000   09 0CCC0000   10 00000000   11 00000000   12 00000000

EBC3      WAS ENTERED

SA 0003FFB4  WD1 00000181  HSA 0CCC0000  LSA 00005434  RET 00002940   EP 400052C8
00 00000030   01 0003FF04   02 0CC00080   03 00000181   04 00005218   05 0003FF34   06 000028F0
07 00000080   08 0000003C   09 4C00B302   10 0003FEF4   11 0003FF34   12 00000180
```

REGS AT ENTRY TO ABEND

REG 0-7	00000001	800CC1CC	800053B8	700032BA	00005A78	800052E4	00005A38	00000008
REG 8-15	00000034	00C3FF34	800053B8	00005850	2B001370	00005A20	0003FF88	5C00250A
000000	00000000	0CC0051C	F0F0F5C1	00000000	000028F0	00004088	FF04C080	00003BA6
000020	FF040001	4003FB94	00000000	00000000	0000FF00	00000000	FF06000E	0003FB94
000040	0003FC60	080CC000	0003FC50	000028F0	5C765E9E	00000000	00040000	000002B4
000060	00040000	00CCC346	C0040000	000002FE	00020000	000000E2	00040000	0000025E
000080	00000000	00CCC000	CC000000	00000000	00000000	00000000	00000000	00000000
LINES 0000A0-000120 SAME AS ABOVE								
000140	00000000	00CCC000	C0000000	00000000	0000366C	00000000	00000000	00000C00
000160	00000000	C0CCC000	00000000	82000170	00040000	00005B68	00000000	0C000000
000180	0003FCF0	00CCC0CC	0003FC84	0003FF34	80000100	00000000	000036A8	00910400
0001A0	00000000	00C0C000	0003FEB8	00000000	000036A8	00005BC0	500032AA	00005BD0
0001C0	50005C86	5000250A	00000001	00005C18	00005B68	0003FC30	00005C18	0003FB70
0001E0	00005D54	C0C05D54	0000C008	00000000	0403FFB4	00000000	000036BC	0C000000
000200	00000000	00C0C0CC	00000000	00000000	00000000	00000000	00000000	0003F8C8
000220	00002F78	00C038C6	00000001	40002D84	00003ACA	00000180	00000000	0000258D
000240	00002542	00C02670	00002508	00001000	00001ED0	00004036	00004020	001C4700
000260	028096F0	025F9029	01D04700	028E5840	0180D207	40100038	94FD4011	90A101B0
000280	58900254	05B95850	024C47F0	0BDE90A1	021CD207	04580038	47F00280	940F025F
0002A0	982901D0	91FC026B	47800460	98A1021C	82000458	902901D0	91F0026B	478002CE
0002C0	90A1021C	D2C70458	001847F0	02E45890	04CC90A1	90305899	0000D207	90100018
0002E0	94FD9011	918CC01B	478002F2	582002F8	052247F0	029C0000	00002160	0A0390A9
000300	01FC98CD	002858B0	02509101	00290788	58A00184	12AA07CB	90C2A004	181A58A0
000320	100012AA	07CB9280	100098F0	A0008900	C0001200	078B50F0	002C41E0	02FC98AD
000340	01FC8200	00284700	03D6900F	04185890	025805B9	1BAA43A0	00239547	002347A0
000360	03EA9889	023C43A9	A00041BA	A0001ABA	47800400	58300010	584004CC	58504000
000380	49A0025C	47A003DE	1EB8D202	0249B000	9107B002	477003DE	96F00347	58600248
0003A0	05E6D400	03470022	477003B8	982E0420	950004CA	478003BC	82000020	95FF0020
0003C0	474003B8	90A101B0	58A00180	D207A010	002047F0	046092FF	002247F0	034ED23F
0003E0	40300418	58C00244	07FC95F8	002347C0	040041B0	00FF17AB	41A0A047	47F00362
000400	481C0022	41101F00	8910000C	988B0438	0A0D0000	00000000	00000001	00005C18
000420	00005B68	0003FC30	00005C18	0003FB70	00005D54	00005D54	00000008	00000000
000440	000036A8	00005BC0	500032AA	00005BD0	50005C86	0003FB70	FF04000E	0003FB94
000460	4700051C	58CC018C	D2070458	C0109500	C01C4770	04945810	01F89181	10004790
000480	04B29029	01D05830	04C00523	982901D0	47F004B2	96020459	581001F8	91881000
0004A0	477004B2	902901D0	583004C4	05239829	01D098A1	01B0D201	04CA04CE	82000458
0004C0	0000228C	C0C02118	0C000180	00000180	000004D2	04D204D2	FF0004D8	FF0004D8
0004E0	12114740	05C448A0	04D4D201	1000A000	4010A000	401004D4	92F00461	D70204C9
000500	04C907FE	131158A0	04DCD203	1000A000	5010A000	501004DC	47F004F8	90290418
000520	91400643	47700464	902901D0	581004D8	12114740	05525510	04DCD203	04D81000
000540	4770054A	D203C4DC	1C004590	05B647F0	052C4810	04D24910	04D64780	062C4910
000560	04D4D201	04D21000	47700572	D20104D4	10005820	10089101	10034780	058694FE
000580	100347F0	069C4190	05525840	20084150	401A4860	50001266	478005A2	185647F0
0005A0	05924010	50C04060	10009101	019D4770	055247F0	05E85840	1008960C	400B4150
0005C0	40185860	50001266	478005D2	185647F0	05C25010	50005060	10009101	019D4770
0005E0	05521801	58101004	9140400B	0779D227	402001C8	D2174048	01B09640	400BD202
000600	401D0181	504C0180	D2024015	400D9101	40114710	061A9200	401041E0	06CE58F0
000620	400C58D0	40C090D1	01BC07F9	92000461	98290418	47F00464	C9C7C5F0	F2F0F0C9
000640	00048000	0CC03118	FF040190	000038BA	00001548	0003FE28	00000001	00005964
000660	800053B8	70C032BA	0C005A78	800052E4	00005A38	00000008	00000034	0003FF34
000680	000036A8	CCC05BC0	5C0032AA	00005BD0	50005C86	5000250A	00002B8E	41400638
0006A0	50104018	459005E8	43610002	1BDD43D0	600845F0	06D055E0	063C50E0	063C4780
0006C0	046458B0	069841A0	0638058B	000A0A03	4ED00000	F3320008	000558E0	000807FF

0006E0	41500800	1A551821	92805102	41C00748	1B111804	58420014	5834002C	910F3018
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0015C0	15CC0000	FF0CC000	0C000000	15D80000	FF000000	00000000	15E40000	FF000000
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0016C0	FF000000	0CCCC0C0	16D40000	FF000000	00000000	16E00000	FF0C0000	00000000
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001720	00000000	00CC0020	00000000	00000000	00000000	00000000	0000C000	00000000
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LINES 001760-001780 SAME AS ABOVE								
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001820	40008008	4780E08E	58808000	47F0E076	91E08012	4710E09C	41F00008	0A0358F8
001840	001441FF	C0C0155F	4780E0B0	41F00014	0A0341F0	00040A03	58802000	45D0E11E
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0020A0	4770F03E	9120C01D	4770F066	501C0010
0020C0	4780F06C	D203D00C	0024D202	0025F09B
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002C40	601874AC	41060018	902A61DC	58B3005C
002C60	743E8799	73549102	60324780	744258B6
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LINES 003020-0030C0 SAME AS ABOVE

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0035C0	506D0154	416D0184	1876584D	013CF363	D14CD155	DC05D14C	C2A8D205	D177D14C
0035E0	488D0148	8880C0C2	1B981288	4780C34E	1B224328	C3901A62	581A0008	5B10C3AA
003600	194147A0	C382F384	D14C4000	DC07D14C	C2A8D207	6000D14C	41440004	41880001
003620	18674690	C346504D	013C07F5	D203D14C	4000414D	014C47F0	C35C000B	16213B46
003640	515CF0F1	F2F3F4F5	F6F7F8F9	C1C2C3C4	C5C65040	00000004	00000020	FFFFFFE0
003660	D3C9D5C5	E240E2C1	D4C540C1	E240C1C2	D6E5C5D9	C5C7E240	C1E340C5	D5E3D9E8
003680	40E3D640	C1C2C5D5	C4D9C5C7	40F060F7	D9C5C740	F860F1F5	C02E1000	41110002
0036A0	000092F4	F0F1F97F	0003FCC0	000052A8	00040000	00000000	00000000	83000180
0036C0	00000000	00CC0000	00000000	00000000	00000000	00000000	00C00000	00000000
LINES 0036E0-003700 SAME AS ABOVE								
003720	00000000	00CC0000	00000000	00000000	05401851	98795000	41D00001	47F04010
003740	18D90540	9603303C	5030304C	50703050	5817002C	41204344	5021C01C	9204101C
003760	41103038	50103040	D7013058	30584110	305F5010	30009231	30005030	3008D204
003780	30044388	D20F3028	438DD203	30143004	41103067	50103028	929E3028	D2073018
0037A0	3028181D	46104070	58750010	41770000	47F04090	58780000	580D8004	12004780
0037C0	43104308	00071857	45C0423E	45C04230	47F04128	91209016	478040D4	98019010

0037E0	8D000010	4309C00B	45C04?3E	41180008
003800	00024010	303645C0	423045C0	41425078
003820	4309000B	45C0423E	41B03020	45C04234
003840	58190020	88100008	1A175010	30209206
003860	92003024	92FF3098	47F0413E	92403024
003880	439A41C0	4182D206	305D3065	92003038
0038A0	4176181D	4610416C	91FF500C	47104156
0038C0	41F0000F	07FE91FF	30984710	431045C0
0038E0	91013098	471041AA	41F0000D	07FE9104
003900	30A04117	10C01821	45C04264	4A2030A6
003920	30A59203	301047FC	413E4810	304A1211
003940	4A10309C	1912078C	41110000	50103034
003960	91043098	47104310	41B03028	45C04234
003980	07FC909F	307C5815	C0005811	002C4120
0039A0	307C07FC	C0C03E64	18AD46A0	427091FF
0039C0	00181B99	05A84780	428C41F0	000E07FE
0039E0	41110004	91E01000	477042EC	58210000
003A00	100043A1	CCC088A0	C00241B0	30731BBA
003A20	1BC747F0	42E41AC7	50C03070	44A0430A
003A40	471042A0	47F0429C	D200B000	2000D200
003A60	D2077000	50C09110	90164780	432E9640
003A80	50750014	07FEC0C0	C0003A9C	00003ACA
003AA0	003041CC	000142C7	0030D500	30107030
003AC0	47FE0008	D2C02020	703007FE	60000005
003AE0	00000000	C0CCC000	C14E92F0	80004830
003B00	80004030	2114D277	80028001	00050700
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003B40	000000C0	C0CCC0C3	00090028	00050600
003B60	00000000	00C00000	0C000000	00000000
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003BA0	05C08000	C1EB1820	18314100	01784510
003BC0	D168C234	D2C7D16C	2C004100	D16845E0
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003C00	05F01B22	5020D164	12B14720	F02A9202
003C20	4720F02A	58B0F1E2	9201D167	18C0906B
003C40	900BD108	1BC04120	D1384150	D1081B88
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003C80	5810B02C	4120D15C	183D90BF	D00041F0
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003CE0	D0024100	C01FD507	1C009000	4780F10A
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003D40	18AF48F0	D16412FF	078E5820	B02CD500
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003D80	9500900A	4780F0E4	47F0F13A	95FF1000
003DA0	D1741008	58C0D174	4B00F214	47A0F07A
003DC0	D16547F0	F1324180	C0011817	47F0F19C
003DE0	000004C8	C0C02E78	3100015F	40000005
003E00	69000000	400C0008	08000118	00000000
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003E40	D0264CAB	C0C21BBB	43B20006	1AAB4BA0
003E60	1BFF07FE	1B994390	1C1018A9	41D000FF
003E80	101F18AD	89DCC004	1AD18800	00084202
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30984780	41BA9200	302492FF	30985810
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900CD167	4340D166	4249000B	46A0F17A
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D1669200	D16518FA	47F0F078	4A9C0002
4740F1AE	D5061001	10004740	F1AED203
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003EE0	C0021880	4AB0D028	1DA942A2	00064AB0
003F00	05B01220	078E5510	B00E47B0	B01A0A03
003F20	70011883	186548C1	0C0288C0	000289C0
003F40	1BAA41F0	704A0A06	05701831	121F4770
003F60	5A107026	0ACDCCC0	00003F74	00000000
003F80	05A08200	A00E41F0	A0160A06	0A034720
003FA0	C9C5C7E3	E3D9D6E3	05205860	10001836
003FC0	1C435865	602091FF	60024710	20384110
003FE0	0A0D9110	60124710	20544110	00578910
004000	00184130	CC031413	413000FF	17135830
004020	D2079074	00209610	90769C01	907C4190
004040	50609054	42A09054	94309054	D2039058
004060	077B58A0	904841AA	001055A0	9050A740
004080	50A09048	07FBC000	CC004D20	000040B0
0040A0	08000C00	C0C0C000	00000000	00000000
0040C0	FF041001	40C038BA	0C000001	0003FC28
0040E0	00000190	C0C010E0	00000000	04000000
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004120	FF041000	500033F0	C00001E8	00005598
004140	FF04100A	50003346	0C0001E8	90003344
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004320	00000180	00C010C8	0003FBB8	0C000000
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0043A0	00041004	40002BC4	00000001	00002E6C
0043C0	00000190	000010D8	000055F8	0D400050
0043E0	FF060190	00C03CC6	C0000000	04000000
004400	FF060190	00003CC6	0003FD28	0C000000
004420	00000190	000010D8	0003FD28	0C000000
004440	FF041001	400038BA	C0000001	0003FC28
004460	0004100A	40C02E02	C0000200	0003FBB0
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004560	00000180	00C010C8	0003FC18	0C000000
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FF041000	60003CB0	00000000	0003FD2C
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004820	FF041000	60003CB0	00000000	0003FD2C
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004A80	FF041001	40003366	00000001	0000577C
004AA0	FF041000	40C0335C	00000001	00005968
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004AE0	00041004	40C02BC4	00000001	00002E6C
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004B20	FF060190	C0C03CC6	00000000	04000000
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00041004	40002BC4	00000001	00002E6C
00000190	000010D8	00000000	04000000
FF041001	40003CC6	0CC00001	0003FD28
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00041004	40002BC4	00000200	00002E6C
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00041004	40002BC4	00000200	00002E6C
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004CC0	00041000	70003896	0000002F	0003FBCC	00000190	000010D8	0003FC18	0C000000
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004D40	94F72001	9102200C	4710F060	91712000	4750F27E	91082008	4710F056	91402008
004D60	4780F2A8	D2C62009	705CD201	2002705A	91042008	4710F336	94EF2001	D501704D
004D80	70334770	F0CC9120	20084780	F2349497	200894EF	200107FE	58D00010	58DD0070
004DA0	1BBB43B7	C0C94CB0	F36E1ADB	48A70016	8EA00002	8BA00002	43A70018	8AA00002
004DC0	8FA00002	48BDC0C8	16AB40AD	0008948A	D00918A2	189F58D0	001058FD	004405CF
004DE0	032C0C46	07180136	02540462	05880E3A	0028063A	092C0A96	0DB82F1A	91802002
004E00	4710F0E0	91AC201E	47C0F2EE	91102001	4710F286	96012008	96042008	47F0F28E
004E20	96802008	47F0F28E	47F0F1E0	D206705C	2009D201	705A2002	47F0F200	91102008
004E40	4710F0D4	96102008	47F0F1C4	910A201E	4710F0D4	45D0F348	9101A000	4780F12C
004E60	9680201F	43D2001E	41DD0001	42D2001E	47F0F1C4	9150201F	4710F0D4	43D2001F
004E80	41DD0010	42D2001F	47F0F1C4	43D70034	41DD0001	42D70034	92007036	96042001
004EA0	45D0F356	45D0F348	50A70044	47F0F1B4	45D0F348	96042001	9180A000	4710F24E
004EC0	9507A000	4780F29C	58DA0000	D2057031	D00045D0	F3564AA0	F36CD207	7044A000
004EE0	91F7A000	4780F1B8	50A70044	92087044	41D7003C	50D20018	96012000	91082008
004F00	4710F1D2	91102001	C78E9601	200058D0	F36805CD	47FE000C	910A201F	4710F0DC
004F20	43D2001F	41DDC001	42D2001F	91022003	4710F0CC	96202008	96402008	96142001
004F40	96017006	41B7004C	50B7003C	45D0F356	94EF7040	41B70054	50B70044	92167044
004F60	92207048	9204704B	47F0F1B8	D2037033	705494BF	20089102	704C47C0	F24E9208
004F80	200147F0	F16843D7	003641DD	00014207	00369104	30084710	F2CA910A	703647C0
004FA0	F1689200	703643D7	003441DD	00014207	003447F0	F1689110	20014780	F28E924F
004FC0	200447F0	F29C58D0	0010D502	D0552015	4760F32E	94DF2000	94EF2001	47F0F2C6
004FE0	9101200C	4710F28E	58D00010	D502D055	20154760	F316943F	402C94DA	2CC047FE
005000	00041BBB	43B2C020	89B00004	41BB3020	D5007036	B00D47C0	F16843B3	000942B7
005020	003647F0	F26E43D2	001E41DD	001042D2	001E9608	20089213	703C9220	70409201
005040	70439610	20019601	700647F0	F1B858DD	00701BBB	43B70009	4CB0F36E	1ADB917F
005060	D0084780	F28E9101	20084710	F0F4D203	2018704D	5530F364	477E0008	47F0F29C
005080	58A20008	41AAC0C0	4BA0F36C	07FD921A	703C9270	70409205	704307FD	00003B60
0050A0	00000738	0008C00A	58B00010	58B0B03C	58B0B0AC	9140B000	071E1BAA	1BCC58F0
0050C0	F01C07FF	000029AA	91800044	078E9102	00444710	F0149601	701B07FE	96027018
0050E0	07FE0000	0000C000	00012000	E0000000	00360000	00320000	C9C5C1F0	F0F0C140
005100	40C9D5E3	40D9C5D8	404040F0	F0C540F0	F040F0F2	F0F040F4	F0F0F040	40404040
005120	40404040	40404040	40404040	40404040	40404040	40404040	40404040	40404040
LINE 005140 SAME AS ABOVE								
005160	40404040	40404040	40404040	40404040	40404040	4040E0E0	63008051	8100E2E3
005180	C1D9E340	40404040	40404040	40400000	0000594C	40000000	00000000	00005220
0051A0	0000026A	00C00000	0000026A	00000180	00000180	80004090	02000000	7F0051EC
0051C0	000051E0	08000000	400051D8	000051B8	00000000	00000000	090050F8	2C00002E
0051E0	00000000	0CC051F0	CC000000	7F000000	00000000	00000000	12000000	00000000
005200	00000000	00CCC000	0F0051B8	02001108	000012A8	C24D47F0	C8C8C8C8	40404040
005220	00000001	FF6058D2	800012A8	800012A8	000012A8	000012A8	02080000	00000000
005240	00CB000A	0E295114	14010219	00000000	47F0F008	41CC0002	1BDD43DC	00009110
005260	C0004710	F03C48BA	000211DD	41000001	8B00D00F	4710F02E	140B4780	F0041BDD
005280	43DC0001	18F91B99	47FDC000	48BA000C	54D0F048	47F0F01A	0000000F	00000000
0052A0	00000000	CCC00000						
0052A0			C5C2C3F3	40404040	003B00C0	000052C8	FF050013	400052F2
0052C0	00000000	00000180	90ECD00C	05304140	31665040	D00850D0	316A41D0	31660700
0052E0	45103022	0FC052F8	C0005358	800053B8	0A1347F0	314A0000	00000000	00000000
005300	00000000	00C0C000	00000000	01000001	00004000	00000001	42000001	98000000

005320	002C0048	00CC5480	03000048	00000001	00000001	00000050	00000000	00000001
005340	00000001	00CCC001	00000050	20000001	00000000	00000001	00000000	00000000
005360	00000000	C0000000	0C000C00	01000001	00004000	00000001	420C0001	98C00000
005380	00404800	C0C05668	03004800	00000001	00000001	00000050	00000000	00000001
0053A0	00000001	00CCC001	00000050	20000001	00000000	00000001	00000000	00000000
0053C0	00000000	C0CCC0C0	00000000	01000001	00004000	00000001	420C0001	98000000
0053E0	00544800	C0C05850	03004800	00000001	00000001	00000050	0000C000	00000001
005400	00000C01	00000001	00000050	20000001	00000000	00000001	4510315A	100052F8
005420	10005358	90C053B8	0A1458D0	316A98EC	D00C07FE	00000000	0003FFB4	00000000
005440	00000000	00CCC000	00000000	00000000	00000000	00000000	00000000	00000000
005460	00000000	00CC00C0	00000000	00000000	00000000	00000000	00000000	50201008
005480	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
LINES 0054A0-0054C0 SAME AS ABOVE								
0054E0	00000000	E3C1D7C5	F1F8F040	40404040	40404040	40404040	40404040	40404040
005500	40404040	40404040	40404040	40404040	40404040	40404040	00000000	00000000
005520	00000000	00C001C0	00010000	00000000	80000000	42011842	011800C0	00000000
005540	00000000	00CCC000	00000000	00000000	00000000	00000000	0001D3C7	D3F0F0F1
005560	40404040	40404040	40404040	40404040	40404040	40404040	00000000	00000000
005580	00000000	C0CCC000	00000000	00000000	00000100	7F000000	02000000	7F005594
0055A0	000055F8	0800C001	400055F0	000055C0	00000000	00000000	00000000	C000030A
0055C0	00000000	00CC0000	00000000	01000000	00000000	0F0055C0	00001108	2B001310
0055E0	00000000	C0C000CA	00097FFF	000055BC	07000000	20000001	080055F0	00000000
005600	060054E4	CCCC00B0	00180000	C9C5C3F1	F0F1C140	D440F1F8	F06BD3C7	D3F0F0F1
005620	00000030	0C0CC001	0003FF60	000055F0	00000000	00000000	00000000	00000000
005640	00000000	00CCCC00	00000000	00000000	E2C3D9E3	C3C80000	00000000	00000000
005660	00000000	C0C0C000	F2F7F5F6	F0F0F3F6	F640F0F1	E2C8C5D3	D340C3C8	C5D4C9C3
005680	C1D34040	40404040	F8F1F3F3	F2F0F7F2	F9F1F140	D9D6C2E2	D6D540D1	40E34040
0056A0	40404040	40404040	40F1F3F3	4040F1F4	F3F4F5D4	C6F3F6F3	00000000	00000000
0056C0	00000000	00C0C0C0	00000C00	E3C1D7C5	F1F8F140	40404040	40404040	40404040
0056E0	40404040	40404040	40404040	40404040	40404040	40404040	40404040	40404040
005700	00000000	00C00000	00000000	00000400	00010000	00000000	00000000	42011842
005720	011800C0	00CC0000	0C000000	00000000	00000000	00000000	00000000	00000000
005740	0001E3C1	D7C5F240	40404040	40404040	40404040	40404040	40404040	40404040
005760	00000000	0C0C0000	C0000000	00000000	00000000	00000000	00000100	7F000000
005780	02000000	7F00577C	000057E0	0C000000	400057D8	000057A8	00000000	00000000
0057A0	00000000	C0C004C2	00000000	00000000	00000000	01000000	00000000	0F0057A8
0057C0	00001108	2BC01340	0C000000	000000CA	00097FFF	000057A4	02005668	20000050
0057E0	080057D8	00C0C000	060056CC	000000B0	00180000	C9C5C3F1	F0F1C140	D440F1F8
005800	F16BE3C1	D7C5F240	00000038	00000001	0003FF74	000057D8	00000000	00000000
005820	00000000	00CC0000	00000000	00000000	00000000	00000000	E3C1D7C5	F2400000
005840	00000000	00C0C000	00000000	00000000	00000000	00000000	00000000	00000000
LINES 005860-005880 SAME AS ABOVE								
0058A0	00000000	00C0C000	00000000	00000000	00000000	E3C1D7C5	F1F8F240	40404040
0058C0	40404040	40404040	40404040	40404040	40404040	40404040	40404040	40404040
0058E0	40404040	40404040	C0000C00	00000000	00000000	00000400	00010000	00000000
005900	00000C00	42011842	011800C0	00000000	00000000	00000000	00000000	00000000
005920	00000000	00CCC000	0C01E3C1	D7C5F340	40404040	40404040	40404040	40404040
005940	40404040	40404040	00000000	00000000	00000000	00000000	00000000	00000000
005960	00000100	41CCC000	06000000	41005964	000059C8	0D000050	400059C0	00005990
005980	00000000	00000000	00000000	C0000405	00000000	00000000	00000000	01000000
0059A0	00000000	0FC05990	C0001108	2B001370	00000000	000000CA	00097FFF	0000598C
0059C0	02005850	20CC0050	080059C0	00000000	06005884	000000B0	00180000	C9C5C3F1
0059E0	F0F1C140	D440F1F8	F26BE3C1	D7C5F240	00000040	00000001	0003FF88	000059C0
005A00	00000000	00000000	00000000	00000000	00000000	00000000	00005A38	00000000
005A20	E3C1D7C5	F3400000	00000000	00000000	00000000	00000000	D5E2D3D6	C8C4D9C9

005A40	00000C00	C0CC0022	03000000	0000C378	00040004	0008C000	00000000	00005480
005A60	00000000	00CC5668	C0000000	00005850	93B6D203	C02C93D6	800053B8	500032AA
005A80	00005850	80C052E4	00005A38	000052F0	00005A68	0003FF34	80001370	00003481
005AA0	0003FF98	CCC05A20	C003FF88	4140B018	50409396	4BB0933C	41600001	41400020
005AC0	5570934A	47A090EC	89700001	41660001	464090AE	462090CC	58B09206	07F55840
005AE0	93964144	C0C45040	93965874	00004B60	933A4A60	933E4060	933E47F0	90A6900B
005B00	934E4A60	933E4B60	933A8960	00015A60	C0044866	00005460	937E50A0	939A07FA
005B20	96FF9386	D2C393CA	C02CD203	C02C93D2	45A09220	D203C02C	93CA47F0	906E4150
005B40	914A45A0	908491C0	60034740	907858E0	93AED203	C02C93DA	47F09066	95009386
005B60	47809192	D2C3C02C	C0000000	00000000	00000000	00000000	00480000	00000001
005B80	00004000	C0CC0001	00000001	54000000	00680020	1003FC84	9203FA18	0003FB70
005BA0	07005D02	00000660	28282828	4103FC28	0103F8D8	0003F8D8	0000007D	00000001
005BC0	00005B68	00C0C0C0	000052A8	0003A188	00000000	00039CF0	40404040	40404040
005BE0	40404040	5CCC5C86	0003FB70	0000274C	00005C18	0000005C	00005DC0	00005BE0
005C00	900035A6	C0C05D54	C0005D54	00000008	40404040	40404040	7F000000	40204040
005C20	00005B68	00005D38	0003FC30	00100010	98E0D158	12EE4780	D096D27C	F000D16C
005C40	41FF007D	50FD015C	411F007D	191047C0	D0B61BFE	40FD0168	D203E000	D16841FE
005C60	000450FD	015C411D	00489220	100558F1	000858F0	F03005EF	411D0048	58E01008
005C80	58F0E034	05EF4110	0001480D	005C9560	D1704740	D0CE4720	D0CC1A01	1A011A01
005CA0	9240D17C	D277D171	D1704110	00381901	47A0D0EA	400D005C	07F5481D	005E4111
005CC0	0001401D	005E92F1	D170D203	D1DDD12C	4E1D0150	F333D1E2	D15496F0	D1E5D201
005CE0	D05CD130	47F0D060	98E0D158	12EE0785	411E0004	191F0785	47F0D082	D7C1C7C5
005D00	FFFF07FE	CCCCC0C0	C0000000	00005D00	00000B18	00060000	00000000	F0F0F0F0
005D20	FFFFFFF0	00005D20	00000000	0003FCF0	0000274C	A0003376	00814040	007D4040
005D40	40404040	404040F0	F0F5C4F4	F0404040	40404040	F4F0F4F0	F4F0F4F0	404040F4
LINES 005D60-005D80 SAME AS ABOVE								
005DA0	40404040	40404040	40404040	40404040	40404040	40404040	4040C7F0	F1F9F0E2
03F8C0	0003F9A8	00C001A4	C9C7C7F0	F1F9C3C6	001CF010	0103F8D8	58503028	4860302E
03F8E0	91C02024	47B0F020	91402024	4780F020	41550008	4B60F01A	4140F0AC	4110F0CE
03F900	41000002	D5C050C0	40004780	F04E8740	F02C9148	20114710	F04A4140	F0CC47F0
03F920	F04E414C	F0AC4155	00014310	30305050	30304210	30304B60	F0504060	30369130
03F940	20124780	F07CD200	302F2012	92002012	96803000	91482011	4710F09A	94BF3030
03F960	D6003030	40C14140	30305040	301847F0	F0A49640	302CD200	30284001	41103008
03F980	0A0007FE	40CBF013	601B4E03	F18BF293	F39BF4A3	F5ABF6B3	F7BBF8C3	F9CBC1D3
03F9A0	C2DBC3E3	E5C1E641	0003FA00	0003F8C0	C9C7C7F0	F1F9C3D3	000AF010	0103F9C0
03F9C0	41220000	41ACC008	1B2A9180	20004780	F036947F	200043A2	002F44A0	F03C4780
03F9E0	F036928B	202894CF	402C41A2	002850A2	001850A0	00484122	000807FE	9100402C
03FA00	0003FB58	C0C3F9A8	C9C7C7F0	F1F9C2C1	002AF010	0103FA18	90E8D014	188F5821
03FA20	00085830	20445833	00004140	00014043	002494BF	20304103	00085001	00105013
03FA40	000C1B55	91C01005	474080CC	91202011	47808044	91802030	4780812A	96802030
03FA60	58F0204C	43402040	1A435043	00189401	30009640	30001B44	43402043	18741A43
03FA80	91202011	47E08074	43502010	91C02024	4780B0A0	91402024	4780B0B0	91201005
03FAA0	47E080B0	5861000C	1A65D201	30066000	48630006	47F080B4	91801004	471080B0
03FAC0	48610006	47F080B4	4860203E	1A654064	0006D202	4001100D	50302044	05EF98E8
03FAE0	D01407FE	434C2042	18741A43	58F02048	94013000	96203000	91202011	47E08100
03FB00	41030030	50C30018	91082024	47108070	947F2030	47F08070	94F04000	50430018
03FB20	91401005	47108118	96024000	47F08074	960C4000	D2013024	813C9640	203047F0
03FB40	80741851	18120A19	18151B55	5013000C	47F08044	FFFF0700	00000000	0003FA00
03FB60	C9C7C7F0	F1F9C2C2	000DF010	0103FB70	90E8D014	185F5821	00085831	00101841
03FB80	917F4C00	4710504C	47405028	18144100	00010A01	47F05010	18121803	4B005008
03FBA0	9001D040	4111C0C0	0A3712FF	47805010	05EF9801	D0404111	00000A37	98E8D014
03FBC0	07FE0700	07C00700						
03FC20			4103FC28	7F000081	40000000	7F005C18	0003FC60	08000000

03FC40	4003FC50	00CC5B68	0003FC58	00010000	8B005D38	40000081	01005D41	20000078
03FC60	00000F14	C0C3F9C0	00000F14	00000F14	00000F14	00000000	00000000	00002BE0
03FC80	0C000000	C4CC0180	0403FDD4	C8C00000	0F000000	01000000	00CC0000	0F005B68
03FCA0	0203FC60	33001290	00010000	C2C2C2C1	C3D3C3C6	000035A2	00003571	600032A8
03FCE0					002F0500	F3F0F5C1	000CD072	000032A8
03FD00	FF04000E	00C3FB94	03F003F0	0003FD50	000000E0	00005BC0	00000878	400032AA
03FD20	00000000	00C3F8C0	00005B68	8C003428	000036A8	00005C36	00040000	00000180
03FD40	00000180	00C05BD0	500034D2	0003FB70	00310100	F4F0F1C3	000CD072	000032A8
03FD60	FF040033	40CC344C	03A103A1	0003FE28	00000001	80000100	800053B8	7000328A
03FD80	00005A78	80C052E4	0C005A38	00000008	00000034	0003FF34	800053B8	00005850
03FDA0	28001370	C0C05A2C	0003FF88	5000250A	00000F14	00000F14	00000F14	00000F14
03FDC0	00000F14	00C0C0C0	5F00000F	00000000	0F000000	00000180	00000000	40000000
03FDE0	00000000	01CC0000	00000000	0F03FEB8	04003A88	500013D4	0000C0C4	000000C4
03FE00	0009000A	C0C3FFB4	0C00C630	0003FF34	800013D4	00003630	0003FF5C	0000C5F8
03FE20	00000180	60C032A8	00380100	C8C4D9C9	0012D072	000032A8	FF04000D	5000337E
03FE40	01610161	00C052A8	0C000030	800052E4	00000080	400052CE	00005434	0003FF34
03FE60	000028F0	00C00080	0000003C	4000B302	0003FEF4	0003FF34	00000180	00005434
03FE80	00002940	40C052C8	C0005218	0003FF34	000028F0	00000080	0000003C	4C00B302
03FEA0	0003FEF4	C0C3FF34	00000180	0003FFB4	00002940	400052C8	00000000	00000000
03FEC0	00CC0000	C0CCC0C0	00000000	00000000	00000000	00000000	00000000	00000000
03FEE0	00188000	C0C3FDD4	12008000	00000000	00000000	0003FEFC	00000000	C5C2C3F3
03FF00	40404040	80C3FF0A	C0000000	00000000	00000000	00000000	00CC0000	00000000
03FF20	00000000	00CC00C0	00000000	00000000	00000000	C8C8C8C8	40404040	C7C54040
03FF40	40404040	40404040	40404040	14040100	D1D6C2D3	C9C24040	00030900	800013D4
03FF60	14010100	E3C1D7C5	F1404040	00030A00	80001310	14010100	E3C1D7C5	F2404040
03FF80	000402C0	80C01340	14010100	E3C1D7C5	F3404040	00040500	80001370	14000000
03FFA0	E2E8E2C1	C2C5D5C4	00040800	80001290	00000000	00000181	00000000	00005434
03FFC0	00002940	40CC52C8	00000030	0003FF04	00000080	00000181	00005218	0003FF34
03FFE0	000028F0	C0CC0080	0000003C	4000B302	0003FEF4	0003FF34	00000180	00000000

END OF DUMP

