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Course 10639

IBM Field Engineering Education
Student Guide

DOS/VS Base

PREFACE

This publication is primarily intended for use by IBM personnel enrolled in course 10639.

PRELIMINARY EDITION (February 1975)
This publication has been printed in a preliminary format so that it would be available to the intended users ih time for training on this course. This preliminary manual may contain typographical errors that would normally be corrected before publication. This edition is not eligible for suggestion awards, however, your comments will be appreciated.

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CONTENTS

GENERAL INFORMATION

LEGEND

ACRE	APAR Control Remote Entry (System)
APAR	Authorized Program Analysis Report
BBOX	Boundary Box
BC	Basic Control (Mode)
BJF	Batch Job Foreground
BPS	Basic Programming System
BTAM	Basic Teleprocessing Access Method
CAW	Channel Address Word
CCB	Command Control Block
CCH	Channel Check Handler
CCW	Channel Command Word
CE	Customer Engineer OR Channel End
CEM	Customer Engineering Memorandum
CICS	Customer Information Control System
CID	Core Image Directory
CIL	Core Image Library
COBOL	Common Business-Oriented Language
COCR	Cylinder Overflow Control Record
COMREG	Communication Region (Partition)
CPS	Central Programming Service
CPU	Central Processing Unit
CR	Control Register
CSP	Current System Program
CSW	Channel Status Word
CYL	Cylinder
DAM	Direct Access Method
DASD	Direct Access Storage Device
DAT	Dynamic Address Translation
DB/DC	Data Base/Data Communication
DE	Device End OR Directory Element
DIB	Disk Information Block
DOS/VS	Disk Operating System Virtual Storage
DRAP	Dynamic Reallocation of Partitions
DTF	Define the File
EC	Extended Control (Mode)
ECSW	Extended Channel Status Word
EOB	End-of-Block
EOF	End-of-File
EOJ	End-of-Job
EOP	End-of-Procedure
EOR	End-of-Real
EOV	End-of-Volume OR End-of-Virtual
EREP	Error Recording and Edit Print (Program)
ERP	Error Recovery Procedures
ESD	External Symbol Dictionary
EWS	Early Warning System
FDP	Field Developed Program
FTSC	Field Technical Support Center
GP/GPR/GR	General Purpose Register
HD	Head
HQ	Hold Queue
IDA	Indirect Data Address
IDAL	Indirect Data Address List

IDAW	Indirect Data Address Word
IMPL	Initial Microprogram Load
IMS	Information Management System
I/O	Input/Output
IPL	Initial Program Load
IR	Incident Report
ISAM	Indexed Sequential Access Method
IT	Interval Timer
IVP	Installation Verification Procedure
JCL	Job Control Language
JECL	Job Entry Control Language
JIB	Job Information Block
LCP	Language Conversion Program
LDL	Local Directory List
LIC	Label Information Cylinder
LIOCS	Logical Input/Output Control System
LL	Load Leveller
LP	Lab Project
LRU	Least Recently Used
LTA	Logical Transient Area
LTK	Logical Transient Key
LUB	Logical Unit Block
MCAR	Machine Check Analysis and Recording
MPS	Multiprogramming System
MTC	Magnetic Tape Command
OEM	Original Equipment Manufacturer
OLTEP	Online Test Executive Program
OS	Operating System
PCID	Private Core Image Directory
PCIL	Private Core Image Library
PD	Problem Determination
PDAID	Problem Determination Aid (Program)
PDS	Page Data Set (SYSVIS)
PDSDM	Paging Data Set Dump (Program)
PER	Program Event Recording
PF	Page Frame
PFT	Page Frame Table
PFTX	Page Frame Table Extension
PGM	Program
PGQU	Page Queue
PHO	Page Handling Overlap
PIB	Program Information Block
PID	Program Information Department
PIK	Partition Information Key
PIOCS	Physical Input/Output Control System
PL/I	Program Language/I
PLM	Program Logic Manual
PMGR/PMR	Page Manager
PP	Program Product OR Page Pool
PROC	Procedure
PROCLIB	Procedure Library
PSAR	Programming Services Activity Report
PSLD	Private Second Level Directory
PSM	Programming System Memorandum
PSR	Programming Systems Representative
PSW	Program Status Word
PT	Page Table

PTA	Physical Transient Area
PTF	Program Temporary Fix
PUB	Physical Unit Block
QTAM	Queued Teleprocessing Access Method
RAS	Reliability, Availability, Serviceability
RCF	Reader Comment Form
RETAIN	Remote Technical Assistance Information Network
RJE	Remote Job Entry
RLD	Relocation List Directory
RMS	Recovery Management Support
RPS	Rotational Position Sensing
RTA	RAS Transient Area
SAB	Seek Address Block
SADP	Serviceability Aids and Debugging Procedures (Manual)
SAM	Sequential Access Method
SB	Sensor Based
SCID	System Core Image Directory
SCIL	System Core Image Library
SCM	Supplementary Course Material
SCP	System Control Program
SDAID	System Debugging Aid (Program)
SDD	System Development Division
SDL	System Directory List (in SVA)
SE	Systems Engineer
SEREP	System Error Recording and Edit Print (Program)
SLD	Second Level Directory (in storage)
SLSS	System Library Subscription Service
SPOOL	Simultaneous Peripheral Operations On-Line
SRL	System Reference Library
STID	System Task Identification Key
STOR	Segment Table Origin Register
SVA	Shared Virtual Area
SVC	Supervisor Call
SYSCOM	Communication Region (System)
T/A	Trouble Analysis Problem
TEB	Tape Error Block
TIC	Transfer In Channel (command)
TIK	Task Identification Key
TNL	Technical Newsletter
TOD	Time-of-Day (Clock)
TOS	Tape Operating System
TP	Teleprocessing
TRF	Track Reference Field
TXT	Text
UCS	Universal Character Set
UPSI	User Program Switch Indicator
VM	Virtual Machine
VS	Virtual Storage
VSAM	Virtual Storage Access Method
VTOC	Volume Table Of Contents
WP	Work Project

COURSE DESCRIPTION

This course trains a student to perform the duties and responsibilities of a DOS/VS Program Support Representative. The course is DOS/VS Release 29 oriented and teaches the student how to interpret DOS/VS operator messages, install PTFs, write APARs, perform an SCP installation, diagnose coding and control card errors in IBM supplied or user written programs, and how to communicate effectively with the customer.

During lab sessions the student diagnoses program errors in both user type and system control programs. User type errors are corrected to allow proper operation, and internal failures are corrected, circumvented or reported. An SCP installation is also performed.

Prerequisites

CC 11298	DOS/VS Basic Coding Techniques OR OS Training

Postrequisites

CC 40016	Macro Definition
CC 57247	DOS/VS Display Operator Console

BASIC SKILLS

Generalized Program Support Basic Skills

Effectively gather the symptoms, severity, and related data of a problem with which to do problem determination and formulate an effective PASS search argument.

Use the assistance of Second Level Support groups to obtain, install, and verify fixes for known problems.

Prepare the necessary documentation of a problem and communicate this information to appropriate IBM and customer personnel.

Define unknown problems and initiate action with the appropriate support resource groups to get resolution; create and submit an APAR along with proper supporting documentation on the problem. Monitor and effect customer communication on the progress of problem determination.

Install, verify, and complete the necessary documentation for an SCP installation; perform installation-related customer skills.

DOS/VS Basic Skills

1. Determine the status of any I/O device by using the appropriate system I/O control blocks.
2. Locate and identify all non-I/O control blocks that are within the resident supervisor.
3. Use an Assembler Language Listing and Linkage Editor Map to locate any given routine or instruction in a storage dump.
4. Obtain a storage dump that contains any desired routine in real/virtual storage.
5. Order and install PTFs or other supplied fixes.
6. Correctly write and submit an APAR.
7. Prepare the required control cards and initiate any partition to execute a program.
8. List and use the correct procedure for obtaining technical data or assistance.
9. Determine the status of any data file by using the appropriate system I/O blocks.
10. Create and/or correct errors in labels on tape and disk.
11. Determine the correct disk data area and print out the area for any data management system presented in this course.
12. Make and use the correct control cards to restart from a checkpoint.
13. Identify, analyze and take appropriate action for error messages.
14. Use the correct PLM and microfiche to locate and trace the logic flow of any given instruction of any phase.
15. Identify Job Control, IPL and Linkage Editor control card errors and correct them, using the applicable SRL.
16. Stop any program at any given instruction of any phase.
17. Effectively use all service aids for problem determination.
18. Within the resident supervisor, locate and fix any failing instruction or routine. If unable to fix, circumvent when possible or advise the user of the temporary restriction, then use the correct trouble reporting procedure.
19. Prepare the necessary control cards to link a specific program into the CI library.
20. Correct any coding errors associated with pre-SYSGEN planning and determine the necessary SYSGEN and program options to properly install and verify an SCP to match the user's system.
21. Obtain a SYSVIS file printout and locate any desired instruction or routine.
22. Determine the key symptoms and conditions required to formulate an effective PASS search argument.
23. Coordinate and monitor the activity on a reported problem to ensure continuous progress towards the resolution of the problem.
24. Apply sound business decisions based on accepted business practices to billable calls, problem determination, and to resolution of customer situations.

The preceding statements generally describe the responsibilities and skills required of a PSR in a DOS/VS environment. For more detailed information on the specific skills required to satisfy any one of the stated skills, refer to the objectives at the beginning of each topic in the course.

MATERIAL REQUIRED

Your instructor will provide you with all the necessary materials required to complete this course.

INFORMATION FOR THE STUDENT

This manual consists of the following sections.

1. General Information - Included are the basic skills for this course. These are statements of what is expected of the student on completion of the course.

2. Course Layout - This is a day-by-day breakdown of the recommended sequence of presentation for all topics in this course. Teaching locations may possibly vary or deviate from this schedule (at their own discretion) as new information relative to DOS/VS becomes available, or as local conditions dictate.

3. Student Outline - This section contains learning material for every topic in this course. Each topic has listed objectives, troubleshooting hints (if applicable), reading assignments and self-evaluation questions that test the student's knowledge of the listed objectives.

4. Laboratory Projects - This section contains all available lab projects that can be completed during this course. Some are not required. All optionals are so noted in the Course Schedule.

5. Trouble Analysis Problems - This section contains all available T/As for this course. All T/As are not required to be completed. The optional T/As are noted in the Course Schedule.

6. Work Projects - This section contains all the work projects to be completed during this course. These projects are basically "paper projects" which can be completed through the use of reference material provided in the course. System availability or utilization is not required for completion of these projects.

7. Problem Determination Techniques - This section (Appendix B) contains a collection of commonly used troubleshooting techniques (hints) that can be employed when analyzing a programming problem. The student should become familiar with these techniques and use them throughout this course.

This manual was created as an aid to help the student reinforce lecture information and increase the knowledge gained from this course. To benefit from it, this manual MUST be used throughout the course.

If you have any questions, do not hesitate to consult your instructor.

COURSE LAYOUT
DOS/VS BASE - CC 10639

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
LECTURE	CONCEPTS OF A PROGRAMMING SYSTEM DOS/VS CONCEPTS DOS/VS OPERATING PROCEDURES	REVIEW PREVIOUS DAY DOS/VS PROCEDURE LIBRARY DOS/VS POWER	REVIEW PREVIOUS DAY SYSRES ORGANIZATION RMS AND DUMPS	REVIEW PREVIOUS DAY RMS AND DUMPS PIOCS	REVIEW PREVIOUS DAY PIOCS PIOCS MESSAGES BUSINESS PRACTICES (See NOTE 3)
LAB	LP1 VM FAMILIARIZATION (See NOTE 1) LP2 VM SPOOLING (See NOTE 1) LP3 DOS/VS FAMILIARIZATION TA 1 to 5 OPERATING PROCEDURES	LP4 PROCEDURE LIBRARY LP6 POWER OPERATION TA 1 to 5 OPERATING PROCEDURES	LP5 DISK FORMATS LP7 LABEL EXTERNALS LP8 INTRODUCTION TO LABEL PROCESSING LP 16 to 18 RMS (See NOTE 2)	LP9 DOS/VS BUG SYSTEM LP10 PIOCS MACROS LP11 DISK READ AND PRINT (Optional) TA 6 to 11 PIOCS	LP11 DISK READ AND PRINT (Optional) TA 6 to 11 PIOCS

NOTES:
1. APPLICABLE ONLY WHEN VM/370 FACILITY IS AVAILABLE AT TEACHING LOCATION.
2. DEFERRABLE - MUST BE COMPLETED BEFORE DAY 10.
3. THIS TOPIC CAN BE SCHEDULED AND ADMINISTERED AT THE DISCRETION OF THE TEACHING LOCATION. THERE IS NO INFORMATION RELATIVE TO THIS TOPIC CONTAINED IN THE DOCUMENTATION FOR CC10639.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 6	DAY 7	DAY 8 WED 24 SEP	DAY 9 THUR 25 SEP	DAY 10 [illegible]
LECTURE	REVIEW PREVIOUS DAY LINKAGE EDITOR • Control Statements • Operation	REVIEW PREVIOUS DAY QUIZ 1 AND REVIEW Programming Services Activity Report (See NOTE 3)	REVIEW PREVIOUS DAY VIRTUAL STORAGE CONCEPTS VIRTUAL STORAGE MACROS	REVIEW PREVIOUS DAY SERVICEABILITY AIDS • PDAID DOCUMENTATION AND OLTEP PROGRAM SUPPORT RESOURCES	REVIEW PREVIOUS DAY SCP INSTALLATION • RESPONSIBILITY • PLANNING • PID SYSTEM
LAB	LP12 LINKAGE EDITOR LP16 to 18 RMS (See NOTE 2)	LP16 to 18 RMS (See NOTE 2)	LP13 VS MACROS AND S/370 INSTRUCTIONS	LP15 OLTEP AND PDAID TA 12 to 14 OLTEP (See NOTE 4)	LP20 SCP INSTALL RESEARCH LP21 SCP INSTALL PID SYSTEM RESTORE LP22 SCP INSTALL LINK AND DELETE SYSTEM COMPONENTS

NOTE: 4. TAs 12 and 13 are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 11	DAY 12	DAY 13	DAY 14	DAY 15
LECTURE	REVIEW PREVIOUS DAY ACCOUNT MANAGEMENT (See NOTE 3) INITIAL PROGRAM LOAD (IPL)	REVIEW PREVIOUS DAY SCP INSTALLATION • LIBRARIAN PROGRAMS • SUPERVISOR GENERATION	REVIEW PREVIOUS DAY SCP INSTALLATION • INSTALLATION VERIFICATION PROCEDURES JOB CONTROL	REVIEW PREVIOUS DAY SCP INSTALLATION • POWER GEN • UTILITY PROGRAMS SERVICEABILITY AIDS • SDAID • SYSVIS DUMP	REVIEW PREVIOUS DAY QUIZ 2 AND REVIEW INTERPERSONAL SKILLS (IPS) (See NOTE 3)
LAB	LP 20 to 22 SCP INSTALL WPO (PART 1) IPL TA 15 to 17 IPL (See NOTE 5)	LP23 PTF SELECTION LP25 SCP INSTALL SUPERVISOR GENERATION LP32 ESERV FAMILIARIZATION	LP 23 & 25 SCP INSTALL LP24 SCP IVP ASSEMBLY WPO (PART 2) JOB CONTROL TA 18 to 21 JOB CONTROL (See NOTE 5)	LP26 SCP POWER GEN LP14 SDAID LP19 SYSVIS DUMP	LP14 SDAID LP27 SCP INSTALL SYSGEN LP28 SCP IVP RUN LP29 SYSRES REALLOCATION (Optional)

NOTES: 5. TAs 15, 16, 18, and 19 are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 16 SUK.	DAY 17	DAY 18	DAY 19	DAY 20
LECTURE	REVIEW PREVIOUS DAY SUPERVISOR • INTRODUCTION IPS (See NOTE 3)	REVIEW PREVIOUS DAY SUPERVISOR • TASK SELECTION	REVIEW PREVIOUS DAY SUPERVISOR • CHANNEL SCHEDULER AND I/O INTERRUPT ROUTINES	REVIEW PREVIOUS DAY SUPERVISOR • ERROR RECOVERY PROCEDURES	REVIEW PREVIOUS DAY SUPERVISOR • MCAR/CCH
LAB	LP 27 to 29 SCP INSTALL WP1 SUPERVISOR INTRO (See NOTE 6) TA 22 to 24 SUPERVISOR (See NOTE 7)	LP 27 to 29 SCP INSTALL WP2 TASK SELECTION (See NOTE 6) TA 25 to 29 TASK SELECTION (See NOTE 7)	LP 27 to 29 SCP INSTALL WP3 CHANNEL SCHEDULER (See NOTE 6) TA 30 to 34 CHANNEL SCHEDULER (See NOTE 7)	LP 27 to 29 SCP INSTALL WP4 ERROR RECOVERY (See NOTE 6) TA 36 to 38 ERROR RECOVERY (See NOTE 7)	LP 27 to 29 SCP INSTALL WP5 MCAR/CCH (See NOTE 6) TA 39 to 40 MCAR/CCH (See NOTE 7)

NOTES:
6. WORK PROJECTS (WPs) MAY OPTIONALLY BE COMPLETED DURING HOME STUDY.
7. TAs 22, 24, 25, 29, 30, 33, 36, and 39, are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 21	DAY 22	DAY 23	DAY 24	DAY 25
LECTURE	REVIEW PREVIOUS DAY SUPERVISOR • FETCH TASK • Shared Virtual Area	REVIEW PREVIOUS DAY SUPERVISOR • TIMERS QUIZ 3 AND REVIEW	REVIEW PREVIOUS DAY PAGE MANAGER • PAGE MANAGER CONCEPTS AND TABLES • INITIALIZATION • SERVICES	REVIEW PREVIOUS DAY PAGE MANAGER • PAGE REPLACEMENT ALGORITHM • LOAD LEVELER • OPTIMIZATION	REVIEW PREVIOUS DAY SUPERVISOR • CCW TRANSLATION • RESOURCE MANAGEMENT
LAB	WP7 FETCH/LOAD (See NOTE 6) WP12 SVA AND STOW TABLE (See NOTE 6) TA 42 to 49 FETCH AND SVA (See NOTE 8)	WP6 INTERVAL TIMER AND EXIT MACROS (See NOTE 6)	WP8 PAGE MANAGER (See NOTE 6) TA 51 & 52 PAGE MANAGER (See NOTE 8)	WP9 PAGE REPLACEMENT ALGORITHM AND LOAD LEVELER (See NOTE 6) TA 53 to 58 PAGE MANAGER (See NOTE 8) ENVIRONMENTAL TAs (See NOTE 3)	WP10 CCW TRANSLATION (See NOTE 6) TA 60 to 63 CCW TRANSLATION (See NOTE 8) ENVIRONMENTAL TAs (See NOTE 3)

NOTES: 8. TAs 42, 45, 48, 49, 51, 53, 55, 58, 60, and 62 are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 26	DAY 27	DAY 28	DAY 29	DAY 30
LECTURE	REVIEW PREVIOUS DAY QUIZ 4 AND REVIEW SUPERVISOR MISCELLANEOUS • DASD FILE PROTECT • SEEK SEPARATE • SYSTEM FILES ON DISK	REVIEW PREVIOUS DAY LIOCS • Introduction • Unit Record	REVIEW PREVIOUS DAY LIOCS • Tape Files • Tape Labels	REVIEW PREVIOUS DAY LIOCS • SD Files • SD Labels	REVIEW PREVIOUS DAY LIOCS • DA Files • DA Labels • ISAM Concepts
LAB	WP11 SYSTEM FILES ON DISK (See NOTE 6) ENVIRONMENTAL TAs (See NOTE 3)	LP30 UNIT RECORD MACROS LIOCs TAs (See NOTE 9) TA 101 to 105 UNIT RECORD MACROS (See NOTE 10)	LP31 TAPE LABELS TA 106 to 108 TAPE MACROS (See NOTE 10)	TA 109 to 115 SEQUENTIAL DISK MACROS (See NOTE 10)	WP13 INDEXED SEQUENTIAL FILE ORGANIZATION (See NOTE 6) TA 116 to 120 DIRECT ACCESS MACROS (See NOTE 10)

NOTES: 9. All LIOCS TA listings (dumps) and program assemblies are contained in DOS/VS Base SCMs 2 and 3 respectively.

10. TAs 101, 102, 103, 106, 107, 109, 111, 114, 116, 118, and 119 are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.

COURSE LAYOUT - CC 10639 Cont'd

	DAY 31	DAY 32	DAY 33		
LECTURE	REVIEW PREVIOUS DAY LIOCS • ISAM IMPLEMENTATION • ISAM INTERNALS	REVIEW PREVIOUS DAY LIOCS • DISK WORK FILES • DEVICE INDEPENDENT FILES • SPANNED RECORD	REVIEW PREVIOUS DAY QUIZ 5 AND REVIEW VISIT BY FIELD SUPPORT REP (See NOTE 3) • CHECKPOINT/RESTART		
LAB	TA 121 to 125 ISAM MACROS (See NOTE 11) ENVIRONMENTAL TAs (See NOTE 3)	WP14 SPANNED RECORDS (See NOTE 6) TA 121 to 125 ISAM MACROS (See NOTE 11) ENVIRONMENTAL TAs (See NOTE 3)	CHECKPOINT/RESTART (See NOTE 12) COMPLETE ALL UNFINISHED LPs, WPs, and TAs ENVIRONMENTAL TAs (See NOTE 3)		

NOTES:

11. TAs 121, 123, and 124 are MANDATORY. The remaining TAs on this page are optional at the discretion of the teaching location.
12. Non-lecture topic - tutorial reading is contained in DOS/VS Base SCM 1.

CONCEPTS OF A PROGRAMMING SYSTEM

This topic introduces the basic concepts of a programming system. The components used in DOS/VS and the concepts of symbolic addressing, multiprogramming, and POWER are also discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Determine whether a program in a given list is a control program or a processing program.
2. Place in the correct sequence the steps required to implement a program.
3. Identify the purpose of the following programs when operating in the DOS/VS environment:
   - IPL
   - Job control
   - Supervisor
   - Assembler
   - Linkage editor
4. Identify the correct sequence of operation and interaction between the following programs when executing an assembly:
   - IPL
   - Job control
   - Supervisor
   - Assembler
   - Linkage Editor
5. Identify the operation of job control when processing an ASSGN statement as it relates to the logical unit block (LUB) and physical unit block (PUB).
6. State the purpose and advantages of both a multiprogramming and POWER operating system.

Highlights

- System control programs consist of:
  - IPL
  - Job control
  - Supervisor
  - POWER
- IPL initializes the system and loads the supervisor.
- Supervisor is core resident after IPL and acts as a monitor for all other programs.
- Job control is in core between job steps and provides job-to-job transition.

The linkage editor is a service program and prepares object programs for execution.

SYSRES contains all programs to be executed by DOS.

Multiprogramming provides the facility of several programs operating in core at the same time.

Activity

IN: Introduction to DOS/VS

READ: Part 1: What is a Disk Operating System

Part 2: The Functions and Facilities of DOS/VS
through
Libraries

SELF-EVALUATION QUESTIONS

1. Below is a list of programs. Place a P next to the processing programs and a C next to the control programs.

   a. ---P COBOL
   b. ---P Linkage editor
   c. ----P IPL
   d. ----P SORT
   e. ---C Supervisor
   f. ---P Job Control
   g. ---P PL/I
   h. ----P POWER

2. Arrange the following items in the correct sequence to execute a program.

   a. -----3 Linkedit time
   b. -----4 Execute time
   c. -----1 Code source program
   d. -----2 Compile time

3. Match the following programs with their associated function.

a. -IPL-- Loads the supervisor
b. -SUP-- Loads job control
c. -JC--- Loads linkage editor
d. -ASM-- Translates symbolic to machine language
e. -IPL-- First DOS control program loaded into the system
f. ----- LK Converts object module from language translator output to executable format
g. -All- Resides on SYSRES
h. -~~JC~~-- Is a service program
i. -JC-- Provides job-to-job transition
j. -SUPV- Handles I/O operations

1. IPL
2. Job control
3. Supervisor
4. Assembler
5. Linkage editor

4. Number the following programs according to the sequence in which they are loaded into core when the system is IPLed and a program is assembled.

a. -----2 Supervisor
b. -----4 Assembler
c. -----1 IPL
d. -----3 Job control

5. The ASSGN statement changes the pointer in the:

a. PUB
b. LUB *
c. Job Control Program
d. IPL program

6. The hardware address of an I/O device is located in which of the following:

a. PUB *
b. LUB
c. Job Control
d. IPL

7. The LUB and PUB is located in the ______________ program.

   a. IPL
   b. Job Control
   c. Supervisor
   d. SORT
   e. RPG

8. To operate a multiprogramming system, it is necessary to have at least _______________ partitions.

   a. 2
   b. 3
   c. 1
   d. 4

9. (True/False) Partition priorities are necessary to determine in which sequence each will be serviced.

10. (True/False) All unit record I/O instructions in the problem program are modified to disk I/O instructions when using POWER.

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS CONCEPTS

This topic introduces the disk operating system operating environment. The use of symbolic names for I/O devices used by IBM programs is explained and examples given. The components of the DOS/VS system are presented and the controlling of these components through the use of control cards is introduced. The specifics of the IPL and JOB CONTROL error messages will also be discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Correct any errors in Job Control cards used to do an assembly, linkedit, and execution of a problem program (excluding label cards).
2. Use the error messages printed out on the console, and the DOS/VS Operating Procedures Manual to correct any operator error encountered during the assembly and execution of a problem program.
3. Use the DOS/VS MGMT guide to determine what symbolic units are required by the ASSEMBLER program.
4. Use the system message to locate the cause of the cancellation on a given system dump.
5. Use the linkage editor map to locate any instruction of a problem program, given a storage print.
6. Locate the following when given a standalone or system storage print:
   - General registers
   - CAW
   - CSW
   - PSWs (old)
   - PSWs (new)

Highlights

- A // JOB card indicates the beginning of a job and another // JOB or /& signals the end of a job.
- A job contains one or more job steps.
- All IBM Programs require specific symbolic units.
- 0IXX messages pertain to IPL errors.
- 1XXXX messages pertain to JOB CONTROL errors.
- Low core information (System Dumps) supplies valuable information in problem determination.

Troubleshooting Hints

- Use the DOS/VS Messages Manual to determine the meaning and corrective action for all messages.
- Use the DOS/VS System Management Guide to determine the symbolic units necessary for operation of the ASSEMBLER program.
- Use the linkage editor map to locate a program in storage at execute time.

IPL from DOC proc 3

Activity

IN: DOS/VS Operating Procedures VOL 4
UNDER: Operator Commands p45 p145
READ: IPL Commands p61-p72
Job Control Commands p195
Attention Commands
149 ADD Command
ALLOC Command
ALLOCR Command
ASSGN Command
CANCEL Command
DEL Command
DPD Command
DUMP Command
EXEC Command
MTC Command
PAUSE Command
181 SET Command

READ: IPL Procedures
(Procedures 2 and 4) DOC proc 3 p63-72

IN: DOS/SADP
UNDER: Serviceability Aids (Section 2) 2.28, 2.171
READ: Low Address Storage AGAIN
Wait State Messages 2171-2178
Linkage Editor Map 2181

UNDER: Operator Commands (Section 2-A-1)
READ: The DUMP Command 2.10

IN: DOS/VS Messages SVDV, IPL DOC
UNDER: 01XX Messages (IPL) ØIxxx
READ: Introductory Information IPL

UNDER: 1-Prefix Messages (Job Control)
READ: Introductory Information
1A0nD Message Meaning

SELF-EVALUATION QUESTIONS

1. The job control program is the unit in the disk operating system that handles job-to-job transition. It does which of the following:

   a. reads job control cards from SYSIPT.
   b. is disk resident and must be loaded into core whenever its functions are needed.
   c. is core-storage resident and its functions are requested via an SVC (Supervisor call instruction).
   d. is loaded, as a deck of cards, from the reader, and in turn loads the Supervisor from a disk pack.

2. At the time that execution of a processing program is requested, it, like all programs run under control of the disk operating system, is:

   a. resident in core storage at all times. X
   b. a module in the relocatable library. ✓
   c. loaded, by the system loader, from SYSIPT.
   d. relocated, loaded and executed by the linkage editor.
   e. fetched from the core image library.

3. Select the required cards and decks from the following list, and place them in sequential order to do an assembly, linkedit, and execution of a problem program.

---	a.	// JOB TEST	1		// JOB TEST
---	b.	// EXEC LINKEDIT	6		// OPTION LINK
---	c.	/*	5 9		// EXEC ASSEMBLY
---	d.	// OPTION LINK	2		SOURCE
---	e.	Object Deck			/*
---	f.	/&	10		// EXEC LINKEDT
---	g.	Source Deck	4		DATA
---	h.	// EXEC ASSEMBLER			/*
---	i.	Data Deck	8		// EXEC
---	j.	// EXEC	7		/*
---	k.	// EXEC ASSEMBLY	3		/&
---	l.	// EXEC TEST			
---	m.	// EXEC LINKEDIT			

4. The message 0S03I indicates that the program was aborted due to:

   a. An invalid SVC.
   b. An invalid logical unit.
   c. A channel program check.
   d. A program check. ✓
   e. None of the above.

5. Under DOS/VS, the terms "job", "job step", and their interrelationship may be most accurately described as:

   a. A "job" is one or more related job steps run as a unit. It is initiated by a // JOB card, and terminated by a /* card.
   b. A "job step" is a series of related jobs.
   c. A "job step" is the execution of one processing program. It is initiated by the // JOB card.
   d. A "job" is one or more related job steps run as a unit. The unit is initiated by a // Job card and terminated by a /& card.
   e. None of the above.

6. The storage location of a problem program at execute time can be determined by using the __LINKEDIT MAP________.

7. The IBM ____________ (standalone/system) dump formats the PSWs.

8. (True/False) When a standalone storage print is taken, DOS does not have to be re-IPLed. STANDALONE destroys SUPV

9. Certain operating conditions, options, etc, that the DOS/VS assembler operates under may require that various symbolic units be assigned. However, under all conditions of operation, the assembler requires certain units be assigned. They are:

   a. SYSRDR, SYSIPT, SYSLST, SYSPCH, SYS001, SYS002, SYS003
   b. SYSIPT, SYSLST, SYSPCH, SYS000, SYS001, SYS002, SYS003
   c. SYSRDR, SYSPCH, SYSLST, SYS000, SYS001, SYS002, SYS003
   d. SYSRDR, SYSLST, SYSIPT, SYSLOG, SYS001, SYS002, SYS003
   e. SYSLOG, SYSRDR, SYSIPT, SYSLST, SYS000, SYS001, SYS002

10. Assume the operator was running a job and it was cancelled due to a program check. There was no system storage print outputted on SYSLIST. Which of the following is the most likely cause of no system dump?

   a. SYSLST unassigned. would be error
   b. The printer is inoperable because of print checks. error
   c. There was a disk error when the storage print program was being loaded in core. error.
   d. There was no // OPTION DUMP job control statement.

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS OPERATING PROCEDURES.

Operating procedures for the DOS/VS are presented in this topic. Basic IPL and Job Control communications are also discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Operate the IPL and JOB CONTROL programs of DOS/VS system to do an assemble, linkedit, and execute.
2. Use the error message printed out on the console, and DOS/VS Operating Procedures Manual to correct simple operator errors encountered during the assembly and execution of the problem program.
3. Use the console and proper JOB CONTROL statements to obtain a system dump, either during execution or on an abnormal termin nation of a problem program.
4. Identify the partition that issued the message, given a message from DOS/VS.
5. Use the error message that resulted from an incorrect JOB CONTROL statement, to locate the failing operand.
6. Identify, given a DOS/VS error message, the action indicator, message number, and program that issued the message.
7. Determine the course of action to be taken when the system enters a wait state with no message printed.

Highlights

- IPL statements can be read from SYSRDR or the operator console.
- Symbolic device addresses can be changed with the ASSGN statement.
- // ASSGN is a temporary assign and is in effect only for a job.
- The // EXEC card with operand causes that program named in the operand to be executed from the core image library.

Troubleshooting Hints

- Use the LISTIO command to determine the symbolic assignments of the system.
- Error messages can occur in low core, on the operator console or on SYSLST.
- Always use the operator's guide to determine what a message really means and to make the correct response.

DLBL — about label 1.
EXTENT — permanent ... where to put data.

LBLTYP — storage for label processing

Activity

IN: DOS/VS Operating Procedures
READ:
✓ 17 -Control Programs — IPL SUP JCL
✓ 24 -Symbolic Device Assignment pg 26. 74 ...
✓ 68 -IPL Procedures (Section 3)
✓ -Job Control Functions
195 -Job Statements and Examples close tape
200 -OPTION Statement
155 197 -ASSGN Statement STDLABEL — all labels ... STDLAB TRK
192 198 -EXEC Statement
206 -/* Statement OPTION PARSTD — puts all DLBL on partition standard label TRK
206 -/& Statement
188 -SET Statement-IPL Statement
165 -DPD Statement-IPL Statement
63 -Starting the System

//OPTION PARSTD
/&
clears track

IN: DOS/VS Messages
-Preface Page
-The Message Code

IN: AH DOS/VS Serviceability Aids
and Debugging Procedures
READ:
-WAIT State (Coded Messages)
-WAIT State (During IPL)

SELF-EVALUATION QUESTIONS

1. IPL is one of the control programs in DOS/VS. It performs certain initialization functions such as: clears core storage, assigns a physical I/O device to SYSRES, loads the supervisor nucleus, etc. IPL does which of the following? It:

   a. ✓ Is resident on disk and its functions are requested by addressing the resident device and pressing the load key.
   b. ✗ Is loaded from a card reader.
   c. ✗ Is loaded from disk every time a program reaches EOJ (end-of-job).
   d. ✗ Is loaded from disk every time a program is abnormally terminated.
   e. ✗ Is core storage resident, and its functions are requested via an SVC.

2. The system is IPLed and the reader is made ready. One card is read and the system enters the wait state. Your next action should be to:

   a. ✓ Check bytes 0-5 for an error message.
   b. Run diagnostics on the reader.
   c. Run diagnostics on the disk.
   d. IPL again.
   e. Check the console switches to determine if you have IPLed the correct device.

3. Given the following job control statement and error message, the operand in error is:

```
ASSIGN SYS003,X'181'
BG 1S01D
```

a. 1
b. 2
c. 3
d. 4
e. 5

Use the following DOS/VS error message to answer questions 4, 5, and 6.

```
F1 1Q52I
```

4. The program that issued the above message is:

a. IPL
b. Job Control
c. Supervisor
d. POWER
e. Sort

5. The partition that issued the above message is:

a. Background
b. IPL
c. Job Control
d. Supervisor
e. None of the above.

6. The action indicator in the above message indicates:

a. Action
b. Information
c. Decision

7. The system enters a wait state with no message printed. Low core (0-3) contains X'07E60190'. This indicates:

a. Machine check
b. Channel failure
c. Program check in the Supervisor
d. IPL error
e. I/O Error queue overflowed

8. The proper action to be taken from the error in question 7 is: Rerun.

Refer to the Contents for the location of the self-evaluation question answers.

PROCEDURE — use of JCL & LNKEDT STMTS (with or without SYSIPT)

① catalog
② retrieve
③ modify

① // JOB PHIL
// EXEC MAINT
CATALP PHILPGM
STMTS. S1 S2 S3
SYSIPT.
/+
/* or CATALP PHIL2
/&

// JOB PHILTEST
// EXEC PROC=PROPAY
/&

// JOB PHILTEST
// EXEC PROC=PHILPGM,OV
5 A after
5 D delete
5 B before
5 M moving
OVEND
/&

80

// EXEC MAINT
CTRL STMTS
/*
/&

catalogue adds

deletes

module to relocatable lib
book to srce stmt lib
proc to procedure lib

CATALR
CATALS
CATALP

DELETC – CIL
DELETR – RL
DELETS – SSL
DELETP – Proc L

// EXEC MAINT
CATALP PHILPGM1, EOP=ZZ, DATA=YES
CNTRL STMTS
SYSIPT DATA
/* END OF SYSIPT DATA
CNTRL STMTS
ZZ END OF PROCEDURE ← /+ assumed.
/*
/&

then // EXEC MAINT
DELETP PHILPGM1
/*

condense // EXEC MAINT
5 CONDS PL

Suppose CATALP PHILPGM1,1,3 ← displayable by DSERV
version, modification

DOS/VS PROCEDURE LIBRARY

This topic introduces the student to the Procedure Library contained in DOS/VS. It will cover the method of developing the library and how it is utilized and modified.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the method used to catalog a procedure in the Procedure Library. CATALP
2. Describe the purpose of overwrite statements. OV , OVEND
3. Develop the overwrite statement(s) necessary to change or add to a cataloged procedure. A B D M
4. Define Partition-Related Procedures and the method used in DOS/VS to process them.

Highlights

- Set up at SYSGEN time
- Basic and Extended support
- Ability to change cataloged procedures (overwrite statements)
- Library maintenance facilities available
- Partition-Related cataloged procedures enhancement
- Inclusion of In-Line SYSIPT in procedure

Troubleshooting Hints

- Interrogate all messages for clues to a procedure problem.
- Display the Procedure Library using the DSPLY function.
- Determine what a given program procedure is attempting to do.
- Build overwrite statements to correct/modify a given procedure.

Activity

IN:	DOS/VS Operating Procedures
UNDER:	Using Cataloged Procedures
READ:	Cataloging a Procedure
	Including a Procedure in the Job Stream
	Modifying a Cataloged Procedure

IN: DOS/VS System Management Guide
UNDER: Using the Libraries (Chapter 7)
READ: Maintaining the Libraries 7.7
Cataloging the Procedure Library 7.11 CATALP EOP=ZZ, DATA=YES
Deleting a Procedure 7.13 7.14
Condensing 7.16
Reallocating (up to Renaming) 7.17 7.20

UNDER: Controlling Jobs (Chapter 5)
READ: Partition-Related Cataloged Procedures

SELF-EVALUATION QUESTIONS

1. To catalog a procedure in the Procedure Library, which of the following statements are required:

--- a. CATALP ✓ 3
--- b. ASSGN
--- c. EXEC MAINT ✓ 2
--- d. TLBL
--- e. /+ ✓ 4
--- f. JOB ANYNAME ✓ 1
--- g. EXEC (PROCNAME)
--- h. /* ✓ 5
--- i. /& ✓ 6

2. To have the ability to change a cataloged procedure, the overwrite statement must have a symbolic name in col ______ and a code in col ________ .

a. 80, 73-79
b. 73-79, 80
c. No symbolic name or code needed.

3. (True/False) SYSIPT data read from the Procedure Library can be modified by overwrite statements.

4. To modify (alter) a statement during execution of an existing procedure that is cataloged in the PROC library, the overwrite statement must contain which of the following codes in column 80?

a. D
b. B
c. Blank or M ✓
d. A

5. (True/False) An unnamed statement in a cataloged procedure cannot be modified by an overwrite statement.

Auto condense CONDL PL=10 —Maint stores limit in SYSTEM DIRECTORY —use DSERV

rename: RENAME
RENAMR
RENAMS
RENAMP oldname, newname.

6. A procedure called PAY has been cataloged in the PROC library so that it can be executed in any partition (Partition-Related). To execute this procedure in the BG partition, the EXEC statement would contain which of the following:

   a. // EXEC PROC=PAY
   b. // EXEC PROC=$PAY
   c. // EXEC PROC=$BPAY
   d. // EXEC PROC=$$PAY — for BG, system will transform $$PAY into $1PAY for F1 and retrieve $1PAY from PROCLIB
   e. // EXEC PROC=$1PAY

7. (True/False) When the EOP parameter is omitted in a CATALP statement, /* can be used as an end-of-data delimiter in the cataloged procedure. because /+ is default PARM of EOJ

   TRUE

8. The support required to allow in-line SYSIPT data to be processed is:

   a. Basic
   b. Extended

Refer to the Contents for the location of the self-evaluation question answers.

Partition related cataloged procedures

naming convention.

1° $ 2° ch

$ 1° char

B = BG
1 = F1
2 = F2
3 = F3
4 = F4 } 2° char

abcdef 3°-8° chars

in EXEC stmt first 2 chars must be $$

INTRODUCTION TO DOS/VS POWER

This topic introduces DOS/VS in a POWER ENVIRONMENT. It includes the philosophy and operation of POWER including the commands necessary to start, stop, and modify the operation. Partition priorities are re-emphasized and the JECL statements to change job priority within the associated queues for the partition are discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the advantages of using POWER. money/os
2. Given a job stream, determine the priority of job execution in a POWER environment.
3. Use the Queue Management console commands to:
   a. Determine the status of any job in the POWER System.
   b. Hold a job in the INPUT Queue.
   c. Release a job from the INPUT Queue.
4. Prepare the POWER JECL statements that are required to execute a job with the following conditions:
   a. Execute a job in the BG partition
   b. Assign the highest priority to the job

Highlights

- POWER increases job throughput.
- Unit record I/O is performed at disk speeds during job execution.
- Up to four (4) partitions can be serviced by POWER.
- POWER JECL statements provide the facility to:
  - assign priorities to jobs.
  - put jobs in the HOLD state.
  - spool output to tape instead of disk.
  - specify the partition a job is to execute in.
  - prevent spooling of output.
- POWER Console Commands provide the facility to:
  - display the status of jobs in the Queue.
  - alter the priorities of jobs.
  - put jobs in the HOLD state.
  - delete jobs from the Queue.
  - release jobs from the HOLD state.

Troubleshooting Hints

- Determine whether the program only fails in a POWER environment.
- Use charts in SADP manual, Section 3, that relate to POWER operations for problem determination.
- Display the Queues to determine the status of the Input, Punch, and/or Print queues.
- Investigate all POWER messages involved with an error.

- To read more job streams from SYSRDR after it has run out, press the REQUEST and END keys.
- Change partition priorities if possible when running diagnostics to speed up input/output processing.
- If restarting POWER is necessary, the response to the message FORMAT QUEUES? should be an EOB/END to prevent formatting the DATAFIL and QFILE and consequent loss of data (If possible, have customer start up POWER).

Activity

IN: DOS/VS Operating Procedures
UNDER: Concepts and Components of DOS/VS * $$ JOB
READ: POWER 38 39 40 * $$ EOJ

UNDER: Using POWER 89
READ:
- 90 Initializing POWER
- Starting a POWER-Supported Partition
- Issuing POWER Commands
- 96 Terminating POWER

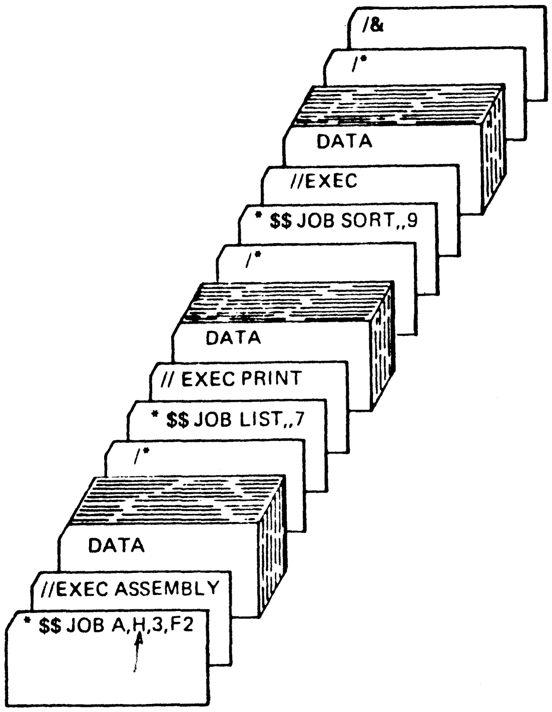
UNDER: POWER Commands (Routine and System Management)
REVIEW:
- 96 START
- STOP
- CANCEL
- DISPLAY
- 96 TERMINATE

UNDER: POWER Commands (Queue Management)
REVIEW:
- 110 ALTER
- DISPLAY
- HOLD
- 116 RELEASE

IN: DOS/VS SADP
UNDER: Hard wait with Message in Low Address Storage (Chart 03, part 1 of 1)
- Check 1
- Check 14
  (Charts 13, 2 parts)
- Checks 1 through 4

SELF-EVALUATION QUESTIONS

Use the following job stream as a reference to answer questions 1 and 2.



1. Which job will execute first when this job stream is read into the INPUT QUEUE?

   a. JOB A
   b. JOB LIST
   c. JOB SORT

2. What partition will JOB SORT execute in?

   a. F2
   b. BG
   c. F1

3. Which one of the following commands would you use to determine the status of the jobs in the F2 INPUT QUEUE?

   a. DISPLAY F2RDR,ALL
   b. D F2RDR,ALL
   c. D F2RDR,QUEUE
   d. D F2RDR,H

4. Which one of the following commands would you use to prevent any more jobs with a priority of 5 from executing in the BG partition?

   a. H BGRDR,5
   b. P BGRDR,5
   c. H BGPRT,5
   d. H BGPUN,5

5. Which one of the following commands would you use to release all the jobs in the BG print Queue from the hold state?

   a. R BGPRT,5
   b. R BGPUN,ALL
   c. R ALL,BGPRT
   d. R BGPRT,ALL

6. Which of the following statements is true for a job running in the POWER environment?

   a. The Punch Task intercepts the punch output and spools them to disk.
   b. The Print Task is responsible for spooling output records to disk.
   c. More jobs can be processed in a given amount of time.

Refer to the Contents for the location of the self-evaluation question answers.

SYSTEM RESIDENCE ORGANIZATION

The system residence pack is the major component of a DOS/VS system. The components comprising the SYSRES pack are discussed as to location, size, purpose and format. These components will be referenced over and over again throughout the course. It is important to gain at least a talking knowledge of the system pack components at this time. Also included will be discussions of private libraries and label information required for disk.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Identify the four libraries of a DOS/VS system residence file and the directories associated with each library.
2. Give the fixed disk address assigned to each of the following system residence components:
   a. Core Image directory 000101
   b. Volume label 000003
   c. IPL records 000001
3. Identify the library on the system residence or private pack from which programs are executed by the DOS/VS system. CLB
4. Identify the library on the system residence pack where object decks from all IBM compilers can be stored. RLB
5. Identify the library that can be used as input by the assembler or COBOL language translators. SSL
6. Identify the DLBL and EXTENT parameters required to define files on disk.

   DLBL N, FileID, date, Type
   EXTENT. sym, #, 1, 0, 40, 20.

Highlights

- Four libraries may exist on SYSRES. They are the core image, relocatable, source and procedure.
- SYSRES can be on a 2314/2319, 3330 or 3340.
- Private libraries can be on anything except 2321.
- Private libraries can take many shapes. For example:
  - All privates on one pack.
  - Each private on its own pack.
- SYSRES will always contain a core image library, but not necessarily a relocatable, source or procedure library.

Activity

IN:	DOS/VS System Control Statements	
UNDER:	Job Control Statements and Commands	
READ:	EXTENT	p34
	XTENT	p52
	DLBL	p29
	DLAB	p29
	VOL	p51

IN: DOS/VS Librarian Logic

UNDER: p19 System Residence Organization and Private Libraries

READ: p19 System Residence Organization After Generation

to

p43 Librarian Organization Program

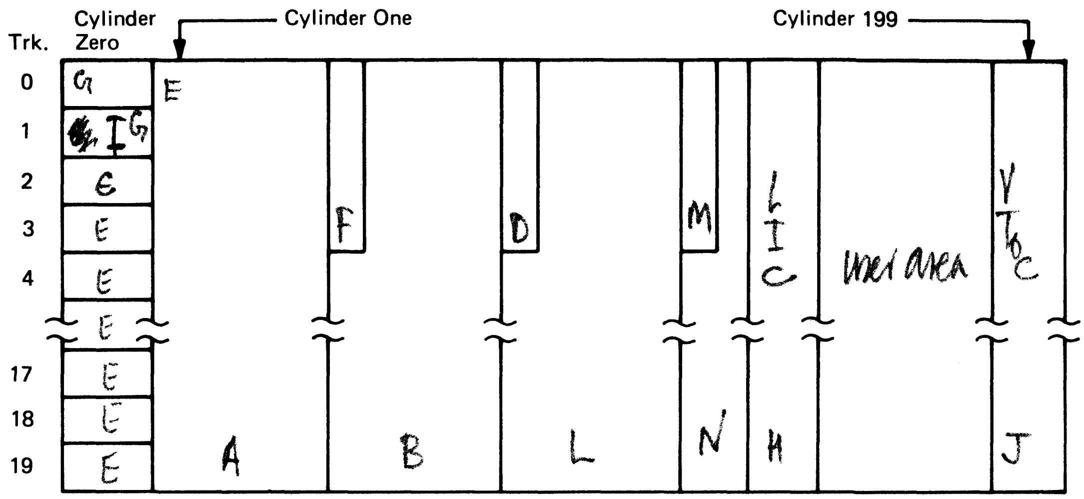
NOTE: The content of each directory entry, etc. is not important at this time. Concentrate on the use or function of all items.

IN: DOS/VS Base SCM 1

STUDY: System Residence Organization Section

SELF-EVALUATION QUESTIONS

1. The figure below is a representative layout of a 2314 SYSRES file. Place in the various areas of the figure, the letter representing that area from the list below.



[FE 121549]

a. Core Image Library
b. Relocatable Library
c. Volume Label
d. Source Directory
e. Core Image Directory
f. Relocatable Directory
g. IPL Records
h. Label Information Cylinder
i. System Directory
j. Volume Table of Contents
k. User Area
l. Source Library
m. Procedure Directory
n. Procedure Library

2. Programs are executed from the CIB ____________ library.

3. (True/False) The library sizes are determined by the customer.

4. The assembler looks in the SSL _________ library if it encounters a macro statement.

5. Object programs assembled by compilers may be stored in the ________RLB____ library.

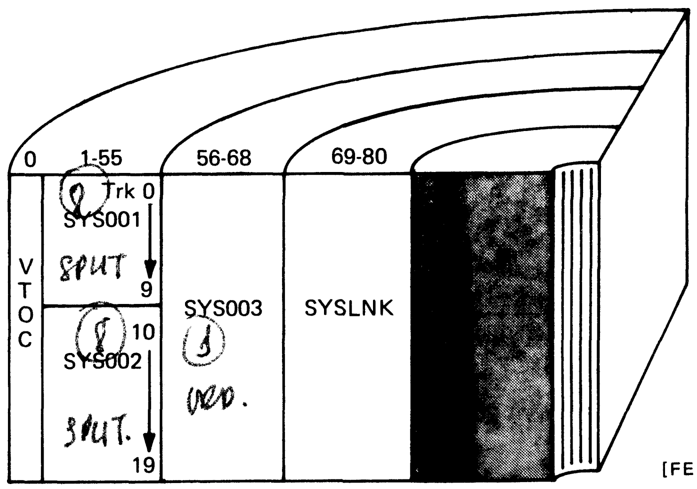
6. The optional library (libraries) on the system residence pack are:

a. Source, relocatable and procedure.
b. Relocatable, core image, and procedure.
c. Core image, source and relocatable.
d. Relocatable, procedure, core image, and source.
e. Core image, and procedure.

7. There can be private libraries associated with which of the following libraries?

a. Relocatable.
b. Core image.
c. Source.
d. All of the above.

8. Study the following figure of a desired 2314 work pack layout. Then code the DLBL and EXTENTS following the figure.



[FE 121550]

```
// DLBL  IJSYS01 ,'DOS.WORKFILE.NO.1',99/365,
// EXTENT SYS001,111111,8,1,20,550,9
// DLBL  IJSYS02 ,'DOS.WORKFILE.NO.2',99/365,
// EXTENT SYS002,111111,8,1
// DLBL  IJSYS03 ,'DOS.WORKFILE.NO.3',99/365,
// EXTENT SYS003,111111,1,1,
```

Refer to the Contents for the location of the self-evaluation question answers.

RMS AND DUMPS

This topic introduces the methods and programs available to the PSR to extract data from a system that will be used in problem determination. It will include operator commands to alter, display, or dump and the method of generating a standalone dump program from the DUMPGEN facility. Concepts of wait state, error recording, and retrieval (EREP) are also covered, along with the use of operator and programmer flowcharts in the Serviceability Aids and Debugging Procedures Manual.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Identify the control cards and parameters needed for the DUMPGEN program, when given user specifications.
2. Interpret a formatted dump which was generated from the DUMPGEN program.
3. Analyze all low core wait state messages.
4. Identify the function of the options for the EREP program for DOS/VS.
5. State the difference between a 'soft' and a 'hard' machine check error.

Highlights

- Formatting or non-formatting standalone dump programs tailored to system requirements can be generated through the use of the DUMPGEN program.
- Problem determination charts aid in determining a hard wait, soft wait, looping, and incorrect results.
- The SYSREC file established at SYSGEN time records errors for both I/O and CPU malfunction.
- EREP is used to retrieve error data from SYSREC in a useable form.
- Logout Analysis on the 370/125 and 370/115 is the vehicle to gather error data on all but channel connected devices.
- ALTER, DSPLY, and DUMP are commands used to gather and modify system information and hard wait failures.
- DUMPGEN produces a customized standalone program used to obtain a formatted/non-formatted dump of storage.

Troubleshooting Hints

- Investigate all error messages and use SADP flowcharts wherever possible to assist in problem determination.
- Utilize EREP to gather I/O related data on 'hard' waits.
- Interpret low-core messages.
- Obtain a core dump using the standalone program generated by the DUMPGEN facility.

- Run SEREP if the low-core message contains a SEREP run request (E2 in byte 1).
- Never use a standalone dump generated on another system, as the non-critical area of the Supervisor that DUMPGEN uses may be at different addresses.

EROS - environment recorder dataset   symbolic name = SYSREC

Activity

IN: DOS/VS SADP
UNDER: Dumps of and Changes to Real and Virtual Addresses
READ:
2.6 2.7 ALTER   AR ALTER 0408200   AR DSPLY
2.8 2.9 DSPLY   AR 00620000   AR DSPLY
2.10 2.11 DUMP   S, BG, Fn, PDAREA, xxxxxx-xxxxxx
BG5 Fns

READ:
2.12 // OPTION DUMP Statement   by OP or when CANCEL's
SYSTEM Dumps → 2 must be CATALOGED
2.17 2.18 DUMPGEN & Standalone Dump   1 - SA   2 - Translating

UNDER: Hardware Error Recording & Recovery
READ:
2.187 General Description of RMS 2.188
Operation and ERPs for I/O Devices 2.198
1.21 → 1.24
SYSREC File 2.199
EREP 2.207
SEREP 2.226

READ: Section 4 (Debugging Procedures for the Programmer)
- Flowcharts for Hard Wait State 4.7 4.8
- Flowcharts for Soft Wait State 4.9

DT11W HARD WAIT CODE = {AB CD EF GH}

SELF-EVALUATION QUESTIONS

1. If the recording file is not ready at IPL time, the:

   a. Recording file will not be maintained.
   b. ✓ Operator will be informed to put recording file online to continue.
   c. Operator will be informed, but may hit EOB/END to bypass.
   d. Operator is not informed.

2. OPTION CLEAR specifies that the EREP program should:

   a. Clear MDR records from SYSREC.
   b. ✓ Clear all records from SYSREC, and edit and print.
   c. Clear SYSREC pack.
   d. Clear MDR and MCAR/CCH from SYSREC.

```
// JOB FORMAT                          // JOB NOFORMAT
// EXEC DUMPGEN                        // EXEC DUMPGEN
ASSGN SYSLST,X'00E' b default          ASSGN SYSLST,X'00F' b
OPTN FORMAT=YES b                      OPTION FORMAT=NO b default.
OPTN DECKS=1 b default                 OPTN DECKS=1 b default      OPTN PPOOL={YES NO}
/*                                     /*                          b
/&                                     /&
```

3. The DOS command that must be given to ensure all error recording data is written on the error file before the system is powered down is:

   a. EREP
   b. IPL
   c. HALT
   d. ROD

4. A 'soft' wait on S/370 will respond to the ________ key on the typewriter console.

   a. EOB/END
   b. REQUEST
   c. IPL
   d. CANCEL
   e. RETRY

5. (True/False) The PPOOL option for the DUMPGEN program defaults to NO if it is not included in the job stream.

6. To have DUMPGEN produce a standalone dump on tape, you must:

   a. Code TAPEIPL=YES in an OPTN statement.
   b. Assign SYSLST to a tape drive.
   c. Code INTR=YES in an OPTN statement, then when the system enters the WAIT state, make the desired tape drive ready.
   d. Assign SYSPCH to a tape drive.

7. To get a dump using the DUMPGEN program that gives the supervisor tables and boundary box, the parameters that must be set are _______________ .

   a. FORMAT=YES
   b. PPOOL=NO
   c. FORMAT=NO
   d. INTR=YES
   e. PPOOL=YES

8. (True/False) The original information in bytes 0 through 23 is destroyed when a dump is loaded into storage.

9. Choose from the following list the error types that are cons sidered <u>soft</u> machine checks.

   --- a. Retry
   --- b. Storage Protect key failures
   --- c. Multiple bit storage errors
   --- d. Single bit storage errors

10. The system is in a wait state with a low core message of X'C8E2C9'. The appropriate action to take is:

p4.6

a. Run EREP.
b. Ignore and continue processing.
c. Run SEREP.
d. Issue the DUMP command.

Refer to the Contents for the location of the self-evaluation question answers.

C8 E2 C9

Ch. fail run Serep Sysres incomplete

PHYSICAL INPUT/OUTPUT CONTROL SYSTEM (PIOCS)

This topic introduces the concepts of the Macro System and presents the PIOCS coding (macro) employed in a problem program that will cause the issuance and testing of an I/O request. The need for specific PIOCS control blocks within the problem program and their relationship with the supervisor, are discussed. Selected Supervisor macros are also presented.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Correct improper usage of EXCP, CCB, and WAIT macros used to control a card reader, printer, console printer, or tape for any given operation.
2. Identify selected problem program option bits in a CCB and state the function of each.
3. Correct improper usage of the Test Under Mask and Branch On Condition instructions when used to detect a carriage overflow on a printer and then cause a skip to ONE.
4. Use the PDUMP macro in an assembler source program to cause the printing of any given CCB during execution of the assembled program.
5. State the function of the following Supervisor macros:
   DUMP
   PDUMP
   JDUMP
   EOJ
   CANCEL
   RELEASE

Highlights

- A source program macro is a single assembler language instruction that will generate a number of additional assembler language instructions through reference to a macro definition.
- Macro definitions are stored in the source statement library.
- IBM supplies three PIOCS macros to simplify coding of I/O requests. They are EXCP, WAIT, and CCB.
- All I/O requests are issued by an SVC 0 (EXCP Macro).
- All I/O requests require a Command Control Block (CCB).
- Use of the SVC 7 (WAIT Macro) ensures that all data is transferred from the I/O device before any processing of the data by the program is attempted.

Source Pgm macros — supervisor
IOCS — imperative GET, PUT, WRITE, READ
declarative DTF - LIOCS - SAM / DAM - DTFDA / ISAM - DTFIS
PIOCS → DTFPH

Troubleshooting Hints

- On issuance of an I/O error message with an OP prefix, the CCB address is normally printed with the message.
- Register 1 normally points to the last used CCB, bytes 9-11 of the CCB point to the first CCW, and bytes 2-3-4 of the CCW contain the I/O area address.
- The contents of the Channel Status Word (CSW), except for the storage protect key, are put into the CCB on an I/O interrupt.

macro models of SH

Activity

IN:	DOS/VS Supervisor and I/O Macros Source pgm macros
UNDER:	Macro Types and Their Usage 11 imperative declarative
READ:	Source Program Macros Superv. IOCS
	Macro Definitions
	Supervisor Macros
	Macro Processing 12
	Notational Conventions 14
	Register Notation and Register Usage 21
UNDER:	Physical IOCS Macros 249 Distinct from Logical IOCS of DAM SAM ISAM VSAM
READ:	CCB Macro 249
	CCB Format
	EXCP Macro
	WAIT Macro 254
UNDER:	Supervisor Macros 265
READ:	DUMP 282
	PDUMP 283
	JDUMP 283
	EOJ 284
	CANCEL 284
	RELEASE 276.
IN:	DOS/VS Base SCM 1
	Physical Input Output Control System (PIOCS) Macros

SELF-EVALUATION QUESTIONS

1. The notation convention that indicates a parameter is required is:
   a. [ ] brackets
   b. ..... ellipsis
   c. { } braces
   d. ________ underlined

2. What is the assumed value for the following macro parameter?

$$\left\{\begin{matrix} \text{ABC} \\ \text{DEF} \\ \text{GHI} \\ \text{JKL} \end{matrix}\right\}$$

a. ABC
b. DEF
c. GHI
d. JKL
e. None of the above

3. The CCB that will cause a record to be read from SYSRDR using a command-list-name of GO is ________________ .

a. RD CCB SYSRDR,GO
b. CCB SYSRDR,RD,GO
c. GO CCB SYSRDR,RD
d. RD CCB SYSRDR,RD
e. None of the above

4. When a WAIT macro is issued in a batch job environment, processing is suspended until the _______ bit is turned on.

a. CHANNEL-END
b. DEVICE-END
c. TRAFFIC BIT
d. CCB
e. TRANSMISSION BIT 5 of BYTE 2

5. ? (True/False) A CCB cannot be in a logical stream of mnemonic instructions because it contains constants (no mnemonic instructions). True.

6. The following is an example of a CCB that may appear in a storage print. What symbolic unit is this CCB for?

0 1 2 3 4 5 6 7
01068000 A0000006 00002800 00002820
SYSREC

a. SYS006
b. SYSREC
c. SYS016
d. SYS106
e. None of the above

7. Code the PDUMP macro to print the entire command control block CCB SYSIPT,RDCCW,X'0400',SENSE whose symbolic name is "READ".

____

PDUMP READ,READ+24

8. (True/False) A problem program terminates normal processing by loading the Job Control program deck into storage from SYSRDR.

9. The CCB that is correctly coded to print on SYSLST, using a CCW chain with the name of PRTCCW, wait for device end, and accept unrecoverable I/O errors is:

```
a.   PRINT    CCB  SYSLST,PRTCCW,X'1004'  X
b.   PRINT    CCB  SYSLST,PRTCCW,X'4010'  X
c.   PRINT    CCB  SYSLST,PRTCCW,X'1400'  <- ✓
d.   PRINT    CCB  SYSLST,PRTCCW,X'4100'  X
e.   PRINT    CCB  SYSLST,PRTCCW,X'4400'  X
```

10. Assume that a printer CCB named PRINT has been coded correctly to wait for device end. The TM instruction that could be used to determine if a channel 9 in the carriage tape of a 1403 printer has occurred is:

```
  a.   TM PRINT+3,X'02'
  b.   TM PRINT+2,X'04'
? c.   TM PRINT+4,X'04'
  d.   TM PRINT+4,X'01'
  e.   TM PRINT+2,X'40'
```

11. In the CCB example for question 6, the address of the first CCW for the CCB is X'____' and that of the last one executed is X'_____'.
? 101800 → 1028200

12. Prior to scheduling an I/O request, the supervisor will reset which of the following bits in byte 2 of CCB?

___ a. 0,1,2
___ b. 3,4,5,6,7
? ___ c. 0
___ d. 0,2
___ e. None of the above ✓ M

13. Match the CCB Fields shown below with their respective information Source Fields.

1 NONE	a.	Count (bytes 0 and 1)	1.	CSW
4 ___	b.	Transmission information (bytes 2 and 3)	2.	First operand in CCB macro
1 ___	c.	CSW status bits (bytes 4 and 5)	3.	Second operand in CCB macro
? 2 ___	d.	Symbolic unit address (bytes 6 and 7)	4.	Third operand in CCB macro
3 ___	e.	CCW address (bytes 9-11)	5.	Fourth operand in CCB macro
1 M ___	f.	CCW address in CSW (bytes 13-15)		
4 ___	g.	Optional sense CCW (bytes 16-23)		

14. (True/False) Bytes 16 to 23 of a CCB (if present) will contain sense information at the completion of an I/O operation.

15. (True/False) When the 'savearea' operand is specified in a RELEASE macro, the contents of Registers 0 and 1 will not be changed during execution of this macro.

will be saved and changed.

16. Which of the following macros can provide a dump of a problem program CCB?

--- a. DUMP
--- b. JDUMP
--- c. PDUMP

Refer to the Contents for the location of the self-evaluation question answers.

PIOCS MESSAGES

This topic briefly reviews low core wait state messages issued during IPL or program execution and discusses the use of 'OP' type messages to determine if an I/O failure is caused by hardware or software.

The importance of system messages (printed or low core) cannot be over-emphasized.

A print 'OP' message is usually the first visual indicator to the system operator that a problem has occurred on an I/O device.

An I/O error may also be indicated when a system operator observes that the system is in the wait state. Prior to entering the wait state (due to a device error) the supervisor, if possible, will place a message in low core that describes the problem.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Use a PIOCS error message to locate any CCB for any I/O device.
2. Locate the following items in a given PIOCS error message:
   - Message number
   - Action code
   - Operator code
   - Message text
   - Logical unit that failed
   - Device address that failed
   - Command code of the last CCW executed
   - CSW
   - Sense bytes
   - CCB address
   - Seek address if DASD
3. Locate and interpret a low core message when the system enters the wait state, and take the necessary corrective action as indicated by the message.

Highlights

- Device error messages may be printed or stored in low core.
- DOS/VS uses a fixed format message code.

CCB is 16 bytes in DTF LIOCS.
CCB is macro when PIOCS.
If IC of PSW is 00,07 then Reg1 → ADDR CCB.

when PIOCS macros. EXCP, WAIT etc.
used; DASD & TAPE files with SL
need to be defined by DTFPH.

DTFPH must be used for CHKPT file on DASD.
[name] DTFPH TYPEFLE=xxxx][,ASCII={NO YES}]
[,CCWADDR=xxx xxxxx][DEVICE= TAPE 2311 2314 2321 2330 3340 3350]
[DEVADDR=SYSxxx]
[HDRINFO=YES]
etc.

Activity

IN:		DOS/VS Messages
READ:		Section on Message Code
	4φ5	-Appendix 1
UNDER:		Supervisor and IPL Messages
REVIEW:		Message Contents
IN:		DOS/VS Serviceability Aids and Debugging Procedures
	2.2	Section 2: Serviceability Aids
UNDER:		Section E 'Other Aids used for Gathering Information' 2.365
REVIEW:	2.176 2.180	WAIT STATE MESSAGES into unaddress code: 1. I/O device error. 2. H/W fail during IS SYSLOG. 3. unrecoverable I/O during FETCH so: 24 bytes at MS 04
IN:		DOS/VS BASE SCM 1
UNDER:		PIOCS Messages
REVIEW:		PIOCS Messages

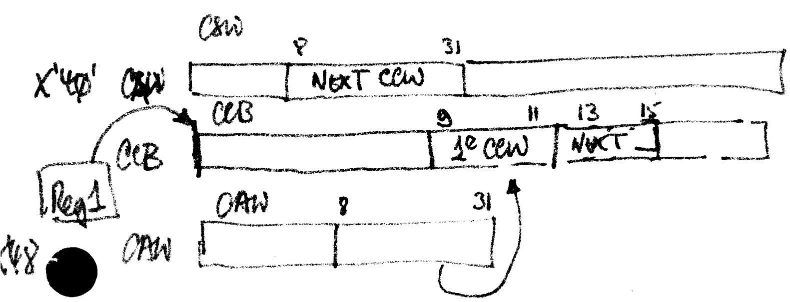
e.g.
10 C4 01 32 01 00
ccuu
msg: OP10 D

SELF-EVALUATION QUESTIONS

1. Match the ELEMENTS of the following 'OP' message with their indicated VALUES.

```
OP11D R DATA CHECK SYSLINK=190
     CCSW=1D00002EC80E400008 CCB=002E50 SK=000000BE0002
     SNS=080000C80000
```

		ELEMENTS	VALUES	
---	a.	Message Number	1.	2EC8
---	b.	Message describing I/O error condition	2.	190
---	c.	Symbolic unit that failed	3.	11
---	d.	Address of hardware device	4.	080000C80000
---	e.	Sense data	5.	DATA CHECK
---	f.	CCB address	6.	SYSLNK
---	g.	Disk address that failed	7.	1D
---	h.	CCW command code that failed	8.	2E50
---	i.	Address of CCW that failed	9.	SYS190
---	j.	Action code	10.	R
			11.	000000BE0002
			12.	2EC0
			13.	D



after DUMP unreliable

unaddress 04 F0 C9 F1 F1 C1
0 I 1 1 A

2. The system is in the wait state and a low core message of X'11C1000C' is displayed. The problem is:
OP11A DATA CHECK ON 00C

a. Command reject on 00C
b. Data check on 0C1
c. Data check on 00C ✓
d. Data check on SYS012
e. Equipment check on 00C

3. If a low core message of X'08C1001F' was displayed when the system entered the wait state the problem is probably:
OP08A INT REQ 01F

a. A data check on the card reader (00C)
b. A data check on the console typewriter (01F)
c. A busout check in the card reader (00C)
d. A busout check on the console typewriter (01F)
e. ? The console typewriter (01F) probably out of forms — UNIT CHECK N INTERVEN.

4. If the system message 'OP71I' is issued, the address of the CCB for the device that failed can be found:

a. By displaying Register 0 on the CPU.
b. In the I/O old PSW.
c. In the I/O new PSW.
d. By obtaining a storage print and looking in Register 1. ✓
e. None of the above.

5. Physical IOCS messages consist of eight major elements. Which of these elements can be used to locate the CCW command code for an unsuccessful I/O operation?

a. Message number
b. Operator code
c. SYSXXX=
d. CCSW=
e. SNS=
f. CCB=
g. SK=

6. If the CPU enters a wait state after IPL time and there is no low core or operator messages, the problem could be a:

a. Unit check on SYSLOG. NO = 08C1001F
b. Unit check on SYSRES. NO = 08C10350
c. Unit check on SYSRDR. NO = 08C1000C
d. Missing interrupt. ✓
e. Program check in supervisor. NO = 0000 0F FF

7. (True/False) An operator can respond to the following message with 'IGNORE'. PROBABLY more than 1 set file mark.

? What

BG OP181 C COMM REJCT SYSRES=190
CCSW=1F1000204802000001 CCB=002018 SK=000000000000
SNS=801000C80000

ADR

SET FILE MASK

CMD REJ

INVAL SEEK

UNIT CHECK

BUSY ONLINE PROG CMNS.

C8 E2 C9

Channel failure, no recp, Async recording incomplete, Codes in ECSW invalid

8. The system is in a wait state and the low core message X'C8E2C9' is displayed. The problem is:

   a. Channel failure, codes in ECSW are invalid and error recording on SYSREC was successful.
   b. Channel failure, channel address invalid and error recording on SYSREC was partially successful.
   c. Channel failure, channel address invalid and error recording on SYSREC was successfully recorded.
   d. Unrecoverable machine check that was recorded on SYSREC successfully.
   e. Unrecoverable machine check and error recording on SYSREC was partially successful.
   f. None of the above.

Refer to the Contents for the location of the self-evaluation question answers.

LINKAGE EDITOR CONTROL STATEMENTS

Getting a problem program into storage involves the use of: the output from a language translator, the linkage editor program and its associated control cards, the core image directory and library, and the supervisor fetch routines.

This topic will introduce the student to these items by using a simple two-phase program. Use of the linkage edit map as a diagnostic aid will also be covered in the two-phase environment.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Define and give an application for the following terms:
    - Control section
    - Source module
    - Object module
    - Program phase
    - Program
2. Use the following linkage editor control statements to construct a multiphase program using object modules from SYSIPT.
    - Phase
    - Action
    - Include
    - Entry
3. Recognize and correct any improper logic when using FETCH or LOAD macro.
4. Use the job control option of LINK or CATAL as required to make any linkage editor output either temporary or permanent in the core image library.
5. Identify the parameters necessary to cause the Linkage Editor to produce Relocatable Phases.

Highlights

- PHASE card is used to name a phase and specify its load address.
- The INCLUDE card, ~~if~~ it has a blank operand field, signals job control to read an object module from SYSIPT and place it on SYSLNK.
- The INCLUDE card can be used to retrieve object modules from the relocatable library for inclusion into a phase.
- The ACTION card is used to specify various linkage editor options, (clear, map, cancel, etc).
- The ENTRY card can specify an entry point into a phase and signals the end of input on SYSLNK.
- In a multiphase program, a FETCH or LOAD macro must be issued to load each succeeding phase of a program after the first phase is placed in core.
- Job control loads the first phase of a program.

Troubleshooting Hints

- Investigate all error messages in the operator's guide.
- Use the linkage editor map to determine the load address, relocation factor, entry point and CSECTS in a program.
- The failing object deck card will be printed alongside the error message on SYSLST.
- Linkage editor error messages print on SYSLST. If NOMAP is operational, no error messages will print.

Activity

IN: System Control Statements
READ: LINKAGE EDITOR through ACTION STATEMENT 97-110

SELF-EVALUATION QUESTIONS

PC? 1. An unnamed START statement in a source module will result in a ___PC___ code generated in the ESD output.

PC? 2. A named CSECT statement in a source module will result in a __________ code in the ESD output.

3. A control section (CSECT) is defined as ________________

____

____.

4. Cross-referencing between control sections is performed by a program known as ______________________.

EXTRN 5. An ER entry appearing in the ESD is the result of having proccessed a ________________ statement.

6. List the three methods of defining an entry point into a phase during linkage editing.

   a. ____

   b. ____

   c. ____

7. How can a problem program override the entry point established during linkage editing when fetching another phase?

____

8. How can you indicate that the linkage edit output is to be permanently cataloged into the core image library? ______

ACTION=REL
OPTION=

____

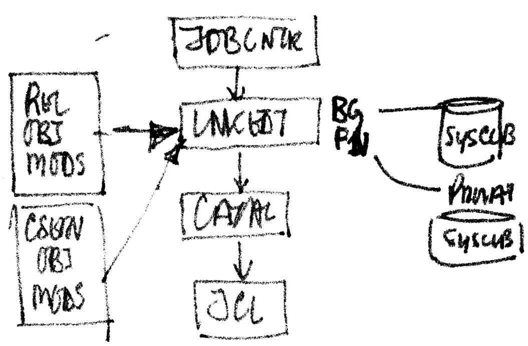
```
// OPTION LINK
  PHASE PAYROLL,S
  INCLUDE, (CSECT1,CSECT3)
     (Object Module 'Mainline')
/*
 INCLUDE PTIME
 // EXEC LNKEDT
 // EXEC
```

9. The preceding cards will cause a program called __________ to be entered into core at ______________________________. This phase will consist of _________and__________of the _________module, and _________ of the _________module.

10. A phase will not be made relocatable if the PHASE card specifies origins of__________ or _______________or if the ACTION card has the ________________option coded.

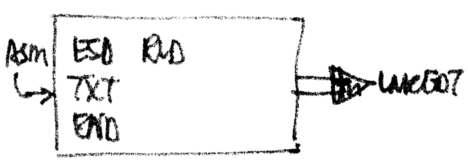
Refer to the Contents for the location of the self-evaluation question answers.

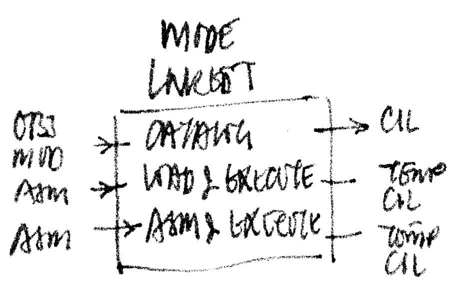
1. will produce relocatable phases whenever possible by inspecting PHASE stmt.



2. LNKEDT stmts (A) read an i/p mod, produce phase
(B) rel-fac. for each CSECT is saved in CNTR DICTIONARY
(C) module TXT cards built into phase blocks.
RLD items are modified & inserted.

ESD. Cover def & references when all together resolution can be made.
SD section definition NAME ORIGIN LNGTH
WX weak
PC private code
LD label def
ER EXTRN or V-type generation.
CM eg: COM assembler instr.
RLD [illegible] to be modified on relocation like ADCONS





LNKEDT CNTR STMTS.
PHASE name + load addr in CIL
INCLUDE.
ENTRY - option transfer addr for 1° phase
ACTION options?