```
COMPLETION CODE - SYSTEM=000  USER=0256
IEF285I   EBCLIB                                  PASSED
IEF285I   VOL SER NOS= 111111.
IEF285I   TAPE180                                 DELETED
IEF285I   VOL SER NOS=       .
IEF285I   TAPE181                                 DELETED
IEF285I   VOL SER NOS= TAPE2 .
IEF285I   TAPE182                                 DELETED
IEF285I   VOL SER NOS= TAPE3 .
IEF285I   SYSOUT                                  SYSOUT
IEF285I   VOL SER NOS=       .
IEF280I K 181,TAPE2 ,HHHH
IEF280I K 182,TAPE3 ,HHHH
IEF285I   EBCLIB                                  KEPT
IEF285I   VOL SER NOS= 111111.
```

```
//SCRATCH  JOB  1,EBC1,MSGLEVEL=1
//         EXEC  PGM=IEHPROGM
//DLIB1    DD  UNIT=2311,VOLUME=SER=111111,DISP=(OLD)
//DLIB2    DD  UNIT=2311,VOLUME=SER=222222,DISP=(OLD)
//SYSPRINT DD  SYSOUT=A
//SYSABEND DD SYSOUT=A
//SYSIN    DD  *
IEF236I ALLOC. FOR SCRATCH
IEF237I DLIB1    ON 190
IEF237I DLIB2    ON 191
IEF237I SYSIN    ON 00C
```

Used to regain space the system has used for Scratch Data Sets

-or-

To avoid a duplicate name running of job DDDD.

```
SYSTEM SUPPORT UTILITIES ----  IEHPROGM                                                    PAGE 0001


         SCRATCH VTOC,VOL=2311=111111,SYS,PURGE
 IEH2071  STATUS OF USERS REQUEST TO SCRATCH THE VOLUME TABLE OF CONTENTS
                  DATA SET NAME                 ACTION TAKEN     REASON FOR TAKING THIS ACTION                ERROR
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00C00001     SCRATCH         USERS REQUEST
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCC00003     SCRATCH         USERS REQUEST
END OF SCRATCH VTOC


         SCRATCH VTOC,VOL=2311=222222,SYS,PURGE
 IEH2071  STATUS OF USERS REQUEST TO SCRATCH THE VOLUME TABLE OF CONTENTS
                  DATA SET NAME                 ACTION TAKEN     REASON FOR TAKING THIS ACTION                ERROR
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.00C00005     SCRATCH         USERS REQUEST
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.0C000006     SCRATCH         USERS REQUEST
AAAAAAAA.AAAAAAAA.AAAAAAAA.AAAAAAAA.CCC00007     SCRATCH         USERS REQUEST
END OF SCRATCH VTOC


         SCRATCH DSNAME=EBC.DDDD,VOL=2311=222222,PURGE
NORMAL END OF TASK RETURNED FROM SCRATCH


UTILITY END
```

```
IEF285I   CDDDDDDDDDDDCCCDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD KEPT
IEF285I   VOL SER NOS= 111111.
IEF285I   CCCCCCDDDCCCCCCDDDDDDDDDDDDDDDDDDDDDDDDDDDDDD KEPT
IEF285I   VOL SER NOS= 222222.
IEF285I   SYSOUT                                        SYSOUT
IEF285I   VOL SER NOS=       .
IEF285I   SYSOUT                                        SYSOUT
IEF285I   VOL SER NOS=       .
```

Appendix 20

INPUT TO STAGE 2 (PREFIX AND SVC TABLE)

```
//SG15 EXEC PGM=IETASM
//SYSLIB DD DSNAME=SYS1.GENLIB,DISP=(OLD,PASS)
//      DD DSNAME=SYS1.MACLIB,DISP=OLD,VOLUME=(,RETAIN)
//SYSUT1 DD DISP=OLD,VOLUME=(,RETAIN),LABEL=(,SL),DSNAME=SYS1.UT1
//SYSUT2 DD DISP=OLD,VOLUME=(,RETAIN),LABEL=(,SL),DSNAME=SYS1.UT2
//SYSUT3 DD DISP=OLD,VOLUME=(,RETAIN),DSNAME=SYS1.UT3
//SYSPRINT DD SYSOUT=A
//SYSPUNCH DD DISP=OLD,VOLUME=(,RETAIN),DSNAME=SYS1.OBJMOD(IEASVC00)
//SYSIN DD *
         PRINT ON,NODATA
IHASVC00 CSECT
         ENTRY SVPRFX,SVCTBL,SVLMT
NOPEXIT  BR    14
SVPRFX   DS    0C
         DC    AL1(1,3,4,5,6,7,8,9,10,11,12,13,14,22)
         DC    AL1(15,16,23,24,17,25,26,27,28,29,0,30,31,32)
         DC    AL1(33,34,35,36,37,0,38,39,2,18,0,40,19,20)
         DC    AL1(41,42,2,21,2,2,2,0,2,43,2,0,0,44)
         DC    AL1(2,0,0,0,2,0,2,0,45,0,0,0,0,46)
SVCTBLX  DS    0C
SVCTBL   EQU   SVCTBLX-3
         DC    AL3(IGC000+0,NOPEXIT,IGC001+0,IGC002+0)
         EXTRN IGC000,IGC001,IGC002
         DC    AL3(IGC003+0,IGC004+0,IGC005+0,IGC006+1)
         EXTRN IGC003,IGC004,IGC005,IGC006
         DC    AL3(IGC007+1,IGC008+1,IGC009+0,IGC010+0)
         EXTRN IGC007,IGC008,IGC009,IGC010
         DC    AL3(IGC011+0,IGC012+1,IGC014+5,IGC015+0)
         EXTRN IGC011,IGC012,IGC014,IGC015
         DC    AL3(IGC018+1,IGC037+7,IGC040+1,IGC041+1)
         EXTRN IGC018,IGC037,IGC040,IGC041
         DC    AL3(IGC045+7)
         EXTRN IGC045
SVLMT    DS    0C
         DC    AL1(1,1,1,7,7,1,7,7,1,2)
         DC    AL1(1,1,1,1,7,1,6,6,7,6)
         DC    AL1(1,1,7,7,1)
         END
/*
```

Appendix 21

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                   275+***  FIRST LEVEL SVC HANDLER  ***

000346                             277+IEAASC00 DS    0H
000346 4700 03D6           003D6   278+SVF      BC    0,SVJ Q. TYPE I SVC ALREADY IN PROCESS.
00034A 900F C400           00400   279+         STM   0,15,SVCSAV SAVE REGISTERS IN TYPE I SAVE AREA.
00034E                             280+SVG      DS    0H
00034E 5890 0258           00258   281+         L     9,TRACESVC TRACE SVC.
000352 05B9                        282+         BALR  11,9
000354 1BAA                        283+         SR    10,10 LOAD SVC CODE INTO REGISTER.
000356 43A0 0023           00023   284+         IC    10,SVCOPSW+3
00035A 9546 0023    00023          285+SVV      CLI   SVCOPSW+3,70 Q. SVC CODE NOT IBM PROVIDED.
00035E 47A0 03EA           003EA   286+         BC    10,SVA
000362 9689 023C           0023C   287+SVW      LM    8,9,ASVCTBL GET SVC TABLE ADDRESS
000366 43A9 A000           00000   288+         IC    10,0(9,10) GET SVC INDEX FACTOR.
00036A 41BA A000           00000   289+         LA    11,0(10,10) DERIVE ADDRESS OF SVC TABLE ENTRY.
00036E 1ABA                        290+         AR    11,10 FOR PROGRAM BEING CALLED.
000370 4780 03EA           003EA   291+         BC    8,SVB Q. NO TABLE ENTRY EXISTS FOR SVC.
000374 5830 0010           00010   292+         L     3,16 CVT TABLEADDRESS.
                                   293+**       L     4,IEATCBP+4          CURRENT TCB ADDRESS

000378 00000474                    295+         DC    AL4(IEATCBP+4)
000378                             296+         ORG   *-4
000378 5840                        297+         DC    X'5840'
00037C                             298+         ORG   *+2

00037C 5850 4000           00000   300+         L     5,TCBRBP(0,4) CURRENT RB ADDRESS.
000380 49A0 025C           0025C   301+         CH    10,SLMT
000384 47AC 03DE           003DE   302+         BC    10,SVD
000388 1EB8                        303+         ALR   11,8
00038A D202 0249 8000 00249 00000  304+         MVC   SVCPSW+5(3),0(11)
000390 9107 8002           00002   305+         TM    2(11),7
000394 477C 03DE           003DE   306+         BC    7,SVD
000398 96F0 0347    00347          307+         OI    SVF+1,X'F0' INDICATE TYPE I SVC IN PROGRESS.
00039C 5860 0248           00248   308+         L     6,SVCPSW+4 ENTRY POINT
0003A0 05E6                        309+         BALR  14,6
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                   341+***  SVC SECOND LEVEL INTERRUPT HANDLER INTERFACE  ***
                                   342+*
0003DE D23F 4030 0400 00030 00400  343+SVD      MVC   TCBGRS(64,4),SVCSAV STORE REGISTERS IN TCB.
0003E4 58C0 0244              00244  344+          L     12,SVEX
0003E8 07FC                          345+          BCR   15,12


0003EA                               347+SVA      DS    0H
                                     348+***   SVC ERROR CODE ROUTINE    ***

0003EA 4810 0022              00022  350+SVB      LH    1,SVCOPSW+2 PICK UP SVC CODE THAT IS IN ERROR.
0003EE 411C 1F00              0CF00  351+          LA    1,X'F00'(0,1) GENERATE ERROR CODE IN REGISTER 1.
0003F2 891C 000C              0000C  352+          SLL   1,12
0003F6 988B 0420              00420  353+          LM    8,11,SVCSAV+32 RESTORE WORK REGS
0003FA 0A0D                          354+          SVC   13
000400                               355+SVCSAV   DS    8D
000440                               356+RESUMPSW DS    1D
                                     357          IEAAPS PRIM,DTIME,N,ONLY12,Y
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

000448                           359+IEAAPS   DS    0D
                                 360+         ENTRY IEAODS
000448                           361+IEAODS   DS    0D
000000                           362+         USING IEAAPS,0
                                 363+         ENTRY IEATCBP
                                 364+         ENTRY IECXTLER
                                 365+         ENTRY SIRB
                                 366+         ENTRY IEAOEF00
                                 367+         ENTRY SVCNV
                                 368+         ENTRY IECIERLC
                                 369+         EXTRN IEAOEN00


000001                           371+GX       EQU   1 IOF REGISTER
00000E                           372+GL       EQU   14
000004                           373+GA       EQU   4
000006                           374+GB       EQU   6
00000C                           375+GC       EQU   12 WORK REGISTER
000008                           376+IRBOF    EQU   8 OFFSET OF IRB ADDR. IN DEB.
000008                           377+ERRTAB   EQU   8
000008                           378+DEBOF    EQU   8
```

Appendix 22

```
  LOC   OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                    311+***  TYPE I SVC EXIT ROUTINE  ***
                                    312+*
0003A2                              313+IEAOXEOO DS    OH TYPE I SVC EXIT ROUTINE.
0003A2 D400 0347 0022 00347 00022   314+SVCXT    NC    SVE+1(1),SVCOPSW+2 Q. RETURN IS NOT TO ORIGINAL LEVEL.
0003A8 4770 03B8            03B8    315+         BC    7,SVL
0003AC 982E 0408            0408    316+         LM    2,14,SVCSAV+8
                                    317+**      CLI    IEATCBP+2,0          Q. DISPATCHER IS TO BE ENTERED.

0003B0 00000472                     319+         DC    AL4(IEATCBP+2)
0003B0                              320+         ORG   *-4
0003B0 9500                         321+         DC    X'9500'
0003B4                              322+         ORG   *+2

0003B4 4780 03BC            03BC    324+         BC    8,SVI
0003B8 8200 0020      00020         325+SVL      LPSW  SVCOPSW
0003BC 95FF 0020      00020         326+SVI      CLI   SVCOPSW,255 Q. CALLER IS DISABLED.
0003C0 4740 03B8            03B8    327+         BC    4,SVL
0003C4 90A1 01B0            01BC    328+         STM   10,1,BREGSX
0003C8 58AC 01B0            01BC    329+         L     10,PRBPTX
0003CC D207 A010 0020 00C10 00020   330+         MVC   XRBPSW(8,10),SVCOPSW
                                    331+**      B      IEAODS

0003D2 00000448                     333+         DC    AL4(IEAODS)
0003D2                              334+         ORG   *-4
0003D2 47FC                         335+         DC    X'47F0'
0003D6                              336+         ORG   *+2

0003D6 92FF 0022      00022         338+SVJ      MVI   SVCOPSW+2,X'FF'
0003DA 47F0 034E            034E    339+         B     SVC
```

Appendix 23

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                   75+***  2ND LEVEL SVC HANDLER ***

000000                             77+          USING SVE,12
000000 47A0 C06A             0006A 78+SVE       BC    10,SVZ Q. SVC IS NON-RESIDENT.
000004 4120 C0C0             000C0 79+          LA    2,SVT SET EXIT FROM SVRB CREATE.


                                   81+***  SVRB CREATION AND GENERAL INITIALIZATION ROUTINE  ***
000008                             82+SVM     DS    0H
000008 D207 5010 0020 00010 00020  83+         MVC   XRBPSW(8,5),SVCOPSW STORE SVC OPSW IN CURRENT RB.
00000E 41B0 0007             00007 84+SVH     LA    11,7 PLACE MASK IN REGISTER.
                                   85+**      L     10,SVCPSW+4          GET SVC E.P. AND RB SIZE

000012 00000004                    87+          DC    AL4(SVCPSW+4)
000012                             88+          ORG   *-4
000012 58A0                        89+          DC    X'58A0'
000016                             90+          ORG   *+2

000016 148A                        92+          NR    11,10 ISOLATE EXTENDED SAVE AREA
000018 17AB                        93+          XR    10,11 SIZE FROM ENTRY POINT ADDRESS AND
00001A 41B0 B00B             00008 94+          LA    11,11(0,11) COMPUTE TOTAL SVRB SIZE.
00001E 111B                        95+          LNR   1,11 SET REG 1 NEGATIVE TO INDICATE
000020 1E11                        96+          ALR   1,1 GETMAIN AND PLACE SUBPOOL 255 INTO
000022 1E11                        97+          ALR   1,1 REG 0 WHILE CONVERTING SVRB SIZE
000024 4101 1000             00000 98+          LA    0,0(1,1) FROM DOUBLE WORDS INTO BYTES.
000028 1300                        99+          LCR   0,0
00002A 0A0A                       100+          SVC   10
00002C 12FF                       101+          LTR   15,15 Q. SVRB CORE IS AVAILABLE.
00002E 4780 C048             00048 102+         BC    8,SVK
000032 58F0 4018             00018 103+         L     15,TCBMSS(0,4) STEAL CORE FROM PARTITION AT 32
000036 9602 401D       0001D       104+         OI    TCBFLGS+1(4),2 BYTES FROM ORIGIN.
00003A 5810 F004             00004 105+         L     1,4(0,15)
00003E 4110 1020             00020 106+         LA    1,32(0,1) TREAT 'STOLEN' CORE AS SVRB.
000042 1800                       107+         SR    0,0
000044 5000 F000             00000 108+         ST    0,0(0,15) CLEAR MSS FQE POINTER.
000048                            109+SVK      DS    0H
000048 50A0 100C             0000C 110+         ST    10,XRBEP(0,1) INIT. E.P. ADDRESS IN SVRB.
00004C 40B0 1008             00008 111+         STH   11,XRBSZ(0,1) INIT. SIZE FIELD IN SVRB.
000050 92C0 100A       0000A       112+         MVI   XSTAB(1),XSVRB FLAG RB AS SVRB ALSO ACTIVE,
000054 9262 100B       0000B       113+         MVI   XSTAB+1(1),XACTV+XDYN+XREG 16REGSAVE, AND DYNAMIC.
000058 D23F 1020 4030 00020 00030  114+         MVC   XRBREG(64,1),TCBGRS(4) MOVE REGS TO SVRB.
00005E 5050 101C             0001C 115+         ST    5,XRBLNK(0,1) ENQUEUE SVRB ON RB QUEUE.
000062 5010 4000             00000 116+         ST    1,TCBRBP(0,4)
000066 1851                       117+         LR    5,1 SVRB IS NOW CURRENT RB.
000068 07F2                       118+         BCR   15,2
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                   120+***  TYPE III SVC HANDLER  ***
                                   121+**
00006A                             122+IEAATR00 DS    0H
00006A                             123+SVZ      DS    0H
                                   124+**       SH    10,SLMT              CORRECT SVC TABLE INDEX FACTOR.

00006A 00000000                    126+         DC    AL4(SLMT)
00006A                             127+         ORG   *-4
00006A 4BA0                        128+         DC    X'4BA0'
00006E                             129+         ORG   *+2

00006E 1EAA                        131+         ALR   10,10 QUADRUPLE RELATIVE INDEX FACTOR
000070 1EAA                        132+         ALR   10,10 FOR SVC-TTR TABLE.
000072 5EA0 C0D4           000D4   133+         AL    10,ASVLMT
000076 5860 A000           00000   134+         L     6,0(0,10) GET TRANSIENT TABLE ENTRY.
                                   135+**       STC   6,SVCPSW+7           PREPARE FOR SVRB CREAE AND INIT.

00007A 00000007                    137+         DC    AL4(SVCPSW+7)
00007A                             138+         ORG   *-4
00007A 4260                        139+         DC    X'4260'
00007E                             140+         ORG   *+2

00007E 48D0 0022           00022   142+         LH    13,SVCOPSW+2 SVRB CREATE AND INITIALIZE ROUTINE.
000082 4520 C008           00008   143+         BAL   2,SVM
                                   144+**       BAL   15,SVCNV             CONVERT SVC CODE TO DECIMAL.

000086 00000000                    146+         DC    AL4(SVCNV)
000086                             147+         ORG   *-4
000086 45F0                        148+         DC    X'45F0'
00008A                             149+         ORG   *+2

00008A 18D6                        151+         LR    13,6
00008C 9869 C0D8           000D8   152+         LM    6,9,DXFINCH0 LOAD CONSTANTS
000090 88D0 0003           00003   153+         SRL   13,3 ISOLATE TTR&SIZE
000094 41B0 07FF           007FF   154+         LA    11,2047
000098 14BD                        155+         NR    11,13
00009A 17DB                        156+         XR    13,11
00009C 88D0 0003           00003   157+         SRL   13,3
0000A0 40B0 1018           00018   158+         STH   11,XRBQ(0,1)
0000A4 40B0 101A           0001A   159+         STH   11,XRBQ+2(0,1)
0000A8 90DE 1000           00000   160+         STM   13,14,XRBNM(1) STORE NAME IN SVRB
0000AC 5090 100C           0000C   161+         ST    9,XRBEP(0,1) STORE ENTRY POINT IN SVRB
0000B0 15E8                        162+         CLR   14,8 Q. CURRENT SVC RESIDES IN XSNT.
0000B2 4780 C0BC           000BC   163+         BC    8,SVU
0000B6 18A5                        164+         LR    10,5
0000B8 0586                        165+         BALR  8,6
0000BA 000E                        166+SVN      DC    X'000E' FINCH PARAMETER.
0000BA                             167+         USING SVN,8
0000BC                             168+SVU      DS    0H
0000BC 9610 500A           0000A   169+         OI    XSTAB(5),X'10' FLAG SVRB AS TRANSIENT.
0000C0 9801 5020           00020   170+SVT      LM    0,1,XRBREG(5) LOAD PARAMETER REGISTERS.
0000C4 98DF 5054           00054   171+         LM    13,15,XRBREG+52(5) LOAD SVC PARAMETER REG.
0000C8 5860 500C           0000C   172+         L     6,XRBEP(0,5)
0000CC 05E6                        173+         BALR  14,6
0000CE 0A03                        174+DEXIT    SVC   3
                                   175+         DROP  8
```

```
  LOC   OBJECT CODE     ADDR1 ADDR2  STMT    SOURCE STATEMENT

0000D0 00000000                     177+TSRET     DC    V(INT025) IOS 12*-RETURN ROUTINE ADDR.
0000D4 00000000                     178+ASVLMT    DC    A(SVLMT)
0000D8 00000000                     179+DXFINCHO  DC    A(IEAOFN00)
0000DC 0000000000000000             180+XSNTCC    DC    XL8'00' NAME ASSOCIATED WITH CURRENT XSNT.
0000E4 00000000                     181+XSNTLDEP  DC    A(IFAAXSNT) TRANSIENT AREA ENTRY POINT.
```

Appendix 24

```
 LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                  183+***  EXIT PROGRAM  ***


0000E8                           185+IEAAXT   DS    0D
0000E8                           186+IGC003   DS    0H
                                 187+***      L     12,SVEX              SET BASE ADDRESS.

0000E8 00000000                  189+         DC    AL4(SVEX)
0000E8                           190+         ORG   *-4
0000E8 58C0                      191+         DC    X'58C0'
0000EC                           192+         ORG   *+2

                                 194+***      MVC   TCBGRS(64,4),SVCSAV  ,OVE REGISTERS TO TCB.

0000EC D23F                      196+         DC    X'D23F'
0000EE 00000000                  197+         DC    AL4(SVCSAV)
0000EE                           198+         ORG   *-4
0000EE 4030                      199+         DC    AL2(X'4000'+TCBGRS)
0000F2                           200+         ORG   *+2

                                 202+***      NI    SVF+1,X'DF'          RESET SVC TYPE 1 SWITCH

0000F2 00000001                  204+         DC    AL4(SVF+1)
0000F2                           205+         ORG   *-4
0000F2 940F                      206+         DC    X'940F'
0000F6                           207+         ORG   *+2

0000F6 D502 0025 006D 00025 0006D 209+         CLC   SVCOPSW+5(3),PINPSW+5
0000FC 4770 C118          00118  210+         BC    7,DXA
000100 58E0 4004          00004  211+         L     14,TCBPIE(0,4) GET P.I.E. ADDRESS.
000104 9200 E000    00000        212+         MVI   0(14),0 FLAG P.I.E. 'RE-ENTRANT'.
000108 98D2 E008          00008  213+         LM    13,2,8(14) RESTORE P.I.E. REGISTERS.
00010C 50D0 0024          00024  214+         ST    13,SVCOPSW+4 INITIALIZE RESUME ADDRESS.
000110 983D 403C          0003C  215+         LM    3,13,TCBGRS+12(4) RESTORE REMAINING REGISTERS.
000114 8200 0020    00020        216+         LPSW  SVCOPSW
000118                           217+DXA      DS    0H
000118 18A5                      218+         LR    10,5
00011A 58DA 001C          0001C  219+         L     13,XRBLNK(10) GET NEXT RB ADDRESS.
00011E 91C0 A00A    0000A        220+         TM    XSTAB(10),XIRB Q. RB IS IRB OR SIRB.
000122 4740 C1D6          001D6  221+         BC    4,DXB
000126 4770 C154          00154  222+         BC    7,DXC Q. RETURNOR IS NOT PRB.
00012A 9510 A00A    0000A        223+         CLI   XSTAB(10),XNSVRB Q. RB IS NON-LOADED 'MAJOR'.
00012E 4770 C14E          0014E  224+         BC    7,DXD
000132 94EF A00A    0000A        225+         NI    XSTAB(10),255-XNSVRB TURN OFF 'MAJOR' INDICATOR.
000136 58B0 A018          00018  226+         L     11,XRBQ(0,10) GET FIRST 'MINOR' RB.
00013A 4100 B008          00008  227+DXP      LA    0,8(0,11) POINT TO NAME TO BE DELETED.
00013E 9220 B012    00012        228+         MVI   XSTAB+8(11),X'20' REMOVE MINOR FLAG FOR DELETE.
000142 0A09                      229+         SVC   9 DELETE 'MINOR'.
000144 58B0 B020          00020  230+         L     11,XRBQ+8(0,11) GET NEXT 'MINOR'.
000148 12BB                      231+         LTR   11,11 Q. 'MINORS' REMAIN TO DELETE.
00014A 4770 C13A          0013A  232+         BC    7,DXP
00014E                           233+DXD      DS    0H
00014E D203 4068 D014 00068 00014 234+         MVC   TCBGRS+56(4,4),XRBPSW+4(13) SET R14 FROM RESUME ADDR.
000154 94BF A00B    0000B        235+DXC      NI    XSTAB+1(10),255-XACTV DEACTIVATE RETURNING RB
000158 15D4                      236+         CLR   13,4 Q. RETURN NOT FROM HIGHEST LEVEL.
00015A 4770 C168          00168  237+         BC    7,DXF
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT

00015E 9640 401D       0001D         238+          OI    TCBFLGS+1(4),X'40' FLAG TCB NORMAL RETURN.
000162 1B11                          239+          SR    1,1 SET UNIQUE ABEND CODE IN REGISTER 1.
000164 0610                          240+          BCTR  1,0
000166 0A0D                          241+          SVC   13
000168                               242+DXF       DS    0H
000168 50D0 4000              00000  243+          ST    13,TCBRBP(0,4) DEQUEUF CURRENT RB.
00016C 91E0 A00A       0000A         244+          TM    XSTAB(10),XLOOP RETURNOR IS NOT NORMAL PRB.
000170 4770 C178              00178  245+          BC    7,DXM
000174 9602 A00B       0000B         246+          OI    XSTAB+1(10),XDYN CAUSE RB CORE TO BE FREED.
000178 9122 A00B       0000B         247+DXM       TM    XSTAB+1(10),XREG+XDYN Q. ABNORMAL ACTION REQUIRED
00017C 4780 C196              00196  248+          BC    8,DXF Q. RB CORE IS NOT TO BE FREED
000180 4740 C18A              0018A  249+          BC    4,DXN Q. RB DOES NOT HAVE 16 REG SAVE AREA
000184 D233 4038 5028 00038 00028  250+          MVC   TCBGRS+8(52,4),XRBREG+8(5) MOVE RB REGS TO TCB.
00018A 4800 A008              00008  251+DXN       LH    0,XRBSZ(0,10) REG0=NUMBER OF BYTES TO BE FREED
00018E 8900 0003              00003  252+          SLL   0,3
000192 181A                          253+          LR    1,10 LOAD AREA ADDRESS
000194 0A0A                          254+          SVC   10 ISSUE FREEMAIN SVC
000196                               255+DXE       DS    0H
000196                               256+DXG       DS    0H
000196 91D0 000A       0000A         257+          TM    XSTAB(13),XSVRB+XNSVRB NEXT RB IS TRANSIENT SVRB.
00019A 4710 C1B2              001B2  258+          BC    1,DXD
00019E 18F4                          259+DXQ       LR    15,4
0001A0 9809 F030              00030  260+          LM    0,9,TCBGRS(15)
0001A4 D217 F030 F058 00030 00058  261+          MVC   TCBGRS(24,15),TCBGRS+40(15) PLACE TCB REGISTERS BACK
0001AA 9001 F048              00048  262+          STM   0,1,TCBGRS+24(15) IN 10-9 SEQUENCE.
                                     263+**      B     IEAODS

0001AE 00000000                      265+          DC    AL4(IEAODS)
0001AE                               266+          ORG   *-4
0001AE 47F0                          267+          DC    X'47F0'
0001B2                               268+          ORG   *+2

                                     270+***  TRANSIENT REFRESH INTERFACE ROUTINE  ***

0001B2                               272+IEAARF00  DS    0H SVC TRANSIENT AREA REFRESH ROUTINE.
0001B2 D503 C0DC D000 000DC 00000  273+DXD       CLC   XSNTCC(4),XRBNM(13) Q. SVC CURRENTLY RESIDES IN XSNT.
0001B8 4780 C19E              0019E  274+          BC    8,DXQ
                                     275+**      MVI   SVCPSW+7,1          PASS SIZE TO SVRB REATE ROUTINE

0001BC 00000007                      277+          DC    AL4(SVCPSW+7)
0001BC                               278+          ORG   *-4
0001BC 9201                          279+          DC    X'9201'
0001C0                               280+          ORG   *+2

0001C0 185D                          282+          LR    5,13
0001C2 4520 C00E              0000E  283+          BAL   2,SVH TO SVRB CREATE ROUTINE.
0001C6 18AD                          284+          LR    10,13
0001C8 58B0 C0D8              000D8  285+          L     11,DXFINCHQ GO TO FINCH.
0001CC 058B                          286+          BALR  8,11
0001CE 000E                          287+          DC    X'000E'
0001D0 980F 5020              00020  288+          LM    0,15,XRBREG(5) RECOVER REGS 0,1,15.
0001D4 0A03                          289+          SVC   3
0001D6                               290+DXB       DS    0H
0001D6 910C A00B       0000B         291+          TM    XSTAB+1(10),XIQEN12+XIQE12 Q. IRB'S IQE IS NOT 12*.
0001DA 47B0 C228              00228  292+          BC    11,DXJ Q. IQE IS NOT 12*.
0001DE 5810 A018              00018  293+          L     1,XRBQ(0,10) DEQUEUE 12* FROM IRB.
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

0001E2 4870 1000            00000   294+          LH    7,0(0,1)
0001E6 5070 A018            00018   295+          ST    7,XRBQ(0,10) COMPLETE 12* DEQUEUE.
0001EA 9823 1004            00004   296+          LM    2,3,4(1) GET IOB AND DEB ADDRESSES.
                                    297+**      L     5,AIOS                LOAD IOS BASE ADDR.