LINKAGE EDITOR OPERATION

Multiple phases exist in many IBM supplied programs, and the ability of the PSR to trace the flow of control through these phases is a necessity in program troubleshooting.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Determine the phase currently in core, the calling phase and the next phase to be fetched when given a multiphase program listing and linkage editor map.
2. Define trouble to a specific phase and submit an accurate APAR to report this failure.
3. Use a linkage editor map to locate program phases in core when their assembled addresses on microfiche do not agree with the core locations.
4. Given a linkage editor map, draw a core layout showing the location of all phases in the program.
5. Given a card deck with control card errors, linkedit and execute the program by eliminating all errors.
6. Identify the directories on SYSRES which are affected during a linkage editor job stream when the following control statements are processed.

    // OPTION LINK PL all phases Temp cat in CIL
    // OPTION CATAL
    // EXEC
    // EXEC (OPERAND) CIL

Highlights

- Programs are composed of one or more phases and a phase may be composed of one or more control sections.
- When using assembler language, a control section is defined by START or CSECT statement.
- The output of all language translators, Assembler, COBOL, etc, contain the same format object module consisting of ESD, TXT, RLD, and END cards.
- The linkage editor always goes to SYSLNK for its input.
- The job control OPTION card parameter for LINK causes all phases in this job step to be temporarily cataloged in the core image library, and they cannot be brought into storage after a /& or // Job card is read.

Troubleshooting Hints

- Sequence of card types in an object module are ESD, TXT, RLD, END.
- Each object card has a type identifier in card columns 2, 3, and 4.
- Each card in an object module is sequence numbered in card columns 77-80.
- Use a REP card to correct bad data in an object deck.
- The REP card must occur after the data to be replaced. Usually placed just before END card.

Activity

IN:	DOS/VS System Control Statements
UNDER:	Linkage Editor
READ:	Linkage Editor Input Considerations through Example of Linkage Editor Input and Output
STUDY:	Figure 'Storage Map' (Part 1 and Part 2) and associated text.

IN:	DOS/VS Librarian PLM
UNDER:	System Residence Organization and Private Libraries
READ:	System Directory through Core Image Directory

SELF-EVALUATION QUESTIONS

1. Place the following steps of a job in the proper sequence.

--- a. Code and assemble PHASE1; use the fetch macro.
--- b. // EXEC PHASE1 is read by job control.
--- c. Code and assemble PHASE2; use the EOJ macro.
--- d. PHASE1 is loaded and executed through to the FETCH PHASE2 macro.
--- e. Construct control cards and perform a linkage edit run.
--- f. Supervisor loader loads PHASE2 into core from CI library.
--- g. Supervisor loader searches the core image directory for PHASE2.
--- h. PHASE2 executes through to the EOJ macro.
--- i. Supervisor loader branches to the entry point in PHASE2.

2. From the following linkage edit map, list:

   a. the names of all phases.
   b. the storage locations they will be loaded into.
   c. the entry point address of each phase.
   d. the disk storage address where each phase is stored.

PHASE	XFR-AD	LOCORE	HICORE	DSK-AD	ESD TYPE	LABEL	LOADED	REL-FR
COMMON					COM		020000	000500
PHASE01	020500	020500	020830	30 7 2	CSECT	G01	020500	008500
PHASE02	020880	020880	030870	30 8 1	CSECT	G02	020880	020880

PHASE NAME	CORE LOCATION	ENTRY POINT	DISK ADDRESS

3. What symbolic units must be assigned to perform an assemble and execute operation?______________________________

   ____

   ____

4. If SYSLOG prints the message 2I99I, it means that__________

   ____

Refer to the Contents for the location of the self-evaluation question answers.

VIRTUAL STORAGE CONCEPTS

This topic introduces the student to the basic DOS/VS system functions and concepts that are required to successfully IPL, load the Supervisor and Job Control, and then transfer control to either a real or virtual problem program. Presentation and discussion is limited to a general and conceptual development of the need for the various functions and services provided by the supervisor, page manager, operator commands, and macros in a virtual environment.

Development of the need for these functions and services, and familiarization with their associated terminologies will provide the student with a basic overview of system operation that will be of considerable benefit during the remaining topics of this course.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Describe, in logical sequence, and using conceptual terms, the basic DOS/VS system functions and services required to IPL, load the Supervisor and Job Control, and execute a real or virtual mode program.
2. Identify the status and/or location of any DOS/VS virtual or real partition page when given its corresponding page table entry.

Activity

IN:	DOS/VS SCM 1
UNDER:	VIRTUAL STORAGE CONCEPTS
STUDY:	The figures as indicated while reading the following text.
READ:	The following:

Refer to the Figure Titled: DOS/VS SYSTEM FLOW OBJECTIVES

- This figure identifies the basic DOS/VS system functions in flowchart sequence that are to be discussed in conjunction with the remaining referenced figures of this topic. Study the chart before proceeding until you have a basic understanding of the functions that are to be discussed. Refer to this figure at any time that you lose the overview of what is being presented.

Refer to the Figure Titled: DOS/VS IPL FUNCTIONS

- IPL is loaded 1 and executes in real storage as a single partition system in the supervisor state with DAT off.

- IPL moves to high storage (2) and the Supervisor is loaded into low real storage by IPL (3) . It remains there permanently (it is never paged out). The supervisor initially contains two temporary routines (INITDAT and INITPT) in the CCW translation copy buffer area that are executed at IPL time to initialize DAT and the page management tables. After IPL these routines are overwritten and never used again.

- After the supervisor has been loaded during the execution of IPL, the INITDAT routine (in the supervisor) is entered (4) . This routine initializes ALL system page tables (5) and page frame tables (not shown). It then activates DAT in the supervisor (this is the one and only time that this routine is ever executed.)

    - Page table entries for all of the real address space are loaded with the 13 high order bits of the real addresses for the page frames associated with each page table entry.

    - Page table entries for <u>virtual</u> address space are invalidated (set to X'8001'). These entries are invalidated because an address higher than that of available real storage should never be referenced during execution of IPL.

    Remember -- DAT is ON in the Supervisor during IPL, and therefore addresses are being translated during any execution of supervisor code. If a virtual address space page table entry should erroneously be referenced during this time, an addressing exception program check will occur because of the high order bit being ON in the PT entry.

- After INITDAT has been executed IPL waits for the operator to enter the IPL Control Commands via the communications device (either SYSLOG or SYSRDR) (6) . The commands that the operator enters are:

    - ADD (optional)
    - DEL (optional)
    - SET (required)
    - CAT (optional)
    - DPD (required)

  The DPD command causes the paging data set (SYSVIS) to be formatted at this time.

- The EOJ transient (End-of-Job) is loaded (7) into the LTA (Logical Transient Area) in the supervisor and executed upon normal termination of all programs (including IPL). EOJ then issues an SVC 59 which prepares the <u>virtual</u> partition to receive Job Control. Remember -- Job Control ALWAYS executes in virtual mode.

Refer to the Figure Titled: FUNCTION OF THE INITPT ROUTINE

- During the execution of EOJ that terminates IPL, the INITPT routine (in the supervisor) is entered (1) prior to the execution of the normal SVC 59 routine. (This is the only time that this routine is executed.) This routine initializes ALL virtual and real page table entries (2) to reflect the system allocations as specified at SYSGEN. All page frame table entries (except those for frames in which the supervisor resides) are also initialized by this routine to the 'unused' state (not shown).

- After the INITPT routine has been executed at the termination of IPL, control returns to the EOJ transient which then issues an SVC 59 to prepare BGV for Job Control (not shown). The specific functions of the SVC 59 will be discussed later in this topic.

- The BOUNDRY BOX (located in the supervisor) supplies the INITDAT and INITPT routines with the necessary system specifications which they require for initialization of the page management tables. The boundry box entries are filled in (loaded) during SYSGEN and are available in the supervisor when it is loaded into storage during IPL.

- An SVA (Shared Virtual Area) (7) is generated in all DOS/VS systems at the Release 29 (or later) level.

- SVA size can be specified via the VSTAB macro at SYSGEN time. If none is specified, a minimum of 64K SVA is always generated.

- Even though generated, the SVA in a single partition batch system is not available to the user (customer).

Refer to the Figure Titled: LOADING OF JOB CONTROL AFTER IPL

- The final function performed by the EOJ transient is to issue an SVC 4 (Load phase) which transfers control to the FETCH routine in the supervisor (1) . Prior to issuing this SVC 4, EOJ places the phasename of Job Control and the BGV load address (virtual address at which Job Control will be loaded) in registers 1 and 0 respectively. The load address for BGV is obtained from the boundry box.

- The FETCH routine now locates Job Control in the Core Image Library and builds an I/O CCW string to bring in Job Control (2). Since Job Control is always loaded into a virtual partition, in this case BGV, the I/O area addresses in the FETCH CCWs are virtual address area addresses. These virtual addresses cause the FETCH CCW Translation routine to request and TFIX page frame(s) via the page manager (PMGR) (3) . The PMGR interrogates the page table entries that encompass the BGV addresses contained in the CCWs and finds that they are 'invalid' (X'0015') (4) . As a result, the PMGR TFIXes and clears to zero the necessary page frames in real storage (5) . The real addresses of these frames are then placed in the FETCH routine CCWs. The 13 high order bits of the real address for each selected frame are also placed in the PT entry that represents the 2K of virtual code that will be loaded in that frame (6) . Control returns to the FETCH routine (7) which then issues an

SVC0 (EXCP) to execute the I/O CCWs that load Job Control ⑧ . Job Control is now in real storage, but in effect, at a virtual address.

- The TFIXed page frames which now contain Job Control are TFREEd after the I/O operation which loads them is complete ⑨ . These frames could now be paged out to SYSVIS if the page manager should require more page frames than are available. Remember -- page frames are only required to be TFIXed <u>during</u> an I/O operation so as to avoid the possibility of their being paged out before all data has been read into them.

- Depending on the size of the program being loaded, the FETCH routine may not be able to build all the CCWs required to load the entire program at one time. If this is the case, a program FETCH (or LOAD) may require several I/O operations to load an entire program and steps ③ through ⑨ would be repeated until all core image library blocks for the program had been read into real storage.

- After FETCH has completely loaded Job Control into a partition (BGV in this case) control is given to the task selection routine (dispatcher) in the supervisor. Task selection will then activate the partition with the highest priority that is ready to run (in this case BGV).

Refer to the Figure Titled: LOADING A VIRTUAL PROBLEM PROGRAM

- When Job Control is in storage, it processes any JCL statements or commands that may be issued until an EXEC statement is read. At that point the virtual partition in which Job Control is executing (BGV for example) must be prepared to accept the program specified in the EXEC statement.

- Processing the EXEC (by Job Control) loads a routine into registers in the partition Save Area (contained in the first 2K of the partition) with parameters that will be needed by the FETCH routine in the supervisor to load the requested program ① . This save area routine will later issue an SVC 4 which will transfer control to the FETCH routine.

- After the save area routine has been built, Job Control issues an SVC 58 which will initialize the partition to receive the requested program ② . This supervisor resident SVC routine performs the following basic functions when the program to be loaded will execute virtual:

    - All of the virtual partition page table entries are invalidated (EXCEPT the first one) to X'0015' (X'0015' in this case because it is BGV) ③ . The <u>first</u> page table entry is not invalidated because the partition save area is in the first 2K and the information saved therein is still needed.

    - All page frame table entries for frames that contain BGV pages of Job Control (EXCEPT for the frame that contains the first 2K) are initialized to the 'unused' state (not shown on figure).

- The load routine in the BGV save area that was built by Job Control is now executed (4) . This routine issues an SVC4 (LOAD phase) which causes entry into the FETCH routine in the supervisor. The parameters needed by FETCH to load the requested program are also passed to the supervisor at this time.

- The problem program is now loaded to the virtual partition by FETCH in the same manner as was previously described for the loading of Job Control (6) .

- If the program being loaded exhausts the available page frames of real storage, pages already in real storage frames are paged out to SYSVIS in order to make frames available for the balance of the program being loaded (7) . Virtual partition page table entries that represent virtual address space pages that are on SYSVIS are set to X'00X4' (X'0014' for BGV). This indicates that the page is not in real (INVALID bit ON) and a copy of the page is on SYSVIS (USED/ UNUSED bit OFF).

- After the problem program has been completely loaded, task selection again activates the partition with the highest priority that is ready to run (BGV in this example).

Refer to the Figure Titled: CONCEPTS OF CCW TRANSLATION

- The System/370 Dynamic Address Translation facility (DAT) does not function for channel programs. Therefore, prior to the execution of a virtual program I/O request, any referenced address in virtual CCBs and CCWs must be translated into their corresponding real addresses by the DOS/VS supervisor.

  The supervisor must do the following before initiating an I/O operation for a virtual mode program.

  - Copy the CCB and the entire channel program into copy blocks in the supervisor.

  - Translate the addresses used by the CCB and the channel program into real storage addresses and place these addresses in the copied CCB and channel program.

  - Build IDALs (Indirect Data Address Lists) in the supervisor for all I/O areas which cross one or more page boundaries.

  - Fix all pages containing I/O areas in real storage for the duration of the I/O operation.

- The channel scheduler routine in the supervisor is entered as a result of an EXCP (1) . The channel scheduler may require the services of the page manager to get the virtual CCB and CCWs into real storage if they are not already in real (dotted lines in figure).

NOTE: The page frame in which the virtual EXCP instruction resides in real storage is not shown in the figure.

- It is important for you to realize at this point that the virtual CCB and CCWs, even though they are now in real storage, still contain virtual address space addresses which must be translated to their corresponding real addresses before the I/O program (EXCP) can be executed. This function is performed by the CCW Translation routine in the supervisor because the DAT hardware feature does not function for channel programs.

- The CCW Translation routine copies the virtual CCB and CCWs into copy blocks located in the supervisor ② . It is in these copy blocks that the 'real' channel program is built and executed. The virtual I/O area addresses in the CCWs are examined and if the I/O areas specified by the virtual addresses are already in real storage frames, the frames are TFIXed and the I/O area real addresses are inserted into the CCWs in the copy blocks. If upon examination of these virtual addresses, the CCW Translation routine finds that the I/O areas are not in real storage, a request is issued to the page manager to obtain and TFIX the necessary frames for the I/O areas. They are then paged in from SYSVIS and their real addresses are inserted into the CCWs in the copy blocks ③ . The channel program is then scheduled and executed.

- After the I/O is completed, all the TFIXed frames are TFREEd, and the original virtual CCB and CCWs in real storage (in the page pool area) are updated to reflect the contents of the copied CCB and CCWs.

Refer to the Figure Titled: PFIX/PFREE CONSIDERATIONS (PART 1)

- A virtual program may require that certain of its pages be maintained in real storage for an extended period of time (ie, TP programs). In order to prevent the possibility of these pages being paged out by the page manager, a PFIX (permanent fix) can be issued by the program that will remove the page frames that contain the pages which are to remain in real storage from the selection pool. When a page frame has been removed from the selection pool, it is no longer a candidate for paging activity. A page frame is removed from the selection pool by turning ON a specific bit in its associated page frame table entry.

- PAGES CAN ONLY BE PFIX'ED IN THEIR CORRESPONDING ALLOCATED REAL PARTITION.

- Virtual program (F1V) issues PFIX for two-2K pages (addresses need only fall within 2K area -- they do not have to be on starting or ending page boundaries) ① .

- The page manager PFIXes specified frames by removing them from the selection pool (turns a bit ON in corresponding page frame table entry) ② . Page(s) may also be brought into real storage from SYSVIS by PGMR if not already in real (dotted lines in figure). If already in real, page(s) <u>must</u> be in corresponding real partition (F1R) or an exchange of frames will occur (this situation covered in next Figure).

  NOTE: If pages to be PFIXed were not in real storage and there were no available frames in F1R, a unique bit in ALL the page frame table entries for F1R would be set to indicate that frames are needed for a PFIX. As soon as frames became available in F1R, they would then be used for the PFIX.

- PFREE returns previously PFIXed page frames to selection pool (resets the SP bit in page frame table entry) ③ .

Refer to the Figure Titled: PFIX/PFREE CONSIDERATIONS (PART 2)

- When virtual pages that are to be PFIXed (X and Y in F1V) are already in real storage, but not in frames that belong to the real partition corresponding to the virtual partition that issues the PFIX (pages X and Y in real are in main pool frames -- not in F1R frames), a specific bit in the page frame table entries for the frames in which they do reside is set by the page manager ② . This bit indicates that pages contained in these frames (indicated by right and left dotted lines from ②) are to be moved to different frames and should not be paged out. These pages are then moved to frames in the corresponding real partition (F1R) in the real partition, IF there are available 'unused' frames on the real partition, or if pages in the real partition can be paged out to make frames available.

  A situation may exist, however, in which all the frames in the corresponding real partition are either TFIXed or PFIXed as shown for F1R in the figure. In this case, another specific bit is set in <u>all</u> the frames of the desired real partition (F1R) to indicate that frames are needed for a PFIX (indicated by center dotted line from ②).As soon as the required number of frames become available in the desired real partition (TFIXed or PFIXed frames are TFREEd or PFREEd), the desired pages in the frames outside the real partition (X and Y in the MMP) are exchanged with the contents of the now available frames in the real partition (pages A and B for examples as shown in the figure) ③ . These frames in the real partition are then PFIXed.

Refer to the Figure Titled: GETVIS/FREEVIS CONSIDERATIONS

- Unused address space in a virtual partition (addresses above those that are required for a program that is loaded into the partition) can be utilized by other storage management routines (ie, VSAM) that the executing program may require. This unused area is called the GETVIS area and that portion of the partition in which the executing program resides is called the SIZE area.

- The SIZE operand of an EXEC statement specifies how much of the partition will be required for the program that will be loaded ① . The remaining address space, minus 2K, becomes the GETVIS area.

- The SIZE operand in an EXEC statement can be specified as SIZE=nK ('n' must be an even multiple of 2), or as SIZE=AUTO. If AUTO is specified, the GETVIS routines in the supervisor ② will automatically make the SIZE area equal to the loaded programs size. If SIZE=AUTO, nK is specified, an amount of the partitions virtual address space equal to nK will be added to the AUTO amount.

- When an EXEC statement is executed with SIZE specified, a 1K VSAM ANCHOR TABLE is generated immediately above the SIZE area. This table is used to monitor VSAM phases in the GETVIS area if VSAM is used. A 1K GETVIS MANAGEMENT TABLE is also built immediately above the VSAM anchor table. This table contains constants and a bitstring that monitors the use of the GETVIS area. Each bit in the bitstring indicates whether a specific 128 byte increment of the GETVIS area ③ is being used or is unused.

  NOTE: The Shared Virtual Area (SVA) of a DOS/VS System can also have a GETVIS area. It is basically the same as a partition GETVIS area with the exception that the SVA GETVIS Management Table is 3K in length rather than 1K and each bit in the SVA GETVIS bitstring represents 512 bytes of an SVA GETVIS area. More on this later in the course.

- If the SIZE operand is specified in an EXEC REAL statement, the real storage above the SIZE area in the real partition remains in the selection pool (it is available for paging activity, whereas the SIZE area is not).

- A problem program in a virtual partition that has a GETVIS area can request the use of and obtain GETVIS address space by issuing a GETVIS macro instruction ② . Specifics on the GETVIS macro will be discussed later in the course.

- A FREEVIS macro instruction releases address space in a GETVIS area that was previously obtained by a GETVIS macro instruction.

Refer to the Figure Titled: TERMINATION OF A VIRTUAL PARTITION

- Upon normal termination of a virtual program, the partition page table entries must be invalidated (set to X'00X5') and page frame table entries for frames that contain the virtual program pages must be initialized (set to 'unused'). If any frames are still PFIXed because the program did not issue a PFREE, they are released and returned to the selection pool.

- The EOJ transient is called at the normal completion of the program (1) just as was seen at the completion of IPL. EOJ issues an SVC59 (2) which causes entry into the routine in the Supervisor that will prepare the page management tables for the loading of Job Control (3) . All page table entries for the virtual partition are set to X'00X5' (X'0015' for BGV) and page frame table entries are set to 'unused' (dotted lines).

- Control returns to the EOJ transient from the SVC59 routine which then issues an SVC 4 (4) . This causes the FETCH routine to load Job Control into the virtual partition (BGV in this case) (5) . Refer to text associated with the loading of Job Control.

Refer to the Figure Titled: LOADING A PROBLEM PROGRAM TO EXECUTE REAL

- A program that is to execute real mode has the REAL operand specified in the JCL EXEC statement that calls the program (ie, // EXEC PROG,REAL).

- Job Control builds a load routine in its save area in the same manner as it does for the loading of a virtual program (1) . An SVC 58 is then issued by JCL just as it was for a virtual program (2) . The load routine in the partition save area is now, however, moved to a save area in the Supervisor (2) . This occurs because the program to be loaded will execute real and All of the virtual partition page table entries will be invalidated to X'8011' (recall that the first page table entry in a virtual partition was not altered by the SVC 58 when a program was being loaded to virtual.)

- PT entries for the <u>virtual</u> partition are examined one at a time by the SVC 58 routine and set to invalid (3) . If an entry, on examination, is found to contain a valid real address, the corresponding page frame table entry (not shown) is initialized (reset) and the frame is returned to the selection pool (dotted lines from (3)).

- Because the program is being loaded to execute real, the page frame table entries for the frames in the allocated real partition (corresponding to the virtual partition in which Job Control is executing) must be removed from the selection pool and prepared to receive the specified program. In addition, the page table entries for the real address space in the real partition must be loaded the real addresses of their associated page frames. These functions are performed by the GETREAL routine (SVC55) in the supervisor during the execution of the SVC58 routine (NOTE: The SVC55 routine is not entered when a program is being loaded to execute virtual).

- The GETREAL routine examines the page frame table entries for the <u>real</u> partition being activated and sets a bit in each entry to indicate the frames are to be removed from the selection pool

11. (True/False) At completion of a virtual program (EOJ), any pages of the program that are on SYSVIS (have been paged out) are erased by writing binary zeros (0) in the relative disk records.

12. (True/False) All page frames in an active real partition are PFIX'd.

13. (True/False) A real partition cannot execute a V=R program until all TFIX'ed page frames in the partition have been TFREE'ed.

14. When a real partition terminates, the routine that will bring Job Control into the corresponding virtual partition is contained in which of the following:

    a. _________ Real partition savearea
    b. _________ Virtual partition savearea
    c. _________ LTA
    d. _________ Supervisor
    e. _________ PMGR

15. Match the following SVC codes to their associated DOS/VS functions:

SVC CODE	FUNCTION
___ a. SVC 55	1. Initialize a virtual partition for a problem program
___ b. SVC 54	2. Initialize a virtual partition for Job Control
___ c. SVC 58	3. Obtain real storage frames for a V=R function
___ d. SVC 59	4. FREE REAL

Refer to the Contents for the location of the self-evaluation question answers.

VIRTUAL STORAGE MACROS

Previous topics have introduced the need for various basic DOS/VS system functions in broad and conceptual terms. This topic discusses specific virtual storage management macros that can be utilized by a programmer when coding a program that is to be executed in virtual mode. Internal virtual storage management functions such as TFIX, GETREAL, etc are not addressed in this topic, but will be covered later in the course.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Detect and correct errors in the use of the following virtual storage macros:
   GETVIS
   FREEVIS
   PFIX
   PFREE
   RUNMODE
   SETPFA
   VIRTAD
   REALAD
   EXCP,REAL

Highlights

- GETVIS and FREEVIS macros can be used to manage Partition and System GETVIS areas.
- RUNMODE can be used by the program to determine if the program is executing virtual or real.
- PFIX provides the programmer with the ability to permanently fix pages of his program in storage.
- SETPFA provides the programmer the ability to select the sequence in which page faults are handled by the system.
- VIRTAD provides the virtual address for a specified real address.
- REALAD provides the real address for a specified virtual address.
- CCW translation is not performed for EXCP,REAL.

Troubleshooting Hints

- If a problem is suspected in a macro, use the DOS/VS Supervisor and I/O Macros SRL to ensure the macro operands are specified correctly.
- Inspect the code generated for a macro for obvious errors.
- Ensure that if return codes are returned after a macro is executed, the programmer checks these codes correctly.
- Check the operator commands (ALLOC, SIZE, etc) submitted with a program by using the MAP command.

Activity

IN:	DOS/VS Supervisor and I/O Macros
UNDER:	Virtual Storage (Part 7)
READ:	Descriptions of the macros specified in OBJECTIVE 1 with the exception of the EXCP,REAL macro
UNDER:	Physical IOCS (Part 6)
READ:	EXCP macro

SELF-EVALUATION QUESTIONS

1. The following PFIX is issued by a virtual program executing in a 256K real storage CPU:

```
            PFIX      LIST
   LIST     DC        X'00050000000008FF'
            DC        X'0103000000000C00FF'
```

   The number of page frames that will be PFIXed in real storage is ________________.

2. A page frame with its PFTX byte equal to X'FF' _______ (is/is not) available for demand paging.

3. (True/False) When the RUNMODE macro is issued to a program executing in F3R, X'00000004' will be returned in Register 15.

4. The BGV partition (128K) is executing the following 24K program in a 1 MEG DOS/VS system (512K Real + 512K Virtual):

```
        // EXEC PROG,SIZE=32K
```

   The BGV GETVIS area for this program begins at address X'________________________'.

   THE GETVIS VISTAB (BITSTRING) begins at address X'_______'.

5. (True/False) Specification of 'POOL' in a GETVIS macro causes the search for unused GETVIS address space to begin at the address contained in R15.

6. (True/False) The address specified in the 'ADDRESS=' operand of a FREEVIS macro must be a multiple of 128.

7. (True/False) When a DOS/VS system includes a Page Handling Overlap (PHO=YES), page faults occurring in a problem program task are resolved by the problem program PFA routine and not the system page manager, after a SETPFA macro has been issued for that task.

8. (True/False) A PFIX must be issued for the Virtual address space in which an EXCP,REAL expansion resides prior to execution of the EXCP,REAL.

9. (True/False) Register 0 will contain a Virtual address after execution of a VIRTAD macro that specifies the real address of a byte that is within a page frame which is in the selection pool.

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS SERVICEABILITY AIDS

In addition to the numerous DOS/VS serviceability aids that can be executed via operator commands and job control statements (ie, ALTER, DSPLY, DUMP, // OPTION DUMP, etc), there are several serviceability PROGRAMS that are available to the PSR for problem determination of a DOS/VS System/370. This topic introduces and discusses the Problem Determination Aid and System Debugging Aid programs (PDAID and SDAID), as well as the SYSVIS Dump program.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Initialize and terminate, via SYSLOG or SYSIPT, any of the following DOS/VS serviceability aids using the correct initialization parameters to trace any specified event(s) and dump any specified type of output.
   - PDAIDS (Problem Determination Aids)
     - -IO Trace
     - -IF Trace
     - -GSVC Trace
     - -QTAM Trace
     - -Transient Dump
   - SDAIDS (System Debugging Aids)
     - -Elementary Events
     - -Dedicated Events
     - -Stop On Event
     - -Dump On Event (NDD)
   - PDSDM (Page Data Set Dump)
     - -Output to Tape or Disk
     - -Output to SYSLST
     - -Tape or Disk Output to SYSLST
2. Correctly interpret and state the meaning of any selected entry in a given type of output obtained from any of the following DOS/VS serviceability aids.
   - PDAIDS
   - SDAIDS
   - PDSDM

Highlights (PDAIDS)

- Four event tracing routines and one dump tracing routine are provided by PDAIDS:
  - -I/O Trace
  - -FETCH/LOAD Trace
  - -GSVC Trace
  - -QTAM Trace
  - -Transient Dump
- PDAIDS run on any System/370 that supports DOS/VS
- Real Storage area required for <u>execution</u>
  - -called PD area

-PD area located in Supervisor
-must be reserved at SYSGEN time via PD parameter of FOPT macro

- Initialization is via real or virtual partition (// EXEC PDAID).
- Control given to PDAID routines via 'hooks' in Supervisor (Upon return from PDAID--processing continues as if event had not occurred).
- PDAIDS run with DAT 'On' and Disabled for I/O and EXT Interrupts.
- Only real storage can be dumped with PDAIDS (Transient Dump).
- PDAID events are mutually exclusive.
- PDAIDS may run concurrently with SDAIDS (Except when PDAIDS uses the alternate area for output).
- Program execution time is slightly increased by PDAIDS.
- Output from PDAIDS is directed to a non-dedicated line printer. (The same printer may be used as an output device for other programs).
- PDAID initializing and terminating routines (Programs) must be cataloged in the Core Image Library.

Troubleshooting Hints (PDAIDS)

1. The following hints identify situations in which the various PDAID functions can assist you when determining a DOS/VS system malfunction.

   - I/O Trace
     When to use: Use the I/O Trace to check that I/O interrupts are correct during the execution of programs.

     For example, in a multiprogramming system where the status of I/O units is suspected of causing incorrect I/O interrupts, an I/O trace output will inform you about the sequence of SIO/IO interrupts and about the status of I/O units at the time of interrupt.

     NOTE: The added time for this facility may cause a failure caused by a timing condition to disappear.

   - F/L Trace
     When to use: Use the F/L Trace if you are not certain which phases are required for a particular program, or in which sequence they are called by the program. From the trace output you can see where the phases were loaded and their entry addresses. In addition you can check the logical use of the phases for the program.

   - GSVC Trace
     When to use: Use the GSVC Trace when a particular SVC issued by a troublesome program is suspected of causing the errors.

     The values of Registers 0 and 1 are printed on the trace output and these can be important for certain SVCs.

The trace output also shows the current PSW at the time the SVC was issued. Therefore, the instruction and routine issuing the SVC in the program can be located.

When reading the output from this trace routine you may see more SVCs listed than expected. This is because an SVC already traced and recorded may be reset by the Supervisor SVC routine, and then reissued by the program being traced. For example, your program may issue an SVC 0, which is traced. But the channel queue may be full at that point in time, and so the Supervisor cannot handle the SVC 0. When your program has control again it will issue the SVC 0 which will be traced again.

- <u>QTAM Trace</u>
  When to use: Use the QTAM Trace to check the sequence of SIO instructions to the channels and devices. Use this trace if you suspect errors in I/O interrupt handling routines or in program routines issuing SVC 0 and SVC 31, or if you suspect errors in the sequence of I/O interrupts being returned from channels or devices. The next two illustrations are examples of output from a QTAM trace.

- <u>Transient Dump</u>
  When to use: Use the Transient Dump when you suspect errors in transient routines. For example, your own error recovery routines for devices not supported by IBM. The information obtained from the dump will help during offline program debugging.

  Once this program has been initiated, it is given control each time a program check interrupt occurs (except X'11' and X'12' program checks) and causes a Transient Dump to occur.

2. Some additional troubleshooting hints relative to PDAIDS are as follows:

- Address of PD area can be found at label PDARPTR.
- Format and contents of PD Area Tables can be found in Appendix A of DOS/VS Serviceability Aids and Debugging Procedures (GC33-5380).
- Refer to PDAID information in DOS/VS Serviceability Aids Logic (SY33-8554).
- PDAREA can be dumped via the AR DUMP command.
- If your customer has not specified PDAID support in his Supervisor, an alternate (troubleshooting) Supervisor can be assembled and cataloged (with the customer's permission) that does contain PDAID support. This Supervisor can then be loaded at IPL time whenever there is a need to determine and analyze system malfunctions.

  The alternate supervisor must be cataloged under a different phasename than the one that the customer normally uses (ie, $$A$SUP2). The Supervisor Selectivity feature of DOS/VS (Release 29 and later) allows alternate Supervisors to be selected at IPL time.

  NOTE: In some instances, dependent on a customer's mode of operation, certain non-essential supervisor options that are included in the customer's normal Supervisor may have to be deleted in the alternate Supervisor.

  This may be necessary in order to keep the size of the alternate Supervisor equal to or less than the size of the customer's normal Supervisor.

  If this situation exists, two or more alternate Supervisors can be cataloged, each with different normal Supervisor options deleted. In this manner, a Supervisor that supports PDAIDS will be available for troubleshooting of most customer programs.

Activity (PDAIDS)

IN:	DOS/VS Serviceability Aids and Debugging Procedures
UNDER:	Trace Routines (Section 2-B)
READ:	PART 1 - PDAIDS
UNDER:	Dumps of and Changes to Real and Virtual Address Areas (Section 2-A)
READ:	Transient Dump (Section 2-A-4)
DO:	PDAIDS Work Project (In DOS/VS Base SCM 1)

Highlights (SDAIDS)

- SDAIDS provide the following functions:
  -PAGE Tracing
  -INSTRUCTION Tracing
  -STORAGE ALTERATION Tracing
  -GENERAL REGISTER ALTERATION Tracing
  -SUCCESSFUL BRANCH Tracing
  -STOP and DUMP on EVENT or ADDRESS
- SDAIDS run on any System/370 that supports DOS/VS.
- Minimum of 6K bytes of real storage required for execution
  - called SD area
  - area taken from page pool
  - need not be specified at SYSGEN time
- Initialization requires 12K of real or virtual storage (// EXEC SDAID) (After Initialization--SDAIDS does not use any DOS/VS services).
- Control given to SDAID via program check interruptions. (Upon return from SDAID--processing continues as if event had not occurred).
- SDAIDS run with DAT 'Off' and Disabled for I/O and External Interrupts.
- Only Real area can be dumped with SDAIDS.
- Multiple SDAID events can be traced simultaneously.
- SDAIDS may run concurrently with PDAID routines (Except when PDAIDS uses the alternate area for output).
- Program execution time is slightly increased using SDAIDS.
- Output from SDAID is directed to a non-dedicated line printer. (The same printer may be used as an output device for other programs).
- SDAID initializing and terminating programs must be cataloged in the Core Image Library.

Troubleshooting Hints

1. The following hints identify situations in which the various SDAID functions can assist you when determining a DOS/VS system malfunction.

   - Translation Exception Trace (TE)
     When to use: Use this trace to determine if an instruction requires a page to be paged in from the page data set in order for the instruction to be completed. An example is an MVC instruction whose address 1 is in page frame x in real storage, and whose address 2 is in page y that is not in real storage.

     When this trace is initialized, any page fault generated because of such an instruction is printed along with the instruction and its address that caused the page fault, plus the output of the specified output class.

- <u>Page Enqueue Trace (PAGENQ)</u>
  When to use: Use this trace to determine the sequence in which programs are calling for pages. Page faults caused by translation exceptions will also be traced with this routine.

- <u>Page Handling Trace (PAGEHDL)</u>
  When to use: Use this trace to determine the sequence in which pages are paged in from the page data set. After a page is handled, a trace output is printed.

  Use this trace if you suspect the loss of a page, or the sequence of page usage by a program, is causing programming errors.

- <u>Instruction Trace (IT)</u>
  When to use: If an unintended loop develops during program execution, this trace can be initiated and the program re-run. During this re-run, a list of all the instructions executed within the loop will be traced. This is an efficient method to obtain a loop trace.

- <u>Storage Alteration Trace (SA)</u>
  When to use: Use this trace if you suspect incorrect alteration of I/O Areas or count locations for loops. Information obtained from this trace will show the instructions that are altering the areas. The SA trace will not record changes in the contents of locations that are changed directly by I/O channel operations.

- <u>General Register Alteration Trace (GA)</u>
  When to use: This trace is similar to the virtual storage alter trace. It should be used when information about changes to any GR during execution is required to help during offline program debugging. Any GR or any combination of GRs can be traced.

- <u>Successful Branch Trace (BR)</u>
  When to use: Use this trace if the actual path taken by a program cannot be analyzed from the program flowcharts and listings. You can also use it to provide information about the path taken, for example, by a long loop.

- <u>Stop On Event</u>
  When to use: Use this option if hands-on debugging is necessary on the occurrence of one of the specified events. For example, when a change occurs in a general register, you may want to look through the program listings to enable you to decide on the next step in isolating an error. When the stop occurs, it is also possible to initiate another SDAID routine that will provide additional system information for offline program debugging.

  When no time is available for hands-on debugging, the non-destroying dumps obtained when the stop on event occurs will provide a great deal of information for offline program debugging.

- <u>Stop On Address</u>
  When and how to use: This facility is used under conditions similar to those for the hardware stop on address compare, that is, hands-on debugging is to be carried out when a program has reached some specific point during its operation. However, this aid enables a stop on all SDAID events.

  The stop on address is accomplished by initiating the instruction trace, specifying stop on event, and entering the address at which the stop is required as the address supplied within the event limit field during initialization of the trace.

- <u>Non-Destroying Dump (NDD)</u>
  When to use: This SDAID facility enables you to obtain the information needed for problem analysis without having to take dumps of real storage at every occurence of an event. Therefore this decreases the amount of paper to be searched through during offline debugging. For example, you may consider it sufficient for offline debugging to take a dump at every twenty-seventh occurrence of an event.

  How to obtain the dump: The following procedure describes how to obtain the non-destroying dump.

  1. When the system is in the stop-on-event wait state, locate the real storage address of the NDD (non-destroying dump) byte switch. The address of this program switch is printed during SDAID initialization. Refer to the SDAID initialization output (Part 2).
  2. To ensure that the wait state is the true stop-on-event wait, use the ALTER/DISPLAY console feature to display the PSW. The instruction address part of the WAIT PSW will be 0000EEEE.
  3. To obtain the dump, set the NDD byte to X'FF', using the ALTER/DISPLAY console feature.
  4. Press the START key and then the EXTERNAL INTERRUPT key. A non-destroying dump will be printed and processing continues.

  When the dump is complete, the NDD byte is reset by the SDAID program, and so a dump will not occur at the next stop on event. To obtain another dump at any following stop, the NDD byte must again be set 'On'.

  Note: The dump can be discontinued by the following procedure.

  1. Make the line printer used as SDAID output device unready.
  2. Now make the line printer ready.
  3. Press the EXTERNAL INTERRUPT key two times within one second.

- Dump On Program Check (PGMCHK)

  On the occurrence of program check interruptions X'01' - X'OF',X'10', and X'12', a non-destroying dump occurs automatically (unless 'No' is specified as a response to message 4C67D during SDAID initialization).

  After this automatic non-destroying dump is executed, the DOS/VS program check handler routine is entered.

  When to use: If PDAIDS are not available on your system, the use of the SDAID 'dump on program check' option is the only way to obtain a non-destroying dump of the Supervisor transient area at the time of of a program check interrupt.

2. Some additional troubleshooting hints relative to SDAIDS are as follows:

- The addresses of the beginning and end of the SD Area and SD Buffer are printed on the device assigned to SYSLST during initialization of SDAID. Refer to SDAID Initializing Output (Part 1).

- Altering SDAID functions and/or address limits after initialization. After SDAIDS have been initialized, trace functions and events limits, where applicable, can be changed by altering SDAID program parameters directly in storage. The contents of the parameters at the addresses printed on Part 2 of the SDAID Initializing Output, and of Control Registers 8, 9, A, and B can be altered.

  To make SDAID parameter changes:

  Press the STOP key.
  Use the console ALTER/DISPLAY feature to alter the contents of the program parameters.
  Press the START key.

  NOTE: When SDAID is terminated and later re-initialized, new SDAID parameters are printed in the SDAID initializing output.

  NOTE: SDAID requires SYSLST for the initializing output. Therefore, if you intend to change SDAID parameters after initializing SDAIDS, you should ensure that the SYSLST device is a line printer on the partition used for SDAID initialization.

- If it is ever desired to reduce (or limit) the size of the available page pool for any reason, SDAIDS can be initialized with the desired amount of reduction specified in response to message 4C55D (minimum of 6K) and no events specified (press END key for all event messages except PGMCHK, to which respond with NO and END). This procedure can also be used to maintain SDAIDS in storage in an inactive state until needed (alteration of parameters in storage, via the console, can then be used to activate any desired event(s).

- Address of SDAID SAVE AREA (in Supervisor) can be found in SYSCOM at offset X'88'.

Activity (SDAIDS)

IN:	DOS/VS Serviceability Aids and Debugging Procedures
UNDER:	Trace Routines (Section 2-B)
READ:	PART 2 - SDAIDS
DO:	SDAIDS Work Project (In DOS/VS Base SCM 1)

Highlights (SYSVIS DUMP)

- SYSVIS DUMP initiated by // EXEC PDSDM.
- Can copy page data set to tape, disk or printer.
- PDSDM can selectively dump the following:
  - the entire PDS (all of the VIRTUAL address area)
  - any specified VIRTUAL partition
  - one or more pages contained within any VIRTUAL partition
- When dump is from Page Data Set:
  - SYS000 must be assigned to SYSVIS (Input Device)
  - SYS001 can be assigned tc tape or disk (Output Device)
    OR
  - SYSLST can be assigned to tape or disk or a line printer (Output Device)
- When dump is from intermediate storage (SYS001)
  - SYS001 must be assigned to the input tape or disk device
  - SYSLST can be assigned to tape or disk, or a line printer (Output Device)
- If a tape or disk device is used for input or output - label information must be supplied in the job stream.
- SYSVIS dump format similar to that of a standalone dump.
- Can be initiated via SYSLOG or SYSIPT.

Troubleshooting Hints (SYSVIS DUMP)

- When to execute the dump: It is recommended to obtain a dump of SYSVIS whenever a standalone dump is executed. A SYSVIS DUMP should not be executed until a standalone dump has been taken, and should then be initiated during the system re-IPL. To help with your analysis of the information contained in the SYSVIS dump, it is also recommended to execute a formatted stand-alone dump. For this reason, execution of a SYSVIS DUMP is included in flowchart A-3-F ('Executing the Stand Alone Dump') in Section 2 of DOS/VS Serviceability and Debugging Procedures.

  How to use the dump output:

  During analysis of a system malfunction (such as a HARD WAIT STATE) using a standalone dump output, it may be necessary to analyze the coding in a page belonging to a virtual partition which was not in real storage when the standalone dump was executed.

  Virtual address allocations can be obtained from the BOUNDARY BOX, and pages not in real storage can be found by analyzing the contents of the PAGE TABLE in the standalone dump. The format and contents of the boundary box and the page table are described in Section 4, Chapter 12 of SADP.

  The SYSVIS dump should then be used in conjunction with the standalone dump output. It is recommended to always use a standalone dump generated with the DUMPGEN parameter FORMAT=YES. DUMPGEN is described in A-3 of Section 2 in SADP.

  It is essential that the operator save the copy of the PDS after executing the standalone dump. You as the system programmer, or the IBM CE/SE will then be able to print out all or any part of the PDS to complete problem analysis.

Activity (SYSVIS DUMP)

IN:	DOS/VS Serviceability Aids and Debugging Procedures
UNDER:	Library Display Programs and Utilities (Section 2)
READ:	SYSVIS DUMP (Section 2-C-6)

SELF-EVALUATION QUESTIONS

1. (True/False) The page pool is reduced by a minimum of 6K whenever PDAIDS are successfully initialized.

2. QTAM Trace entries _______ (can/cannot) be listed on a line printer.

3. The PDLIST program will process a PDAID output tape when the tape is mounted on a tape drive assigned to symbolic unit __________.

4. (True/False) The I/O Trace routine PDAIDITW (when initialized) will be located in the PD Buffer area of the PD area.

5. The POINTER to the PD Area in a DOS/VS Supervisor listing has the label _________ and is located in the ___________ ____________ _____________ .

6. Indicate, in decimal, the byte lengths of the following areas in the PD area:

   ________ PD Address Table
   ________ PD Standard Preface Table

7. The name of the phase (routine) that will be in the event handling routine area of the PD area when the PDAID Transient Dump function (output to tape) has been initialized is _______________.

8. If an output device has been identified during PDAID initialization, its address can be found in bytes _____ to _______ of the __________________ table.

9. The address of the last byte in the PD Area can be found in bytes ______ to ______ of the ______________ table.

10. If an alternate area (AAA) has been specified for core-wrap output, it can be dumped prior to termination of PDAIDS via the job control ____________ command using the ____________ operand.

11. The starting and ending addresses of the alternate area can be located in bytes _______ to ______ and _____ to _____ of the ________________ table.

12. (True/False) SDAIDS and PDAIDS can not be active (initialized) in a DOS/VS system at the same time.

13. (True/False) ALL SDAID events can be traced simultaneously.

14. (True/False) If 'GO' is specified for message 4C58D during SDAID initialization, only dedicated SDAID events will be traced.

15. Alterations to GPRs 1, 5, 9, and 13, as well as all BR events are being traced via SDAIDS. Control Register 9 (CR9) will contain _________________________ .

16. (True/False) Segment, Page, and Page Frame Table contents are not output when SDAID event defaults are taken.

17. (True/False) Non-destroying (NDD) and PDUMP can only be obtained from SDAIDS if a YES reply is given to message 4C60D.

18. The SDAID phase that resides in the alternate area during SDAID execution is ________________ .

19. (True/False) SDAIDS can only be terminated when Job Control is active.

20. (True/False) Output classes (OUTCL) 01 through 08 must be obtained for SDAID dedicated events.

21. The logical units that are used during execution of PDSDM are:

    SYS___=SYSVIS

    SYS___=Tape or disk input/output unit

    SYS___=Line printer output unit

22. (True/False) Initialization of SDAIDS (//EXEC SDAID) on the DOS/VS Base lab system with the following parameters will cause a dump of the LTA each time a $$B phase (logical transient) is loaded (SVC2).

```
OUTPUT DEVICE=(END KEY)
STOP ON EVENT=(END KEY)
EVENT LIMITS=X'006817',X'006817'(END KEY)
OUTCL=PDUMP,X'006810',X'006CBF'(END KEY)
EVENT BR=(END KEY)
EVENT IF=(END KEY)
EVENT SA=YES(END KEY)
EVENT GA=(END KEY)
EVENT TE=(END KEY)
EVENT PGMCHK=NO,GO(END KEY)
```

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS DOCUMENTATION AND OLTEP

This topic familiarizes the student with the various types of support documentation that are available in the DOS/VS Library (i.e, Descriptive, Reference, and Logic manuals).

The documentation familiarization process is employed as a vehicle to instruct the student in the concepts and usage of the On-Line Test Executive Program (OLTEP).

Instruction on the use of microfiche is also covered.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate information relative to any given function or aspect of DOS/VS in the following support documentation:
   - SRLs
   - PLMs Program logic manual
   - Bibliography
   - Microfiche
2. Use the OLTEP SRL to initialize OLTEP.
3. Use the PDAID FETCH/LOAD Trace function to observe the phases of OLTEP and OLTS that are called when executing the 1403G test of OLTEP.

Highlights

- The IBM System/360 and System/370 Bibliography can be used to determine which manuals pertain to any given function or aspect of DOS/VS.
- SRLs contain "externals" reference information.
- PLMs contain "internals" logic information.
- Microfiche reduces the volume of hard copy listings required for DOS/VS support.
- OLTEP always executes REAL in BG.
- OLTEP requires a minimum partition size of 14K (18K if RETAIN/370 active).
- OLTEP, CDS and OLTS must be cataloged in the core image library before IJZADOLT can be executed.
- OLTEP is a SYSGEN OPTION.

Activity

IN:	DOS/VS OLTEP SRL
READ:	Module 1 and Module 2
IN:	DOS/VS OLTEP Logic
UNDER:	CHARTS
STUDY:	CHARTS 00 and 01

SELF-EVALUATION QUESTIONS

1. To locate the SUBJECT CODE LISTINGS for DOS/VS publications in the IBM System/360 and System/370 Bibliography, which of the following should initially be referenced in the Bib?

   a. Part 2
   b. The Index
   c. The Preface
   d. The Contents Page
   e. Part 4

2. What is the form number of the publication that is referenced in the last paragraph of the Abstract for the DOS/VS BTAM LOGIC manual? (BTAM is an ACCESS METHOD).

   a. GC27-6989
   b. SY27-7251
   c. SY27-7249
   d. GC27-6986
   e. GC27-6985

3. (True/False) All DOS/VS Control Program Logic manuals have form numbers that begin with SY33.

4. Select the answer that indicates the correct statement to use when initializing OLTEP.

   a. // EXEC PGM=OLTEP
   b. // EXEC IJZADOLT
   c. // EXEC OLTEP
   d. // EXEC PGM=OLTS
   e. None of the above

5. Which detail chart in the OLTEP PLM contains the routines that determine which device test(s) are to be executed?

   a. 01
   b. 00
   c. AH
   d. AE
   e. AK

Refer to the Contents for the location of the self-evaluation question answers.

PROGRAM SUPPORT RESOURCES

This topic addresses the responsibilities of a PSR and acquaints the student with the various support resources ("tools") that he has available to carry out these responsibilities. The functions of the FTSC, SDD Change Teams, the ACRE System, RETAIN/360 and RETAIN/370 Systems are presented. Use of the PSGI Handbook and APAR submission are also covered.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the function and/or mission of any of the following given Program Support Resources:
   - FTSC
   - PTF
   - APAR
   - SDD Change Team
   - ACRE System
   - RETAIN/360 and RETAIN/370 Systems
   - EWS
   - PSAL
   - PLTR
   - Central Programming Service (CPS)
   - Education Update
   - FSS/ANSWR
2. Prepare an acceptable APAR for submission to the proper SDD Change Team based on your analysis of a given T/A Problem during the lab portion of the course.
3. Interrogate the RETAIN/360 System for any given programming information related to a specific component and release level.

Highlights

- Activities and responsibilities of the PSR are fully supported by the FTSC, SDD Change Teams and Field Support organizations.
- The RETAIN/360, RETAIN/370, ACRE and FSS Systems are utilized to provide the PSR with comprehensive and timely programming information.
- The PSGI Handbook (ZZ25-0511) is an invaluable reference "tool" to the PSR.

Activity

IN:	Programming System General Information Handbook
UNDER:	SECTION 1
STUDY:	ALL, and become familiar with the contents contained therein.
UNDER:	SECTION 2
READ:	PSMs 2, 4, 12, 16, 20, 23, 26, 27 and 34

SELF-EVALUATION QUESTIONS

1. Select the answer that correctly identifies the most proper sequence of events that should occur to efficiently resolve a customer reported Severity 1 programming problem:

   a. Customer calls FTSC, PASS Search, Component Specialist writes APAR, APAR entered in RETAIN/360, PTF or circ cumvention fixes problem, PSR obtains APAR status from ACRE.
   b. Customer calls PSR or B.O., Problem Determination, PASS Search by FTSC Component Specialist, Fix applied by PSR, APAR submitted by PSR, ACRE response entered into RETAIN/370.
   c. Customer calls, Dispatch Systems Engineer, SE calls Component Specialist, Specialist submits APAR to ACRE, Change Team develops PTF, PTF entered on FSS/ANSWR, PSR obtains PTF from FSS/ANSWR and installs.
   d. Customer calls CE, Dispatch Programming Systems Representative, FTSC PASS Search, APAR Abstract entered in RETAIN/370, APAR placed in ACRE, FSS/ANSWR of ACK, circumvention fixes problem, permanent fix for problem occurs via PTF from Change Team.
   e. Customer calls SE, Dispatch PSR, PD occurs, FTSC PASS Search, APAR Abstract entered in RETAIN/370, APAR placed in ACRE, FSS/ANSWR of CAN, Customer discontinues service.

2. When submitting an APAR for DOS/VS because of an abnormal termination due to a program check, the FAILURE SYMPTOM keyword that should be used on the APAR form is:

   a. ABENDPCK
   b. PROCCHK
   c. SUPVR
   d. WAIT
   e. None of the above

3. To obtain terminal printouts of all DOS/VS Release 29 PTF Cover Letters from the RETAIN/360 System for the period of 06/01/74 to the current date, the correct PIN PROGRAM REQUEST entry should be ____________________________ .

4. To obtain up-to-date information for SYSGEN planning (from RETAIN/360) prior to an SCP installation of DOS/VS Release 29 (ie, minimum EC levels, etc), the correct PIN PROGRAM REQUEST entry should be ________________________ .

Refer to the Contents for the location of the self-evaluation question answers.

INTRODUCTION TO SCP INSTALLATION

This topic will introduce the need and present an overview of an SCP installation. This topic will build the foundation for all the following installation topics. The pre-installation planning portion of an SCP installation will be shown.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State in his own words, the four stages of an SCP installation and the PSR's responsibility for each stage.
2. Identify the resources available to the PSR for an SCP installation.
3. Identify the steps of planning and generating a SCP.

Highlights

- The PSR will install an unaltered SCP.
- The PSR responsibility during the pre-installation planning session is to ensure that RAS areas are addresses and any known problems are fixed.
- The following items are useful to the PSR during the SCP installation:
    - Memo to user
    - Program Status Document
    - SYSGEN SRL
    - System Management Guide SRL
    - FE Education Release Update
    - Planning SRLs
    - EWS
    - PSAL
    - S/360 RETAIN

Activity

Also DOS/VS SYSTEM MANAGEMENT GUIDE — chap 3 planning the system.

IN: DOS/VS SYSGEN SRL
UNDER: Module 1: PLANNING and PROCEDURES p7-24
READ: Introduction
through
System Configuration

READ: Planning an Operation Pack 62
through
System Directory and Library Track Capacities 65

IN: DOS/VS SCM 1
READ: Introduction to SCP Installation

- Use the Console ALTER/DISPLAY feature and/or Standalone Dump Program to print out storage at a given point during IPL.
- IPL from a different physical device.
- Use a different SYSRES (if available).

Activity

IN:	DOS/VS IPL and Job Control Logic	
UNDER:	Introduction	
READ:		Initial Program Load (IPL)
UNDER:	IPL Program	
READ:		$$A$IPL1 and $$A$IPL2, Chart 01
		$IPLRT2, Chart 02
		$IPLRT3, Chart 03
		$IPLRT4, Chart 04
		$IPLRT5, Chart 05
STUDY:	IPL Figures in DOS/VS Base SCM 1	
DO:	PART 1 (IPL) of WORK PROJECT 0	

SELF-EVALUATION QUESTIONS

1. The IPL phase $$A$IPL2 is located on the system residence pack at disk address:

   a. 00 01 5
   b. 00 00 5
   c. 00 00 1
   d. 00 00 2
   e. 00 00 3

2. The IPL program builds and uses a two-device system. The IPL two-device system consists of what symbolic units?

   a. SYSRDR
   b. SYSIPT
   c. SYSLOG
   d. SYSRES
   e. SYSUSE

The following figure will be referenced by questions 3, 4, and 5.

LUB TABLE

L0	00	SYSRDR
L1	00	SYSIPT
L2	01	SYSPCH
L3	02	SYSLST
L4	03	SYSLOG
L5	06	SYSLNK
L6	05	SYSRES
L7	04	SYSSLB
L8	04	SYSRLB
L9	00	SYSUSE
L10	07	SYSREC

PUB TABLE

P0	00	0C
P1	00	0D
P2	00	0E
P3	00	1F
P4	00	2B
P5	01	90
P6	01	91
P7	01	80
P8	02	81

Figure 1

3. If the IPL control statement that follows was processed by IPL, the physical device address would be placed in the PUB Table (Figure 1) at location ______________ . ADD X'021',2400T9

   a. P4
   b. P5
   c. P8
   d. P9
   e. P0

4. If the preceding ADD card had been processed, the LUB entries (as shown in Figure 1) that must be updated are:

   a. L5, L6, and L10
   b. L0, L1, L2, L3, L4, L7, L8, and L9
   c. L6
   d. L5 and L6
   e. None of the above

5. If the following DEL card was processed by IPL, what LUB entries (as shown in Figure 1) must be updated, if any?
   DEL X'02B'

   a. L5, L6, and L10
   b. L0, L1, L2, L3, L4, and L9
   c. L5, L6, L7, L8, and L10
   d. L7 and L8
   e. None of the above

6. Including the IPL bootstrap routines, there are a total of how many IPL phases?

   a. 5
   b. 6
   c. 7
   d. 2
   e. 1

SELF-EVALUATION QUESTIONS

1. List the four stages of a SCP installation

   a. ____

   b. ____

   c. ____

   d. ____

2. The maintenance integrated into a PID system is documented in the ________________________________ .

3. The first item decided when planning the SCP is ______ .

4. After the SCP is installed, the ____________ should be updated to indicate the PTFs applied to the system.

Refer to the Contents for the location of the self-evaluation question answers.

PID SYSTEM

This topic will discuss the content of the PID system as received by the user. Included will be the initial format of the disk or tape and the documentation received with the system.

The initial use of the PID system to begin the installation procedure will also be discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Create the control cards necessary to create a SYSRES pack from a PID tape.
2. Given a message from the distribution program, perform the necessary corrective action.
3. Given the control cards, perform the steps necessary to create a SYSRES pack from a PID tape.

Highlights

- The Distribution Program will initialize disk and restore the PID system tape to disk.
- The SYSRES libraries can be allocated when SYSRES is first created.
- The customer will punch up the cards necessary for the SCP installation.
- The initialize disk program can be bypassed.
- The DOS/VS System Generation SRL contains several examples of system generation.

Troubleshooting Hints

- The distribution program messages are in the DOS/VS System Generation SRL and not in the DOS/VS Messages SRL.
- If you are not sure about a local fix working in the supervisor, catalog the supervisor under the name $$A$SUP2. When you are sure it is working correctly, rename it $$A$SUP1.
- Keep all printouts from the SCP installation on site in a correctly labeled folder.
- Follow the SCP procedure in the SYSGEN SRL as closely as possible.

Activity

IN:	DOS/VS System Generation SRL
UNDER:	DOS/VS Distribution Program JOB CONTROL Coding Specifications
READ:	DOS/VS Distribution Program JOB CONTROL Coding Specifications through End of Section
READ:	IBM 2314 Direct Access Storage Facility Example through 2314 Example: Result of System Generation

SELF-EVALUATION QUESTIONS

1. The recommended location of the VTOC on a 3348/70 MB SYSRES pack is cylinder ______________________________ .

2. The message S302W is caused by detecting ______________ ____ .

3. The format of the FILES statement to bypass initializing of the pack is ______________________________ .

4. The name of the DOS/VS system utility program used to back up the SYSRES is ___________________________________.

Refer to the Contents for the location of the self-evaluation question answers.

INITIAL PROGRAM LOAD (IPL)

This topic teaches the student how to separate program errors from operator errors during system initialization. His knowledge will be applied to PLM flowcharts to see the steps taken by the programs to accomplish IPL functions. In the lab, problems which cause incomplete or incorrect operation will be isolated using PLMs, microfiche, and storage dumps.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Follow a PLM flowchart and record on paper all changes made to LUB and PUB tables when an IPL control statement is being processed.
2. Identify the failing instruction or group of instructions causing incorrect operation of the IPL program. Show the failure in a core dump, microfiche listing, and a PLM.

Highlights

- IPL is the only time during which devices can be added or deleted from the PUB table (with the exception of generating a new Supervisor).
- IPL determines real storage size.
- IPL loads the Supervisor.
- IPL identifies the Communication Device.
- IPL builds LUB and PUB tables.
- IPL assigns SYSRES, SYSCAT (if present), and SYSVIS.
- IPL initializes DAT.

Troubleshooting Hints

- Investigate all error messages in the DOS/VS Messages Manual.
- Use Error Message Cross-Reference in the PLM in conjunction with the detail PLM charts to determine why an error message was issued.
- Use the charts to determine why an error message was issued.
- Use the diagrams in the PLM to determine where elements of IPL should be in storage at a given point during IPL.
- Use the CPU address Stop feature to halt the IPL process at a given storage address.

7. What phase of IPL would process the following control statement?

   SET DATE = 03/29/68,CLOCK=20/00/00

   a. $IPLRT3
   b. $IPLRT2
   c. $$A$IPL1
   d. $$A$IPL2
   e. None of the above

8. (True/False) The INITPT routine is called by IPL phase $$A$IPL2.

9. The name of the program that determines the storage size of the CPU is:

   a. Problem program
   b. Supervisor
   c. Job Control
   d. IPL
   e. None of the above

10. The extent of a 2314 SYSVIS for a DOS/VS system that has 1026K of virtual address space will encompass ______ tracks.

11. (True/False) It is not necessary to issue the DPD command during IPL of a DOS/VS system if the DPD macro has been specified at system generation.

12. (True/False) After $IPLRT5 is executed, $BEOJ will always be called.

13. (True/False) $IPLRT2 clears storage above itself to the end of real storage.

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS LIBRARIAN PROGRAMS

The use of the librarian programs will be discussed in this topic. The use of these programs will be required in the following topics.

Also to be covered is the application of any PTFs to the E.Books before generating the Supervisor or POWER.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Use the correct maintenance program to display any given directory.
2. Use the correct maintenance program to display or punch any given library entry.
3. Identify the correct librarian program to catalog any given entry.

Highlights

- The Librarian is a group of programs that organize, maintain, and service the libraries and directories of a DOS/VS resident system and private libraries where desired. The Librarian has three types of programs:
  - Organization programs
  - Maintenance programs
  - Service programs

- The organization program is fetched by Job Control when the // EXEC CORGZ control statement is read. Its major functions are to:
  - create private libraries
  - copy SYSRES either selectively or completely
  - merge from one library to another, either selectively or completely without having to generate punched card output and recatalog
  - It can also redefine the number of tracks and cylinders allocated to libraries and directories.

- The Maintenance programs are fetched by Job Control when a // EXEC MAINT control statement is read. Its major functions are:
  - catalog function for all libraries

    NOTE: The core image library catalog function is performed by $MAINDIR, which is called $LNKEDT.
  - Delete function for all libraries
  - rename function for all libraries
  - reallocate function for all system libraries
  - condense function for all libraries.

- The Service programs are fetched by Job Control when a // EXEC (DSERV, CSERV, RESERV, SSERV, or PSERV) is read by Job Control. The functions are:
  - Directory service program (DSERV). Displays the contents of the directories in SYSRES and the private directories. All directories can be displayed in a single run, or they can be displayed selectively.
  - Core image library service program (CSERV). Displays and/or punches phases from the system and/or private core image library.
  - Relocatable library service program (RSERV). Displays and/or punches modules from system relocatable and/or private relocatable libraries.
  - Source statement library service program (SSERV). Displays and/or punches books from the system and/or private source statement libraries.
  - Procedure library service program (PSERV). Displays and/or punches procedures from the system procedure library.
- Before you can put a macro definition on the macro library, the assembler has to edit it and, using the EDECK option, produce an edited macro deck. The edited deck is placed on the macro library using the MAINT program. An edited macro definition, either in card format or on the copy library, is updated. After the changed macro definition has been tested, debugged, and edited, it can be placed on the macro library.
- If your source macro definition is not available, the de-editor program, ESERV, can be used to de-edit the edited macro definition to source format. Several macros can be handled at one time. The de-editor program also combines the function of de-editing with that of updating the source macro definition.
- The 'copy' library contains A.BOOKS.
- The 'macro' library contains E.BOOKS.
- The Source Statement Library contains the 'copy' and the 'macro' library.

Troubleshooting Hints

- Maintenance of the system, in certain cases, causes the directories to be incompatible with their corresponding lib braries. These cases occur, in particular, when the reallocation program (MAINTA) and the condense program (MAINTCN) are being executed. If the execution of either of these programs is not completed, the status of the system is unpredictable and the system may have to be rebuilt. It is therefore imperative that during the execution of either program, the supervisor be prevented from fetching any phase. To safeguard against these incompatibilities, PIOCS performs the following:
  - masks attention if bit 6 of the linkage control byte (displacement 57 of the communications region) is on. This bit is turned on and off by both programs.
  - enters the system into a 'hard wait' when an I/O error occurs on SYSRES, or when updating the core image library. The indication 'XFF6' is then set in register 11 and is stored in low real storage.

Cataloging a new book to the Source Library when an old book (same name) already exists in the library can cause unique problems. The directory entry for the old book is deleted before the new book is cataloged. If the maintenance function runs out of room in the library during the catalog, both old and new books are lost. A condense of the library may be required before the catalog will occur.

Activity

IN:	Guide to the DOS/VS Assembler
UNDER:	Maintaining the Macro and Copy Libraries
READ:	The whole section
UNDER:	De-editing and Updating Macros: ESERV Program
READ:	The whole section
IN:	DOS/VS System Control Statements
UNDER:	Librarian
REVIEW:	From beginning to CSERV, Core Image Library
REVIEW:	The figures 'Maintenance Functions, Example' and 'Service Functions, Example' and 'Copy Function, Example'

SELF-EVALUATION QUESTIONS

1. To determine the relocatable modules present in a library, the ____________________ function would be used.

2. To punch a macro from a private source statement library, it is necessary to ____ .

3. (True/False) The Service programs supply the catalog function for the relocatable library.

4. To create a private library, the _______________ program would be used.

5. The maintenance program to catalog a program into the Core Image Library is called by // EXEC _______________ .

Refer to the Contents for the location of the self-evaluation question answers.

SUPERVISOR GENERATION

This topic will discuss the generation of the tailored supervisor as specified by the user.

All parameters will be discussed and the SCP to be generated in lab will be introduced.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Correct any given error in the macros used for Supervisor generation.
2. State the importance of the RAS parameters for problem determination.
3. Correct any given errors in the catalog job stream for Supervisor and maintenance programs.

Highlights

- The DOS/VS Supervisor is assembled using thirteen (13) macros.
- The functions required in each unique installation can be selected by proper coding of the macro parameters.
- Consideration must be given to the programs which will be used with the tailored supervisor. Examples:
  - COBOL requires AB=YES
  - Some utilities use SYS010. If these are not 10 entries in the LUB table, the program cannot be executed.
  - FORTRAN and PL/I require floating point in hardware and FP=YES in the CONFG macro.
- Multiple supervisors can be assembled and cataloged, each having different parameters.

Troubleshooting Hints

- If the user doesn't have enough storage to include RAS items in the Supervisor:
  - Generate another Supervisor of the same size, omitting enough items to add the aids and replace the phase card with a unique name before cataloging.
- To save time during the catalog of the new Supervisor, the phase card can be changed to $$A$SUP2 before cataloging. If the new Supervisor won't IPL, the PID Supervisor is still available. When the new Supervisor is checked out, use RENAME to change name to $$A$SUP1.

- Check the following items carefully during a SYSGEN:
  - all MNOTES during Supervisor assembly
  - any error message
  - the LINK MAP during all catalog operations

Activity

IN:	DOS/VS System Management Guide
UNDER:	Chapter 3: Planning the System
REVIEW:	From beginning to 'Generating a Version of POWER'
IN:	DOS/VS System Generation
UNDER:	Module 1: Planning and Procedures
REVIEW:	System Configuration
REVIEW:	The Supervisor/Generation Macros through Maintenance Procedures
UNDER:	IBM 2314 Direct Access Storage Facility Example
REVIEW:	Steps 8, 9, and 10

SELF-EVALUATION QUESTIONS

1. The SEND macro, when specified without an address will ____ .

2. The PUB table entries are built from the __________________ macro.

3. To specify DASD file protection for a system with 3330s on channel 1 and 2314s on channels 2 and 3, the FOPT macro would contain ____.

4. (True/False) If the default values for the standard Job Control macro are correct, the macro can be omitted from the SYSGEN deck.

5. RMS support is standard for all 370 CPUs except _______ .

6. To generate RMS support for these CPUs, the ________ macro parameters ______________, ___________, and __________ are used.

7. (True/False) The SYSGEN macros may be submitted in any order.

8. To assemble a supervisor and catalog it to the Core Image Library, label information is required for what logical units?

____

9. The key librarian programs must be linked at the same time as the new supervisor if ______________________ .

Refer to the Contents for the location of the self-evaluation questions answers.

INSTALLATION VERIFICATION PROCEDURES (IVP)

The Installation Verification Procedures (IVP) for the DOS/VS SCP will be covered in this topic. In the lab, during the installation, the students will operate the IVP to verify the SCP installation.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Assemble and operate the IVP program to verify that an SCP has been installed correctly.
2. Code the IVPGEN macro to create an IVP job stream to verify any DOS/VS SCP.

Highlights

- The IVPGEN macro will generate the necessary job streams to verify the SCP installation and delete unused IVP books.
- The IVP procedure is a two-stage process, the first stage consisting of assembling the IVPGEN macro to create the IVP job stream and the second stage is running the IVP job stream.

Troubleshooting Hints

- Use VERIFY=YES parameter for the first compile of the IVPGEN macro.
- The SYSGEN manual contains printouts of the stage II IVP run.
- If a function is added to the system after the IVP stage II run, the RERUN parameter will create an IVP job stream to check out the new function.

Activity

IN:	DOS/VS System Generation SRL
READ:	MODULE 3: INSTALLATION VERIFICATION PROCEDURE

SELF-EVALUATION QUESTIONS

1. The IVPGEN macro operand that causes a job stream to be created that will delete all IVP books not used in the assembly of the IVP macro is ________________________ .

2. The stage II IVP job stream requires ____K of real storage allocated.

Refer to the Contents for the location of the self-evaluation question answers.

JOB CONTROL

This topic teaches the student the purpose and structure of the Job Control program. The loading sequence of the various job control phases and the specific functions performed by each is presented. Through the use of PLMs, microfiche, and storage prints, the student will learn to locate key areas and information within the program code. This knowledge will be used in lab to analyze and isolate job control problems that cause incomplete or incorrect system operation. Generic device assignment is also presented during this topic.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

$JOBCTLA — 3.

1. State which phase of job control is required in storage for the processing of a given JCL statement or command.
2. Identify, in a storage print, the phases(s) of job control that were in storage at the time the dump was taken and the system addresses at which they were loaded.
3. Interpret the contents of a given JCL phase vector table entry.
4. Using a DSERV of the core image library directory, calculate the size of a given JCL phase.
5. Determine the failing instruction, or group of instructions which cause incorrect execution of the job control program. Identify the failure in a storage print, microfiche, and PLM.

Highlights

- Job Control provides job-to-job transition for all programs.
- Job Control always executes in virtual mode.
- Job Control is a multiphase program.
- $JOBCTLA is the root phase of the Job Control program. A portion of this phase is always in storage during execution of job control.
- The phase vector table (within $JOBCTLA) determines which JCL phase is needed to process a specific JCL statement or command.
- $JOBCTLA is loaded into a virtual partition at the termination of an executing program by $BEOJ.

Troubleshooting Hints

- Investigate all JCL error messages.
- Use Error Message Cross Reference in the PLM in conjunction with the general and detail PLM charts to determine why a JCL error message was issued.
- Inspect the last character of the job control phasename in a dump to determine the JCL phase that is in the root phase overlay area.
- Use a core image library directory DSERV to determine the length, load point, and entry point for any phase of job control.
- Reference the phase vector table in $JOBCTLA to determine the required JCL processing phase for any valid JCL statement or command argument.
- Use labels in the JCL detail charts (in the PLM) as a means to locate specific areas of code in the microfiche to be investigated.

Activity

IN:	DOS/VS IPL and Job Control Logic
READ:	Job Control Program
IN:	DOS/VS Base SCM1
READ:	The Generic Assignment Section
DO:	PART 2 (Job Control) of WORK PROJECT 0

SELF-EVALUATION QUESTIONS

1. The Job Control phase that will process an ASSGN statement is:

   a. $JOBCTLA
   b. $JOBCTLJ
   c. $JOBCTLK
   d. $JOBCTLG
   e. None of the above

   $JOBCTLD

2. Indicate True (T) or False (F) for each of the statements below concerning the following phase vector table entry:

   1 7 4 0
   0001 0111 0100 0000

   A L L O C R ..... J
   C1D3D3D6C3D9401740D1

   X a. The entry is for the ALLOC operation.
   ✓ b. The required processing phase is $JOBCTLJ.
   Hex'40' X c. The required phase will be entered at a displacement of 40 bytes from its origin address.
   X d. Processing is to occur even though a cancel condition exists.
   unconditional SYSLOG logging
   X e. The statement must not start with //.
   ✓ f. The statement can start in any column.

448.
bytes.

X

3. (True/False) The size of $JOBCTLN is 1808 decimal bytes (Refer to the PARTIAL DSERV Figure in DOS/VS SCM 2).

X

4. (True/False) The first eight (8) bytes in a Job Control phase that has been loaded into the overlay area of $JOBCTLA will contain the name of the overlay phase. the eight in $JOBCTLA shows name of phase.

5. ? (True/False) The Generic Assignment capability of I/O devices by job control must be included in a DOS/VS system by the user at system generation time (SYSGEN).

6. The following job control statement is an example of which kind of generic device assignment?

    // ASSGN SYS005,(X'183',X'184')

___ a. Address
___ b. Generic CLASS
___ c. Generic TYPE
___ d. Address-list ✓

Refer to the Contents for the location of the self-evaluation question answers.

POWER GENERATION

The POWER component is part of the SCP and therefore a PSR responsibility to install. The concepts of POWER were covered previously. The parameters required to generate POWER will be discussed and the supervisor parameters required for POWER will also be discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Given a customer prepared POWER source deck, install the POWER component.
2. State the function of any POWER parameter.
3. Given a set of POWER generation parameters, determine the size of the POWER program that will be generated.
4. Determine from the POWER assembly listing the minimum and maximum partition sizes required to operate POWER.

Highlights

- The DIAG parameter of the POWER macro causes a PSR serviceability aid to be generated in the POWER program.
- Installation and verification of the POWER component is a PSR responsibility.
- The execution time portion of the POWER program must be linkedited in from the relocatable library.
- POWER program runs in real mode.

Troubleshooting Hints

- Check the POWER assembly and linkedit map for error diagnostics when installing the SCP.
- When POWER is assembled, use multipart forms for the output listing.
- Check the POWER macro parameters before assembling the POWER program.
- Advise the customer on the benefits of including the DIAG parameter when selecting the POWER options.
- Catalog the POWER object deck in the relocatable library so that replace (REP) cards can be used for fixes.

Activity

IN:	DOS/VS System Generation SRL
READ:	MODULE 2: GENERATING A VERSION OF POWER - 5745-SC-PWR through Deleting POWER Phases and Macros
IN:	DOS/VS System Generating SRL
UNDER:	Chapter 1: Understanding the System
READ:	POWER through end of chapter
UNDER:	Chapter 3: Planning the System
READ:	POWER
READ:	Generating a Version of POWER
UNDER:	Chapter 8: Using POWER
READ:	Initiating POWER through end of chapter

SELF-EVALUATION QUESTIONS

1. The purpose of the DIAG=parameter is to generate a POWER routine to ___________________________________ .

2. The entry point in the POWER program FGPSPOOL is ______ .

3. When the POWER parameter TAPE=YES is specified, ______ bytes will be generated in the POWER program to support the function.

4. The label _______ contains the value indicating the minimum number of bytes that must be allocated to operate POWER with all functions.

5. The core image phase name of the POWER program is __________ unless the customer supplies his own.

6. List the operands of the DELETR maintenance program control statement to delete all POWER components from the relocatable library.

   a. ______________
   b. ______________
   c. ______________
   d. ______________

Refer to the Contents for the location of the self-evaluation question answers.

UTILITY PROGRAMS

There are several utility programs supplied on the PID tape. These programs are of special value during SCP installation. This topic will discuss the different types of utilities and their use.

This topic will present the utilities as three groups.

1. DASD and Tape Utilites
2. DEBLOCK Utility
3. FASTCOPY Utility

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Select the correct DOS/VS utility for any given job requirement.
2. Select and deblock any given PTF.
3. Use FASTCOPY to copy and restore a DOS/VS system.

Activity

IN:	DOS/VS System Utilites SRL
UNDER:	Introduction
READ:	Description and Characteristics
REVIEW:	Machine Requirements through end of Introduction
UNDER:	Deblock
REVIEW:	Entire Section
UNDER:	Fast Copy Disk Volume
REVIEW:	Entire Section

SELF-EVALUATION QUESTIONS

1. To run the Clear Disk utility, the program name in the // EXEC card is ______________________________ .

2. To assign an alternate track on disk, the symbolic unit required for the disk is ____________________ .

3. In the standalone FASTCOPY, the Utility Modifier Statement must be placed ________________________ .

4. (True/False) The end of data cards, when blocking from card to tape, is indicated by /*.

5. The VTOC on a disk may be printed by using the program ______________________________ .

Refer to the Contents for the location of the self-evaluation question answers.

SUPERVISOR INTRODUCTION

This topic will introduce the Supervisor with emphasis on the major routines within it, their functions, and techniques for locating each of them. The macros used to assemble a supervisor and the assembly/catalog sequence will be introduced.