0001EF 00000000                     299+          DC    AL4(AIOS)
0001EE                              300+          ORG   *-4
0001EE 5850                         301+          DC    X'5850'
0001F2                              302+          ORG   *+2

0001F2 5860 C0D0            000D0   304+          L     11,TSRET GET IOS 12*-RETURN ROUTINE ADDR.
0001F6 186A                         305+          LR    6,10 SAVE REG. 10.
0001F8 058B                         306+          BALR  8,11 ENTER IOS 12*-RETURN ROUTINE.
0001FA 18C4                         307+          LR    12,4 RESTORE ADDRESSABILITY.

                                    309+**      L     12,SVEX               RE-ESTABLISH ADDRESSABILITY.
0001FC 00000000                     310+          DC    AL4(SVEX)
0001FC                              311+          ORG   *-4
0001FC 58C0                         312+          DC    X'58C0'
000200                              313+          ORG   *+2

000200 18A6                         315+          LR    10,6
000202 1217                         316+DXL       LTR   1,7 Q. LAST 12* FOR THIS IRB.
000204 4780 C228            00228   317+          BC    8,DXH
000208                              318+DXI       DS    0H
000208 58F0 A00C            0000C   319+          L     15,XRBFP(0,10) GET IRB ROUTINE ENTRY POINT ADDRESS
00020C 50F0 0024            00024   320+          ST    15,SVCOPSW+4 AND ASSEMBLE RE-ENTRY PSW.
000210 41EC C0CE            000CE   321+          LA    14,DEXIT PLACE RETURN ADDRESS IN RETURN REG.
000214 58D0 A000            00000   322+          L     13,XRBNM(0,10) REINIT. SAVE AREA ADDRESS.
000218 9101 0021      00021         323+          TM    SVCOPSW+1,1 Q. IRB IS PROBLEM PROGRAM.
00021C 4770 C224            00224   324+          BC    7,*+8
000220 9200 0020      00020         325+          MVI   SVCOPSW,0 DISABLE PSW IF IRB PRIVILEGED.
000224 8200 0020      00020         326+          LPSW  SVCOPSW RE-ENTER ROUTINE.
000228                              327+DXJ       DS    0H
000228                              328+DXH       DS    0C
000228 D23F 4030 A020 00030 00020   329+          MVC   TCBGPS(64,4),XRBREG(10) MOVE IRB REGS TO TCB.
000020                              330+TCBFSIRB  EQU   X'20' TCB, SIRB-IN-PROCESS INDICATOR.
00022E 47F0 C154            00154   331+          B     DXC
                                    332+          DROP  12
```

```
LOC   OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                  334+***  ADDRESS VALIDITY CHECK ROUTINE  ***

                                  336+*UPON ENTRY TO THIS ROUTINE REGISTER 7 MUST CONTAIN THE ADDRESS TO
                                  337+*BE CHECKED FOR VALIDITY. REGISTER 8 MUST CONTAIN THE ROUTINE ENTRY
                                  338+*POINT, AND 10 THE RETURN ADDRESS. REGISTER 9 MUST CONTAIN EITHER THE
                                  339+*TCB ADDRESS OR ZERO. IF ZERO IS FOUND IN REGISTER 9 THE CURRENT TCB
                                  340+*ADDRESS WILL BE RETURNED TO THE CALER IN REGISTER 9. UPON RETURN TO
                                  341+*THE CALLER REGISTER 7 WILL CONTAIN THE STORAGE KEY IN THE LOW ORDER
                                  342+*BYTE,LEFT ADJUSTED,AND THE CONDITION CODE WILL HAVE BEEN SET TO 8
                                  343+*(AS IN BC  8,***) FOR A VALID ADDRESS.  IF THE CONDITION CODE IS OTHER
                                  344+*THAN 8 THE ADDRESS BEING CHECKED HAS BEEN FOUND TO BE INVALID DUE TO
                                  345+*ADDRESSING OR PROTECTION. REGISTERS 8 AND 10 WILL REMAIN TRANSPARENT.
                                  346+*CALLERS TO THIS ROUTINE MUST BE PRIVILEGED. THE SYSTEM MASK IS
                                  347+*UNIMPORTANT.

000007                            349+R1        EQU   7
000008                            350+R2        EQU   8
000009                            351+R3        EQU   9
00000A                            352+R4        EQU   10
                                  353+*
000232                            354+          USING *,R2
000232                            355+IEAQVLOO  DS    0H
000232 1299                       356+          LTR   R3,R3 Q. CALLER HAS SUPPLIED TCB ADDRESS.
000234 4770 800A          0023C   357+          BC    7,VLA
                                  358+*         L     L3,IEATCBP+4        GET CURRENT TCB ADDRESS.
000238 00000004                   359+          DC    AL4(IEATCBP+4)
000238                            360+          ORG   *-4
000238 5890                       361+          DC    X'5890'
00023C                            362+          ORG   *+2
00023C                            363+VLA       DS    0H
00023C 5570 8016          00248   364+          CL    R1,VMCSZ ADDRESS NOT WITHIN MACHINE RANGE.
000240 072A                       365+          BCR   2,R4 RETURN TO CALLER WITH CC SET.
000242 1B77                       366+          SR    R1,R1
000244 07FA                       367+          BCR   15,R4 RETURN TO CALLER WITH CC SET.
000248                            368+VMCSZ     DS    1F
                                  369+          DROP  R2

                                  371+***  TEMPORARY LINKAGE TO IRB CREATION ROUTINE  ***
00024C 0A2B                       372+IEA1FF00  SVC   43
00024E 07FE                       373+          BR    14
                                  374           END
```

Appendix 25

NIP SVC TRR TABLE

```
 LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT

                                   385+*          OBTAIN TTR AND LENGTHS OF CLL NON RESIDENT SVC'S
                                   386+*             AND SAVE IN SVCEXTNT TABLE
                                   387+*          ****************************************************************
000000                             388+R0         EQU   0
000001                             389+R1         EQU   1
000002                             390+R2         EQU   2
000003                             391+R3         EQU   3
000006                             392+R6         EQU   6
000007                             393+R7         EQU   7
000008                             394+R8         EQU   8
000009                             395+R9         EQU   9
00000F                             396+R15        EQU   15
                                   397+*
000DB0                             398+IEAOUT2    EQU   *
000DB0 1B88                        399+           SR    8,8
000DB2 4190 0046             00046 400+           LA    R9,SVPRXLN LOAD LENGTH OF SVC PREFIX TABLE
000DB6 1B77                        401+           SR    R7,R7
000DB8 5860 C5AA             00E6C 402+           L     R6,SLMTAD
000DBC 5840 C5A2             00E64 403+           L     4,SVXPREX LOAD ADDR OF SVC PREFIX TABLE
000DC0 4866 0000             00000 404+           LH    R6,0(R6) LOAD HIGHEST TYPE 1/2 INDEX VALUE
000DC4 1B22                        405+SVXINIT    SR    R2,R2
000DC6 1B32                        406+           LR    R3,R2
000DC8 4337 4000             00000 407+           IC    R3,0(R7,4) LOAD VALUE FROM PREFIX TABLE
000DCC 1B36                        408+           SR    R3,R6 SUB LOWEST TYPE TYPE 3 OR 4 VALUE
000DCE 4740 C57A             00E3C 409+           BC    4,SVXLOOP BRANCH IF NOT A TRANSIENT ENTRY(NEG)
000DD2 8930 0002             00002 410+           SLL   R3,2 MULTIPLY BY 4
000DD6 1883                        411+           LR    8,R3 SAVE FOR STORING TTR
000DD8 5830 C5A6             00E68 412+           L     R3,SVCXTAB REG3=ADDR OF SVCEXTNT TABLE
000DDC 4120 0046             00046 413+           LA    R2,SVHI LOAD NUMBER OF HIGHEST IBM SVC + 1
000DE0 1972                        414+           CR    R7,R2
000DE2 47A0 C592             00F54 415+           BC    10,SVXUSER BRANCH IF USER PROVIDED
                                   416+*                        THE NUMBER OF THE ENTRY IN THE PREFIX TABLE
                                   417+*                          IS THE SVC NUMBER IF NOT A USER PROVIDED SVC
000DE6 1817                        418+           LR    R1,R7
000DE8 4E10 C5D6             00E98 419+SVXCONV    CVD   R1,SVWA1 CONVERT SVC NUMBER TO DECIMAL
000DEC F332 C5B6 C5DB 00E78 00E9D 420+           UNPK  SVNAM+4(4),SVWA1+5(3) UNPACK TO 4 DIGIT VALUE AND
                                   421+*                                       PLACE IN STANDARD SVC NAME
                                   422+*
                                   423+*                        GET DE ENTRY FOR SVC ROUTINE
000DF2 4100 C5AE             00E7C 424+           LA    R0,SVLST
000DF6 5810 0010             00010 425+           L     R1,16 GET CVT ADDR
000DFA 5811 0054             00054 426+           L     R1,84(R1) GET SVC DCB ADDR
000DFE 0A12                        427+           SVC   18 LINK TO BLDL RQUTINE
000E00 12FF                        428+           LTR   R15,R15
000E02 4770 C588             00E4A 429+           BC    7,SVXERR BRANCH IF NOT FOUND
                                   430+*
                                   431+*
000E06 4110 C5B2             00E74 432+SVXFOUND   LA    R1,SVLST+4
000E0A 4881 000E             0000E 433+           LH    11,DETTR(R1) REG11=TT RIGHT ALIGNED
000E0E 88B0 0016             00016 434+           SLA   11,22 REG11=10 BITS OF TT LEFT ALIGND
000E12 1B55                        435+           SR    5,5
000E14 4351 0010             00010 436+           IC    5,DETTR+2(R1) R5= R RT ALIGNED
000E18 8B50 000E             0000E 437+           SLA   5,14 R5= R ALIGNED TO TT
000E1C 16B5                        438+           OR    11,5 R11=TTR LEFT ALIGNED
000E1E D201 C5DE 101B 00EA0 0001B 439+           MVC   HWD(2),DELNTH(R1) MOVE LENGTH FIELD
000E24 4850 C5DE             00EA0 440+           LH    5,HWD
```

```
  LOC  OBJECT CODE     ADDR1 ADDR2  STMT   SOURCE STATEMENT

000E28 8B50 0003             00003   441+          SLA   5,3
000E2C 16B5                          442+          OR    11,5 R11=TTR + LNGTH LEFT ALIGNED
000E2E 4150 0007             00007   443+          LA    5,7
000E32 5458 3000             00000   444+          N     5,0(8,3)
000E36 16B5                          445+          OR    11,5
000E38 50B8 3000             00000   446+          ST    11,0(8,R3) REG11=TTR+LENGTH+ESA IN TABLE
                                     447+*
000E3C 4177 0001             00001   448+SVXLOOP   LA    R7,1(R7) INCREMENT INDEX TO SVC PREFIX TABLE
000E40 1979                          449+          CR    R7,R9
000E42 474C C502             00DC4   450+          BC    4,SVXINIT BRANCH IF MORE TO CHECK
000E46 47F0 C5E0             00EA2   451+          BC    15,IFAEXIT
000E4A 1B00                          452+SVXERR    SR    0,0
000E4C 42C7 4000             00000   453+          STC   0,0(R7,4) CLEAR PREFIX VALUE SO THAT REQUESTS
                                     454+*                                 FOR THE ROUTINE WILL CAUSE AN ERR
000E50 47F0 C57A             00E3C   455+          B     SVXLOOP CHECK FOR MORE ENTRIES
                                     456+*                                 PRINT MESSAGE-ROUTINE NOT FOUND
                                     457+*
                                     458+*                           GET SVC NUMBER FOR USER ROUTINE
000E54 1817                          459+SVXUSER   LR    R1,R7 LOAD INDEX TO PREFIX TABLE
000E56 1B12                          460+          SR    R1,R2 SUB HIGHEST IBM SVC + 1
000E58 4120 00FF             00FFF   461+          LA    R2,255 COMPLEMENT VALUE TO GET SVC NUMBER
000E5C 1712                          462+          XR    R1,R2 OF USER PROVIDED SVC
000E5E 47F0 C526             00DE8   463+          BC    15,SVXCONV BRANCH TO GET DE ENTRY
                                     464+*
000046                               465+SVPRXLN   EQU   70+255-255 TOTAL NUMBER OF SVC'S
00000E                               466+DETTR     EQU   14 DISP OF TTR FOR TEXT RECORD IN DE ENTRY
00001B                               467+DELNTH    EQU   27 DISP OF LENGTH OF ROUTINE IN DE ENTRY
                                     468+*
000E62 0000
000E64 00000000                      469+SVXPREX   DC    A(SVPREX) ADDR OF PREFIX TABLE
000E68 00000000                      470+SVCXTAB   DC    A(SVLMT)
000E6C 00000000                      471+SLMTAD    DC    A(SLMT) ADDR OF SVC LIMIT VALUE
000E70 00010024                      472+SVLST     DC    X'00010024' INPUT PARAMETER TO BLDL
000E74 C9C7C3F0F0F0F0F0              473+SVNAM     DC    C'IGC00000' STANDARD NAME FOR SVC ROUTINES-1ST 4 CHAR
000E7C 0000000000000000              474+          DC    7F'0' AREA FOR RETURN OF DF ENTRY FROM BLDL
000E98                               475+          DS    0D
000E98 00C0000000000000              476+SVWA1     DC    XL8'00' WORK AREA TO CONVERT SVC NUMBER
000EA0                               477+          DS    0H
000EA0                               478+HWD       DS    H
```

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

000EA2                            480+          DS    0H
000EA2                            481+IEAEXIT   EQU   *
                                  482+*THIS ROUTINE OPENS LINK LIB DEB
000EA2 18FF                       483+          SR    15,15
000EA4 18BB                       484+          SR    11,11
000EA6 D22B C07E C0D6 01640 01698 485+          MVC   IEADSTNM(44),IEALNKNM MODIFY DS NM TO LINKLIB
000EAC 4590 C7FE            010C0 486+          BAL   9,IEALOCAT BRANCH TO  VOLID LOCATION ROUTN
000EB0 19FB                       487+          CR    15,11
000EB2 4720 C62C            00EEE 488+          BH    IEANIP7
000EB6 4580 C74A            0100C 489+          BAL   8,IEARDVOL BRANCH TO READ DA VOL  ROUTINE
000EBA 49A0 CBF8            0148A 490+          CH    10,IEAIPL IS LINKLIB ON IPL-ED DEVICE
000EBE 4780 C620            00EE2 491+          BE    IEASAMED YES- PERM RES BIT IS SET
000EC2 1B66                       492+          SR    6,6 CLEAR REG 6 FOR MULTIPLY
000EC4 4870 CCA2            01564 493+          LH    7,IEAVTOC REG 7 = CC OF VTOC
000EC8 1C64                       494+          MR    6,4 CONVERT CC INTO TRACKS
000ECA 4A70 CCA4            01566 495+          AH    7,IEAVTOC+2 REG 7 = TT OF VTOC
000ECE 4073 0024            00024 496+          STH   7,36(3) STORE VTOC TT IN LINKLIB UCB
000ED2 D200 3026 CCA6 00026 01568 497+          MVC   38(1,3),IEAVTOC+4 MOVE R OF VTOC INTO LINKLIB UCB
000ED8 9684 3003      00003       498+          OI    3(3),X'84' STATUS A = ONLINE AND PERM RES.
000EDC D205 301C CCA7 00C1C 01569 499+          MVC   28(6,3),IEAVOLAB PUT VOLUME LABEL INTO UCB
000EE2 5810 0010            00010 500+IEASAMED  L     1,16 REG 1 = CVT ADDR
000EE6 5811 0008            00008 501+          L     1,CVTLINK(1)
000EEA 45E0 C7B6            01078 502+          BAL   14,IEACOMON
```

Appendix 26

```
MEMBER NAME  IEEWTC01
         GBLC  &SCHDLR                                                  00020000
         GBLC  &IEEPG                                                   00040000
         GBLC  &IEEPP                                                   00060000
&SCHDLR  SETC  'SSS'                                                    00080000
&IEEPG   SETC  'OMC'                                                    00100000
&IEEPP   SETC  'OMC'                                                    00120000
MSCED    IEEGMSLT DSECT,SMBL=YES                                        00140000
         IEEMIOCS                                                       00160000
         TITLE 'WRITE TO OPERATOR/WRITE TO OPERATOR WITH REPLY'         00180000
*                                                                       00200000
*              *** WTO/WTOR ***                                         00220000
*                                                                       00240000
*        THIS MACRO ENABLES THE USER TO WRITE A MESSAGE TO THE          00260000
*        OPERATOR AND, IF HE SO DESIRES,REQUEST A REPLY.                00280000
*                                                                       00300000
IGC03E   CSECT                                                          00320000
         BALR  BASEREG,0                      ESTABLISH WTO/WTOR        00340000
         USING *,BASEREG                       BASE REGISTER            00360000
         L     BASEREG1,FLCCVT                CVT ADR TO R8             00380000
         L     BASEREG1,IEEMSLTV(BASEREG1)    RES CORE ADR TO R8        00400000
         USING IEEMSLT,BASEREG1   ESTABLISH RESIDENT ADDRESSABILITY     00420000
*                                                                       00440000
*        BEGIN PSEUDO-DISABLE                                           00460000
*                                                                       00480000
         L     BASEREG2,MSABL     SUPERVISOR INSTRUCTION ADDRESS        00500000
         ST    BASEREG2,MSUCBPR   RETURN WITH BYTE ADR (BC MASK) SAVED  00520000
         MVC   MSUCBAL(1),1(BASEREG2)  SAVE CURRENT MASK                00540000
         MVI   1(BASEREG2),X'F0'  INSERT DISABLING MASK                 00560000
*                                                                       00580000
*        END PSEUDO DISABLE                                             00600000
*                                                                       00620000
         SSM   MSENABLE           MACHINE ENABLE                        00640000
*                                                                       00660000
         LR    SCANREG,PASSREG1   SAVE LIST POINTER ADDRESS            00680000
         TM    MSECBFL,MSWTO  FIRST TIME IN SVC34 OR SVC35             00700000
         BO    WTORETRY         NO,WAIT AND CHECK FOR POSSIBLE RETRY   00720000
         CI    MSECBFL,MSATTN+MSWTO  YES,SVC34 AND SVC35 SWITCHES TO ON 00740000
         LA    VRBTBL,MSCMD       RESIDENT BUFFER                      00760000
         ST    VRBTBL,CCWRDR       ADDRESS TO CCW                      00780000
         B     CONTINUE                                                 00800000
WTORETRY BAL   TRBASADR,ERENTRY1  WAIT AND CHECK FOR POSSIBLE RETRY     00820000
         SSM   MSENABLE           PERMANENT ERROR,ENABLE MACHINE,RETRY  00840000
         B     RETRYWTO           RETRY                                00860000
         NOP   *+4                IGNORE OR ERROR FREE                 00880000
CONTINUE LR    PASSREG1,SCANREG   RESTORE WTO/WTOR LIST POINTER ADDRESS 00900000
         TM    0(PASSREG1),ONES   WTO OR WTOR                          00920000
         BZ    WTOADR              WTO                                00940000
         LA    SCANREG,8(SCANREG)  WTOR,POINT TO WTO LIST              00960000
WTOADR   SR    WORKREG,WORKREG    CLEAR R6                             00980000
         IC    WORKREG,1(SCANREG) MESSAGE LENGTH+4 TO R6               01000000
         CLI   1(SCANREG),BIT0+BIT6    MSG LNGTH+4 .GT. 130           01020000
         BNE   LNGTHLE4                NO,TEST FOR LNGTH .LE. 4        01040000
LNGTHBAD LA    WORKREG,130(0,0)         YES,MAX MSG LNGTH(130) TO R6    01060000
         B     LNGTHOK                                                  01080000
LNGTHLE4 CLI   1(SCANREG),BIT5          MSG LNGTH+BFR HDR LNGTH .LE. 4  01100000
         BNE   LNGTHBAD                                                 01120000
LNGTHOK  XC    MSBCTLH(8),MSBCTLH      ZERO OUT BUFFER HEADERS          01140000
         MVC   MSBFH(4),0(SCANREG)     USER MSG BFR HDR TO RES BFR HDR  01160000
```

```
MEMBER NAME  IEEWTOT
          SH    WORKREG,MSSSFIVE        MSG LNGTH-1 OF MSG FOR MOVE       01180000
          EX    WORKREG,MSGMOVE    MOVE USERS MESSAGE TO RESIDENT BUFFER  01200000
          TM    0(PASSREG1),ONES   WTO OR WTOR                            01220000
          BC    5,WTORMOVE          WTOR                                  01240000
          B     CLEANUP             WTO                                   01260000
*                                                                         01280000
MSGMOVE   MVC   MSCMD(1),4(SCANREG)                                       01300000
*                                                                         01320000
WTORMOVE  MVC   MSCMD+3(123),4(SCANREG)  WTOR,MSG OFFSET 3 CHAR TO RIGHT  01340000
          MVC   MSCMD(3),ZZB             REPLY ID (00 ) PRECEEDING MSG    01360000
          LA    WORKREG,3(WORKREG)       INCREMENT MSG LENGTH BY 3        01380000
CLEANUP   LA    WORKREG,5(WORKREG)                                        01400000
          LR    SCANREG,PASSREG1        SAVE WTO/WTOR LIST POINTER        01420000
MSGAGAIN  STC   WORKREG,MSBFH+1         MSG LNGTH+4 TO MSBFH+1            01440000
          LA    WORKREG,4(WORKREG)                                        01460000
          STC   WORKREG,MSBCTLH+1       MSG LNGTH+8 TO MSBCTLH+1          01480000
          LH    PASSREG1,MSBFH     MSG LNGTH+4 TO R1                      01500000
          SH    PASSREG1,MSSSFOUR  DECREMENT R1 TO ACTUAL MSG LNGTH       01520000
          STH   PASSREG1,CCWRDR+6  MSG LNGTH TO CCWRDR                    01540000
WRTRETRY  LA    PASSREG0,CCWRDR    CCW ADDRESS                            01560000
          ST    PASSREG0,CCWAI      TO IOB                                01580000
          MVI   CCWRDR,X'09'       1052 WRITE COMMAND TO CCW              01600000
          XC    ECBRDR(4),ECBRDR   CLEAR ECB                              01620000
*                                                                         01640000
          SSM   *+1                MACHINE DISABLE                        01660000
*                                                                         01680000
          BAL   RETURN,CONSWICH    CHECK FOR EXT INT (ALT CONSOLE)        01700000
*                                                                         01720000
          EXCP  IOBRDR                                                    01740000
*                                                                         01760000
          SSM   MSENABLE           MACHINE ENABLE                         01780000
*                                                                         01800000
          TM    0(SCANREG),ONES    WTO OR WTOR                            01820000
          BZ    ERRORTN             WTO                                   01840000
          TM    ECBRDR,BIT1         WTOR,HAS CH END BLEN POSTED FOR WTO   01860000
          BZ    *-4                  NO,LOOP UNTIL POSTED                 01880000
*                                                                         01900000
*              *** FULL ERROR TESTS MADE ***                              01920000
*                                                                         01940000
ERRORTN   BAL   TRBASADR,ERENTRY2  CHECK FOR POSSIBLE RETRY               01960000
          SSM   MSENABLE           PERMANENT ERROR,ENABLE MACHINE,RETRY   01980000
          B     WRTRETRY           RETRY                                 02000000
          NOP   *+4                IGNORE OR ERROR FREE                  02020000
QUOTE     EQU   X'7D'          QUOTE MARK                                 02040000
          TM    0(SCANREG),ONES    WTO OR WTOR                            02060000
          BZ    WTOEXIT             WTO                                   02080000
WTORLOOP  TI    MSFHF,BIT4         WTOR,BIT4 TO ON                        02100000
          TM    MSFHF,BIT4         PSEUDO-WAIT                            02120000
          BO    *-4                 FOR ATTENTION                         02140000
          XC    MSBCTLH(8),MSBCTLH ZERO BUFFER HEADERS                    02160000
          MVI   MSCMD,BLANK        BLANK OUT                              02180000
          MVC   MSCMD+1(125),MSCMD  COMMAND BUFFER                        02200000
          MVC   CCWRDR+6(2),RDRCOUNT    CHAR COUNT OF 126 TO CCW          02220000
          LA    PASSREG0,CCWRDR    CCW ADDRESS                            02240000
          ST    PASSREG0,CCWAI      TO IOB                                02260000
          MVI   CCWRDR,X'0A'       1052 READ COMMAND TO CCW               02280000
          XC    ECBRDR(4),ECBRDR        CLEAR ECB (INITIALIZATION)        02300000
*                                                                         02320000
```

```
MEMBER NAME  IEEWTC01
          SSM   *+1                 MACHINE DISABLE                          02340000
*                                                                            02360000
          BAL   RETURN,CONSWICH     CHECK FOR EXT INT (ALT CONSOLE)          02380000
*                                                                            02400000
          EXCP  IOBRDR                                                       02420000
*                                                                            02440000
          SSM   MSENABLE            MACHINE ENABLE                           02460000
*                                                                            02480000
          TM    ECBRDR,BIT1         HAS THE READ BEEN POSTED                 02500000
          BZ    *-4                  NO,LOOP UNTIL POSTED (PSEUDO-WAIT)      02520000
*                                                                            02540000
*                  *** FULL ERROR TESTS MADE ***                             02560000
*                                                                            02580000
          TM    CSWRDR+4,BIT7       WAS MSG CANCELED (UNIT EXCEPTION)        02600000
          BO    WTORLOOP             YES,RETRY                               02620000
          BAL   TRBASADR,ERENTRY2    NO,CHECK FOR POSSIBLE RETRY             02640000
          SSM   MSENABLE            PERMANENT ERROR,ENABLE MACHINE,RETRY     02660000
          B     WTORLOOP            RETRY                                    02680000
          NOP   *+4                 IGNORE OR ERROR FREE                     02700000
          LH    NTRYSIZE,CCWRDR+6   MAX MSG SIZE TO R4                       02720000
          SH    NTRYSIZE,CSWRDR+6   MAX MSG SIZE-RESIDUAL MSG SIZE=ACTUAL    02740000
          LA    LASTNTRY,8(BASEREG1,NTRYSIZE) ADR OF LAST CHAR+1 TO R5       02760000
          LA    NTRYSIZE,4(NTRYSIZE)     MSG LNGTH+4                         02780000
          STC   NTRYSIZE,MSBFH+1          TO MSBFH+1                         02800000
          LA    NTRYSIZE,4(NTRYSIZE)     MSG LNGTH+8                         02820000
          STC   NTRYSIZE,MSBCTLH+1        TO MSBCTLH+1                       02840000
          LA    WORKREG,7(BASEREG1,0)    POINT TO RES BUFR-1                 02860000
SCANBUFR  LA    WORKREG,1(WORKREG,C)     SCAN RES BUFR                       02880000
          CLI   0(WORKREG),BLANK    SKIP LEADING                             02900000
          BE    SCANBUFR             BLANKS                                  02920000
          CLC   0(6,WORKREG),REPLY       REPLY FOR WTOR CORRECT              02940000
          BNE   READOVER       NO,WRITE ERR MSG,REPEAT REPLY                 02960000
          LA    WORKREG,4(WORKREG,C) YES,POINT TO -Y- IN REPLY               02980000
REPLYID   LA    WORKREG,1(WORKREG,C) SCAN FOR REPLY ID                       03000000
          CLI   0(WORKREG),BLANK    SKIP LEADING BLANKS                      03020000
          BE    REPLYID              BEFORE REPLY ID                         03040000
          CLC   0(3,WORKREG),ZZCOMMA     REPLY ID = 00,                      03060000
          BNE   READOVER       NO,WRITE ERR MSG,REPEAT REPLY                 03080000
          LA    INDEXER,4(WORKREG,C)     POINT INDEXER TO MSG TEXT ADR       03100000
          LA    WORKREG,3(WORKREG,C)     POINT WORKREG TO QUOTE              03120000
          CLI   0(WORKREG),QUOTE     MSG TEXT START WITH QUOTE               03140000
          BNE   READOVER       NO,WRITE ERR MSG,REPEAT REPLY                 03160000
TEXTLOOP  CR    WORKREG,LASTNTRY      YES,MSG TEXT END WITH QUOTE            03180000
          BNL   READOVER       NO,WRITE ERR MSG,REPEAT REPLY                 03200000
          LA    WORKREG,1(WORKREG,C)                                         03220000
          CLI   0(WORKREG),QUOTE      QUOTE MARK                             03240000
          BNE   TEXTLOOP               NO,LOOP                             03260000
          LA    WORKREG,1(WORKREG,C)   YES                                   03280000
          CLI   0(WORKREG),QUOTE      DOUBLE QUOTE MARK                      03300000
          BE    TEXTLOOP              YES                                    03320000
          SR    WORKREG,INDEXER       NO,DONE-COMPUTE MSG REPLY LNGTH        03340000
          BCTR  WORKREG,0                                                    03360000
          LTR   WORKREG,WORKREG                                              03380000
          BZ    POSTECB  REPLY LENGTH=0,POST USERS ECB AND RETURN            03400000
          L     PASSREG1,0(SCANREG,C)   REPLY LNGTH AND ADR TO R1            03420000
          SRL   PASSREG1,24              SHIFT LENGTH TO LOW ORDER BYTE      03440000
RITOR5    LR    LASTNTRY,PASSREG1                                            03460000
          CR    PASSREG1,WORKREG   COMPARE GIVEN VS. COMPUTED LENGTHS        03480000
```

```
MEMBER NAME  IEEWTC01
         BL    READOVER GIVEN LOWER WRITE ERR MSG,REPEAT REPLY          03500000
R6TOR5   LR    LASTNTRY,WORKREG        COMPUTED LOWER                   03520000
         BCTR  LASTNTRY,0                                               03540000
         L     WORKREG,0(SCANREG) REPLY ADDRESS TO R6                   03560000
         EX    LASTNTRY,RPLYMOVE  MOVE REPLY TO USERS AREA              03580000
POSTECB  L     PASSREG1,4(SCANREG)     USERS ECB ADDRESS TO R1          03600000
*                                                                       03620000
         POST  (1)                                                      03640000
*                                                                       03660000
*        BEGIN PSEUDO-ENABLE                                            03680000
*                                                                       03700000
*                                                                       03720000
WTOEXIT  SSM   *+1                MACHINE DISABLE                       03740000
*                                                                       03760000
         L     BASEREG2,MSUCBPR   RESTORE R11                           03780000
         MVC   1(1,BASEREG2),MSUCBAL   RESTORE PREVIOUS MASK            03800000
*                                                                       03820000
*        END PSEUDO-ENABLE                                              03840000
*                                                                       03860000
         SVC   EXIT      *** WTO/WTOR TERMINATED ***                    03880000
*                                                                       03900000
RPLYMOVE MVC   0(1,WORKREG),0(INDEXER) MOVE REPLY TO USER'S REPLY AREA  03920000
*                                                                       03940000
CONSWICH L     INDEXER,TVTADR      CVT ADDRESS TO R7                    03960000
         LA    NTRYSIZE,20(INDEXER) APPENDAGE TABLE ADDRESS TO R4       03980000
         L     INDEXER,IEECUCBT(INDEXER) 4 WORD UCB TABLE ADR TO R7     04000000
         TM    0(INDEXER),BIT0     PRINCIPAL OR ALTERNATE UCB           04020000
         BO    *+8                  PRINCIPAL                           04040000
         LA    INDEXER,8(INDEXER)  ALTERNATE,POINT TO PRINCIPAL         04060000
         MVC   UCBPTR1(3),1(INDEXER)   PRINCIPAL UCB ADR TO DEB         04080000
         MVC   APNDGAD1(3),1(NTRYSIZE) APPENDAGE TABLE ADDRESS TO DEB   04100000
BR14     BR    RETURN                                                   04120000
*                                                                       04140000
*                1052 ERROR ROUTINES FOR SVC'S 34 AND 35                04160000
*                                                                       04180000
ERENTRY1 TM    ECBRDR,BIT1   HAS CHANNEL END BEEN POSTED FOR            04200000
         BZ    *-4            PREVIOUS SIO COMMAND. NO,LOOP TILL POSTED 04220000
ERENTRY2 TM    ECBRDR,X'7F'  POST CODE = 7F OR 00 FOR PREVIOUS SIO      04240000
         BM    ERENTRY4       NO,ERROR CHECKING REQUIRED                04260000
ERENTRY3 MVI   CCWRDR+5,Z    ZERO EXCP ERROR COUNTER                    04280000
         B     BIT4(TRBASADR)      RETURN TO ERROR FREE E.P.            04300000
ERENTRY4 NI    CCBRDR+44,X'CC'     CLEAR DCB FLAGS                      04320000
         TM    ECBRDR,X'44'  HAS I/O REQUEST BEEN INTERCEPTED (DE/UK)   04340000
         BE    BIT5(TRBASADR) YES,RETRY PREVIOUS EXCP                   04360000
         TM    ECBRDR,X'48'  HAS I/O REQUEST BEEN PURGED OR NOT STARTED 04380000
         BE    BIT5(TRBASADR) YES,RETRY PREVIOUS EXCP                   04400000
         L     WORKREG,TVTADR      FIND EXTENDED SAVE AREA - R6=CVT ADR 04420000
         L     WORKREG,0(WORKREG) DBL WRD                               04440000
         L     WORKREG,4(WORKREG) TCB                                   04460000
         L     WORKREG,0(WORKREG) RB-ACTIVE                             04480000
         LA    WORKREG,96(WORKREG) RB(32)+REGS(64)=96                   04500000
         MVC   0(8,WORKREG),GONGCCW     ALARM CHANNEL COMMAND SAVED     04520000
         MVC   8(2,WORKREG),IOBRDR+2   IOB SENSE BYTES AND CSW STATUS   04540000
         MVC   10(2,WORKREG),CSWRDR+4   BYTES TO EXTENDED SAVE AREA     04560000
         ST    WORKREG,CCWAI            GONG CCW ADDRESS TO CCWAI       04580000
         MVI   MSERM+1,Z                CLEAR GONG ERROR COUNTER        04600000
GONGTWO  XC    ECBRDR(4),ECBRDR         CLEAR ECB                       04620000
*                                                                       04640000
```

```
MEMBER NAME  IEEWTCOL
          SSM   *+1                    MACHINE DISABLE                          04660000
*                                                                               04680000
          BAL   RETURN,CONSWICH        CHECK FOR CONSOLE SWITCH                 04700000
*                                                                               04720000
          EXCP  IOBRDR                                                          04740000
*                                                                               04760000
          SSM   MSENABLE               MACHINE ENABLE                           04780000
*                                                                               04800000
          TM    ECBRDR,BIT1            HAS GOING BEEN RUNG (POSTED)             04820000
          BZ    *-4                     NO,LOOP UNTIL POSTED                    04840000
          TM    ECBRDR,X'7F'           GOING RING CK                            04860000
          BM    GOINGCNT                NO,RETRY GOING                          04880000
          TM    CCWRDR+5,BIT5          HAS MAX NO OF EXCP RETRYS BEEN GIVEN     04900000
          BO    ERENTRY5         YES,GOTO PERMANENT ERROR                       04920000
          IC    BASE,CCWRDR+5          NO,ERROR COUNT TO R15                    04940000
          SLL   BASE,1                  SHIFT LEFT 1 BIT                        04960000
          STC   BASE,CCWRDR+5          ERROR COUNT BACK TO STORAGE              04980000
          CI    CCWRDR+5,BIT7          INCREMENT ERROR COUNT BY 1               05000000
          B     BIT5(TRBASADR) RETURN FOR RETRY                                 05020000
GOINGCNT  TM    MSERM+1,X'03' HAS GOING BEEN RETRYED MAX NO OF TIMES            05040000
          BE    BIT5(TRBASADR) YES,RETURN                                       05060000
          IC    BASE,MSERM+1   NO,UPDATE                                        05080000
          SLL   BASE,1                 GOING                                    05100000
          STC   BASE,MSERM+1            ERROR                                   05120000
          CI    MSERM+1,BIT7             COUNTER                                05140000
          B     GOINGTWO         RETRY GOING                                    05160000
ERENTRY5  MVI   CCWRDR+5,Z      ZERO ERROR COUNTER                               05180000
          LA    RETURN,PERMERR                                                  05200000
          L     BASE,8(WORKREG)     IOB SENSE AND CSW STATUS BYTES TO R15       05220000
          MVC   0(2,0),BR14    BR  14  INSTRUCTION TO LOCATION 0                05240000
          CLI   CCWRDR,X'09'   READ OR WRITE COMMAND                            05260000
          BE    PSWOUT          WRITE COMMAND,GO LOAD WRITE PSW                 05280000
          LPSW  READPSW         READ COMMAND,LOAD READ PSW                      05300000
PSWOUT    LPSW  WRITEPSW                                                        05320000
*                                                                               05340000
READOVER  MVC   MSCMD(26),ERRMSG   ERROR MESSAGE TO RESIDENT BUFFER             05360000
          LA    WORKREG,30     ERROR MESSAGE LENGTH+4 TO WORKREG                05380000
          B     MSGAGAIN       WRITE OUT MESSAGE                                05400000
*                                                                               05420000
RETRYWTO  LA    PASSREGO,CCWRDR     CCW ADDRESS                                 05440000
          ST    PASSREGO,CCWAI       TO IOB                                     05460000
          XC    ECBRDR(4),ECBRDR    CLEAR ECB                                   05480000
          MVI   CCWRDR,X'09'        1052 WRITE COMMAND TO CCW                   05500000
*                                                                               05520000
          SSM   *+1                    MACHINE DISABLE                          05540000
*                                                                               05560000
          BAL   RETURN,CONSWICH        CHECK FOR EXT INT (ALT CONSOLE)          05580000
*                                                                               05600000
          EXCP  IOBRDR                                                          05620000
*                                                                               05640000
          SSM   MSENABLE               MACHINE ENABLE                           05660000
*                                                                               05680000
          B     WTORETRY               RETURN FOR WAIT AND POSSIBLE RETRY       05700000
*                                                                               05720000
PERMERR   ER    TRBASADR  PERMANENT ERROR - RETURN FOR MORE RETRIES             05740000
          NOPR  TRBASADR                                                        05760000
          B     ERENTRY3  PERMANENT ERROR - IGNORE IT AND PROCEED               05780000
*                                                                               05800000
```

```
MEMBER NAME  IEEWTC01
          CS    0D                                                      05820000
READPSW   DC    X'FF'     SYSTEM MASK                                   05840000
          DC    X'02'     PROTECTION KEY,AMWP                           05860000
          DC    X'0000'   INTERRUPTION CODE                             05880000
          DC    X'00'     ILC,CC,PROGRAM MASK                           05900000
          DC    X'00DE00'      ERROR CODE FOR ERROR DURING CONSOLE READ 05920000
WRITEPSW  DC    X'FF'     SYSTEM MASK                                   05940000
          DC    X'02'     PROTECTION KEY,AMWP                           05960000
          DC    X'0000'   INTERRUPTION CODE                             05980000
          DC    X'00'     ILC,CC,PROGRAM MASK                           06000000
          DC    X'00DE01'      ERROR CODE FOR ERROR DURING CONSOLE WRITE 06020000
GENGCCW   DC    X'0B'     GENG COMMAND                                  06040000
          DC    X'000000'                                               06060000
          DC    X'2000'        WRONG LENGTH RECORD INDICATOR            06080000
RDRCOUNT  DC    FL2'126'                                                06100000
MSSSFOUR  DC    F'4'                                                    06120000
MSSSFIVE  DC    F'5'                                                    06140000
ZZB       DC    C'CC '              REPLY ID = (CC )                    06160000
MSENABLE  DC    X'FF'          MACHINE ENABLE MASK                      06180000
REPLY     DC    CL6'REPLY'     VERE=(REPLY )                            06200000
ZZCOMMA   DC    C'00,'         REPLY ID IN REPLY                        06220000
ERRMSG    DC    C'IEE008A ERROR-REPEAT REPLY'                           06240000
          END                                                           06260000
 END OF DATA FOR SDS CR MEMBER
```