This topic will lay the foundation for all of the following supervisor topics.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate and identify the major components of the resident supervisor in a storage print.
2. Locate, in a supervisor listing or storage print, the entry point in the routine that processes each of the supervisor interrupts.
3. Determine when any given error is caused by the lack of the correct macro coding at supervisor assembly.
4. Use the supervisor listing to determine the size and initial values for the following tables:
   - SYSCOM
   - COMREG
   - Boundary Box
   - DPD Table

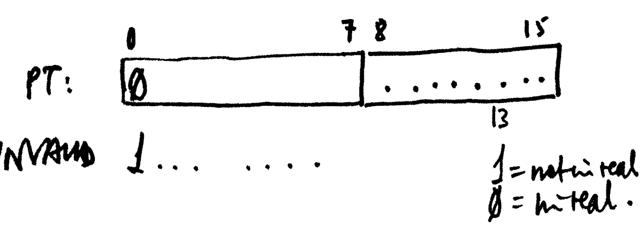
JI'WAIT msg. 81A-832

5. Locate the Supervisor routine that develops the low core messages and cancel codes and all linkages to this routine.
6. Use the translation tables in the supervisor to determine if a page is in real storage and its location.

DAGUSTAB.

Highlights

- The system communications region (SYSCOM) contains information relative to tables and routines in the Supervisor.
- The partition COMREG contains general information about tables in the Supervisor and partition dependent information.
- Bytes 14-17 contain the address of the partition COMREG that is active.
- The Boundary Box will contain the sizes of real and virtual partitions.
- The DPDTAB contains information relative to SYSVIS.



Troubleshooting Hints

- The contents of SYSCOM and the COMREGs are useful when trying to locate tables in the Supervisor.
- The BG COMREG PIK value indicates the partition enabled for interrupts or last interrupted (in control of system).
- Always check the PSWs in the partition save areas to determine where program lost control in each partition.
- When the customer generates Supervisor(s) for the system, ensure that multi-part paper is used since a supervisor listing may have to be submitted with an APAR.
- The labels in the cancel routines (ERRnn) are useful to trigger the SDAID program.
- Register 11 will contain the wait code on a hard wait.
- Always do a store status before taking a standalone dump.
- Check the contents of the old and current PSW.

Activity

IN: DOS/VS Supervisor Logic

READ: 15 – 19 Introduction
through
Low Real Storage

STUDY: Appendix D: Cancel Codes and Messages
- ✓ Figure 'System Communications Region (SYSCOM)' p42
- ✓ Figure 'Partition Communication Region' p44
- ~~Figure 'Partition Communication Region'~~
- ✓ Figure 'Boundary Box (BBOX)' p54
- ✓ Figure 'Page Data Set Table (DPDTAB)' p70

SELF-EVALUATION QUESTIONS

1. In a four partition system, the partition in control of the system when PIK's X'30 is ____ F2 ____ .

2. The address of SYSCOM is located in storage at X' __80__ '.

3. The Supervisor parameter that determines the size of the PUB table is ________________ . IODEV=

4. A code of 4 in bytes 2 and 3 of the DPD table indicates SYSVIS is ____ 3330 ____ .

5. (True/False) A low storage message of X'00000FFA' will be created if a Supervisor routine branches to label HARDWTFA. TRUE. p17 HARDWT msgs.

6. The address of the end of real storage is located in SYSCOM at a displacement of X'__~~EC~~__'. EORSTR.

'39' bit 3.

7. The byte and bit in the COMREG that indicates a // OPTION CATAL statement is in effect for a partition is _______ .

Refer to the Contents for the location of the self-evaluation question answers.

TASK SELECTION

When the currently operating program gives up control because of a supervisor interruption, the supervisor must determine which task (program) is to get control of the system after the interruption is handled.

This topic will show how DOS/VS controls the system activity. Much of the discussion will center on the "dispatcher" or "task selection". Due to the possibility of program checks occurring in the supervisor (page faults) there are partition save areas in the supervisor. There are now a possibility of five system tasks and fifteen user tasks. This topic will discuss the areas in regard to the dispatcher and how these areas can be used to determine the status of the system and its resources.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Identify the purpose, locate in a storage print, and use the following items to determine the status of the DOS/VS system and its resources.
   - RID routine identifier p87.
   - STID/SELECT system task id p78.
   - PIK/TIK partition id. p447 id key. 447.
   - LTK/LIK LTK id key p448 id key 448.
   - MVCFLD
   - TRTMASK 77.
   - TRTFLD
   - TRFLD
   - System Task Control Block 79.
   - PIB Table 50
   - PIB Table Extenstion PIB2 53
   - System Save Area (Special Save Area) 71
   - System Task Save Area
   - Dispatcher routine
2. Identify the function of the SVC22 and SVC33.
3. Identify the following terms in relation to DOS/VS:
   - Disabled/Enabled state
   - Gated routine
   - Reentrant routine
   - Reusable routine
4. Determine from the translate and test mask (TRTMSK) when the logical transient area is busy, and when the system has been seized by any program.
5. Use the program interrupt key (PIK) to determine which partition is or was in control (enabled for interrupts), at any given point in time.
6. Use the logical transient key (LTK) to determine which partition is using the logical transient area.

LTK in BGCOMREG = PIK task owns LTA
or 00 LTA free.

Highlights

- Partition general registers and the partition's current PSW are saved in the partition savearea upon entry to the supervisor.
- The five supervisor tasks in their priority are as follows:

STID
  - RAS (optional)
  - Page Manager
  - Supervisor (Fetch routine)
  - CRT (optional)
  - ERP
- Program Interrupt Key (PIK)/Task Interrupt Key (TIK) in the BG communication region identifies the problem program task in control of the system.
- The label of the dispatcher in the supervisor listing is "EXIT".
- The STID (SELECT byte) identifies the supervisor task active in the system.

Troubleshooting Hints

- Check PIK/TIK to determine the partition user task in control of the system if the system enters a wait state.
- Check STID to determine the supervisor task active in the system.
- Check low core for a message if the system enters the wait state.
- The fields "TRTFLD" and "TRFLD" in the supervisor can be checked to determine the status of all tasks the last time the dispatcher selected a task to run.
- The reason a problem program task loses control can be determined from the interrupt information in the PIB extension and the PSW in the partition savearea.
- The DAT flag in the PIB indicates the state of the partition in regard to supervisor routines and if the partition special savearea in the supervisor is active.
- If the system enters the wait state, check the 'TRTMASK' field for the status of system resources.

* LTK: which partition using LTA, or task.

* use TRTMSK ~~[illegible]~~ to find if LTA is busy.

* PDO - page manager, [illegible] of page fault.

Activity

IN:		DOS/VS Supervisor Logic PLM
READ:	77 - 83	'Task Selection' through 'Asynchronous Processing'
STUDY:		Figure for 'Program Information Block (PIB) Table' Figure for 'Indications of Logical Transient Area Occupancy and Activity' Figure for 'Program Information Block Table Extension'
IN:		DOS/VS BASE SCM 1
REVIEW:	✓	TASK SELECTION SECTION

SELF-EVALUATION QUESTIONS

1. ? (True/False) When a page fault occurs in a reentrant supervisor routine, the routine cannot be entered again until the page fault has been handled.

2. A disabled user task is operating with I/O and external interrupts masked (on/off) in the PSW.

3. The field __________ can be used to determine the status of the user tasks after task selection.

4. The name of the routine that restores the PSW and registers for a reentrant supervisor routine after a page fault was handled is ____.

5. If a system task wants to give a higher priority ready system task a chance to run, it would issue a SVC 33. .

6. The number of the last SVC issued in a partition could be determined by checking SVC int code. .

7. In a core dump, where can the cancel code for a problem program be found?
R11. .

8. How does the supervisor transfer to the Attention Task Handling routines? ____

9. In a core dump, where can the address of the F1 save area be found? ____

10. Where are the partition communications region's addresses stored?
____

11. What does it mean when a byte of the 'TRTMASK' is changed to X'00'? ____

12. The 'PIK' is found at __________ byte displacement into the partition 'COMREG'. Its value for problem programs is equal to the hex value of the program's storage protect key multiplied by __________________________ .

13. What does a 'LTK' value of X'20' indicate?

____

____

____

14. Where is the 'LTK' located? ______________________________

____

Refer to the Contents for the location of the self-evaluation question answers.

CHANNEL SCHEDULER AND I/O INTERRUPT ROUTINES

Problem programs request I/O operations by using the EXCP, WAIT, and CCB macros. The issuing of the SIO and the handling of the subsequent I/O interrupts are accomplished by two major routines within the supervisor which are called the channel scheduler and the I/O interrupt handling routine.

This topic will teach the student how to use the program logic manual (PLM) and the supervisor listing to analyze and correct or circumvent problems in these routines.

The 'CCW Translation' routine used for I/O requests from a virtual partition will be covered in a later topic.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate the channel scheduler start I/O instruction and all instructions that modify it in core when given a supervisor listing.
2. Locate the PUB table and channel queue and use them to determine which devices have I/O requests from the problem program when given a supervisor core dump.
3. Locate in a core dump, all communications regions, LUB, PUB, channel queue, and channel scheduler routines, and list the sequence of their use for two consecutive I/O requests to a 2540 reader.
4. Use the I/O trace to determine the number and sequence of all I/O events, and to locate the CCB for each request.
5. Use a core dump of the physical unit block (PUB table) to determine the following.
   - The number of entries into the device error routines (non-T/P) for each device
   - The device type for each entry
   - The TEB table entry if that option applies
   - If a device is on queue and busy
   - If a device is switchable
6. Determine the standard and temporary assignments for all system and program LUBs (symbolic assignments) by using the LISTIO command and by analysis of the LUB and JIB tables in core.
7. Use the register ID to determine the partition using each entry in the channel sequence.
8. Locate and interpret the following tables as an aid to problem determination:
   - Pub Owner
   - Channel Buckets
   - Channel Control Table
   - Headqueue PUB Table
9. State in ycur own words the purpose of any SVC related channel scheduler services.

Highlights

- The DOS/VS Supervisor handles all I/O operations.
- I/O is initiated via SVC interrupt.
- I/O is terminated via I/O interrupts.
- The PUB table contains an entry for each physical device on the system.
- The PUBOWNER table identifies the partition owning each PUB.
- The LUB table contains a pointer to the assigned physical unit.
- The JIB table holds standard assignments for temporary LUB assignments.
- The channel queue is used to store the CCB address from an I/O request (SVC0).

Troubleshooting Hints

- Register 1 usually contains the address of the last CCB used.
- The channel buckets (label REGSAV) will contain information about the last I/O on a channel.
- The ADD/DEL statements can be used to alter the content of the PUB table at IPL.
- The PUB Channel Queue Pointer can be used to determine the I/O requests for a device, if any.
- The PDAID I/O Trace can be used to obtain a list of all I/O Interrupts or stored CSWs.

Activity

```
IN:    BINDER 9    DOS/VS Supervisor Logic
UNDER:             Physical I/O Control System
READ:  129-139     To CHANQ figure

STUDY:             The following tables
                        CHANQ
                        PUBTAB
                        PUBOWNER
                        JIBTAB
                        CHNTAB
       144              LUBTAB
                        Channel Buckets

READ:  138         'Selector and Block Multiplex Channel Switching'
       +145             through
                   'Command Control Block'

STUDY: 145         CCB Table
```

SELF-EVALUATION QUESTIONS

1. Which of the following items would be most helpful in locating instructions that modify the channel scheduler start I/O instruction?

   a. Supervisor PLM
   b. Cross-reference listing of the supervisor
   c. Microfiche copies of the error transient routines

2. What byte(s) in a PUB table entry indicate(s) that an I/O request has been queued for that device?

   a. Byte zero
   b. Byte six, bit 3
   c. Byte seven, bit 5
   d. Byte two

3. How does the LUBID entry relate to the channel queue?

   a. Pointer to the logical unit translate table identification
   b. It points to the CCB of the program requesting I/O
   c. It points to the next entry in the channel queue
   d. It points to the logical unit that requested I/O

4. Given the following PUB entry in hex, fill in the blanks:

   X'0283030050C3C0C4'

   a. The channel address is ______________________________ .
   b. The device address is ______________________________ .
   c. The device type is ___________________________________ .
   d. The device __________ (is/is not) busy.
   e. The device __________ (is/is not) on queue.
   f. (True/False) A TEB table entry is associated with this device.
   g. This device _________ (is/is not) switchable.
   h. The device is ____________ (a 7-track tape/a 9-track tape/not a tape) unit.

5. What one LISTIO command will print all the devices in the PUB table with their associated assignments? ______________

6. To determine the last I/O successfully started on a channel, the ___________________ table could be interpreted.

7. A 'REQID' of X'30' indicates that the partition using the associated CCB is the _______________ partition.

8. In a core dump, a LUB value of X'FEFF' indicates an assignment of ____________________________ .

Refer to the Contents for the location of the self-evaluation question answers.

ERROR RECOVERY PROCEDURES (ERP)

Device Error Routines in DOS are core resident for the disk devices (SYSRES), and are fetched from the core image library for non-SYSRES device types.

This topic will teach the student how to use the fetch trace routine, PLMs, and microfiche listings to determine the system operation when a device error occurs.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Determine the phase or routine that issued any physical I/O error message (0P08 through 0P60) and indicate what sense or status checking took place prior to the message being issued.
2. Determine the phases(s) that are used for error recovery and error recording (non-T/P devices only) from any given device type.
3. Determine what I/O devices had been entered into the error queue when the error queue overflow message is issued.
4. Locate the sense data device address, SEREP interface code, and message for low core I/O error messages, with the system in the wait state: then determine if it is a hardware or program failure.
5. Given a storage print obtained due to an error in ERP, locate and interpret the following:
   - ERBLOC
   - A-transient area
   - PUB2 Table
   - RF Table
   - Unit Check Record (In core or from SYSREC)

Highlights

- Device error recovery is performed on DOS with A-transients.
- When device error recovery is entered and the error can't be corrected, all status is logged on the console and the operator is given an option (RETRY, IGNORE, CANCEL).
- On unrecoverable errors that cannot be retried, the SEREP interface will be set up.
- Disk error recovery is resident within the Supervisor for DOS.
- The Error Queue entry is built by the I/O interrupt handler routine of the Supervisor.
- The five functions required for ERP are:
  - Supervisor Resident Routine
  - RMSR Recorder Transients (update statistics)
  - Error Recovery Procedures
  - RMSR Recorder Transients (write unit check record)
  - ERP Message Writer Transients
- SVC 5 is used to fetch A-transients
- SVC 44 is used to write the unit check record on SYSREC.

Troubleshooting Hints

- Observe the information in the error queue when an I/O error occurs.
- To prevent information from being reset on an error queue overflow, SAR stop on 'ERR31' in Supervisor take a standalone storage print.
- The PUB Table contains the number of retries attempted and a flag that indicates if the device is queued for error recovery.
- The section in the PLM on I/O recovery procedures and sense data can be used to determine what DOS did to recover from the error.
- The PDAID Transient dump can be used to obtain a storage print of an A-transient causing a program check.
- The DOS/VS Error Recovery and Recording Transient PLM contains a description of ERP action and a message cross-reference for the ERP transient phases.
- Use the PDAID I/O Trace if a problem is suspected with I/O.

Activity

IN: DOS/VS SCM 1
READ: p269 'Invocation of Error Recovery Procedures'

IN: BINDER 10 DOS/VS Recovery and Error Recording Logic
READ: Chapter 1: INTRODUCTION
Chapter 2: DEVICE-DEPENDENT ERROR RECOVERY PROCEDURES
Chapter 4: RECOVERY MANAGEMENT SUPPORT RECORDER (RMSR)
through
'RMSR Functional Flow for Unit Check Type Errors on Data Cell, Tape, and Unit Record Devices'

IN: BINDER 9 DOS/VS Supervisor Logic
UNDER: Physical Input/Output Control System (PIOCS)
181–186 'Error Queueing and De~~bugging~~' queuing
through
'3330 Disk Storage Error Recovery'

SELF-EVALUATION QUESTIONS

1. What bytes in an error queue entry contain a pointer to the device address for devices on queue? 8,9 .

2. Assume the following message was issued while attempting to list on a 1403 printer:

BG OP10A EQUIP CHK SYSLST = 00E
CCSW=0B10022B5006000000 SNS=010000000000 CCB=022AD8

The name of the ERP phase (not RMS) that will handle this error is ______ PHASE $$ABERR

3. Using the example in question 2, fill in the blanks below.

a. Device Address 00E
b. Partition issuing the message BG
c. CCW command code 0B
d. Status indicated 0600
e. CCB location 022AD8
f. CCW location 22B50
g. Sense information indicated 01 0000 0000
h. Storage protect key 10

4. Given a device type of X'50', what is the first transient called in the event of an error? Use Chart 07 in PLM.

$$ABERRB

5. Given a core dump, how would you locate the first error queue entry? ____

____

____

6. The system goes into the wait state. Where can a method for determining the cause of this error be found? __________

____

7. Given a message 'OP34', name the transient that detected the error and caused the message to be issued. _______________

8. The sense byte information for a 1403 is located at displacement of X'____' in a Unit Check Record.

9. The 'intervention required' statistical counter is located at a displacement of X'____' in a Unit Check or Counter Overflow Record for a 1403.

10. State the purpose of the PUB2 entries. _____________________

____

____

Refer to the Contents for the location of the self-evaluation question answers.

MACHINE CHECK AND CHANNEL CHECK HANDLING (MCAR/CCH)

With the growth of more and more online data processing activities, increased reliability, availability, and serviceability (RAS) of computing systems have become a prime requirement. Improved hardware features have been included in System/370 to accomplish these goals. The programming systems used with System/370 have also been expanded to provide increased recovery support in the event of system failures. In this topic we will study the functions and overall program logic of recovery management support (Machine Check Analysis and Recording (MCAR) and Channel Check Handler (CCH).

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate and interpret the following areas in a storage print as an aid to problem determination:
   - RAS Monitor Table (RASTAB)
   - RAS Linkage Area (RASLINK)
   - Error Recovery Procedure Information Block (ERPIB)
   - Limited Channel Logout
   - RAS Transient Area
2. Use tables in PLM to determine how the channel check severity is determined and recovery action.
3. State the function of any RAS Transient.
4. Determine the routine/phase that issues any RAS message or low core message.

Highlights

- The CCH routine attempts to recover for channel control checks and interface control checks.
- DOS/VS will attempt to record hard and soft machine checks (dependent on EFL).
- The three elements of MCAR are:
  - Resident Machine Check Handler
  - RAS Monitor
  - RAS Transients
- The four elements of CCH are:
  - Resident Channel Check Handler
  - Resident DASD Channel Check Handler
  - RAS Monitor
  - RAS Transients

Activity

IN:	DOS/VS Error Recovery and Recording Transients PLM
READ:	Chapter 3: MACHINF CHECK AND CHANNEL CHECK HANDLING (MCAR/CCH)
STUDY:	Figures of Machine Check and Channel Check Record Format on IJSYSRC

SELF-EVALUATION QUESTIONS

There are no self-evaluation questions for this topic because the objectives are addressed by questions on the MCAR and CCH Work Project.

SUPERVISOR TASK (FETCH) CONCEPTS AND TABLES

After a program has been cataloged into the core image library or PCIL, it can be retrieved and brought into storage by any problem program through the use of the fetch or load macro (or the equivalent coding), which issues a SVC and gives control to the supervisor task.

There are ten SVCs used for fetch and passing control. This topic will teach the tables used and the concepts of the fetch task.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the objectives or a Fetch or Load.
2. Correct any given coding errors in a Fetch or Load macro.
3. Identify the contents of any given field or table used for Fetch or Load, given a disk dump or storage print.
4. Use the Fetch routines to stop the system with any desired phase in storage.
5. Use the PDAID F/L Trace to determine the sequence of accessing phases within any given program.

Highlights

- The system loader is resident in the supervisor and loads programs from the core image library into storage.
- The FETCH and LOAD macro can be issued by the problem programmer to cause a program phase to be loaded into storage.
- The SVC 2 will cause a logical transient to be fetched.
- The SVC 5 will cause a physical transient to be fetched.

Troubleshooting Hints

- Use the CE Serviceability Aid Fetch/Trace
- $$A and $$B phases can be loaded into core by submitting a // EXEC phasename card and the phase will be loaded into core after the supervisor. Usually a Program Check and dump will then occur.
- When a logical transient is cancelled, the system will call in a logical transient to dump storage and overlay the transient and the logical transient register save area. If it is necessary to know the contents of the LTA and LTA register save area, you must stop the system prior to fetching the first termination phase (SAR stop on mahchine check old PSW) and take a standalone dump or use the PDAID of Logical Transient.

Activity

IN:	DOS/VS Supervisor Logic
READ:	SVC 1
	SVC 2
	SVC 4
	SVC 5
	SVC 8
	SVC 9
	SVC 11
	SVC 23
	Section on Program Retrieval
IN:	DOS/VS Supervisor and I/O Macros
READ:	FETCH Macro
	LOAD Macro
	GENL Macro
IN:	DOS/VS Base SCM 1
STUDY:	FETCH figures

SELF-EVALUATION QUESTIONS

1. Which of the following should issue a SVC 11?

   a. Problem program (any partition)
   b. Logical transients
   c. Physical transient
   d. Supervisor fetch routine

2. If you suspect the reason a multiphase program aborted is because a portion of it was overlayed, what PDAID would help in determining the last phase fetched before the cancellation?

   ____

3. Which of the following SVCs are used to return from a problem program to a logical transient?

   a. SVC 2
   b. SVC 8
   c. SVC 1
   d. SVC 9

4. The high core address of the last problem phase fetched is available in:

   a. The COMREG displacement 36-39.
   b. Register 2.
   c. The COMREG displacement 40-43.
   d. Bytes 4 through 6 of the associated PIB.

5. The address of the F1 PSLD can be found in:

   a. SYSCOM.
   b. the System Directory.
   c. the Fetch Table.
   d. General Register 14.

6. The length of an 'in-core' directory entry is:

   a. 30 bytes.
   b. 34 bytes.
   c. variable.
   d. 42 bytes.

7. A LOAD macro with TXT=NO, SYS=YES and DE=YES will:

   a. Search the SCID first.
   b. Use the directory element if active.
   c. Fill in the directory element if inactive.
   d. All of the above.

8. Put the following SVCs in the correct sequence for a problem program that requires a logical transient routine.

   a. SVC 9 _____
   b. SVC 2 _____
   c. SVC 11 _____
   d. SVC 8 _____

Refer to the Contents for the location of the self-evaluation question answers.

SUPERVISOR TASK (FETCH) OPERATION

The internal operation of the Fetch routine will be shown. This will be accomplished by using an example of a fetch of a relocatable problem program phase.

The areas used by the Fetch routine to build CCWs, relocate address constants, and store intermediate information will be shown because it can be useful when working on a problem in this area. The activation and deactivation of the Fetch task by other routines will also be discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Given a message, loop, or wait state due to a fetch routine failure, locate the failing instruction in the Supervisor.
2. Locate and interrupt the contents of the SSA and TCB, used by the Fetch routine, as an aid to problem determination.
3. For any given fetch, determine the sequence the directories are searched.

Highlights

- Fetch is performed by the Supervisor System Task.
- The directory search depends on the parameters selected in the macro.
- Phases may be fetched from a Catalog or Link Library.
- Directories may be :
  - Within the macro expansion (DE)
  - In a list in storage (GENL)
  - On disk
- The Supervisor may be 'shut down' by the Load Leveler.
- The Supervisor task (Fetch) has its own CCW translation routines.
- Fetch uses CTFIX.

Troubleshooting Hints

- Use the Fetch Table to determine directory status.
- If Select is 03:
  - Check Fetch SSA and if
    SYSFLAG 3 has bit 7 = 1, the TCB information will be in FCHWORK and FCHWORK1.
    SYSFLAG 3 has the bit 7 = 0, the TCB information will be in the issuing partition's TCB,
- If SELECT is not 03 and Fetch failure is suspected:
  - Scan PIB tables for an 01 in the fifth byte.
  - Check partition SSA for PSW pointing to SETFCH routine.
  - If PSW contains this data, TCB has valid information about the interrupted fetch.
  - Use SCM to determine values in TCB.

Activity

IN:	DOS/VS BASE SCM 1
STUDY:	Fetch section

SELF-EVALUATION QUESTIONS

There are no self-evaluation questions for this topic. All objectives will be met via Work Projects and T/As.

SHARED VIRTUAL AREA (SVA)

This topic will discuss the DOS/VS facility which allows relocatable and reentrant phases to reside in the SVA. Also included will be a discussion of the System GETVIS area.

OBJECTIVE

Upon completion of this topic, the student, using the documentation, should be able to:

1. State the advantages of using SVA cataloged phases.
2. Determine the disk address of the SVA on SYSVIS.
3. Determine the directory search sequence when using SVA.
4. Identify the contents of any given table in a storage print.
5. Identify the macros and/or commands used for SVA support.

Highlights

- Often used phases may reside in the SVA.
- SVA phases must be relocatable and reentrant.
- SVA support is built at SYSGEN. Job Control statements are used to load the SVA or alter its size.
- The System GETVIS area has been added, primarily to support VSAM.

Activity

IN:	DOS/VS Supervisor and I/O Macros
READ:	GETVIS and FREEVIS
IN:	DOS/VS Supervisor Logic
READ:	Writeups for SVC 61 SVC 62 SVC 65 VSTAB Macro (SVA parameter)
IN:	DOS/VS System Control Statements
READ:	SET (SVA and SDL)
IN:	DOS/VS BASE SCM 1
REVIEW:	SVA Section

SELF-EVALUATION QUESTIONS

1. (True/False) The SDL can only be created at IPL time.

2. The advantages of having phases cataloged in the SVA are:

   a. ____

   b. ____

   c. ____

3. Given a FETCH operation with the following options
   LINK
   PCIL
   LDL
   SDL

   the directories will be searched in what order?

   a. ______________
   b. ______________
   c. ______________
   d. ______________
   e. ______________

4. The statements required to create an SDL entry and load phase JACK into the SVA are:

   a. ______________
   b. ______________
   c. ______________

5. The phase card for JACK would have to be coded _________ to support this phase in the SVA.

Refer to the Contents for the location of the self-evaluation question answers.

DOS/VS TIMERS

The measurement of elapsed time during user program operation requires an accurate method of measuring time intervals. This topic will discuss the Interval Timer and TOD Clock. The macros required and coding technique will be discussed.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the use of the Time-of-Day Clock.
2. State the use of the Interval Timer.
3. Identify the macros used for TOD Clock and Interval Timer support.
4. State the use of any given TOD or IT macro.

Highlights

- The Time of Day Clock keeps track of time in hh/mm/ss. This clock is set at IPL time.
- The Interval Timer may be set by the user to measure time intervals.
- When the IT Interval decrements to a zero, an interrupt is generated. Control is passed to a user routine at this time.
- The ITREQ table is used for managing multiple partition timer requests.
- The ITTAB is used to store linkage informaticn from a STXIT macro which is used at interrupt time.

Activity

IN: DOS/VS Supervisor and I/O Macros
UNDER: Supervisor Macros
READ:
- Time-of-Day Macro
- Interval Timer and Exit Macro
- Entering a Routine when Time Elapses
- Entering a Routine at Given Intervals

IN:	DOS/VS System Management Guide
UNDER:	Chapter 10: USING THE FACILITIES AND OPTIONS OF THE SUPERVISOR
READ:	Timing Features to Checkpointing Facilities
IN:	DOS/VS Base SCM 1
STUDY:	DOS/VS Timers Section

SELF-EVALUATION QUESTIONS

1. The STXIT macro when issued with ONLY the first operand will ______________________________ .

2. (True/False) The Interval Timer can be set for an interval of 24 hours.

3. The WAIT macro ________ (is/is not) generally used in a routine with a STXIT.

4. To wait for the timer to reach zero before continuing processing, the ___________ should be used.

5. The macro SETIME 1800 will cause the timer to be set for an interval of ________________________________ .

6. The GETIME Macro is used in conjunction with ____ .

7. If TOD support was not specified as a SYSGEN option, ______________ will be returned on a GETIME.

Refer to the Contents for the location of the self-evaluation question answers.

PAGE MANAGER CONCEPTS AND TABLES

This topic will review the concept of the page manager. Then the tables required for page management will be discussed showing their formats. This topic prepares the base for all the following page manager topics.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. State the objective of the Page Manager.
2. Identify the routine(s) which initialize the system for DOS/VS.
3. Identify the contents of any given table used to support virtual operation.

Activity

IN:	DOS/VS BASE SCM 1
UNDER:	'Page Manager'
REVIEW:	The following figures DOS/VS Control Flow Objectives Pre-IPL DOS/VS System DOS/VS IPL Functions Function of EOJ Transient during IPL Loading of Job Control after IPL Loading a Virtual Problem Program Termination of a Virtual Partition Use of Translation Mode in DOS/VS Abbreviations Page Management Tables in Relation to Real and Virtual Storage

IN:	DOS/VS Supervisor Logic
UNDER:	'Page Management'
READ:	Page Management through Page Table Initialization

IN:	DOS/VS Supervisor Logic
UNDER:	'Page Management'
STUDY:	The layout of Page Frame Table Page Frame Table Extension Page Table

SELF-EVALUATION QUESTIONS

1. One page table is built for each segment of virtual storage and contains ________ two byte entries.

   a. 16
   b. 32
   c. 48
   d. 20
   e. None of the above

2. The initialization of the Page Table is done by routine ___________ during IPL.

   a. INITPT
   b. JOBCTLA
   c. EOJ
   d. INITDAT

3. (True/False) The Segment table is not used by the Page Manager.

4. The Page Frame table is located at label _________ in the Supervisor listing SCM.

   a. PFT
   b. PT
   c. PFRT
   d. PGFRT

Refer to the Contents for the location of the self-evaluation question answers.

PAGE MANAGER INITIALIZATION

This topic will discuss the initialization of Page Manager Tables in DOS/VS. Initialization occurs at IPL time and by Job Control when loading a virtual program.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Determine if IPL has initialized the Page Manager tables correctly.
2. Determine if Job Control has initialized the Page Manager tables correctly.
3. Identify any given error in IPL or Job Control Initialization.

Highlights

- DAT is 'Off' during part of IPL.
- The Page Manager tables initially contain values from Supervisor assembly.
- IPL initializes all PT entries above the Supervisor and sets storage protect keys.
- The initialization routines are entered via SVC interrupts.
- SYSVIS is readied for use during IPL.

Troubleshooting Hints

- If the PSW or Control Registers are incorrectly initialized, check INITDAT routine.
- If the Page Table is incorrectly initialized, check INITPT routine.
- INITDAT routine initializes the B BOX.

Activity

IN:	DOS/VS IPL and Job Control
UNDER:	Introduction
READ:	IPL and Job Control
IN:	DOS/VS Base SCM 1
REVIEW:	Page Manager Initialization Section

SELF-EVALUATION QUESTIONS

1. After executing the INITDAT routine all page table entries above the End-of-Real Storage will contain ____ .

2. The INITDAT routine is called by ____________________ .

3. The INITPT routine is called by _____________________ .

4. The INITDAT and INITPT routines are part of _________ .

5. The INITPT Routine will set the F1V page table entries to ____ .

6. After INITPT the PFT entries for areas above the Supervisor will contain _________ in bytes 4 and 5.

Refer to the Contents for the location of the self-evaluation question answers.

PAGE MANAGER SERVICES

The page manager provides its services to system and user tasks. Its primary function is to manage the real storage resource of the system. The concept and operation of the page manager for page faults, TFIX/TFREE, PFIX/PFREE, and GETREAL/FREEREAL will be shown. The page manager uses the page frame table, page table, FIXWTAB and PFIX table to manage the real storage operation. The manipulation of these tables and their contents will be discussed in some depth.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate any given error in the Page Manager.
2. Identify the failing Page Manager Instruction when a failure occurs in:
   - TFIX/TFREE
   - PFIX/PFREE
   - GETREAL/FREEREAL
   - Page Fault Handling
3. Locate and interpret the contents of the following tables used by the Page Manager:
   - Segment Table
   - Page Table
   - Page Frame Table
   - Page Queue (PGQU)
   - FIXWTAB
   - Storage Protect Key

Highlights

- DOS/VS Supervisor and problem programs (virtual and real) execute with DAT 'On'.
- The PGQU is the interface between the Supervisor and Page Manager.
- The FIXWTAB is used by the Page Manager for posting of tasks when resources are available.
- The Page Manager will minimize page I/O by exchanging pages, paging out only when data has been changed and paging in only when there is valid data on SYSVIS.
- The NF bit being on in a a PFT entry indicates a request for the physical page frame (storage).
- The NFF bit being on in a PFT entry indicates a request for a logical page.

Troubleshooting Hints

- The Page Manager will normally post a task with a PIB flag of X'87' when it enqueues the request.
- The Pge Manager tables are formatted by the standalone dump.
- Use SYSVIS dump to display virtual storage.
- The storage protect keys can be displayed with a DK command on the console or standalone dump.
- If the system enters a soft wait, check the PIB flags of all tasks.
- Check low core X'90' to determine the last request enqueued to the Page Manager.
- The PSW in the partition save area indicates where a program was interrupted. If the partition was interrupted by a page fault, the PSW points to the first byte of the instruction causing the interrupt.
- In a standalone storage print, the formatted low core information is valid and the low core information has been overlaid.
- Use SDAIDS to monitor paging activity.

Activity

IN:	DOS/VS Supervisor Logic
READ:	Page Management through FREEREAL, TFREE, and PFREE Requests
UNDER:	Supervisor Call Interrupt (SVC)
READ:	SVC 54 SVC 55 SVC 58 SVC 59 SVC 61 SVC 62 SVC 66 SVC 67 SVC 68

SELF-EVALUATION QUESTIONS

1. The ENQU routine in Page Manager builds PGQU entries in low storage location ______________________________ .

2. The system task requesting a given PGQU entry can be identified by examining ___________ of the PGQU entry.

3. Bit 14=1 in a Page Frame table entry indicates ____ .

4. (True/False) A PFT entry with NFF bit=1 indicates that there is a pending request for the page frame.

5. The Page Manager uses the table PCKATAB to determine ____ .

6. A task waiting for a page will have its task identification posted in _____________________ of the associated Page Table entry.

7. If the System Save Area is indicated as active by the PIBDAT and the PSW points to the label LOADRA2, the Page Manager is doing a ___________ and waiting for a __________________ .

Refer to the Contents for the location of the self-evaluation question answers.

PAGE REPLACEMENT ALGORITHM

This topic will discuss the algorithm used in DOS/VS to determine which page is to be replaced on a page fault. The algorithm attempts to select the least recently used (LRU) page. Also included is an explanation of the Load Leveler and the Dynamic Reallocation of Partitions (DRAP). The Load Leveler is a portion of the Page Manager that monitors the amount of paging activity. If the activity becomes too high, it will then attempt to deactivate a partition.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Use the following areas in a storage print to determine how a system has been reallocated after an error in a page frame:
   - SYSCOM
   - BBOX
   - PT
   - PFT
   - Partition COMREG
2. Given a system wait, due to an error in the Load Leveler, locate the problem using the following:
   - RTAB
   - A CONST
   - B CONST
3. Given a system wait due to an error in the page replacement algorithm, locate the problem using:
   - Queue Headers
   - PFT
   - PT

Highlights

- Pages in real storage are replaced as required, using a page replacement algorithm.
- The Page Manager maintains five queues for page replacement.
- The Page Manager will select the least recently used page for replacement.
- To be selected for replacement, a page must be in Q00 or Q01.
- When Q00 and Q01 are empty, a queue switch occurs.
- Pages are queued for the page replacement algorithm based on bits 5 and 6 (reference and change bits) in the Storage Protect key.
- When paging activity becomes too high, the 'load leveler' will try to deactivate tasks to reduce activity.
- DOS/VS will attempt Dynamic Reallocation of Partition (DRAP) under certain error conditions.
- System tasks, user macros, and Job Control may directly queue pages to Q00 and Q01 bypassing the hold queue (HQ) for performance considerations.

Troubleshooting Hints

- A PIB flag of X'87' for a task normally indicates a page manager service is being performed for the task.
- The RETAB bytes labeled TRTLLBG-TRTLLF1 are used by the load leveler to deactivate a partition.
- If a task(s) is in the wait state, check the PSW to determine where it was interrupted. If the PIB has a PIB DAT flag with bits 6 or 7 on, the PSW is in the partition system savearea versus the partition savearea.
- The label APNO in SYSCOM (X'CE') indicates the number of active partitions.

Activity

IN:	DOS/VS Supervisor Logic
UNDER:	Page Management
READ:	Selection Pool up to Page Handling Routines Partition Deactivation and Reactivation

IN:	DOS/VS Base SCM 1
READ:	User Program Performance in Virtual Storage Systems

IN:	DOS/VS Error Recovery and Recording Transients PLM
UNDER:	Chapter 3: MACHINE CHECK ANALYSIS AND RECORDING
READ:	$$RAST09 $$RAST13

SELF-EVALUATION QUESTIONS

1. When a page replacement is necessary, the page selected should be ____ .

2. If a page has not been selected for replacement after a scan of Q00 and Q01, a _______________ will occur.

3. (True/False) The Queue Headers contain the address of the first and last PFT entry in queue.

4. If bytes 2 and 3 are equal to bytes 6 and 7 in a Queue Header entry it indicates ___________________________ .

5. The _______________ instruction is used to test the setting of the reference and change bits.

6. The load leveler measures paging activity against the constants ACONST and BCONST. These constants contain ________

____ .

7. During a DRAP operation, the PT entry for the failing page is set to ______________________________________ .

8. (True/False) The BBOX is updated after a DRAP operation.

Refer to the Contents for the location of the self-evaluation question answers.

PAGE MANAGER OPTIMIZATION

There are several system facilities available to optimize page manager operation. This topic will discuss these items.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Identify the macros and their application to optimize:
   a. Program execution.
   b. I/O execution.
2. Identify any given completion or return code and its meaning.

Activity

IN:	DOS/VS Supervisor and I/O Macros	
UNDER:	Supervisor Macros	
READ:	Write-ups on	
	-	RELPAG macro
	-	FCEPGOUT macro
	-	PAGEIN macro
	-	VIRTAD macro
	-	REALAD macro
UNDER:	Physcial IOCS	
READ:	Write-ups On	
	-	EXCP
IN:	DOS/VS Supervisor Logic	
UNDER:	Page Management	
READ:	Write-ups On	
	-	PAGEIN REQUEST
	-	RELPAG and FCEPGOUT REQUESTS
UNDER:	Interrupt Processors	
READ:	From SVC 85 through SVC 87	
UNDER:	Supervisor Generation and Organization	
REVIEW:	ECPREAL parameter of the FOPT macro	
IN:	DOS/VS BASE SCM 1	
REVIEW:	Page Manager Optimization	

SELF-EVALUATION QUESTIONS

1. (True/False) If the FCEPGOUT macro is issued, the affected page frames are no longer available in real storage.

2. When a program is running in REAL mode and an EXCP.....,REAL is issued, the _________________________________ .

3. If byte 2 of the ECB contains X'40' after a PAGEIN macro has been issued, it indicates ________________

____

4. If a page being processed by RELPAG is found to have an entry in the page queue (PGQU), the SVC routine will ____

____ .

Refer to the Contents for the location of the self-evaluation question answers.

CCW TRANSLATION

The function of the CCW translation routine will be discussed in this topic. For virtual programs, this routine copies and translates the user's channel programs into copy blocks in the Supervisor. The blocks used are as follows:

CCWTCB - CCW Translation Control Block
CCB Copy Block
CCW Copy Block
IDAL Block
FIX Block

The pages required for the I/O operation are TFIXed and then the request is enqueued to the channel queue.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Locate and interpret the following areas in a storage print as an aid to problem determination.
   CCWTCB
   CCB Copy Block
   CCW Copy Block
   IDAL Block
   FIX Block
2. Given an OP message, determine whether the problem is in the user's channel program or the translated channel program.

Highlights

- DOS/VS must translate virtual CCWs because the DAT feature does not function for channel programs.
- Copy blocks are all the same length.
- An IDAL is required if a data area spans a page boundary.
- CCW translation is skipped for:
  - I/O requests from real mode programs
  - I/O requests from system tasks
  - I/O requests from ATTN task
  - Console I/O if console buffering
  - I/O requests via EXCP with REAL parameter

- CCW translation will not support:
  - Self-modifying channel programs
  - Time dependent I/O requests
  - CCWs with length greater than 32K
  - I/O devices not supported by DOS/VS
  - Start I/O requests from I/O appendage routine when CCWs not translated
  - Channel programs with Data Chaining, if CCWs have different Op Codes. The data chaining function uses the Op Code of the first CCW only.

Troubleshooting Hints

- Any time a job cancels, the copied CCB and CCW blocks are lost.
- To obtain a dump of the copy blocks before a cancel, trigger SDAID on instruction fetch of instruction at label ERR1A.
- Standalone dump will format the copy blocks as an aid in troubleshooting.
- Virtual CCBs and CCWs are always translated unless the REAL parameter is specified in the EXCP.
- System throughput can suffer severely if not enough copy blocks are assigned. See DOS/VS System Management Guide for planning information.
- The TCB may contain important information if the CCW translation routine loses control.

Activity

IN:	DOS/VS Supervisor Logic
UNDER:	Physical Input/Output Control System (PIOCS)
READ:	Channel Program Translation

IN:	DOS/VS BASE SCM 1
STUDY:	CCW Translation Section

SELF-EVALUATION QUESTIONS

1. (True/False) The CCW translation routine is interruptable.

2. The TCB is ____ .

3. A CCB copy block is ____________ bytes in length.

4. The Page Frames that are TFIXed for I/O requests are kept track of in the ______________________________ .

Refer to the Contents for the location of the self-evaluation question answers.

RESOURCE MANAGEMENT

The concept of resource management and measurement of system utilization will be explained. The system components of DOS/VS use macros for the reserving and releasing of system resources. These resources may be shared or exclusively used. A resource usage record table (RURTAB) in the supervisor is used to manage the resources between partitions.

The Job Accounting (JA) interface facility provides job and job step information that can be used for charging system use, supervising system operation, planning new applications, etc. The customer must record the system utilization information on a data set. This JA phase will be fetched by Job Control at a job step or end of job.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Given a system wait state due to a system or operator error, locate and identify the problem.
2. State the purpose of the USE/RELEASE macros.
3. Determine the status of the system resources by interpreting the contents of the RURTAB and WAITLIST.
4. Given a system error in the JA interface facility, determine whether the problem is a design error or incorrect usage of the facility.
5. Locate and interpret the contents of the following Job Accounting Tables as an aid for problem determination.
   - JA Interface Common Table
   - JA Interface Partition Table

Highlights

- The USE macro is used to reserve system resources.
- Reserved resources can be shared or used exclusively.
- The RELEASE macro is used to free reserved resources.
- The USE/RELEASE macro uses the RURTAB and WAITLIST.
- The customer must write his own job accounting phase and name it $JOBCTLN.

Troubleshooting Hints

- A task is waiting for a system resource if its PIB flag is X'82' and the PSW in the save area points to a SVC 63 (0A3F).
- The RURTAB can be used to determine the task(s) using a resource and whether it is being used exclusively or being shared.
- If the job name in a dump is $JOBACCT, the dump was caused by the user JA routine.
- If $JOBACCT aborts, Job Accounting is inactive until the next IPL.
- If the user writes his JA records on unit record devices (tape or card), he must assign the recording device at supervisor generation time. Job Control will not allow assignment of unit record devices between partitions.

Activity

IN: DOS/VS System Management Guide
UNDER: Chapter 3: Planning the System
READ: Job Accounting

UNDER: Chapter 10: Using the Facilities and Options of the Supervisor
READ: Job Accounting Interface Information

IN: DOS/VS Supervisor Logic
READ: SVC 63
SVC 64
Job Accounting Interface Common Table
Job Accounting Interface Partition Table

SELF-EVALUATION QUESTIONS

1. The USE macro interfaces to the system with an SVC ________.

2. (True/False) A request for exclusive use of a resource that is being shared between partitions can be satisfied immediately.

3. (True/False) The address of the RURTAB is in SYSCOM.

4. The number of entries in WAITLIST for a 4-partition system without multitasking is ______________________ .

5. If the WAITLIST contains X'C097' it indicates the task is waiting for the _________________ resource.

6. The user's JA phase is fetched by phase __________ of Job Control.

7. The indicator for job or job step record is located at ________ in ________________________________Table.

8. The Job Accounting CPU duration is computed using the

   a. CPU Timer
   b. TOD Clock
   c. Interval Timer
   d. Wall Clock

9. When the user's program receives control, Register ____ will point to the JA save area.

Refer to the Contents for the location of the self-evaluation question answers.

DASD FILE PROTECTION AND SEEK SEPARATION

The DASD File Protect feature is provided to prevent user's programs from attempting to read or write outside the limits of the DASD file currently being accessed. These limits are defined by the extents specified for the accessed file.

The Seek Separation feature enables the supervisor to separate a seek CCW from its chained search read or write CCWs so that the seek can be separately scheduled. This enables the disk control unit to disconnect from the channel during the seek operation. The channel can then service other devices during this free time.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. List the supervisor generation macro and paramters that are used in providing DASD file protection.
2. Locate and identify in a core dump all control blocks, within the supervisor, that are used in implementing DASD file protection.
3. List the supervisor generation macros and their parameters that are used in providing the seek separation option.
4. Explain the term long seek as it applies to DASD file protection.
5. Locate and identify in a core dump all supervisor and problem program control blocks that are used in implementing seek separation.
6. List the conditions which will prevent a seek separation from being performed.

DASD FILE PROTECT

Highlights

- DASD file protection is a supervisor generation option.
- DASDFP is an operand of the FOPT macro.
- The upper and lower limits for DASD file protections are stored in the JIB table at OPEN time.
- DASDFP protects only to the cylinder, not to the track.

Activity

IN: DOS/VS Systems Management Guide
UNDER: Chapter 3
READ: DASD File Protection 3.22.

IN: DOS/VS Systems Generation
READ: DASDFP Option in the FOPT Macro. 1.31.

IN: DOS/VS Supervisor PLM
UNDER: Job Information Block (JIBTAB).
READ: Notes 1, 2 and 3

SEEK SEPARATION

Highlights

- Seek Separation is a supervisor generation option.
- This option provides increased process and/or available channel time during the time a seek is completed on a DASD device.

Activity

IN: DOS/VS System Management Guide
UNDER: Chapter 3
READ: Seek Separation 3.23.

IN: DOS/VS BASE SCM 1
READ: Seek Separation Explanation

IN: DOS/VS Supervisor PLM
UNDER: Physical Input/Output Control System
READ: Seek Separation

Toubleshooting Hints

- Check bit 7 of byte 12 in a CCB to determine if a failing DASD I/O operation was using SEEK SEPARATION.

SELF-EVALUATION QUESTIONS

1. Under what supervisor macro can DASD file protection be specified at system generation time? FOPT

2. What do the (n,n) parameters signify in the DASDFP specification of the macro? range of cylinders.

3. Write the DASDFP= parameters that will generate a supervisor with only selector channel 1 being file protected for both 2311 and 2314 DASD. DASDP= 1

4. Which program, user or supervisor, checks to make sure the first CCW in a channel program is a long seek when DASDFP or SEEK Separate has been optioned? SUPV

5. Is the user's CCW for the first seek to disk in a channel program used to do the actual seek when DASD file protect is supported? (Yes/No) YES

6. In what control block in the supervisor are the upper and lower limits for DASD file protection stored? JIBTAB

7. Which table in the supervisor contains a pointer to the control block asked for in the preceding question? ~~[illegible]~~ LUB Byte 1.

8. Under what supervisor macro is the parameter for seek separation found? FOPT

9. What is the name of the parameter referenced in question 8?

   SKSEP

10. What can the 'n' option be used for when specifying seek separation?

    Devices.

11. What is the name of the block in the supervisor that is used to keep track of the disk address when using seek separation? ~~[illegible]~~ SAB.

12. At what hex displacement in SYSCOM is the pointer to the Seek Address Block (SAB) located? X' 38 '

13. List four conditions which will prevent a seek separation on a DASD device.

    a. If first CCW is not 07

    b. If seek not within limits.

    c.

    d.

Refer to the Contents for the location of the self-evaluation question answers.

SYSTEM FILES ON DISK

System logical units (SYSRDR, SYSIPT, SYSLST and SYSPCH) are normally assigned to the reader, printer and punch. In some instances, it could be advantageous to assign them to a disk extent. For example, if SYSPCH was assigned to a disk extent, the assembled output from a language translator could then be written on disk instead of being punched into cards. This would result in faster retrieval of intermediate data and a subsequent saving in cards. This feature also affords extended support for the Procedure Library allowing insertion of in-line data to a specific job stream.

This feature is activated by specifying SYSFIL=YES at System Generation time.

OBJECTIVE

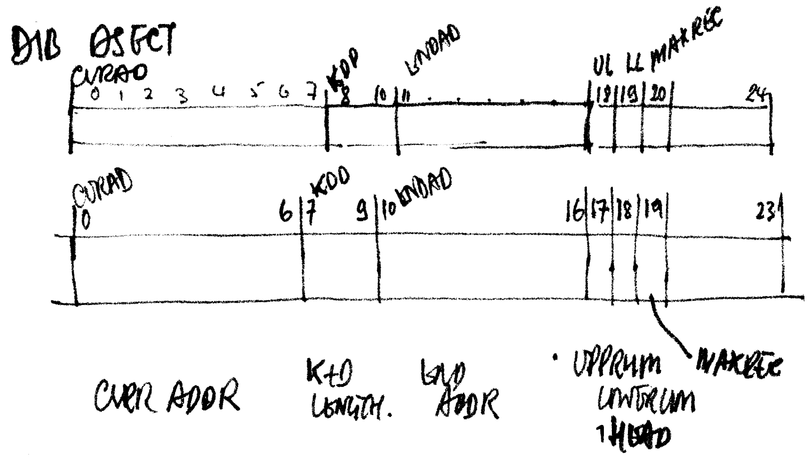
Upon completion of this topic, the student, using the available documentation, should be able to:

1. Determine if a supervisor will support system files on disk when given a supervisor listing.
2. Locate the Disk Information Block (DIB) in a supervisor listing and define its function.
3. Locate the cause and take the necessary corrective action for any error when given an error printout and listing of Job Control cards that utilize the system files on disk feature.
4. Determine if a disk dump of SYSIN file is in the correct format and sequence.

Activity

IN:	DOS/VS System Management Guide
UNDER:	Chapter 5 - Controlling Jobs
READ:	- System Files on Tape, Disk or Diskette
	- System Files on Tape
	- System Files on Disk

IN:	DOS/VS Base Student Guide (this manual)
DO:	WORK PROJECT 11 - SYSTEM FILES ON DISK



SELF-EVALUATION QUESTIONS

1. Under what macro is support for system files on disk specified at system generation?

   a. SUPVR
   b. SYSFIL·
   c. CONFG
   d. PIOCS
   e. FOPT

2. In the macro parameter given below, what is the residual capacity of the file for SYSPCH?

   SYSFIL=YES

   a. 500
   b. 2400
   c. 1500
   d. 1000

3. When assigning SYSIN to disk, what type of assignment must be made?

   a. Temporary
   b. Permanent

4. At what hex displacement into a partition communication region can the address of the DIB be found? X'___'

   a. X'96'
   b. X'50'
   c. X'500'
   d. X'60'
   e. X'98'

5. (True/False) The DIB table is updated by physical IOCS and each time a PCIL is assigned.

6. The following command: CLOSE SYSIN,X'00C'

   a. Is invalid
   b. Assigns X'00C' as the SYSIN device
   c. Closes the SYSIN file X'00C'
   d. Closes the SYSIN file and reassigns SYSIN to the card reader.

Refer to the Contents for the location of the self-evaluation question answers.

LIOCS CONCEPTS/MACROS

Most data processing I/O is accomplished by using IBM supplied routines which are collectively called the logical input/output control system (LIOCS). These routines provide macros for converting customer I/O reqiests into the physical I/O requests that are recognized by the supervisor (EXCP, WAIT, CCB).

During this topic, the student is introduced to the terms used in LIOCS, the I/O control tables, and the register conventions established for LIOCS.

OBJECTIVE

Upon completion of this topic the student, using the available documentation, should be able to:

1. Use the following terms to correctly describe logical files:
   a. Physical record
   b. Logical record
   c. Volume and volume labels
   d. Logical file and file labels
   e. Fixed, Variable, and Undefined record formats
   f. Blocked or Unblocked records
2. Correctly identify the register conventions used by LIOCS.
3. Correctly identify the usage and/or interaction of the following terms: DTF, MOD, GET, PUT, OPEN, CLOSE, EXCP, WAIT, CCB.
4. Identify the different types of file organization used by LIOCS which are Sequential, Random and Index Sequential.

Highlights

- The Command Control Block (CCB) for all files processed by LIOCS is the first 16 bytes of each DTF table.
- Byte 2Ø in a DTF table contains the code to identify the DTF type.
- All labeled files must be opened before processing and closed after processing.
- Each file in a program must have its own DTF table.
- Logic modules can be shared by two or more files providing the files have similar characteristics.
- High level languages such as COBOL, FORTRAN, and PL/1 all use Logical IOCS.

Troubleshooting Hint

- Refer to the DOS/VS Supervisor and I/O Macro SRL under Register usage for register significance using LIOCS. 20,297.

23,124 116
257
460.

Activity

In: Supervisor and I/O Macros
Under: Macros Processing
Read: DTF Declarative Macros
Logical Module Generation Macros
Register Usage
Under: Label Processing
Read: End-of-File Processing

In: LIOCS - Volume 1
Under: Introduction
Read: Through MOD Macros and Imperative Macros.

In: DOS/VS Data Management Guide 108 — 123
Under: Input/Output Control System
Read: To Physical IOCS (PIOCS)

SELF-EVALUATION QUESTIONS

1. The CCB expansion is part of the DTF.

2. The EXCP and WAIT macros are generated as part of the XXMOD.

3. Upon linkage from a GET to LIOCS, register R0 contains the address of the work area, register 15 contains the MOD address, register 14 contains return address, and register ~~0~~ 1 contains the address of the DTF.

4. The macro that initializes a logical file is OPEN OPENR.

5. A blocked record contains multiple logical (physical/logical) records.

Use the following terms to answer question 6 through 8.

a. Card file
b. Print file
c. Disk file
d. Tape file

6. Which of the preceding file(s) can have volume labels ? DISK & TAPE.
(More than one answer may be correct.)

7. Which of the above file(s) can contain multiple volumes ? DISK & TAPE.
(More than one answer may be correct.)

8. Match the above terms to the following record formats which may be used to record on these files. (More than one answer may be correct for each blank).

a. DISK TAPE Fixed blocked NOT CARD
YpFUV b. PRINT CARD Fixed unblocked
c. DISK TAPE Variable blocked NOT CARD
d. PRINT TAPE DISK Variable unblocked

a | c d
b | a b c d
c | a b c d
d | c d

9. End-of-file can be identified by _____ on a card reader, __EOB__ on 1050, __TM__ on tape, ________ on printers, and ____________ on DASD devices.

10. Place in sequence the events needed to cause an I/O operation on an output unit record device (PUT) using a work area.
Note: Some items are incorrect and therefore not used.

a. ____________ Issue an EXCP macro from the DTF.
b. ____________ Return to the DTF after the successful execution of the EXCP macro.
c. ____1_______ Exit to the logic module from the PUT macro expansion to the problem program.,
d. ____________ Move the work area to the I/O area.
e. ____________ Exit to the logic module from the PUT macro expansion in the DTF.
f. ____2_______ Move the I/O area to the work area.
g. ____________ Issue an EXCP macro from the problem program.
h. ____3_______ Issue an EXCP macro from the logic module.
i. ____4_______ Return to the problem program from the logic module.

11. Which type of file organization can be processed both randomly and sequentially? ________D________

12. Name three types of file organization methods available in DOS.
____D____ ____S____ ____IS____

13. What is the blocking factor if the logical record size is 60 bytes and the physical tape record is 300 bytes? ___5___

Refer to the Contents for the location of the self-evaluation question answers.

UNIT RECORD FILES/MACROS

Most data processing I/O is accomplished by using IBM supplied routines which are collectively called the logical input/output control system (LIOCS). These routines provide macros for converting customer I/O requests into the physical I/O requests that are recognized by the supervisor (EXCP, WAIT, CCB).

During this topic, the student will be introduced to the terms used in LIOCS for unit record files, the I/O control tables, and the register linkage conventions established for LIOCS.

OBJECTIVE

Upon completion of this topic the student, using the available documentation, should be able to:

1. Correct all coding and/or logic errors in any program using LIOCS macros for card and/or printer operation.
2. Correct any errors caused by incorrect expansion of DTFCD, CDMOD, DTFPR, PRMOD, or imperative macros.
3. Use the correct PLM to identify correct operation when given a failing program or routine.
4. Locate the following items in a DTFCD or DTFPR table:
   - CCB 0—16
   - Address of logic module 17-18.
   - DTF type 19
   - Address of I/O areas 24-27.
   - CCWs
5. Determine the DTF type code, using the PLM, when given a DTF in a storage print.
6. Identify by name any DTFxx macro provided for LIOCS and indicate the physical file types processed.

Highlights

- The Command Control Block (CCB) for all files processed by LIOCS is in the first 16 bytes of each DTF table.
- Byte 21 (displacement of 20) contains a code to identify the DTF type.
- All labeled files must be opened before processing and closed after processing.

OPEN DTFxx

- Every file in a program must have its own DTF table.
- Logic modules can be shared by two or more files, if the files have similar characteristics.
- High level languages such as COBOL, FORTRAN, PL/I, and RPG all use Logical IOCS.

Troubleshooting Hint

- Refer to the DOS/VS Supervisor and I/O macros SRL Register Usage for register significance while using LIOCS.

Activity

In: Supervisor and I/O Macros SRL
Under: DTF Declarative Macros
Read: DTFCD
DTFPR
CDMOD
PRMOD
Under: Processing Macros
Read: CNTRL Macro
PRTOV Macro

In: DOS/VS LIOCS - Volume 1
Under: Imperative Macro Expansions
Read: CNTRL Macro
Under: Declarative Macros
Review: DTF Table Types & codes.

In: DOS/VS SCM3
Review: Unit Record Files/Macros

SELF-EVALUATION QUESTIONS

1. If byte 20 of a DTF contains a X'08' this file is:

   a. DTFCD reader file 02 05 04
   b. DTFCN console
   c. DTFCD combined file
   d. DTFCD punch file
   e. DTFPR printer file

2. The DTFOR macro supports what device type? Optical Reader except 3881 & 3886
   and Optical Reader, [illegible]

3. The CCWs used in LIOCS are contained in what LIOCS element?

   a. CCB
   b. Logic Module
   c. DTF
   d. GET and PUT macro
   e. Supervisor

4. When is the logic module address in the DTF table (bytes 17-19) resolved?

   a. During execution of the OPEN
   b. During execution of the CLOSE
   c. During the assembly of the program
   d. During linkage editing of the program
   e. During execution of the first GET or PUT macro

5. (True/False) When an end-of-file is sensed on an input device, the EOJ macro is issued by the logic module.
is a stmt in logic

6. The standard name generated for the PRMOD is IJDFCZZW. This indicates support for which of the following? (More than one answer is correct.)

F C Z Z W

a, e, d

a. CONTROL =YES
b. ERROPT
c. WORKA =YES
d. PRINTOV =YES
e. IOAREA2 no
f. Variable unblocked records
g. 3211 printer

7. Match the locations on the right with the areas they point to on the left. Use the DTFPR table as a reference. Assume a 1403 with STLIST specified. (There is only one correct answer for each area.)

wrong.

1. IOAREA1 C	________	a.	DTF Bytes 40-47
2. Print CCW 48-55(a)	________	b.	DTF Bytes 17-19
3. Workarea e ? 32-35	________	c.	DTF Bytes 24-27
4. Logic Module Addr b	________	d.	DTF Bytes 34-37
	________	e.	GET/PUT macro expansion
	________	f.	DTF Bytes 49-51

Refer to the Contents for the location of the self-evaluation question answers.

MAGNETIC TAPE FILES/MACROS

The use of LIOCS macros to process magnetic tape files releases the problem programmer from the burden of maintaining maximum channel utilization, blocking/deblocking physical records and handling various physical record types. The problem programmer can now concentrate on the processing of one logical record at a time.

OBJECTIVE

Upon completion of this topic the student, using the available documentation, should be able to:

1. Locate and correct any errors in a program caused by an incorrectly coded DTFMT or MTMOD.
2. Select the appropriate detail flowchart (PLM) for imperative macros.
3. Determine from the operands of the DTFMT the name of the logic module required to support tape files.
4. Identify, from a list of statements, the use of the following macros and operands, when processing variable length tape records.
   - Macro
     - TRUNC
     - RELSE
     - DTFMT
       - VARBLD= specifies Reg with space left in I/O area.
       - IOREG=
       - IOAREA1=
       - WORKA=

Highlights

- The Command Control Block (CCB) for all files processed by LIOCS is in the first 16 bytes of each DTF table.
- Byte 21 (displacement of Decimal 20) contains a code to identify the DTF type.
- All labeled files must be opened before processing and closed after processing.
- Every file in a program must have its own DTF table.
- Logic modules can be shared by two or more files, if the files have similar characteristics.
- High level languages such as COBOL, FORTRAN, PL/I, and RPG all use Logical IOCS.

Troubleshooting Hints

- The proper linkage macro expansions can be found in the LIOCS PLM Volume 1.
- By referring to registers 1 and 14 in an automatic system dump, caused by a LIOCS or a device error, the DTF address of the file in error and the linkage macro in the problem program from which

this I/O request was made can be determined.

- By using the SUPVR and I/O macros SRL to breakdown a LIOCS module name the device type and the options that the module will support can be determined.

Activity

In: Supervisor and I/O Macros SRL
Under: Sequential Access Method
Read: DTFMT Macro Parameter
Error Options
MTMOD Macro Parameters

In: LIOCS - Volume 2
Under: Magnetic Tape Files
Read: MTMOD Macro Through Error Option Extensions
Data File Charts on MOD Expansions (10 charts)

In: SCM 3
Under: Magnetic Tape Files
Read: Entire section

SELF-EVALUATION QUESTIONS

1. When does a GET macro cause a physical record to be read?

____

Use the following DTFMT parameters to answer questions 2 through 8.

```
TAPEOUT DTFMT        BLKSIZE=320, DEVADDR=SYS003,
                     ERROPT=ERRUT, FILABL=STD,
                     IOAREA1=OUTAREA, RECFORM=FIXBLK,
                     RECSIZE=80, TYPEFLE=OUTPUT,
                     WORKA=YES, IOREG=5
```

2. Will this DTFMT generate correctly? (Yes/No) If no, what is the error? ______ WORKA & IOREG are mutually exclusive. ______

For questions 3 through 8 consider the IOREG=5 operand eliminated from the DTF.

3. Is it necessary for the user to write a routine to handle errors? ______ Yes call it ERRUT

4. How many logical records are there in each physical record?

______________ 4 ______________

MTMOD for above DTF: IJFFZZWZ

5. Match the following macros and operands with their uses.

Macros

______ TRUNC

______ RELSE

Operands

______ VARBLD

______ IOREG

______ IOAREA1

______ WORKA

a. Used when no work area is specified.
b. Used to write a short block on tape.
c. Used when records are processed in a work area.
d. Specifies the name of the I/O area.
e. Used when variable-length records are built in the I/O area.
f. Used to skip input records.

6. What MTMOD name would be generated to support the DTF? IJFFZZWZ

7. The size of the work area in bytes is 320? 80? (decimal).

8. To assemble this DTFMT separately the ? ______________________ operand must be specified.

9. The PLM flowchart which explains the movement of data from the I/O area to the work area when processing tape files with fixed-length records is ______________.

10. What bytes in a DTF contain the logical record size? (Assume a tape file with fixed blocked records). _____ through _____ ?

11. Which bytes in a DTF contain the physical tape record size? (Assume an output tape with fixed blocked records.) Bytes ______ through _____

12. Which of the following points to the current logical record when using blocked tape records?

a. I/O AREA 1
b. I/O AREA 2
c. I/O REGISTER 14
d. REGISTER 14
e. REGISTER 15

13. Which of the following most accurately describes a tape file whose DTF table has an X'7D' in byte 21?

    a. Unblocked records, output, forward
    b. Blocked records, two I/O areas, workarea, input, backwards
    c. Unblocked records, one I/O area, input, backwards
    d. Blocked, one I/O area, output, backwards
    e. Blocked, two I/O area, no work area, input, forward

Refer to the Contents for the location of the self-evaluation question answers.

// LBLTYP TAPE
// EXEC

// LBLTYP TAPE
// EXEC LNKEDT

80 byte reservation.

MAGNETIC TAPE LABELS

Data file protection is a problem that concerns all users of DOS. Data management provides the programmer with a method of checking each type file prior to writing or reading it to ensure that no tape file is incorrectly used or destroyed. This topic will teach the student how volume and file labels are used to give the user this control. The student will also learn how to identify the label records and the concepts of file-label processing.

OBJECTIVE

Upon completion of this topic the student, using the available documentation should be able to:

1. Determine the appropriate IBM utility to print out the volume label, header labels, etc, from a reel of tape.
2. Identify the various types of standard labels on a tape file.
3. Locate and correct any errors in label set cards when a label error message is printed by the system.
4. Identify the contents of the various fields when given a printout of a standard tape label.
5. Locate and correct errors in a label processing routine of a program caused by an incorrectly generated or coded DTFMT or MTMOD.
6. Identify the function of a // LBLTYP card when processing tape data files.
7. State in his own words the correct use of the LBRET Macro.

LBRET {1|2|3} Return.
- 1 IOCS ELIM CHECK.
- 2 IOCS READ & PASS
- 3 IOCS UPDATE

Highlights

- IBM STANDARD LABELS are written and checked by B transients as a result of the problem programmer coding the 'OPEN' and 'CLOSE' macros.
- The customer may supply additional standard labels that will be written or read by LIOCS, but must be checked by a user routine.
- Tape labels are processed automatically during automatic volume switching.
- LIOCS neither reads, writes, or processes nonstandard labels. THEY ARE THE RESPONSIBILITY OF THE USER.

Troubleshooting Hints

- Investigate all messages in the operators guide.
- Use the MESSAGE CROSS REFERENCE in LIOCS Volume 1 and 2 in conjunction with the PLM charts to determine why an error message was issued.
- Use the PDAID Fetch/Trace feature in conjunction with the high level charts in the PLM to trace the order of the label processing transients.

Activity

In: LIOCS - Volume 1
Under: Tape Labels
Read: From tape Labels through Unlabeled Tape Files

In: Supervisor and I/O Macros
Under: Label Processing
Read: Tape Labels through Unlabeled Input Files on Tape
LBRET Macro usage.

In: LIOCS - Volume 2
Under: Magnetic Tape Files
Review: DTFMT Macro Expansion Fields
Under: Initialization and Termination
Review: Tape open/close and EOF/EOV Routines

In: DOS/VS SCM3
Review: Magnetic Tape Labels

SELF-EVALUATION QUESTIONS

1. The type of labels used on a tape file can be determined by looking at byte number _____ of the DTF.

   a. 0
   b. 16
   c. 21
   d. 32
   e. 36

2. If standard labels are specified for a tape file, byte 40-43 of the DTF contain a block count. The block count is the total of:

   a. Logical records.
   b. Logical records and tape labels.
   c. Physical record and tape labels.
   d. Physical record.
   e. Logical records, labels, and tape marks.

3. Which one of the following control cards is used to reserve a label work area in the problem program?

   a. // TPLAB
   b. // TLBL
   c. // LABLTYP(01)
   d. // LBLTYP
   e. // VOL

4. How many bytes of the problem program's area are required by the open routines for label processing?

   a. 84 bytes
   b. 80 bytes
   c. 80 bytes for each tape file in the program ✓
   d. 80 bytes for the first tape file and 20 bytes for each additional file
   e. 20 bytes

5. List the required job control cards in the proper sequence to catalog a group of TLBL cards onto SYSRES for a foreground 2 program.

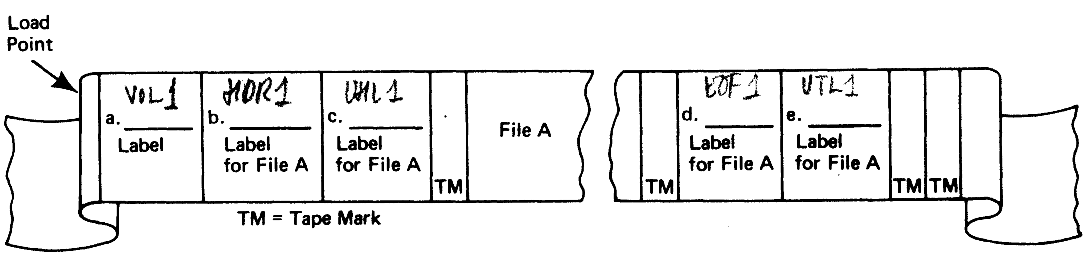
(1)	Start F2	a. 1	// Job catalog
		b. 3	/&
(2)	____________	c.	// EXEC STDLABEL
		d. 4	TLBL(s) (as many as desired)
(3)	____________	e.	// OPTION CATAL
		f.	// OPTION USERIABEL
(4)	____________	g.	// OPTION STDLABEL
		h.	// EXEC PARSTD
(5)	____________	i. 2	// OPTION PARSTD
		j.	// END

6. Which of the following items are useful in a tape file header label?

   a. Block count — HDR only.
   b.✓ Expiration date ✓
   c. Alternate tape address ?
   d.✓ Creation date ✓
   e.✓ File ID ✓?
   f. VTOC Address
   g. DTF Filename ✓

7. On a multi-volume file, the last volume must contain a EOF (EOF/EOV) label and all preceding volumes must contain a EOV (EOF/EOV) label.

8. Identify the various labels by inserting the correct label type in the volume layout below. (all standard labels)



9. The ____________ program may be used to print out the label information from a reel of tape.

```
                     #      VOLSEQ FILSEQ GEN  V    CR       EXP        BLKCOUNT.
EOF1|SAMPLE TAPE OUT |111111|0001|0001|0001|01| 70023| 70365|0000007|DOS VER 5
```

10. Determine from the above printout of a standard label:

   a. Creation date 70023. = 23 JAN 70
   b. Number of records on file 7
   c. Type of label EOF1
   d. File serial number 111111
   e. Expiration date 70365 = 31 DEC 70
   f. The number of reels in the logical file 1

```
TAPEOUT DTFMT  BLKSIZE=300,DEVADDR=SYS001,       EOFADDR?
               ERROPT=ERRUT,FILABL=NSTD,
               IOAREA1=OUTAREA,RECFORM=FIXBLK,
               RECSIZE=100,TYPEFLE=OUTPUT,
               WORKA=YES,REWIND=UNLOAD
```

Use the above printout to answer questions 11 and 12.

11. Will the above DTFMT generate correctly? If not, what is the error? (Assume all else to be correct.)

   EOFADDR omitted. Full errors.

12. Using the PLM flowcharts, what will be written on the tape after executing the first PUT macro. (Assume the tape to be at load point.)

   Vol label

13. Match the labels in the left column with the appropriate statement in the right column.

234	2 3 4	a.	Hdr 1 label
13	1 3	b.	Volume label
13	5 6	c.	Dummy header label
3478	3 4 7 8	d.	EOV/EOF label
56		e.	Nonstandard header label
56		f.	Nonstandard trailer label

1. Created by initialize tape program.
2. Created by the open routine on output
3. Checked by LIOCS on input or output
4. Contains information supplied in TLBL or TPLAB cards
5. Bypassed by LIOCS
6. Created by a label routine written by the user
7. Created by the close routine on output
8. Contains block count

14. Determine from the list below the correct sequence of events for processing a tape output file using standard labels. Assume the file to be written is the first and only file.

___ a. Backspace and write new HDR1 label.
___ b. Problem program writes data record.
_4_ c. Locate the label set in the volume information cylinder for the tape drive to be processed.
___ d. Reads and checks volume label from tape.
___ e. Close macro issued by problem program.
_3_ f. Open transient monitor is fetched into storage.
_2_ g. Problem program issues open macro for tape drive.
___ h. Reads the HDR1 label to determine if expired.
_1_ j. Job control writes the label set cards information into the label information cylinder.
___ k. End of file label written with block count.
___ l. Rewind tape drive.
___ m. Logic module counts number of physical records written.
___ n. Write tape mark.
___ p. The logic module writes the last physical record on tape.

15. (True/False) The // LBLTYP card reserves work area for job processing labels.

16. When is it necessary to use the LBRET macro? return to LIOCS after ~~[illegible]~~ proc

17. LIOCS, when handling nonstandard labels, will ______________

Branch to user routine.

____

Refer to the Contents for the location of the self-evaluation questions.

efnk.

SEQUENTIAL DISK FILES/MACROS

The use of LIOCS macros to generate/process a sequential file on a DASD device greatly reduces the volume and complexity of coding in the problem program for I/O processing. The generated module will develop successive DASD addresses and automatically handle volume and extent switching. The flexibility of this management system also allows it to be used to process files created by other LIOCS file management systems.

OBJECTIVE

Upon completion of this topic the student, using the available documentation should be able to:

DTFSD SDMOD FI FO FU VI

1. Write the macros and/or operands of a DTF or MOD to generate the proper coding for any given sequential disk file.
2. Locate any given entry in a sequential disk DTF or MOD.
3. Locate and correct, in any given imperative sequential disk macro, any coding or expansion failure.
4. Locate and correct LIOCS program failures for a sequential disk file caused by incorrect expansion of a DTF or MOD macro.
5. Determine from the DTFSD operands the name of the MOD required to support the sequential disk file. i.e. FI dr Fixed lngth I/P
6. Determine from the ERROPT and ERREXT operands of the DTFSD the error recovery procedures to be used for a sequential disk file. i.e. SKIP, IGNORE, ABEND, ROUTINE to HANDLE

Highlights

- All three data formats are supported ie fixed, variable or undefined, blocked or unblocked.
- IOCS generates successive disk addresses to access data records sequentially.
- Data records containing keys are not supported.
- DASD sequential files may be accommodated on the IBM 2311, 2314, 2321, 3330 and 3340 DASD devices.

Troubleshooting Hints

- The current seek search argument is stored in the DTF.
- Use a utility to list the data tracks of the file to determine if:
  1. The file was actually created.
  2. The record formats conform to specifications.
- Change the extent information to utilize a blank section of the DASD device to ensure that the data being listed by DASD printer was written by the LIOCS program in question.
- Refer to previous topics for further troubleshooting hints.
- Check the OPEN/CLOSE indicators for the status of the file.
- The displacement into the MOD determines the type of operation.

Activity

IN:	LIOCS VOL 2
UNDER:	Sequential Access DASD Files
READ:	Introductory Material through Module Save Areas.
IN:	DOS/VS Data Management Guide
UNDER:	Record formats for DOS/VS
READ:	Through Spanned Record (Format V)
IN:	DOS/VS Supervisor and I/O Macros
UNDER:	Declarative Macros
READ:	DTFSD macro and operand meanings SDMOD macro and operands
UNDER:	Imperative Macros
REVIEW:	GET, PUT, TRUNC, CNTRL, ERET, OPEN and CLOSE macros
IN:	DOS/VS SCM 3
READ:	Sequential Disk Files

SELF-EVALUATION QUESTIONS

1. When may a PUT macro be issued to a sequential disk input file?

   ____

2. A DTF table has a X'20' at a displacement of 20 (decimal) into the table. What bytes (decimal) contain the latest search address (CCHHR)? ___________________

3. Which bytes of the DTF for a sequential disk file contain the symbolic file name (decimal)? _________________

   Use the following to answer questions 4 through 7, given the following DTFSD parameters:

   BLKSIZE=240, RECSIZE=80, ERROPT=IGNORE, EOFAIDR=EOFDK, IOAREA1=DSKOUT1, IOAREA2=DSKOUT2, RECFORM=FIXBLK, TYPEFILE=OUTPUT, IOREG=09

4. The output area required is ________bytes (decimal).

5. What module name will be generated to handle this DTF? _________

6. What superset name could be used to support the maximum functions including the above DTF? _____________________________________

7. (True/False) The user must include a device error recovery routine because of ERROPT=IGNORE.

8. The _____________ operand must be specified if the user does not want a job terminated because of unrecoverable I/O errors.

9. To allow a problem program to return to the SDMOD using the ERET macro, the __________ operand must be specified.

10. (True/False) The ERREXT operand can be specified without the ERROPT operand.

11. A logic module with the name IJGFIEZY had which of the following operands specified?

    a. HOLD=YES
    b. RDONLY=YES
    c. RECFORM=SPNBLK
    d. TRUNCS=YES
    e. ERROPT=YES

12. Entry into the SDMOD at a displacement of 000C is for processing which macro?

    a. TRUNCS
    b. CONTROL
    c. GET
    d. PUT
    e. RELEASE

13. If ERROPT=name and ERREXT=YES are specified in the DTFSD, on entry into user routine register 1 points to a parameter list, this parameter list contains:

    a. ________________________

    b. ________________________

Refer to the Contents for the location of the self-evaluation question answers.