Appendix 27

```
0002                TITLE 'IGC01B - FIND/BLDL AN  TTR CONVERT ROUTINES'                0002
0004       *FUNCTION - THIS RESIDENT MODULE SEARCHES A DIRECTORY OF A PARTITIONED  0004
0006       *           ORGANIZATION DATA SET FOR A NAME OR LIST OF NAMES, AND      0006
0008       *           RETURNS INFORMATION STORED IN THE DIRECTORY ASSOCIATED WITH 0008
0010       *           EACH NAME. THE FORMAT OF THE DIRECTORY AND OF THE RETURNED  0010
0012       *           INFORMATION IS DESCRIBED IN THE PUBLICATION 'CONTROL        0012
0014       *           PROGRAM SERVICES' UNDER THE TOPIC 'BASIC PARTITIONED ACCESS 0014
0016       *           METHOD'.                                                    0016
0018       *                                                                       0018
0020       *           THIS MODULE ALSO CONTAINS ENTRY POINTS TO ROUTINES WHICH    0020
0022       *           CONVERT AN ABSOLUTE DIRECT ACCESS ADDRESS, MBBCCHHR, TO AND 0022
0024       *           FROM ITS RELATIVE EQUIVALENT, TTR.                          0024
0026       *                                                                       0026
0028       *ENTRY POINTS --                                                        0028
0030       *              IGC01B   -ENTERED FROM SVC SUPERVISOR AFTER MAINLINE     0030
0032       *                        CODE ISSUES  SVC 18 IN A CALLING SEQUENCE      0032
0034       *                        GENERATED BY ONE OF THE FOLLOWING MACROS--     0034
0036       *                                                                       0036
0038       *                             FIND  DCBADDR,NAMEADDR        FIND MACRO  0038
0040       *                                                                       0040
0042       *                             LA    0,NAMEADDR                   GN 0042
0044       *                             LA    1,DCBADDR                    GN 0044
0046       *                             LCR   1,1                          GN 0046
0048       *                            SVC    18                           GN 0048
0050       *                                                                       0050
0052       *                             BLDL  DCBADDR,LISTADDR        BLDL MACRO  0052
0054       *                                                                       0054
0056       *                             LA    0,LISTADDR                   GN 0056
0058       *                             LA    1,DCBADDR                    GN 0058
0060       *                             SVC   18                           GN 0060
0062       *                                                                       0062
0064       *              IECPBLDL -ENTRY VIA A BALR IN ORDER TO BYPASS SVC ENTRY  0064
0066       *                        TO BLDL AND IN ORDER TO SUPPLY A WORKAREA TO   0066
0068       *                        BLDL. REGISTER CONVENTIONS UPON ENTRY AND UPON 0068
0070       *                        EXIT ARE AS FOLLOWS--                          0070
0072       *                                                                       0072
0074       *                           REGISTER        ENTRY          EXIT        0074
0076       *                             0          BLDL LIST ADDRESS  DESTROYED   0076
0078       *                             1          DCB ADDRESS        DESTROYED   0078
0080       *                             2-12       IGNORED            DESTROYED   0080
0082       *                             13         400 BYTE           TRANSPARENT 0082
0084       *                                          WORKAREA ADDRESS              0084
0086       *                             14         RETURN ADDRESS     TRANSPARENT 0086
0088       *                             15         IGNORED            ERROR CODE  0088
0090       *                                                                       0090
0092       *              IECPRLTV -ENTRY TO ROUTINE VIA A BALR THAT CONVERTS AN   0092
0094       *                        ABSOLUTE DIRECT ACCESS ADDRESS, MBBCCHHR, INTO 0094
0096       *                        ITS RELATIVE EQUIVALENT, TTRO. REGISTER        0096
0098       *                        CONVENTIONS UPON ENTRY AND UPON EXIT ARE AS    0098
0100       *                        FOLLOWS--                                      0100
0102       *                                                                       0102
0104       *                           REGISTER        ENTRY          EXIT        0104
```

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0106      *                              0          IGNORED              TTRO RESULT 0106
0108      *                              1          DEB ADDRESS          TRANSPARENT 0108
0110      *                              2          ADDRESS OF           TRANSPARENT 0110
0112      *                                           MBBCCHHP IN CORE               0112
0114      *                              3-8        IGNORED              TRANSPARENT 0114
0116      *                              9-13       IGNORED              DESTROYED   0116
0118      *                              14         RETURN ADDRESS       TRANSPARENT 0118
0120      *                              15         ENTRY ADDRESS        ZERO        0120
0122      *                                                                          0122
0124      *                    IECPCNVT -ENTRY TO ROUTINE VIA A BALR THAT CONVERTS A 0124
0126      *                              RELATIVE DIRECT ACCESS ADDRESS AND          0126
0128      *                              CONCATENATION NUMBER, TTRN, INTO ITS ABSOLUTE 0128
0130      *                              EQUIVALENT, MBBCCHHR. REGISTER CONVENTIONS  0130
0132      *                              UPON ENTRY AND UPON EXIT ARE AS FOLLOWS--   0132
0134      *                                                                          0134
0136      *                                 REGISTER        ENTRY          EXIT     0136
0138      *                                    0          ACTUAL TTRN       DESTROYED 0138
0140      *                                    1          DEB ADDRESS       TRANSPARENT 0140
0142      *                                    2          ADDRESS OF 8 BYTE TRANSPARENT 0142
0144      *                                                 AREA FOR MBBCCHHR        0144
0146      *                                    3-8        IGNORED           TRANSPARENT 0146
0148      *                                    9-13       IGNORED           DESTROYED 0148
0150      *                                    14         RETURN ADDRESS    TRANSPARENT 0150
0152      *                                    15         ENTRY ADDRESS     ERROR CODE 0152
0154      *                                                                          0154
0156      *                              THE ERROR CODE FOR IECPCNVT WILL BE 0 FOR   0156
0158      *                              SUCCESSFUL CONVERSION, OR 4 IF VALUE OF TT  0158
0160      *                              EXCEEDS TOTAL EXTENTS ASSIGNED.             0160
0162      *                                                                          0162
0164      *INPUT  -INPUTS TO IGC018 ARE AS DESCRIBED UNDER 'FIND' AND 'BLDL'       0164
0166      *        MACROS IN CONTROL PROGRAM SERVICES MANUAL.                        0166
0168      *                                                                          0168
0170      *       -INPUT TO IECPBLDL IS AS DESCRIBED ABOVE UNDER ENTRY POINTS.       0170
0172      *        THE BLDL LIST HAS THE SAME FORMAT AS WHEN EXECUTING THE MACRO     0172
0174      *        WITH THE FOLLOWING ADDITION-- IF THE NUMBER OF FIELDS, FF, IS     0174
0176      *        ZERO, IT REALLY MEANS ONE FIELD BUT THAT BLDL'S SEARCH IS TO      0176
0178      *        START AT BLOCK IDENTIFIED BY TTRO IMMEDIATELY FOLLOWING NAME      0178
0180      *        IN LIST.                                                          0180
0182      *                                                                          0182
0184      *       -INPUTS TO IECPRLTV AND IECPCNVT ARE DESCRIBED ABOVE UNDER         0184
0186      *        ENTRY POINTS.                                                     0186
0188      *OUTPUT -OUTPUTS FROM IGC018 ARE AS DESCRIBED UNDER 'FIND' AND 'BLDL'     0188
0190      *        MACROS IN CONTROL PROGRAM SERVICES MANUAL.                        0190
0192      *                                                                          0192
0194      *       -OUTPUT FROM IECPBLDL IS THE SAME AS FOR IGC018 ENTERED VIA        0194
0196      *        BLDL MACRO, WITH THE ADDITION THAT THE LAST DIRECTORY OR          0196
0198      *        CATALOG BLOCK READ BY BLDL, ITS CCHHR, AND THE IOB AND CHANNEL    0198
0200      *        PROGRAM USED TO READ IT APPEAR IN THE 400 BYTE WORKAREA           0200
0202      *        DESCRIBED LATER IN THIS LISTING BY THE DSECT LABELED WORKAREA.    0202
0204      *                                                                          0204
0206      *       -OUTPUTS FROM IECPRLTV AND IECPCNVT ARE AS DESCRIBED ABOVE         0206
0208      *        UNDER ENTRY POINTS.                                               0208
```

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0210      *                                                                      0210
0212      *EXTERNAL ROUTINES -GETMAIN       -USED TO GET WORKAREA.              0212
0214      *                   FREEMAIN      -USED TO FREE WORKAREA.             0214
0216      *                   EXCP          -USED TO START CHANNEL PROGRAM FOR  0216
0218      *                                  DIRECTORY SEARCH.                   0218
0220      *                   WAIT          -USED TO WAIT FOR CHANNEL PROGRAM TO 0220
0222      *                                  COMPLETE.                           0222
0224      *EXITS  -EXITING CONDITIONS ARE DESCRIBED UNDER 'FIND' AND 'BLDL'      0224
0226      *        MACROS IN CONTROL PROGRAM SERVICES MANUAL.                    0226
0228      *                                                                      0228
0230      *TABLES AND WORKAREAS ARE DESCRIBED BY DSECTS LATER IN LISTING.        0230
0232      *                                                                      0232
0234      *ATTRIBUTES-   REENTRANT, PRIVILEGED, ENABLED                         0234
0236      *                                                                      0236
0238      *                                                                      0238
0240      *                                                                      0240
0242      *                                                                      0242
0244      *WORK AREA DEFINITION                                                 0244
0246      WORKAREA DSECT                                                       0246
0248      FIRST    DS    0D                                                    0248
0250      RDAREA   DS    64F                  256 BYTE READIN AREA             0250
0252      NEWCNT   DS    2F                                                    0252
0254      CCW      DS    0D                                                    0254
0256      CCW1     DS    D                                                     0256
0258      CCW2     DS    D                                                     0258
0260      CCW3     DS    D                                                     0260
0262      CCW4     DS    D                                                     0262
0264      CCW5     DS    D                                                     0264
0266      CCW6     DS    D                                                     0266
0268      ECB      DS    F                                                     0268
0270      IOB      DS    8F                                                    0270
0272      MBB      DS    C'MBB'                                                0272
0274      CCHHR    DS    C'CCHHR'                                              0274
0276      ERCODE   DS    F                                                     0276
0278      FNDLST1  DS    F                                                     0278
0280      FNDLST2  DS    CL8                                                   0280
0282      FNDLST3  DS    F                                                     0282
0284      LAST     DS    0D                                                    0284
0286      *                                                                    0286
0288      *EQUATE STATEMENTS                                                   0288
0290      ******                                                               0290
0292      EXIT     EQU   3                                                    0292
0294      *CONTROL BLOCK EQUATES                                               0294
0296      TCBJLB   EQU   40                                                   0296
0298      UCBDVTYP EQU   19                   LOW ORDER BYTE OF DEVICE TYPE   0298
0300      DVTHH    EQU   2                                                    0300
0302      ******                                                               0302
0304      *        REGISTERS--                                                 0304
0306      RGADDR   EQU   0                                                    0306
0308      RGDCB    EQU   1                                                    0308
0310      RGA      EQU   2                                                    0310
0312      RGB      EQU   3                                                    0312
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0314       RGC      EQU   4                                                  0314
0316       RGD      EQU   5                                                  0316
0318       RGE      EQU   6                                                  0318
0320       RGF      EQU   7                                                  0320
0322       RGG      EQU   8                                                  0322
0324       RGH      EQU   9                                                  0324
0326       RGI      EQU   10                                                 0326
0328       RGJ      EQU   11                                                 0328
0330       RGK      EQU   12                                                 0330
0332       RGAREA   EQU   13                                                 0332
0334       RGRET    EQU   14                                                 0334
0336       RGBASE   EQU   15                                                 0336
0338       *                                                                 0338
0340       *CONVERT ROUTINES REGISTERS--                                     0340
0342       RGTTR    EQU   0                                                  0342
0344       RGDEB    EQU   1                                                  0344
0346       RGMBB    EQU   2                                                  0346
0348       RGV      EQU   9                                                  0348
0350       RGW      EQU   10                                                 0350
0352       RGX      EQU   11                                                 0352
0354       RGY      EQU   12                                                 0354
0356       RGZ      EQU   13                                                 0356
0358       *                                                                 0358
0360       *THE FOLLOWING EQUATES ARE FOR REGISTERS WITH WELL DEFINED ABSOLUTE 0360
0362       *USAGE, AND FOR TEMPORARY WORK REGISTERS--                         0362
0364       R0       EQU   0                                                  0364
0366       R1       EQU   1                                                  0366
0368       R2       EQU   2                                                  0368
0370       R3       EQU   3                                                  0370
0372       R4       EQU   4                                                  0372
0374       R5       EQU   5                                                  0374
0376       R6       EQU   6                                                  0376
0378       R7       EQU   7                                                  0378
0380       R8       EQU   8                                                  0380
0382       R9       EQU   9                                                  0382
0384       R10      EQU   10                                                 0384
0386       R11      EQU   11                                                 0386
0388       R12      EQU   12                                                 0388
0390       R13      EQU   13                                                 0390
0392       R14      EQU   14                                                 0392
0394       R15      EQU   15                                                 0394
0396       *                                                                 0396
0398       *DCB DEFINITION--                                                 0398
0400       IHADCB   DSECT                                                    0400
0402                DS    44X                                                0402
0404       DCBDEBAD DS    F                                                  0404
0406                DS    36X                                                0406
0408       DCBPOINT DS    F                                                  0408
0410       *                                                                 0410
0412       *DEB DEFINITION--                                                 0412
0414       IHADEB   DSECT                                                    0414
0416                DS    F                                                  0416
```

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0418  DEBAMIND DS    X                                                  0418
0420           DS    11X                                                0420
0422  DEBNMEXT DS    X                                                  0422
0424           DS    15X                                                0424
0426  DEBDVMOD DS    F                                                  0426
0428  DEBBINUM DS    H                                                  0428
0430  DEBSTRCC DS    H                                                  0430
0432  DEBSTRHH DS    H                                                  0432
0434  DEBENDCC DS    H                                                  0434
0436  DEBENDHH DS    H                                                  0436
0438  DEBNMTRK DS    H                                                  0438
0440  *****                                                             0440
0442  IGC018   CSECT                                                    0442
0444           ENTRY SVC018                                             0444
0446  SVC018   EQU *                                                   0446
0448           BALR  RGK,0                                              04484/29
0450           USING BASE1,RGK                                          04504/29
0452  BASE1    SSM   G+1                ENABLE INTERRUPTS               04524/29
0454           LR    RGA,RGADDR                                         04544/29
0456           LR    RGB,RGDCB          TEMP STORE                      0456
0458           LA    R0,LAST-FIRST      SP=0, NO.OF BYTES               0458
0460           GETMAIN R,LV=(0)                                         0460/2
0462           LR    RGAREA,R1                                          0462/2
0464           USING WORKAREA,RGAREA                                    0464
0466           LTR   RGDCB,RGB                                          0466
0468           BC    10,A2              Q. BLDL                         0468
0470           LCR   RGDCB,RGDCB                                        0470
0472           MVC   FNDLST1,DC1        INIT BLDL LIST FOR FIND         0472
0474           MVC   FNDLST2,0(RGA)     MOVE NAME                       0474
0476           LA    RGADDR,FNDLST1                                     0476
0478           BAL   RGRET,IECPBLDL     EXEC BLDL                       0478
0480           DROP  RGK                                                04804/29
0482           USING BASE2,RGRET                                        0482
0484  BASE2    LTR   R15,R15                                            0484
0486           BP    A1                 Q. ERROR ON BLDL                0486
0488           LR    R1,RGJ                                             0488
0490           USING IHADCB,RGJ                                         0490
0492           MVC   IHADCB(4),FNDLST3  MOVE TO RELAD                   0492
0494           LR    R0,R1              POINT TO RELAD                  0494
0496           L     R15,DCBPOINT       USE POINT ROUTINE               0496
0498           BAL   R14,4(R15)                                         0498
0500           SR    R15,R15            SET NO ERROR                    0500
0502  A1       LR    RGA,R15            SAVE ERROR CODE                 0502
0504           LA    R0,LAST-FIRST      FREEMAIN BYTES                  0504
0506           FREEMAIN R,LV=(0),A=(RGAREA)                             0506/2
0508           LR    R15,RGA            RESTORE ERROR CODE              0508
0510           SVC   EXIT                                               0510
0512  *                                                                 0512
0514           DROP  RGRET                                              0514
0516           USING BASE1,RGK                                          05164/29
0518  A2       LA    RGRET,A1           RETURN TO A1                    0518
0520           LR    RGADDR,RGA         RESTORE LIST ADDRESS            0520
```

```
0522     *                                                                      0522
0524              ENTRY IECPBLDL       THIS ENTRY POINT FOR BLDL TO BYPASS SVC  0524
0526     IECPBLDL BALR  RGBASE,0                                                0526
0528              USING BASE3,RGBASE                                           0528
0530     BASE3    SR    RGA,RGA                                                 0530
0532              ST    RGA,ERCODE          ERCODE, C.N., Z TO ZERO             0532
0534              LTR   RGJ,RGDCB           RGJ HAS DCB ADDR                    0534
0536              BP    BBBB1               Q. NOT LINKLIB OPTION               0536
0538              MVI   ERCODE+3,2          Z=2 INDICATES JOBLIB                0538
0540              L     R2,FINDTCBP         ADDR OF TCB POINTER                 0540
0542              L     R2,4(R2)            TCB ADDR                            0542/5
0544              L     RGJ,TCBJLB(R2)      JOBLIB DCB ADDR                     0544
0546              LTR   RGJ,RGJ                                                 0546
0548              BP    BBBB1               Q. JOBLIB ASSIGNED TO THIS TASK     0548
0550              L     RGJ,FINDLINK        LINKLIB DCB ADDR                    0550
0552              MVI   ERCODE+3,1          Z=1 INDICATES LINKLIB               0552
0554     BBBB1    LR    RGK,RGADDR          RGK POINTS TO FELL                  0554
0556              STM   6,11,RDAREA         TEMP SAVE                           0556
0558              LM    R0,R11,CHANPROG     MOVE AND RELOCATE CHAN PROG         0558
0560              ALR   R0,RGAREA                                               0560
0562              ALR   R2,RGAREA                                               0562
0564              AR    R4,RGAREA                                               0564
0566              AR    R8,RGAREA                                               0566
0568              AR    R10,RGAREA                                              0568
0570              STM   R0,R11,CCW                                              0570
0572              SR    R0,R0                 ZERO ECB                        0572
0574              LA    R2,ECB              MOVE AND RELOCATE IOB               0574
0576              LA    R5,CCW                                                  0576
0578              SR    R8,R8               ZERO BLK INCR FIELD                 0578
0580              STM   R0,R8,ECB           ECB AND IOB TO WORKAREA             0580
0582              MVI   IOB,X'02'           SET NON-RELATED FLAG                0582
0584              LM    6,11,RDAREA         RESTORE REGS                        0584
0586              LA    RGF,4(RGK)          SET TO FIRST ENTRY                  0586
0588              AH    0,0(RGK)            PICKUP NO. OF FIELDS                0588
0590              BZ    H                   Q. TTR START SUPPLIED               0590
0592              LR    RGA,RGK             INIT USERS LIST                     0592
0594     BBB1     MVI   14(RGA),0           ZERO R FIELD                        0594
0596              AH    RGA,2(RGK)          GO TO NEXT FIELD IN LIST            0596
0598              BCT   0,BBB1              Q. ANOTHER FIELD                    0598
0600              LH    RGG,0(RGK)          GET NO. OF ENTRIES                  0600
0602     BB1      SR    0,0                 SET TTR START TO 000                0602
0604     BB1A     IC    0,ERCODE+2          INSERT C.N.                         0604/5
0606              USING IHADCB,RGJ                                              0606
0608     BB2      L     1,DCBDEBAD                                              0608
0610              LA    2,MBB               FOR RESULT MBBCCHHR                 0610
0612              LR    3,RGAREA                                                0612
0614              STM   11,15,RDAREA        SAVE VOLATILE REGISTERS             0614
0616              LA    15,IECPCNVT         USE TTR CONVERT ROUTINE             0616
0618              BALR  14,15                                                   0618
0620              LM    11,15,RDAREA-FIRST(3) RESTORE VOLATILE REGISTERS        0620
0622              LR    RGH,RGF             POINT TO FIRST EMPTY ENTRY          0622
0624              LR    RGI,RGG             NO. OF ENTRIES REMAINING            0624
```

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0626                ST    RGJ,IOB+20          DCB ADDR INTO IOB                0626
0628                A     RGH,SKEH            SEARCH CCW OP                    0628
0630      B1        ST    RGH,CCW4            INIT SEARCH                      0630
0632                LR    2,15                SAVE BASE                        0632/2
0634                EXCP  IOB                                                  0634/2
0636                DROP  RGBASE                                               0636
0638                USING BASE3,2                                              0638
0640                L     15,PDVCON                                            0640
0642                TM    1(15),X'F0'         TEST PSEUDO-DISABLE BYTE         0642
0644                BO    WAITLOOP            Q. P-D MODE, BYPASS WAIT         0644
0646                WAIT  1,ECB=ECB                                            0646
0648      WAITLOOP  TM    ECB,X'60'           CHECK COMPLETE AND ERROR BITS    0648
0650                BZ    WAITLOOP            Q. NOT YET COMPLETE              0650
0652                LA    R15,8               ERROR CODE IN CASE I/O ERROR     0652
0654                BCR   4,RGRET             Q. PERM. I/O ERROR               0654
0656                LR    R15,R2              RESTORE BASE                     0656
0658                DROP  R2                                                   0658
0660                USING BASE3,RGBASE                                         0660
0662      *SCAN DIRECTORY BLOCK                                                0662
0664                LR    R3,RGAREA                                            0664
0666                BCTR  R3,0                                                 0666
0668                AH    R3,RDAREA              SET END ADDR-1                0668
0670                LA    R1,RDAREA+2            SET START ADDR                0670
0672                LA    R0,31               SET MASK FOR C BYTE              0672
0674      C         CLC   0(8,R1),0(RGH)      COMPARE NAMES                    0674
0676                BE    D                      Q. FOUND                    0676
0678                BH    G             Q. NOT IN THIS DIRECTORY SECTION     0678
0680                IC    R2,11(R1)              GET USERS FIELD LENGTH       0680
0682                NR    R2,R0               MASK 3 H.O. BITS                0682
0684                LA    R2,12(R2,R2)        ENTIRE ENTRY LENGTH IN 2         0684
0686                BXLE  R1,R2,C                Q. MORE ENTRIES IN BLOCK     0686
0688                MVC   CCHHR,NEWCNT        SET NEW START                    0688
0690                B     B1                                                   0690
0692      *                                                                    0692
0694      D         MVC   8(3,RGH),8(1)       MOVE TTR                         0694
0696                IC    4,11(1)             GET C FROM DIRECTORY             0696
0698                NR    R4,R0               MASK 3 H.O. BITS                 0698
0700                LH    R5,2(RGK)           GET USERS LL                     0700
0702                SH    R5,C14                                               0702
0704                BM    E1                  Q. LL LESS THAN 14               0704
0706                BXLE  R4,R4,E                                              0706
0708                LR    R4,R5               USE REG 4                        0708
0710      E         EX    R4,MOVE             MOVE INTO USERS LIST             0710
0712                MVC   12(1,RGH),ERCODE+3  GET Z                            0712
0714      E1        IC    R4,ERCODE+2         GET C.N.                         0714
0716                STC   R4,11(RGH)          C.N. INTO USERS LIST             0716
0718      F         BCT   RGI,F2              Q. ANOTHER LIST ENTRY            0718
0720      F1        LR    RGI,R15             SAVE BASE                        0720
0722                DROP  RGBASE                                               0722
0724                USING BASE3,RGI                                            0724
0726                LH    R15,ERCODE                                           0726
0728                LTR   R15,R15                                              0728
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0730                BCR   8,RGRET                 Q. IF NO ERROR, RETURN          0730
0732                L     RGA,DCBDEBAD                                            0732
0734                USING IHADEB,RGA                                              0734
0736                CLC   DEBAMIND,ERCODE+2       CHECK C.N.                      0736
0738                DROP  RGA                                                     0738
0740                BH    FF1                    Q. MORE DATA SETS IN CNCTNTN    0740
0742                CLI   ERCODE+3,2              TEST WHICH DCB                  0742
0744                BCR   6,RGRET                 Q. NOT JOBLIB, RETURN           0744
0746                LA    R4,255                  FORCE C.N. TO ZERO WHEN INCR    0746
0748                MVI   ERCODE+3,1              Z=1 INDICATES LINKLIB           0748
0750                L     RGJ,FINDLINK            LINKLIB DCB ADDR                0750
0752    FF1         LA    R4,1(R4)                INCREMENT C.N.                  0752
0754                STC   R4,ERCODE+2                                             0754
0756                MVI   ERCODE+1,0              ZERO ERROR CODE                 0756
0758                LR    R15,RGI                                                 0758
0760                DROP  RGI                                                     0760
0762                USING BASEB,RGBASE                                            0762
0764                B     BB1                                                     0764
0766    F2          AH    RGH,2(RGK)              GO TO NEXT ENTRY                0766
0768                CLI   10(RGH),0               FIND NEXT ZERO R                0768
0770                BE    C                       Q. EMPTY ENTRY                  0770
0772                B     F       GO SEE IF ANOTHER EMPTY ENTRY                   0772
0774    *                                                                         0774
0776    G           CLI   0(R1),X'FF'             CHECK FOR CONTINUATION POINTER  0776
0778                BL    G1                      Q. NOT HIGH NAME                0778
0780                CLC   1(7,R1),0(R1)           MAKE SURE                       0780
0782                BL    G1                      Q. REALLY NOT HIGH NAME         0782
0784    GG1         MVC   ENDLST3,8(R1)           GET TTRO ON WORD BOUNDARY       0784
0786                L     R0,ENDLST3                                              0786/2
0788                SH    R0,H256                 DECREMENT R BY 1                0788
0790                BC    10,BB1A                 Q. CONTINUATION POINTER         0790
0792    G1          CLI   ERCODE+1,4                                              0792
0794                BE    E1                     Q. PREVIOUS ERROR               0794
0796                LA    RGF,0(RGH)  POINT TO FIRST EMPTY ENTRY, ZERO H.O. BYTE  0796
0798                LR    RGG,RGI                 NO. OF ENTRIES REMAINING        0798
0800                MVI   ERCODE+1,4              SET ERROR CODE 4                0800
0802                B     E1                                                      0802
0804    *                                                                         0804
0806    H           LA    RGG,R1                  SET FOR ONE ENTRY               0806
0808                LR    R1,RGF                  MAKE MOVE AT GG1 WORK           0808
0810                B     GG1                                                     0810
0812    *                                                                         0812
0814    *           CONSTANTS                                                     0814
0816    MOVE        MVC   13(1,RGH),11(R1)        BLDL MOVE                       0816
0818    DC1         DC    H'1'                                                    0818
0820                DC    H'12'                   MUST IMMEDIATELY FOLLOW DC1     0820
0822    C14         DC    H'14'                                                   0822
0824    PDVCON      DC    V(IEA0I002)                                             0824
0826    FINDTCBP    DC    V(IEATCBP)                                              0826
0828    FINDLINK    DC    V(IEFLINK)                                              0828
0830    *                                                                         0830
0832    *CHANNEL PROGRAM---                                                       0832/2
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0834        *                                                                   0834
0836        CHANPROG DS    OF                                                   0836
0838        *CCW1                                                               0838
0840                 DC    X'31'                    SEARCH ID EQUAL           0840
0842                 DC    AL3(0+CCHHR-FIRST)                                 0842
0844                 DC    X'4000'                  COMMAND CHAIN             0844
0846                 DC    H'5'                     COUNT                     0846
0848        *CCW2                                                               0848
0850                 DC    X'08'                    TIC                       0850
0852                 DC    AL3(0+CCW1-FIRST)                                  0852
0854                 DC    F'0'                                               0854
0856        *CCW3                                                               0856
0858                 DC    X'92'                 RD COUNT, M/T                0858
0860                 DC    AL3(NEWCNT-FIRST)                                  0860
0862                 DC    X'4000'                                            0862
0864                 DC    H'8'                                               0864
0866        *CCW4                                                               0866
0868        SKEH     DC    X'69'                 SEARCH EQ HI KEY             0868
0870                 DC    AL3(0)                                             0870
0872                 DC    X'4000'                  COMMAND CHAIN             0872
0874                 DC    H'8'                     COUNT                     0874
0876        *CCW5                                                               0876
0878                 DC    X'08'                    TIC                       0878
0880                 DC    AL3(0+CCW3-FIRST)                                  0880
0882                 DC    F'0'                                               0882
0884        *CCW6                                                               0884
0886                 DC    X'06'                    READ DATA                 0886
0888                 DC    AL3(0+RDAREA-FIRST)                                0888
0890                 DC    H'0'                                               0890
0892        H256     DC    H'256'                                             0892
0894        *                                                                   0894
0896        *                                                                   0896
0898        *                                                                   0898
0900        ********************************************************************* 0900
0902        *                                                                   0902
0904        *IECPRLTV-- MBBCCHHR TO TTR0 CONVERT ROUTINE                        0904
0906        *REGISTER CONVENTION--                                              0906
0908        *         0     CONTAINS RESULT TTR0                                0908
0910        *         1     ADDRESS OF DEB                                      0910
0912        *         2     ADDRESS OF MBBCCHHR INPUT                           0912
0914        *         3-8   TRANSPARENT                                         0914
0916        *         9-13  VOLATILE                                            0916
0918        *         14    RETURN ADDRESS                                      0918
0920        *         15    ENTRY ADDRESS-- USED FOR BASE                       0920
0922        *                                                                   0922
0924                 ENTRY IECPRLTV                                             0924
0926                 USING IECPRLTV,R15                                         0926
0928        IECPRLTV SR    RGTTR,RGTTR                                         0928
0930                 LR    RGZ,RGDEB                                           0930
0932                 USING IHADEB,RGZ                                          0932
0934                 SR    RGY,RGY                                             0934
0936                 IC    RGY,0(RGMBB)              PICKUP M                  0936
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0938                LTR   RGY,RGY                                          0938
0940                BZ    RLTVB                 Q. IS M ZERO             0940
0942      RLTVA     AH    RGTTR,DEBNMTRK        NO. OF TRKS IN EXT       0942
0944                LA    RGZ,16(RGZ)           GO TO NEXT EXTENT        0944
0946                BCT   RGY,RLTVA             Q. ANY MORE EXTENTS      0946
0948      RLTVB     BAL   RGW,CNVTDVC           PICKUP DEVICE CONSTANT   0948
0950                SR    RGW,RGW                                        0950
0952                IC    RGW,4(RGMBB)          GET ACTUAL C             0952
0954                SH    RGW,DEBSTRCC          MINUS START CC           0954
0956                MH    RGW,DVTHH(RGX,RGY)    TIMES TRKS/CYL           0956
0958                SR    RGX,RGX                                        0958
0960                IC    RGX,6(RGMBB)          GET ACTUAL H             0960
0962                AR    RGW,RGX               PLUS TRKS IN CC          0962
0964                SH    RGW,DEBSTRHH          MINUS START HH           0964
0966                AR    RGTTR,RGW             DEVELOP TOTAL TT         0966
0968                SLL   RGTTR,8                                        0968
0970                IC    RGTTR,7(RGMBB)        PICKUP R                 0970
0972                SLL   RGTTR,8                                        0972
0974                SR    R15,R15                                        0974
0976                BR    R14                   RETURN                   0976
0978      ********************************************************************0978
0980      *                                                                0980
0982      *IECPCNVT--- TTRN TO MBBCCHHR CONVERT ROUTINE                    0982
0984      *                                                                0984
0986      *THIS ROUTINE WILL CONVERT RELATIVE TRACK TT TO  ABSOLUTE TRACK MBBCCHH 0986
0988      *REGISTER CONVENTION--                                          0988
0990      *         0     CONTAINS TTRN, WHERE N IS CONCATENATION NO.     0990
0992      *         1     ADDRESS OF DEB                                 0992
0994      *         2     ADDRESS OF 8 BYTE FIELD FOR RESULT MBBCCHHR    0994
0996      *         3-8   TRANSPARENT                                    0996
0998      *         9-13  VOLATILE                                       0998
1000      *         14    RETURN ADDRESS                                 1000
1002      *         15    ENTRY ADDRESS-- USED FOR BASE                  1002
1004      *                                                              1004
1006                ENTRY IECPCNVT                                       1006
1008                USING IHADEB,RGDEB                                   1008
1010                USING IECPCNVT,R15                                   1010
1012      IECPCNVT  SR    RGV,RGV                                        1012
1014                DROP  RGZ                                            1014
1016                IC    RGV,DEBNMEXT          NUMBER OF EXTENTS        1016
1018                LR    RGW,RGV               USE FOR LIMIT            1018
1020                LA    RGZ,X'FF'             MASK                     1020
1022                NR    RGZ,RGTTR             CONCATENATION NUMBER (N) 1022
1024                BZ    CNVTA                 Q. N IS ZERO             1024
1026                LR    RGY,RGV               NUMBER OF EXTENTS        1026
1028                SLL   RGY,4                 TIMES 16                 1028
1030                AR    RGY,RGZ               ADD N                    1030
1032                IC    RGZ,DEBDVMOD-1(RGY)   FIRST M OF DATA SET N    1032
1034                SR    RGW,RGZ               ADJUST LIMIT             1034
1036                SLL   RGZ,4                 TIMES 16                 1036
1038      CNVTA     AR    RGZ,RGDEB             ADJUST DEB PTR           1038
1040                DROP  RGDEB                                          1040
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1042                    USING IHADEB,RGZ                                        1042
1044                    SRL   RGTTR,8                                           1044
1046                    STC   RGTTR,7(RGMBB)          SAVE R                    1046
1048                    SRL   RGTTR,8                 DEVELOP TT                1048
1050          CNVTB     SH    RGTTR,DEBNMTRK          DECREASE BY TRKS IN EXTENT 1050
1052                    BM    CNVTC                   Q. PROPER EXTENT          1052
1054                    LA    RGZ,16(RGZ)             GO TO NEXT EXTENT         1054
1056                    BCT   RGW,CNVTB               Q. STILL WITHIN DEB       1056
1058                    LA    R15,4                   SET ERROR CODE            1058
1060                    BR    R14                     RETURN                    1060
1062          CNVTC     SR    R15,R15                 INDICATE NO ERROR         1062
1064                    DROP  R15                                               1064
1066                    SR    RGV,RGW                 DEVELOP M                 1066
1068                    AH    RGTTR,DEBNMTRK          ADD BACK OVERDRAW         1068
1070                    STC   RGV,0(RGMBB)            STORE M                   1070
1072                    MVC   1(6,RGMBB),DEBBINUM     MOVE BBCCHH FROM DEB      1072
1074                    BCR   8,R14                   Q. DIVIDE UNNECESSARY     1074
1076                    LA    RGW,1                   FORCE RGW TO ZERO ON BCTR 1076
1078          *PICKUP LOCATION OF APPROPRIATE DEVICE CONSTANTS                  1078
1080          CNVTDVC   L     RGX,DEBDVMOD            UCB ADDR                  1080
1082                    IC    RGX,UCBDVTYP(RGX)       GET DEVICE TYPE CODE      1082
1084                    LA    RGY,15                  MASK                      1084
1086                    NR    RGX,RGY                 LEAVE ONLY 4 L.O. BITS    1086
1088                    BALR  RGY,0             ESTABLISH BASE                  1088
1090                    USING *,RGY                                             1090
1092                    L     RGY,CNVTDTAB            DEVICE TBLE ADDR          1092
1094                    IC    RGX,0(RGX,RGY)          DISPLACEMENT FOR DEVICE   1094
1096                    BCTR  RGW,RGW                 Q. RETURN TO RLTV ROUTINE 1096
1098                    LH    RGV,DVTHH(RGX,RGY)      TRKS/CYL                  1098
1100                    LR    RGX,RGTTR               DIVIDE REG                1100
1102                    AH    RGX,DEBSTRHH            STARTING HH               1102
1104                    DR    RGW,RGV                 QUO=CYLS, REM=TRKS        1104
1106                    STC   RGW,6(RGMBB)            STORE H                   1106
1108                    AH    RGX,DEBSTRCC            PLUS CC START             1108
1110                    STC   RGX,4(RGMBB)            STORE C                   1110
1112                    BR    R14                     RETURN                    1112
1114          *                                                                 1114
1116          CNVTDTAB  DC    V(IECZDTAB)             DEVICE ATTRIBUTES TABLE   1116
1118                    END                                                     1118

$LIST,IGC0002A-S
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Appendix 28

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0002          TITLE 'IGC0002A- BPAM STOW ROUTINE'                                0002
0004         *FUNCTION/OPERATION- THE STOW FUNCTION MAINTAINS BPAM DIRECTORIES. IT * 0004
0006         *      PERFORMS FOUR FUNCTIONS- ADDS, REPLACES, CHANGES NAME OF, OR   * 0006
0008         *      DELETES ENTRIES. IN ADDITION, IF THE FUNCTION IS ADD OR REPLACE* 0008
0010         *      AND CERTAIN OTHER CONDITIONS ARE MET, AN EOD MARK WILL BE      * 0010
0012         *      WRITTEN IN THE USERS DATA AREA. THE DIRECTORY IS MAINTAINED IN * 0012
0014         *      SEQUENTIAL ORDER OF THE BINARY VALUE OF THE NAMES OF THE       * 0014
0016         *      MEMBERS. THREE BUFFERS ARE USED AND ROTATED BETWEEN USE AS     * 0016
0018         *      INPUT AND OUTPUT.                                              * 0018
0020         *                                                                     * 0020
0022         *ENTRY POINTS- THE ENTRY TO THIS ROUTINE IS VIA SVC 21 ONLY.         * 0022
0024         *                                                                     * 0024
0026         *INPUT- THE NAME OF THE MEMBER UPON WHICH ACTION IS DESIRED MUST BE  * 0026
0028         *      SUPPLIED. IN ADDITION, MORE INFORMATION IS REQUIRED FOR SOME OF* 0028
0030         *      THE FUNCTIONS AS FOLLOWS-                                      * 0030
0032         *             ADD AND REPLACE      ANY USER DATA AS REQUIRED         * 0032
0034         *               ALIAS BIT ON       BEGINNING TTR OF MEMBER           * 0034
0036         *             CHANGE NAME          THE NEW NAME TO BE GIVEN THE MEMBER* 0036
0038         *             DELETE               NO OTHER INFORMATION IS REQUIRED  * 0038
0040         *      THE ADDRESS OF THIS DATA IS SUPPLIED IN REGISTER 0. THE ADDRESS* 0040
0042         *      OF THE DCB TO BE USED BY STOW IS FURNISHED IN REGISTER 1. EACH * 0042
0044         *      OF THE FOUR FUNCTIONS IS INDICATED BY A UNIQUE COMBINATION OF  * 0044
0046         *      SIGNS OF REGISTERS 0 AND 1 AS FOLLOWS-                         * 0046
0048         *              REG0  REG1     FUNCTION                               * 0048
0050         *               +     +       ADD                                    * 0050
0052         *               +     -       REPLACE                                * 0052
0054         *               -     +       DELETE                                 * 0054
0056         *               -     -       CHANGE NAME                            * 0056
0058         *                                                                     * 0058
0060         *OUTPUT- FOR ADD OR REPLACE WITHOUT ALIAS OPTION, THE BEGINNING      * 0060
0062         *      RELATIVE (TTR) ADDRESS OF THE MEMBER STOWED IS RETURNED WITHIN * 0062
0064         *      THE ENTRY SUPPLIED TO STOW.                                    * 0064
0066         *                                                                     * 0066
0068         *EXTERNAL ROUTINES- THE BSAM/QSAM END-OF-BLOCK ROUTINE IS USED TO    * 0068
0070         *      WRITE AN END-OF-DATA MARK AT THE END OF THE MEMBER BEING STOWED* 0070
0072         *      IF REQUIRED. EXCP AND WAIT ARE USED TO PERFORM I/O OPERATIONS, * 0072
0074         *      AND GETMAIN AND FREEMAIN ARE USED TO GET AND FREE WORK AREAS.  * 0074
0076         *                                                                     * 0076
0078         *EXITS-NORMAL- NORMAL EXIT IS AN SVC 3 RETURN TO USER WITH A ZERO    * 0078
0080         *      ERROR CODE IN REGISTER 15.                                     * 0080
0082         *     -ERROR- ERROR RETURN IS AGAIN AN SVC 3 WITH REGISTER 15 SET TO  * 0082
0084         *      INDICATE ERRORS AS FOLLOWS-                                    * 0084
0086         *                  CODE          CONDITION                            * 0086
0088         *                   4             FOR ADD OR CHANGE NAME, THE NAME  * 0088
0090         *                                  IS ALREADY IN THE DIRECTORY.      * 0090
0092         *                   8             FOR DELETE OR REPLACE, THE NAME IS* 0092
0094         *                                  NOT IN THE DIRECTORY. (NOTE. IF   * 0094
0096         *                                  REPLACE, THE ITEM WILL BE ADDED,  * 0096
0098         *                                  AND THE ERROR NOTED.)             * 0098
0100         *                  12             NO SPACE IS LEFT IN THE DIRECTORY * 0100
0102         *                  16             A PERMANENT I/O ERROR HAS BEEN    * 0102
0104         *                                  DETECTED.                         * 0104
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0106      *                                                                 * 0106
0108      *TABLES/WORK AREAS- A WORK AREA OF 1056 BYTES IS USED BY STOW. THIS * 0108
0110      *       AREA IS DYNAMICALLY OBTAINED USING GETMAIN, AND WILL CONTAIN * 0110
0112      *       THREE 272 BYTE BUFFERS FOR I/O USE.                       * 0112
0114      *ATTRIBUTES- READ ONLY, REENTRANT, SUPERVISOR FUNCTION             * 0114