SEQUENTIAL DISK LABELS

The use of labeling on disk files gives the user a means of protecting his files against being accidentally destroyed.

The format of the disk label set as written by job control on the label information cylinder is discussed during this topic. The logic behind opening and closing DASD files is presented showing the relationship between the DTF, the label information cylinder, and the VTOC. Exiting to the problem program for processing user labels is discussed with emphasis on what functions LIOCS will perform and what routines the problem programmer will supply.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Use the DASD print utility to locate and print out the VOL label, all labels in the VTOC, and the label information cylinder.
2. Determine any files location and size, using the labels contained in the VTOC or lable set cards.
3. Locate and correct any errors in label set cards when a label error message is printed by the system.
4. Obtain a system dump containing any failing OPEN or CLOSE transient.
5. Identify the control statements necessary to catalog standard labels on the SYSRES pack for any partition.
6. Identify the label information and its layout in the label information cylinder.
7. Identify what program builds and/or deletes the following labels.
   a. Format 1 labels in VTOC
   b. Format 3 labels in VTOC
   c. Format 4 labels in VTOC
   d. Volume label
   e. Label information cylinder
   f. User labels
8. Identify and correct any errors in the use or expansion of the OPEN or CLOSE macros.
9. Identify where user labels are located on a sequential disk file.
10. Identify macro parameters needed to process user labels.

Highlights

- Label set consists of one (1) // DLBL control statement and at least one (1) // EXTENT control statement.
- Only one extent is opened at a time.
- A // LBLTYP card is not needed to reserve core in the partition for label records since the open transients read the label record directly into the transient area.
- Only IBM standard labels are processed by LIOCS Open/Close routines.
- User labels are allowed and will occupy the first track of the first extent.
- User labels will be read and written by LIOCS but must be built and checked by user routines.

Troubleshooting Hints

- Use the VTOC display program (LVTOC) to list the VTOC to determine if the label processing failure occurred at output or input time.
- Use LSERV to list the label information cylinder (LIC) to determine if job control constructed the labels properly.
- Refer to previous troubleshooting hints for added techniques.

Activity

In:	Supervisor and I/O Macros SRL
Under:	Label Processing
Read:	From DASD standard labels through writing User standard labels on disk.
Under:	Declarative Macros
Review:	DTFSD (LABADDR Operand)
Under:	Processing Macros
Review:	GET, PUT, TRUNC

In:	LIOCS - Volume 1
Under:	Standard File Label Formats
Review:	Format 1, 3, 4, and Standard DASD Volume Label
Under:	Open Sequential DASD
Review:	Charts 04, 05, and 06

In:	DOS/VS Systems Management SRL
Under:	DASD Labeling
Read:	To Labeling of VSAM Files

In:	DOS/VS - SCM3
Review:	Sequential Disk Labels.

SELF-EVALUATION QUESTIONS

1. What routine inserts the unit and class into the CCB portion of the DTF? ____________________________

2. (True/False) If user labels are specified, the first extent must specify a minimum of two tracks.

3. Match the following programs and/or routines to the function they perform.

a. ______ Builds format 1 label in VTOC	1.	Job control
b. ______ Builds format 3 label in VTOC	2.	Linkage editor
c. ______ Builds format 4 label in VTOC	3.	OPEN
d. ______ Creates volume label	4.	GET
e. ______ Builds label information cylinder	5.	CLOSE
f. ______ User labels	6.	PUT
	7.	Initialize disk utility
	8.	User written label routine

4. Match the correct label information to the track in the label information cylinder where it is stored.

a. ______ Track 0	1.	Foreground two temporary labels
b. ______ Track 1	2.	Background temporary labels
c. ______ Track 2	3.	Foreground two partition standard labels
d. ______ Track 3	4.	Foreground one temporary labels
e. ______ Track 4	5.	Standard labels - all partitions
f. ______ Track 5	6.	Background partition standard labels
g. ______ Track 6	7.	Foreground one partition standard labels
h. ______ Track 7		
i. ______ Track 8		
j. ______ Track 9		

5. User labels, if used, will be found ____________________________.

6. Indicate the correct sequence of the following label cards to do a standard label run for an output file on SYS005 and an input file on SYS006 in that order.

```
______ /&
______ // DLBL DISKOUT,'SEQUENTIAL DISK FILE.',75/001,SD
______ // EXTENT SYS005,111111,1,1,1600,1
______ // OPTION STDLABEL
______ // DLBL DISKIN,'SEQUENTIAL DISK FILE.',75/001,SD
______ // EXTENT SYS006,111111,1,1,1600,1
______ // EXTENT SYS005,111111,1,2,1601,9
______ // EXTENT SYS006,111111,1,2,1601,9
```

7. DOS/VS will accept which of the following label cards?

a. // VOL
b. // DLBL
c. // DLAB
d. // EXTENT
e. // XTENT
f. All of the above.

8. Reference the label cards in question 6 to answer this question.

   How many tracks are there on the unit assigned to SYS005 that are part of the file 'SEQUENTIAL DISK FILE.'? ________________

9. The disk address of the label information cylinder can be found in the communications region at a displacement of ______________.

10. What control cards are required to use the VTOC display utility (printer output)?

    ____

    ____

    ____

    ____

    ____

11. Where is the address of the volume table of contents (VTOC) found on all disk packs? ____________________________

12. Which bytes of the DTF for a sequential disk file contain the symbolic file name? ________________________________

13. What format type file label contains the first extent limits for a sequential disk file?

    a. One
    b. Two
    c. Three
    d. Four
    e. Five

14. Where can the extent limits for the volume table of contents (VTOC) be found on all disk packs?

    a. Format four label
    b. Volume label one
    c. Format five label
    d. The first format one DASD file label

15. Given: The 20 cylinders on a disk file (cylinders 1 through 20).

Write the split extents to give SYS001 tracks 0, 1 and 2 of all cylinders and SYS002 tracks 3, 4 and 5 of all cylinders and SYS003 tracks 6, 7, 8 and 9 of all cylinders for an SD file. The VOL serial number = 222222.

a. ____

b. ____

c. ____

Refer to the Contents for the location of the self-evaluation question answers.

DIRECT ACCESS DISK FILES/MACROS

The direct access file management system provides a flexible set of macro instructions for creating and processing a data file on a DASD device. Although this file management applies specifically to data records organized in a random order, it can also be used to process records sequentially.

This topic will deal specifically with the CCW building routines within the module, the interface requirements between the problem program and LIOCS, and the problem programmer's responsibility in utilizing this file management system.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Locate and correct any errors in a program caused by an incorrectly coded or generated DAMOD or DTFDA.
2. Locate, in the PLM, the correct chart to build a CCW string for any given DTFDA declarative macro.
3. Select from a list of statements the correct use for the following macros.
   a. WAITF
   b. READ
   c. WRITE
4. Locate the following when given a listing of a DTFDA.
   a. Test byte
   b. First seek CCW address
   c. CCW character strings
   d. Basis CCWs
   e. CCW build area
   f. Error byte address
   g. Control CCB
5. Determine when the data in record zero of any track is altered.
6. Differentiate between a WRITE AFTER and WRITE ID operation.
7. Determine the failure that occurred when given the contents of the error status byte.
8. Identify from a list of statements the correct operation for a WRITE ID.
9. Locate and interpret the track reference field, using a program listing and dump.

Highlights

- Record reference may be either by KEY or ID.
- The logic module will build the appropriate CCW chain every time it is entered to perform a read/write function.
- All data records are considered to be unblocked.
- The problem program must supply a ten byte track reference field (TRF) for every read/write request to the file.
- The problem program must check every TRF before issuing a read/

write to the file to ensure that the TRF specified is within the given extents for the file.

Troubleshooting Hints

- The test byte is not reset until completion of the WAITF macro. Therefore, it can be extremely useful in determining the function that the module was attempting to perform at the time of the failure.
- The LIOCS - Volume 3 PLM contains charts which indicate every possible test byte, vector string and resulting CCW chain for every macro that can be issued to a DAMOD.

Activity

In:	LIOCS PLM - Volume 3
Under:	Direct Access Files
Read:	From Direct Access Method through DTFDA Macro
Under:	Referencing Methods
Read:	From Track Reference to Control Field - Spanned Records
Under:	Channel Program Builder
Review:	Descriptor Byte, Builder strings and the DAM Channel Program Charts

In:	DOS/VS Systems Management SRL
Under:	Direct Access Method
Read:	From Device and Record Format to Indexed Sequential Access Method

In:	DOS/VS Supervisor and I/O Macros SRL
Under:	Declarative Macros
Review:	DTFDA Macro and DAMOD Macro
Under:	Imperative Macros
Review:	Operation and Fields of the Read, Write, WAITF and Control Macros

In:	DOS/VS Base SCM 3
Under:	Direct Access Files
Read:	Entire Section

SELF-EVALUATION QUESTIONS

1. (True/False) All volumes of a DA file must be online for any processing function.

2. What is the second CCB in a DTFDA used for ? ____________________

3. When is the logical unit inserted into the CCBs of a DTFDA?

____

4. How does the DAMOD determine what CCW string to build?

____

5. Match the macros in the left column with the appropriate statements in the right column.

a. ______ READ		1.	Must be issued after any read or write.
b. ______ WAITF		2.	To return control from the user back to LIOCS
c. ______ WRITE		3.	Causes data to be transferred to a DASD device.
		4.	Causes data to be transferred from a DASD device.

6. How many bytes (decimal) displacement into the DTFDA are the following:

a. Macro switch ______
b. Error status ______
c. Control CCW ______
d. Control seek CCB ______
e. CCW build area ______

7. When a WRITE AFTER is issued, fields __________________ and ______ ___________________ of record zero (capacity record) are updated.

8. What are the descriptor bytes that will be generated for read key operation with the following conditions: _________________________

SRCHM=YES
RECFORM=FIXUNB
IDLOC=YES

9. Match the items in the left column with the appropriate statements in the right column. (Multiple answers are possible.)

a. ______ WRITE RZERO		1.	Writes record zero and erases the remainder of the track.
b. ______ WRITE AFTER		2.	Alters record zero.
		3.	Writes a record in the first available space on the track.
		4.	Erases the track and then writes a record after record zero.

10. The error status bytes contain X'0800'. What failure occurred?

____

11. Why would a programmer issue a WRITE AFTER,EOF macro?

____

12. What is the randomizer routine used for? ______________________

____

13. The _________ _________ utility program must be used to format a disk pack on which DA files will be written using the WRITE ID macro.

14. Put the following items in the correct sequence for a WRITE ID operation.

a. ______ Verify that the seek address is within the extent limits.
b. ______ Randomize to the disk record address.
c. ______ Write the record.
d. ______ Move disk record address into the track reference field (seek address).
e. ______ Check file for a duplicate record.
f. ______ Format disk using the clear disk utility.

15. Is the following sample of a track reference field valid for a 2314? _____

Sample: 00 01 00 AA 00 00 09

16. What is wrong with it, if anything? ___________________________

____

____

Refer to the Contents for the location of the self-evaluation question answers.

DIRECT ACCESS FILE LABELS

When files of data records are stored on disk packs or cells, those packs or cells must be identified (labeled) for future reference to the data. Internal labels, written directly on the disk or cell itself, can be read in the same way as data records - by the computer. This is a form of file protection.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Locate and correct any errors in label set cards when a label error message is printed by the system.
2. Identify when to use and the purpose for the XTNTXIT operand of the DTFDA macro.
3. Interpret the format of the parameters passed at XTNTXIT time.

Highlights

- For a multivolume DA file, all extents are opened before any data records are processed.
- For a DA file, the maximum number of EXTENT cards is 15 if user standard labels are specified, and 16 if they are not.
- The LBLTYP card must be used.
- Before loading a DA file, the disk data area must be formatted. (RO)

Activity

In:	Supervisor and I/O Macros
Under:	DTFDA Coding
Read:	XTNTXIT = Parameter
Under:	Concepts of DAM
Read:	Reference Methods
In:	DOS/VS System Control Statements
Under:	Job Control Statement and Commands
Review:	EXTENT Statement
In:	DOS/VS LIOCS Volume 3
Under:	Direct Access Files
Read:	Direct Access Method through DAM Logic Module Macros

SELF-EVALUATION QUESTIONS

1. When is the XTNTXIT operand required in a DTFDA macro?

   ____

2. What is wrong with the following label set for a 2314 DA file?

   ____

```
// DLBL DISK,'FIIE FCR LOAD OR ADC DIRECT ACCESS',75/365,DA
     // EXTENT SYS004,111111,1,1,3400,100
     // EXTENT SYS006,111111,1,2,3600,1C0
```

3. (True/False) For a multivolume DA file, all volumes are opened simultaneously.

4. Refer to question 2.

   What does the information 3400,100 in the first extent card mean?

   ____

5. Refer to question 2 extents.

   Could a type code of 8 be used in these extents? _____

6. What does the following message mean? ____________________

   4944A OVERLAP ON UNEXPRD FILE IJSYSRS SYSRES=191 111111

7. What should you do when this message is issued by the system?

   ____

8. How does a problem programmer determine the area on disk to be formatted with the WRITE RZERO macro for a program using the WRITE AFTER function?

   ____

   ____

   ____

9. Refer to question 2 (the first extent only). Assume 2314 file.

   What would be the actual information passed to the problem programmer at XTNTXIT time (14 bytes)? ____________________

Refer to the Contents for the location of the self-evaluation question answers.

INDEX SEQUENTIAL FILE CONCEPTS

The indexed sequential file management system (ISFMS) permits processing DASD records in both random and/or sequential order by control information. This data management system is very popular and is used by the majority of DOS/VS users.

This topic will present the concepts of this management system with emphasis placed on file organization and index construction.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Identify the function of the following items used for processing index sequential files.
   a. Master index
   b. Cylinder index
   c. Track index
   d. Cylinder overflow control record (COCR)
   e. Cylinder overflow area
   f. Independent overflow area
   g. Sequence link field
2. Identify the correct sequence and data manipulation necessary to add records to:
   a. Prime data area
   b. Cylinder overflow area
   c. Independent overflow area
3. Identify the requirements necessary to do the following functions:
   a. Load
   b. Add
   c. Retrieve
   d. Add retrieve
   e. Extend

Activity

In:	DOS/VS Supervisor and I/O Macros SRL
Under:	Concepts of ISAM
Read:	Up to Declarative Macros

In:	LIOCS - Volume 3 PLM
Under:	Indexed Sequential Access Method
Read:	Up to DTFIS Macros

In:	DOS/VS Data Management Guide SRL
Under:	Indexed Sequential Access Method
Read:	Through Reorganizing an ISAM File

In:	DOS/VS SCM 3
Under:	Index Sequential Access Method
Read:	Up to Troubleshooting Hints

SELF-EVALUATION QUESTIONS

1. Match the following terms to the correct function described.

    a. ______ Master index
    b. ______ Cylinder index
    c. ______ Track index
    d. ______ COCR
    e. ______ Cylinder overflow
    f. ______ Independent overflow
    g. ______ Sequence link field

    1. Each entry contains the highest record key associated with the cylinder, and the address of the track index for that cylinder.
    2. Each entry specifies one track of the cylinder index.
    3. Contains records displaced from tracks on one given cylinder.
    4. Contains a normal and overflow entry for each track on a cylinder.
    5. Contains the address of the last overflow entry written in the cylinder overflow area.
    6. Contains the disk address of the record with the next highest key in the overflow area.
    7. Can contain overflow records from any track, cylinder, etc.

Use figure 1 to answer questions 2 through 6.

2. What is the content of the normal entry in the track index for track one?

    KEY= ________________ DATA= ________________

3. Why does record four of the track index contain a key of 150?

    ____

4. Why does the data portion of record four of the track index contain the address of track 8 record 3? ____________________________________

    ____

    ____

5. A record with a key of 235 is added to the file shown. Which areas of the file will be changed and if changed, what will the area contain?

   a. Master index ____________________

   b. Cylinder index ____________________

   c. Track index ____________________

   d. Track 1 ____________________

   e. Track 2 ____________________

   f. Track 8 ____________________

   g. COCR ____________________

6. If a record with a key of 90,000 was added to this file, which index(es) will be altered? ____________________

7. What three requirements are necessary for the input data used to load an IS file?

   a. ____________________

   b. ____________________

   c. ____________________

8. What is the difference between a LOAD and EXTEND on an IS file?

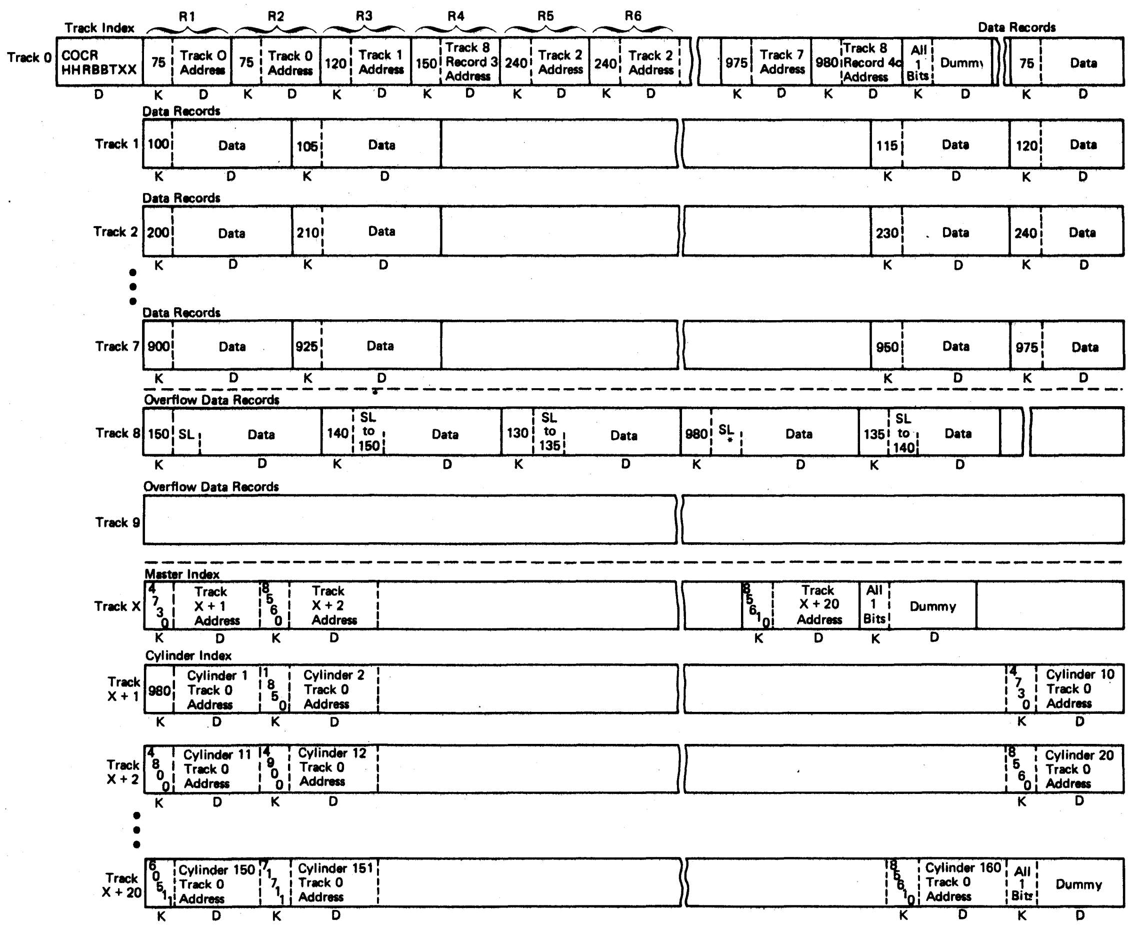
   ____

   ____

   ____

9. Records with keys higher than highest on file will be added to the prime data area until ____________________ ____________________ and then the records will be added to the appropriate overflow areas.

Refer to the Contents for the location of the self-evaluation question answers.



K = Key Area
D = Data Area
SL = Sequence Link
*SL indicates the end of the overflow chain.
COCR = Cylinder Overflow Control
Record (Contained in RO)

(FE 104947)

Figure 1 - ISAM File Example

INDEX SEQUENTIAL IMPLEMENTATION

This topic will cover the MACRO coding necessary to use an ISFMS. Also covered will be the labels necessary to define the areas on disk.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Identify and correct any errors in label set cards used for IS files.
2. Identify and correct any errors in coding or expansion of IS MACROS.
3. Identify and correct failures indicated by the status or condition code byte (FILENAMEC) while using IS files.
4. Identify the MACROS needed to do the following functions.
   a. Load or extend file
   b. Adding records
   c. Random retrieval
   d. Sequential retrieval
5. Identify any entry in a DTFIS that is created from the labels in VTOC for any input file.

Activity

In: DOS/VS SCM 3
Under: Index Sequential
Read: Troubleshooting Hints

In: DOS/VS System Management Guide SRL
Under: Indexed Sequential Access Method
Read: From Indexes to Storage Space Formulas

In: DOS/VS Supervisor and I/O Macros
Under: Concepts of ISAM
Read: Up to Declarative Macros
Under: Declarative Macros
Reference: DTFIS and ISMOD
Under: Imperative Macros
Read: SETFL
ENDFL
WRITE
WAITF
SETL
ESETL

In: DOS/VS DASD Labels
Under: Types of Labels
Read: Format 2 Label

```
In:       LIOCS - Volume 3
Under:    Indexed Sequential Access Method
Read:     Overflow Areas
          Indexes
          Functions Performed by ISAM
          •    Loading
          •    Adding
          •    Retrieving
```

SELF-EVALUATION QUESTIONS

1. What three parameters in the DTFIS are required to implement core indexes?

   a. ______________

   b. ______________

   c. ______________

2. (True/False) The master and cylinder indexes can be in core for ADD and SEQRTVL only.

3. While loading an IS file, the input data is out of sequence. What would the status or condition code byte contain? X'__________'

4. The following instructions are being used to create an IS file. End-of-file on the card reader will cause a branch to STOP. Assume all DTF parameters and record formats are correct.

```
          OPEN      CARD
          SETFL     ISFILE
     OVER GET       CARD
          WRITE     ISFILE,NEWKEY
          WAITF     ISFILE
     STOP ENDFL     ISFILE
          CLOSE     CARD,ISFILE
```

   The macros will not accomplish the desired functions because

   ____

5. To sequentially update an IS file which of the following macros are not used?

   a. READ
   b. SETL
   c. GET
   d. WRITE
   e. PUT
   f. ESETL

6. Select the correct sequence of the following macros needed to randomly update a record in an IS file.

a.	______	1.	WAITF	ISFILE
b.	______	2.	READ	ISFILE,KEY
c.	______	3.	WRITE	ISFILE,KEY
d.	______	4.	WRITE	ISFILE,NEWKEY
e.	______	5.	READ	ISFILE,NEWKEY
		6.	Internal manipulation of record (update)	

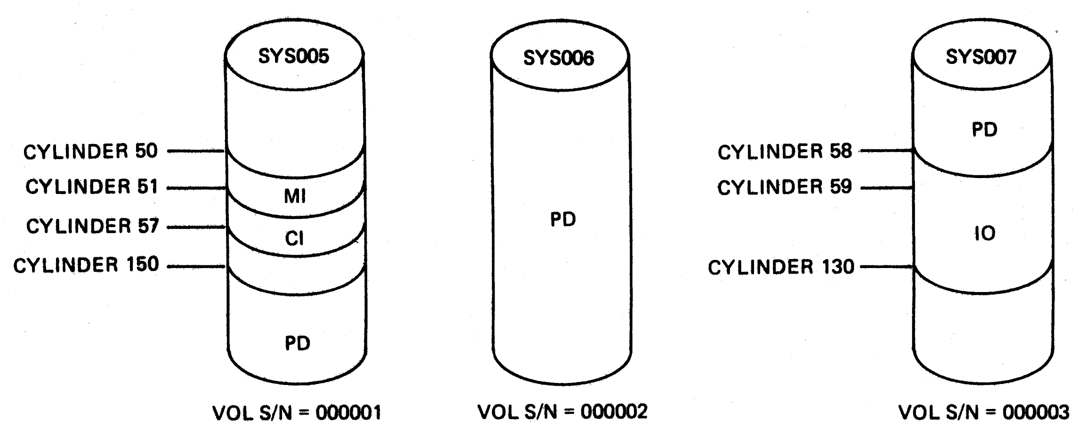
7 Write the macro to initiate sequential processing of an IS file at the beginning of the file. ____________________________________

8. In a format 2 label, bytes ___________ contain the address of the last record written in the independent overflow area.

9. On an IS file used as input, the location of the key in the record is inserted into the DTF from bytes _________ of the format ______ label at __________ time.

10. Write the DLBLs and EXTENTs for an IS file created with the following characteristics: Assume 2314 file.

    DTFIS name is ISBUILD
    File ID should be 'PAYROLL01'
    (Assume all extents start on head 0 and end on head 19.)



LEGEND: MI = Master Index
CI = Cylinder Index
PD = Prime Data
IO = Independent Overflow

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

11. (True/False) The file described in question 10 could be extended at a later date if desired.

Refer to the Contents for the location of the self-evaluation question answers.

INDEX SEQUENTIAL INTERNALS

This topic covers the internal operation of ISFMS. Included will be the CCW Build function, format of the indexes and sequence link field and a work project to let the student interpret the disk data layout. This exercise will tie together the interaction of the indexes with relation to prime data and overflow records in both the cylinder and independent overflow areas.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Determine if the following areas have been created correctly when given a disk printout.
   a. Master index
   b. Cylinder index
   c. Track index
   d. Sequence link field
2. Use the indexes and sequence link fields to locate a record in any of the following areas when given a disk printout of an IS file.
   a. Prime data
   b. Cylinder overflow
   c. Independent overflow
3. Use the label set to locate the following in a printout of an IS file.
   a. Master index
   b. Cylinder index
   c. Prime data
   d. Independent overflow
4. Determine how the M table is generated and what information it contains.
5. Use the CCW build constants in the ISMOD to determine if a CCW string has been built correctly or use the CCW string to determine if the CCW build constants are correct.
6. Identify, using the PLM, correct operation for an OPEN or any imperative macro for an IS file.

Troubleshooting Hints

- Refer to DOS/VS SCM 3 under Indexed Sequential Access Method

Activity

In:	DOS/VS LIOCS - Volume 3
Under:	ISAM
Read:	From Record Types through Sequential Record Retrieval
Under:	DTFIS Macro
Scan:	Fields of the Macro
Under:	ISAM Initialization and Termination Procedures
Read:	Through the ISAM Open Chart

In:	DOS/VS Supervisor and I/O Macros SRL
Under:	Concepts of ISAM
Read:	Entire Section
Under:	Declarative Macros
Read:	DTFIS Macro and Operands

In:	DOS/VS Data Management Guide
Under:	Indexed Sequential Access Method
Read:	From Indexes to ISAM space Formulas

In:	DOS/VS SCM 3
Under:	Indexed Sequential
Refer:	Troubleshooting Hints on register usage

SELF-EVALUATION QUESTIONS

1. The format 2 label is created during ________ time while creating an IS file.

2. The entry in the M table containing the cylinder index information is:

   a. First.
   b. Second.
   c. Third.

3. A record will be written (ADDed) to the IS file by which of the following?

   a. WRITE FILENAME,NEWKEY
   b. PUT
   c. WAITF
   d. READ FILENAME,NEWKEY
   e. OPEN FILENAME

   Use the following information to answer questions 4 and 5.

   Given a CCW builder control code of 1333 to do an ADD function to an IS file.

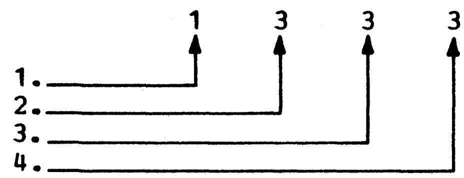
4. What is the resulting CCW command code? X'________'

5. At what label can the I/O area address be found? ________________

6. Register ____________ contains the address of the list of CCW builder control codes when in the CCW builder routine.

7. Match the following digits of the CCW builder control code to the CCW fields built.

a. ______ CCW OPCODE
b. ______ I/O AREA
c. ______ FLAGS
d. ______ COUNT



8. Given a DTFIS with the name ISBUILD, at what label will the DSKXTN table (M table) be found? ______________________________

9. What indicates the end of the DSKXTN table (M table)? _________

10. If the ERREXT option is specified for a DTFIS and an unrecoverable I/O error occurs, register 1 plus a displacement of ____________ (DEC) will give the failing CCW op code.

11. (True/False) User standard labels for ISAM can only be created at OPEN time.

12. What functions do $$BOIS09 and $$BOIS10 perform? ______________

____

____

Refer to the Contents for the location of the self-evaluation question answers.

DISK WORK AND DEVICE INDEPENDENT FILES

A work file is a single volume file that can be used for both input and output, even within a single program phase. It is often used to pass intermediate results between successive phases or job steps. However, work files, also can be written, read, and rewritten within a single phase without requiring additional OPEN and CLOSE processing.

Device independent files are implemented by utilizing the DTFDI and DIMOD macros. The problem programmer can achieve device independence for system files. For example, when the device-independent macros are used in the program, at execution time the system unit SYSLST could be assigned to a printer, tape drive, or disk extent. This can be particularly advantageous to the problem programmer in a multiprogramming environment since a specific physical device may be in use by another partition. By the use of an assign statement, the desired program can still be run.

OBJECTIVE

Upon completion of this topic, using the available documentation, you should be able to:

1. Select from a list of statements the correct use for the following macros.
   a. CHECK
   b. NOTE
   c. POINTR
   d. POINTW
   e. POINTS
2. Use the appropriate detail flowcharts in the PLM to locate logic or coding errors in the DTFDI or DIMOD macro.

Highlights

Disk Work Files

- Work files process fixed-length unblocked records and undefined-format records only.
- Disk work files are always opened as output files.

Device Independence

- Only fixed unblocked records are supported.
- Combined file is not supported.
- User labels are not supported.
- Rewind options and reading backward are not supported.
- Device independence is limited to card readers, card punches, magnetic tape units, DASD and Diskette.

Activity

In:	Supervisor and I/O Macros SRL
Under:	Sequential Access Method
Read:	From DTFDI Macro through DIMOD Macro
Under:	Imperative Macros (Sequential Disk)
Read:	From Work File Macros for Tape and Disk to Completion Macros
In:	LIOCS - Volume 2
Under:	DIMOD Macro
Read:	GET and PUT Macro Unit 1 and 2 I/O Areas
In:	DOS/VS Data Management Guide SRL
Under:	Device Independence
Read:	All information under this heading

SELF-EVALUATION QUESTIONS

1. (True/False) Only system logical units may be specified with a device independent file.

2. (True/False) Within the execution of the first GET/PUT request, the module will determine the physical device type and will modify the DTFDI accordingly.

3. Match the statements in the right hand column with the appropriate macro in the left hand column.

______	POINTR	1.	Prevents user processing until completion of the input/output operation.
______	POINTW	2.	Returns to register 1 the address of the record just written or read.
______	NOTE	3.	Used to reposition the file to read the record that was just read or written.
______	POINTS	4.	Used to reposition the file to write at the record location that was just read or written.
______	CHECK	5.	Used to reposition the file to the beginning of the first extent.

4. List the eight restrictions of DTFDI processing.

____

____

____

____

____

____

____

____

5. If the problem programmer wishes to retain the format 1 label of a disk work file, in the VTOC, what operand(s) in the DTFSD must be specified? ____

____

6. The detail flowchart in the PLM that contains the logic for the GET macro for a DTFDI file (one I/O area) is on chart __________.

7. When using the DTFDI and DIMOD to process input records, ERROPT=OMITTED and WLRERR=OMITTED in DTF, and a wrong length record occurs, the message issued by the system will be ________.

Refer to the Contents for the location of the self-evaluation question answers.

CHECKPOINT/RESTART

Checkpointing is a means of recording the status of a program at desired intervals. Restart is a means of restarting the execution of a program from one of the previously checked points, rather than from the beginning, if processing is terminated for any reason before the normal end of program. For example, a job of higher priority may require immediate processing, or some malfunction such as a power failure may occur and cause an interruption. The checkpoint ability is provided through the CHKPT macro while the restart ability is provided through a job control statement (RSTRT).

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Identify the various types of checkpoint records that are written on tape or disk.
2. Identify erroneous usage of the CHKPT macro.
3. Determine what the contents of a specified field should contain in any given checkpoint record.

Highlights

- Checkpoint records can be written onto disk or tape.
- Checkpoint records on disk require user routines to open the disk area that will be used.
- If checkpoint records are interspersed between normal data records on tape, the user's responsibility increases.
- Checkpoints can be taken by any program.
- Restarting of checkpointed programs is accomplished by use of a job control statement and the job control restart program.

Activity

IN: DOS/VS Base SCM 1
READ: The Checkpoint/Restart Section and answer the Study Questions

SELF-EVALUATION QUESTIONS

1. (True/False) Checkpoint records can be stored on a device other than disk or tape.

2. The __________ operand of the CHKPT macro designates the point at which restarting takes place.

3. Select from the list below those items which are saved as a result of a checkpoint.

___ a. Floating point registers
___ b. General registers
___ c. Timer values from the SETIME macro
___ d. Portions of the communications region

4. What is the meaning of nnnn in the following job control statement?

// RSTRT SYSxxx,nnnn,filename

____

5. Under what conditions is CHKPT ignored?

a. The device on which the checkpoint records are to be written is a magnetic tape.
b. The area on disk is not large enough for two checkpoints.
c. The CHKPT macro is issued before the disk checkpoint file is opened.

6. (True/False) The job name specified in the JOB statement for RSTRT must be identical to the job name used when the checkpoint was taken.

7. From which of the following does the programmer obtain the number of the last checkpoint taken?

a. From the number of DATA cards read.
b. From the output on SYSLST.
c. From the output on SYSLOG.
d. From a DASD dump of the checkpoint records.

8. (True/False) Restarting can be done from any checkpoint record, not just the last.

9. A disk checkpoint header record can be identified by which of the following:

a. /// CHKPT // in bytes 0 to 11 of the record.
b. PFIX in bytes 0 to 3 of the record.
c. ///CHKPT// in bytes 0 to 9 of the record.
d. ///CHKPT in bytes 0 to 7 of the record.
e. /// CHKPT in bytes 0 to 9 of the record.
f. None of the above

10. (True/False) When a checkpoint is taken by a CHKPT macro in which the fifth and sixth operands are specified, the general registers are saved in bytes 4 to 67 (decimal) of the second checkpoint record written on the checkpoint device.

11. (True/False) PFIX checkpoint records are not written during a checkpoint if bit 0 of the 13th byte in a /// CHKPT // record is 0.

12. (True/False) When the sixth operand in a CHKPT macro is specified, the fifth operand must be specified.

13. Issuance of message 0C04I would indicate the improper usage of which of the following:

    a. DTFPH macro
    b. ASSGN statement
    c. CHKPT macro
    d. RSTRT statement
    e. JOB statement

14. The first four bytes in a checkpoint record contain X'E7E3D510'. Select the most appropriate statement based on the given information.

    a. A checkpoint has been taken on tape and the problem program was using 2314 and/or 2311 DASD for I/O.
    b. A checkpoint has been taken on disk and the problem program was using non-file protected 3330 DASD for I/O.
    c. A checkpoint has been taken on either tape or disk and the problem program was using file protected 3340 DASD for I/O.

Refer to the Contents for the location of the self-evaluation question answers.

CONTENTS

SAFETY PRECAUTIONS AND HOUSEKEEPING

Refer to your CE Safety Practices card (Form S229-1264) for general safety precautions. Additional instructions on safety and housekeeping procedures will be supplied to you by your instructor.

LAB PROJECT 1 - VM FAMILIARIZATION

The VM/370 control program (CP) may be thought of as a second level of microprogram in addition to the one that normally controls a CPU. This microprogram accepts operator commands to display storage and registers, IPL, address stop, instruction step, etc, just as any other CPU. The intent of this project is to provide the student with the necessary skills to operate VM/370 as a typical CPU. Therefore, only the commands necessary to achieve that skill level will be introduced at this time.

OBJECTIVE

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Operate the VM/370 terminal for program execution and debugging.

Time-required to complete this project averages 1.0 hour.

Tools, Test Equipment and Documentation

VM/370 Terminal and Reader
System/370 Principles of Operation
Console Familiarization Deck - Lab Copy

Directions

This project is intended to familiarize the student with VM/370 Operation if he has not been trained on it. All students will read this project. PART 1 will be answering the study questions, using Figure 1. Students then are to read PART 2. Obtain a system and follow instructions in PART 2. Consult your lab instructor when ready to begin PART 2.

PART 1

Study Questions

1. The instruction at F70 (Subtract Register) is used to zero register 5. What is the instruction at F72 accomplishing?

____

____

2. The load address instruction at F78 is used to increment the register. How is this accomplished? ______________________

____

3. Under what conditions will a branch occur with the instruction at F7E? ____

____

4. How many positions of core are reserved by the DS statement that follows the LPSW instruction?

____

____

5. When the LPSW instruction is executed, does the program branch to address 001234? ________________________________

____

Answers

1. This instruction is also used to zero a register. Both methods are commonly used in programming.

2. The LOAD ADDRESS instruction loads the address specified by the second operand into the specified register. This differs from the LOAD instruction in that the LOAD instruction loads the contents of core at the address specified. An example of this would be: Suppose register 5 contained the value of 10. If that register is used for a base register and a displacement of 1 is also indicated, the combined value would indicate address 11. Using the same register as a base register and the register to be loaded, this instruction can be used to increment a counter by any value specified in the displacement.

3. Specifically, the instruction is testing for and will branch on a compare low or a compare high condition. What the programmer is looking for is a branch on any not equal condition.

4. This use of a DS statement doesn't reserve any core per se. It is used for boundary alignment for the following constant.

5. The program doesn't branch but causes the machine to enter WAIT state.

```
  LOC  OBJECT CODE    ADDR1 ADDR2  STMT   SOURCE STATEMENT

000F70                                1           START X'F70'
                            00F70     2           USING *,0
000F70 1B55                           3 BEGIN     SR    5,5
000F72 1766                           4           XR    6,6
000F74 5860 0F90            00F90     5           L     6,CON
000F78 4155 0001            00001     6 LOOP      LA    5,1(5)
000F7C 1956                           7           CR    5,6
000F7E 4770 0F78            00F78     8           BC    7,LOOP
000F82 8200 0F88      00F88           9           LPSW  PSW
000F88                               10           DS    0D
000F88 7F02000000001234              11 PSW       DC    X'7F02000000001234'
000F90 00070000                      12 CON       DC    X'00070000'
                            00F70    13           END   BEGIN
```

LAB PROJECT 1 - Figure 1

PART 2

1. LOG ON - The terminal must be logged on. Your instructor will do this for you. He will also provide a card deck and ID card.

2. PROGRAM LOAD

   a. Ready the card reader with the program used for this lab project after placing the ID card ahead of the deck. The deck is immediately read from the card reader.

   b. The screen should display the message CP READ. If it does not, depress the DUP PA1 key.

   c. To load the program into our DOS system enter the IPL command.

      1. Key in ipl 00C (If a typing error is made, the key with the ← allows you to backspace and retype). When the program has been loaded in its entirety, the loader transfers control to the program and it starts its execution. The program will loop for a few moments before it enters a wait state.

3. Console Indications

   a. Notice that after 15 seconds or so, there has been no response from the console. During this period of time, the program first looped for a few moments and then entered the wait state. It is apparent then, that there is no observable difference between a loop and a wait state.

   b. A wait state results from loading a PSW which has its wait bit turned on. Thus, by displaying the current PSW, it may be determined if the system is in a wait state.

      1. Depress the DUP PA1 key.

      2. The terminal responds with CP READ.

      3. Key in: display psw

4. Depress enter key

5. The terminal responds by printing the current PSW: PSW - 7F020000 00001234. The wait bit is, in fact, turned on.

6. To return control to a program that has been stopped by a depression of the DUP PA1 key:

   Key in: begin

   Depress the ENTER key

NOTE: Your program does not continue to execute while you are in CP READ mode.

4. Setting the Instruction Counter

The program will now be rerun by initializing the instruction counter to the address of the first instruction in the program.

a. If control has been returned to the program (via the begin command) depress the DUP PA1 key.

   The terminal responds with: CP READ

b. Key-in: store psw 00000000 00000f70

c. Depress enter key. The current PSW now points at the first instruction (0F70) and the wait bit is off.

d. To verify that the program does re-execute, change the instruction address portion of the PSW at location 0F88 from X'1234' to X'0F70'.

   1. Key-in: store 0f88 7f020000 00000f70
   2. Depress the enter key

e. Return control to the program via the begin command.

   1. Key-in: begin
   2. Depress the enter key

f. At this time, the program re-executes the loop and then re-enters a wait state. After approximately 15 seconds, again display the current PSW.

   1. Depress the DUP PA1 key
   2. The terminal responds: CP READ
   3. Key-in: display psw
   4. The terminal prints the current PSW:
      PSW 7F020000 00000F70

The instruction address of the PSW is X'0F70', verifying that the program did, in fact, re-execute.

5. Display and Alter Main Storage

   a. Display the storage locations containing the PSW to be loaded by the program (0F88-0F8F)

      1. Key-in: display 0f88-0f8f
      2. Depress the enter key
      3. The terminal prints the storage locations:
         0F88 7F020000 00000F70

   b. Alter these locations so that when they are loaded as the current PSW, control will be returned to the program beginning address (0F70)

      1. Key-in: store psw 7f000000 00000f70
      2. Depress enter key
      3. Key-in: begin
      4. Depress enter key. The program is now in an endless loop.

6. Trace

   The trace facility is a useful tool for determining the sequence of instruction execution within a program. It is particularly useful in determining the cause of a loop. Trace a portion of the program which is now executing:

   a. Depress the DUP PA1 key

   b. The terminal responds: CP READ

   c. Key-in: trace all

   d. Depress enter key

   e. The terminal responds: TRACE STARTED

   f. Key-in: begin

   g. Depress enter key

   h. The program executes one instruction. The terminal prints the instruction address, the mnemonic and the actual instruction followed by: CP READ.

   i. To execute each successive instruction you must again key-in begin followed by a carriage return.

      There are other options available using trace and a method to take it out of instruction step mode. These will be discussed later in the project.

7. Display and Alter Registers

The program is looping through the instructions at 0F78, 0F7C and 0F7E. This loop will continue until the contents of register 5 has been incremented to equal the contents of register 6. Lets speed the process by first displaying register 5 and then storing a value of 6f000 into register 5.

a. Display register 5

1. When the program has been traced to address 0F7E, key-in: display g5
2. Depress enter key
3. The terminal responds: G5=X (some value between 0 and 70000)

b. Alter register 5

1. key-in: store g5 0006f000
2. depress the enter key

c. Display all registers and verify that register 5 has been changed.

1. Key-in: display g
2. Depress enter key
3. The terminal responds by printing the contents of all of the general purpose registers. Note the contents of register 5.

d. To stop the trace:

1. key-in: trace end
2. Depress the enter key
3. The terminal responds: TRACE ENDED
4. key-in: begin
5. depress the enter key AVOID

The program now resumes execution.

8. Tracing a loop

The program is in a 3 instruction loop. That can be determined with the trace function.

a. Depress the DUP PA1 key

b. The terminal responds: CP READ

c. key-in: trace all run

d. depress the enter key

e. The terminal responds: TRACE STARTED

f. key-in: begin

g. depress the enter key

h. The program is now running with trace active. The arrows indicate branches were successful.

i. Submit the trace end sequence as you did in step 7d.

j. Enter CP READ mode by depressing the DUP PA1 key.

   1. key-in: trace branch run
   2. depress the enter key
   3. The terminal responds: TRACE STARTED
   4. key-in: begin
   5. depress the enter key

   This trace function displays only instructions that were successful branches. Our program has only one on this loop. It should be displayed as:

   000F7E BNZ 47700F78 = 000F78

   It indicates the BNZ instruction at F7E branched successfully to F78.

k. Submit the trace end sequence as you did in step 7d.

l. To break out of the loop, alter register 5 to 6ffff while at location 0F7E. Use the trace function (without RUN) to stop at 0F7E and use the alter register procedure.

m. Continue to execute the program with trace enabled:

   1. Key-in: begin
   2. Depress enter key
   3. Repeat steps 1 and 2 to trace execution of each instruction.

   After executing the instruction at 0F7E, the next time, the program breaks out of the loop.

n. To stop the trace:

   1. Key-in: trace end
   2. Depress enter key
   3. The terminal responds: TRACE ENDED
   4. Key-in: begin
   5. Depress enter key

   The program now resumes execution.

9. Address Stop

The address stop feature allows the execution of the program to be stopped at a particular instruction address. Stop execution of the executing program just as the LPSW instruction at 0F82 is to be executed.

a. Depress the DUP PA1 key

b. The terminal responds: CP READ

c. Key-in: adstop 0f82

d. Depress enter key

e. Key-in: begin

f. Depress enter key

g. When the LPSW is encountered the terminal types:
ADDRESS STOP AT 0F82 CP READ

h. To continue execution:

1. Key-in: begin
2. Depress enter key

NOTE: The program must be in storage before address stop is activated, otherwise, the system will not stop.

10. IPL DOS/VS Under VM

a. key-in: IPL 130

b. depress the enter key twice, the terminal responds:
0I03A Specify Supervisor Name

c. depress enter key twice, the terminal responds:
0I04I IPL DEV=X'130',VOLSER=111111
0I30I DATE=xx/xx/xx,CLOCK=xx/xx/xx
0I10A GIVE IPL CONTROL COMMANDS

d. key-in: set

e. depress enter key

f. key-in: dpd

g. depress enter key, terminal responds:
0I52 PAGE DATA SET EXTENT

0I20I DOS/VS IPL COMPLETE
BG
1I00A READY FOR COMMUNICATION
BG

NOTE: When you are in VM READ you may enter a log statement. Do not type in log while your terminal is in CP READ mode as you will be logged off the system. Use of the log statement in VM READ will cause Job Control statements to be displayed on the tube. This will enable you to determine which job step the CPU is processing. On an assemble, link edit, and execute job stream this feature is a valuable aid. To use this aid, key in log and depress the enter key while in VM READ mode.

11. Notify your instructor of your completion of this project.

LAB PROJECT 2 - VM/370 SPOOLING

The commands which will be introduced in this project are those which control and monitor the spooling activities of VM/370. The intent of this project is to provide the students with the information necessary to operate DOS/VS systems under VM/370 while in the lab. Therefore, only those commands which are essential to achieving that level are introduced in this project.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Use the query command to monitor spooled files.
2. Use the purge command to erase spooled files.
3. Use the close command to produce punched or printed output.
4. Correctly code an ID card and execute a program in a spooled environment.

Time required to complete this project averages 0.5 hour.

Tools, Test Equipment and Documentation

VM/370 Terminal, Reader and Printer
System/370 Principles of Operation SRL
VM/370 Spooling Familiarization Deck

PART 1

Directions

Read the following:

In a spooled environment, input from the reader is placed on disk prior to processing. During program execution, output destined for the printer and punch is also first stored to an area on disk. During program execution then, all unit record I/O operations are intercepted by the VM/370 Control Program (CP) and rerouted to disk. In order for the input from the reader to be stored in the correct disk area, an ID card must precede the deck. In order to obtain output on the printer or punch from their respective areas on disk, the CLOSE command must be issued by the operator. The number of existing input and output files for the reader punch and printer may be determined via the QUERY command. Files may be erased via the PURGE command. These commands, as with the others presented in Lab Project 1, are valid only when CP READ appears in the lower right corner of the console screen.

PART II

Figure 1 is an assembly listing of the standalone program which will be executed. The program is an extension of the one executed in Lab Project 1. Its function is to print 3 lines on the printer. Study the listing in Figure 1 before executing the program on the system. Perform the following steps:

1. Obtain the lab project deck.

2. Log on the system.

   a. Key-in: Log USERID PASSWORD (See note following Step 14)

   b. Depress enter

3. Query files to determine if there is any existing input from the reader or output for the printer/punch.

   a. Key-in: Query files

   b. Depress enter

   c. The console responds by displaying the number of existing files.

4. Purge the reader files

   a. Key-in: Purge rdr

   b. Depress enter

   c. If any reader files had existed previously, they would now have been erased.

5. Purge the printer files.

   a. Key-in: Purge prt

   b. Depress enter

   c. If any printer files has existed previously, they now would have been erased.

6. Purge the punch files.

   a. Key-in: Purge pun

   b. Depress enter

   c. If any punch files had existed previously, they would now have been erased.

7. Spool the project deck to the disk area associated with the reader for this userid.

   a. Place an ID card ahead of the deck (See note).

   b. Place deck in the reader and depress start <u>and end of file</u>.

   c. Observe that the entire deck is immediately read and stored in the disk area associated with this user's reader.

8. Query files to determine if the deck has truly been read into the user's virtual reader as was stated in 7c.

   a. Key-in: Query files

   b. Depress enter

   c. The displayed information indicates that there is now 1 reader file present.

9. IPL the program as a standalone.

   a. Key-in: IPL 00C

   b. Depress enter

   c. After a few moments, the program execution is complete and enters a disable wait.

   d. Note that, as yet, there has been no output to the printer.

10. Query files

   a. Key-in: Query files

   b. Depress enter

   c. Notice that the information displayed indicates that the reader file no longer exists--that is to say, the cards have been read from the virtual reader.

11. To obtain the output for the printer, the printer file must be closed by the operator.

   a. Key-in: Close prt

   b. Depress enter

   c. The output for the user now appears on the printer. Notice that it is preceded by separator pages. The first name on each page is the userid (the second name is the jobname when running a DOS job).

12. If output also existed for the punch, the punch file would have to be closed. Separator cards precede and follow each deck punched.

13. When running DOS, the close commands to the punch and printer are automatically issued by Job Control when a /& is encountered.

14. Log off the system.

    a. Key-in: Log

    b. Depress enter

    NOTE: See lab instructor for userid, password, and ID card.

Study Questions

1. To enter VM/370 commands __________ must appear in the lower right corner of the screen.

2. (True/False) When several users with the same userid output to the same printer, they should place their own first or last name in their job cards.

3. (True/False) Before a user runs a job they should query files and purge any files left from a previous user.

4. (True/False) When running DOS jobs, the /& should always be included in the job, otherwise output will not occur until close' commands are given by the operator.

Answers

1. CP READ
2. True. By punching their name (as you should) in the job card, the second name on each separator page will identify the output for each user.
3. True. Otherwise the input/output obtained may be that of the previous user.
4. True.

```
  LOC   OBJECT CODE      ADDR1 ADDR2  STMT   SOURCE STATEMENT

000F70                                  1 START     START X'F70'
                               00F70    2           USING *,0
000F70 4170 0005               00005    3           LA    7,5
000F74 1855                             4 BEGIN     SR    5,5
000F76 1866                             5           SR    6,6
000F78 5860 0FB0               00FB0    6           L     6,CON
000F7C 4155 0001               00001    7 LOOP      LA    5,1(5)
000F80 1956                             8           CR    5,6
000F82 4770 0F7C               00F7C    9           BC    7,LOOP
000F86 4110 0FA0               00FA0   10           LA    1,PCCW
000F8A 5010 0048               00048   11           ST    1,X'48'
000F8E 9D00 000E         0000E         12           TIO   X'00E'
000F92 9C00 000E         0000E         13           SIO   X'00E'
000F96 4670 0F74               00F74   14           BCT   7,BEGIN
000F9A 8200 0FA8         00FA8         15           LPSW  PSW
000FA0                                 16           DS    0D
000FA0 09000FB420000050                17 PCCW      CCW   9,DATA,X'20',80
000FA8 0002000000001234                18 PSW       DC    X'0002000000001234'
000FB0 0000FFFF                        19 CON       DC    X'0000FFFF'
000FB4 E3C8C9E240C9E240                20 DATA      DC    CL80'THIS IS IT'
                               00F70   21           END   START
```

LAB PROJECT 2 - Figure 1

LAB PROJECT 3 - DOS/VS FAMILIARIZATION

This project exposes the student to the basic functions of job control--job to job transition, I/O device assignments, job options and operator controlled tape drive functions. The functions introduced are those associated with the job, assgn, listio, pause, UPSI, comment, mtc, option, exec, cancel, map, /* and /& statements and commands. In addition, the student is exposed to JCL error messages and correction of the associated errors.

A clear understanding of the material presented in this project will provide students with a foundation in batch job concepts on which much of the DOS/VS system and DOS/VS base course is based.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Operate a DOS using basic job control commands.
2. Given a job control error message, correct the statement causing the error.

Time required to complete this project averages 1.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Student System Residence Disk Pack
DOS/VS Work Pack
DOS/VS Operating Guide SRL
DOS/VS System Control Statements SRL
DOS Familiarization Project Deck (Lab Instructor)

PART 1

Directions

The following comments and questions reference Figure 1. Read the JCL comment statements numbered LP030001 through LP030016. Part I of this project is intended to highlight the commands and JCL statements necessary to sucessfully execute the job stream shown in the figure.

1. There are _________ (how many) jobs in the job stream.

2. (True/False) The LOG statement causes all JCL statements to be logged on the console.

3. (True/False) The dump option in statement LP030019 will cause a dump to occur when a job is cancelled by the operator.

4. The command that will be keyed in response to stmt LP030020 is ______________ .

5. The statement that will be keyed in response to statement LP030021 is ________________ .

6. At the time the listio is issued at stmt LP030025, SYS005 is assigned to __________ and SYS006 is assigned to ____ .

7. The program at statements LP030027 through LP030031, when executed, will ________________ (read cards/ program check/ loop).

8. A pause statement allows the operator to take some kind of action before depressing the __________ (end/ request) key to continue the job.

9. To stop a program that is looping and go on to the next job, the operator may key in _____________ (stop/ cancel).

10. The listio, at LP030042 will show that SYS005 is assigned to _________ and SYS006 is assigned to ________________.

11. The EXEC statement indicates that a program is to be loaded and executed. The EXEC at statement LP030033 will cause the program named _____________ to be executed.

12. Statement LP030032 indicates ___________ (end of job/ end of file).

13. When the job named LP3A is cancelled, the cards up to the next ___________ (/*-//EXEC-/&) will be flushed through and the pause statement at LP030042 will temporarily terminate the flow of the job stream until the operator depresses the end or enter key.

14. ____________ will be keyed in response to statement LP030043.

15. ____________ will be keyed in response to statement LP030044.

16. ____________ will be keyed in response to statement LP030045.

17. ____________ will be keyed in response to statement LP030046.

18. ____________ will be keyed in response to statement LP030047.

19. ____________ will be keyed in response to statement LP030048.

20. As a result of the generic assigns at statement LP030044 and LP030047, SYS005 will, in each case, be assigned to an available ___________ (tape/ disk) drive.

21. The function of job LP3B is to read cards from SYSRDR and write the data on SYS005 which is assigned to tape. LP3C then reads tne data from tape and prints the data on SYSLST. The UPST statement at LP030050 turns _________ (lights/ input output devices/ bit switches) on or off.

22. __________ will be keyed in response to statement LP030053.

23. __________ will be keyed in response to statement LP030086.

24. A /& resets __________ (permanent/ temporary) assignments and ____________ (standard/ job control) options.

25. A tape mark normally indicates __________ (end of job/ end of file).

PART 2

Directions

Obtain the lab project deck and execute the job stream. Use the DOS/VS system control statement SRL and the DOS/VS messages SRL to resolve any questions that arise.

```
* DURING THIS PROJECT, YOU WILL PLAY THE ROLE OF AN OPERATOR AT A       LP030001
* CUSTOMER LOCATION. AS SUCH, YOU WILL BE GIVEN DIRECTIONS FROM THE     LP030002
* PROGRAMMER VIA COMMENT AND PAUSE STATEMENTS WHICH HE HAS INCLUDED IN  LP030003
* THE JOB STREAM.THE INTENT IS TO EXERCISE YOUR SKILLS IN THE USE OF    LP030004
* THE DOS/VS JCL STATEMENTS AS WELL AS COMMANDS FROM THE CONSOLE.       LP030005
* YOUR RESPONSIBILITY, AS AN OPERATOR, IS TO FOLLOW THE DIRECTIONS OF   LP030006
* THE PROGRAMMER EXACTLY, AND TO DO THIS IN A MINIMUM OF TIME.  ANY     LPC30007
* DELAYS IN THE EXECUTION OF JOBS IN THE DAILY JOB STREAM WASTES        LP030008
* THE CUSTOMERS VALUABLE SYSTEM TIME. AS RESOURCES, YOU SHOULD HAVE     LP030009
* BOTH THE DOS/VS SYSTEM CONTROL STATEMENT SRL AND THE DOS/VS           LP030010
* MESSAGES SRL WITH YOU AT THE CONSOLE TO ENABLE YOU TO QUICKLY         LP030011
* RESOLVE DIFFICULTIES. YOU CAN FIGURE ON 15 MINUTES AS BEING AVERAGE   LP030012
* TIME FOR A BEGINNING OPERATOR. SEE HOW YOU FAIR IN RELATION TO THAT   LP030013
* TIME. ONCE COMPLETED AT THE CONSOLE, TAKE THE CONSOLE LOG BACK TO     LP030014
* THE STUDY AREA TO SEE IF THE RESULTS COMPARE WITH THE STUDY QUESTIONS LP030015
// JOB LP3A                                                             LP030016
// EXEC BUG01       DO NOT REMOVE THIS CARD                             LP030017
LOG                                                                     LP030018
// OPTION DUMP,LINK,NODECK                                              LP030019
// PAUSE ENTER A MAP COMMAND AND NOTE THE ALOCATIONS                     LP030020
* PERFORM A LISTIO TO THE CONSOLE FOR BACKGROUND AND NOTE THE           LP030021
// PAUSE ASSIGNMENTS FOR SYS005 AND SYS006.                             LP030022
ASSGN SYS005,X'00C'                                                     LP030023
// ASSGN SYS006,X'00E'                                                  LP030024
// PAUSE PERFORM LISTIO AND NOTE SYS005 AND SYS006 ASSIGNMENTS NOW      LP030025
// EXEC ASSEMBLY                                                        LP030026
         START                                                          LP030027
         BALR  7,0                                                      LP030028
         USING *,7                                                      LP030029
BEGIN    B     BEGIN                                                    LP030030
         END                                                            LP030031
/*                                                                      LP030032
// EXEC LNKEDT                                                          LP030033
* THE PROGRAM WILL BEGIN TO LOOP WHEN IT EXECUTES. DEPRESS THE ENTER    LP030034
* OR REQUEST KEY IN ORDER TO TALK TO THE ATTENTION ROUTINE (AR).        LP030035
* WHEN THE AR IS READY FOR COMMUNICATION, KEY IN CANCEL. YOU WILL HAVE  LP030036
* TO DEPRESS THE END KEY TWICE AT THIS TIME. WATCH FOR THE DUMP.        LP030037
*                                                                       LP030038
// PAUSE                                                                LP030039
// EXEC                                                                 LP030040
/&                                                                      LP030041
*******************REPLACE THIS CARD WITH /& ************************** LP030041
// PAUSE PERFORM A LISTIO AND AGAIN NOTE SYS005 AND SYS006              LP030042
// PAUSE PERMANENTLY UNASSIGN SYS005                                    LP030043
// PAUSE TEMPORARILY ASSIGN SYS005 TO GENERIC CLASS OF DISK             LP030044
// PAUSE PERFORM A LISTIO AND NOTE THE UNIT THAT SYS005 IS ASSIGNED     LP030045
// PAUSE PERMANENTLY UNASSIGN SYS005                                    LP030046
// PAUSE TEMPORARILY ASSIGN SYS005 TO GENERIC TYPE OF 2314              LP030047
// PAUSE PERFORM A LISTIO AND NOTE THE SYS005 ASSIGN                    LP030048
// JOB LP3B                                                             LP030049
// UPSI 1                                                               LP030050
// PAUSE MOUNT A SCRATCH TAPE ON DRIVE 280                              LP030051
// PAUSE TEMPORARILY ASSIGN SYS005 TO 280                               LP030052
// PAUSE USE THE MTC COMMAND TO WRITE 2 TAPEMARKS ON 280                LP030053
// EXEC DITTO                                                           LP030054
```

LAB PROJECT 3 - Figure 1 (Part 1 of 2)

ATTN Time gets CP

or #cp msg

B begin for DO mode

```
$$DITTO  CT     OUTPUT=SYS005                                            LP030055
DATA CARD                                                                LP030056
DATA CARD                                                                LP030057
DATA CARD                                                                LP030058
DATA CARD                                                                LP030059
DATA CARD                                                                LP030060
DATA CARD                                                                LP030061
DATA CARD                                                                LP030062
DATA CARD                                                                LP030063
DATA CARD                                                                LP030064
DATA CARD                                                                LP030065
DATA CARD                                                                LP030066
DATA CARD                                                                LP030067
DATA CARD                                                                LP030068
DATA CARD                                                                LP030069
DATA CARD                                                                LP030070
DATA CARD                                                                LP030071
DATA CARD                                                                LP030072
DATA CARD                                                                LP030073
DATA CARD                                                                LP030074
DATA CARD                                                                LP030075
DATA CARD                                                                LP030076
DATA CARD                                                                LP030077
/*                                                                       LP030078
$$DITTO  WTM    OUTPUT=SYS005                                            LP030079
$$DITTO  REW    OUTPUT=SYS005                                            LP030080
$$DITTO  EOJ                                                             LP030081
/&                                                                       LP030082
// JOB LP3C                                                              LP030083
// UPSI 1                                                                LP030084
// PAUSE TEMPORARILY ASSIGN SYS005 TO 280 AGAIN                          LP030085
// PAUSE USE THE MTC COMMAND TO FORWARD SPACE FILE OVER THE FIRST TPMK   LP030086
// EXEC DITTO                                                            LP030087
$$DITTO  TP     INPUT=SYS005                                             LP030088
$$DITTO  REW    OUTPUT=SYS005                                            LP030089
$$DITTO  EOJ                                                             LP030090
/&                                                                       LP030091
```

LAB PROJECT 3 - Figure 1 (Part 2 of 2)

LAB PROJECT 4 - PROCEDURE LIBRARY

Implementation of the procedure library enables users to run repetitive job streams with a minimum of JCL in card form. This project exposes the student to the statements necessary to implement procedures. This will enable the student to more clearly understand and utilize the proclib.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Create a job stream and catalog it in the Procedure Library.

2. Display and/or punch the cataloged procedure from the Procedure Library.
3. Correctly modify a cataloged procedure using overwrite statements.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment and Documentation

DOS/VS Operating Procedures
DOS/VS System Management Guide
DOS/VS System Control Statements

Directions

1. Execute PSERV in order to display and punch LP004. Add the necessary JCL to assemble and linkedit but not execute the program. Catalog the JCL and program in the PROCLIB by the name LBPROJ4.

2. Display and punch the procedure you cataloged.

3. Use overwrite statements to modify your job stream to assemble, linkedit, and execute the program. Figure 1 shows the logic flow of the program and Figure 2 shows the intended output.

4. Display and punch the procedure again.

Study Questions

1. Does the use of overwrite statements permanently modify the cataloged procedure? ________

2. What character sequences are invalid as EOP characters? ________________________

3. (True/False) It is an invalid operation to have an EXEC statement in a procedure whose purpose it is to call in another procedure.

4. (True/False) An unnamed statement in a cataloged procedure cannot be modified.

5. (True/False) SYSIPT data read from the procedure library cannot be modified by overwrite statements in the job stream.

6. (True/False) A cataloged procedure that contains a JOB statement will not be correctly executed if the procedure is called by an EXEC statement that is immediately preceded by a JOB statement.

7. To what device is SYSRDR (or SYSIPT) assigned during the execution of a PROC? ____________________________________

Answers

1. No - The modification is for the duration of the job only.

2. There are 3 invalid sequences for EOP characters; //, /*, and /&.

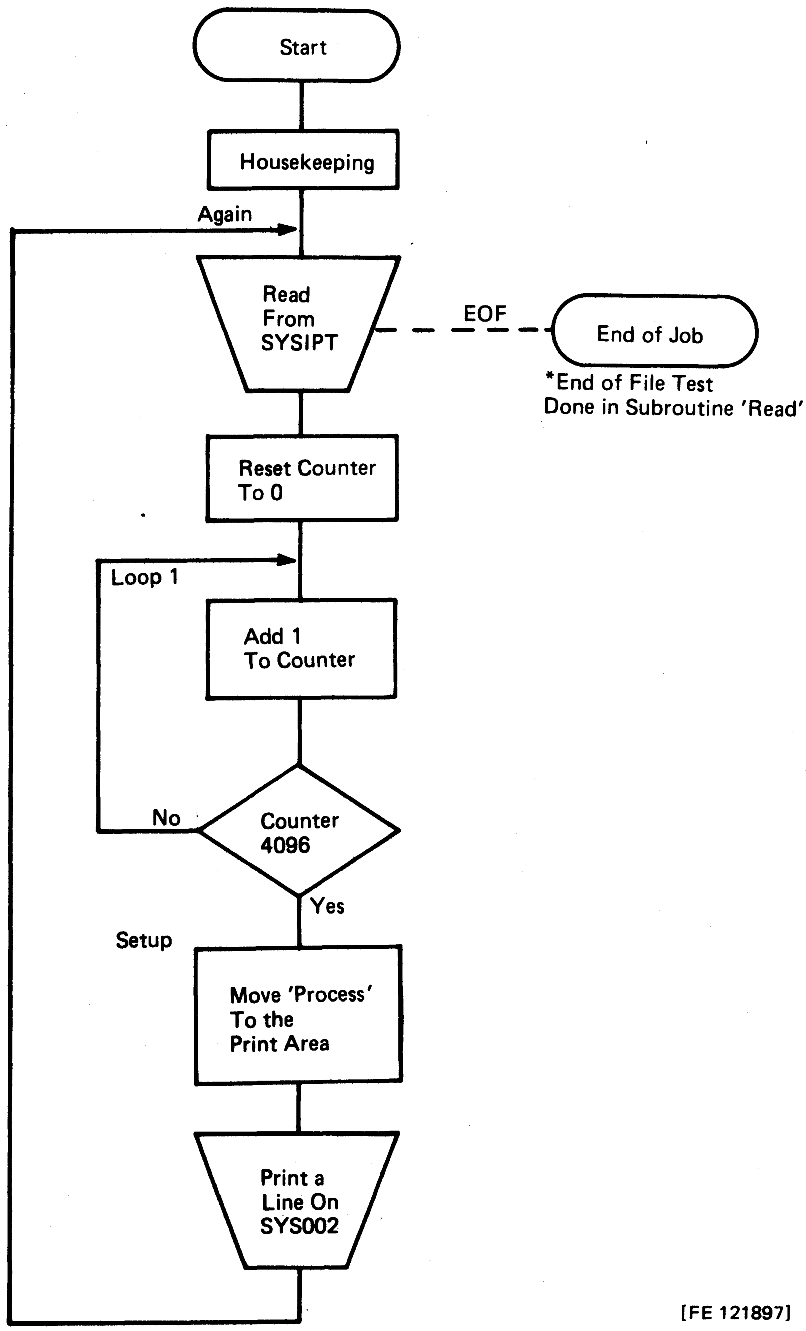
3. True - Procedures cannot be nested.

4. True

5. True

6. True

7. The assignment for SYSRDR is dummied-up by the system to point to the device from which the PROC is being executed (SYSRES). For this reason SYSRDR and SYSIPT assignments cannot be altered by a procedure (SYSIPT is assigned to the SYSRES device only when DATA=YES is specified in the procedure).



[FE 121897]

LAB PROJECT 4 - Figure 1 FLOWCHART

```
********************          DATA CARD NUMBER 1      **********PROCESS
********************          DATA CARD NUMBER 2      **********PROCESS
********************          DATA CARD NUMBER 3      **********PROCESS
********************          DATA CARD NUMBER 4      **********PROCESS
********************          DATA CARD NUMBER 5      **********PROCESS
********************          DATA CARD NUMBER 6      **********PROCESS
```

LAB PROJECT 4 - Figure 2 **SAMPLE PRINTOUT**

LAB PROJECT 5 - DISK FORMATS

This project re-introduces students to the topic of disk formats. Students are required to locate a particular cylinder and head and then to identify the home address, count, key and data areas. Understanding of this topic provides a base from which knowledge of the DOS/VS sysres organization can be built. The programs DITTO and DASD PRINT are introduced as aids in displaying areas of disk.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Run the Ditto Program to print out a track of 2314 Disk Pack.
2. Use the printout from the Ditto Program to identify areas on the track.
3. Observe differences in a Ditto Dump of DASD compared to a disk dump program.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment and Documentation

SRL FOR 2314

Directions

Each system in the lab has the DITTO program in the core image library. Use this program to obtain a dump of cylinder 199 head 0.

Use this printout to answer the study questions.

Then use // EXEC DAPRINTR to answer any questions that DITTO did not provide. It may be necessary to ASSGN SYS000 to disk drive 130. Do Not Delete Any Unexpired Files. After execution, return assignments to their original devices.

Study Questions

Complete the statements below in hexadecimal, except where DEC is noted, using the Disk Dump Program printout of cylinder 199 head 0.

1. Length of HA is _______________ bytes.
2. Contents of HA area is _______________.
3. The flag byte indicates this is a _______________ (operative/alternate) track.
4. The length of R0 count area is ___________ bytes.
5. The R0 ID is cylinder __________, head __________ and record _________________ .
6. The R0 ID is cylinder __________ (DEC), head __________ (DEC) and record ____________ decimal.
7. The R0 key length is _____________ bytes.
8. The R0 data length is ____________ bytes.
9. The R1 count area length is ____________ bytes.
10. The R1 key length is _______________ bytes.
11. The R1 key area contains 44 (DEC) bytes of hexadecimal ___________________ .
12. The R1 data area length is _____________ (DEC) bytes.

Answers

1. 5
2. 0000C70000
3. Operative
4. 8
5. 00C7, 0000, 00
6. 199,0, 0
7. 0
8. 8
9. 8
10. 2C
11. 04
12. 96

LAB PROJECT 6 - POWER OPERATION

POWER provides support for spooled input and output under DOS/VS. The greatest advantage of spooling is faster overall throughput. This is achieved by enabling inputting, processing and outputting of jobs to occur independently from each other. When we allow this to occur, System I/O units are able to operate at maximum speeds.

In order to operate POWER, students must be familiar with the associated JECL statements and console commands. The intent of this project is to provide students with the skills needed to operate a DOS/VS system with POWER initiated. Consequently, only those statements and commands necessary to achieve those skills will be introduced.

Objective

Upon completion of this project, students should be able to operate a DOS/VS System using POWER. Students should be able to operate POWER by performing the following tasks:

1. Use Queue management console commands to:
    a. Display the status of any job in the POWER system.
    b. Delete a job from the input queue.
    c. Release a job from the input queue.
2. Prepare or correct POWER job entry control statements that are required to execute a job with the following conditions.
    a. Assign priority to any job.
    b. Execute the job in a specified partition.
    c. Hold a job in the input queue.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment and Documentation

DOS/VS Operating Procedures
POWER SAMPLE DECK

PART 1 - JECL AND POWER COMMANDS FAMILIARIZATION

Directions

The sample deck for this Lab Project is complete with the exception of the power JECL needed to run in a power environment. The following diagram will assist you in preparing the necessary JECL to run the job stream. The numbered statements indicate the JECL which you will be required to punch and insert in the sample deck obtained in Part 2. Enter the appropriate operands in the underlined areas of the JECL statements. All jobs are to be entered in the hold state and run in BG.

```
1.   * $$JOB ________,H,5, _____
     // JOB ASSEM
     /&

2.   * $$ _______

3.   * $$JOB _______, ___,5,BG
     // JOB SECOND
     /&

4.   * $$EOJ

5.   * $$ _____Third, _____,_____,____
     // JOB THIRD
     /&

6.   ____$$______

7.   * $$ JOB LSERV ____,______,_______
     // JOB LSERV
     /&

8.   _______________

9.   ____________ JOB ____,____,____,_____
     // JOB ASSEM
     /&

10.  * $$EOJ
```

POWER COMMANDS (Answer the following)

1. To display the input queue for background, depress the Request Key and KEY-IN ____ .

2. To alter a Job named XYZ from a priority of 5 to a higher priority of 6, depress the Request Key and KEY-IN _______ .

PART 2 - EXECUTION OF JOBS UNDER POWER

Directions

This project should not be performed under VM/370. Obtain the POWER sample deck and add the necessary POWER control cards to run the jobs under POWER. After the jobs have been read into the INPUT queue, display the queue. Alter the priority so the last job entered in the queue will execute first and then delete the job named LSERV. Display the queue to check the results. Release the remaining jobs and allow them to execute.

NOTE: JECL does not replace standard DOS job control.

Jobs running under this power system have a default priority of 5.

The POWER program (FGPSPOOL) must be initiated on the system before PART 2 of this lab project can be executed. If POWER has not already been initiated on the system, use the procedure on the following page to do so; then execute PART 2.

POWER INITIALIZATION PROCEDURE

IPL the System

```
OI03A SPECIFY SUPERVISOR NAME

OI04I IPLDEV=X'130',VOLSER=111111,CPUID=000603330135
OI30I DATE=06/13/74,CLOCK=04/59/00,ZONE=EAST/00/00
OI10A GIVE IPL CONTROL COMMANDS
set
dpd
OI52I PAGE DATA SET EXTENT        LOW     HIGH
                               188    0 196   19
OI20I DOS/VS IPL COMPLETE
BG 1100A  READY FOR COMMUNICATIONS.
BG stop <------------------------------ End/Enter Key and press Request Key
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
F1 log
F1 // exec proc=powergo
F1 // ASSGN SYS001,X'131'
F1 // ASSGN SYS002,X'131' POWER DATAFILE
F1 // DLBL DATAFIL,'POWER V5 DATAFILE',99/365,DA
F1 // EXTENT SYS002,111111,1,0,2020,1900
F1 // DLBL QFILE,'POWER V5 QFILE',99/365,DA
F1 // EXTENT SYS001,111111,1,0,1400,20
F1 EOP POWERGO
F1 1C10A  PLEASE ASSIGN SYSRDR.
F1 // exec fgpspool,real
F1 1Q39D FORMAT QUEUES ? d
F1 1Q40D AUTOSTART ? <----------------- End/Enter
F1 4733A EQUAL FILE ID IN VTOC        QFILE     SYS001=131   111111
   POWER V5 QFILE
* F1 delete
F1 4733A EQUAL FILE ID IN VTOC        DATAFIL   SYS002=131   111111
   POWER V5 DATAFILE
* F1 delete
F1 1Q41I POWER CONTROLLED PARTITIONS MAY NOW BE STARTED
F1 1Q14I 08 PROGRAM BUFFERS
F1 1Q15I 20 DATA BUFFERS
F1 OP08A    INTERV REQ SYS003=00C <---- POWER is now active.  Place cards
AR start bg                             in the reader.  If reader ready,
BG // job pwrtst                        this message does not print.
BG // JOB PWRTST
   DATE 06/13/74,CLOCK 05/07/15
F1 1Q51A MISSING $JOB CARD  BG
BG 1I93I  RECORDER FILE IS   0% FULL
BG /&
BG EOJ PWRTST
   DATE 06/13/74,CLOCK 05/08/11,DURATION 00/00/55
```

*** Key in DELETE only in response to the 4733A message. Should any other message print, contact your instructor.**

NOTE: All underlined entries are to be made by the operator.

LAB PROJECT 7 - LABEL EXTERNALS

This project extends the student's knowledge of JCL to include the function, content, format and sequence of the DLBL and EXTENT statement. The student's understanding of the material in this project is prerequisite to the topic of Label Processing Techniques in the next project.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Correct any errors in EXTENT and DLBL information.

Time required to complete this project averages 1.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Operating Procedures
DOS/VS Control Statements

Directions

Obtain the deck called LP007 from the PROC library. Correct the labels to conform to Figure 1 of Lab Project 7. All of these labels are for disk 131. After all errors have been corrected, the job will execute and give you a printout like Figure 2. Save the corrected label cards for Lab Project 8.

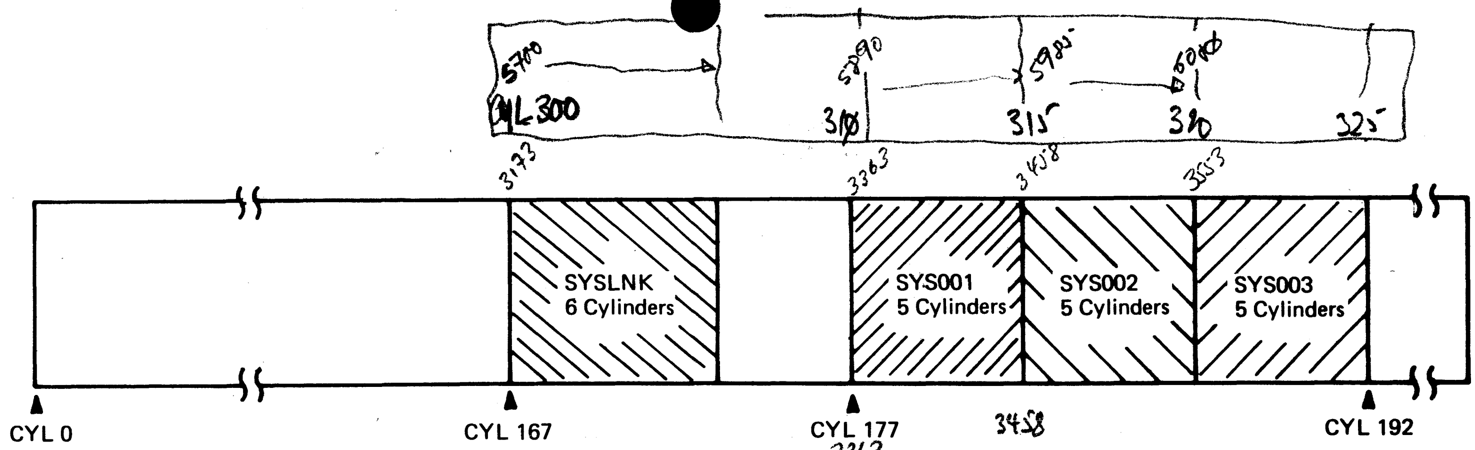


Figure 1

[FE 121896]

```
        LABELBUG            04/27/74                                                                  PAGE    1

GR 0-7   00080150 00080148 4008007A 0000D9E8   0000DBD0 80000015 80000015 000FA7FF
GR 8-F   800821F6 0A16180C 00000000 182F07F1   00080078 D7C8C1E2 C55C5C5C 000FA7FF
FP REG   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
CR 0-7   804000E0 0100DE00 FFFFFFFF FFFFFFFF   00000000 00000000 00000000 00000000
CR 8-F   00000000 00000000 00000000 00000000   00000000 00000000 C4000000 00000200

080060                                                           05205810 20DE0A00                     ........
080080   581020DE 91801002 47102014 0A07D501   207620E6 478020C6 411020CE 410020D6   ..............N.  ...W...F.......O
0800A0   0A025810 20E20A00 581020E2 91801002   4710203C 0A0747F0 20000000 80000800   .....S.....S....  .......O........
0800C0   01050008 00D00008 00D80000 00000000   020800F0 00000050 00000400 00000003   .........Q......  ...0...&........
0800E0   000800E8 CCC0C000 090800F0 20000050   5C5C5C5C 5C5C5C5C 5C5C5C5C 5C5C5C5C   ...Y.......0...&  ****************
080100   5C5C5C40 40404040 40404040 40C4C1E3   C140C3C1 D9C440D5 E4D4C2C5 D94040F1   ***          DAT  A CARD NUMBER  1
080120   40404040 40404040 5C5C5C5C 5C5C5C5C   5C5C5C5C 5C5C5C5C 40404040 40404040           ********  ********
080140   0A0EC000 D7D9D6C7 5B5BC2D7 C4E4D4D7   0C08C07A CC08017A CC0800BA CC08C0D8   ....PROG$$BPDUMP  ...............Q
080160   615CCCCC C0CCCCCC 00CCCC00 CCCC000C   CCCCCCC0 C0CCCCC0 CCCCCCC0            /*..............  ............
*********************             DATA CARD NUMBER  1          *****************
```

Figure 2

LAB PROJECT 8 - INTRODUCTION TO LABEL PROCESSING

When using disk files as input or output, labels must exist on the label information cylinder to identify and locate the file. In this project, students are required to excercise skills in placing labels in both the standard and temporary areas of LIC, executing a program requiring those labels and displaying the contents of those label areas.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Identify the three general areas where labels are located on the label information cylinder.
2. Code a job stream to place labels in any of the three LIC areas: System standard, partition standard, or partition temporary.
3. Describe in general terms the types of labels used by DOS/VS and their functions.
4. Display the labels contained on the LIC of a DOS/VS SYSRES pack.

Time required to complete this project averages 1.5 hours.

Tools, Test Equipment and Documentation

DOS/VS System Management Guide
DOS/VS Data Management Guide
DOS/VS System Control Statements

Directions

Use the label set that you corrected in Lab Project 7 to create labels for the F4 partition standard area. Create a job stream to place these labels on the F4 partition standard area of the label information cylinder. Use the DOS/VS POWER system to make F4 active. Use LSERV to obtain a printout of the labels. Answer the study questions.

- LSERV prints LIC, from last cylinder on SYSRES, onto SYSLST. Job Control stores LBL INFO DOS/VS SADP
- VTOC file in organisation DOS/VS Utilities.

Study Questions

1. (True/False) The OPTION statement is used to specify the partition with which a label set is to be associated after it has been written on the LIC.

2. (True/False) If there is no option statement preceding a label set, the label set goes to the system standard area of the label information cylinder.

3. (True/False) If a new label is to be added to the background standard label area, all labels already on that track must be included in the new job stream or they will be deleted.

4. Describe a method to display the partition temporary area of the label information cylinder while it contains labels.

   ____

5. Why might expired dates be used in label cards? ____________

   ____

Answers

1. False - The partition in which Job Control is executing determines the partition with which the labels will be associated.

2. False - The label set goes to the partition temporary area of LIC.

3. True

4. Use // EXEC LSERV as a job step after the label cards (set) and before the /& or a new // JOB statement.

5. If frequent changes are made in an output file or work files, it makes it unnecessary for the operator to type in DELETE when the file is opened. This procedure should be used with caution since the file is not protected.

LAB PROJECT 9 - DOS/VS BUG SYSTEM

Objective

Upon completion of this project the student should be able to:

1. Apply Bugs to the DOS/VS System for T/A Problems.
2. Remove Bugs from the DOS/VS System.

Time required to complete this project averages 0.5 hour.

Tools, Test Equipment and Documentation

DOS/VS System

Directions

1. IPL the DOS/VS system
2. When the 'BG READY FOR COMMUNICATIONS' message prints enter:

   a. // EXEC BUG01

3. The system will respond:

   BG SYSTEM IS BUGGED
   BG 1I00A READY FOR COMMUNICATIONS

NOTE: This message sometimes will not be printed. Instead 'IPL TO CONTINUE' will be printed. If this occurs, IPL the DOS/VS system again to continue with the bug applied.

4. To continue, enter the job stream as called out for each T/A Problem. Obtain the deck for T/A 6 and submit it at this time. DO NOT SHOOT T/A 6 NOW. It is being used only to give you a sample dump for this project.

   a. An error message and a dump should occur.

   b. Verify that the dump starts at storage location X'080000'. This indicates BUG01 is on the system.

   c. Retain the error message and dump for use later.

5. When it has been verified that BUG01 is on the system enter:

   a. // EXEC DEBUG to remove the bug from the system.

   b. Use the error message and dump from STEP 4 to go on to T/A 6.

STUDY QUESTIONS

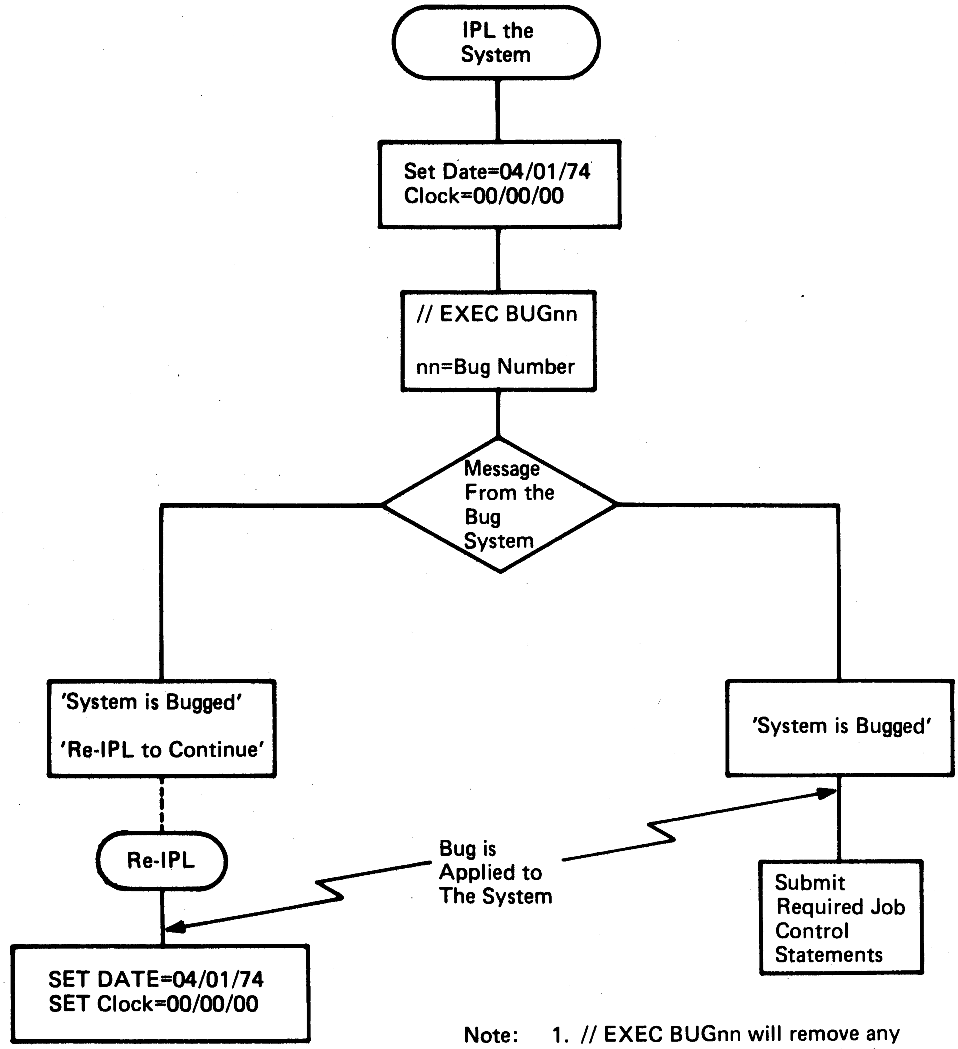
1. What is the address of the PSW in the dump?

2. What is the address of general purpose register 1 in the save area?

3. What is the starting address of the program? Hint: Check link edit map.

ANSWERS

1. 080008
2. 080030
3. 080078



Note:
1. // EXEC BUGnn will remove any bug on the system and apply the new bug.
2. // EXEC DEBUG will remove any bug on the system.
3. Every time the system is IPLed, it will remove any bug on the system.

[FE 121552]

LAB PROJECT 9 - Figure 1

LAB PROJECT 10 - PHYSICAL INPUT/OUTPUT CONTROL SYSTEM MACROS

The physical IOCS macros, EXCP, WAIT and CCB are used in the DOS/VS system as the problem program's means of making I/O requests to the supervisor. No matter whether the source program was written in basic assembler COBOL, Fortran, PL1, etc. While performing this project, students will correct errors in these macros and execute the program provided. The PIOCS interface between the problem program and the supervisor provides the foundation on which the logical input output control system (LIOCS) for handing data files is built. Student understanding of PIOCS is an essential element in grasping the concepts and implementation of LIOCS covered later in the course.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Correct any source statement coding or logic errors in the use of the EXCP, WAIT, CCB, PDUMP or EOJ macro.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor and I/O Macros
System/370 Principles of Operation

Directions

Obtain a deck of cards from your lab instructor or the procedure library. The procedure name is LP010. The source program uses PIOCS macros to do an 80/80 list. Figure 1 is a flowchart of the program. The source program contains coding and logical errors.

NOTE: Do a // EXEC BUG01 at the console before running your source deck. This will prevent an unnecessary dump of the supervisor.

Study Questions

1. Which bit in the CCB is tested to determine if an end-of-file has occurred on a 2540 reader assigned to the symbolic unit SYSRDR?

2. What is the mask for the test under mask instruction used to check for this condition?

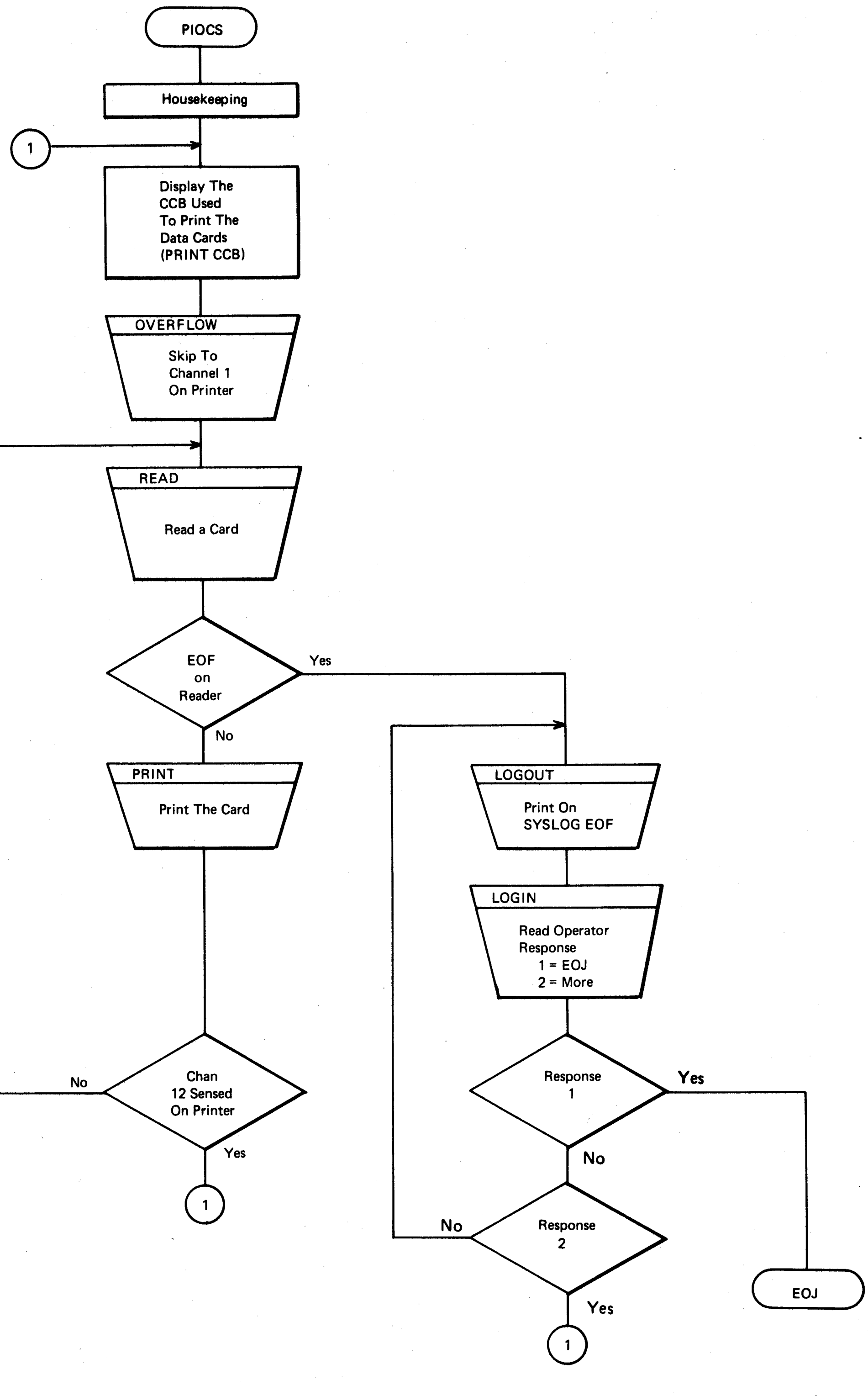
3. What value must the third operand in the CCB have to allow this test to be made?

Answers

1. byte 2 bit 1 for SYSRDR or SYSIPT only

2. X'40'

3. The third operand indicates user options. This is not a user option so the third operand is not meaningful to this test.



LAB PROJECT 10 - Figure 1

LAB PROJECT 11 - DISK READ AND PRINT

This project exercises the student's skills in the debugging of PIOCS programs. It is a review of the PIOCS macros covered in the previous lab project as well as a review of disk channel programs. The overall function of this progam (read volume label and VTOC and print the information on the printer) will be repeated in the VS macro project. This project then will provide the students with a better base for the VS macro project.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Correct logic errors in a source program. This program will read seven records from a disk pack and print the records.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment and Documentation

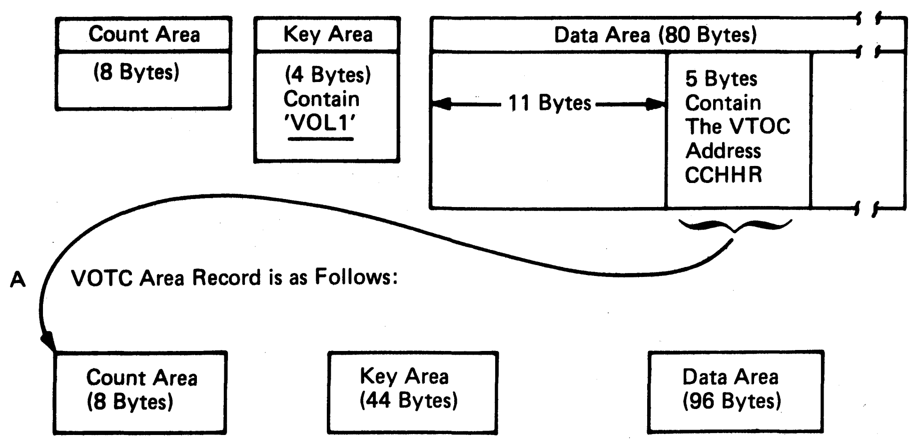
Figures 1 and 2 for this project
IBM System/370 Principles of Operation

Directions

Obtain a source deck from your lab instructor or the procedure library. The procedure name is LP011. The program is to read the Volume Label, extract the address of VTOC from the label, and then read 6 records from the VTOC. Verify your program's output with the lab instructor.

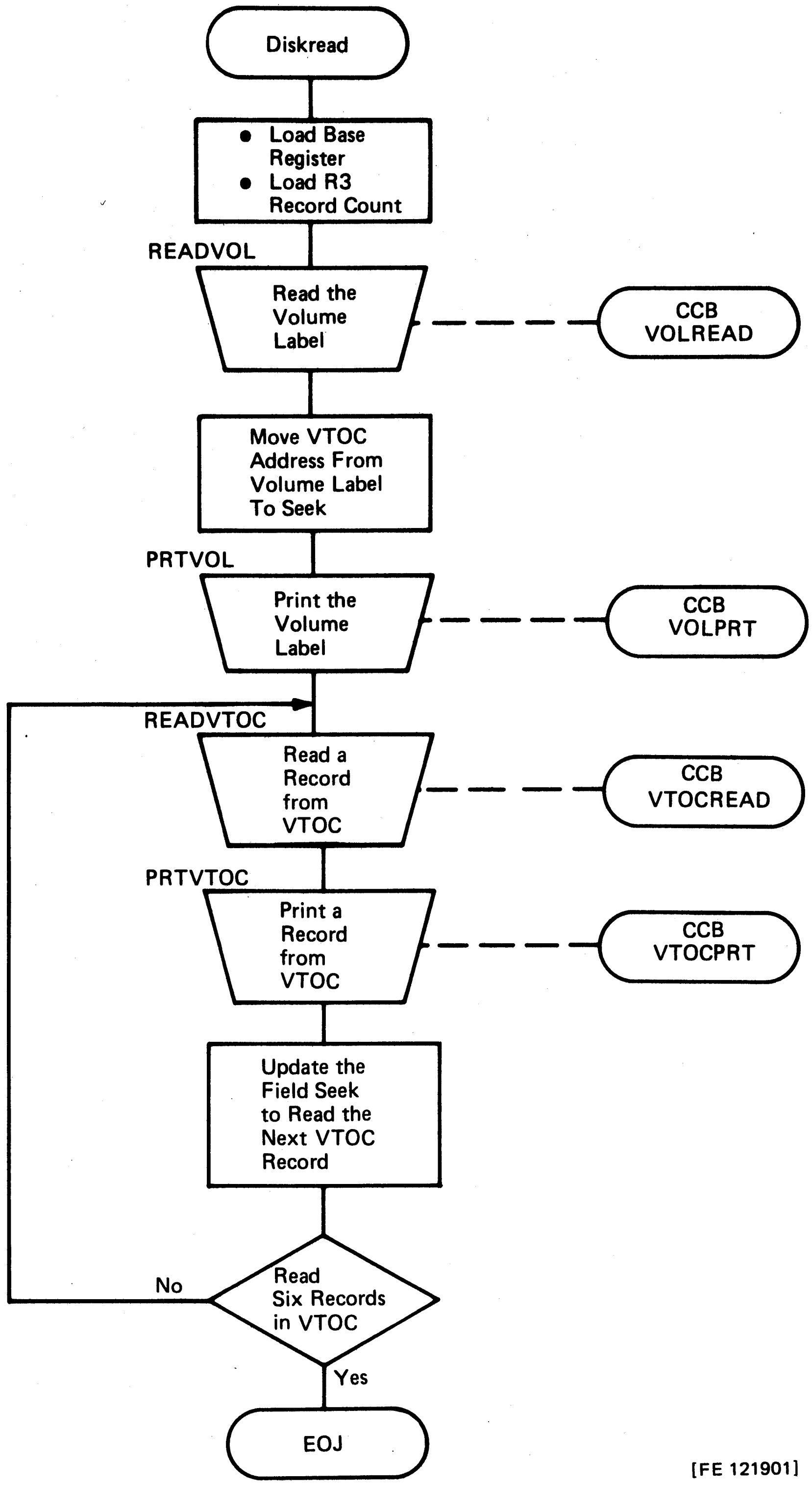
NOTE: Do a // EXEC BUG01 at the console before running your source deck. This will prevent an unnecessary dump of the supervisor.

Volume Label - This record is on cylinder zero and its format is as follows:



[FE 121551]

LAB PROJECT 11 - Figure 1



LAB PROJECT 11 - Figure 2

LAB PROJECT 12 - LINKAGE EDITOR

The intent of this project is to familiarize the student with the statements required to utilize the linkage editor. Student knowledge of this topic is essential to future understandings of the total process of coding, assembling, linking, and executing programs. The project presents a structured approach and logical method for problem solving as it applies to user errors in jobs. This is intended to enhance the student's ability to complete tasks of this nature in a logical fashion.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Correct control card errors in a job stream that links 5 modules together to form a two-phase program.
2. Punch a REPLACE card to correct an error in an OBJECT module.
3. Identify the record types contained in an OBJECT module and the contents of each field in the various types.

Time required to complete this project averages 2.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Base SCM 2
DOS/VS System Control Statements SRL
DOS/VS Messages SRL

PART 1

Read the following:

This portion of the project is intended to help organize the student's thinking and assist in developing a logical approach to the errors in the associated project deck. The approach that will be used consists of:

1. Understanding the overall function of the job.

2. Breaking the job into units.

3. Breaking down the units into individual statements.

4. Attacking the statements in each unit, one unit at a time.

In essence, this approach is geared to reducing a difficult problem into smaller, more easily solved elements. This problem-solving exercise deals in particular with the linkage editor. However, the same techniques may be used in solving most user coded errors. Let's apply the 4 steps above to the project deck. Refer to LAB PROJECT 12 - Figure 1 in DOS/VS Base SCM 2 and read the following:

1. What is the overall function of the job? The job is a link and go. It links 5 modules into a 2-phase program.

2. What are the units of the job? There are 4 units into which the job can be broken down.

   a. Job control statements
   b. Linkage editor control statements
   c. Object module statements
   d. Data cards.

3. What are the individual statements within each unit? The job control statements are: JOB, OPTION, EXEC, ASSGN, /*, etc. The linkage editor control statements are : ACTION, INCLUDE, PHASE, etc. The object module statements are: ESD, TXT, RLD, and END. The data cards are 01P, 02P, 03P, etc.

4. How are the errors in the statements to be attacked? First, let's understand the types of user errors which can be enc countered in a job:

   a. Format errors - This type of error is caused by incorrect positioning, length or punctuation of operands.

   b. Functional errors - This type of error is caused by coding operands in a statement which are not consistent with the intended overall function of the job.

   c. Sequence errors - Sequence errors result from missing, duplicate or out-of-sequence statements.

   d. Content errors - Incorrect spellings and values for operands are statement content errors.

Now, based on your knowledge of job control and linkage editor control statements, fill-in the following pattern with what you believe to be the corrected statements that will cause the LINKEDT BUGS to execute properly.

```
// JOB LINKEDT BUGS

// _______________

   _______________

   _______________

   _______________

   object module deck

   object module deck

   _______________

   object module deck

   object module deck

/*

// EXEC

// _______________

// _______________

// _______________

   data cards

/*

/&
```

PART 2

Directions

Obtain the project deck. Correct the statements that you have already determined to be in error. Run the job. Error messages during link edit indicate unresolved errors which should already have been corrected. Correct those errors first. Then correct the errors in the object modules via reps. Use the same approach that was used for the JCL and link editor control statement errors. Also use the System Control Statement SRL, the assembly listings, the deck listing and the sample output to complete the project (Listings are in DOS/VS Base SCM 2).

LAB PROJECT 13 - VS MACROS AND S/370 INSTRUCTIONS

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and correct, using an assembler listing and system dumps, the cause of program checks and/or incorrect output resulting from the improper use of VS macros and S/370 instructions.
2. Interpret and relate the significance of the various fields in the output listing of a correctly assembled sample program that employs VS macros to the specified macro parameters in the source coding.

Time required to complete this project averages 2.5 hours.

Tools, Test Equipment and Documentation

1. Source listing and deck
2. DOS/VS Supervisor and I/O Macros
3. DOS/VS Messages SRL

Directions

1. The deck is a 'link and go' source deck for the job MCROASSM. This job assembles and executes (when debugged) various VS macros. There are several errors in the source deck which must be corrected before good output can be obtained. See Figure 1 and Figure 2 to determine the oepration to be performed by the program.

2. Obtain the deck and a listing of the cards for the project.

3. Debug and execute the program.

4. Complete the study questions.

Study Questions

1. If the return code for the RUNMODE had been X'04', what message would have been issued? ______________________________

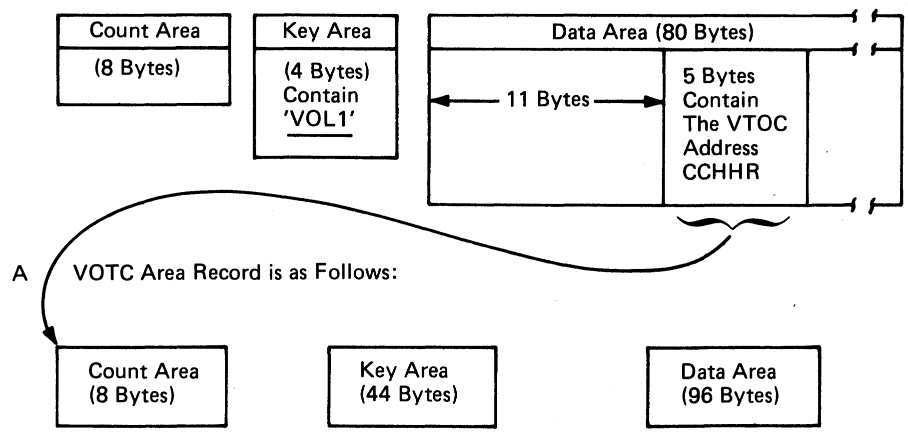
2. (True/False) The EXCP REAL macro requires that the addresses within the CCWs be real addresses.

3. (True/False) A return code of X'08' for a PFIX indicates that the PFIX may be reissued later if PFREE is issued in the meantime.

Answers

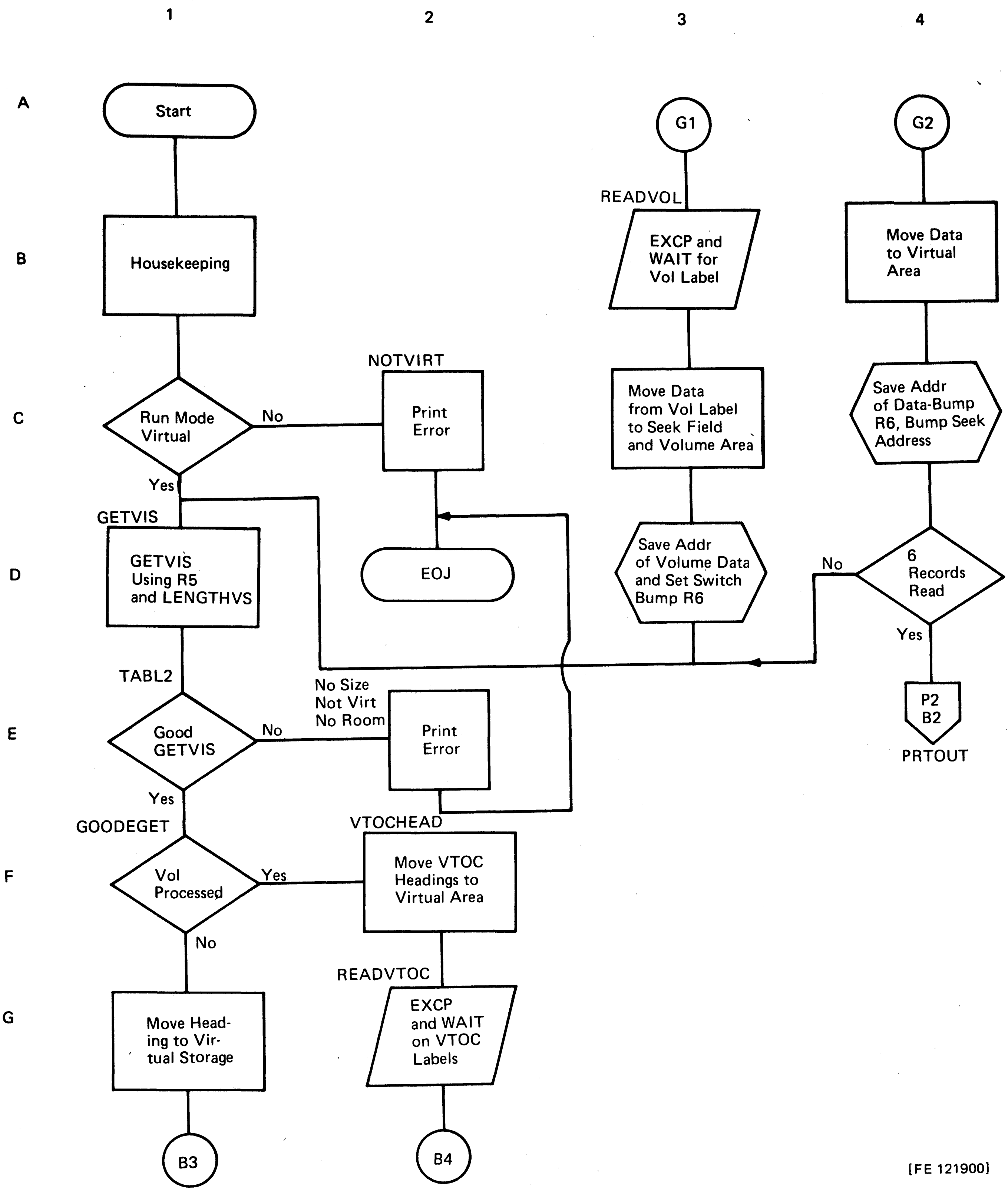
1. Program Running REAL - Cancelled
2. True
3. True

Volume Label - This record is on cylinder zero and its format is as follows:

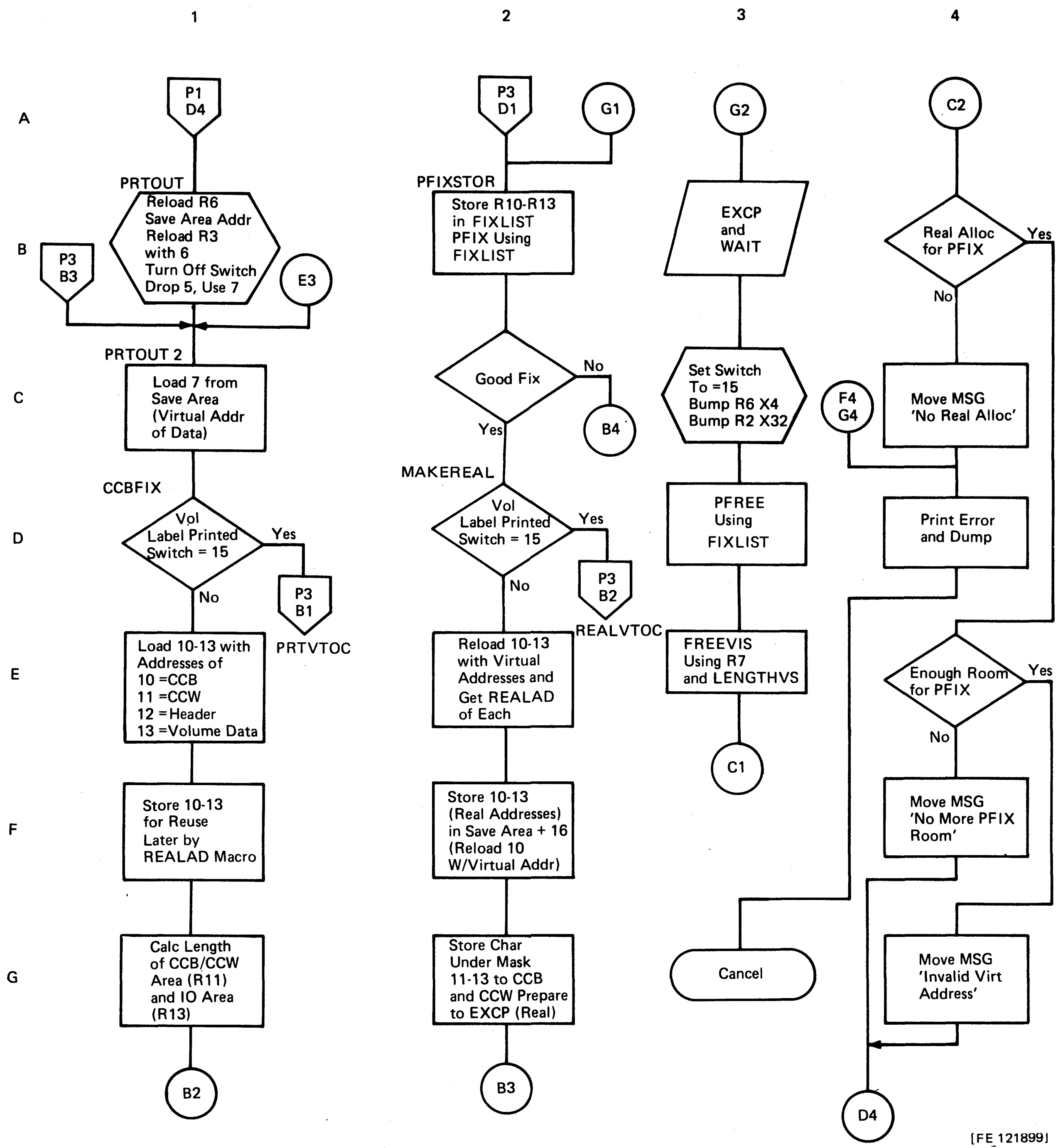


[FE 121551]

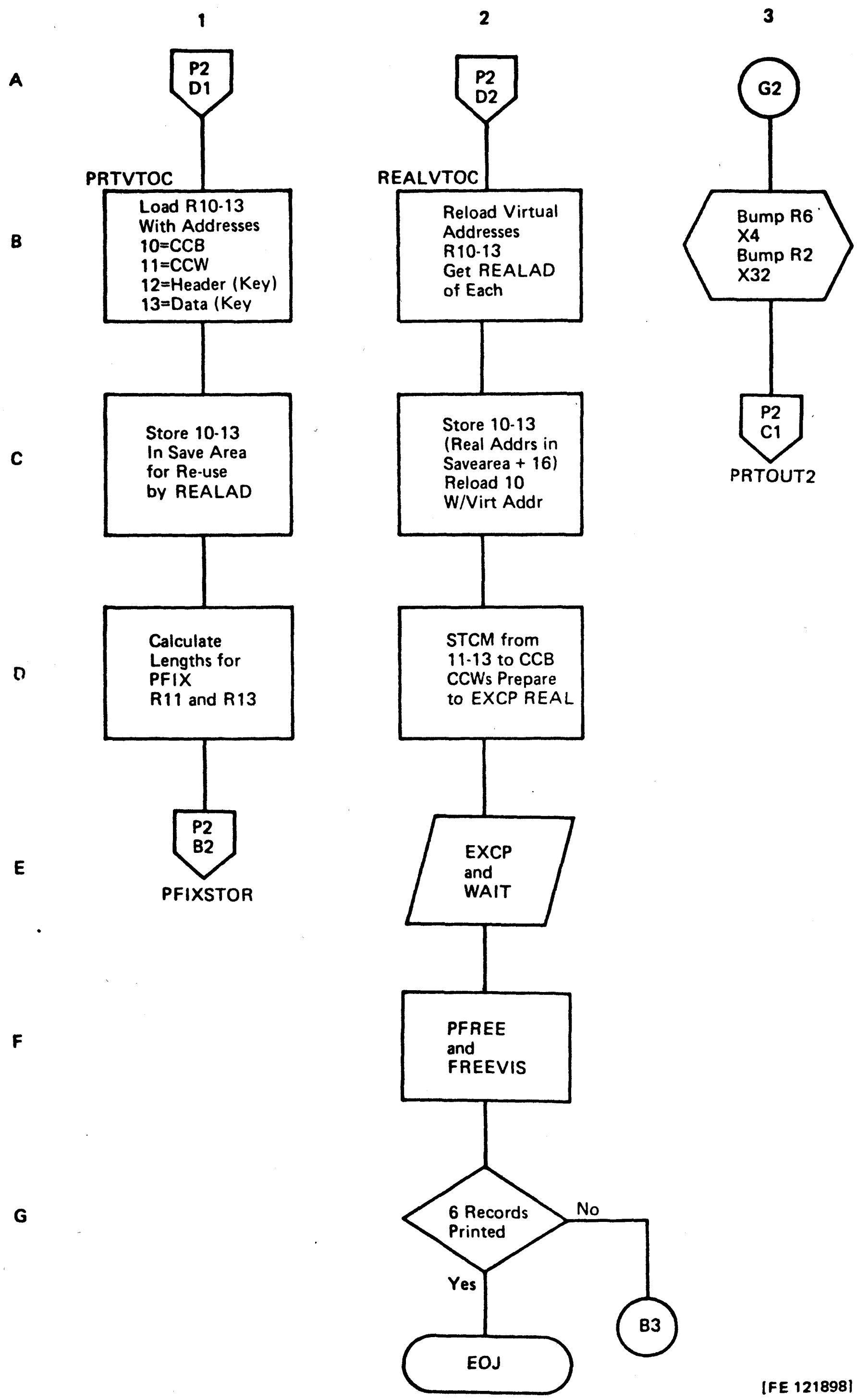
LAB PROJECT 13 - Figure 1



LAB PROJECT 13 - Figure 2 VSMACROS FLOWCHART (Part 1 of 3)



LAB PROJECT 13 - Figure 2 VSMACROS FLOWCHART (Part 2 of 3)



LAB PROJECT 13 - Figure 2 VSMACROS FLOWCHART (Part 3 of 3)

LAB PROJECT 14 - SDAID

SDAID, as well as other programs such as PDAID, are tools designed to assist the PSR in quickly isolating program failures during execution. As such, students with a sound understanding of SDAID operation and capabilities have enhanced problem determination ability. This project provides the students with an opportunity to exercise their skills in the various functions of SDAID.

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Use SDAID to locate a failing instruction.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment and Documentation

SADP SRL

Directions

During this project, you will execute a program named Rocky. Based on keywords given by the operator, Rocky injects different bugs into the supervisor and then turns control over to the supervisor to cause the bug to appear. The student's objective in this project is to use SDAID to find the failing instruction in supervisor, not to trace the execution of Rocky.

The project contains 2 bugs. Show the lab instructor the failing instruction but DO NOT DEBUG.

1. Execute 'ROCKY' from the console (// EXEC ROCKY).

2. Rocky begins to execute and issues a read to the console. Depress the End Key.

3. Enter the keyword reply to the message ROCK IS:

   a. 'END' key (Bug #1)
   b. ROCK CANDY (BUG #2)

LAB PROJECT 15 - OLTEP AND PDAID

OLTEP is run to exercise I/O devices. This is normally performed by a CE or a customer to verify a problem on a device which is suspected to be failing. This project is intended to expose the students to the operation of OLTEP since as PSRs they may be requested to assist in the implementation and operation of OLTEP. Students are also given an opportunity to exercise their skills in the fetch/trace function of PDAID, an effective tool to be used from this time on in pinpointing a failing phase within a multi-phases program.

Objective

Upon completion of this project, the student, using the available documentation should be able to:

1. Use the OLTEP SRL to initialize OLTEP.
2. Use PDAID Fetch/Trace Function to observe phases used to run the 1403G test of OLTEP.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment and Documentation

OLTEP SRL
DOS/VS System Serviceability Aids Logic

Directions

1. Initialize the Fetch/Trace function of PDAID.

2. Initialize the OLTEP to run the 1403G test.

3. Save the output as an aid for the OLTEP T/As.

4. Deactivate PDAID.

5. Run the 1403H test to restore the UCS buffer in the printer.

LAB PROJECT 16 - DUMPGEN

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Punch the control statements necessary to create a standalone dump program using DUMPGEN.
2. Identify the limitations of a dump produced when the created standalone deck is executed.

Time required to complete this project averages 0.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Serviceability Aids and Debugging Procedures (Section 2-A-3)

Directions

Use the documentation to create a standalone dump deck using DUMPGEN with the following options:

```
INTERRUPT=NO
DECKS=1
PPOOL=NO
FORMAT=YES
TAPEIPL=NO
```

Run the job to create your deck. Retain this deck for your use in future lab projects and T/As.

Study Questions

1. How many OPTN statements were required in your job stream? __________

2. If, at a later time, you wish to generate two additional decks, can you add a DECKS=2 operand to your FORMAT=YES option card? _______

3. The required ASSGN for DUMPGEN execution is ____________ .

4. (True/False) The dump will give a printout of all of real storage.

Answers

1. One (1) - FORMAT=YES (the others are defaults)
2. NO - Only one one operation and only operand per control statement is allowed.
3. SYSLST, X'CUU' (if this ASSGN is omitted, X'00E' is assumed)
4. False. Bytes X'00'-X'17', X'40'-X'4B', X'BA-BB', and 214 bytes of a non-critical area of supervisor are not dumped.

LAB PROJECT 17 - EREP FAMILIARIZATION

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Execute the EREP program from SYSLOG.
2. Interpret data obtained from SYSREC when the program is executed.

Time required to complete this project averages 0.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Operating Procedures
DOS/VS Serviceability Aids and Debugging Procedures

Directions

1. Use the SADP manual as a reference to execute the EREP program from SYSLOG with the parameter:

   OPTION EDIT

2. Use the obtained printout and the SADP to answer the study questions.

Study Questions

1. What options, if selected, clear the SYSREC file?

   ____

2. What is the command code and data address of the failing CCW in the first edited output of an I/O device? __________
3. What was the time and date of the failure? _______________
4. How many Start I/Os were issued to this device by this program before the failure occurred? _______________________
5. What type of error caused this SYSREC entry? ______________

Answers

1. CLEAR,HIST (DO NOT EXECUTE THESE OPTIONS IN LAB).

2. The answers to Questions 2-5 are found on the printout obtained from executing EREP. They may vary from system to system. For assistance or to verify your answers, check with a lab instructor.

LAB PROJECT 18 - LIBRARY DISPLAY PROGRAMS

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Use the library display program to display the directories for any library on SYSRES.
2. Use the library display programs to display any library or element of any library on SYSRES.
3. Interpret the output of the display programs.

Time required to complete this project averages 0.5 hours.

Tools, Test Equipment and Documentation

DOS/VS Serviceability Aids and Debugging Procedures
DOS/VS Operating Procedures

Directions

1. Punch the control cards necessary to display the core image directory. Use the control statement that will list the directory in collating sequence. Save the output to answer the study questions.

2. Punch the control cards necessary to display the phase IDCDB01. Save the output to answer the study questions.

Study Questions

1. The beginning disk address of the core image directory is cylinder ________ head ________ record ______ .

2. The number of tracks allocated for the procedure library directory is ______ tracks and the procedure library is allocated ______ cylinders.

3. (True/False) In a sorted DSERV of the core image directory $IPLRT2 displays after $$RAST00.

4. (True/False) A DSERV of the core image directory gives a status report of all of the directories and libraries on SYSRES.

5. Phase IDCDB01 is _______ bytes in length.

Answers

1. 0, 2, 1

2. 5, 14. These are values for our lab system and not a fixed value. The directory and library size for each library is set at system generation time by the customer.

3. True. The sequence is $$ phases, followed by $ phases followed by alphabetic sequences. SEE NOTE.

4. True. It indicates the space allocated, the remaining available space, the number of deleted blocks and other information of significance for potential condenses of libraries or planning for a new SYSGEN.

5. 1170 bytes. This may be found at the top of the CSERV printout or the DSERV by noting there are 2 text records in the phases and the last record has 146 bytes of text. A full record has 1024 bytes for the 1170 byte total.

NOTE: With DOS/VS Release 29 (and later) CORE IMAGE Directory entries are always maintained in collating sequence. It is therefore NOT necessary to use the DSPLYS statement when displaying the CORE IMAGE directory to obtain a sorted output (DSPLY is sufficient).

The DSPLYS statement is still required, however, to obtain a sorted output when displaying the RELOCATABLE, SOURCE, or PROCEDURE library directories.

LAB PROJECT 20 - SCP INSTALLATION RESEARCH

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Given a representative system, determine the PTFs that must be applied during an SCP installation.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

RETAIN/360 Terminal
Memo to User
Program Status Document

Directions

This lab project is the first in a series that deal with the installation of an SCP. Study Figures 1, 2, and 3 in this lab project closely for the target system the SCP will be installed on. If there are any questions about the target system, consult your instructor. The first operation you will do is to research the PTFs required for the target system. Ask your instructor to schedule you for time on the RETAIN/360 terminal to pull the latest PTF information. Your instructor will also give you the password.

Obtain the following publications from your lab instructor:

- Release 29 Memo to User
- Release 29 Program Status Document
- PTF Cover Letter
- EWS

Obtain the following publications and the RETAIN/360 printout to fill out the following form.

Discuss your answers with the lab instructor.

not available yet

Student's Name

____

____

Minimum EC LEVEL ________________________________

APAR #	PTF#	AVAILABILITY (Indicate if PTF is on PID Tape, PTF Tape 290 or EPC).

which PTF's should be listed.
list contain PTF's first.

Describe any Local Fixes to be applied below:

____

____

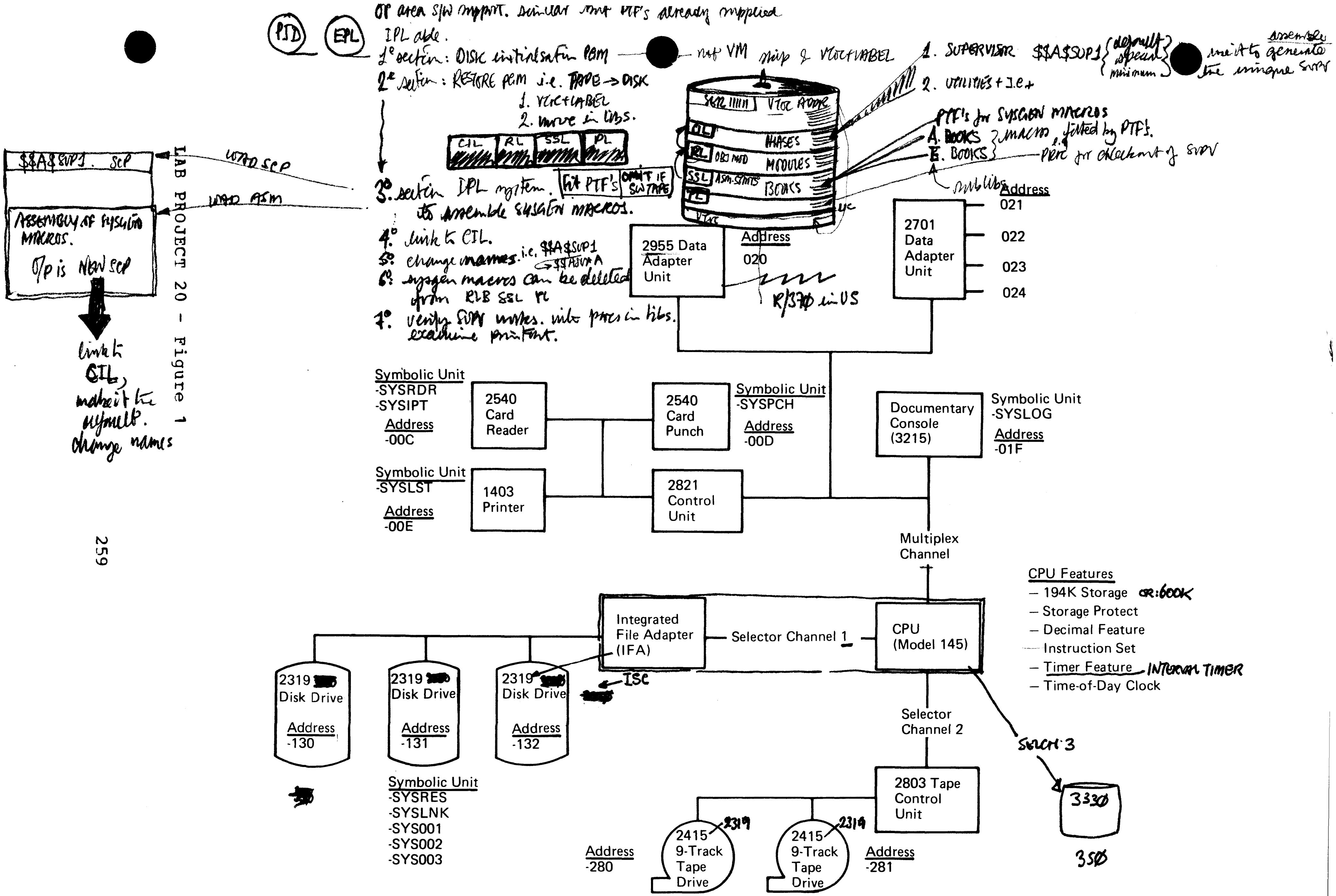
____

____

____

____

____

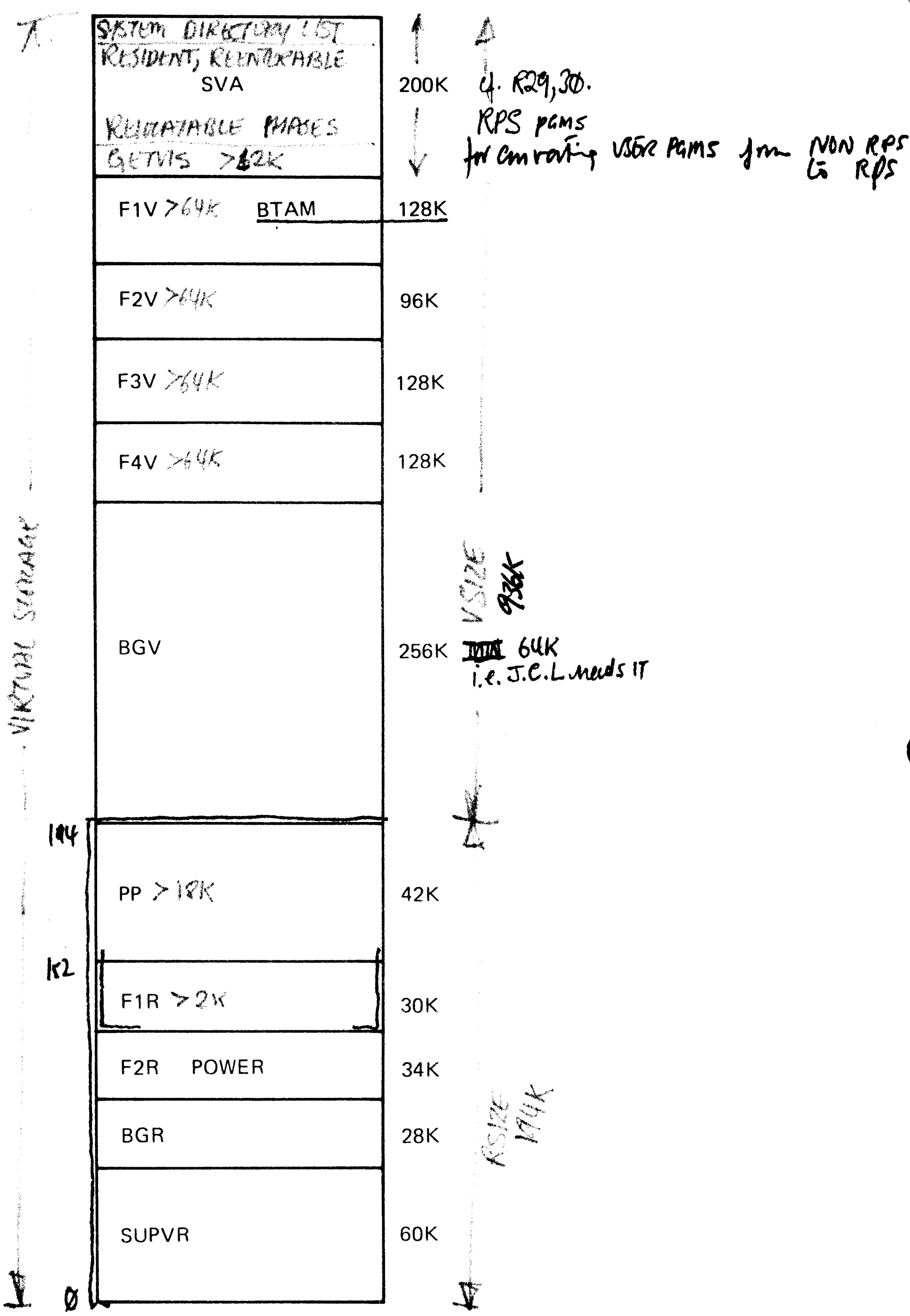


System/370 Model 145 Lab Configuration

[FE 121902]

Programs
- VSAM
- BTAM
- SORT/VS
- COBOL
- POWER
- OLTEP
- System Utilities
- EREP
- OLT's
- COBOL LCP

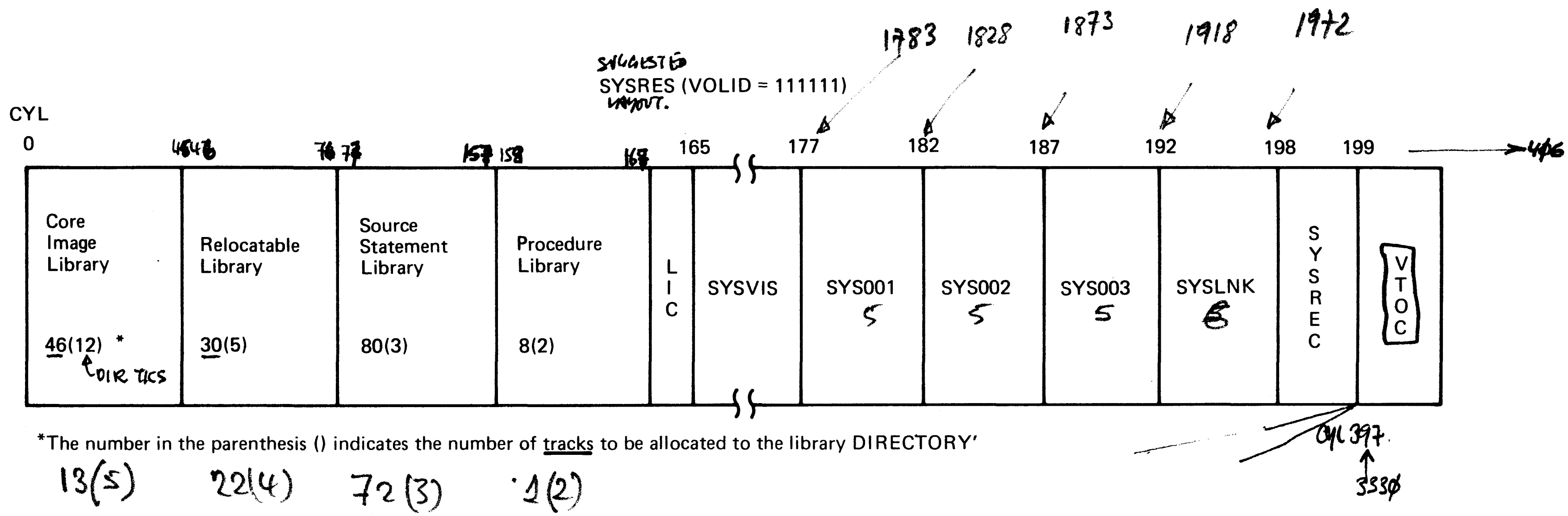
ECIREAL=YES



[FE 121903]

LAB PROJECT 20 - Figure 2

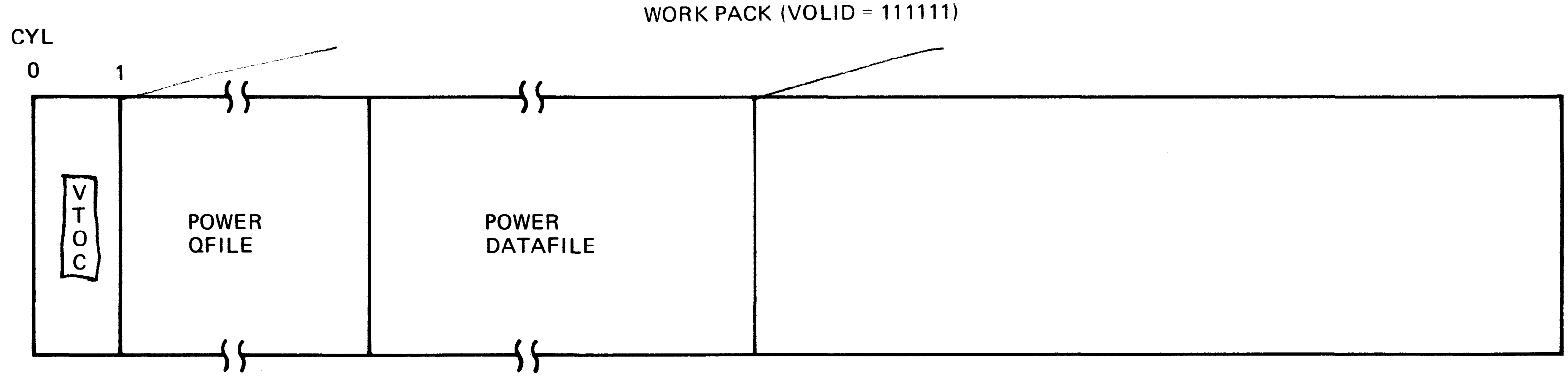
SUGGESTED
SYSRES (VOLID = 111111)
LAYOUT.



*The number in the parenthesis () indicates the number of tracks to be allocated to the library DIRECTORY'

13(5) 22(4) 72(3) 1(2)

WORK PACK (VOLID = 111111)



[FE 121907]

LAB PROJECT 21 - SCP INSTALLATION PID SYSTEM RESTORE

Objective

Upon completion of this project the student, using the available documentation, should be able to:

1. Restore a PID system from tape to disk.
2. IPL a PID system using supplied control cards and correct all errors.
3. Catalog a set of standard labels on a PID system.

Time required to complete this project averages 2.5 hours.

Tools, Test Equipment and Documentation

PID Tape
Memo to User
Program Status Document N/A
PTF Cover Letter N/A
System configuration figure from lab project 20

Directions

Obtain copies of the above materials from your lab instructor. Punch out the procedure "SCPDISTR". This deck represents the customer prepared SCP cards to restore the PID tape to disk corresponding to steps 1 through 4 in the SYSTEM GENERATION SRL. There are several errors in the deck. You should verify the control cards to ensure they are punched correctly.

When you have verified the control cards, contact you lab instructor and he will schedule you for machine time. Ensure that you are familiar with all aspects of this procedure before continuing.

NOTE: The PID system on disk should be the same size as shown in lab project 20. The individual size of the libraries will not correspond to those shown on the figure.

Retain all printouts and control cards from this lab project as well as from all subsequent SCP lab projects. The control cards will be used again during LP27.

LAB PROJECT 22 - SCP LINK and DELETE

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Operate the PID system to obtain a DSERV.

2. Operate the PID system to punch and display the following books.

   - Z.LINKEDIT
   - Z.DELETECL
   - Z.DELETERL
   - Z.DELETESL
   - Z.FASTCOPY

3. Prepare the Z books provided on the PID system for execution.

Time required to complete this project averages 1.5 hours.

Tools, Test Equipment and Documentation

PID System
System Generation SRL

Directions

Display and punch from the procedure library the customer prepared cards that can be used to display and punch the Z books that will be used in lab project 27 to build the system residence pack. This procedure is cataloged under the name 'SCPZ-BOOK'.

1. Configure the Z.FASTCOPY deck to restore from disk to tape. You will not use this utility to back up your SCP system residence pack because 3330/3340's are not being used. IPL the deck to be sure it has been configured correctly. The utility run will terminate with the '8F14D INPUT DISK TYPE UNSUPPORTED' because a 2314 is being used as input.

2. To create backup during the SCP installation projects the OS DUMP/RESTORE utility will be used. Contact your instructor for the deck and operating instructions when you need a back-up of your SYSRES pack.

3. Select the link and catalog books you will use for the SCP installation.

LAB PROJECT 23 - PTF SELECTION N/A

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Select and deblock PTFs from a DOS/VS PTF tape.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS PTF Tape and Cover Letter
Work tape for the selected PTFs

Directions

Obtain a PTF work tape from your lab instructor.
Using the BLOCK/DEBLOCK Utility, select (SEL) the PTFs that you require (determined during LAB PROJECT 20).

DO NOT LOSE OR DESTROY THIS TAPE. Ensure that it is labeled with your name and its contents. DO NOT back up at this time.

These selected PTFs will be applied to your DOS/VS system prior to the actual SCP Generation during LAB PROJECT 27.

LAB PROJECT 24 - SCP IVP ASSEMBLY

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Assemble the Installation Verification Procedures using the IVPGEN macro with the VERIF=YES option.

2. Delete any unused IVP macros from the source library.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

Back up tape of your SCP.

Directions

From the DOS/VS lab pack (not your SYSRES pack) punch out the procedure 'SCPIVP'. This is a prepared deck for IVP generation and it contains some errors. The IVP will use a disk work space of one track on 130 for verification of the disk utilities (input and output) and the volume serial number is 111111.

After the assembly is error free, follow the comments in the assembly listing to obtain a printout and delete deck for the unused IVP procedures.

Ensure that you delete the unused IVP procedures from your SYSRES pack and not the lab packs.

Save the 'delete' deck for use during LAB PROJECT 27.

Prepare the source deck for assembling with VERIFY=NO and include the parameter necessary to generate the decks which will delete the used IVP books during LAB PROJECT 28.

LAB PROJECT 25 - SCP SUPERVISOR GENERATION

Objective

Upon completion of this topic, the student, using the available documentation, should be able to:

1. Given a supervisor generation source deck, correct all errors.

Time required to complete this project averages 3.0 hours.

Tools, Test Equipment and Documentation

None listed.

Directions

Punch out the user supplied supervisor generation deck ('SCPSUPVR in procedure library) and locate all errors. You may do your preliminary assemblies of this deck on either your system or the lab system. When you obtain your first error free listing, contact your lab instructor. Do not assemble the supervisor with the PRINT GEN option until you have contacted your lab instructor. Ensure that the supervisor parameters selected support the environment the customer desires.

Retain the corrected source and JCL (job stream) to catalog the supervisor. The supervisor will be cataloged during LAB PROJECT 27.

LAB PROJECT 26 - SCP POWER GENERATION

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Given a POWER generation source deck correct all errors.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

None listed.

Directions

Punch out the user supplied POWER source deck ('SCPPOWER' in the procedure library) and locate all errors. You may do your preliminary assemble on either the lab system or your own. The customer has specified that POWER cannot be larger than 34K so compute the approximate size of POWER before assembling.

Do not assemble POWER with the PRINT GEN option until you have contacted your lab instructor.

Insert into the source deck, the necessary statements to catalog this program into the core image library as a permanent phase entry. The deck will actually be run during LAB PROJECT 27.

LAB PROJECT 27 - SCP SYSGEN

Objective

Upon completion of this project, the student, using the available documentation should be able to:

1. Linkedit and delete IBM components to create a SCP to customer specifications.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment and Documentation

Supervisor source deck and JCL (job stream) from LAB PROJECT 25.
POWER source deck and JCL from LAB PROJECT 26.
LINKEDIT and DELETE Z books from LAB PROJECT 22.
OLTs Tape (will be supplied by lab instructor).
Selected and Deblocked PTF Tape from LAB PROJECT 23.
PID Tape, Initialize Disk, Dump Restore, and Standard Label control cards from LP21.
IVP Delete Deck from LP24.

Directions

Using your system, create a basic SCP from the items obtained or created in the previous SCP lab projects.

Retain ALL printouts from this lab project and make a copy of your system on tape when you have finished deleting and link-editing.

PERFORM THE FOLLOWING:

1. Run Initialize Disk, Dump Restore, and Standard Label control cards from LP21.
2. Apply PTF tape and decks to the PID System
3. Assemble the Supervisor - obtain a deck but NO LISTING.
4. Perform links and deletes obtained from 'Z' books (include supervisor object deck in LNKEDT job stream).
5. Assemble and catalog POWER (use OPTION NODECK and NOLIST).
6. Execute the IVP delete deck to delete UNUSED IVPs.
7. Catalog the OLTs (phases) in the core image library.

LAB PROJECT 28 - SCP IVP RUN

Objective

Upon completion of this project, the student, using the available documentation should be able to:

1. Verify the installation of an SCP using Installation Verification procedures.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

Directions

Use the SCP source deck from LAB PROJECT 24 to create your Stage II IVP deck, as well as the delete decks for the 'used' IVP books. Run the Stage II deck to verify the installation of the SCP (run only the first 2 or 3 procedures and then terminate when you feel confident that you understand the IVP operation).

Delete the 'unused' IVP books.

LAB PROJECT 29 - SYSRES REALLOCATION

Objective

1. Reallocate the system residence pack.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment and Documentation

Directions

Create the control cards needed to allocate the SYSRES pack libraries to the specifications in lab project 20. Obtain a DSERV of the reallocated pack. This is a lengthy operation so contact the lab instructor before starting.

LAB PROJECT 30 - LIOCS MACROS FOR UNIT RECORD FILES

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Identify and correct source coding and logic errors in a program that employs LIOCS UNIT RECORD macros.

2. Include a logic module from the relocatable library in a source program at linkage edit time via the use of an INCLUDE statement.

3. Code the source statements required to separately assemble and catalog a logic module to the relocatable library.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment, and Documentation

DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volume 1
DOS/VS System Control Statements
DOS/VS Base SCM 2

Directions to the Student

Obtain the LP030 source deck from the lab instructor or from the PROC library (use // EXEC PSERV and DSPCH LP030). This program, when correctly assembled, linked, and executed, should read data cards and list them on the printer.

An assembly listing of this program (which contains coding and logic errors) and an example of expected output are provided for your reference in DOS/VS SCM 2.

Execute the job stream and correct all errors as dictated by resultant error messages.

DO NOT add source statements to the job stream that would generate the required CDMOD and PRMOD logic modules into the program (assume that the CDMOD and PRMOD macros are NOT in the source statement library and that you would not be able to do this). INSTEAD determine the names of the required CDMOD and PRMOD logic modules (either from the generated DTF coding or by developing a superset name); then cause these modules (contained in the relocatable library) to be included in the LP030 program at linkage time via the use of the INCLUDE linkage editor statement.

NOTE: NO SEPARATE ASSEMBLIES OF LOGIC MODULES ARE REQUIRED TO COMPLETE THIS PROJECT.

<u>Study Questions (Do not answer until LP030 has been completed)</u>

1. (True/False) A logic module contained in the relocatable library, that has the exact some name as the logic module name generated in a DTF expansion, will be automatically included om a program at linkage editor time even if the logic module macro instruction (XXMOD) was not included in the source coding.

2. Why do you think the ACTION NOAUTO statement was included in the LP030 job stream?

____

____

____

3. If the specific logic module required by a DTF is not in the relocatable library, and can not be generated by source coding because the required macro is not in the source statement library, it may be possible to include a __________ module from the relo library that will support the required functions of the DTF.

4. What was the name of the logic module that you include in the LP030 program to satisfy the required functions of the DTFCD? ________________

Before answering Questions 5 and 6, refer to DOS/VS Supervisor and I/O Macros and 'Program, DTF, and Logic Module Assembled Separately'.

5. If a specific logic module is not in the relocatable library, but the required macro that can generate that module is in the source statement library, you can separately assemble only the desired module and then catalog it to the relocatable library.

   What is the additional parameter that must be specified in the source macro instruction that will allow you to do this?

   ____

   Which assembler instruction must not be used in the source code for a separate assembly? _______________

6. The following job stream will separately assemble a CDMOD logic module and punch an output deck that can be used to catalog the module to the relocatable library. Supply the parameters for the CDMOD macro instruction that will generate module IJCFCIWO.

```
// EXEC ASSEMBLY
   CDMOD  __________' __________' .....
   END
/*
/&
```

Study Questions Answers

1. True (this is an automatic system function and can only be overridden by the specification of NOAUTO in an ACTION or PHASE statement).

2. The NOAUTO statement was intentionally included to prevent the required PRMOD logic module from being AUTOLINKED into the program from the relocatable library at linkage editor time. This forced you to call module IJDFCPZW into the program via the use of the INCLUDE statement.

3. SUPERSET

4. IJCFCIW0 (this module is a superset of IJCFZIW0).

5. SEPASMB=YES; START

6. CONTROL=YES, WORKA=YES, SEPASMB=YES (the defaults for DEVICE=; RECFORM=; and TYPEFLE= ARE TAKEN IF THEY ARE NOT SPECIFIED).

LAB PROJECT 31 - TAPE LABELS

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Identify and correct job control statement errors in a job stream which linkedits and executes a tape file processing program.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment, and Documentation

DOS/VS System Control Statements
DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volumes 1 and 2
DOS/VS Tape Labels

Directions to the Student

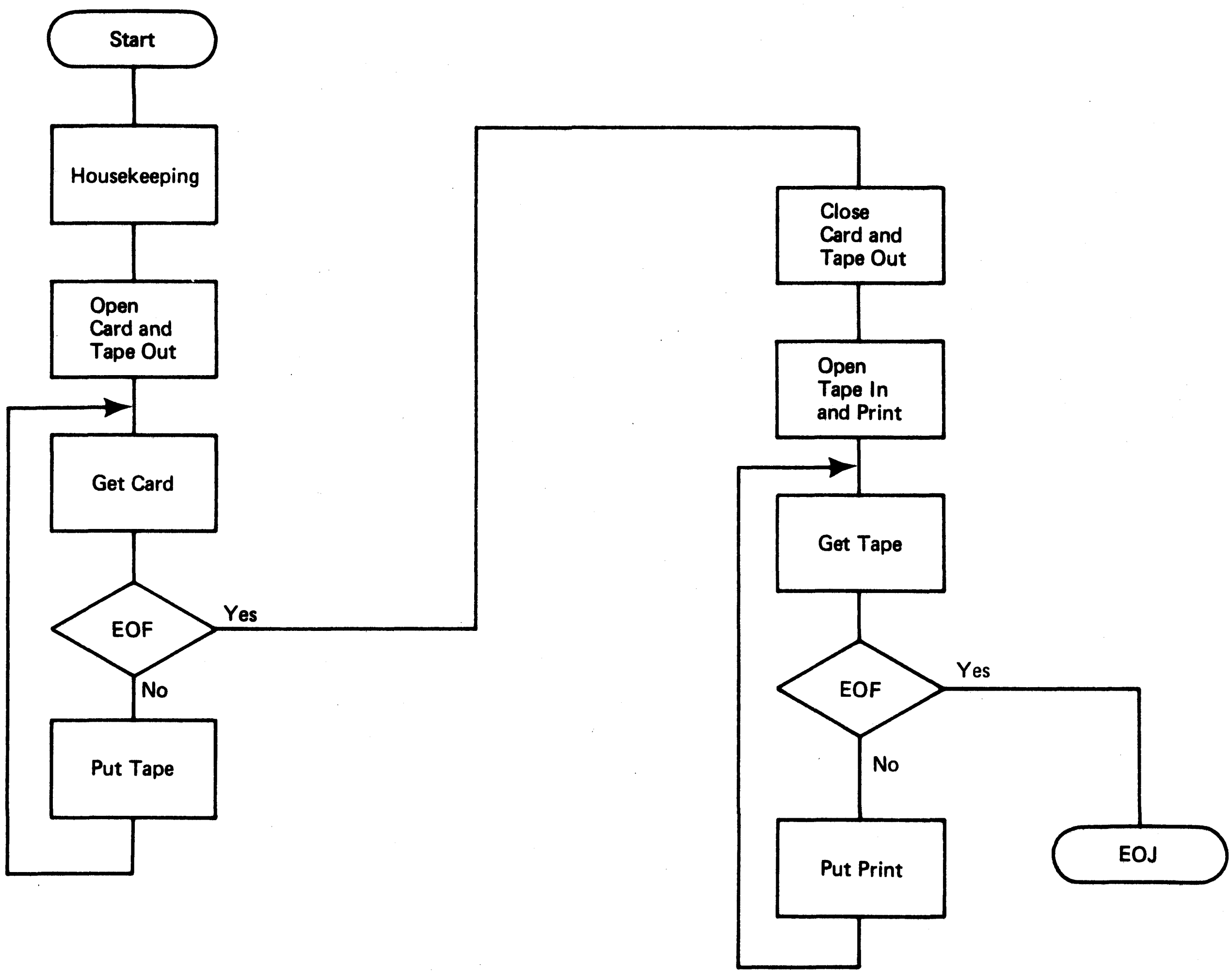
Obtain the LP031 job stream deck from the lab instructor or from the PROC library (use // EXEC PSERV and DSPCH LP031). This job stream, when correctly executed, will linkedit and execute a program that reads cards to tape, and then lists them on the line printer from tape.

The program (TAPE) has been previously assembled and cataloged in the relocatable library. It is linkedited into the core image library by the LP031 job stream via an INCLUDE card (there are no errors in TAPE).

The job stream contains errors which will prevent the program from executing correctly.

Execute the job stream and correct all errors as dictated by resultant error messages.

A program flowchart and an example of expected output are provided immediately following this lab project write-up.



Lab Project 31 - Program Flowchart

```
// JOB LP031 TAPE LABELS
// OPTION LINK
// VOL SYS004,TAPEOUT
// TPLAB 'SAMPLE TAPE  OUT 1212120001000100010l 70150 70150'           X
                '0000000   TAPE LABEL'
// TLBL TAPEIN,'SAMPLE TAPE OUT',70/150,121212,2,1,1
   INCLUDE TAPE
// EXEC LNKEDT
// ASSGN SYS004,X'280'
// EXEC
200000006NUT                          016987        160004683
200000014BOLT 1-IN                    734681        170002011
200000015SCREW                        216942        340006138
200000019WASHER                       369876        660006700
200000022CLIP                         369876        900010843
200000024BOLT 1/4-IN                  734681        7C0060000
200000025HAMMER                       218990        012000150
200000029PLIERS                       647341        036000411
200000030FORK                         798473        020000266
200000036CUP                          379871        016000183
200000037SHOVEL                       643791        009000341
200000039BRACE                        874384        014000363
200000041WASHER                       279696        400016666
200000043L 1/2-IN                     848437        080011111
200000046T 1/2-IN                     428091        040012121
200000051ELBOW 1/2-IN                 981111        090001906
200000054TUBE  1/2-IN                 116933        600008132
200000056STOPPER                      126480        010000406
200000057GOER                         135790        010000381
200000058PLUG                         663398        080001684
200000060GLUE-WOOD 1 QT               987771        008000113



EOJ LP031
```

Lab Project 31 - Job Stream and Expected Output

LAB PROJECT 32 - ESERV FAMILIARIZATION

Objectives

Upon completion of this project, the student using the available documentation, should be able to:

1. Execute the ESERV program (// EXEC ESERV) to cause the de-editing and listing of any given macro definition contained in the edited sublibrary (E.sublibrary) of the source statement library.