0116      *                                                                   0116
0118      *WORKAREA DEFINITION--                                             0118
0120      AREA     DSECT                                                    0120
0122      CCW1     DS    5D                                                 0122
0124      CCW2     DS    3D                                                 0124
0126      ECB      DS    F                                                  0126
0128      IOB      DS    8F                                                 0128
0130      MBB      DS    C'MBBR'                                            0130
0132      CCHHR    DS    C'CCHHR'                                           0132
0134      BUFF1    DS    136H                                               0134
0136      BUFF2    DS    136H                                               0136
0138      BUFF3    DS    136H                                               0138
0140      TEMPSAVE DS    12F                                                0140
0142      PARAM    DS    F                                                  0142
0144      NEWNAME  DS    37H                                                0144
0146      FUNCT    DS    H                                                  01464/29
0148      AREAEND  DS    0D                                                 0148
0150      *                                                                 0150
0152      *REGISTER EQUATES--                                               0152
0154      WORK1    EQU   1                                                  0154
0156      WORK2    EQU   2                                                  0156
0158      COUNT    EQU   3                                                  0158
0160      EXIT     EQU   3                                                  0160
0162      POINT    EQU   4                                                  0162
0164      LENGTH   EQU   5                                                  0164
0166      LAST     EQU   6                                                  0166
0168      NEXT     EQU   7                                                  0168
0170      OUT      EQU   8                                                  0170
0172      STOWED   EQU   9                                                  0172
0174      DCB      EQU   10                                                 0174
0176      ENTRY    EQU   11                                                 0176
0178      RGBASE   EQU   12                                                 0178
0180      RGAREA   EQU   13                                                 0180
0182      RGRET    EQU   14                                                 0182
0184      RGERCD   EQU   15                                                 0184
0186      *                                                                 0186
0188      *THE FOLLOWING EQUATES ARE FOR REGISTERS WITH WELL DEFINED ABSOLUTE 0188
0190      *USAGE, AND FOR TEMPORARY WORK REGISTERS--                         0190
0192      R0       EQU   0                                                  0192
0194      R1       EQU   1                                                  0194
0196      R2       EQU   2                                                  0196
0198      R3       EQU   3                                                  0198
0200      R4       EQU   4                                                  0200
0202      R5       EQU   5                                                  0202
0204      R6       EQU   6                                                  0204
0206      R7       EQU   7                                                  0206
0208      R8       EQU   8                                                  0208
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0210  R9       EQU   9                                                        0210
0212  R10      EQU   10                                                       0212
0214  R11      EQU   11                                                       0214
0216  R12      EQU   12                                                       0216
0218  R13      EQU   13                                                       0218
0220  R14      EQU   14                                                       0220
0222  R15      EQU   15                                                       0222
0224  *                                                                       0224
0226  *OTHER EQUATES--                                                       0226
0228  DEBDISP  EQU   36                                                       0228
0230  *                                                                       0230
0232  *DCB DEFINITION--                                                      0232
0234           DCBD  DSORG=(PO,PS),DEVD=DA                                   0234
0236  *COMMUNICATION VECTOR TABLE DEFINITION--                               0236
0238  CVT      DSECT                                                         0238
0240           CVT   SYS=MIN                                                 0240
0242  ************************************************************************ 0242
0244  IGC021   CSECT                                                         0244
0246           BALR  RGBASE,0                                                0246
0248           USING *,RGBASE                                                0248
0250           SSM   HIBINARY              ENABLE INTERRUPTS                 02504/29
0252           LA    WORK2,4               FUNCTION CODE, A=4                0252
0254           LTR   ENTRY,R0              PICKUP ADDR OF NAME ENTRY         0254
0256           BP    AROPT                 Q. A OR R OPTION                  0256
0258           LCR   ENTRY,ENTRY                                             0258
0260           LA    WORK2,12              FUNCTION CODE, D=12               0260
0262  AROPT    LTR   DCB,R1                PICKUP DCB ADDR                   0262
0264           BP    GETMAIN               Q. A OR D OPTION                  0264
0266           LCR   DCB,DCB                                                 0266
0268           LA    WORK2,4(WORK2)        FUNCTION CODE, R=8, C=16          0268
0270  *GET WORKAREA FOR STOW AND BSAM/QSAM EOB ROUTINE                       0270
0272  GETMAIN  LA    R0,AREAEND-AREA                                         0272
0274           GETMAIN R,LV=(0)                                              0274
0276           LR    RGAREA,R1                                               0276
0278           USING AREA,RGAREA                                             0278
0280           STH   WORK2,FUNCT           SAVE FUNCTION CODE                0280
0282           CLI   FUNCT+1,8                                               0282
0284           BH    RELOC                 Q. D OR C OPTION, DON'T WR EOD    0284
0286           TM    11(ENTRY),X'80'       ALIAS BIT                         0286
0288           BO    RELOC                 Q. ALIAS BIT ON, DON'T WR EOD     0288
0290  ***THE FOLLOWING CODE INTERFACES WITH THE BSAM/QSAM EOB ROUTINE IN      0290
0292  ***        ORDER TO WRITE AN EOD MARK                                   0292
0294           USING IHADCB,DCB                                              0294
0296           MVC   8(3,ENTRY),DCBRELAD   GET TTR FROM DCB                  0296
0298           L     R3,DCBIOBA            GET AN IOB                        0298
0300           LA    R9,4(R3)              DEVELOP ECB ADDRESS               0300
0302           ST    R9,12(R3)                                               0302
0304           OI    DCBCIND1,X'10'        SET WRITE FLAG                    0304
0306           OI    DCBOFLGS,X'80'        SET LAST WR BIT                   0306
0308           SR    R2,R2                                                   0308
0310           IC    R2,DCBOFFSW                                             0310
0312           LR    R7,R2                 OFFSW FOR EOB ROUTINE             0312
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0314                AR    R2,R3                    POINT 2 TO CCW                  0314
0316                SH    R2,N8                    BACKUP 8                        0316
0318                NI    4(R2),X'7F'              TURN OFF DATA CHAIN BIT         0318
0320                SR    R4,R4                                                    0320
0322                IC    R4,DCBKEYLE                                              0322
0324                STH   R4,14(R2)                FORCE DATA LENGTH=0             0324
0326                L     R15,DCBEOBW              GET EOB ROUTINE ENTRY           0326
0328                TM    DCBCIND2,X'01'           TEST FOR QSAM                   0328
0330                BZ    NOTQSAM                  Q. NOT QSAM                     0330
0332                L     R15,DCBEOB               QSAM EOB ADDR                   0332
0334    NOTQSAM     LR    R2,DCB                  DCB ADDR FOR EOB RTN             0334
0336                STM   R9,R12,TEMPSAVE                                          0336
0338                BALR  R14,R15                  WRITE EOD                       0338
0340                LM    R9,R12,TEMPSAVE         RESTORE VOLATILE REGS           0340
0342    *WAIT FOR COMPLETION OF EOD WRITE--                                        0342
0344                WAIT  1,ECB=(R9)                                               0344
0346                AR    R7,R9                    7 POINTS TO CCW+4               0346
0348    *RESTORE BSAM/QSAM CHAN PROG AND CHECK FOR I/O ERROR--                     0348
0350                SH    R7,N8                    GO TO PREVIOUS CCW              0350
0352                OI    0(R7),X'80'              TURN DATA CHAIN BIT BACK ON     0352
0354                TM    0(R9),X'20'              CHECK IOS COMPLETION CODE       0354
0356                BZ    IOERR                    Q. PERM I/O ERR ON EOD WRITE    0356
0358    *RELOCATE CHANNEL PROGRAM TO SEARCH DIRECTORY FOR NAME--                   0358
0360    RELOC       LM    R0,R9,SEARCH             SEARCH CHAN PROG                0360
0362                AR    R0,RGAREA                                                0362
0364                AR    R2,RGAREA                                                0364
0366                AR    R4,ENTRY                                                 0366
0368                AR    R6,RGAREA                                                0368
0370                AR    R8,RGAREA                                                0370
0372                STM   R0,R9,CCW1                                               0372
0374                LM    R0,R1,SCCW6               2ND HALF OF CHAN PROG          0374
0376                AR    R0,RGAREA                                                0376
0378                STM   R0,R1,CCW2                                               0378
0380    *BUILD AND MOVE ECB AND IOB--                                              0380
0382                SR    R0,R0                    ZERO ECB AND 'M'                0382
0384                LA    R2,ECB                   BUILD IOB                       0384
0386                LA    R5,CCW1                                                  0386
0388                LR    R6,DCB                   DCB ADDRESS                     0388
0390                SR    R8,R8                    ZERO BLK INCR FLD               0390
0392                STM   R0,R8,ECB                STORE ECB AND IOB               0392
0394                MVI   IOB,2                    SET NON-RELATED FLAG            0394
0396                STC   R0,MBB                   LOAD   'M'                      0396
0398                L     R1,DCBDEBAD                                              0398
0400                MVC   MBB+1(6),DEBDISP(R1)     LOAD  'BBCCHH'                  0400
0402                MVI   CCHHR+4,1                LOAD  'R'                       0402
0404                EXCP  IOB                      SEARCH DIRECTORY                0404/2
0406                BAL   WORK2,CHECK              WAIT AND CHECK                  0406
0408                LA    COUNT,BUFF3+18                                           0408
0410                LA    POINT,BUFF1+18                                           0410
0412                LA    LAST,BUFF1+16                                            0412
0414                AH    LAST,BUFF1+16                                            0414
0416                LA    NEXT,BUFF2                                               0416
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0418                LA    OUT,BUFF3                                          0418
0420                LA    STOWED,ST1E1                                       0420
0422      ST1E1     CLC   0(8,POINT),0(ENTRY)                                0422
0424                LH    WORK1,FUNCT       GET FUNCTION CODE                04244/29
0426                BE    BRANCH1-4(WORK1)  Q. IS NAME IN BLOCK              04264/29
0428                BH    BRANCH2-4(WORK1)  Q. IS HIGHER NAME IN BLOCK       04284/29
0430      ST1G1     LR    WORK1,LENGTH      CALCULATE ENTRY LENGTH           0430
0432                BAL   RGRET,LNTHCALC                                     0432
0434                LA    WORK2,271(OUT)                                     0434
0436                SR    WORK2,COUNT                                        0436
0438                CR    WORK2,LENGTH      IS THERE ROOM IN BLOCK           0438
0440                BC    10,ST1J1          YES, DONT WRITE RECORD           0440/2
0442                BAL   RGRET,ROTATE                                       0442
0444                EXCP  IOB                                                0444/2
0446                LA    COUNT,18(OUT)     POINT TO OUTPUT AREA             0446/2
0448      ST1J1     LR    WORK2,LENGTH                                       0448/2
0450                BCTR  WORK2,0                                            0450
0452                EX    WORK2,MOVE1                                        0452
0454                AR    POINT,LENGTH      UPDATE POINT AND COUNT.          0454
0456                AR    COUNT,LENGTH           TO INDICATE NEXT VALUES     0456
0458      TSTLST    CLR   POINT,LAST        Q. LAST INPUT ITEM               0458
0460                BCR   4,STOWED          NO.  TEST NEXT ITEM              0460
0462                SR    POINT,LENGTH                                       0462
0464                CLC   HIBINARY,0(POINT) YES,  TEST FOR LAST INPUT REC    0464
0466                BNE   ST1C3             Q. NOT LAST INPUT RECORD         0466
0468                LR    WORK1,LENGTH                                       0468
0470                BAL   RGRET,ROTATE                                       0470
0472                NI    CCW1+44,X'BF'     TURN OFF COMMAND CHAIN BIT       0472
0474                XC    DCBDIRCT(2),DCBDIRCT ZERO DIRECTORY CNT            0474
0476                TM    IOB+12,X'01'                                       0476
0478                BC    8,NOTEOD                                           0478
0480                L     NEXT,CCW2+16                                       0480
0482                MVC   DCBDIRCT(2),16(NEXT) UPDATE DIRECTORY CNT          0482
0484      NOTEOD    EXCP  IOB               WRITE LAST RECORD                0484/2
0486                BAL   WORK2,CHECK       WAIT AND CHECK FOR I/O ERROR     0486
0488                CLI   FUNCT+1,0         TEST FOR CHANGE NAME OPTION      04884/29
0490                BC    8,CHGNAM3                                          0490
0492                SR    R2,R2                                              0492
0494                IC    R2,FUNCT          GET ERROR CODE                   0494
0496      RETURN    LA    R0,AREAEND-AREA   FREEMAIN NO. OF BYTES            04964/29
0498                FREEMAIN R,LV=(0),A=(RGAREA)                             0498
0500                LR    R15,R2            SET ERROR CODE                   05004/29
0502                SVC   EXIT              RETURN                           05024/29
0504      *                                                                  05044/29
0506      ST1C3     BAL   WORK2,CHECK       WAIT AND CHECK FOR I/O ERROR     0506
0508                LA    POINT,18(NEXT)    SET UP NEXT INPUT BUFFER         0508
0510                LA    LAST,16(NEXT)                                      0510
0512                AH    LAST,16(NEXT)     SET UP NEW END                   0512
0514                LA    WORK2,BUFF3                                        0514
0516                CLR   WORK2,NEXT                                         0516
0518                LA    NEXT,272(NEXT)                                     0518/2
0520                BCR   2,STOWED          Q. OK TO GO NEXT BUFFER          0520
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0522                LA    NEXT,BUFF1              RESET TO FIRST BUFFER          0522/2
0524                BR    STOWED                                                 0524/2
0526          *                                                                  05264/29
0528          NOSPACE LA    R2,12                   SET ERROR CODE 12          05284/29
0530                B     RETURN                                                 05304/29
0532          DELERR  LA    R2,8                    SET ERROR CODE 8           05324/29
0534                B     RETURN                                                 05344/29
0536          *                                                                  0536
0538          *                                                                  0538
0540          CHGNAM1 BAL   RGRET,LNTHCALC                                       0540
0542                SH    LENGTH,N9                                              0542
0544                EX    LENGTH,MOVE2                                           0544
0546                MVC   NEWNAME(8),8(ENTRY)                                    0546
0548                MVI   FUNCT+1,20                                             05484/29
0550                ST    ENTRY,PARAM             SAVE INPUT PARAMETER           0550
0552                LA    ENTRY,NEWNAME                                          0552
0554                B     RELOC                                                  0554
0556          CHGNAM3 L     ENTRY,PARAM                                          0556
0558                MVI   FUNCT+1,12                                             05584/29
0560                B     RELOC                   PERFORM SEARCH                 0560
0562          DELETE  EQU   *                                                    0562/2
0564          REPLACE LR    WORK1,LENGTH                                         0564
0566                BAL   RGRET,LNTHCALC                                       0566
0568                AR    POINT,LENGTH            DELETE OLD ENTRY               0568
0570                LR    LENGTH,WORK1                                         0570
0572                CLI   FUNCT+1,12              CHECK FUNCTION                 0572
0574                BE    SHIFT                   Q. DELETE OPTION               0574/2
0576          ADD   TM    11(ENTRY),X'80'         Q. IS ENTRY AN ALIAS           0576
0578                BO    BYPASS                  YES. DONT FOOL WITH TTR        0578
0580                OI    DCBCIND2,X'80'          SET STOW BIT                   0580
0582                STM   R3,R14,TEMPSAVE                                        0582
0584                LR    R3,RGAREA                                              0584
0586                L     R1,DCBDEBAD                                            0586
0588                LA    R2,DCBFDAD              INPUT TO CONVERT ROUTINE       0588
0590                L     R15,CVTPTR              CVT ADDR                       0590
0592                USING CVT,R15                                                0592
0594                L     R15,CVTPRLTV            CONVERT RTN ADDR               0594
0596                BALR  R14,R15                 CONVERT TTR TO MBBCCHHR        0596
0598                LM    R3,R14,TEMPSAVE-AREA(R3) RESTORE REGS                  0598
0600                AH    R0,N256                 INCREMENT R BY 1               0600
0602                ST    R0,DCBRELAD             SAVE IN DCB FOR NEXT STOW      0602
0604          BYPASS  CLI   DCBDIRCT+1,181          ANY ROOM IN DIRECTORY          0604/2
0606                BC    2,NOSPACE               NO, BRANCH TO ERROR ROUTINE    0606/2
0608                LR    WORK1,LENGTH            YES. CONTINUE                  0608/2
0610                LR    STOWED,POINT            SAVE POINT ADDRESS IN STOWED   0610/2
0612                LR    POINT,ENTRY                                            0612/2
0614                BAL   RGRET,LNTHCALC                                         0614
0616                LA    WORK2,271(OUT)                                         0616/2
0618                SR    WORK2,COUNT                                            0618/2
0620                SR    WORK2,LENGTH                                           0620/2
0622                BC    10,PUT                  Q. DONT WRITE BLOCK            0622
0624                BAL   RGRET,ROTATE                                           0624
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0626                EXCP  IOB                                                0626/2
0628                LA    COUNT,18(OUT)                                      0628/2
0630          PUT   LR    WORK2,LENGTH                                       0630/2
0632                BCTR  WORK2,0                                            0632/2
0634                EX    WORK2,MOVE1          YES, STORE ENTRY              0634/2
0636                AR    COUNT,LENGTH                                       0636/2
0638                LR    POINT,STOWED                                       0638/2
0640          SHIFT LA    STOWED,ST1G1         SHIFT REST OF DIRECTORY       0640/2
0642                B     TSTLST                                             0642
0644          BRANCH1 B   ADDERR               BRANCH TO THE                 0644
0646                B     REPLACE                                            0646
0648                B     DELETE                     PROPER ROUTINE          0648
0650                B     CHGNAM1                                            0650
0652          ADDERR  LA  R2,4                 SET ERROR CODE 4              0652/2
0654                B     RETURN                                             0654/2
0656          RPLCADD MVI FUNCT,8              INDICATE ERROR 8              0656
0658          BRANCH2 B   ADD                                                0658
0660                B     RPLCADD                                            0660
0662                B     DELERR                                             0662
0664                B     DELERR                     IN FUNCT REGISTER       0664
0666                MVI   FUNCT+1,0            SET UP TO ADD NEW NAME        0666/2
0668                B     BYPASS                                             0668/2
0670          ROTATE  LA  WORK2,16(OUT)        CALCULATE ACTIVE BYTES        0670
0672                SR    WORK2,COUNT                                        0672
0674                LCR   WORK2,WORK2                                        0674
0676                STH   WORK2,16(OUT)        STORE COUNT IN OUTPUT RECORD  0676
0678                SR    COUNT,WORK1          SUB LNTH OF LAST ENTRY        0678
0680                MVC   8(8,OUT),0(COUNT)    STORE KEY                     0680
0682                LA    WORK1,BUFF3                                        0682
0684                CLR   WORK1,OUT                                          0684
0686                LR    WORK1,OUT                                          0686
0688                LA    OUT,272(OUT)                                       06884/29
0690                BNE   GO                 Q. USE NEXT BUFFER            0690
0692                LA    OUT,BUFF1                                          0692/2
0694          GO    STM   R0,R11,TEMPSAVE                                    0694
0696                LR    R11,OUT                                            0696
0698                LA    R10,8(WORK1)                                       0698
0700                BAL   WORK2,CHECK          WAIT AND CHECK FOR I/O ERROR  0700
0702                MVC   CCHHR,0(R11)         SET SEEK ADDR                 0702
0704                LM    R0,R9,WRANDRD        RELOCATE CHAN PROG            0704
0706                ALR   R0,R11               SEARCH EQUAL ID               0706
0708                ALR   R6,R11               SEARCH EQUAL ID               0708
0710                AR    R2,RGAREA            TIC                           0710
0712                AR    R8,RGAREA            TIC                           0712
0714                ALR   R4,R10               WRITE KEY AND DATA            0714
0716                STM   R0,R9,CCW1                                         0716
0718                LM    R0,R5,WRCCW6                                       0718
0720                SH    R10,N8                                             0720
0722                ALR   R4,R10               READ CKD                      0722
0724                STM   R0,R5,CCW2                                         0724
0726                LM    R0,R11,TEMPSAVE      RESTORE MAINLINE REGISTERS    0726
0728                BR    RGRET                                              0728
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0730     *                                                                      0730
0732     *                                                                      0732
0734     LNTHCALC LH    LENGTH,10(POINT)                                       0734
0736              N     LENGTH,MASK                                            0736
0738              LA    LENGTH,12(LENGTH,LENGTH)                               0738 4/29
0740              BR    RGRET                                                  0740
0742     *                                                                      0742
0744     CHECK    WAIT  1,ECB=ECB                                              0744
0746              TM    ECB,X'20'          CHECK FOR I/O ERROR                 0746
0748              BCR   1,WORK2            Q. NO ERROR                         0748
0750              TM    IOB+12,X'01'                                           0750
0752              BCR   1,WORK2            Q. EOD INSTEAD OF ERROR             0752
0754     IOERR    LA    R2,X'10'           SET ERROR CODE                      0754
0756              B     RETURN                                                 0756
0758     MOVE1    MVC   0(1,COUNT),0(POINT)                                    0758
0760     MOVE2    MVC   NEWNAME+8(1),8(POINT)                                  0760
0762     HIBINARY DC    X'FFFFFFFFFFFFFFFF'                                    0762
0764     N8       DC    H'8'                                                   0764
0766     N9       DC    H'9'                                                   0766
0768              DS    0F                                                     0768
0770     MASK     DC    X'0000001F'                                            0770
0772     SEARCH   DS    0F                 CH PROG TO SEARCH DIRECTORY         0772
0774     SCCW1    DC    X'16'              READ R0                             0774
0776              DC    AL3(0+BUFF1-AREA)                                      0776
0778              DC    X'6000'                                                0778
0780              DC    H'16'                                                  0780
0782     SCCW2    DC    X'92'              READ COUNT                          0782
0784              DC    AL3(0+BUFF1-AREA)                                      0784
0786              DC    X'4000'                                                0786
0788              DC    H'8'                                                   0788
0790     SCCW3    DC    X'E9'              SEARCH HI/EQUAL KEY                 0790
0792              DC    AL3(0)                                                 0792
0794              DC    X'4000'                                                0794
0796              DC    H'8'                                                   0796
0798     SCCW4    DC    X'08'              TIC TO SCCW2                        0798
0800              DC    AL3(0+SCCW2-SEARCH)                                    0800
0802     ZERO     DC    F'0'                                                   0802
0804     SCCW5    DC    X'86'              READ DATA                           0804
0806              DC    AL3(16+BUFF1-AREA)                                     0806
0808              DC    X'4000'                                                0808
0810     N256     DC    H'256'                                                 0810
0812     SCCW6    DC    X'9E'              READ COUNT,KEY AND DATA             0812
0814              DC    AL3(0+BUFF2-AREA)                                      0814
0816              DC    F'272'                                                 0816
0818     WRANDRD  DS    0F                 CH PROG TO WRITE AND READ A BLK     0818
0820     WRCCW1   DC    X'31'              SEARCH EQUAL ID (NOT M/T)           0820
0822              DC    AL3(0)             BUFF1                               0822
0824              DC    X'4000'                                                0824
0826              DC    H'5'                                                   0826
0828     WRCCW2   DC    X'08'              TIC TO WRCCW1                       0828
0830              DC    AL3(0)                                                 0830
0832              DC    F'0'                                                   0832
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