2. Create and execute a job stream (JCL) that will alter the contents of any given E. macro in the source statement library via ADD, REP, or DEL control statements of the ESERV program.

3. Correctly use the COL, VER, and END control statements of the ESERV program when altering or updating an E. macro/

4. State the basic difference between macro definitions that are contained in the MACRO and COPY sublibraries of the DOS/VS source statement library.

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment, and Documentation

Guide To The DOS/VS Assembler (GC33-4024)
OS/VS and DOS/VS Assembler Language (GC33-4010)

Information for the Student

This project is intended to familiarize you with the procedures that you will be required to know and use when implementing changes to an E. macro contained in the source statement library.

When you have completed this project, you will be expected to know only the mechanics of how a statement (or statements) can be added to, deleted from, or altered in a E. macro.

This project does not attempt to teach an understanding of the 'Conditional Assembly Language' (the coding actually contained in a macro definition), nor does it teach the structure and internals of a macro definition. Information and training on these subjects is provided in a postrequisite to this DOS/VS Base course (MACRO DEFINITION Student Self/Study Course #40016).

Information relative to completing this project can be found in the 'Guide To The DOS/VS Assembler' under 'DE-EDITING AND UPDATING MACROS: ESERV PROGRAM'.

In this project you will be working with a sample E. macro that has been cataloged in the source statement E. sublibrary (MARCO sublibrary) under the name E.CCB32. This cataloged version of E.CCB32 contains statements that you must remove, alter, or add to, prior to executing a simple assembly that utilizes the E.CCB32 macro definition.

Edited and de-edited listings of the correct version of E.CCB32 are provided for your reference immediately following the answers to the study questions for this lab project.

The source statements for the simple assembly that utilizes E.CCB32 are contained in the COPY sublibrary (A. sublibrary) of the source statement library under the name A.ASM32. You will call these statements into the assembly using the assembler COPY instruction.

Upon completion of this project, you should have obtained an error free listing of the 'link and go' assembly, and a message printed on the line printer that indicates your successful completion of the project.

Directions to the Student

1. Execute the procedure LP032 (// EXEC PROC=LP032) prior to performing any of the following directions (this procedure initializes E.CCB32 in the source statement library and condenses this library so as to prevent an exhaustion of library space as a result of the many catalogs of E.CCB32 by lab groups).

2. Create and execute the job stream that will de-edit E.CCB32 and provide you with a listing of the de-edited macro (refer to 'Guide to the DOS/VS Assembler.'

3. Compare all statements in the de-edited listing of E.CC32 (obtained in step 2) with those in the correct de-edited listing of this macro (this listing follows the answers to the study questions for this project).

   Any statements in your de-edit listing of E.CCB32 that are not exactly the same (or are additional or missing) as those in the correct listing must be corrected, deleted, or added to E.CCB32 by you via the update function of ESERV (refer to 'Guide to the DOS/VS Assembler').

4. Create and execute a job stream to de-edit, update, reassemble, and catalog E.CCB32 with the corrections, additions, and deletions that you have determined to be necessary in step 3.

   NOTE: Use the Verify (VER) function of ESERV prior to any REP or DEL that you may include in your update job stream.

5. Create and execute a 'link and go' job stream that will call, assemble and execute the source statements contained in the COPY sublibrary macro A.ASM32 (do not allow this assembly to be cataloged - use // OPTION LINK, NODECK as the only options in your job stream). If you wish to see the source statements contained in A.ASM32, execute SSERV (//EXEC SSERV) and DSPLY ASM32.

6. Show your output assembly listing to your instructor and answer the study questions for this project.

Study Questions

1. Which of the following ESERV control statements causes the punching of END and /* cards as the last 2 cards in the output deck from an ESERV operation that will be used as input to the assembler?

   _____ PUNCH
   _____ GENCATALS
   _____ END
   _____ GENEND

2. Write the ESERV control statement that should be used in an 'update' job stream to specify that the sequence numbers in the statements of a macro definition start in column 73 and extend to column 80. CONTROL STATEMENT = ____________

3. If the sequence numbers in the statements of a macro definition are such that at some point they start over again with a value of zero (or some value less than that contained in the previous statement), what parameter in a VER, ADD, REP, or DEL control statement must be specified to allow identification (and accessing) of a second (or third, or fourth, or fifth, etc) macro statement that has the same identical sequence number? PARAMETER = _____________

4. (True/False) The header statement in a de-edited macro ('MACRO' statement) will always have a sequence number of zero (00000000).

5. (True/False) BOOKS in the COPY sublibrary (A.sublibrary) of the source statement library can also be updated by the ESERV program.

Answers

1. GENEND (This statement is particularly useful when the output device is a tape unit instead of a card punch because it provides for the writing of the END and /* records on the tape. When output is to cards, the END and /* cards could be manually punched and placed at the end of the output deck if GENEND had not been specified.)

2. CONTROL STATEMENT=) COL 73,8

3. PARAMETER= seqno+REL (A REL factor must be attached to the sequence number of the statement that has the first highest sequence number in the macro expansion. This REL factor acts as a displacement from the specified sequence number to the desired statement that is to be acted on by the VER, ADD, REP, or DEL. The REL factor can be calculated by using the statement numbers on the left side of the listing).

4. True (Refer to 'Differences Between De-edited Macro Definitions and Source Macro Definitions'.)

5. False (BOOKS can only be updated by the UPDATE function of the MAINT program. Refer to 'How to Maintain the Copy Library.')

```
          BKEND   E.CCB32

B V 8   E<<.CB      H  A  U 2 C " 2 B :QQ F    BHH CMCNOO= GD;  &5A,?*
';R¬$?<QOOP?O <$Q*? ?<<.? ?EGDE *< *;R? ?$+N2?BH2 II GA   BH*/ I    B
NH< COMAQXK   DDDDD:  DTF & F OPQ)+F& >ORQ**K.N+?+$$Q$? ?P O+?|K+N(?.
JN PMOIIA     BH*-AA    BH< D6&FWK FFDDDDD:*YAB    BH< D7&A&C>MC*S*XK
. BFDDDDD:Q*AC    BHH  < D7&D&C>=*%AD    BHH  MC   VH  MCBDCT*K A9DDD
EDD:*2AE     BHH  &B&A>MA VH  &B&A>MAIT*K BFDDDDD:*2AF    BHH  &C&A>MA
$ VH  &C&A>MAIT*K BFDDDDD:MNAG     BH    &A@MPAH     BH  AH  /@;RAI    B
(HK B9DDDDD#*NBA     BHH  M $($KR)R<JN*)NQ&NPM$+**N.$N.   $+<<N.¬K*< )
R&C  AQ&AO&C>ZK B9DDDDD:MRBC     BH  A  A&AO@*¬BD     BH  A&(%K A9DDDDD
C: IDTF & F OPQ)+?&C>O|K$*)?QR+$ P(?KP¬ NK(? ?OO|||OO?&+P+$ )+(OIIBE
H    BHMNBF     BH    &"@MNBG     BH  A&"@QOBI    BHH AMA =*/C     BH< E
JOMAQZK C-DDDDD:QPCA     BHH A< E7=;RCC     BHK C¬DDDDD# "DTF & F OPQ)+
2V& >ORQ**K.N+?+$$Q$?KP?*+<QP(?QR+$ P(OIICD     BHQOCF     BHH BMA =*/C
$G     BH< FOMAQZK D9DDDDD:*YCH     BH< F6&DU< F6&GS*K D1DDDDD:*9CI
>BH< F7&A&B>MC/OOX< F7< F6&A>MBOOX*K D1DDDDD:Q/DA     BHH B< F7&C< F6&
FCP>=;RDB     BHK D9DDDDD# HDTF & F OPQ)+>&C>O)JK$(?QR+$ P(?KP¬ NK(? ?
;/OO     OO? **;O+(OIIDC     BHO$DE     BHD  < GOMAQX'*)DF     BHD  )K E+
HDDDDD: )D<M & C (*C& (BL2IIDG     BH 7D.L JFA< C7 C (<G&/NBO OBP2|T$+
Q*K(; N?<Q;P)II      BH  D.L M C (<&&MD/NBOH B?MAO? B*2NV<OOO;PK< )KQ
MP*?.S)+*II   A  BH 3D.L & C (<G&/NBO OBP2JT<*-?*) );*?.S)+*II A    B
CH "D.L M C (<J&MD NAY   ;?MA_? B*2LYNQ&K< N?;PK)?<N **II B    BH 9D.
7L M C (<J&MD NAY  A;?MA_? B 2(WNQ&K< N?;PK)II C    BH ;D.L & C (<G&/
JNAJ OIIAD     BH 7D.L M C (<&&MD NCYH A?MA_? B*2<T<<-? (($+**IIBA
DBH 'D.L M C (<O&MD.O  D  -?MF     O? B-2<X*) );*?.S)+IIBH     BH 2D.L
? & C (<G& NCY _BP2&T<*-?<<-? (($+**IIBI    BH*)C     BHD  )K GFDDDDD
C: 5D&  M D <<- &MBD>< G7?MC> >?H C?< G7? BU2IICA     BH+|FA    BH S #
   < AF*S*P(/< BF*S*+<)< CD<<.P< DF*S*///< EF<<- ((< FGQR)KQP*< GE*+
*P*+   E<N **  ACP;OD  C*P*  #   H  D;PK)H AE<<- (H BEQR)*-H CA)F*S"
B O @      EP OQM A9DN)$* BFC+$$ B9C|P( C-E<<(+$ C¬E<MQR) D1EQR)+$ D9
ME *O.N E+B$B GFB$A . @      "

          BKEND
```

Lab Project 32 - Correct Version of E.CCB32 <u>Before</u>
De-editing by ESERV (Part 1 of 1)

```
          CATALS A.CCB32
          MACRO                                                            00000000
&CCBN CCB32 &SYSXXX,&CCWADD,&OPTIONS,&SENSE
 LCLA &CLASS,&NUM
 LCLB &SNS
 LCLC &UNIT,&CCWAD,&OPTSW,&T
&T        SETC  'L'''                                                      06000028
* SUPVR COMMN MACROS - CCB - 5745-SC-SUP - REL. 28.0                       07100028
          AIF   (T'&CCBN NE 'O').NAMOK                                     09000028
          MNOTE 0,'POSSIBLE ERROR - NAME FIELD BLANK'                      10000028
.NAMOK    ANOP
          AIF   (K'&SYSXXX NE 6).ERR                                       11000028
          AIF   ('&SYSXXX'(1,3) NE 'SYS').ERR                              12000028
&UNIT     SETC  '&SYSXXX'(4,3)                                             13000028
          AIF   ('&UNIT' LT '000' OR '&UNIT' GT '243').LTRS                14000028
          AIF   ('&UNIT'(2,1) LT '0' OR '&UNIT'(2,1) GT '9').ERR           15000028
          AIF   ('&UNIT'(3,1) LT '0' OR '&UNIT'(3,1) GT '9').ERR           16000028
&CLASS    SETA  1                                                          17000028
&NUM      SETA  &UNIT                                                      18000028
          AGO   .FND                                                       19000028
.LTRS     ANOP
          AIF   ('&UNIT' EQ 'RDRIPTPCHLSTLOGLNKRESSLBRLBOOORECCLBVISCAT'X21000028
                (3*&NUM+1,3)).FND
&NUM      SETA  &NUM+1                                                     23000028
          AIF   (&NUM LE 13).LTRS                                          24000028
.ERR      ANOP
          MNOTE 3,'FIRST OPERAND INVALID - ''FFFF'' GENERATED'             25000028
&CLASS    SETA  255                                                        26000028
&NUM      SETA  255                                                        27000028
.FND      ANOP
&CCWAD    SETC  '0'                                                        29000028
          AIF   (T'&CCWADD EQ 'O').CCDER                                   30000028
&CCWAD    SETC  '&CCWADD'                                                  31000028
          AGO   .CKOPT                                                     33000028
.CCDER    ANOP
          MNOTE 0,'POSSIBLE ERROR IN SECOND OPERAND'                       34000028
.CKOPT    ANOP
&OPTSW    SETC  '0'                                                        36000028
          AIF   (T'&OPTIONS EQ 'O').ASMBL                                  37000028
          AIF   (K'&OPTIONS LT 4 OR K'&OPTIONS GT 7).OPTER                 38000028
          AIF   ('&OPTIONS'(1,2) NE 'X''' OR '&OPTIONS'(K'&OPTIONS,1) NEX39000028
                '''').OPTER
&OPTSW    SETC  '&OPTIONS'(3,K'&OPTIONS-3)                                 41000028
          AGO   .ASMBL                                                     42000028
.OPTER    ANOP
          MNOTE 3,'THIRD OPERAND INVALID - X''0000'' ASSUMED'              43000028
.ASMBL    ANOP
&SNS      SETB  (T'&SENSE NE 'O')                                          45000028
          AIF   (NOT &SNS).R2                                              46000028
          DS    0D .                                                       47000028
.R2       ANOP
&CCBN     DC    XL2'0' .            RESIDUAL COUNT                         00000028
          DC    XL2'&OPTSW' .         COMMUNICATIONS BYTES                 00010028
```

Lab Project 32 - Correct Version of E.CCB32 __After__ De-editing by ESERV (Part 1 of 2)

```
            DC     XL2'0' .            CSW STATUS BYTES                     01000028
            DC     AL1(&CLASS) .            LOGICAL UNIT CLASS              02000028
            DC     AL1(&NUM) .            LOGICAL UNIT                      03000028
            DC     XL1'0'                                                   14000028
            DC     AL3(&CCWAD) .       CCW ADDRESS                          21000028
            DC     B'00&SNS.00000' .      STATUS BYTE                       28000028
            DC     AL3(0) .            CSW CCW ADDRESS                      29000028
            AIF    (NOT &SNS).R1                                            30000028
            CCW    4,&SENSE,0,&T&SENSE .                                    31000028
   .R1      ANOP
            MEND                                                            61000028
```

Lab Project 32 - Correct Version of E.CCB32 <u>After</u>
De-editing by ESERV (Part 2 of 2)

CONTENTS

TROUBLE ANALYSIS SECTION (T/As)

all assigns are temp. until EOJ

// LISTIO SYS
PROG
BG
F1
F2
F3
F4
ALL
SYSXXX
UNITS
DOWN
UA
X'cuu'

for DISKS: // ASSIGN SYSxxx,X'cuu' ,TEMP ,PERM
SYSyyy like EQU
DISK
3330
2314

printer // ASSIGN SYSxxx, X'cuu'
SYSyyy
PRINTER
1403

read/pun SYSxxx, X'cuu'
SYSyyy
PUNCH
2540P

rdr. 2540R

T/A PROBLEM 1

Indications - No printer output when the program is executed.

Directions to the Student - The T/A 1 deck may be obtained from the lab instructor or punched from the PROC library. The following procedure is used to punch T/A decks from the PROC library.

```
// EXEC PSERV
   DSPCH TA001
/*
/&
```

This example will punch T/A 1 from the procedure library and give you a printout on SYSLST, with additional instructions and a listing of the program. The same format is used whenever the directions indicate a T/A may be punched from the PROC library.

The program operation is identical to the program used in Lab Project 4. Figures 1 and 2 of Lab Project 4 may be used as reference.

1. IPL the system.
2. Make a card reader ready with the T/A deck.
3. Observe the failure indications (for example, how many cards were read, console messages, printer output, etc.)
4. Locate the problem.
5. Show the lab instructor your solution to the problem.

A231I This is not DASD, so issue HSTIO

Console Log

```
BG // JOB TA001
   DATE 01/31/74,CLOCK 12/13/50
BG // OPTION LINK,DUMP,NODECK
BG  PHASE   LPTWO,S+X'6A8'              DO NOT MOVE THIS CARD
BG // ASSGN SYS002,X'00E'   omit or replace with // ASSIGN SYS002,X'350' or DISK or 3330
BG // EXEC ASSEMBLY
1 BG A231I INVALID DEVICE FOR SYS002
BG A236I ASSEMBLER CANNOT CONTINUE
BG // EXEC LNKEDT
3 BG 2181I NO VALID STORAGE ASSIGNMENT IN FINAL PHASE     2 INCLUDE CARD MISSING
BG OS02I JOB TA001     CANCELED DUE TO PROGRAM REQUEST
BG EOJ TA001
   DATE 01/31/74,CLOCK 12/14/11,DURATION 00/00/21
BG 1C00A  ATTN. 0 0C.
BG
```

A PUNCH // JOB PHILTA1

A = ASSIGN   I = INFO
L = LKED

INSERT 1 ASSEMBLER REQUIRES SYS001/2/3 should assign to DASD 350 Default?
INSERT 2 OPTION LINK requires SYSLNK should assign to DASD 350 Default?
DUMP requires SYSLST —"— to 1403 00E Default?
// ASSIGN SYSnnn,X'00E'

INSERT 3 // EXEC after // EXEC LNKEDT

4 LNKEDT always needs SYSIPT? SYSLOG default? console 01F?
always needs SYSLNK —"—? DASD 350?
always needs workfile SYS001 DASD 350?
ASMB always needs SYSIPT SYSLOG SYSLST default 00C?

T/A PROBLEM 3

Indications - Job Control error message issued on the console.

Directions to the Student - Obtain the T/A 3 deck from the lab instructor, or from the PROC library. This program is identical to the program used in Lab Project 4. Figures 1 and 2 of Lab Project 4 may be used for reference.

Console Log

```
BG // JOB TA#003
   DATE 01/31/74,CLOCK 12/19/49
BG // OPTION LINK,DUMP,NODECK
BG  PHASE   LPTWO,S+X'6A8'             DO NOT MOVE THIS CARD
BG // EXEC ASSEMBLY
BG EOJ TA#003
   DATE 01/31/74,CLOCK 12/20/31,DURATION 00/00/41
BG // ASSGN SYSIPT,X'00C'
BG // ASSGN SYS002,X'00E'
BG // EXEC
BG 1S13D  STATEMENT OUT OF SEQUENCE.
BG
```

M
LNKEDT

1. //EXEC encountered while in STDLBL or USRLBL mode
2. Serious errors in compilation. all backward.

Job control stopped at STMT //EXEC and found field 3 empty and gave error.

T/A PROBLEM 4

Indications - Job Control message of UNIT CURRENTLY UNASSIGNABLE and no job output.

Directions to the Student - Obtain the T/A 4 deck from the lab instructor or the PROC library. Correct the problem using over-write statements and verify your solution to the problem by listing data cards using this program.

Console Log

```
BG // JOB TA004
   DATE 01/31/74,CLOCK 12/21/25
BG // OPTION LINK,NODECK
BG  PHASE   LPTWO,S+X'6A8'          DO NOT MOVE THIS CARD
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // ASSGN SYS005,X'00C'
BG // ASSGN SYS002,PRINTER
BG 1A64D  UNIT CURRENTLY UNASSIGNABLE.
BG
```

] unit

~~LNKEDT needs SYS002, ...~~

LNKEDT needs SYSLOG SYSLNK SYS001

~~00E~~ 00F alloc

FIELD4

ASSGN attempted to assign logical unit to device in another partition.

or no dev avail

cf. PRINTER is OK but for SYS002 is somewhere else

of. 00C not to SYS005 SYSIPT? RDR?

SYS005 SYS002 } may be required.

T/A PROBLEM 5

Indications - Program loops at execution.

Directions to the Student - Obtain the T/A 5 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. The program operation is identical to Lab Project 4. Figures 1 and 2 of Lab Project 4 may be used for reference.

Use the following procedure to locate the problem:

1. IPL the system residence pack (SYSRES).
2. Make the card reader ready with the T/A deck.
3. Observe failure symptoms, for example console messages, CPU indicators, SYSLST printout, etc.

NOTE: If you are running under VM it is more difficult to determine if your program is looping. A procedure that can be used if you suspect you are looping is: Issue a LOG command to DOS so your Job Control statements will be displayed, use the CP TRACE function to find the loop. Do not issue log while CP READ is displayed or you will be logged off. Refer to VM familiarization project for the procedure.

4. Locate the problem.
5. Verify your solution with the lab instructor.

Console Log

```
BG // JOB TA#005
   DATE 01/31/74,CLOCK 12/23/49
BG // OPTION LINK,DUMP,NODECK
BG  PHASE   LPTWO,S+X'6A8'         DO NOT MOVE THIS CARD
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // ASSGN SYSIPT,X'00C'
BG // ASSGN SYS002,X'00E'
BG // EXEC
DIJ DUMP PSW
DP
071D1000   00080730       PSW


DP
071D1000   00080732       PSW
```

(NOTE: There are more instructions in the loop.)

T/A PROBLEM 6

Indications - Error message on the console at execute time and a system abort.

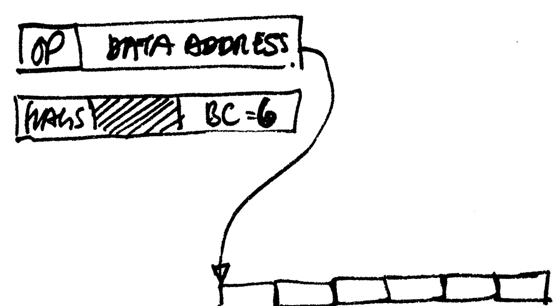
Directions to the Student - Obtain the T/A 6 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is the flowchart of the program and Figure 2 is the correct output. Verify your solution with the lab instructor.

Console Log

```
BG // JOB TA006
   DATE 01/31/74,CLOCK 12/27/32
BG // OPTION LINK,DUMP,NODECK
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // EXEC
BG OP26D  R INVAL SEEK SYSRES=130
         CCSW=07100800C00E000000 CCB=0800A4 SK=0000C6000009
         SNS=81000040
BG
```

addr of last CCW-8 i.e. 0800B8

07 = seek cyl head. i.e. CCW.



2314: 00 00 00 CC 00 HH

3330:

Change to

00 00 01 8E 00 09

0 1 2 3 4 5

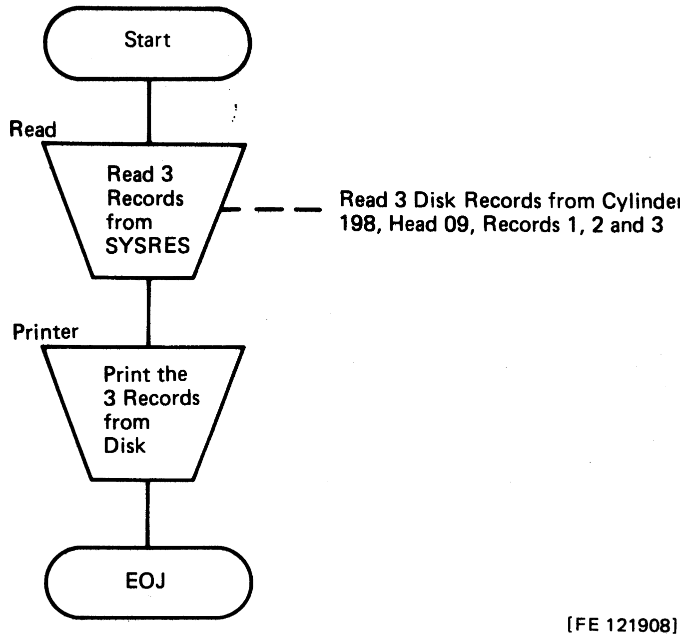


Figure 1 - T/A 6 Flowchart

```
// EXEC
THIS IS RECORD NUMBER ONE ISN'T IT A LOT OF FUN.
THIS IS RECORD NUMBER TWO ONLY ONE MORE RECORD TO DO.
THIS IS RECORD NUMBER THREE AND CONGRATULATIONS TO THEE.        WHOOPEE
```

Figure 2 - T/A 6 Printer Output

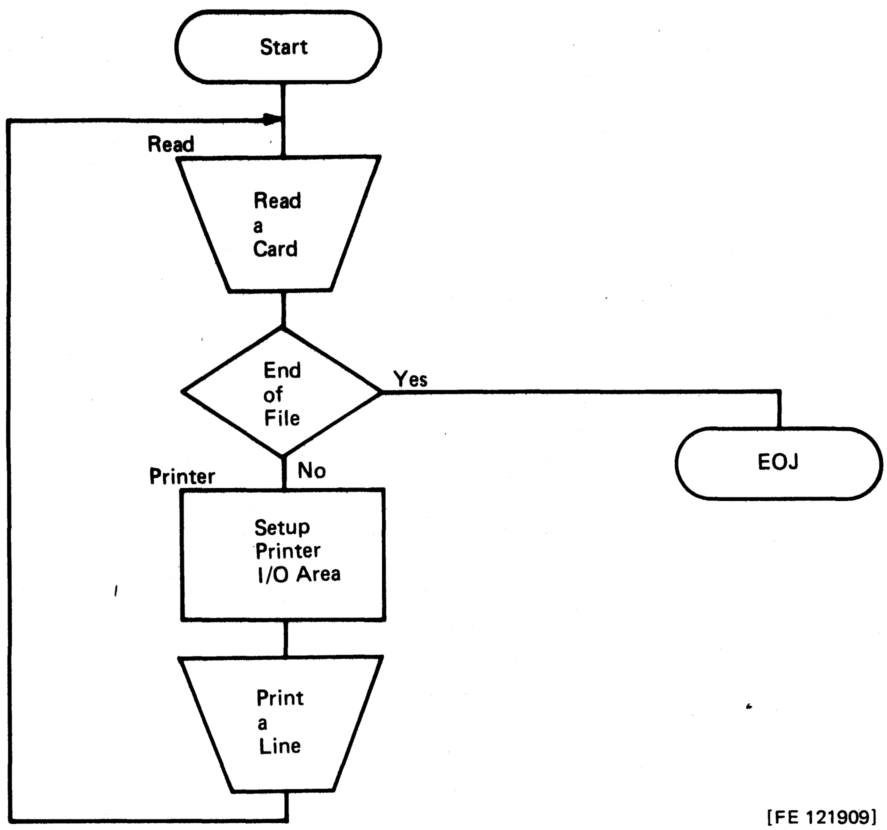
T/A PROBLEM 7

Indications - Error message on the console and a system abort.

Directions to the Student - Obtain the T/A 7 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is the flowchart of the program and Figure 2 is the expected output. Verify your solution with the lab instructor.

Console Log

```
BG // JOB TA007
   DATE 01/31/74,CLOCK 12/29/24
BG // OPTION LINK,DUMP,NODECK
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // EXEC
BG OP72I JOB TA007    CANCELED DUE TO READING PAST /& STATEMENT
BG EOJ TA007
   DATE 01/31/74,CLOCK 12/33/18,DURATION 00/03/53
BG 1C00A  ATTN. 0 OC.
BG
```



[FE 121909]

Figure 1 - T/A 7 Flowchart

```
// EXEC
********************          DATA CARD NUMBER  1          **************************
********************          DATA CARD NUMBER  2          **************************
********************          DATA CARD NUMBER  3          **************************
********************          DATA CARD NUMBER  4          **************************
********************          DATA CARD NUMBER  5          **************************
********************          DATA CARD NUMBER  6          **************************
```

Figure 2 - T/A 7 Printer Output

T/A PROBLEM 8

Indications - Printer page fails to overflow.

Directions to the Student - Obtain the T/A 8 deck from the lab instructor or from the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is a flowchart of the program and Figure 2 is the expected output. Verify your solution to the problem with the lab instructor. See NOTES.

Console Log

```
BG // JOB TA008
   DATE 01/31/74,CLOCK 12/33/48
BG // OPTION LINK,DUMP
BG // EXEC ASSEMBLY
BG OP08A     INTERV REQ SYSPCH=00D
BG // EXEC LNKEDT
BG // EXEC
BG EOJ TA008
   DATE 01/31/74,CLOCK 12/48/39,DURATION 00/14/50
BG 1C00A  ATTN. 0 OC.
BG
```

NOTE 1: THIS T/A SHOULD BE EXECUTED ON A STAND-ALONE SYSTEM AND NOT UNDER VM

NOTE 2: BEFORE EXECUTING THE T/A 8 DECK, DO AN //EXEC BUG01 AT THE CONSOLE TO PREVENT AN UNNECESSARY DUMP OF THE SUPERVISOR. ENSURE THAT THE PROCEDURE 'LOWBUGS' HAS BEEN EXECUTED PRIOR TO EXECUTING BUG01.

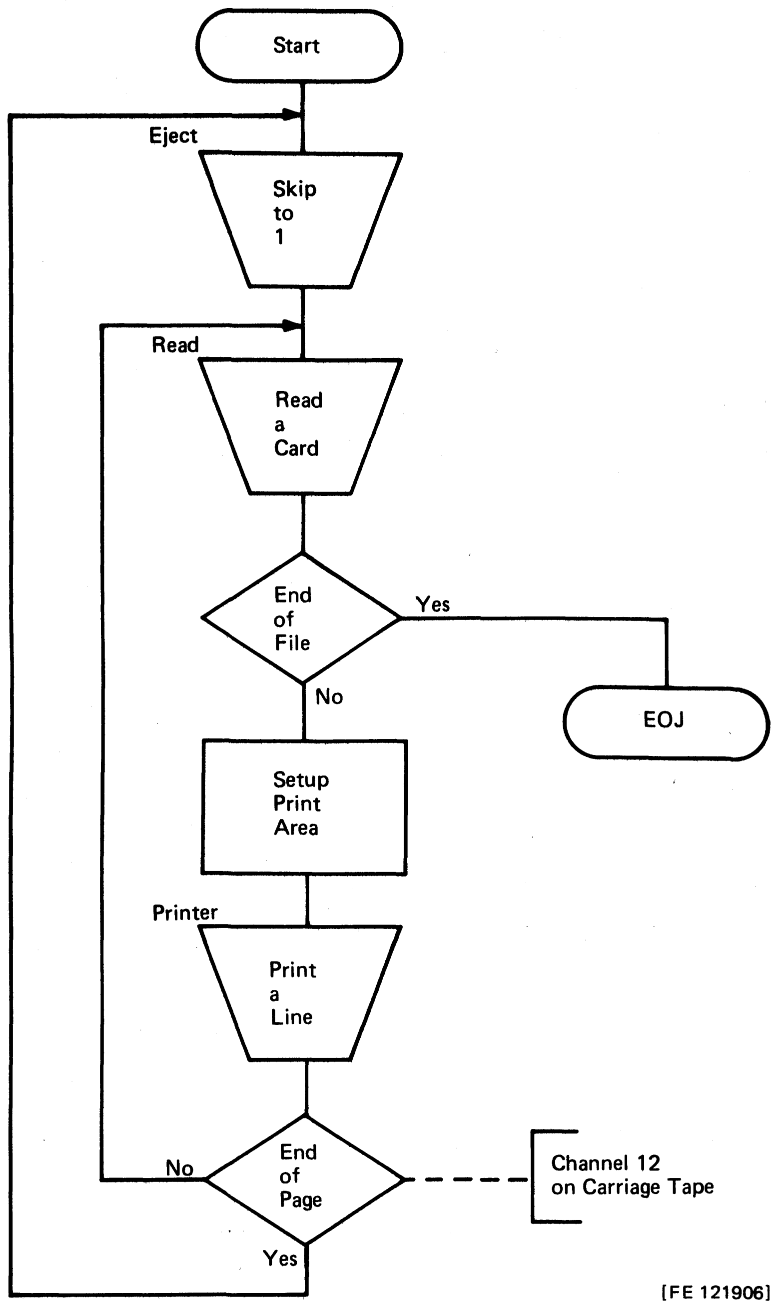


Figure 1 - T/A 8 Flowchart

```
*******************          DATA CARD NUMBER  1          ************************
*******************          DATA CARD NUMBER  2          ************************
*******************          DATA CARD NUMBER  3          ************************
*******************          DATA CARD NUMBER  4          ************************
*******************          DATA CARD NUMBER  5          ************************
*******************          DATA CARD NUMBER  6          ************************
*******************          DATA CARD NUMBER  7          ************************
*******************          DATA CARD NUMBER  8          ************************
*******************          DATA CARD NUMBER  9          ************************
*******************          DATA CARD NUMBER 10          ************************
*******************          DATA CARD NUMBER 11          ************************
*******************          DATA CARD NUMBER 12          ************************
*******************          DATA CARD NUMBER 13          ************************
*******************          DATA CARD NUMBER 14          ************************
*******************          DATA CARD NUMBER 15          ************************
*******************          DATA CARD NUMBER 16          ************************
*******************          DATA CARD NUMBER 17          ************************
*******************          DATA CARD NUMBER 18          ************************
*******************          DATA CARD NUMBER 19          ************************
*******************          DATA CARD NUMBER 20          ************************
*******************          DATA CARD NUMBER 21          ************************
*******************          DATA CARD NUMBER 22          ************************
*******************          DATA CARD NUMBER 23          ************************
*******************          DATA CARD NUMBER 24          ************************
*******************          DATA CARD NUMBER 25          ************************
*******************          DATA CARD NUMBER 26          ************************
*******************          DATA CARD NUMBER 27          ************************
*******************          DATA CARD NUMBER 28          ************************
*******************          DATA CARD NUMBER 29          ************************
*******************          DATA CARD NUMBER 30          ************************
*******************          DATA CARD NUMBER 31          ************************
*******************          DATA CARD NUMBER 32          ************************
*******************          DATA CARD NUMBER 33          ************************
*******************          DATA CARD NUMBER 34          ************************
*******************          DATA CARD NUMBER 35          ************************
*******************          DATA CARD NUMBER 36          ************************
*******************          DATA CARD NUMBER 37          ************************
*******************          DATA CARD NUMBER 38          ************************
*******************          DATA CARD NUMBER 39          ************************
*******************          DATA CARD NUMBER 40          ************************
*******************          DATA CARD NUMBER 41          ************************
*******************          DATA CARD NUMBER 42          ************************
*******************          DATA CARD NUMBER 43          ************************
*******************          DATA CARD NUMBER 44          ************************
*******************          DATA CARD NUMBER 45          ************************
*******************          DATA CARD NUMBER 46          ************************
*******************          DATA CARD NUMBER 47          ************************
*******************          DATA CARD NUMBER 48          ************************
*******************          DATA CARD NUMBER 49          ************************
*******************          DATA CARD NUMBER 50          ************************
*******************          DATA CARD NUMBER 51          ************************
*******************          DATA CARD NUMBER 52          ************************
*******************          DATA CARD NUMBER 53          ************************
*******************          DATA CARD NUMBER 54          ************************
*******************          DATA CARD NUMBER 55          ************************
*******************          DATA CARD NUMBER 56          ************************
*******************          DATA CARD NUMBER 57          ************************
*******************          DATA CARD NUMBER 58          ************************
*******************          DATA CARD NUMBER 59          ************************
*******************          DATA CARD NUMBER 60          ************************
```

[FE 104945]

Figure 2 - T/A 8 Printout (Part 1 of 2)

```
********************          DATA CARD NUMBER 61        *************************
********************          DATA CARD NUMBER 62        *************************
********************          DATA CARD NUMBER 63        *************************
********************          DATA CARD NUMBER 64        *************************
********************          DATA CARD NUMBER 65        *************************
********************          DATA CARD NUMBER 66        *************************
********************          DATA CARD NUMBER 67        *************************
********************          DATA CARD NUMBER 68        *************************
********************          DATA CARD NUMBER 69        *************************
```

Figure 2 - T/A 8 Printout (Part 2 of 2)

T/A PROBLEM 9

Indications - Error message on the console and a system abort.

Directions to the Student - Obtain the T/A 9 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is a flowchart and Figure 2 is the correct output. Verify your solution to the problem with the lab instructor. See NOTE.

Console Log

```
BG // JOB TA009
   DATE 01/31/74,CLOCK 12/49/25
BG // OPTION LINK,DUMP,NODECK
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // EXEC
BG OP24I C   PROG CHECK SYSLST=00E
       CCSW=1B1008019000200000 CCB=080170
       SNS=0
BG OP73I JOB TA009     CANCELED DUE TO I/O ERROR
```

NOTE: BEFORE EXECUTING THE T/A 9 DECK, DO AN // EXEC BUG01 AT THE CONSOLE TO PREVENT AN UNNECESSARY DUMP OF THE SUPERVISOR. ENSURE THAT THE PROCEDURE 'LOWBUGS' HAS BEEN EXECUTED PRIOR TO EXECUTING BUG01.

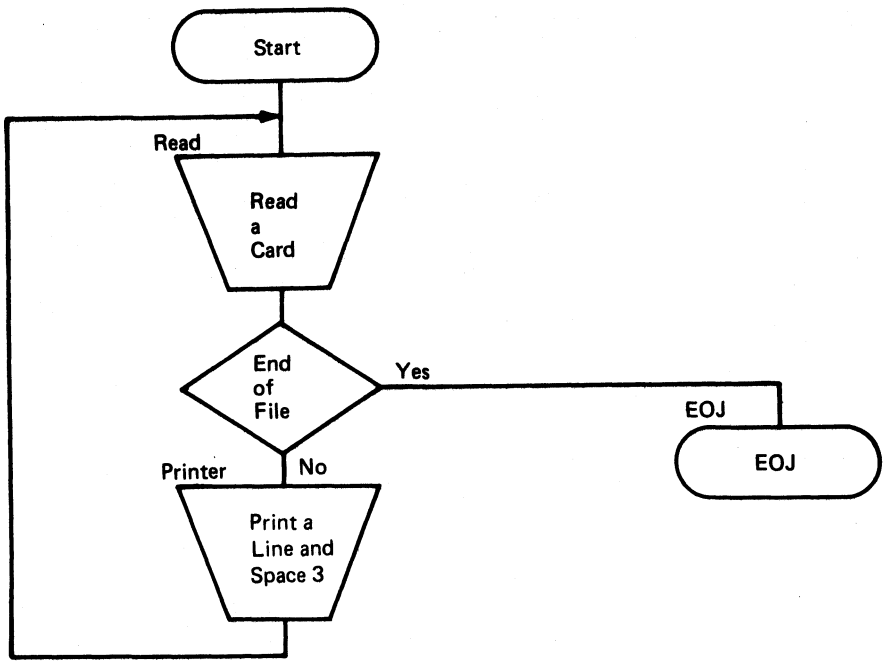


Figure 1 - T/A 9 Flowchart

[FE 121905]

```
// EXEC
********************          DATA CARD NUMBER  1          *************************

********************          DATA CARD NUMBER  2          *************************

********************          DATA CARD NUMBER  3          *************************

********************          DATA CARD NUMBER  4          *************************

********************          DATA CARD NUMBER  5          *************************

********************          DATA CARD NUMBER  6          *************************
```

Figure 2 - T/A 9 Printer Output

T/A PROBLEM 10

Indications - Improper output on the printer. The printer fails to space 3 between print lines.

Directions to the Student - Obtain the T/A 10 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is a flowchart of the program and Figure 2 is the correct output. Verify your solution with the lab instructor. Before attempting to run the T/A 10 deck, do a // Exec BUG01 at the console to prevent an unneeded dump of the supervisor. Ensure that the procedure 'LOWBUGS' has been executed prior to executing BUG01.

Console Log

```
BG // JOB TA010
   DATE 01/31/74,CLOCK 12/51/40
BG // OPTION LINK,DUMP,NODECK
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // EXEC
BG EOJ TA010
   DATE 01/31/74,CLOCK 12/52/34,DURATION 00/00/53
BG 1C00A  ATTN. 0 OC.
BG
```

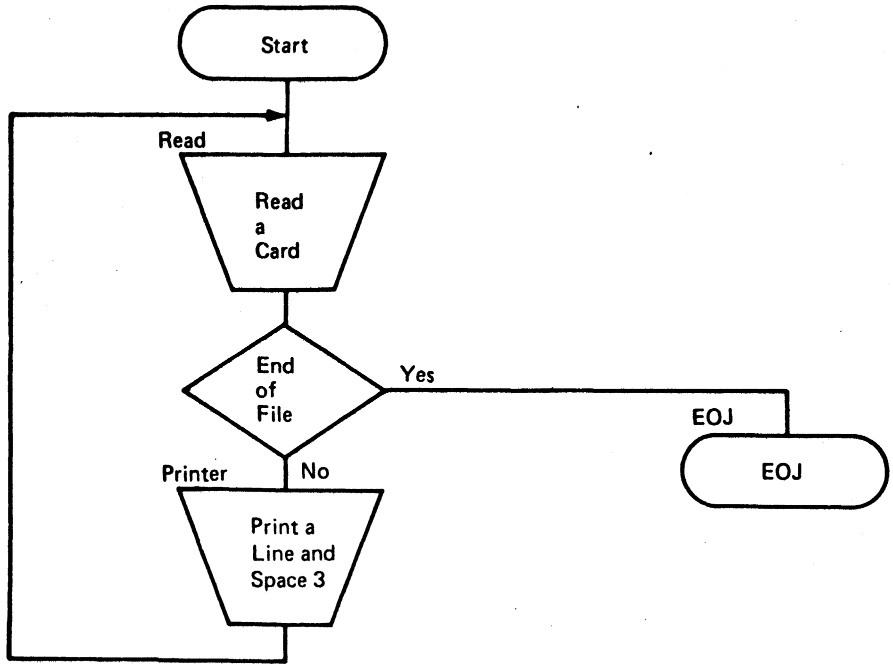


Figure 1 - T/A 10 Flowchart

```
// EXEC
*******************          DATA CARD NUMBER  1          ************************

*******************          DATA CARD NUMBER  2          ************************

*******************          DATA CARD NUMBER  3          ************************

*******************          DATA CARD NUMBER  4          ************************

*******************          DATA CARD NUMBER  5          ************************

*******************          DATA CARD NUMBER  6          ************************
```

Figure 2 - T/A 10 Printer Output

T/A PROBLEM 11

Indications - Error message on the console and printer and a system abort.

Directions to the Student - Obtain the T/A 11 deck from the lab instructor or the PROC library. Assemble, link edit, and execute the program correctly. Figure 1 is a flowchart of the program and Figure 2 is the correct output. Verify your solution with the lab instructor. Before attempting to run the T/A 11 deck, do a // EXEC BUG01 at the console to prevent an unneeded dump of the supervisor. Ensure that the procedure 'LOWBUGS' has been executed prior to executing BUG01.

Console Log

```
BG // JOB TA011
   DATE 01/31/74,CLOCK 12/53/05
BG // OPTION LINK,DUMP,NODECK
BG // EXEC ASSEMBLY
BG // EXEC LNKEDT
BG // EXEC
BG 0P77I JOB TA011     CANCELED DUE TO INVALID ADDRESS
```

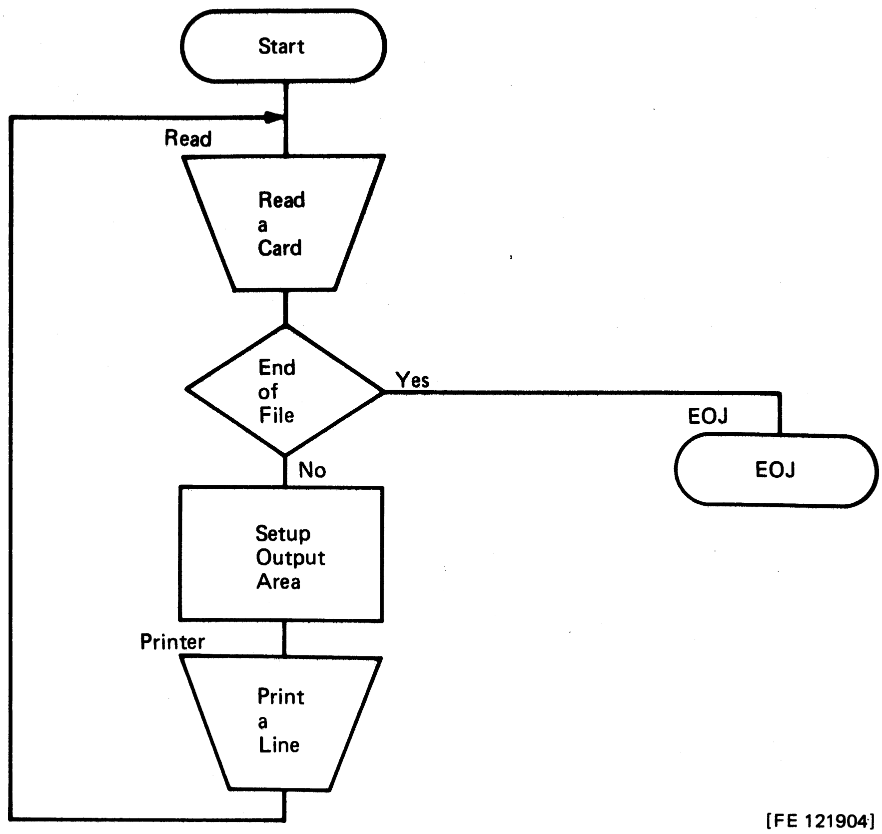


Figure 1 - T/A 11 Flowchart

```
// EXEC
********************          DATA CARD NUMBER  1          **************************
********************          DATA CARD NUMBER  2          **************************
********************          DATA CARD NUMBER  3          **************************
********************          DATA CARD NUMBER  4          **************************
********************          DATA CARD NUMBER  5          **************************
********************          DATA CARD NUMBER  6          **************************
```

Figure 2 - T/A 11 Printer Output

80078

T/A PROBLEM 12

Indications - After the message E102I OLTS RUNNING prints on the console a program check occurs at location 0147FF. (Specification exception).

Directions to the Student - Type in // EXEC BUG12 on the console. Assign SYS005 to the printer and initialize the OLTEP program to run the 1403G test. Use PDAID Fetch/Load Trace to assist in trouble analysis. Notify your lab instructor when you have located the altered code. Ensure that the procedure 'LOWBUGS' has been executed prior to execution of BUG01.

BG // EXEC ~~[illegible]~~ PROC = LOWBUGS
BG // EXEC BUG01 — to prevent supvr. being dumped.

Console Log BG SYSTEM IS BUGGED
BG 1I00A READY FOR COMMUNICATIONS.

```
BG // JOB TA012
   DATE 01/31/74,CLOCK 12/55/18
BG allocr bgr=20k
BG exec bug12
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG assgn sys005,x'00e'
BG // exec ijzadolt,real
BG E102I OLTS RUNNING.
BG OS03I PROGRAM CHECK INTERRUPTION - HEX LOCATION 0147FF
          CONDITION CODE 3 - SPECIFICATION EXCEPTION
   OS00I JOB TA012    CANCELED
```

E05 MSG → PGM CHK INT

LSTNDISK.

so 1: take dump.

close pt — ① have pgm listing
② LNKVOT o/p
③ S.ADUMP

CO FR

DOSVS OLTEP.

IJZADOLT: 2 C01 28
20 C01 29
13/A. 27 C01 30

BG FACTOR
VAL
1336 1930 1923

Suspect 07FF
Change to 07FE

S[illegible]

T/A PROBLEM 13

Indications - Message E226I OLTEP TERMINATED - CONSOLE KEYBOARD UNAVAILABLE

Directions to the Student - Type in // EXEC BUG13 on the console. Attempt to initialize OLTEP to run the 1403G (ripple print) test. Assign SYS005 to the printer before initializing OLTEP. Use PDAID Fetch/Load Trace to assist in trouble analysis. Notify your lab instructor when you have located the problem.

Console Log

ADSTOP '011174'

```
BG // JOB TA013
   DATE 01/31/74,CLOCK 12/59/23
BG allocr bgr=20k
BG assgn sys005,x'00e'
BG exec bug13
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG exec ijzadolt,real
BG E102I OLTS RUNNING
BG E134I WARNING - DASD VOLUME LABELED CEPACK NOT PROTECTED FROM WRITE
BG E107I OPTIONS ARE NTL,NEL,NPP, FE,NMI, EP, CP, PR,NRE,NTR
BG E226I OLTEP TERMINATED. CONSOLE KEYBOARD UNAVAILABLE
BG 1I00A  READY FOR COMMUNICATIONS.
BG
```

1. not enough info. Dump useless for analysis.

T/A PROBLEM 14

Indications - The message E108I INVALID ENTRY IN DEV FLD 00E prints on the console and the ENTER DEV/TEST/OPT message reprints.

Directions to the Student - Type in // EXEC BUG14 on the console. Assign SYS005 to the printer. Attempt to initialize OLTEP to run the 1403G test. Use PDAID Fetch/Load Trace to assist in trouble analysis. Notify your lab instructor when you have located the problem.

Console Log

```
BG // JOB TA014
   DATE 01/31/74,CLOCK 13/00/26
BG allocr bgr=20k
BG assgn sys005,x'00e'
BG exec bug14
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG exec ijzadolt,real
BG E102I OLTS RUNNING
BG E134I WARNING - DASD VOLUME LABELED CEPACK NOT PROTECTED FROM WRITE
BG E107I OPTIONS ARE NTL,NEL,NPP, FE,NMI, EP, CP, PR,NRE,NTR
BG 01E105D ENTER-DEV/TEST/OPT/
BG r 01,'00e/1403g//'
BG E108I INVALID ENTRY IN DEV FLD- 00E/
BG E161I FOR HELP ENTER PROMPT DEV TO NEXT DEV/TEST/OPT/ MESSAGE
BG E107I OPTIONS ARE NTL,NEL,NPP, FE,NMI, EP, CP, PR,NRE,NTR
BG 01E105D ENTER-DEV/TEST/OPT/
BG
```

T/A PROBLEM 15

Indications - The message 0I10A GIVE IPL CONTROL COMMANDS prints continuously on SYSLOG.

Directions to the Student - Type in // EXEC BUG15 on the console. When requested, re-IPL the default DOS supervisor to have the bug show up.

Console Log

```
BG // JOB TA015
   DATE 01/31/74,CLOCK 13/03/16
BG exec bug15
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=13/03/40,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
0I10A GIVE IPL CONTROL COMMANDS
0I10A GIVE IPL CONTROL COMMANDS
0I10A GIVE IPL CONTROL COMMANDS
0I10A GIVE IPL CONTROL COMMANDS
```

LOGSTR TM IPLFLG,FCARD
BZ
LA IPLMSG, BGNMSG
IPLLNG

T/A PROBLEM 16

Indications - The message 0I18A SET COMMAND NOT GIVEN is printed even though the normal SET command has been entered.

Directions to the Student - Type in // EXEC BUG16 on the console. When requested, re-IPL the default DOS supervisor and enter the IPL commands.

Console Log

```
BG // JOB TA016
   DATE 01/31/74,CLOCK 13/05/04
BG 1I93I  RECORDER FILE IS   4% FULL
BG exec bug16
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=13/05/28,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I18A SET COMMAND NOT GIVEN
```

Execute stand alone from DDC

#CP DUMP 0-6000

T/A PROBLEM 17

Indications - OI11A PREVIOUS COMMAND INVALID message is printed whenever a DPD command is entered without operands.

Directions to the Student - Type in // EXEC BUG17 on the console. When requested, re-IPL the default DOS supervisor and enter the IPL commands SET and DPD.

Console Log

```
BG // JOB TA017
   DATE 01/31/74,CLOCK 13/07/17
BG exec bug17
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=13/07/36,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I11A PREVIOUS COMMAND INVALID
```

#CP DUMP Ø-END

T/A PROBLEM 18

Indications - When a job control statement contains more than three characters in the first or second operand, an error message of 1S02D INVALID STATEMENT is issued.

Directions to the Student - Type in // EXEC BUG18 on the console. After the system is bugged, enter the following commands:

```
// JOB YOURNAME
// ASSGN SYS005,X'00E'
```

Console Log

```
BG // JOB TA018
   DATE 01/31/74,CLOCK 13/08/33
BG exec bug18
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS. ✓ $JOBCTLA label EXCPRG
BG // job student
BG EOJ TA018
   DATE 01/31/74,CLOCK 13/09/03,DURATION 00/00/30
BG // JOB STUDENT
   DATE 01/31/74,CLOCK 13/09/05
BG // assgn sys005,x'00e'
BG 1S02D  INVALID STATEMENT. — $$ABERRZ     8433 8551
   i.e. not in table.
```

HC DUMP Ø-END

$JOBCTLA contains phase vector table: TBLADR

$JOBCTLD processes ASSGN statement. entry is ASSGN   size = 11K + 536.

EXEC BUGØ1.

cancel

took stand alone dump.

LABEL H6 at loc 00022Ø found to be 0002 instead of 0006

T/A PROBLEM 19

Indications - When an ASSGN statement is encountered, the message 1S04D INVALID STATEMENT is issued.

Directions to the Student - Type in // EXEC BUG19 on the console. After the system is bugged, enter the following commands:

```
// JOB YOURNAME
// ASSGN SYS005,X'00E'
```

PUB

0 1 2 3 4 5 6 7
CC. UU. CHANQ. TEB. DEVTYPE. DEV CHAR CODE. CHAN SCHED FLAGS. S.C. FLAGS.

HS is at ~~[illegible]~~ 1F00

Console Log

```
BG // JOB TA019
   DATE 01/31/74,CLOCK 13/11/27
BG exec bug19
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job student
BG EOJ TA019
   DATE 01/31/74,CLOCK 13/11/46,DURATION 00/00/18
BG // JOB STUDENT
   DATE 01/31/74,CLOCK 13/11/48
BG // assgn sys005,x'00e'
BG 1S04D  INVALID STATEMENT.
BG
```

CP > TRACE BRANCH

ASSGN SYSxxx, X'cuu' / addr list / SYSyyy / PRINTER / 1403 / 1403U / 1443 / 3203 / 3211 / 5203 / 5203U [,TEMP] [,PERM]

~~HS~~ is 49

#4

deductions from $JOBCTLD - ASSGN stmt processor.

(1) check chart DJ label DEVSCAN in microfiche.
~~[illegible]~~ B1
GETNEXT C1

GETPUB KN
RETURN.

all error msgs. from $JOBCTLD are 1A0ND thru 1A82D.

A good try. But suspect no good.

(2) go through $JOBCTLD until when all possibilities of 3rd operand exhausted. $JOBCTLD branches to NVSERR in $JOBCTLA at GWC2 goes to ERRRTN [LOGOUT GJ]

80000
1C48
,1F00
83B48

BIG DIS W A LOC IN D

10848.

83000
83800

F800

OK points to wrong loc.

T/A PROBLEM 20

Indications - When any Job Control JOB statement is encountered, the error message 1S03D INVALID STATEMENT is issued.

Directions to the Student - Type in // EXEC BUG20 on the console. After the system is bugged, enter the following commands:

    // JOB YOURNAME

Console Log

```
BG // JOB TA020
   DATE 01/31/74,CLOCK 13/12/56
BG exec bug20
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job student
BG 1S03D  INVALID STATEMENT.
BG
```

T/A PROBLEM 21

Indications - Gives program check in the BG savearea when trying to process an EXEC statement.

Directions to the Student - Type in // EXEC BUG21 on the console. After the system is bugged, enter the following commands:

```
// JOB YOURNAME
// ASSGN SYS005,X'00E'
// EXEC DSERV
```

Console Log

```
BG // JOB TA021
   DATE 01/31/74,CLOCK 13/14/32
BG exec bug21
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job student
BG EOJ TA021
   DATE 01/31/74,CLOCK 13/15/09,DURATION 00/00/36
BG // JOB STUDENT
   DATE 01/31/74,CLOCK 13/15/10
BG // assgn sys005,x'00e'
BG // exec dserv
BG 0S03I PROGRAM CHECK INTERRUPTION - HEX LOCATION 080028
         CONDITION CODE 0 - OPERATION EXCEPTION
   0S00I JOB STUDENT  CANCELED
```

$$A$SVP1 will have
OPTION DUMP on.

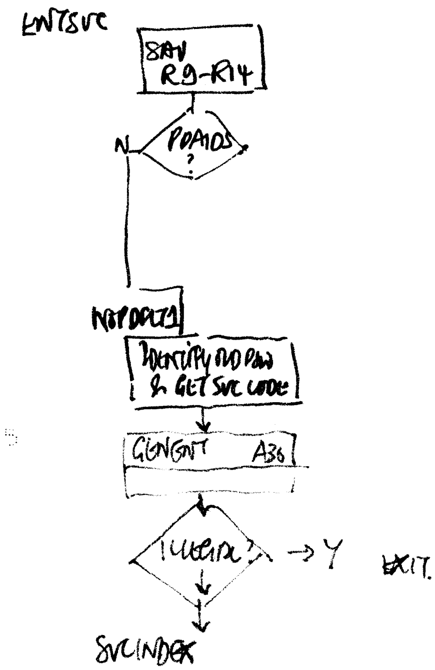
NEXT

T/A PROBLEM 22

Indications - Job is canceled with the message 0S04I ILLEGAL SVC - HEX LOCATION nnnnnn - SVC CODE 42.

Directions to the Student - Type in // EXEC BUG22 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
// EXEC TESTMAC
```



Console Log

```
BG // JOB TA022
    DATE 06/19/74,CLOCK 02/58/38
BG // exec bug22
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0103A SPECIFY SUPERVISOR NAME

0104I IPLDEV=X'130',VOLSER=111111,CPUID=000603330135
0130I DATE=06/19/74,CLOCK=02/59/09,ZONE=EAST/00/00
0110A GIVE IPL CONTROL COMMANDS
set
dpd
0152I PAGE DATA SET EXTENT       LOW     HIGH
                               188   0 196   19
0120I DOS/VS IPL COMPLETE
BG 1100A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
    DATE 06/19/74,CLOCK 02/59/38
BG 1193I  RECORDER FILE IS   2% FULL
BG // exec testmac                                          66
BG 0S04I ILLEGAL SVC - HEX LOCATION 08007C - SVC CODE HEX 42
    0S00I JOB YOURNAME CANCELED
```

yes got dump.

OBS. 1. The SUPV function requested is not defined. 2. SVC supports macro RUNMODE i.e. return mode in which pgm is running. R1 c.Ø if virt c 4 if real

3. In general SVC entrypoint: Code goes to 8B in LMS, also 4,5,6,7 of PIB2TAB. Some SVC's are optional & if missing we get cancel. If SVC42 is not optional

4. SUPV logic explains SVC 66; tests PIB DAT flag byte 4 for a '80' - i.e. pgm running in virtual.

5. Logic chart A00 - entry under SVC A46 SVC66 = A66 - first a test label SVC 66 and return. OK?
~~A66~~ 46 H1 is test for illegal SVC br to 01 A2 label ERRXX i.e. msg & EOJ

msg issued because SVCTAB for Y (SVC66) is 0772 i.e. ERR21 routine giving cancellation. who mucked up SVCTAB?

T/A PROBLEM 23

Indications - The system enters a 'Hard Wait' state during IPL.

Directions to the Student - Type in // EXEC BUG23 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA023
   DATE 01/31/74,CLOCK 13/19/09
BG exec bug23
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME
```

WAIT EDB — $$A$SUP1 ?
WAIT. EOB — SYSLOG. ?
which wait ?
is it at default supv.
or syslog request ?

```
DM 000000
00000FFF  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
00081000  00012AB6  040C0000  00000012  00000000  00000000  00000000  00000000

DG
0003B7FF  000000D6  0000D6C0  000003B8  00000000  00000000  00000010  0000243E
A0012A6C  00009378  00002E00  00000FFF  00002000  00003000  0000924A  00000012

DP
000A0000  00001000

ST
```

dump taken.

use micro-fiche

no device address in INT CODE MS 84. label IOINT3 chart BB D3. [illegible] $$A$IPL2.

no SGTKEY1 label?

no CHANNTAB. stmts. of SGTKEY2. $$A$[illegible]IPL2.

T/A PROBLEM 24

Indications - 0I16A NO PUB GIVEN FOR SYSLOG. When the student tries to add the PUB for SYSLOG, he receives the following message 0I13A CANNOT ADD PUB - INSUFFICIENT TABLE SPACE.

Directions to the Student - Type in // EXEC BUG24 on the console. When requested, re-IPL the default supervisor.

Console Log

sequence is DEL
ADD
SET
CAT
DPD.

```
BG // JOB TA024
   DATE 01/31/74,CLOCK 13/21/56
BG exec bug24
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=13/22/16,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
0I17A NO PUB GIVEN FOR SYSLOG
dpd
0I18A SET COMMAND NOT GIVEN
add x'01f',1050a
0I13A CANNOT ADD PUB-INSUFFICIENT TABLE SPACE
```

waiting for ADD, DEL, SET, CAT, DPD

$IPLRT4 EB

red herring

OR enter ADD, resume SET then DPD.

$$IPLRT2 CC

no room in PUB.

1. check SUPV listing for sysgen allocation .PUBTAB.
ØI13A is from $$IPLRT3 chart DA.

step. if SET given $IPLRT4 loaded which sets date, zone, scans PUB

Monday - wrong assumptions.

① ØI13A? — RT3 Chart DA.
ØI17A? RT4 EB. PBPAN 4412, 4367, 4565,

PUB length entry altered in SUPV

T/A PROBLEM 25

Indications - System enters a soft wait state during IPL.

Directions to the Student - Type in // EXEC BUG25 on the console. When requested, re-IPL the default supervisor.

Console Log

EXEC PROC=UNBUGS.

```
BG // JOB TA025
   DATE 01/31/74,CLOCK 13/26/10
BG exec bug25
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME


DP
03030000   80000000

DM 000000
00000000   00000000   00000000   00000000   00000000   000004A0   00000000   00000000
00081000   00012AB6   00000000   00000000   00000000   00000000   03030000   00000000

DG
0003B7FF   000000D6   0000D6C0   000003B8   00000000   00000000   0000089C   90000958
A0012A6C   00002DF0   00002E00   00001000   00002000   00003000   00002046   0000DE80
```

Couldn't get the same

alter 0I03A ① hit EOB
② no answer
③ hits CP mode.
④ DM 0-8F

T/A PROBLEM 26

Indications - System enters wait state when end key depressed for message READY FOR COMMUNICATIONS.

Directions to the Student - Type in // EXEC BUG26 on the console. When requested, re-IPL the default supervisor normally and press the END key in response to the READY FOR COMMUNICATIONS message.

Console Log

```
BG // JOB TA026
   DATE 01/31/74,CLOCK 13/28/29
BG exec bug26
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=13/28/56,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW      HIGH
                                 188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG

DM 000000
00000FFF  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00080C5E  040C0000  00000938  00000000  00000000  070F2000  000008AC


DG
00000000  FF002A5E  00004C83  00005618  00000000  00000000  0000089C  80000A32
076A076A  00009378  00002C14  00000FFF  00002000  00003000  0000924A  00000938

DP
000A0000  00001000
ST
```

T/A PROBLEM 27

Indications - System enters a wait state during IPL.

Directions to the Student - Type in // EXEC BUG27 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA027
   DATE 01/31/74,CLOCK 13/48/58
BG exec bug27
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME


DP
03030000  80000000
DG
0003B7FF  000000D6  0000D6C0  000003B8  00000000  00000000  0000089C  90000958
A0012A6C  00002DF0  00002E00  00001000  00002000  00003000  00002046  0000DE80

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
00081000  00012AB6  00000000  00000000  00000000  00000000  03030000  00000000
00012FC0

ST
```

T/A PROBLEM 28

Indications - 1) System enters a hardwait condition during execution of the BGV program. 2) Hardwait code is stored in GPR11 (RB).

Directions to the Student - Type in // EXEC BUG28 on the console. When requested, re-IPL the default supervisor and enter the following commands to Job Control/Attn. ALLOCR F1R=130K, STOP BG, BATCH F1, exec the program VSSLOLEV in real mode in F1, giving it a wait time interval of 1, restart BG and exec the program VSSCP03 in BGV.

Console Log

```
BG // JOB TA028
   DATE 01/31/74,CLOCK 01/04/58
BG // exec bug28
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=01/05/29,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW    HIGH
                              188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG allocr f1r=130k
BG stop bg
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
F1 // exec vsslolev,real
F1 SPECIFY WAIT TIME INTERVAL
F1 1
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
AR 1I60A  READY FOR COMMUNICATIONS.
AR start bg
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
BG exec vsscp03
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
```

T/A PROBLEM 28

Console Log (Continued)

```
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED
BG VSSCP03 - CCW TRANSLATION (EXTREME CASES)
F1 LOOP EXECUTED
F1 LOOP EXECUTED
F1 LOOP EXECUTED




DG
00080078  00080360  80000D6A  00005438  00000004  00000010  0000089C  00080818
80000D6A  000098B6  00002E00  00000FFB  00000000  00003000  4000924A  A0000B0A


DP
000A0000  00001000

DC
804000E0  0100DE00  FFFFFFFF  FFFFFFFF  00000000  00000000  00000000  00000000
00000000  00000000  00000000  00000000  00000000  00000000  C2000000  00000200


DM 0
00000FFB  00000000  00000000  00000000  00000000  000004A0  070F2000  000008AC
071D3000  00080136  040C0000  00000D7E  00000000  00000000  070F2000  000008AC
1000E5E0  0C000000  1000E6A8  00000000  FFF6B300  00126A38  040C0000  00000BB2
040C0000  00000B2C  000C0000  00009244  04080000  0000C0A8  040C0000  00000A74
00000540  00000080  00020000  00040011  00080800  00000000  00000000  00000000
00000000

ST
```

T/A PROBLEM 29

Indications - 1) System enters a hardwait condition during IPL. 2) An addressing program interruption is indicated.

Directions to the Student - Type in // EXEC BUG29 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA029
   DATE 01/31/74,CLOCK 14/00/02
BG exec bug29
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=14/00/21,ZONE=EAST/00/00
DM 000000
00000FFF  00000000  00000000  00000000  00000000  000004A0  00000000  00000000

DG
00000000  000069C0  00000130  0000309E  00004BD6  5000370A  0000309E  00000000
70009560  00009378  00002E00  00000FFF  00002000  00003000  0000924A  00009562

DP
000A0000  00001000

ST
```

no msg. ØI10A

CAA4

$IPLRTR CB
$IPLRT2 CC

PROG CHK IN SUPV

RET $ALR

A task selection problem?

CCB address = 111FC. 8CØ

what about chan CM $IPLRT2 I/O interrupt

Regsave @ 5494 gives PUB, CCB, DEV Ø1F, no PUB pointer, no CHANQ pointer, no PIB pointer.

Return reg has 9516 in ENTPCK

OBS! '9528' instruction is ADØ4 E2Ø8 i.e. stor 1° byte of PSW at E2Ø8 at 97DE ne fiel (41) & replace 1° byte with logical sum (OR) of nn & 04

Why did we enter PGM CHK?

T/A PROBLEM 30

Indications - The system enters into a LOOP.

WESTR.

Directions to the Student - Type in // EXEC BUG30 on the console. When requested, re-IPL the default supervisor.

$\boxed{\text{MSGRTN CH}}$

Console Log

SVC00 issued in JMRT2

```
BG // JOB TA030
   DATE 01/31/74,CLOCK 14/03/39
BG exec bug30
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=14/03/59,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
```

$ ~~[illegible]~~

```
DP
040C0000   00000B2C


DP
040C0000   00000B30


DP
040C0000   00000B8E


DP
040C0000   00000B92


DP
040C0000   00000B96


DP
040C0000   00000A8C
```

(NOTE: There are more instructions in the loop.)

TRACE BR PRINTER

TRACE END

T/A PROBLEM 31

Indications - When the // ASSGN SYS005,X'00C' Job Control statement is processed, a message is issued: 1A43D INVALID LOGICAL UNIT SPECIFICATION

Directions to the Student - Type in // EXEC BUG 31 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
// ASSGN SYS005,X'00C'
```

Console Log

```
BG // JOB TA031
   DATE 01/31/74,CLOCK 14/11/26
BG exec bug31
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=14/11/43,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 01/31/74,CLOCK 14/12/04
BG 1I93I  RECORDER FILE IS   4% FULL
BG // assgn sys005,x'00c'
BG 1A43D  INVALID LOGICAL UNIT SPECIFICATION.
BG


DP
070F2000  000008AC
```

T/A PROBLEM 32

Indications - System enters a soft wait state.

Directions to the Student - Type in // EXEC BUG32 on the console. When requested, re-IPL the default supervisor and enter the following commands:

// JOB YOURNAME

Console Log

```
BG // JOB TA032
   DATE 04/27/74,CLOCK 12/26/57
BG exec bug32
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=12/27/14,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                               188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 12/28/00
AR 1I60A  READY FOR COMMUNICATIONS.
AR

DP
070F2000  000008AC
DG
00000000  0000A616  0000001F  000030C6  00004BE6  00009DB0  0000089C  90000958
00001570  400009E2  00002DF0  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006952  070D0000  000818E6  00000000  00000000  070F2000  000008AC
00000000  04000000  00002D48  00000000  FF000000  01CC40F8  040C0000  00000BB2
040C0000  00000B2C  000C0000  00009244  04080000  0000C0A8  040C0000  00000A74
00000540  00000000  00020007  00040011  10084010  00000000  00000000  00000000
00000000  00000000  80000060  000002C0  00000000  00000100  0000001F  00000000
00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
00000000
```

T/A PROBLEM 36

Indications - The first time an error occurs on the 2540R, the message 0P27 UNKNOWN DEVICE SYSnnn=00C is issued.

Directions to the Student - Type in // EXEC BUG36 on the console. When the READY FOR COMMUNICATIONS message is returned, press the END Key while the SYSRDR device is not ready.

Console Log

```
BG // JOB TA036
   DATE 04/27/74,CLOCK 12/42/13
BG exec bug36
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG
SP 0T03I ERROR ON RECORDER FILE AT 00C500001E
BG 0P27D  R UNKNWN DEV SYSRDR=00C
        CCSW=0210080338020000050 CCB=080318
        SNS=40
BG
```

```
DG
000072C8  0000A616  000070D8  00000008  00000082  00009DB0  0000089C  90000958
000057D0  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DP
070F2000  000008AC
```

T/A PROBLEM 37

Indications - System enters a soft wait state.

Directions to the Student - Type in // EXEC BUG37 on the console. When requested, re-IPL the default supervisor and enter the following commands:

    // JOB YOURNAME

Console Log

```
BG // JOB TA037
   DATE 04/27/74,CLOCK 12/46/56
BG exec bug37
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=12/47/18,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188   0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 12/47/38


BG 0P08A    INTERV REQ SYSLST=00E
AR 1I60A  READY FOR COMMUNICATIONS.
AR


DP
070F2000  000008AC
DG
00000000  0000A616  0000001F  000030C6  02004BEE  00009DB0  0000089C  90000958
00004C74  400009E2  00002DF0  00001000  00002000  00003000  0000924A  0000A24A
```

T/A PROBLEM 38

Indications - No output when the EDIT option source is selected by depressing the End Key in response to msg. 3E11D.

Directions to the Student - Type in // EXEC BUG38 on the console. When the READY FOR COMMUNICATIONS is returned, enter the following commands:

```
// JOB YOURNAME
// EXEC EREP
```

Console Log

```
BG // JOB TA038
   DATE 04/27/74,CLOCK 12/49/20
BG exec bug38
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG EOJ TA038
   DATE 04/27/74,CLOCK 12/49/43,DURATION 00/00/23
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 12/49/45
BG // exec erep
BG 3E11D ENTER OPTION SOURCE,C=CARD,S=CONSOLE,N=NONE
BG
BG 3E11D ENTER OPTION SOURCE,C=CARD,S=CONSOLE,N=NONE
BG
```

T/A PROBLEM 39

Indications - The system enters a hard wait state.
disabled wait.

Directions to the Student - Type in // EXEC BUG39 on the console. When requested, re-IPL the default supervisor and press the EOB/END key with the card reader not ready.

Console Log

```
BG // JOB TA039
   DATE 01/31/74,CLOCK 01/11/50
BG // exec bug39
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=01/12/14,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW     HIGH
                                188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG



DG
00006B42  0000C798  FFFF9552  000004A0  00005F30  00002D74  0000089C  000000FF
8000C2AA  000036C0  00002C1C  00000540  0000C930  00003000  00005F30  0000C0AA

DP
000A0000  00EEEEEE

DC
804000E0  0100DE00  FFFFFFFF  FFFFFFFF  00000000  00000000  00000000  00000000
00000000  00000000  00000000  00000000  00000000  00000000  C2000000  00000200

DM 0
C9E2C100  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00080C5E  070D1000  000819FC  00000000  00000000  070F2000  000008AC
0000C808  0C000000  0000C7E8  00000000  FED08700  0112D57A  040C0000  00000BB2
040C0000  00000B2C  000C0000  00009244  0408000F  0000C0A8  040C0000  00000A74
00000540  00000000  00020000  00060011  1013B810  00000000

ST
```

T/A PROBLEM 40

Indications - The system enters a hard wait state.

Directions to the Student - Type in // EXEC BUG40 on the console. When requested, re-IPL the default supervisor, mount a scratch tape unit and enter the following commands:

```
// JOB YOURNAME
// EXEC DITTO
```

Using the DITTO program, enter the command 'FSF' for the tape address where the scratch tape is mounted.

T/A PROBLEM 42

Indications - System enters a hard wait state during IPL.

Directions to the Student - Type in // EXEC BUG42 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA042
   DATE 04/27/74,CLOCK 13/20/04
BG exec bug42
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/20/24,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE

DP
000A0000  00001000
DG
00081888  00002B18  00082078  000070B0  00006D00  00000001  00007A50  00006CC0
00082478  00004E90  00002E00  00000FFE  00002000  00003000  80008170  00000000

DM 000000
00000FFE  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00007D54  00000000  00000000  00000000  00000000  070F1000  0000095C

ST
```

T/A PROBLEM 44

Indications - System enters a LOOP during IPL.

Directions to the Student - Type in // EXEC BUG44 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA044
   DATE 04/27/74,CLOCK 13/22/03
BG exec bug44
BG SYSTEM IS BUGGED
IPL TO CONTINUE

OI03A SPECIFY SUPERVISOR NAME

OI04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
OI30I DATE=04/27/74,CLOCK=13/22/23,ZONE=EAST/00/00


DP
070F0000  0000095C
DG
00006810  00002B18  00000000  00005438  00000004  00000000  0000089C  90000958
10005818  00002DF0  00002E00  00001000  00002000  00003000  90007D08  90000C5C

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00007D54  00000000  00000000  00000000  00000000  070F0000  0000095C
00002CB0

DP
040C0000  00000A74

DP
040C0000  00000A78

DP
040C0000  00000A7C
```

(NOTE: There are more instructions in the loop.)

T/A PROBLEM 45

Indications - The job is canceled with the message:
0P77I JOBXXXXXXX CANCELED DUE TO INVALID ADDRESS.

Directions to the Student - Type in // EXEC BUG45 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
ASSGN SYSIN,UA
ASSGN SYSLST,UA
STOP
(Request Key)
BATCH F1
ASSGN SYSIN,X'00C'
ASSGN SYSLST,X'00E'
// JOB YOURNAME
// EXEC PROC=SUPERBUG
```

Console Log

```
BG // JOB TA045
   DATE 04/27/74,CLOCK 13/25/05
BG exec bug45
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/25/26,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                             188   0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG assgn sysin,ua
BG assgn syslst,ua
BG stop
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
F1 assgn sysin,x'00c'
F1 assgn syslst,x'00e'
F1 // job yourname
F1 // JOB YOURNAME
   DATE 04/27/74,CLOCK 13/26/47
F1 1I93I  RECORDER FILE IS   4% FULL
F1 // exec proc=superbug
F1 0P77I JOB YOURNAME CANCELED DUE TO INVALID ADDRESS

DP
070F2000  000008AC
DG
00000007  0000A616  00000005  00005618  00000014  00009DB0  0000089C  90000958
80004E20  400009E2  00002E40  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000031E8  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DED8  08000000  0000DEC8  00000000  FF000000  01DC3CA0  040C0000  00000BB2
```

T/A PROBLEM 46

Indications - The job is canceled with the message:
0P77I JOBXXXXXXXX CANCELED DUE TO INVALID ADDRESS.

Directions to the Student - Type in // EXEC BUG46 on the console. After the system is bugged, enter the following commands:

```
// JOB YOURNAME
// ASSGN SYS005,X'00C'
// EXEC SUPERBUG
```

Console Log

```
BG // JOB TA046
   DATE 04/27/74,CLOCK 13/29/14
BG exec bug46
BG SYSTEM IS BUGGED
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG EOJ TA046
   DATE 04/27/74,CLOCK 13/29/36,DURATION 00/00/21
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 13/29/38
BG // assgn sys005,x'00c'
BG // exec superbug
BG 0P08A    INTERV REQ SYS005=00C
BG 0P77I JOB YOURNAME CANCELED DUE TO INVALID ADDRESS

DP
070F2000  000008AC
DG
00000007  0000A616  00000018  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00C340D7  E4D540C4  C940E3C1  F0F4F640  40400000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DED8  08000000  0000DEC8  00000000  FF000000  01DD1FB6  040C0000  00000BB2
040C0000  00000B2C  000C0000  00009244  04080000  0000C0A8  040C0000
```

T/A PROBLEM 47

Indications - An 'END' in response to the READY FOR COMMUNICATIONS message with the card reader not ready causes the system to go into a wait state. When the Request Key is depressed the system enters into a loop.

Directions to the Student - Type in // EXEC BUG47 on the console. When requested, re-IPL the default supervisor and depress the End Key in response to the 1I00A message. Press the Request Key. Do not make the card reader ready.

Console Log

```
BG // JOB TA047
   DATE 04/27/74,CLOCK 13/31/22
BG exec bug47
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/31/42,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG


DP
070F2000  000008AC
DG
000070D8  0000A616  00000000  00000008  00000082  00009DB0  0000089C  90000958
00005818  400009E2  00002DF0  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00007D54  070D1000  000819FC  00004CAC  00000000  070F2000  000008AC
00002CB0  0C000000  00002C70  00000000  FF000000  01DDF58E  040C0000
```

T/A PROBLEM 48

__Indications__ - The program running in the BG partition cancels with a protection exception program check.

__Directions to the Student__ - Type in // EXEC BUG48 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// EXEC PROC=SDL1
/&
// JOB YOURNAME
// EXEC PROC=TA049
```

* If at IPL the message 1T00A is printed, respond with 'REJ'.

__Console Log__

```
BG // JOB TA048
   DATE 04/27/74,CLOCK 13/34/16
BG exec bug48
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/34/37,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                                188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // exec proc=sdl1
BG // PAUSE ENTER /& FROM THE CONSOLE OR READY THE RDR WITH /&
BG /&
BG 1N90I  EOP WAS FORCED BY EOJ OR CANCEL
BG EOP SDL1
BG EOJ NO NAME
   DATE 04/27/74,CLOCK 13/35/22
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 13/35/32
BG 1I93I  RECORDER FILE IS   4% FULL
BG // exec proc=ta049
BG 0S03I PROGRAM CHECK INTERRUPTION - HEX LOCATION 140ED2 -
         CONDITION CODE 2 - PROTECTION EXCEPTION
   0S00I JOB YOURNAME CANCELED


DP
070F2000  000008AC
DG
00000007  0000A616  00000030  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00C340D7  E4D540C4  C940D5D6  D5C1D4C5  40400000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
```

T/A PROBLEM 49

Indications - The program is canceled due to an operation exception program check.

Directions to the Student - Type in // EXEC BUG49 on the console. When requested, re-IPL the default supervisor and enter the following commands in sequence:

```
// EXEC PROC=SDL
/&
// JOB YOURNAME
// EXEC DSERV
```

* If at IPL the message 1T00A is printed, respond with 'REJ'.

Console Log

```
BG // JOB TA049
   DATE 04/27/74,CLOCK 14/45/32
BG exec bug49
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/46/03,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // exec proc=sdl
BG // PAUSE ENTER /& FROM THE CONSOLE OR READY THE RDR WITH /&
BG /&
BG 1N90I  EOP WAS FORCED BY EOJ OR CANCEL
BG EOP SDL
BG EOJ NO NAME
   DATE 04/27/74,CLOCK 14/46/37
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 14/46/47
BG 1I93I  RECORDER FILE IS   4% FULL
BG // exec dserv
BG 0S03I PROGRAM CHECK INTERRUPTION - HEX LOCATION 000000 -
         CONDITION CODE 0 - OPERATION EXCEPTION
   0S00I JOB YOURNAME CANCELED

DP
070F2000  000008AC
DG
00000007  0000A616  0000002D  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00C340D7  E4D540C4  C940D5D6  D5C1D4C5  40400000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DED8  08000000  0000DEC8  00000000  FF000000  01F261C2  040C0000  00000BB2
```

T/A PROBLEM 51

Indications - The system enters into a loop during IPL.

Directions to the Student - Type in // EXEC BUG01 on the console. When requested, re-IPL the default supervisor. Ensure that the procedure 'HIGHBUGS' has been executed prior to execution of this T/A.

Console Log

```
BG // JOB TA051
   DATE 04/27/74,CLOCK 13/40/07
BG exec bug01
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME


DP
000C0000   00009248
DG
0003B7FF   0000924A   0000D6C0   000003B8   00000000   00000000   0000089C   0000243E
A0012A6C   80000B9A   00002E00   00001000   00002000   00003000   4000924A   0000DE80

DM 000000
00000000   00000000   00000000   00000000   00000000   000004A0   00000000   00000000
00081000   00012AB6   040C0000   00009396   00000000   00000000   00000000   00000000
00012FC0

DP
000C0000   0000924A


DP
000C0000   0000924E


DP
000C0000   00009392
```

(NOTE: There are more instructions in the loop.)

T/A PROBLEM 52

Indications - System enters into a loop.

Directions to the Student - Type in // EXEC BUG02 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA052
   DATE 04/27/74,CLOCK 13/43/34
BG exec bug02
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/43/55,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00008072  040C0000  0000939A  00000000  00000000  070F1000  0000095C
00002CB0

DG
00081888  0000D9E8  00000010  000000F8  000000F9  00000000  0000CEC0  0000CFB8
00009C90  000098B6  00002E00  00001000  8000A65E  0000B24A  4000924A  0000A24A

DP
000C0000  00009248

DP
000C0000  0000924A

DP
000C0000  0000924E

DP
000C0000  00009392
```

(NOTE: There are more instructions in the loop.)

T/A PROBLEM 53

Indications - System enters a hard wait state at IPL.

Directions to the Student - Type in // EXEC BUG03 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA053
   DATE 04/27/74,CLOCK 13/46/15
BG exec bug03
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/46/33,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW     HIGH
                                188   0 196  19
0I20I DOS/VS IPL COMPLETE

DM 000000
00000FFF  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00008072  00000001  40000002  00000000  00000000  070F1000  0000095C
00002CB0

DG
00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000
00000000  00009378  00000000  00000FFF  00002000  00003000  0000924A  40000002

DP
000A0000  00001000
ST
```

T/A PROBLEM 54

Indications - 1) System enters a soft wait condition during execution of the BGV program. 2) No task is ready to run.

Directions to the Student - Type in // EXEC BUG04 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA054
   DATE 04/27/74,CLOCK 13/49/01
BG exec bug04
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/49/22,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                                188   0 196  19
0I20I DOS/VS IPL COMPLETE


DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00007D54  070D1000  000819FC  00000000  00000000  070F2000  000008AC


DG
00000000  0000A616  0000001F  000030C6  00004BD6  00009DB0  0000089C  90000958
00004C74  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DP
070F2000  000008AC
```

T/A PROBLEM 55

Indications - The program issues a DUMP macro due to an error condition detected while using the page manager services.

Directions to the Student - Type in // EXEC BUG05 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
ALLOCR BGR=100K
// EXEC TESTMAC,SIZE=4K
```

Console Log

```
BG // JOB TA055
   DATE 04/27/74,CLOCK 13/55/19
BG exec bug05
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=13/55/37,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW     HIGH
                                 188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 13/55/56
BG 1I93I  RECORDER FILE IS   4% FULL
BG allocr bgr=100k
BG // exec testmac,size=4k
BG 0P08A    INTERV REQ SYSLST=00E
BG 1I00A  READY FOR COMMUNICATIONS.
BG
```

T/A PROBLEM 56

Indications - 1) System dump and message 0P77I printed on console and printer. 2) Message 1I00A never issued.

Directions to the Student - Type in // EXEC BUG06 on the console. When requested, re-IPL the default supervisor.

Console Log

```
BG // JOB TA056
   DATE 04/27/74,CLOCK 14/04/47
BG exec bug06
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/05/05,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                              188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 0P77I JOB NO NAME  CANCELED DUE TO INVALID ADDRESS

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DED8  08000000  0000DEC8  00000000  FF000000  01E72128  040C0000

DG
00000007  0000A616  00000003  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DP
070F2000  000008AC
```

T/A PROBLEM 57

Indications - 1) System enters a softwait condition following an attempt to execute an F1 program in REAL mode. 2) BGV program does not execute.

Directions to the Student - Type in // EXEC BUG07 on the console. When requested, re-IPL the default supervisor and enter the commands indicated by the Console Log.

Console Log

```
BG // JOB TA057
   DATE 01/31/74,CLOCK 01/38/29
BG // exec bug07
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=01/31/74,CLOCK=01/39/02,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                               188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG *
BG *
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
BG *
F1 // exec vsspm01,real
BG // exec vsspm01


DG
00000000  0000A616  0000001F  000030C6  00004BDE  00009DB0  0000089C  90000958
00004C74  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DP
070F2000  000008AC

DC
804000E0  0100DE00  FFFFFFFF  FFFFFFFF  00000000  00000000  00000000  00000000
00000000  00000000  00000000  00000000  00000000  00000000  C2000000  00000200

DM 0
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
040C0000  00009682  070D1000  00006A1A  00000000  00000000  070F2000  000008AC
00000000  04000000  10002D48  00000000  FE96C500  011A3226  040C0000  00000BB2
040C0000  00000B2C  000C0000  00009244  04080000  0000C0A8  040C0000  00000A74
00000540  00000000  0002003A  00060011  5212D803  00000000  00000000  00000000
00000000

ST
```

T/A PROBLEM 58

Indications - All programs run slower than normal in BGV.

Directions to the Student - Type in // EXEC BUG08 on the console. When requested, re-IPL the default supervisor and enter the following command sequence:

> Initialize SDAID with a space of 400K. Batch F1V and execute VSSPM01. Then execute VSSPM01 in BGV and once again in F1 (refer to Console Log).

Console Log

```
BG // JOB TA058
   DATE 04/27/74,CLOCK 14/09/12
BG exec bug08
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/10/58,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW      HIGH
                                188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG exec sdaid
BG 4C55D GIVE SPACE FOR SDAID =
BG 400k.
BG 4C58D  OUTPUT DEVICE =
BG
BG 4C60D  STOP ON EVENT =
BG no,go
BG 4C57E  SDAID SUCCESSFULLY INITIATED  SDAREA=0112K
BG 1I00A  READY FOR COMMUNICATIONS.
BG stop bg
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
F1 exec vsspm01
F1 VSSPM01 - PAGE MANAGEMENT TEST
AR 1I60A  READY FOR COMMUNICATIONS.
AR start bg
F1 TEST IS     SUCCESSFUL
00033 PAGES REFERENCED
BG exec vsspm01
F1 1I00A  READY FOR COMMUNICATIONS.
F1 exec vsspm01
BG VSSPM01 - PAGE MANAGEMENT TEST
F1 VSSPM01 - PAGE MANAGEMENT TEST
F1 TEST IS     SUCCESSFUL
00033 PAGES REFERENCED
F1 1I00A  READY FOR COMMUNICATIONS.
F1
F1 1C10A  PLEASE ASSIGN SYSRDR.
F1
F1 1C10A  PLEASE ASSIGN SYSRDR.
F1 stop f1
```

T/A PROBLEM 59

Indications - System enters a loop while executing a program in the F1 partition.

Directions to the Student - Type in // EXEC BUG09 on the console. When requested, re-IPL the default supervisor and enter the following commands as indicated on the Console Log.

Console Log

```
BG // JOB TA059
   DATE 06/19/74,CLOCK 03/24/31
BG exec bug09
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000603330135
0I30I DATE=06/19/74,CLOCK=03/24/55,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT          LOW      HIGH
                               188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 06/19/74,CLOCK 03/25/13
BG 1I93I  RECORDER FILE IS   2% FULL
BG assgn sys004,x'131'
BG allocr bgr=28k
BG alloc f1=100k
BG *
BG *
AR 1I60A  READY FOR COMMUNICATIONS.
AR batch f1
BG *
F1 // exec vsspm01
BG


DP
040C1000  00009DC4


DP
040C1000  00009DC8
```

(NOTE: There are more instructions in the loop.)

T/A PROBLEM 60

Indications - 1) The BGV job is canceled due to an I/O error (Command Reject) on X'131'. 2) The error occurred during execution of a 'SET FILE MASK' command (1F).

Directions to the Student - Type in // EXEC BUG10 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
ASSGN SYS004,X'131'
// EXEC VSSCP03
```

Console Log

```
BG // JOB TA060
   DATE 04/27/74,CLOCK 14/30/51
BG exec bug10
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/31/12,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                                188   0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 14/31/29
BG 1I93I  RECORDER FILE IS   4% FULL
BG assgn sys004,x'131'
BG exec vsscp03
BG VSSCP03 - CCW TRANSLATION (EXTREME CASES)
BG 0P18I C  COMM REJCT SYS004=131
        CCSW=1F100804180E000000 CCB=080320 SK=000000640000
        SNS=8000004002
BG 0P73I JOB YOURNAME CANCELED DUE TO I/O ERROR

DP
070F2000  000008AC
DG
00000007  0000A616  0000001F  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
```

T/A PROBLEM 61

Indications - System 'CHANNEL PROGRAM CHECKS' because of invalid CCW command code during execution of BGV I/O operation.

Directions to the Student - Type in // EXEC BUG11 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
ASSGN SYS004,X'131'
// EXEC VSSCP03
```

Console Log

```
BG // JOB TA061
   DATE 04/27/74,CLOCK 14/33/24
BG exec bug11
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/33/45,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT       LOW     HIGH
                                188   0 196  19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.

BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 14/34/10
BG 1I93I  RECORDER FILE IS   4% FULL
BG assgn sys004,x'131'
BG exec vsscp03
BG VSSCP03 - CCW TRANSLATION (EXTREME CASES)
BG 0P24I C  PROG CHECK SYS004=131
        CCSW=0010000000000200000 CCB=080320
        SNS=0
BG 0P73I JOB YOURNAME CANCELED DUE TO I/O ERROR

DP
070F2000  000008AC
DG
00000007  0000A616  00000027  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A


DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DF20
```

T/A PROBLEM 62

Indications - System "CHANNEL PROGRAM CHECKS' during execution of BGV I/O operation.

Directions to the Student - Type in // EXEC BUG12 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
ASSGN SYS004,X'131'
// EXEC VSSCP03
```

Console Log

```
BG // JOB TA062
   DATE 04/27/74,CLOCK 14/36/01
BG exec bug12
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/36/31,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW     HIGH
                                 188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 14/36/49
BG 1I93I  RECORDER FILE IS   4% FULL
BG assgn sys004,x'131'
BG exec vsscp03
BG VSSCP03 - CCW TRANSLATION (EXTREME CASES)
BG 0P24I C  PROG CHECK SYS004=131
       CCSW=01100804300C201B60 CCB=080320
       SNS=0
BG 0P73I JOB YOURNAME CANCELED DUE TO I/O ERROR

DP
070F2000  000008AC
DG
00000007  0000A616  00000026  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000  000008AC
0000DFF8  08000000  0000DFE8  00000000  FF000000  01EFC3AE  040C0000  00000BB2
040C0000

ST
```

T/A PROBLEM 63

Indications - System 'CHANNEL PROGRAM CHECKS' during execution of BGV I/O operation.

Directions to the Student - Type in // EXEC BUG13 on the console. When requested, re-IPL the default supervisor and enter the following commands:

```
// JOB YOURNAME
ASSGN SYS004,X'131'
// EXEC CCWTEST
/&
```

Console Log

```
BG // JOB TA063
   DATE 04/27/74,CLOCK 14/41/30
BG exec bug13
BG SYSTEM IS BUGGED
IPL TO CONTINUE

0I03A SPECIFY SUPERVISOR NAME

0I04I IPLDEV=X'130',VOLSER=111111,CPUID=000100190145
0I30I DATE=04/27/74,CLOCK=14/41/52,ZONE=EAST/00/00
0I10A GIVE IPL CONTROL COMMANDS
set
dpd
0I52I PAGE DATA SET EXTENT        LOW      HIGH
                                188    0 196   19
0I20I DOS/VS IPL COMPLETE
BG 1I00A  READY FOR COMMUNICATIONS.
BG // job yourname
BG // JOB YOURNAME
   DATE 04/27/74,CLOCK 14/42/07
BG 1I93I  RECORDER FILE IS   4% FULL
BG assgn sys004,x'131'
BG exec ccwtest
BG 0P24I C  PROG CHECK SYS001=131
        CCSW=081008099800C200001 CCB=080998
        SNS=0
BG 0P73I JOB YOURNAME CANCELED DUE TO I/O ERROR

DP
070F2000  000008AC
DG
00000007  0000A616  00000021  00005438  00000004  00009DB0  0000089C  90000958
80004E20  400009E2  00002E00  00001000  00002000  00003000  0000924A  0000A24A

DM 000000
00000000  00000000  00000000  00000000  00000000  000004A0  00000000  00000000
070D0000  00006B10  040D0000  00006912  00000000  00000000  070F2000
```

101,2,3,6,7

T/A PROBLEMS 101 THROUGH 105 - LIOCS UNIT RECORD MACROS

Objectives

Upon completion of these problems, the student, using the available documentation, should be able to:

1. Locate errors in an assembled program that are caused by incorrect expansions of LIOCS UNIT RECORD Declarative and Imperative macros, and by source coding errors.

2. Use the correct logic manual (PLM) to identify correct imperative macro expansions.

3. State the system procedures that are required to repair or update an incorrect macro definition in the source statement library (A. and E. macros).

Directions to the Student

These T/As utilize a program called SEQDISK as a vehicle to present macro expansion and source coding errors. A flowchart; assembly listing (which contains all the errors for these and subsequent T/As that utilize SEQDISK); and an example of correctly executed SEQDISK output (without errors) can be found in DOS/VS Base SCM 3.

Each T/A has been executed separately (with only its own unique 'bug' applied to SEQDISK) and the resulting storage dumps obtained; these can be found in DOS/VS Base SCM 2. The T/A listings in SCM 2 can be used to analyze these T/A problems if sufficient hard systems are not available to prevent an overcrowding situation during lab sessions.

Storage dumps in SCM 2 do not contain supervisor code (except for those T/As where it is necessary or helpful); most LIOCS T/As require only a dump of BGV.

When progress is not being made on any of these T/As, refer to Student Guide topics LIOCS CONCEPTS and UNIT RECORD MACROS for possible trouble-shooting hints. If these hints do not help, contact your lab instructor.

Contact your lab instructor after you have solved each T/A problem.

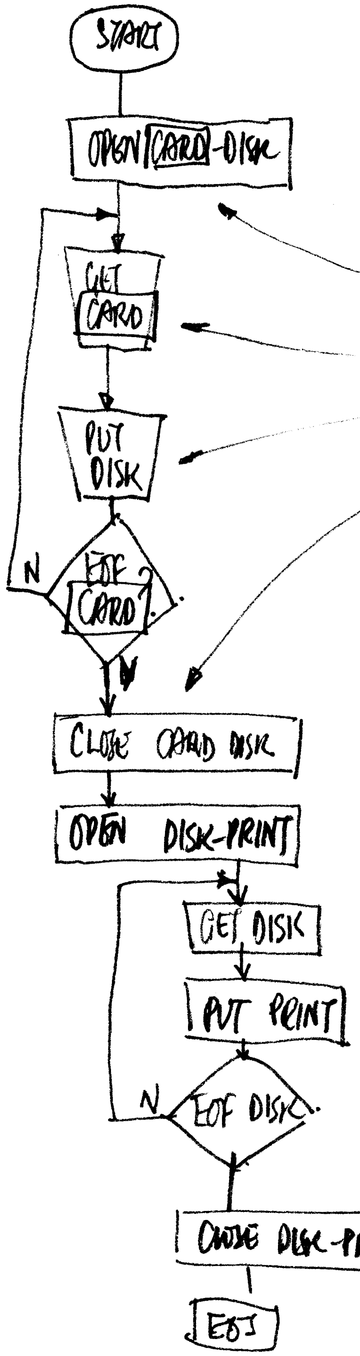
Tools, Test Equipment and Documentation

DOS/VS Base Student Guide
DOS/VS Base SCM 2
DOS/VS Base SCM 3
✓DOS/VS Supervisor and I/O Macros
✓DOS/VS LIOCS Volume 1
✓DOS/VS LIOCS Volume 2

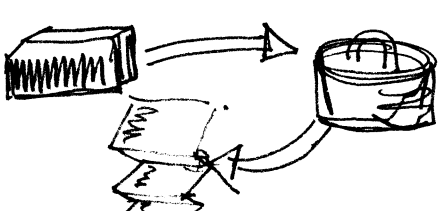
To apply the 'bug' for any LIOCS T/A <u>on a hard system</u>, the procedure LIOCBUGS must first be executed in order to load the BUGSYSTEM with the LIOCS 'bugs' (// EXEC PROC=LIOCBUGS). A specific LIOCS T/A 'bug' can then be applied to the system as shown in the following table:

SEQ DISK

For T/A #	EXECUTE
101	// EXEC BUG01
102	// EXEC BUG02
103	// EXEC BUG03
10n	// EXEC BUG0n
110	// EXEC BUG10
11n	// EXEC BUG1n
120	// EXEC BUG20
etc	




```
                filename  work
                  (A)      (B)                DTFCD, CDMOD
                                              DTFSD, SDMOD
        OPEN    CARD,DISKOUT
GETCD   GET     CARD,OUTDK      link to IOCS to read in.
        PUT     DISKOUT         link to IOCS to write to disk.
        B
EOFCD   CLOSE   CARD,DISKOUT
        OPEN    DISKIN,PRINT               DTFPR    PRMOD
                                  DISKOUT  DTFSD    SDMODFO  ERROPT=YES
                                  DISKIN   DTFSD    SDMODF1  ERROPT=YES
GETDK   GET     DISKIN,OUTPRT
        PUT     PRINT
        PRTOV   PRINT,12
        B       GETDK
EOFDK   CLOSE   DISKIN PRINT.
        EOJ

   10 AREAS. CD

CARD    DTFCD   DEVADDR=SYSRDR, TYPEFILE=INPUT, EOFADDR=EOFCD,
                IOAREA=CARDIN, WORKA=YES

        DC      A(IJCX0011) CCW
        DC      VL3(IJCFZIW0)           LOGICMOD
        DC      A(CARDIN)               IOAREA1
        DC      AL3(EOFCD)              EOF ADDR
IJCX0011 CCW
        CDMOD . TYPEFILE=INPUT,WORKA=YES.
        CCB
        DS      ADDR OF IOAREA2
        DS      ADDR OF EOF ROUTINE
IJCFZIW0 CSECT

        SVC 0
        SVC 7          PIOCS Rtn.

PRINT   DTFPR   etc.
```



T/A PROBLEMS 106 THROUGH 108 - LIOCS TAPE MACROS

Objectives

Upon completion of these problems, the student, using the available documentation, should be able to:

1. Locate errors in an assembled program that are caused by incorrect expansions of LIOCS TAPE Declarative and Imperative macros, and by source coding errors.

2. Use the correct logic manual (PLM) to identify correct imperative macro expansions.

3. State the system procedures that are required to repair or update an incorrect macro definition in the source statement library (A. and E. macros).

Directions to the Student

These T/As utilize a program called SEQTAPE as a vehicle to present macro expansion and source coding errors. A flowchart; assembly listing (which contains all the errors for these T/As); and an example of correctly executed SEQTAPE output (without errors) can be found in DOS/VS Base SCM 3.

Each T/A has been executed separately (with only it's own unique 'bug' applied to SEQTAPE) and the resulting storage dumps obtained; these can be found in DOS/VS Base SCM 2. The T/A listings in SCM 2 can be used to analyze these T/A problems if sufficient hard systems are not available to prevent an overcrowding situation during lab sessions.

Storage dumps in SCM 2 do not contain supervisor code (except for those T/As where it is necessary or helpful); most LIOCS T/As require only a dump of BGV.

When progress is not being made on any of these T/As, refer to Student Guide topics LIOCS CONCEPTS and TAPE MACROS for possible troubleshooting hints. If these hints do not help, contact your lab instructor.

Contact your lab instructor after you have solved each T/A problem.

Tools, Test Equipment and Documentation

DOS/VS Base Student Guide
DOS/VS Base SCM 2
DOS/VS Base SCM 3
DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volume 1
DOS/VS LIOCS Volume 2

T/A PROBLEM 109 THROUGH 115 - LIOCS SEQUENTIAL DISK MACROS

Objectives

Upon completion of these problems, the student, using the available documentation, should be able to:

1. Locate errors in an assembled program that are caused by incorrect expansions of LIOCS SEQUENTIAL DISK Declarative and Imperative macros, and by source coding errors.

2. Use the correct logic manual (PLM) to identify correct imperative macro expansions.

3. State the system procedures that are required to repair or update an incorrect macro definition in the source statement library (A. and E. macros).

Directions to the Student

These T/As return to the use of SEQDISK as a vehicle to present additional macro expansion and source coding errors. A flowchart; assembly listing (which contains all the errors for these T/As); and an example of correctly executed SEQDISK output (without errors) can be found in DOS/VS Base SCM 3.

Each T/A has been executed separately (with only it's own unique 'bug' applied to SEQDISK) and the resulting storage dumps obtained; these can be found in DOS/VS Base SCM 2. The T/A listings in SCM 2 can be used to analyze these T/A problems if sufficient hard systems are not available to prevent overcrowding during lab sessions.

Storage dumps in SCM 2 do not contain supervisor code (except for those T/As where it is necessary or helpful); most LIOCS T/As require only a dump of BGV.

When progress is not being made on any of these T/As, refer to Student Guide topics LIOCS CONCEPTS and SEQUENTIAL DISK MACROS for possible troubleshooting hints. If these hints do not help, contact your lab instructor.

Contact your lab instructor after you have solved each T/A problem.

Tools, Test Equipment and Documentation

DOS/VS Base Student Guide
DOS/VS Base SCM 2
DOS/VS Base SCM 3
DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volume 1
DOS/VS LIOCS Volume 2

T/A PROBLEMS 116 THROUGH 120 - LIOCS DIRECT ACCESS MACROS

Objectives

Upon completion of these problems, the student, using the available documentation, should be able to:

1. Locate errors in an assembled program that are caused by incorrect expansions of LIOCS DIRECT ACCESS Declarative macros.

2. State the system procedures that are required to repair or update an incorrect macro definition in the source statement library (A. and E. macros).

Directions to the student

These T/As utilize a program called DALOAD as a vehicle to present macro expansion errors. A flowchart; assembly listing (which contains all the errors for these T/As); and an example of correctly executed DALOAD output (without errors) can be found in DOS/VS Base SCM 3.

Each T/A has been executed separately (with only it's own unique 'bug' applied to DALOAD) and the resulting storage dumps obtained; these can be found in DOS/VS Base SCM 2. The T/A listings in SCM 2 can be used to analyze these T/A problems if sufficient hard systems are not available to prevent an overcrowding situation during lab sessions.

Storage dumps in SCM 2 do not contain supervisor code (except for those T/As where it is necessary or helpful); most LIOCS T/As require only a dump of BGV.

When progress is not being made on any of these T/As, refer to Student Guide topics LIOCS CONCEPTS and DIRECT ACCESS MACROS for possible troubleshooting hints. If these hints do not help, contact your lab instructor.

Contact your lab instructor after you have solved each T/A problem.

Tools, Test Equipment and Documentation

DOS/VS Base Student Guide
DOS/VS Base SCM 2
DOS/VS Base SCM 3
DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volume 1
DOS/VS LIOCS Volume 3

T/A PROBLEMS 121 THROUGH 125 - LIOCS INDEXED SEQUENTIAL MACROS

Objectives

Upon completion of these problems, the student, using the available documentation, should be able to:

1. Locate errors in an assembled program that are caused by incorrect expansions of LIOCS INDEXED SEQUENTIAL Declarative macros.

2. State the system procedures that are required to repair or update an incorrect macro definition in the source statement library (A. and E. macros).

Directions to the Student

These T/As utilize programs called ISLOAD and ISADRTR as vehicles to present ISAM macro expansion errors. Flowcharts; assembly listings (which contain the errors for these T/As); and examples of correctly executed outputs (without errors) can be found in DOS/VS Base SCM 3.

Each T/A has been executed separately (with only it's own unique 'bug' applied to either ISLOAD or ISADRTR) and the resulting storage dumps obtained; these can be found in DOS/VS Base SCM 2. The T/A listings in SCM 2 can be used to analyze these T/A problems if sufficient hard systems are not available to prevent an overcrowding situation during lab sessions.

Detailed instructions for executing each of these T/As (121 through 125) are contained on the following page.

Storage dumps in SCM 2 do not contain supervisor code (except for those T/As where it is necessary or helpful); most LIOCS T/As require only a dump of BGV.

When progress is not being made on any of these T/As, refer to Student Guide topics LIOCS CONCEPTS and INDEXED SEQUENTIAL MACROS for possible troubleshooting hints. If these hints do not help, contact your lab instructor.

Contact your lab instructor after you have solved each T/A problem.

Tools, Test Equipment and Documentation

DOS/VS Base Student Guide
DOS/VS Base SCM 2
DOS/VS Base SCM 3
DOS/VS Supervisor and I/O Macros
DOS/VS LIOCS Volume 1
DOS/VS LIOCS Volume 3

INSTRUCTIONS FOR SYSTEM EXECUTION OF T/As 121 THROUGH 125

T/A 121: Type in // EXEC BUG21. Submit the ISLOAD job stream deck (see NOTE).

T/A 122: Type // EXEC BUG22. Submit the ISLOAD job stream deck followed by the ISADRTR (ADD) job stream deck containing an UPSI 10 card. Then submit the ISADRTR (RANDOM RETRIEVE) job stream deck containing an UPSI 01 card.

T/A 123: Type in // EXEC BUG23. Submit the ISLOAD job stream deck followed by the ISADRTR (ADD) job stream deck containing an UPSI 10 card.

T/A 124: Type in // EXEC BUG24. Submit the ISLOAD job stream deck followed by the ISADRTR (ADD) job stream deck containing an UPSI 10 card. Then submit the ISADRTR (RANDOM RETRIEVE) job stream deck containing an UPSI 01 card.

T/A 125: Type in // EXEC BUG25. Submit the ISLOAD job stream deck followed by the ISADRTR (ADD) job stream deck containing an UPSI 10 card.

NOTE: Obtain the required job stream decks from your lab instructor if you are executing these T/As on a hard system.

CONTENTS

WORK PROJECT 0 - IPL AND JOB CONTROL

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Use any of the following aids as a means to identify the location and/or contents of specified tables, constants, registers, instructions, and phases in storage prints (dumps) of IPL and Job Control.

   - Microfiche
   - IPL and Job Control Logic (PLM)
   - Core Image Library Directory DSERV

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS IPL and Job Control Logic

Dos/VS Serviceability Aids and Debugging Procedures

DOS/VS Base SCM2

IPL Release 29.0 Microfiche (SYC7-1946)

JOB CONTFOL Release 29.0 Microfiche (SYC7-1948)

Directions to the Student

To complete this project you must answer study questions relative to separate storage prints (dumps) that were taken during the execution of IPL and Job Control respectively.

The listings that you will require to answer the study questions for this project are contained in the DOS/VS Base SCM2 and are as follows:

- IPL Dump (15 parts)
- Job Control Dump (6 parts)
- Partial DSERV of the Core Image Library Directory that contains the directory entries for IPL and Job Control

PART 1 - IPL

Reference the IPL Microfiche (SYC7-1946) to answer the following mandatory questions: 74 55 60 1053 1411

1. What is the statement number in the $$A$IPL1 microfiche at which the disk address of $$A$IPL2 is located?
   Statement # 61 ________________ .

2. What label (name) is attached to the $$A$IPL2 disk address in the $$A$IPL1 microfiche? ___SKADR1_________

3. At what statement in the $IPLRT2 microfiche are the version and modification level bytes located?
   Statement #___________________ .

4. What does the '@DL28' information contained in $IPLRT2 statement 21 mean?

   @ ____

   D ____

   L ____

   28 ____

NOTE: Refer to comment statements above statement 21 tc find answers for the above.

Refer to the IPL Dump in DOS/VS Base SCM2 to answer the following mandatory questions:

NOTE 1: The various parts of the dump were excerpted from a complete <u>stand-alone</u> dump of the system. All pages of the entire SA dump are not included. Only those pages that you will require to answer the study questions have been provided in the SCM (Refer to Appendix G in SADP for example of a STAND-ALONE dump output if you are not already familiar with this type of dump).

NOTE 2: The SA dump was taken by the operator because the system was looping during IPL. The operator stopped the system and performed a STORE STATUS (ST) via the console keyboard prior to taking the dump.

5. In the dump, what is the address of the next instruction that would have been executed in the loop if the operator had not stopped the system and taken the dump? X'_________________'
   (Note: Refer to Store Status under 'SYSTEM CONTROL' in the Principles of Operation Manual

6. In which IPL phase (in the dump) is the instruction that would have been executed next located? __________________

setclock 8 4 2 1
set secure - n/p.

7. At what statement number in the IPL microfiche is the instruction that would have been executed next located?
Statement #________________________

8. How many instructions are in the loop that was executing before the dump was taken? ______SEK______BC 4______
What are their mnemonics? ____B2Φ4 E99E 474Φ 1Φ48____

9. Why was the system looping ? Running in circle of 4 i.e. set clock was secure! ?
____
TOD clock disabled. i.e. secure. Time not changing.
____

10. In the IPL and JOB CONTROL PLM, locate and identify the detail chart, and specific block on the chart, that represents the instructions that were looping.
Chart ____________ setclock label in $IPLRT4 chart EA
Block ____________ block F4

Optional Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following optional questions:

11. At what address in the dump is the root phase of IPL loaded?
X'_____________' $IPLRT2 @ X'1Φ8ΦΦ'

12. What other (if any) phases of IPL, in addition to the root phases and $IPLRT4, were in storage at the time the dump was taken? _____$IPLRT3_____________________

During execution of $$A$IPL2, the I/O tables in the supervisor nucleus were copied into the area of storage immediately following the supervisor. Blocks 031 and 032 in the dump contain these copied tables.

NOTE: Blocks 000 to 030 would have shown all of the 62K supervisor code if they had been included. Each block in the dump contains X'800' bytes (2K).

13. The copied PUB table in the dump starts at address X'F88B'. What device address does entry '01' of this table contain?
X'__00E______'

14. What is the address of the next available (unused) PUB table entry? X'___F8FB___'

15. The PUB table entry for the I/O device with address X'0350' is for what specific type of I/O unit? ____________________
3330.

16. The copied LUB table in the dump starts at address X'10090'. What is the PUB pointer contained in the SYSLOG LUB table entry? X'________' Ø5

17. What is the address of the last LUB table entry in the system? X'___________' X'10D0'

18. In the formatted portion of the dump (starts on Part 15) what table in the Supervisor (not contained in dump) is the address in Control Register 1 (CR1) pointing to? _Segment table_.

19. What is the address of the Segment Table? X'__DEØØ__'

20. Which partitions are indicated as not being active in the formatted portion of the dump? ______________________________

____

21. At what displacement in the Communications Region (shown in the formatted portion of the dump on Part 12) can the address of the LUB table in the Supervisor be found? Displacement X'__2F4C__'

22. In the formatted portion of the dump for the LUB table (Part 13), what entry in the PUB table (in the Supervisor nucleus which is not shown in the dump) is the LUB entry for SYSUSE pointing at? Entry X'__FF____'

23. What is the device address that is contained in bytes 0 and 1 of PUB entry that is being pointed by the SYSUSE LUB pointer? Device address in PUB entry is X'_001F_______' in BG!

24. How many PUB table entries are shown in the formatted portion of the dump for the PUB table? ______________________________ shown. X'ØØ' X'Ø1'

25. What system logical units do the entries as shown in formatted PUB table represent? ____SYSUSE SYSRES____________________

26. Using the formatted BOUNDARY BOX information in the dump, identify the origin address (in hex) of the first virtual address space address in our DOS/VS system. X'____________' 08000

ANSWERS TO WORK PROJECT 0 (IPL)

1. Statement 61 (located on Card 1 - Frame A4 of IPL microfiche)

2. SKADR1 (label at statement 61)

3. Statement 35 (located on Card 3 - Frame A4 of IPL microfiche)

4. '@' denotes that the change activity has occurred on the statement (has been either altered or added as the result of an APAR, PTM, or new development)

   Dbl A8 B14

   'D' is the system identifier for DOS/VS.

   'L' indicates the change was made because of new development.

   '28' indicates that the change was made for Release 28 of DOS/VS.

5. X'11E14' (Current PSW at time of dump was stored at X'000100' because of STORE STATUS operation. IA of PSW points to next instruction that would have been executed)

6. $IPLRT4 (Phasename located at X'11D60' in dump)

7. Statement 4325 (The instruction is at a displacement of X'B4' from the beginning of $IPLRT4 in the dump. In the microfiche, $IPLRT4 begins at X'1D40', plus X'B4' equals X'1DF4', which is statement 4325)

8. 2;SCK (Set Clock) ; BC (Branch Condition)

9. The operator had failed to press the TOD-Clock switch on the CPU console to the enable set position after entering an IPL SET command that contained the DATE and CLOCK operand.

10. CHART EA; BLOCK F4

11. X'10800' ($IPLRT2 can be found on PART 4)

12. $IPLRT3 (can be found on Part 6 at X'11468')

13. X'000E' (Entry '00' contains X'000C')

14. X'F8FB' (The 'FF' null character in byte 0 of this entry indicates that it is unused)

15. 3330 Disk Drive (Indicated by X'63' in byte 4 of entry).

16. X'05' (Points to the 6th PUB table entry which is for device X'001F', the console keyboard)

17. X'10190'

18. SEGMENT Table (CR1 is the Segment Table Origin Register (STOR) and bytes 1, 2, and 3 always point to the first entry in the Segment Table in a DOS/VS System)

19. X'00DE00'

20. F4; F3; F2; F1 (Refer to Part 11)

21. X'4C' (The Communication Region that is printed out on Part 12 is the communication region for the BG partition (the partition that was active at the time the dump was taken). Each partition has its own communication region. There is also a SYSTEM Communication Region. The purpose and function of communications regions will be discussed and explained in more detail as the course progresses).

22. Entry X'00' (Byte 0 of SYSUSE LUB entry contains the pointer to the PUB entry for the device assigned to SYSUSE).

23. X'001F' (This is the device address of SYSLOG - the device that was selected by the operator) as the IPL communication device)

24. Two (2) (Entries X'00' and X'01')

25. SYSUSE; SYSRES; (IPL Communication device and SYSRES device).

26. X'080000' (Refer to 'Origin of Virtual Storage' in B-BOX printout).

PART 2 - JOB CONTROL

Refer to the JCL Dump in the DOS/VS Base SCM2 and answer the following mandatory questions:

1. In which partition was Job Control executing at the time the dump was taken? BGV

2. Starting at what hex address are the contents of GR12 stored in the partition save area? X'8001C'

3. What is the mnemonic of the next instruction that would have been executed if the dump had not been taken? S

4. Which phase of Job Control (in addition to the root phase) is in the partition? $JOBCTLG.

5. What are the starting and ending storage addresses of the I/O buffer area?

   Starts at X'800B6'   Ends at X'80160.'

6. What is the hex address in the dump of the last phase vector table entry that was referenced before the dump was taken? X'80FB5.'

7. At what hex address in the dump is the last byte of $JOBCTLA located? X'81887' In the microfiche? X'___________'

   Explain why these addresses are different. ________________

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

OBS: JOBCTLG remain there.

8. At what hex address was $JOBCTLA loaded? X'80078'

9. What is the length of the area (field) that immediately follows the I/O buffer area? ____________ bytes

   What label in the microfiche identifies this area? ________

   1 msg. check microfiche

10. What message was issued as a result of processing the statement contained in the I/O buffer in the storage print?

    1S03D invalid statement . . . .

11. Which field of the statement contained in the I/O buffer caused the message to be issued? Field ______________

    Why? ____________________________

    3rd operand too long

12. The message contained in the message area was printed on both SYSLOG and SYSLST. At what label in the microprogram is the instruction located that moved the message into the message area? Label ______________________________

On which Job Control detail chart can this label be found? Chart _____________

13. At what hex address was the processing phase contained in the root phase overlay area entered? X'__8B4Ø__'

14. What are the hex contents of the version and modification level bytes for $JOBCTLA in the dump? X'_________'

ANSWERS TO WORK PROJECT 0 (JOB CONTROL)

1. BGV (The PSW printed on the dump identifies the partition)

2. X'8001C'

3. TM (Test Under Mask - X'91' at X'8032'. BGVPSW IA (instruction address) points to next instruction that would have been executed)

4. $JOBCTLG (The last character in the first 8 bytes of $JOBCTLA is replaced with the character that represents the job control phase that has been called into the overlay area of $JOBCTLA)

5. Starts at X'800F6'; Ends at X'8016D' (Refer to the label 'BUFFER' in the $JOBCTLA microfiche)

6. X'807B5' (The label of the phase vector table in $JOBCTLA in the microfiche is TBLADR)

7. X'81887'; X'1888' (At statement number 3640 in the $JOBCTLA microfiche, $JOBCTLG has overlaid the initialization code contained in the $JOBCTLA. At statement 4071 in the microfiche can be found the 'END' statement for JOBCTLA)

8. X'80078' ($JOBCTLA loads at the address immediately following the partition savearea)

9. 80 bytes; LOGOVR

10. 1S03D INVALID STATEMENT

11. Field 3; The jobname operand in the JCL statement was too long (more than 8 characters)

12. CHAIN; CHART GJ

13. X'81890' (Start of $JOBCTLG plus 8 bytes - refer to the 'Branch Displacement' byte in the phase vector table entry for a 'JOB' statement (byte 8 in the entry).

14. X'2900' (Indicates Release 29 version of $JOBCTLA).

WORK PROJECT 1 - SUPERVISOR INTRODUCTION

Objective

Upon completion of this project the student, using the available documentation should be able to:

1. Locate in a core dump the basic communication control blocks of the Supervisor.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base Supervisor Listing
DOS/VS Base SCM2

Directions to the Student

Using the core dump WP1N2 in DOS/VS Base SCM2 and the supervisor listing, answer the following mandatory questions:

1. What is the address of the routine to which control is passed at the time of an I/O interrupt? X'~~00A8~~' A74
2. What is the address of the device that caused the last I/O interrupt? X'131'
3. What is the channel and device status of the device that caused the last I/O interrupt? DEVICE END
4. At what address was the current PSW saved the last time the system was interrupted? X'PGM/IO 28' I/O 38
5. What is the beginning address of the system control program communication region (SYSCOM control block)? X'540'

6. What are the addresses of the following:

a. Logical Transient Area (LTA) X'6810'. SYSCOM 1C.
b. Segment Table (STAB) X'D600' CR1.
c. Page Table (PT) X'D7E8' 1st STAB entry.
d. Boundary Box (BBOX) X'4DB0' SYSCOM 'DC'
e. DPD Table (DPDTAB) X'4E10' SYSCOM E0
f. Background Communication Region (BGCOM) X'4A0'. MS '24'

7. What are the beginning addresses, in decimal, of the following areas? Boundary Box

a. BGR Partition F800
b. F4R Partition 14800
c. F1R Partition 1DF00
d. MPP 2F000

8. What are the end addresses, in hex, of the following virtual partitions?

a. BG X'1017FF' 101800 - 1
b. F4 X'1177FF' 117800 - 1
c. F3 X'1287FF' 128800 - 1
d. F2 X'13B7FF' 13B800 - 1
e. F1 X'13B7FF' 13B800 - 1

9. How many page frames are there in the main page pool? 'A0'

10. How many bytes are allocated the smallest real partition? 800 F4. 14800 - 15000

11. Are there any partitions with an allocation of zero bytes? YES If so, which ones? F4V

12. What is the address of the device on which the page data set resides? X'131' SYSCOM 'E0' → DPDTAB. Bytes 0,1.

13. State the number of records that can be contained on each track of the page data set (SYSVIS). ______________

14. At what cylinder and head can the first track of SYSVIS be found? CYL 00 HEAD 00 is begin lower CYL 01, HH 0

15. At what cylinder and head can the last track of SYSVIS be found? CYL 14 HEAD 00 ... is CYL 9 HH 19.

16. What is the lowest hex address in the DOS/VS Base System that can ever have its contents paged-out to SYSVIS? X'8000'.

ANSWERS TO WORK PROJECT 1

1. X'A74' (Label:ENTIO) pointed to by the I/O new PSW.

2. X'131' (I/O device address stored at address X'B9')

3. Device end only (CSW stored at address X'40')

4. X'38' (The address of the last saved PSW is stored at label HLDPSW)

5. X'540' (Address X'80' contains the pointer to SYSCOM)

6.
   a. LTA - X'6810'
   b. Segment Table - X'DE00'
   c. Page Table - X'D7E8'
   d. Boundary Box - X'4DB0'
   e. DPD Table - X'4E10'
   f. BGCOM - X'4A0'

7.
   a. BGR - 63488
   b. F4R - 83968
   c. F1R - 118784
   d. MPP - 192512

8.
   a. BG - X'1017FF'
   b. F4 - X'1177FF'
   c. F3 - X'1287FF'
   d. F2 - X'13B7FF'
   e. F1 - X'13B7FF'

9. 162 (Halfword,BBOX+6)

10. 2048 (Halfword,BBOX+4)

11. Yes (F1V) - Starting and Ending addresses are equal (No allocation)

12. X'131' (DPDTAB + 0)

DCL in SUPVR listing

13. <u>3</u> - The halfword at DPDTAB +2 is used by the supervisor as a displacement into the table labeled 'DCL' for it to determine this answer. The 'device-constants-list' contains the number of records per track and the number of tracks per cylinder for all of the possible SYSVIS device types.

14. CYL - 0001, HH - 0000 (DPDTAB +4 is the 'Relative Track Low' which is the track relative to CYL0-HD0 on the disk for the beginning of the extent for SYSVIS)

15. CYL = 0009, HEAD = 0019 (DPDTAB +8 is the 'Relative Track High').

16. X'80000' (This address is the beginning address of virtual address space in the DOS/VS Base lab system.)

Ø131	08	CCHH	CCHH.

04
08

WORK PROJECT 2 - TASK SELECTION

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate in a core dump the control blocks used for task selection.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic

DOS/VS Base Supervisor Logic

DOS/VS Base SCM2

Directions to the Student

Using the core dump WP1N2 in DOS/VS Base SCM2, and the Supervisor Listing, answer the following mandatory questions:

1. What is the address of the Partition Identifier Key (PIK)? X'__4CE__' COMREG '23'
2. What is the address of the PIB Table? X'__2DF0__' from COMREG 4AA.
3. What is the address of the Background System Savearea? X'__________' 4E90
4. What is the address of the BG Partition Savearea? X'__4E20__'.
5. For SVC, IO, and all PC interrupts (except page translation exceptions) the interrupt code is stored in the __Assigned Real main Storage.__ SVC @ 8B, IO @ BA, PC @ 8E

PIB2LIST

6. What is the address of the first System Task Control Block?. X'__2C34__'
7. What General Register would be stored at a displacement of X'10' into any Problem Program Savearea? GR __9__
8. If the byte at RETAB + X'85' was 00, what system resource would be in use? ____________ SVC5 bound i.e. waiting for PTA to be released.

RETAB +85

TRTMASK - X'80' of STMT 19169.

TRTMASK + X'5'

9. Given the following System Tasks, list them in priority sequence.

a. 4 SUPVR ____________
b. 6 ERP ____________
c. 1 RAS ____________
d. 3 PAGEIN ____________
e. 2 PMGR ____________
f. 5 CRT ____________

RASBLOCK
PMR
SUP
CRT
ERP
3 PGN

10. Are the System Task Control Blocks physically located in priority sequence? _________ NO.

11. Which task selection control block determines the system task priority? _______________ TIDFLD

12. What is the current partition dispatching priority in the dump? ______ BG F4 F3 F2 F1 ______ SYSCOM B4 → MVCFLD

13. When SVC33 is issued by a supervisor task, what is the SELECT byte set to? X'____________'

Ø

MVCFLD.
06 03 04 05 00

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

14. What is the current value of the PIK? X' 0010 '. BG active.

PIB.
AR
BG
F4
F3
F2
F1
Sub

15. NB. PIK is used to identify the task in control of the system or the task that was last being serviced by the supervisor. Internally the PIK value is used as a displacement into what table (control block)? __PIBTAB.__________________________

16. How many partitions are inactive at this time? FG4, FG3, FG1.

17. Are there any partitions waiting for the services of the page manager to complete? __possibly FG2____

18. At the time the dump was taken, which partition, if any, had control of the LTA? ________________________________ BG.

19. Considering the answer to question no. 18, what was the service requested by the BG partition? __________________

20. What is the address of the System Task Savearea of the last system task that was in control of the system?
X'____________'

21. What is the address of the system savearea of the partition being serviced by the last system task? X'__________'
4C90

FG2 is SVC7 bound
BG is ready

22. Was a system task in control at the time of the dump?
______________ NO

23. If the byte at address X'2A5A' was changed to a X'83' and task selection was performed, what address, if any, would be placed in ASYSBLKX? X'___________' PMGR task will be selected. addr of PMGR sys task block.

24. What byte in the TRTMASK Field will be set to zero when an SVC22 is issued? Address X'____73_____'

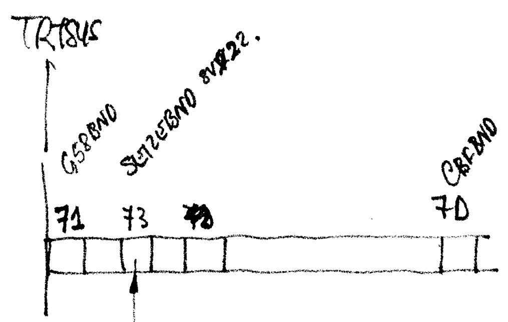
25. When the byte referenced in the previous question has been set to zero, what PIB flag will be used to prevent the dispatching of any problem program other than the one that issued the SVC22? X'__73._____'

321/19170.

26. What is the PIB FLAG for the supervisor task set to when it issues an SVC33? X'__83______' ready to run.

SVC22 : ① seize / release
② enable/disable external and I/O int
③ set key in mem PSW.

TRTMASK Table gates resources and contains various selection masks used to scan PIB flags



set to 00 - PIB flag set to 73
System seized.

ANSWERS TO WORK PROJECT 2

1. X'4CE' (BGCOM + X'2E' contains the PIK that is altered to indicate which partition is in control)

2. X'2DF0' (BGCOM + X'5A')

3. X'4E90' (BGPIB + 9)

4. X'80000' (ARPIB + 5 because this address and the address of LTASAVE are swapped in the PIBTAB when a partition gains control of the LTA)

5. Program Information Block Extension

6. X'2C14' - SYSCOM + X'98' (ASYSBLKO)

7. Register 9 (Registers are stored 9 through 8 starting 16 bytes into the savearea)

8. The Physical Transient Area (PTA) Label - TRTPTA

9. a. 4
   b. 6
   c. 1
   d. 3
   e. 2
   f. 5

10. No (The PAGEIN SYSTEM TASK is third in priority but its control block is physically located sixth)

11. TIDFLD (Entries are by position highest to lowest priority).

12. F3, F4, F2, BG, F1 (SYSCOM + X'B4' contains address of MVCFLD which contains the dispatching priorities high to low for the partitions and the attention routine).

13. 0 - ZERO (The system task is relinquishing control, if needed, to a higher priority system task)

14. X'0010' (Background)

15. Program Information Block (PIBTAB)

16. 3 (F4, F3, and F1 have PIB FLAGS of '80' indicating program not active. The Attention Routine is also not active)

17. No (None of the PIB DAT FLAGS are set on except Virtual Mode).

18. Background (LTK at BGCOM + X'6E' contains PIK of LTA owner when it is active. When the LTA is inactive, the LTK contains zeros)

BG requested.

19. SVC67 - PFIX (Along with the savearea addresses being swapped when the LTA becomes active, the interrupt codes are swapped in the PIB2TAB)

savearea of partitions

20. X'5818' (SYSCOM + X'9C' (ASYBLKX) points to the system task control block for the task that was in control. Bytes 5-7 of this control block contain the address of the savearea). system task save area of last system task in control.

21. X'4E90' (Byte 2 of the SUPVR SYSTEM TASK CONTROL BLOCK contains the PIK of the partition being serviced, in this case BG; and the address of the system savearea is in bytes 9-11 of the PIBTAB entry)

22. No (The SELECT byte (SYSCOM + X'44') is 00 indicating no system task in control of the system)

23. X'2C24' (Address of the PMGR System Task Control Block).

24. X'6EB' - TRTSIEZE (RETAB + X'73')

25. X'73'

26. X'83' (If no higher priority system task is ready to run, this task will regain control of the system)

WORK PROJECT 3 - CHANNEL SCHEDULER

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. In a core dump of the system, locate and interpret the various control blocks used by the channel scheduler and I/O supervisor.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base Supervisor Listing
DOS/VS Base SCM2

Directions to the Student

Using the Supervisor PLM, and referencing the WP03 DUMP in DOS/VS Base SCM2, answer the following mandatory questions:

1. What is the address of the PIB table? X'2DF0'

2. Using the value of PIK as a displacement into the PIB table, find the PIB entry associated with the problem program currently active. What is the address of this PIB entry? X'2E00'

3. Using the PIB table find the address of the problem program savearea for the active partition. What is the address of that savearea? X'~~[illegible]~~' F800

4. Find Register 1 in the savearea. What is the value in Register 1? X'~~[illegible]~~' F8A6

5. Register 1 points to a CCB in the program.

   a. What is the Symbolic Logical Unit in the CCB? SYS005

   b. What is the CCW address? X'F888'

6. Using the value in bytes 6 and 7 of the CCB, go the LUB table and find the assignment for that Logical Unit. SYS005

   a. What is that assignment? X'_unassigned_' FF.

   Find the LUB entry for SYS004.

   b. What is the assignment for SYS004? X'_000C_'

   c. Is there a JIB pointer? _NO_

7. Using SYSVIS's JIB pointer, find that JIB entry.

   a. Does SYSVIS have an alternate assignment? _NO_

   b. Why is bit 4 in byte 02 of SYSVIS's JIB entry ON? _____ EXTENT INDICATOR ON Bit 2

8. Find the SYSREC LUB entry:

   a. What does the entry contain? X'_0801_'

   b. What device is it assigned to? X'_8th device PUB. 131_

   c. What are the JIB (s) being used for? _EXTENTS_

      ___2311/2314/2319 EXTENTS___

   d. What are the extents? _C5 C5 197 for 2311_

9. Look at the PUB entry for SYSREC:

   a. What is the device address X'_0131_'

   b. What is the device type? X'_2314_'

10. According to the FREE LIST POINTER:

   a. Which CHANNEL Queue entry is the first one in the free list? _01_

   b. How many entries are in the free list? _16_

   c. What is the CCB address in the second Channel Queue entry? X'_6B80_'

   d. Why is there a CCB address in the second Channel Queue entry when that entry is in the Free List? ? left over.

11. According to the channel control table, what type of channel is channel 1? ____________

   Selector Channel.

12. According to the CHANNEL BUCKETS:

a. What is the channel and unit address of the last device started on Channel 0? X'__00E___'

b. What is the PUB address for that device? X'_30Ø A6___'

c. What is the PUB address of the first PUB on that channel? X'_____3Ø96_____'

ANSWERS TO WORK PROJECT 3

1. X'2DF0'

2. X'2E00'

3. X'F800'

4. X'F8A6'

5. a. SYS005 - Bytes 6 and 7 in the CCB contain X'0105' Programmer Class (01) Sixth Unit (05)
   b. X'F8B8' (Points to first CCW, but there may be more than one).

6. a. Unassigned (X'FF' in LUB)
   b. X'000C'
   c. No

7. a. No
   b. Because bit 2 of byte 02 is also ON.

8. a. X'0801'
   b. X'131'
   c. 2311/2314/2319 extents
   d. Extent is: Lower Limit 197; Upper Limit 197 (Only one extent because byte 03 is 'FF' - not chained)

9. a. X'131'
   b. 2314/2319

10. a. 01 or the SECOND entry
    b. 16
    c. X'6BB0'
    d. It is residual (left over from a previous I/O request).

11. Selector Channel

12. a. X'00E'
    b. X'30A6'
    c. X'3096'

WORK PROJECT 4 - ERROR RECOVERY

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. In a core dump of a DOS/VS System, locate and interpret the various control blocks and areas used by the Physical Device Error Recovery Procedures.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment, and Documentation

DOS/VS Error Recovery and Recording Transients Logic
DOS/VS Base Supervisor Listing
DOS/VS Base SCM2

Directions to the Student

Using the Supervisor Listing, WP04 Core and Disk Dumps in DOS/VS Base SCM2, and Error Recovery and Recording Transients PLM, answer the following mandatory questions:

1. Refer to the System Communications Region (SYSCOM):

   a. What is the address of the current system task block? X'_2C3C_'

   b. What value does the System Task Identification Field (STID) contain? X'_05_'

   c. Which system task is currently active? _ERP_

2. Going to that System Task Block:

   a. What is the address of the savearea for that system task? X'_5700_'

   b. Which User Task is being serviced by this system task? X'_80_'

3. Since this is the Error Recovery Task:

   a. What is the address of the error block? X'__4CAC__'

   b. What is the address of the Physical Transient Area (PTA)? X'__7ØD8__'

4. Going to the Error Block, we find that an error has occurred. Look at the first error queue entry in the Error Block:

   a. Which device did the error occur on? X'__ØØC__'

   b. What is the address of the CCB? X'__F8A6__'

   c. What type error is indicated? __CE UC Pres msg 40. - BCK -__

later 5. ~~Using the formula in the PLM for finding the PUB2 entry for~~ a device, find the PUB2 entry for device X'000C'.

   a. What is the address of this PUB2 entry? X'________'

   b. What is the SYSREC cylinder/head address? X'________' (HINT: Kept in the recorder file table)

6. Looking at the DASD Disk Dump of SYSREC, specifically Record 2:

   a. What type of record is this record? _______________

   b. What type of device is this record associated with? _______________

   c. What is the device address? X'____________'

7. 'A' transients are used for Physical Device Error Recovery. Look at the Physical Transients Area (PTA):

   a. Which Physical Transient is now in core? __$$ABERRN.__

   b. What is the function of this transient? __ERP messagewriter.__

____

ANSWERS TO WORK PROJECT 4

1. a. X'2C3C'
   b. X'0005'
   c. Error Recovery (ERP)

2. a. X'57D0'
   b. Background (PIK=10)

3. a. X'4CAC'
   b. X'70D8' (SYSCOM +X'94)

4. a. X'000C'
   b. X'F8A6'
   c. Equipment Check

5. a. X'5F98'
   b. 00C50000 <u>or</u> Cylinder 197 - Head 0

6. a. Type 1 I/O Device Record
   b. 2540 Card Reader (Device Type Code 11; Bytes 52-53 in Figure 32)
   c. X'000C'

7. a. $$ABERRN (First Eight Bytes of Transient Area)
   b. Message Writer (Figure 2 ERP PLM)

WORK PROJECT 5 - MCAR/CCH

Objectives

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate the control blocks used to handle a machine or channel check on a System/370.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Error Recovery and Recording Transients Logic
DOS/VS Base Supervisor Listing
Dos/VS Base SCM2

Directions to the Student

Using the WP05 Core Dump in DOS/VS Base SCM2, and any available documentation, answer the following mandatory questions:

This standalone dump was taken following a data compare trap that referenced the ERPIBQ at the time of a Channel Interface Check (see Stored Status area). Normal operation would continue with the cancellation of the task with the msg. OP82I JOB XXX CANCELED DUE TO CHANNEL FAILURE.

1. Does a Channel Control Check or a Channel Interface Control Check cause the loading of the Machine Check New PSW? ______

2. What type of Channel Check caused the Resident Channel Check Handler to gain control of the system? ____________________

3. Was an Extended Channel Status Word (Limited Channel Logout) stored for this check? ______________

4. What is the fixed address of the LIMITED CHANNEL LOGOUT ECSW? X'__________'

5. Was it the CPU or the Channel that recognized the check?

   ____

6. Was the source of the error from main storage or its controls? ______________

7. Was the channel and device address recognized as being valid? ___________

8. What is the address of the RAS Linkage Area? X'_________'

9. Is the RAS Monitor active in the dump? __________

10. Was the Channel Check Handler entered from the SIO routine or the I/O Interrupt Handler? ______________

11. What is the address of the RAS Monitor Table? (RASTAB) X'__________'

12. At the time the dump was taken, which RAS transient was activated? ____________

13. What is the CIL disk address for $$RAST01? Cyl_______ Hd_________Rec ____________

14. What is the address of the RAS transient area? X'______'

15. What RAS Transient is currently residing in the RTA? ___________

16. What is the address of the (ERPIB) Error Recovery Procedure Information Block? X'___________'

Refer to the WP05 SYSREC Disk Dump in DOS/VS Base SCM2 to answer the remaining questions.

17. What type of records are recorded on SYSREC at Cyl 197, Head 0, Records 2, 3, and 4? ____________________________

18. What was the CPU serial number contained in the records referenced in question 17?

19. What was the job name being used at the time the records referenced in question 17 were recorded?

20. How many devices were active at the time each check occurred? ______________

21. What command was issued to the tape drive which caused SYSREC record 2 to be written? ________________

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

22. Because of the timing of the core dump, some significant data has not as yet been placed in the ERPIB. There is some data temporarily saved in a non-documented area just prior to the RASTAB that may be of use in troubleshooting any RAS problems. You may want to make note of these for future reference. Starting at RASTAB-24, there is a 4 byte savearea for Reg.8 which is the BAL Reg to the routine to dequeue an I/O request (RASDEQ). It can be used to determine which routine called RASDEQ. RASTAB-20 is used to save the address of the PUB TABLE entry for the device in error, and RASTAB-12 is the address of the current ERPIB entry being worked on. RASTAB-16 is the CHANQ address.

    Using this information, what is the Channel and Device Address being accessed when the Channel Check occurred? X'__________'

23. Had the CCH been allowed to continue, at what address would the PUB pointer have been placed in the current ERPIB? X'____________'

24. What RAS transient will eventually be called to handle a channel check for this device type? $$RAST ______________

25. Use the 'Channel Check ERP Decision Tables' in the DOS/VS Error Recovery and Recording Transients Logic to answer the following question:

    Given the same ECSW as in the dump, but with a test I/O operation issued to a 3505 card reader having byte 2, bit 3 off in the user's CCB, what action would be taken? ________

    ____

ANSWERS TO WORK PROJECT 5

1. No (These two checks are indicated by bits 45 and 46 of the Channel Status Word and are recognized by either the SIO routine or the I/O Interrupt Handler which then passes control to the Channel Check Handler).

2. Interface Control Check (Bit 46 is on in the CSW contained in ERPIBQ - CSW at X'40' has been overlaid by SA dump).

3. Yes (This was accomplished by the hardware at the time the CSW was stored - Bit 5 in CSW).

4. X'B0' (Refer to FIXED STORAGE LOCATIONS on S/370 REFERENCE SUMMARY card).

5. The Channel (Bit 5 of the Detect Field in the ECSW is on, indicating the channel detected the error).

6. No (Bits 9 and 12 of the ECSW being on, and not bits 10 and 11, might indicate to the hardware CE that the problem was coming back from the channel or control unit that was being accessed).

7. Yes (Bits 16, 19, 21, 22, and 23 being on in the ECSW indicates that the addresses sent to the channel were valid. These bits being on will cause the CCH to continue to attempt to retry the I/O operation).

8. X'640' (SYSCOM + X'70' contains a pointer to this control block).

9. Yes (Bit 0 of the RAS Flag Byte in RASLINK being on indicates that the RAS Monitor has been activated).

10. SIO routine (Indicated by bit 6 of the RAS Flag Byte being on).

11. X'C798' (RASLINK + X'0C').

12. $$RAST00 (LD00SLOT FLAG BYTE-BIT 0 (Activated Bit) is the only Activated Bit on).

13. Cyl 3 Head 12 Rec 1 (LD01SLOT bytes 1, 2, 3 contain cyl, hd, rec address of this transient).

14. X'C930' (The address of the RTA is contained in the data address portion of the RASREAD CCW (RASTAB + X'68').

15. $$RAST00 (The name of the Phase contained in the first eight bytes of the RTA)

16. X'C8CC' (label ERPIBQ in Supervisor Listing).

17. Channel Check Records (Indicated by X'20' in byte 0 of the records - Refer to SYSREC Record Format Charts in SY33-8552).

18. 10791 (Bytes 17 - 19 in the Channel Check Records).

19. WP05 (Bytes 24-31 in the Channel Check Records).

20. 2 (Bytes 32-47 in the Channel Check Records indicate the addresses of the I/O units active at the time of recording. The active devices were 01F and 282. Refer to WP05 EREP Printouts for formatted SYSREC records).

21. Set Mode (C3) (Bytes 48-55 of the Channel Check Record contain the failing CCW).

22. X'282' (RASTAB - 20 contains the pointer to the PUB entry for 282).

23. X'C8DA' (14 bytes into the ERPIB pointed to by the address in RASTAB -12).

24. $$RAST12 (PUB DEVTP indicates a 3420 tape drive (X'52') which is handled by this transient).

25. The program would be cancelled (Refer to 'I/O Recovery Procedures and Sense Data' for the 3505 in SY33-8552).

WORK PROJECT 6 - INTERVAL TIMER AND EXIT MACROS

Objectives

Upon completion of this project, the student, using the available documentation, should be able to:

1. Determine the operation of the interval timer and exit macros.
2. Identify areas in the supervisor used by these macros.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Supervisor and I/O Macros
Dos/VS Base Supervisor Listing
DOS/VS Base SCM2
DOS/VS Principles of Operation

Directions to the Student

Using the above indicated documentation, become acquainted with timer and exit macros and their associated SVCs.

Step 1 Read INTERVAL TIMER in DOS/VS Principle of Operation.

Step 2 Read the descriptions of the following macro instructions in DOS/VS Supervisor and I/O macros.

STXIT, GETIME, SETIME, TTIMER, TECB

Step 3 Observe the SVCs generated by the macro instructions in the WP06 Sample Program Assembly listing in DOS/VS Base SCM2. Read the function of these SVCs in the DOS/VS Supervisor Logic.

Step 4 Option tables are generated by the FOPT macro at System Generation. They are located in the supervisor with the labels PCTAB, ITTAB, and OCTAB. Refer to the DOS/VS Supervisor Logic to find their formats.

Step 5 The output of the WP06 program contains several PDUMPs of storage locations containing information set up or used by the timer macros. Prior to execution of a PDUMP in the WP06 program, the information contained in Registers 0 and 1 is moved to other registers so that the PDUMP macro doesn't destroy it.

Correlate the source listing, output and documentation; then answer the following mandatory study questions.

1. Statement 5 in the source listing is a GETIME macro. During execution of the program, at what time of day in hours, minutes, and seconds was this macro issued? (Note instructions at statements 30 and 31, and the first PDUMP at statement 52).

   ________ Hrs _________ Min ________ Sec

2. The first PDUMP displays what table(s)? ____________________

3. The third PDUMP displays the TECB. Does it indicate that the time specified by the SETIME macro has elapsed? _______

4. The second PDUMP displays SYSTIMER and SYSTOD. Approximately how much time remains in SYSTIMER? _________________

5. What value is contained in the BG PC option table entry in the cancel dump? X'__________'

6. Does DOS/VS provide interval timer support for all partitions? ____________

ANSWERS TO WORK PROJECT 6

1. Register 11 was loaded from register 1 and contains 0190933C or 19 hours 09 minutes, and 33 seconds. Register 10 now contains the minutes in hex. (See statement 18).

2. ITTAB

3. No (Bit 0-Byte 2 is 0 at address X'802FC' -- SETIME has not elapsed).

4. About 8 seconds - Bytes 50-52 contain 000969. Converted to decimal this equals 2409 (Then divide by 300 because the time is in 1/300 second intervals).

5. All zeros starting at X'2E50' (The EOJ transients clear this area).

6. Yes (Beginning with Release 28, DOS/VS provides multiple partition timer support. Before Release 28, only the partition that had the timer assigned could support the timer macros).

WORK PROJECT 7 - FETCH/LOAD

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the contents of control blocks used to Fetch or Load a phase.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base SCM2
DOS/VS Base Supervisor Listing

Directions to the Student

Using the WP07 Storage Print in DOS/VS Base SCM2, answer the following mandatory questions:

1. What is the address of the Fetch Table? X'6278'

2. What is the address of the SYSRES Second Level Directory? X'__________'

3. At what cylinder and head does the Core Image Directory always start for SYSRES? Cyl_________ Hd _________

4. What is the phase name in the last entry on track 2 of the SYRES Core Image Library? ____________

5. How many Core Image Library Directory tracks can the System Second Level Directory support? ______________________

6. What is the name of the control block (work area) used by the Fetch routines when fetching or loading a phase?

   ____

7. What is the address of the TCB for Background? X'_______'

8. What was the SVC that was issued to cause the activation of Fetch? SVC __________________

9. What is the name of the phase being fetched or loaded?
____

10. What is the address in the problem program area where the phase name was originally found? X'____________'

11. How many RLD items are in the phase being fetched or loaded? ___

Using the WP07 Disk Dump of the Core Image Directory in DOS/VS Base SCM2, answer the following mandatory questions.

12. How many tracks are allocated for the Core Image Directory?
____

13. How many cylinders are allocated for the Core Image Directory?
____

14. How many tracks are in use in the Core Image Library? ______

<u>OPTIONAL Study Questions</u>

If you encounter difficulty analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions.

15. Is the Fetch System Task currently in control of the system?
____

16. What is the entry address for the Fetch routine? X'______'

17. How many core image blocks are contained on each track of the Core Image Library? _____________

18. How many Core Image Directory tracks are supported for each PRIVATE Second Level Directory? __________

19. How many Core Image Library blocks are used by the phase being fetched or loaded? _______________

20. What is the name of the phase that was linked the last time a 'LINK and GO' operation was performed by the Linkage Editor? ____________________

21. What is the disk address (CCHHR) on SYSRES where the beginning of the phase $$BJACT can be found?
Cyl=___________ Hd=____________ R=____________

22. How big (no. of bytes) is the phase referenced in question 21?
____

23. What type of phase (i.e. Self-relocating, SVA Eligible, etc.) is the phase referenced in the last question?
____

ANSWERS TO WORK PROJECT 7

1. X'6278' (SYSCOM + X'F0')

2. X'62F0' (FTTAB + 0)

3. Cyl 0-Head 2 (FTTAB + X'0A')

4. Assembly (SLD + X'0A')

5. 15 (SLD + 0)

6. Translation Control Block or TCB (As you will see later this same work area is used for CCW translation for I/O issued from a virtual mode program).

7. X'4EE0' CCWTCB1 (The translation control block for each partition is always 80 bytes beyond the beginning of its SYSTEM savearea).

8. SVC 4 (SVEARA + X'58' contains X'880' which is the return address to the SVC routine that invoked Fetch).

   NOTE: SVEARA + X'58' is at the label FCHRET in the TCB. Refer to the DSECT for the LTA and PP Savearea).

9. FCHT (The phase name is always placed in the 8 bytes at the label CALLNAME which is SVEARA + X'68' or CCWTCBX + X'18').

10. X'8008C' (SVEARA + X'5C' contains the address of the phase name passed to Fetch by the calling program - label CALLPNAM).

11. 0 (The indication that the phase is self-relocating at ENTRYC and the halfword at SVEARA + X'80' both indicate no RLD items).

12. 10 (In the Library Descriptor Entry at a displacement of X'0E'. Observe that the descriptor record actually starts at byte 03 <u>as shown in the dump</u> - bytes 01 and 02 are the NN field of the first directory block).

13. 34 (Displacement of X'10' into the LDE).

14. 612 (LDE + X'1C' contains the number of library blocks in use and LDE + X'1A' contains the number of blocks per track).

15. Yes (SELECT byte contains X'03').

16. X'7A50' (SYSCOM + X'10') (AFETCH).

17. 6 (Halfword at FTTAB + 6).

18. 5 (Refer to bytes 0 and 1 in SLD for each partition).

19. 7 (The halfword at SVEARA + X'74' (ENTRYTT) contains the number of TXT blocks in the phase. The byte at SVEARA + X'78' indicates that it is a self-relocating program-label ENTRYC).

20. HISPDUMP - LDE + X'32' contains the first phase name of the last program that was linked during a 'LINK and GO' operation (OPTION LINK).

21. Cyl = 22, HD = 16, R = 3 (The directory entry + 8 contains 3 bytes called the TTR or relative track address for the beginning of the phase relative to the beginning of the directory. For $$BJACT this entry is X'01C603' which is TT=1C6 and R=3. The beginning of the CID is track 2 so we must add this to TT and then divide by the number of tracks per cyl,
    X'1C8' / X'14' = 22 with a remainder of 16.
    The remainder is the head value.

22. 38 (The directory entry + X'0C' indicates the number of TXT blocks in this phase. Since that entry indicates only one block, the size of the phase can be determined by the entry in the next two bytes, that is, the number of TXT bytes in the last TXT blocks).

23. Self-relocating (The byte at a displacement of X'10' into the directory entry indicates this type).

WORK PROJECT 8 - PAGE MANAGER

OBJECTIVE

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the contents of control blocks used for storage management in the DOS/VS Supervisor.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base SCM2
DOS/VS Base Supervisor Listing

Directions to the Student

Using the WP8N9 Core Dump in DOS/VS Base SCM2, the Supervisor Listing, and any additional documentation necessary, answer the following mandatory questions:

1. What are the beginning addresses of the following control blocks?

   a. PMGR System Task Control Block (PMRBLOCK) X'_2020_'
   b. Segment Table (STAB) X'_D700_' CR1.
   c. Page Table (PT) X'_D7E8_'
   d. Page Frame Table (PFT) X'_CCC0_'
   e. Page Frame Table Extension (PFTX) X'_D7E8_'
   f. Page Queue (PGQU) X'__________'
   g. Fix Waiter Table (FIXWTAB) X'_________'

2. Which partition was being serviced the last time the PMGR System Task was in control? ___BG___

3. What are the three main routine names of the Page Manager System Task? _________ _____________ ____________

4. What is the name of the control block that is always used to pass information to the PMGR System Task? ______________

5. An entry that is to be placed in the table referenced in question 4 is always initially built at what hex address? X'_____________'

6. Which of the three main routines of the PMGR System Task builds the entry at the address referenced in question 5?
____

7. In the core dump, which partition was the last to enqueue a request for the services of the PMGR System Task?
____

8. Was the partition referenced in question 7 being serviced by a system task when this request was enqueued? ________

9. What are the four basic request types handled by the PMGR System Task? __________________ _________________________
_________________ ___________________

10. Which type of PMGR request was indicated by the last service request to the PMGR System Task? ___________________________

11. Is the request that was last built at TRADDR the one that is currently being handled by the PMGR System Task? _________

12. Which of the three main routines of the PMGR System Task deletes a handled service request and posts the requester ready to go?

13. If the PFIX or the GETREAL routines are forced to wait for page frames to be returned to the selection pool, what control block is used to save information needed when the routine is restarted? ____________________________________

14. What is the virtual address of the page currently being handled by the Page Manager for BG in the core dump?
X'___________________'

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

15. How many partitions were active at the time the core dump was taken? ____

16. Of the partitions that are active, how many are waiting for Page Manager services? _______________

17. Are any of the System Saveareas in use at this time for the waiting partitions? ___________________

18. Why is the PMGR System Task in a wait condition?____________

____

19. After a request has been handled by the page manager, can the entry in the PGQU for this request still be found? _________

20. If a PFIX or GETREAL routine had been forced to wait, which two page manager routines are the only ones that could post the waiting routine ready to go? ____________ ____________

21. The PMGR System Task uses a work area starting at X'A8FC' (label PGAD). This area contains information that is of significant value when diagnosing PMR problems. PGAD contains the virtual address of the PAGE being handled. PFAD contains the address of the PAGE FRAME selected by BQCL (via the Least Recently Used algorithm). NPTEAD contains the address of the new PAGE TABLE ENTRY (the PT entry associated with the PAGE being handled). CPTEAD contains the address of the PAGE FRAME TABLE ENTRY associated with the selected PAGE FRAME. OLDPTE contains the address of the 'old' PAGE TABLE ENTRY when two pages are being exchanged. CPTEOF1 contains the PFT offset (displacement) to the 'old' page frame and CPTEOF2 contains the PFT offset to the 'new' page frame when two pages are being exchanged.

Based on the previous information, answer the following questions relative to the request currently being handled by the PMGR System Task in the dump:

a. What is the address of the PT entry associated with the page being handled? X'________'

b. At the time the dump was taken, did this PT entry contain the address of the page frame selected by BQCL to receive the page? ___________

c. What is the real address of the selected page frame? X'________'

d. Is the selected page frame currently (in the dump) in the selection pool? ___________

e. When the PNR address in the PFT entry for the selected frame is eventually plugged into bytes 4 and 5 of the PFT entry, what will it be? X'_________'

ANSWERS TO WORK PROJECT 8

1. a. X'2C24' (SYSCOM + X'98') + (SYSCOM + X'A2')
   b. X'DE00' (SYSCOM + X'D0')
   c. X'D7E8' (First entry in STAB or at the label 'PT')
   d. X'CEC0' (SYSCOM + X'D4')
   e. X'D6E8' (SYSCOM + X'D8')
   f. X'9C8C' (SYSCOM + X'11C')
   g. X'9D44' (Label FIXWTAB in the SUPVR listing)

2. BG (Indicated by the PIK of 10 in byte 2 of the PMGR System Task Control Block).

3. ENQU, PMR, DEQU

4. Page Queue (PGQU)

5. X'90' (TRADDR) This fullword is used to pass the virtual address to be handled by the PMGR System Task. The entry is built at this address and then moved to the first available position in the Page Queue (PGQU).

6. ENQU (One of the functions of this routine is to build bytes 0 and 3 of the entry placed in TRADDR. These bytes indicate which user task this request belongs to (byte 0) and whether another system task is servicing the user task or not (byte 3). Bytes 1 and 2 contain the leftmost 16 bits of the address of the page to be handled (inserted by hardware or VS management routines).

7. F4 (Indicated by the PIK of X'20' stored at X'90' by the ENQU routine and by the last request contained in the PGQU at X'9C90').

8. No (This is indicated by the F4 PIK of X'20' being in byte 3 of the TRADDR. If a system task was servicing F4, the SELECT value for the particular task would have been placed in TRADDR + 3).

9. Page Translation Exception, PFIX, TFIX, GETREAL (In order to successfully diagnose page manager problems in a minimum amount of time, a determination should be made of the request type being handled at the time of the failure).

10. Page Translation Exception (Bits 4-7 of the first byte at TRADDR being off indicate either a PTE or a PAGEIN request. The lack of a select byte value of X'06' in TRADDR + 3 eliminates PAGEIN).

11. No (The entry built last is contained in the second entry of the PGQU. The request currently being handled is <u>always</u> at the start of the PGQU).

12. DEQU (After removing the last entry from the PGQU, this routine turns off the SELECT byte and exits to task selection, otherwise it returns to PMR).

13. FIXWTAB (FIX Waiters Table).

14. X'0F8000' (Bytes 1 and 2 of any PGQU entry contain the leftmost 16 bits of the virtual address to be handled).

15. 2 (SYSCOM + X'CE' indicates the number of active partitions).

16. 2 (BG and F4 PIBFLAGS of '87' indicate this).

17. No (None of the necessary PIB DAT FLAGS (bits 6 and/or 7) have been set to indicate the use of the System Savearea).

18. It is waiting for an I/O interrupt (from SYSVIS) as indicated by a PIBFLAG of X'82'. The PSW in the PMGR Savearea points right beyond an SVC 0 to an I/O WAIT routine. Reg 1 in the PMGR Savearea points to a CCB for SYSVIS.

19. No (When the first entry in the PGQU has been handled the remainder of the entries are shifted up by four bytes, overlaying the entry just handled).

20. TFREE or PFREE (When returning a page frame to the selection pool, the PFREE routine will check the NF bit in the Page Frame Table Entry, and the TFREE routine will check both the NF and NFF bits in the PFTE. If any of the respective bits are on, either routine will then perform the required functions which include posting the waiting task ready to go.

21. a. X'DBC8' (Contained in NPTEAD at X'A904')
    b. No (The first 13 bits (0 to 12) of this entry will eventually be plugged with the first 13 bits of the real address of the selected frame).
    c. X'4D000' (Contained in PFAD at X'A900')
    d. No (Bit 14 (SP bit) in the PFT entry at X'D390' is ON. CPTEAD at X'A908' points to this entry).
    e. X'0F80' (The virtual address of the page being handled divided by 2048).

WORK PROJECT 9 - PAGE REPLACEMENT ALGORITHM/LOAD LEVELER

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the constants and control blocks used to control virtual storage paging activities.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base SCM2
DOS/VS Base Supervisor Listing

Directions to the Student

Using the WP8N9 Core Dump in DOS/VS Base SCM2, the Supervisor Listing, and any additional documentation necessary, answer the following mandatory questions:

1. What is the label of the PMGR System Task subroutine that performs the Least Recently Used algorithm? ______________

2. This subroutine scans the Selection Pool which is made up of five chains of entries in what control block?______________

3. Which bit in a PFT entry indicates whether or not a page frame is eligible for paging? ____________________

4. To be able to distinguish between each of the 5 Selection Pool Queues (chains), 5 Queue Headers are generated immediately following the PFT. Each of these headers are 8 bytes long, with the top (forward) and bottom (backward) queue pointers in bytes 2-3 and 6-7 respectively as are the forward and backward pointers in each PFT entry. Each pointer in either a PFT entry or a header is the displacement from the beginning of the PFT to the entry pointed at (either forward or backward).

   Identify the labels of the 5 Selection Pool Queues.

   ________ ___________ ____________ ________ ________

5. The particular queue that is represented by each header changes every time a Queue Switch function is performed. What is the physical sequence of the 5 labels given to the adcons which point to the current chain that each header represents?

_________ _____________ __________ ___________ _______

6. Which two of the five selection pool queues are the only ones that are scanned during the Least Recently Used algorithm?

______________ ______________

7. Scanning of the Q00 and Q01 queues consists of determining the Reference and Change bit settings in the hardware storage protect stack for each frame represented by the PFT entries in the two queues.

   What is the machine instruction that is used to determine these bit settings? ________________________________

8. What is the label of the one byte field that is used to indicate which selection pool queue is being scanned for an available frame? ___________________________________

9. Which of the selection pool queues are currently empty in the core dump? _________________________

10. How many entries are currently in the Q00 chain? _________

11. What is the name of the PMGR routine that prevents the system from entering a thrashing condition due to excessive paging activity? __________________________

12. What are the names of the parameters used by the Load Leveler to measure the following conditions when testing for a thrashing condition?

    a. Maximum number of Page-ins per second ______________
    b. Minimum number of Page-ins per second _______________
    c. Minimum length of Reactivation-Measurement Interval _________________
    d. Maximum Reentry Rate _____________
    e. Number of Page-ins defining Deactivation-Measurement-Interval ________________

13. Which supervisor control block contains a pointer to the Load Leveler constants referenced in question 12? ____________

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

14. What condition code must be returned by an RRB instruction in order for a frame in the Q01 chain to be selected?
____

15. What is the real address of the last frame for which the Page Manager completely finished handling the paging activity? ____________________

16. Which virtual storage control block is used by the PMGR System Task to determine the storage protect key value to be set whenever paging activity has been completed for any frame? _____________________

17. What is the name of the field used to maintain a count of the number of page-ins of pages that were paged out earlier in the same measurement time period? _______________

18. What is the name of the bit-string table that is used as a page-in reference (compare) in determining the need for an increase in the value of the counter referenced in question 17? ____________________.

19. In the core dump, what is the lowest page address of any pages that were paged out to SYSVIS within the last Load Leveler time measurement? X'_______'

20. What is the count of the number of elements (frames) in the Selection Pool at the time of the dump? ____________

21. For the machine configuration from which the core dump was taken, what is the maximum number of page-ins allowed per second before deactivation of a partition begins? _________

22. In the core dump, CCONST contains zeros. What table in $IPLRT5 could be changed to put a different value in this or any of the Load Leveler constants? _____________

23. What is the routine that will be called first to post a partition Load Leveler-Bound when the proper deactivation criteria is met? ___________________

ANSWERS TO WORK PROJECT 9

1. BQCL (This routine is called by the PMR portion of the system task when it is determined that a free page frame is needed).

2. Page Frame Table (This control block is used to maintain statistics and control all of real main storage. Each eight byte entry in the PFT represents a 2K block (frame) of real storage).

3. Bit 14 (When this bit is off, the corresponding page frame is eligible for BQCL to select it when paging becomes necessary (i.e., the frame belongs to (is in) the Selection Pool).

4. Q00, Q01, Q10, Q11, HQ

5. Q00, Q10, HQ, Q01, Q11 (These adcons are in this physical order to accomplish the Queue Switch Function. The adcon at Q10 is moved to Q00, HQ is moved to Q10, Q01 is moved to HQ, Q11 is moved to Q01, and Q00 adcon (saved before starting the switch) is moved to Q11).

6. Q00, Q01 (When these queues have been scanned and both are found to be empty (no frames selected) the Queue Switch function is performed and the scan begins again with Q00).

7. Reset Reference Bit (RRB) (This instruction turns off the reference bit only and returns a condition code indicating the settings of both the reference and change bits prior to the reset).

8. SCAN (This field contains X'00' when scanning Q00 and X'01' when BQCL is scanning Q01. Its setting at the time of a possible failure in BQCL may be important).

9. Q10 and Q11 (Indicated by the top and bottom pointers being equal. These displacements into the PFT are to the headers themselves).

10. 7 - Seven entries are currently in the Q00 chain. 4C0 (D830), 4C8 (D388), 740 (D600), 4D8 (D398), 750 (D610), 3B0 (D270), 760 (D620).

11. Load Leveler

12. a. ACONST
    b. CCONST
    c. MINTIME
    d. BCONST
    e. NPI

    All of these fullword values are filled in during IPL by $IPLRT5 after a determination has been made as to the CPU type and the SYSVIS device type (using the DPDTAB). This allows a variance for more paging activity on faster machines.

13. DPDTAB (Bytes 20-23 contain the address of ACONST).

14. Not Referenced but Changed - CC1 (This indicates that the frame had been either in the Q00 or the Q01 queue at least once during a scan and had been returned to the Q01 queue without being referenced again since the last queue switch).

15. X'5D000' (After a frame has been selected and the paging function completed, the PFT entry for the 'NEW' page frame is inserted at the bottom of the Hold Queue. The bottom (backward) pointer in the queue header for the HQ points to the PFT entry that was last inserted in the HQ. By appending two zeros to any halfword pointer the real address of any frame is obtained).

16. Page Table (Bits 8 -11 of a PT entry contain the storage key of the corresponding partition if bit 13=1 (Invalid). The PMGR uses this value for a SSK instruction whenever the corresponding page has been made valid, (i.e., read in from SYSVIS or fetched from a Core Image Library).

17. RRCTR (Reentry Rate Counter)

18. RTAB (Reentry Rate Table)

19. X'E6800' (The first bit that has been turned on in the RTAB is Bit 4 of the byte at X'B1B5'. This bit corresponds to the page at X'E6800'. This page was replaced in real storage by another page within the current measurement interval).

20. 217 (The halfword at label 'NSPE' is used to maintain this count).

21. 10 (This is indicated by the value at ACONST).

22. LLIPLPAR (Using the CPU and SYSVIS device type codes, $IPLRT5 determines what entries in this table will be moved to the Load Leveler constants).

23. DEACTP (DEACT is called to measure for deactivation criteria and if it is met, a branch is taken to DEACTP to have a partition deactivated).

WORK PROJECT 10 - CCW TRANSLATION

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the contents of control blocks used during the CCW Translation function of the DOS/VS Supervisor.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base SCM2
DOS/VS Base Supervisor Listing

Directions to the Student

Using the WP10 Core Dump in DOS/VS Base SCM2, the Supervisor Listirg and any other available documentation, answer the following mandatory questions:

The WP10 Core Dump was taken at the time a SIO was issued for DASD X'131'. The EXCP for this operation came from the F4 program VSSDY01 running in virtual mode. The program DITTO was also running in BGR.

1. What is the address of the last CCB copy block used by the CCW translation routines? X'__________'

2. Which partition does the CCB copy block, referenced in question 1, belong to? ____________________

3. What is the address of the Translation Control Block (TCB) for the partition referenced in the last question. X' ______'

Use the TCB referenced in Question 3 to answer questions 4 -21.

4. Is the device that was handled by this TCB capable of handling Status Modifier Commands? ___________

5. What was the last virtual address passed to the TFIX routines for this I/O operation? X'__________'

6. At the time the core dump was taken, was the TCB still in use (enqueued)? ______________

7. Has translation for the I/O request been completed? ________

8. What is the virtual address of the user's CCB for this I/O operation? X'__________'

9. What is the address of the first CCW Copy Block in this channel program? X'________'

10. What is the virtual address of the first CCW in this channel program? X'___________'

11. How many Channel Command Words are contained in this channel program? ____________

12. Are there any Indirect Address Lists associated with this I/O operation? ____________

13. What bit in any CCW indicates to the channel that the data address in the CCW points to an IDAL instead of an I/O area? BIT ____

14. Are there any pages TFIXed in real core below 384K? _____

15. What is the address of the FIXBLK associated with this I/O operation? X'_________'

16. What is the address of the Channel Queue Entry for this I/O operation? X'_________'

OPTIONAL Study Questions

If you encounter difficulty when analyzing the T/As associated with this work project, you may wish to enhance your diagnostic ability by answering the following OPTIONAL questions:

17. What is the address of the byte, and bit within the byte, that indicates to the CCW translation 'SETFLAG' routine that the device for this I/O operation is capable of handling a SET FILE MASK control command (command code X'1F')? X'_________', Bit ________

18. What is the logical unit associated with the I/O request? SYS ______________

19. If all of the CCWs that require a 2 byte or larger data area crossed page boundaries, how many IDAL blocks would have to be enqueued to handle this operation? ___________

20. What is the page frame address of the page that has been TFIXed for this I/O operation? X'_________'

21. Are there any additional I/O requests queued against the I/O device associated with this operation? _________

ANSWERS TO WORK PROJECT 10

1. X'DE80' (SYSCOM + X'84' (ACCWT) contains a pointer to the CCW translation routine which is headed by three adcons, the first of which (ACCBB) is a pointer to the first CCB copy block enqueued for all current virtual I/O operations. The first entry in this chain of CCB copy blocks is also the last because CCBNEXT at X'DEC4' contains zeros).

2. F4 (CCB Copy BLK + X'18' contains the PIK of the current user of this block).

3. X'4FA0' (The respective TCB is always X'50' beyond the System Savearea for each partition. The address of the System Saveareas are in the PIB table).

4. Yes (As indicated by the pointer to the Status Modifier List located at TCB + 4. This fullword would contain zeros if the device did not support Status Modifier Commands).

5. X'FAC83' (Located at TCB + X'30'. This address would have been used to free up the TFIXed pages belonging to this request if the TFIX routines ran out of available frames).

6. No (There are no TCBs in use by CCWTRANS at the time of the dump. This is indicated by the zeros in the adcon AUTCB which follows immediately after ACCBB. Had there been an address at this location, a search of the chain of TCBs that are currently enqueued would have been necessary in order to answer this question (TCB + X'6C' is the chain pointer).

7. Yes (As indicated by CCB Copy Block + X'1A', bit 0, being on. This is at label CCBFLAG in the copied CCB).

8. X'FACD8' (As indicated by CCB Copy Block + X'1C').

9. X'DF58' (As indicated by CCBACB (CCB Copy Block + X'20')).

10. X'FAD70' (This address is contained at a displacement of X'3C' into the first CCW Copy Block. This fullword in any CCW Copy Block contains the virtual address of the first CCW in the block).

11. 9 (Seek, Set File Mask, Search ID Equal, TIC back to the Search, Write Count/Key/Data, Search ID Equal, TIC back to the search, TIC to the next CCW Copy Block at X'DEC8', and a Read Count finishing the chain in the second copy block).

12. No (The address of the first IDAL Copy Block would have been placed at CCB Copy Block + X'24').

13. Bit 37 (The channel will assume that an I/O area does not cross a page boundary if this bit is off).

14. No (The bit string labeled CCBXINF at CCB Copy Block + X'28' is used to indicate any pages that have been TFIXed in the first 384K of real storage).

15. X'DF10' (As indicated by CCB Copy Block + X'40' (Label CCBXPTR).

16. X'4BDE' (SYSCOM + X'25' contains the address of the Channel Queue. The second entry in the queue points to the CCB for this operation).

17. X'8F8E', Bit 7 (The address at TCB + 8 (DEVCDPTR) which is placed there at the beginning of translation, indicates that this device does support some control commands with data. The routine, after determining that the current CCW is a control command, checks the fullword at DEVCDPTR for non-zero. If satisfied, the routine then shifts the CCW command code 2 bits to the right and uses the remaining bits as bit displacement into the list pointed to by TCB +8. For a command code of X'1F', the shift would result in a bit displacement of X'07', (i.e., 00011111 shifted to 00000111). Converting the 07 to a mask of 01 for a TM instruction, the routine is capable of determining if the byte at DEVCDPTR has bit 7 on, and therefore whether or not the device supports the Set File Mask control command).

18. SYS004 (Halfword at CCB + 6 indicates Programmer Logical Unit Number 4. In the copied CCB at X'DE80', bytes 6 and 7 provide this information).

19. 1 (There would only be 2 IDAWs required for each of the five CCWs that have data areas 2 bytes or larger in length. Each IDAL BLOCK can contain up to 17 IDAWs).

20. X'73000' (This is indicated by Bit 5 of Byte 4 in the FIXBLK being on (address X'DF14').

21. No (As indicated by the channel Queue Entry chain byte of X'FF' at X'4BDE').

WORK PROJECT 11 - SYSTEM FILES ON DISK

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Identify the supervisor generation macro required to include supervisor support for system files on disk.
2. Determine the correct use of Jcb Control statements when processing with system files on disk.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS System Management Guide
DOS/VS Supervisor Logic

Directions - Read the following:

Considerations When Using System Files on Disk

- Files for the system logical units of SYSIPT, SYSRDR, SYSIN (which refers to both SYSIPT and SYSRDR), SYSPCH, and SYSLST can be created on disk for any batched-job partition.
- The creation of files on disk for use as system input and output files is done by user written programs. (Utility macros are available to simplify this).
- Unique Filenames must be specified in DLBL statements for all system files that reside on disk.
- If SYSRDR and SYSIPT are both assigned to files on disk, their files must coincide (reside in the same extent) and SYSIN must be specified as the symbolic unit in an ASSGN statement.
- SYSOUT cannot be assigned to disk (tape only).
- Job Control issues an operator warning message when the area (extent) assigned to disk for SYSLST or SYSPCH approaches a predefined residual capacity.
- Residual capacity limits are established at supervisor generation time via the FOPT MACRO (SYSFIL=parameter). These values can be changed after IPL by the Job Control SET statement (RCLST and RCPCH operands).
- System files, when on disk, are supported by use of the

Job Control statements ASSGN and CLOSE, and by the supervisor channel scheduler routines.

- Job Control, through the use of the ASSGN statement, OPENs a system file on disk and initializes a disk information block (DIB table) within the supervisor. (See DIB Table in the DOS/VS Supervisor Logic PLM).

- Each time a problem program requests an I/O operating on a system logical unit, the supervisor checks the DIB table for a valid seek address. (Note that the job information block (JIB) is not used for system files on disk). After each successful access to the file, the supervisor updates the current address field in the affected DIB.

- When a problem program issues an OPEN to a system file that is currently assigned to disk, the LICCS OPEN routine transfers the EXTENT information to the DTF table from the DIB, instead of from the file label in the volume table of contents. This causes the current address field in the DIB to be used as the beginning extent for the DTF of the file being opened.

- When a problem program closes a system file that is assigned to disk, the LIOCS close routine posts the file closed and does not disturb the DIB.

- Job Control, through the use of the CLOSE statement, must be used to close system files on disk and to deactivate the DIB.

- If only the SYSRDR or SYSIPT file (not both) is assigned to a disk extent, the filename IJSYSIN must be used in the DLBL statement and SYSRDR or SYSIPT must be specified in the ASSGN and CLOSE statements.

- If both SYSRDR and SYSIPT files are assigned to a disk extent, they must occupy the same extent and be referred to as SYSIN in the ASSGN and CLOSE statements. In this instance, the filename IJSYSIN is also used in the DLBL statement.

  SYSLST and SYSPCH files must occupy separate extents. Thus, SYSOUT may not be used to refer to a combined SYSLST/SYSPCH on a 2311, 2314, or 3330.

- Assignment of system logical units to disk extents must be permanent. The permanent ASSGN statement (no slashes) must be used instead of the temporary statement (//ASSGN). Temporary assignments (via the // ASSGN statement) to other device types are permitted. Thus, a job not in the input job stream on disk could be run by causing a pause at the end of the current job, temporarily assigning SYSRDR to a card reader or a magnetic tape unit.

- Specification of the system generation parameter SYSFIL= is required to allow assignment of system logical units to a disk. It provides the capability of warning the operator when

SYSPCH and SYSLST files on disk reach a certain (specified or assumed) capacity.. Note that this warning is given after the job ends, and that if the extent limits are exceeded before end-of-job, the job is terminated.

Filenames for System Files on Disk

- System input and output files are assigned to disk by providing a set of DLBL and EXTENT statements, and then submitting a permanent ASSGN statement. The set of DLBL and EXTENT statements preceding the ASSGN statement may contain only one EXTENT statement.

- The filename in the DLBL statement (which is associated with the SYSxxx entry from the accompanying EXTENT statement) must be one of the following:

  - IJSYSIN for SYSRDR, SYSIPT, or a combined SYSRDR/SYSIPT file (SYSIN)

  - IJSYSPH for SYSPCH

  - IJSYSLS for SYSLST

- In the DLBL statement, the 'codes' operand must specify SD (or blank, which defaults to SD) to indicate sequential DASD file type.

- In the EXTENT statement, 'type' may be 1 (data area, no split cylinder) or 8 (data area, split cylinder). There is no unique requirement for the remaining operands of the EXTENT statement.

- The ASSGN statement must be one of the following:

  - ASSGN SYSIN,X'cuu' (for a combined SYSRDR/SYSIPT file)
  - ASSGN SYSRDR,X'cuu' (for SYSRDR only)
  - ASSGN SYSIPT,X'cuu' (for SYSIPT only)
  - ASSGN SYSPCH,X'cuu' (for SYSPCH)
  - ASSGN SYSLST,X'cuu' (for SYSLST)

  NOTE: All assignments must be permanent (not preceded by //).

OPEN System Disk Files

Upon encountering a system input or output assignment to a 2311, 2314 or 3330, Job Control performs the following functions:

- Rejects the assignment if is is not permanent.

- Rejects the assignment if a previous assignment to a 2311, 2314 or 3330 for the same logical unit still exists (has not been closed). Also, because SYSRDR and SYSIPT must be a single combined file <u>if both</u> are on disk, one cannot be assigned to disk if an assignment to disk for the other (or both) already exists.

- OPENs the file. If input, the labels are checked. If output, DASD labels are written. Also, information is placed into the supervisor disk information block (DIB table) for the problem program OPEN, and for monitoring of file operations by physical IOCS.

- If the OPEN is unsuccessful, Job Control unassigns the unit and requests further operator commands.

<u>CLOSE System Disk Files</u>

- System logical units assigned to disk must be closed by the operator. The operator CLOSE command must be used to specify a system input or output file which has been previously assigned to a 2311, 2314 or 3330. The optional second parameter (X'cuu') of the CLOSE command must be used (instead of an ASSGN command) to assign the system logical unit to a physical device. The system will notify the operator that a CLOSE is required when the limit of the file has been exhausted. If a program attempts to read or write beyond the limits of the file, the program will be terminated and the file must be closed.

- The CLOSE function:

  - Writes a file mark if the file is an output file.

  - Resets the DIB table in the supervisor to indicate that the file no longer exists.

  - Reassigns the logical unit to the value of the second operand of the CLOSE command.

NOTE: The CLOSE command must specify SYSIN if the file being closed is a combined SYSRDR/SYSIPT file (ie, CLOSE SYSIN,X'00C'). If only SYSRDR (or SYSIPT) has been assigned to disk, the CLOSE command must specify SYSRDR (or SYSIPT).

FOPT Macro Parameter for System Files on Disk

SYSFIL=	NO YES (YES,$n_1 n_2$)	Specify YES if system input and system output files (SYSRDR, SYSIPT, SYSLST, SYSPCH) in any partition may be assigned to a disk device or, if support for the procedure library is desired. Specification of YES gives support for all disk devices and the IBM 3540 Diskette Input/Output Unit. In a configuration without tape, specification of SYSFIL=YES is required for system maintenance purposes. If the emulator program parameter SYSIO is specified with a value ranging from 200 through 233, a value must be specified for SYSFIL.

n_1 = residual capacity limit at which point the operator is notified when SYSLST assigned to disk. The value for n_1 must be at least 100 and no more than 65535. If n_1 is omitted, 1000 is assumed.

n_2 = residual capacity limit at which point the operator is notified when SYSPCH assigned to disk. The value for n_2 must be at least 100 and no more than 65535. If n_2 is omitted, 1000 is assumed.

Notes:

1. If neither n_1 or n_2 is specified, the operand need not be placed between parentheses.

2. Neither n_1 or n_2 may be specified if the logical units are assigned to an IBM 3540 Diskette Input/Output Unit.

3. The Job Control SET command can, through the use of the RCLST and RCPCH operands, change these 'n' values at any time.

Significant System File Error Messages

1A0nD INVALID I/O ASSIGNMENT

n indicates the field processed when the error was detected.

Cause:

Previous ASSGN specified invalid logical or physical unit, or

*Previous ASSGN attempted to assign the IGN parameter SYSRDR or SYSIPT, or

*Previous ASSGN attempted to make a temporary assignment to SYSPCH or SYSLST when there was already a SYSOUT assignment, or SYSOUT has to be used. See DOS/VS System Management Guide, under Symbolic I/O Assignment, or

Previous ASSGN attempted to make an alternate assignment to a logical unit currently unassigned, or

*Previous ASSGN attempted to make an alternate assignment to SYSOUT when SYSOUT cannot be assigned. See DOS/VS System Management Guide, under Symbolic I/O Assignment, or

*Previous temporary ASSGN attempted to assign SYSRDR, SYSIPT, SYSLST, or SYSPCH to a disk extent. See DOS/VS System Management Guide, or

Previous ASSGN attempted to make a temporary alternate assignment to a logical unit in standard mode, or

Previous ASSGN attempted to make a standard alternate assignment to a logical unit in a standard mode, or

Previous // ASSGN attempted to unassign SYSCLB, or

Previous ASSGN attempted to make a temporary assignment for SYSCLB, or

Previous ASSGN attempted to assign the IGN parameter to SYSCLB (See DOS/VS Operating Procedures or DOS/VS System Control Statements), or

Previous ASSGN attempted to assign SYSCLB or a private core image library currently being condensed in another partition, or

Previous ASSGN attempted to assign SYSCLB to a private core image library already assigned to a partition where a compile, link-edit, and go is taking place, or

*There is no SYSFIL support in the supervisor.

System Action: If SYSLOG is assigned to a keyboard, the system waits for an operator response; otherwise, the invalid assignment is ignored.

Programmer Action: none.

Operator Action: Issue the LISTIO command for both the physical and logical unit referenced by the assignment that caused the error. Check for any of the following errors:

An invalid physical or logical unit.

*The IGN parameter in an assignment for SYSRDR, SYSIPT, SYSIN or SYSCLB.

*A temporary assignment for SYSPCH or SYSLST when SYSOUT is assigned to a disk cr magnetic tape.

*An alternate assignment for SYSOUT when SYSPCH and SYSLST are not assigned to the same disk or magnetic type.

*Sysfile related

1A1nD CONFLICTING I/O ASSIGNMENT

n indicates the field processed when the error was detected.

Cause: Previous ASSGN attempted to assign a logical unit to a physical device already assigned to another logical unit with a conflicting function. For example, no physical device can be assigned to both SYSOUT and SYSIN.

System Action: If SYSLOG is assigned to a keyboard, the system waits for an operator response; otherwise, the invalid assignment is ignored. If option ACANCEL is in effect together with the NOLOG command, the system cancels the job.

Programmer Action: Use the LISTIO output to correct the assignments.

Operator Action: Enter a new assignment, or
Use the LISTIO command to obtain the current assignments, check the assignment in question, and make the necessary correction, or

Issue the LISTIO command, then type CANCEL to cancel job, or

Type IGNORE or press END/ENTER to ignore the assignment if you can do without, and continue processing.

If the problem recurs, have the

- Log sheet
- LISTIO output

available for problem determination.

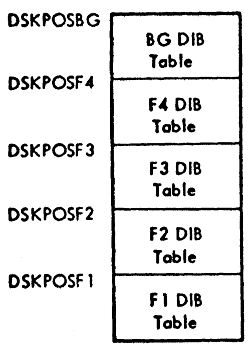
DIB (Disk Information Block)

A DIB is built at generation time if the option was selected. It performs a recordkeeping function on system class units assigned to a DASD. The DIB contains the current seek address for all system files on disk when the system is operating in a batched-job environment.

A DIB clock is initialized by Job Control with extent information and updated by physical IOCS. When the PCIL option is used, the DIB is updated each time the PCIL is assigned.

There is one DIB table for each partition. Label DSKPOSBG identifies the first byte of the BG DIB Table (DSKPOSF1, DSKPOSF2, DSKPOSF3, DSKPOSF4, for the other partitions). The addresses of the DIB tables are contained in bytes 96 and 97 (X'60' and X'61') of the appropriate partition communication region).

DISK INFORMATION BLOCK (DIB) TABLE



The number of DIB tables depends on the number of partitions specified at supervisor generation.

PCL

Format of any DIB table if SYSFIL= YES

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Current Address							K	D	D	End Address							UL	LL	M	RC			
SYSLNK	C	C	H	H	00	00	00	P	P	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
SYSIN	B	B	C	C	H	H	R	00	00	50	B	B	C	C	H	H	R	H	H	XX	XX	XX	00	00
SYSPCH	B	B	C	C	H	H	R	00	00	51	B	B	C	C	H	H	R	H	H	XX	XX	XX	00	00
SYSLST	B	B	C	C	H	H	R	00	00	79	B	B	C	C	H	H	R	H	H	XX	XX	XX	00	00
PRCDIB	B	B	C	C	H	H	R	00	00	50	B	B	C	C	H	H	P	H	H	XX	XX	XX	00	00

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Format of any DIB table if SYSFIL= NO

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	Current Address							K	D	D	End Address							UL	LL	M	RC			
SYSLNK	C	C	H	H	00	00	00	P	P	00														
PRCDIB	B	B	C	C	H	H	R	00	00	50	B	B	C	C	H	H	R	H	H	XX	XX	XX	00	00

■) BG SYSLNK DIB contains the PUB pointer for CLB.
For FG SYSLNK DIBs this byte is unused.

DIB TABLE

Bytes

0-6: Current Address

0-5: Current address of key: the next address to be used (both for input and output).

6: Record number of current address.

7-9: KDD

Key and data length of the symbolic device. PP: starting cylinder of Private Core Image Library if PCIL is assigned; otherwise zero.

10-16: End Address

10-15: End address of key: the last address within the the limits of the extent.

16: Record number of end address.

17 : UL Upper head limit.

18 : LL Lower head limit.

19 : M Maximum number of records per track.

20 : RC Record count: Residual capacity limit at which point the operator is notified. Set at system generation time with SYSFIL parameter, or after IPL with SET statement (RCLST and/or RCPCH operands). A warning message is issued by Job Control after End-of-Job step when the minimum number of remaining records has been reached or exceeded during the previous job. Not supported for 3540.

22 : Utilized for RPS (X'40'=RPS device). See Release 30 Update.

23 : Reserved.

Answer the Following Mandatory Questions:

1. What parameter of the FOPT macro will allow the use of system files on disk? SYSFIL=YES

2. Which system files on disk are referenced when SYSIN is used in an ASSGN statement? SYSRDR, SYSIPT

3. When SYSOUT is assigned, what symbolic devices are used?
SYSPCH or SYSLST
____

4. What filename is used in a DLBL statement to identify a combined SYSRDR/SYSIPT file on disk? IJSYSIN

5. Write the JCL statement that would be used to assign SYSRDR/SYSIPT to a disk whose address is 191. // ASSGN SYSIN,X'191'

6. What is the length of a record read from SYSRDR on disk? 80

7. What is the length of a record read from SYSPCH on disk? 81

8. What filename is used in a DLBL statement to identify only the SYSRDR file on disk? IJSYSIN

9. Write the JCL statement that would be used to close a SYSIPT file on disk and reassign SYSIPT to its conventional IBM device address. // CLOSE SYSIPT,X'00C'

10. The ASSGN statement that assigns a system symbolic unit to a disk device must always be read (before/after) the DLBL and EXTENT statements that define the file.

Why? ____

____

ANSWERS TO WORK PROJECT 11

1. SYSFIL=
2. SYSRDR, SYSIPT
3. SYSPCH, SYSLST (only if they are assigned to tape - SYSOUT is not valid for disk).
4. IJSYSIN
5. ASSGN SYSIN,X'191'
6. 80
7. 81
8. IJSYSIN
9. CLOSE SYSIPT,X'00C'
10. After; The filename and extent information must be available at assignment time because the ASSGN statement for a system file on disk actually opens the file.

WORK PROJECT 12 - SVA and STOW TABLE

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the contents of the Shared Virtual Area and the control block used to pass information to the library directory maintenance phase, $MAINDIR.

Time required to complete this project averages 1.0 hours.

Tools, Test Equipment and Documentation

DOS/VS Supervisor Logic
DOS/VS Base SCM2
DOS/VS Base Supervisor Listing

Directions to the Student

Using the WP12 Core Dump in DOS/VS Base SCM2, the Supervisor Listing, and any other available documentation, answer the following mandatory questions.

The WP12 Core Dump Was forced at the time the linkage editor was to branch to $MAINDIR.

1. What is the address of the Shared Virtual Area? X'_______'
2. What is the beginning address of the System Getvis Area? X'____________'
3. How many bytes are there in the System Getvis Area (SGA)? ___________
4. Is the System Directory List (SDL) active at the time of the dump? ______________
5. What is the maximum possible number of SDL entries? ________
6. What is the start address of the SDL? X'_________'
7. What is the length of the SDL in the core dump? ________
8. Of the twenty-seven directory entries in the SDL, which two currently have their phases in the SVA? ______________

9. What is the current entry point address for $MAINDIR?
X'__________'

10. What is the address of the STOW table being passed to $MAINDIR by the Linkage Editor? X'__________'

11. What is the name of the phase that is being passed to $MAINDIR in the STOW table? ____________

12. Which function of the Linkage Editor was requested in the OPTION card for the Linkedit run in the core dump?
// OPTION __________________

13. What is the address of the beginning of the SVA library?
X'___________'

14. How many bytes are available for additional phases in the SVA library? ________

ANSWERS TO WORK PROJECT 12

1. X'13B800' (SYSCOM + X'F5' contains a pointer to the SVA)

2. X'16D800' (SYSCOM + X'F8' contains a pointer to the SVA)

3. 51200 (X'C800') (This is the difference between the beginning address of the SGA and the end address of virtual storage. The end of virtual storage address can be found in the Boundary Box + X'0C').

4. Yes (SYSCOM + X'F4' contains the SVA FLAG byte. Bit 1 being on indicates that the SDL is active).

5. 963 (32K is the maximum size of the SDL. Each entry requires 34 bytes).

6. X'13B822' (As indicated in the SVA Constants Area at the Supervisor DSECT LABEL 'VDSA').

7. 954 bytes (As indicated by the value in the first two bytes of the SDL).

8. $LIBSTAT, $MAINDIR (As indicated by Byte 16, Bit 3 being on in their respective SDL directory entries).

9. X'13D000' (As indicated by bytes 31-33 of the directory entry).

10. X'84B50' (The address of the STOW table is always passed in General Register 0).

11. DANSPHAZ (As indicated by the first eight bytes of the phase entry in the STOW table).

12. // OPTION LINK (As indicated by the L (X'D3') in byte 17 of the STOW table entry (X'84B6D').

13. X'13BBE0' (As indicated in the SVA Constants Area; SVA + X'0C' (VSLA).

14. 188464 (2E030) (This amount is the difference between the Next Available Entry in the SVA Library value at VLNA (SVA + X'10'), minus 1 and the End of the SVA Library value at VLEA (SVA + X'14').

WORK PROJECT 13 - INDEXED SEQUENTIAL FILE ORGANIZATION

Objective

Upon completion of this project, the student, using the available documentation, should be able to:

1. Locate and interpret the contents of the following areas in a DASD PRINT of an indexed sequential file.

   - The MASTER INDEX
   - The CYLINDER INDEX
   - The TRACK INDEXES
   - The PRIME DATA AREA
   - The CYLINDER OVERFLOW TRACK(S)
   - The INDEPENDENT OVERFLOW AREA

Time required to complete this project averages 2.0 hours.

Tools, Test Equipment, and Documentation

DOS/VS System Control Statements
DOS/VS Data Management Guide
DOS/VS LIOCS Volume 3
DOS/VS Base SCM 3

Directions to the Student

Using the listings for ISLOAD - 'Job Stream To Execute Program' and ISADRTR - 'Job Stream To Execute An ADD Operation' in DOS/VS Base SCM 3, answer the following questions relative to the ISADRTR - 'File Dump Via DASD PRINT After ADD' (also in DOS/VS Base SCM 3).

A layout form on which you can map the contents of the ISAM file contained in the ISADRTR DASD PRINT is located immediately following the questions for this work project.

QUESTIONS

1. For each of the specified AREAS, fill in the EXTENT INFORMATION as determined from the label set contained in the job stream listings.

AREAS	EXTENT INFORMATION				
	Cylinder	Head		Cylinder	Head
Master Index	________	______	to	________	______
Cylinder Index	________	______	to	________	______
Prime Data	________	______	to	________	______
Independent Overflow	________	______	to	________	______

2. (a) What is the disk address (CHR) of the normal track index entry for the fourth track in the prime data area?
C= ______ H= ______ R= ______

(b) What is the key of the first record on the track to which this track index entry points? KEY= ______________

3. (a) What is the disk address of the overflow track index entry for the first track in the prime data area?
C= ______ H= ______ R= ______

(b) To which overflow area is this track index entry pointing?
____

(c) What is the key of the record to which this track index entry points? KEY= _____________

4. (a) What is the disk address of the normal track index entry for the 25th track in the prime data area?
C= ______ H= ______ R= ______

(b) What is the key contained in this entry? KEY= __________

5. (a) At what disk address is the cylinder overflow control record (COCR) located for the first cylinder in the prime data area? C= ______ H= ______ R= ______

(b) What is the significance of the first three bytes (X'001312') in the data portion of this record?

____

____

____

6. What is the disk address of the last record 0 in the independent overflow area extent?
C= ______ H= ______ R= ______

7. (a) The data portion of the record at cylinder 151, head 00, record 02 can be described as which of the following:

______ Sequence - Link Field
______ Index Level Pointer
______ Cylinder Overflow Control Record

(b) The byte within this field that describes the type of entry contained in this record contains what hex value?
X'______'

8. If the ninth byte in a sequence - link field or index level pointer contains X'10', what type of entry is contained in the record? ____

9. What is the disk address of the record that contains the overflow end entry for those records that have overflowed from the first track in the prime data area?
C= ______ H= ______ R= ______

10. In the record at cylinder 160, head 19, record 05, what is the significance of the first byte in the data portion of the record (X'02')? ____

____

____

11. What is the significance of the first byte in the data area portion of the record at cylinder 155, head 00, record 04?

12. What is the significance of the first byte in the data area portion of the record at cylinder 160, head 01, record 14?

13. Starting with the MASTER index, list in sequence the disk address of each and every index and sequence - link entry that must be referenced in the DASD PRINT to locate the logical records whose 'keys' are listed below.

	First Record KEY=00000010			Second Record KEY=00000109			Third Record KEY=00000099		
	C	H	R	C	H	R	C	H	R
(1)	150	00	01	150	00	01	150	00	01
(2)									
(3)									
(4)									
(5)									
(6)									
(7)									
(8)									
(9)									
(10)									
(11)									
(12)									
(13)									
(14)									
(15)									
(16)									
(17)									
(18)									
(19)									
(20)									

14. (a) If a record whose key is '00000147' is added to the file, at what disk address would it be inserted?
C= ______ H= ______ R= ______

(b) What is the key of the record that would be displaced by the new record? KEY= ____________

(c) What is the key of the record that would be forced into the overflow area? KEY= ____________

(d) At what disk address in the overflow area would this record be placed? C= ______ H= ______ R= ______

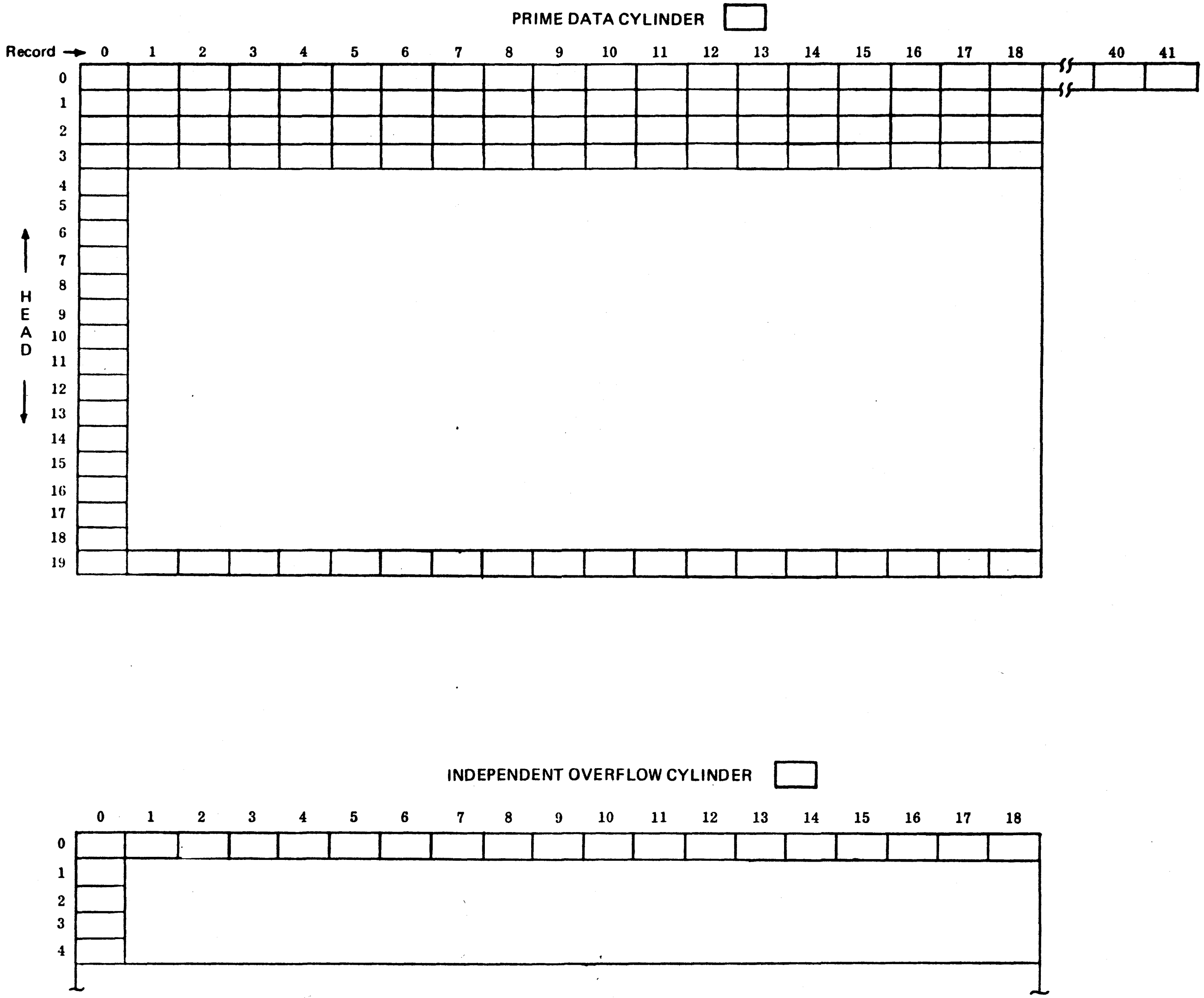
Why? ____

____

____

15. (a) How many 'overflow end' entries are contained on cylinder 160, head 19? ____________

(b) At what disk address is the 'overflow end' entry located for the chain of records that overflowed from the third track in the prime data area?
C= ______ H= ______ R= ______



Work Project 13 - Layout Form for Mapping the ISAM File

ANSWERS TO WORK PROJECT 13

	Cylinder	Head		Cylinder	Head
Master Index	150	00	to	150	19
Cylinder Index	151	00	to	151	09
Prime Data	160	00	to	161	19
Independent Overflow	155	00	to	155	04

2. (a) C= 160 H= 00 R= 07 (this is the location of the normal track index entry for track 03 on cylinder 160).

   (b) KEY= 00000198 (1st record on track 03 of cylinder 160).

3. (a) C= 160 H= 00 R= 02 (this is the location of the overflow track index entry for track 00 on cylinder 160).

   (b) Cylinder (Cylinder 160 - Head 19).

   (c) KEY= 00000008 (2nd record on track 19 of cylinder 160).

4. (a) C= 161 H= 00 R= 09

   (b) KEY= 00000000 (this entry is not active because there are no records contained on track 4 of cylinder 161).

5. (a) C= 160 H= 00 R= 00

   (b) These bytes point to the last record that was written in the overflow area for this cylinder (in this case head 19, record 18 of cylinder 160).

6. C= 155 H= 04 R= 00 (The independent overflow extent specifies only 5 tracks. Records 0 for heads 5 to 19 do not fall within the extent specified for the independent overflow area. These records were printed only because the DASD PRINT program was instructed to print the contents of heads 00 to 19 on cylinder 155).

7. (a) Index Level Pointer

   (b) X'21' (Refer to 'F' character breakdown (ccccciii) in the chart 'Format of Sequence - Link Field/Index Level Pointer' contained in DOS/VS LIOCS Volume 3).

8. Overflow Entry (End)

9. C= 160 H= 19 R= 01 (The key of the record at this disk address is '00000014'. This record was originally the last record on cylinder 160, head 00 when the file was created. Because of added records (7, 8, 9, 10, 11, 12,eand 13), it was moved to the cylinder overflow area and is the last record in the overflow chain from head 00).

10. The X'02' indicates that the disk address contained in the sequence - link field falls within the prime data area extent (EXTENT sequence number 2).

11. This byte indicates that the disk address contained in the sequence - link field falls within the independent overflow area extent (EXTENT sequence number 3).

12. None as far as ISAM is concerned (this X'F2' is simply the first byte of the users data record).

13.

	First Record KEY=00000010			Second Record KEY=00000109			Third Record KEY=00000099		
	C	H	R	C	H	R	C	H	R
(1)	150	00	01	150	00	01	150	00	01
(2)	151	00	01	151	00	01	151	00	01
(3)	160	00	01	160	00	01	160	00	01
(4)	160	00	02	160	00	02	160	00	02
(5)	160	19	02	160	00	03	160	00	03
(6)	160	19	03	160	00	04	160	00	04
(7)	160	19	04	160	00	05	160	19	17
(8)	___	___	___	160	02	01	160	19	16
(9)	___	___	___	160	02	02	160	19	15
(10)	___	___	___	160	02	03	160	19	18
(11)	___	___	___	160	02	04	155	00	01
(12)	___	___	___	160	02	05	160	19	14
(13)	___	___	___	___	___	___	160	19	13
(14)	___	___	___	___	___	___	160	19	12
(15)	___	___	___	___	___	___	160	19	11
(16)	___	___	___	___	___	___	160	19	10
(17)	___	___	___	___	___	___	160	19	09
(18)	___	___	___	___	___	___	160	19	08

14. (a) C= 160 H= 02 R= 15

    (b) KEY= 00000150

    (c) KEY= 00000169

    (d) C= 155 H= 00 R= 8 (The cylinder overflcw track is full and this is the next available record location in the independent overflow area. The EOF record would be shifted to the record 9 location).

15. (a) Two (These are the 'end' entries for the overflow chains from tracks 00 and 01 on cylinder 160. They are located at records 01 and 08 respectively).

    (b) C= 155 H= 00 R= 02 (This record (KEY= 00000197) was originally the last record (record 18) on track 02 of cylinder 160 when the file was created.

A completely filled-in map of the ISAM file is contained in Appendix A of this manual. It is suggested that you do not refer to this map until you have completed WORK PROJECT 13.

WORK PROJECT 14- SPANNED RECORDS

Objective

Upon completion of this project, the student using the available documentation, should be able to:

1. Determine the number of physical records in a Spanned Record File.

2. Determine the number of logical records in a Spanned Record File.

3. Determine the length, in bytes, of a logical record in a Spanned Record File.

Time required to complete this project averages 1.0 hour.

Tools, Test Equipment, and Documentation

DOS/VS Data Management Guide
DOS/VS Supervicor and I/O Macros
DOS/VS LIOCS Volume 2

Directions to the Student

This project consists of performing a reading assignment and then answering questions relative to a printout of a spanned record file on disk.

Spanned record capability allows a logical record to exist on disk as a part of a single physical record or as multiple physical records (refer to Figure 1).

Spanned records are format V (variable) records, each of which specifies its own length. Spanned record processing is an extension of variable-length record processing. This technique offers the advantage that a user need not be concerned with the restrictions hardware imposes on the length of physical records. Thus, a user is able to maximize secondary storage efficiency, while organizing data files with logical record lengths most suited to needs. DASD access methods allow a logical record, either blocked or unblocked, a span multiple physical records.

1. The user need only be concerned with logical records; IOCS segments and blocks logical records while making a most efficient use of the track capacities on DASD devices.

2. The user is allowed greater flexibility in transferring logical records from one type of DASD device to another, when making use of the DASD access methods.

Activity

IN: DOS/VS Data Management Guide
UNDER: Section 2: DOS/VS Data Management Facilities
READ: 'Variable - Length Records (Format V)'
'Spanned Records (Format V)'
'Control Information'

Read the following:

Major DTF and Logic Module (MOD) considerations for spanned record processing are:

A. Sequential Disk Processing (SD)

1. DTFSD

a. WORKA = YES must be specified
b. RECFORM = either SPNBLK or SPNUNB
c. RECSIZE = (r) must be specified
On output the user must load the length of the logical record into the register specified. On input the module will load the length of the logical record retrieved.

2. SDMODVI, SDMODVO and SDMODVU

a. RECFORM = either SPNBLK or SPNUNB

3. The first four letters of SDMOD names that support spanned record processing are IJGP or IJGQ.

B. Direct Access Processing (DA)

1. DTFDA

a. KEYARG = (required if RECFORM=SPNUNB)
b. RECFORM = SPNUNB only
c. RELTYPE = (required if RECFORM=SPNUNB)

2. DAMOD

a. RECFORM=SPNUNB only

3. The first four letters of DAMOD names that support spanned record processing are IJIS.

C. Spanned Record processing is not supported by Indexed Sequential Access Methods (ISAM).

BLOCK DESCRIPTOR WORD

Refer to Figure 2.

The first four bytes of every physical record in a spanned record file, whether it is blocked or unblocked, constitutes a Block Descriptor Word. This word describes the physical block which immediately follows it. The first two bytes contain the physical length (LL). This length is supplied by Data Management when the file is written. The last two bytes (RR) are reserved and set to binary zeros. The user is required to reserve, for use by IOCS, the four bytes occupied by the Block Descriptor Word, at the beginning of his input and output areas.

A physical record may simultaneously contain complete logical records and/or segments of a logical record because the length of a logical record may exceed the size of a single physical record (or block) on the output device.

Each complete logical record, or segment of a logical record, includes two bytes for a length field (11) and two bytes for a field used by the data management method (rr). These four bytes are called a Segment Descriptor Word (described below).

The length of each logical record must be supplied by the problem program at the time the record is to be written.

SEGMENT DESCRIPTOR WORD

Refer to Figures 2 and 3.

When a logical record is written on a spanned record file, each complete logical record or segment of a logical record includes a Segment Descriptor Word. The Segment Descriptor Word is a four-byte field which describes the data bytes which immediately follow it. The segment length (including the four bytes occupied by the Segment Descriptor Word itself) is contained in bits 1-15 of the first two bytes (11); this value must lie in the range of from 4 to 32,763 inclusive. Bit 0 describes the segment type. If this bit is off, it indicates that the segment is a normal one; if it is on, it indicates a null segment (containing the 8 descriptor bytes only). The last two bytes of the Segment Descriptor Word are reserved and set to binary zeros, with the exception of bits 6 and 7 which contain a flag value.

Figure 3 shows the significance of bits 6 and 7 in the flag. These bits specify the relative position of a segment with respect to other segments (i.e., whether it is a single segment or whether it is the first, the last, or an intermediate segment of a multisegment logical record).

The first segment of a spanned record may begin at any point in the physical record on the associated device.

When a spanned record is read, the segment lengths specified in each Segment Descriptor Word are added together to provide the problem program with the length of the complete logical record.

Study Questions

Use Figure 4 (2 parts) to answer the following questions.

Figure 4 consists of a disk printout of a Spanned Record File.

1. The number of user physical records in this file is ________.
2. The number of logical records in this file is ______________.
3. The decimal length of data in each logical record is _______ ______________________.

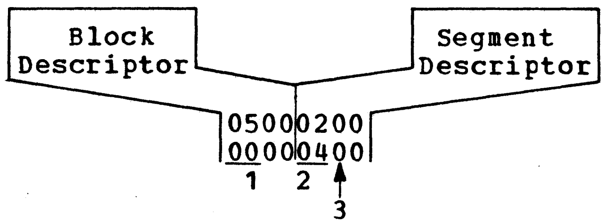
ANSWERS TO WORK PROJECT 14

1. 13

2. 5 (1 'zero' flag (00) and 4 'one' flags (01). Note that the segment descriptor word may occur anywhere within a block.

3. 32, 120, 400, 60, 240

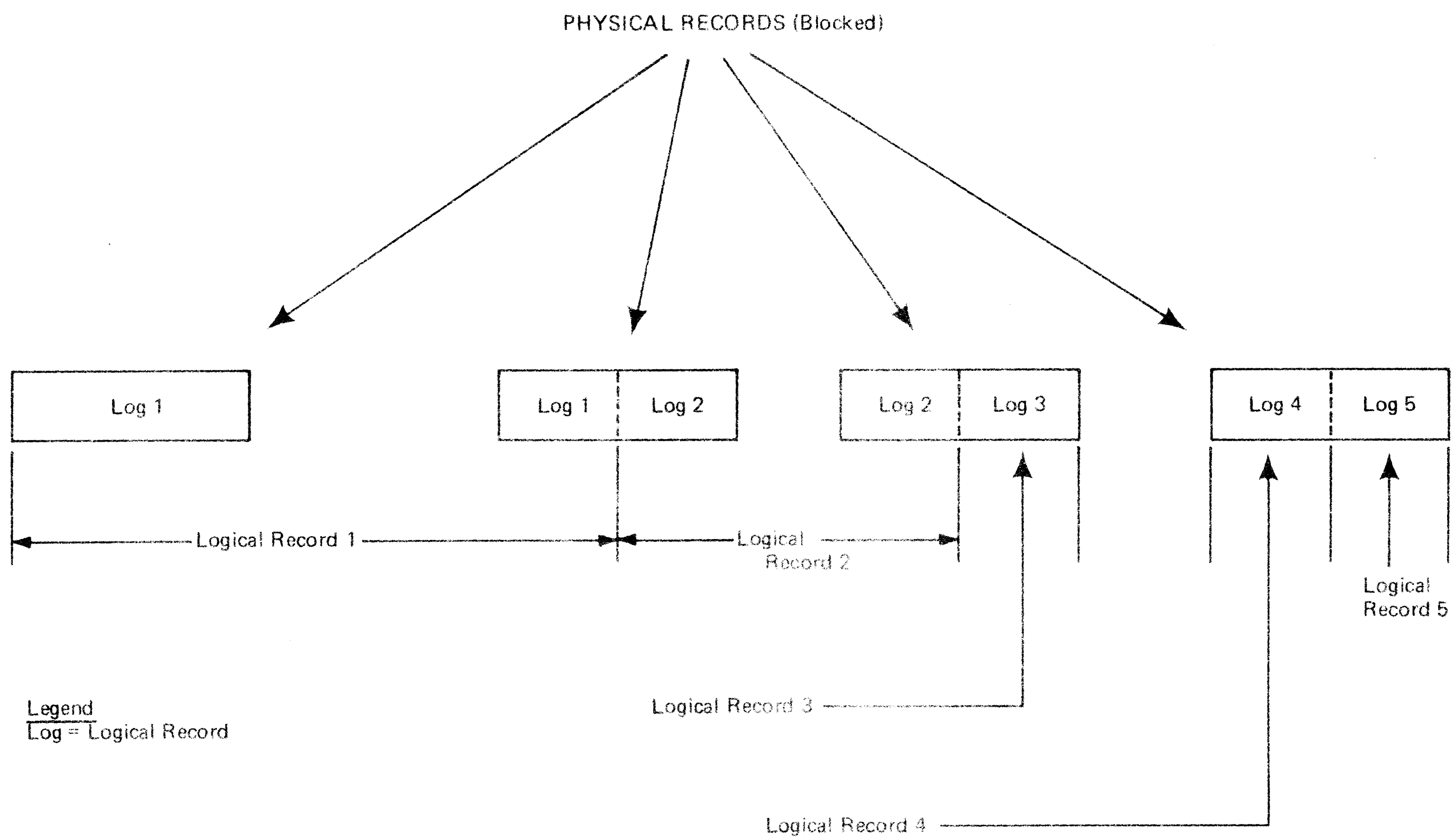
   a. An explanation of how the length 32 was determined for the first record is as follows:

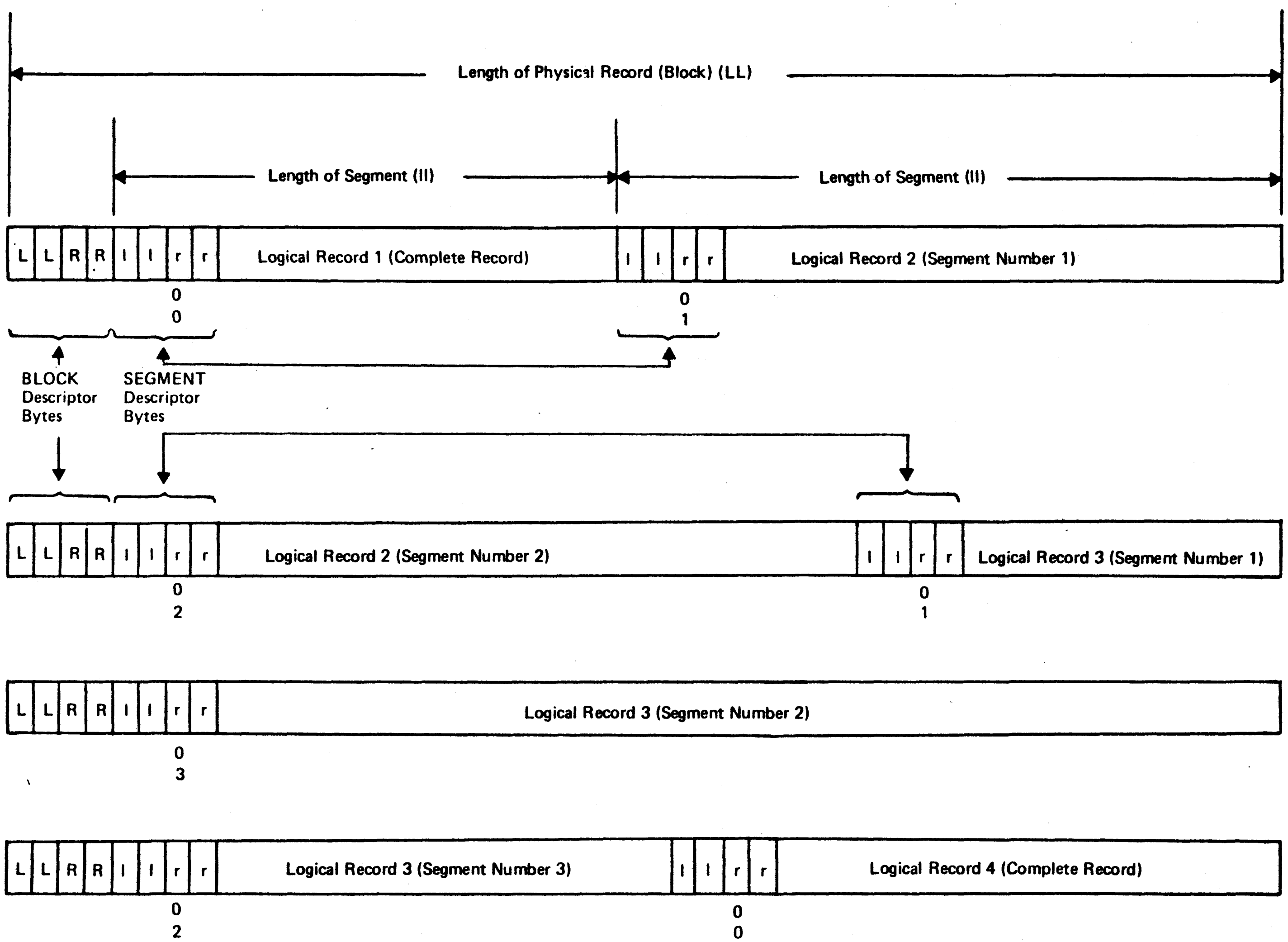


   1. The block length is 80 bytes (50 hex).
   2. The segment length is 36 bytes (24 hex).
   3. The flag in bits 6 and 7 = 00 which indicates that the whole record is contained within the segment defined by this Segment Descriptor Word.

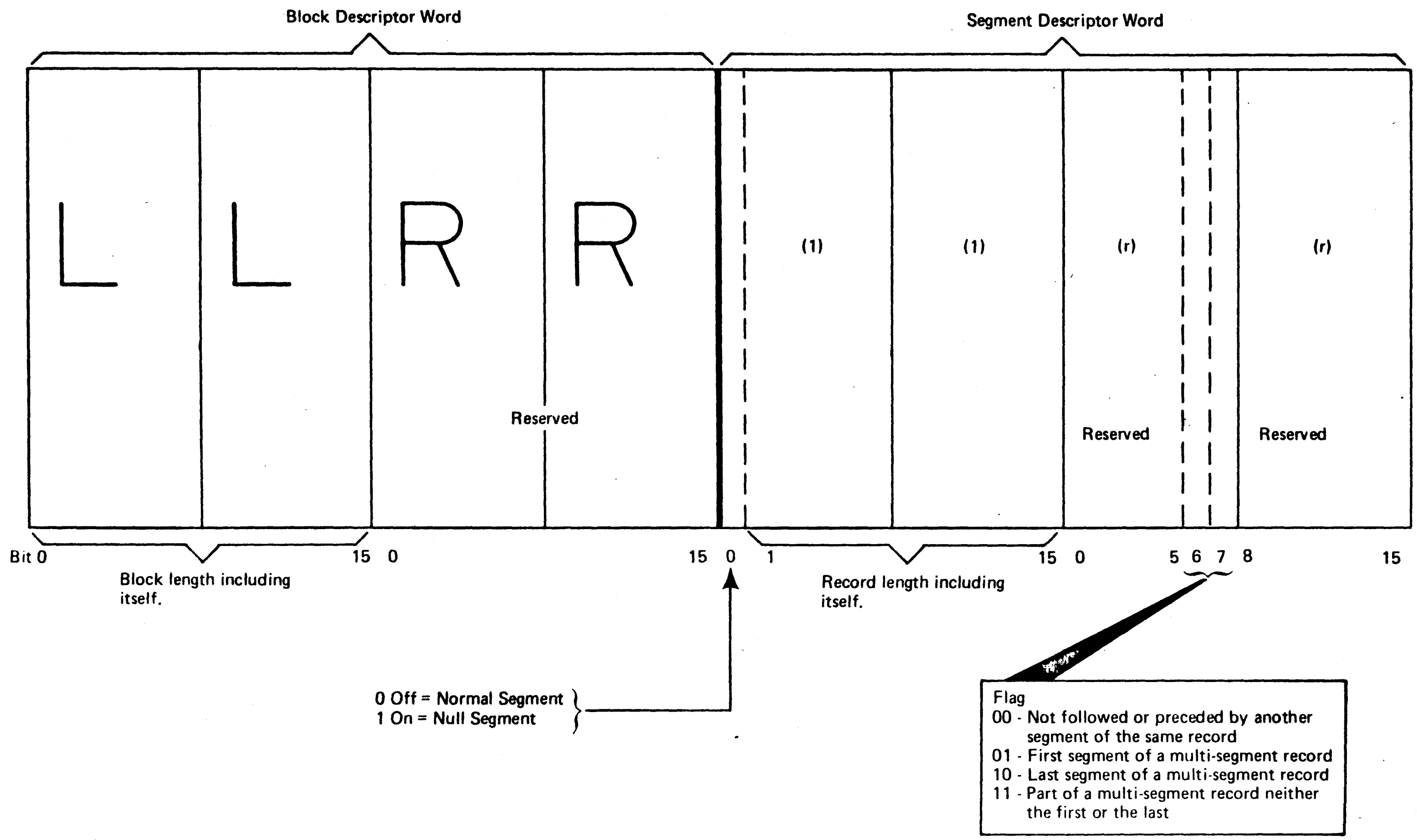
Since the length (36 in 2 above) contains the 4 byte segment descriptor word, 4 must be subtracted from it to determine the actual record length (36-4=32).

Work Project 14 - Figure 1 Spanned Record Concept





Work Project 14 - Figure 2 Example of a Spanned Record File



Work Project 14 - Figure 3 Block and Segment Descriptor Words

```
------------------------------------------------------------------------------------------------------
CYLINDER 001. TRACK 00.  HOME ADDRESS= 00 0001 0000.  CONDITION= OPERATIVE.  USE= PRIMARY.
------------------------------------------------------------------------------------------------------

     RECORD 000.  COUNT LENGTH= 8.  DATA LENGTH= 0008.

          COUNT
                  00000000
                  01000008

          DATA
                  00000020
                  01000E90

     RECORD 001.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01001000

          DATA     *      ********************************    ************************************
                  05000200555555555555555555555555555555550200555555555555555555555555555555555555
                  00000400CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC0810CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 002.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01002000

          DATA     *   )  ************************************************************************
                  05000400555555555555555555555555555555555555555555555555555555555555555555555555
                  00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 003.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01003000

          DATA     *      ************    ********************************************************
                  05000100555555555555030055555555555555555555555555555555555555555555555555555555
                  00000020CCCCCCCCCCCC0C10CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 004.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01004000

          DATA     *   )  ************************************************************************
                  05000400555555555555555555555555555555555555555555555555555555555555555555555555
                  00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 005.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005

                  01005000

          DATA     *   )  ************************************************************************
                  05000400555555555555555555555555555555555555555555555555555555555555555555555555
                  00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 006.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01006000

          DATA     *   )  ************************************************************************
                  05000400555555555555555555555555555555555555555555555555555555555555555555555555
                  00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 007.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01007000

          DATA     *   )  ************************************************************************
                  05000400555555555555555555555555555555555555555555555555555555555555555555555555
                  00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

     RECORD 008.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

          COUNT          *
                  00000005
                  01008000

          DATA     *      ********************************************************    ************
                  05000300555555555555555555555555555555555555555555555555555555550100555555555555
                  00000C20CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC0010CCCCCCCCCCCC
```

Work Project 14 - Figure 4 Disk Print of Spanned Record File (Part 1 of 2)

```
RECORD 009.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

   COUNT               *
                00000005
                01009000

   DATA          *      ************************************************    ********************
                05000300555555555555555555555555555555555555555555555555010055555555555555555555
                00000420CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC0810CCCCCCCCCCCCCCCCCCCC

RECORD 010.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

   COUNT               *
                00000005
                0100A000

   DATA          *   )  ************************************************************************
                05000400555555555555555555555555555555555555555555555555555555555555555555555555
                00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

RECORD 011.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

   COUNT               *
                00000005
                0100B000

   DATA          *   )  ************************************************************************
                05000400555555555555555555555555555555555555555555555555555555555555555555555555
                00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

RECORD 012.  COUNT LENGTH= 8.  DATA LENGTH= 0080.

   COUNT               *
                00000005
                0100C000

   DATA          *   )  ************************************************************************
                05000400555555555555555555555555555555555555555555555555555555555555555555555555
                00000C30CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

RECORD 013.  COUNT LENGTH= 8.  DATA LENGTH= 0012.

   COUNT
                00000000
                0100D00C

   DATA                 ****
                000000005555
                0C000820CCCC

RECORD 014.  COUNT LENGTH= 8.  DATA LENGTH= 0000.

   COUNT
                00000000
                0100E000
```

Work Project 14 - Figure 4 Disk Print of Spanned Record File (Part 2 of 2)

PRIME DATA CYLINDER 160

Head \ Record	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	40	41
0	COCR	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	6	7
1		15	16	18	19	22	23	25	26	28	30	31	33	34	37	41	46	47	49		
2		102	104	105	107	109	110	111	114	119	122	126	132	139	145	150	156	161	169		
3		198	199	203	301	303	400	550	575	695	783	888	996	1011	1050	EOF					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					
18																					
19 (Cylinder Overflow Track)		14	8	9	10	11	12	13	99	94	91	89	84	75	70	60	57	54	61		

LEGEND:
- COCR= Cylinder Overflow Control Record
- TIN= Track Index (normal entry)
- TIO= Track Index (overflow entry)
- (marked box) = Added Record (after file was originally created)

INDEPENDENT OVERFLOW CYLINDER 155

Head \ Record	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0		63	197	196	195	194	187	177	EOF										
1																			
2																			
3																			
4																			

Map of the Records Contained in the ISAM File for Work Project 13

CONCEPTS OF A PROGRAMMING SYSTEM

1. a. P
   b. C
   c. C
   d. P
   e. C
   f. C
   g. P
   h. C
2. a. 3
   b. 4
   c. 1
   d. 2
3. a. 1
   b. 3
   c. 3
   d. 4
   e. 1
   f. 5
   g. all
   h. 5
   i. 2
   j. 3
4. a. 2
   b. 4
   c. 1
   d. 3
5. b
6. a
7. c
8. a
9. True
10. False

DOS/VS CONCEPTS

1. b
2. e
3. a. __1__
   c. _5,9_
   d. __2__
   e. _____
   f. _10__
   g. __4__
   h. _____
   i. __8__
   j. __7__
   k. __3__
   l. _____
   m. __6__
4. d
5. d
6. linkage editor map
7. stand-alone
8. False -- The standalone dump destroys the DOS/VS Supervisor
9. d
10. d - All other answers would have resulted in an error message.

DOS/VS OPERATING PROCEDURES

1. a
2. a
3. a
4. d -- The Q identifies POWER
5. e -- F1 partition
6. b
7. d -- Table E3 in the SADP manual
8. Re-IPL

DOS/VS PROCEDURE LIBRARY

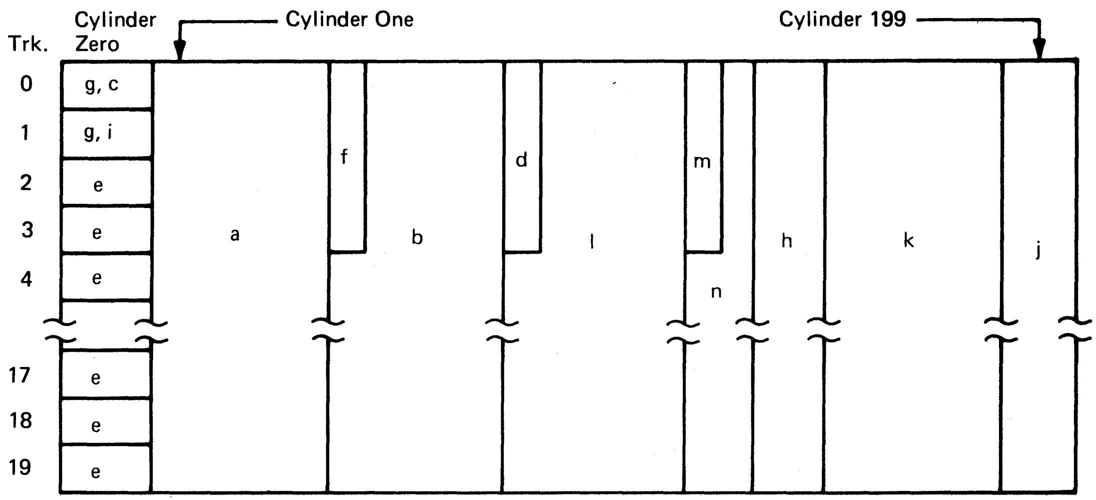
1. a,c,e,f,g,h,i -- Although ASSGN and TLBL statements can be included, they are not required unless the specific procedure calls for it.
2. b
3. False -- Refer to 'SYSIPT Detail Catalog Procedures (GC33-5371)
4. c
5. True
6. d -- must contain $$ to operate in any partition
7. True -- When EOP parameter is omitted, /+ is the default EOP parameter.
8. b

POWER OPERATING PROCEDURES

1. b. Job 'A; has a Hold parameter on it.
2. b. No partition parameter defaults to BG.
3. b.
4. a.
5. d.
6. c.

SYSTEM RESIDENCE ORGANIZATION

1.



[FE 121549]

2. Core Image
3. True
4. Source
5. Relocatable
6. a. There is always a Core Image library on SYSRES to contain the Supervisor, IPL, etc.
7. d.
8.
```
// DLBL IJSYS01,'DOS.WORKFILE.NO.1',99/365,SD
// EXTENT SYS001,111111,8,1,20,550,9
// DLBL IJSYS02,'DOS.WORKFILE.NO.2',99/365,SD
// EXTENT  SYS002,111111,8,1,30,550,19
// DLBL IJSYS003,'DOS,WORKFILE.NO.3',99/365,SD
// EXTENT SYS003,111111,1,1,1120,260
```

RMS and DUMPS

1. b
2. b
3. d
4. b
5. True
6. d
7. a,e
8. True
9. a,d
10. c

PHYSICAL INPUT/OUTPUT CONTROL SYSTEM (PIOCS)

1. c. (Braces indicates a required parameter)
2. e. (No option of the required parameter is underlined, therefore none is assumed - one must be selected.)
3. a. (The command-list-name is the second operand in a CCB macro).
4. c. (Byte 2 - bit 0 of the CCB).
5. True
6. e. (CCB is for SYSRES - Byte 6 is X'00' which indicates a system logical unit of which byte 7 identifies SYSRES).
7. PDUMP READ,READ+23 (24 bytes in a CCB when fourth parameter used.)
8. False. (Problem program issues an EOJ macro which loads JOB CONTROL from core image library.)
9. c. (Problem program option bits 3 and 5 in operand 3 of the CCB.)
10. a. (Byte 3 - bit 6 turns on when channel 9 in carriage tape is sensed.)
11. X'2800' (bytes 9-11 in CCB); X'2818 (bytes 13-15 in CCB minus 8).
12. a. (bits 3, 4, 5, 6 and 7 are user option bits and are not reset by the supervisor).
13. a1; b1 & 4; c1; d2; e3; f1; g5
14. False. (They will contain the CCW for returning sense information to the problem program).
15. False. (They are always changed by the macro, but first they will be saved in the designated 'savearea').
16. abc. (All three dumps will provide this information).

PIOCS MESSAGES

1. a-3; b-5; c-6; d-2; e-4; f-8; g-11; h-7; i-12; j-13
2. c.
3. e.
4. d.
5. d and f - Bytes 9-11 of CCB (in a dump) point to start of CCW chain.
6. d.
7. False (Job is automatically cancelled)
8. f.

LINKAGE EDITOR CONTROL STATEMENTS

1. PC - this is an unnamed START. Providing a name would make this a section definition (SD).
2. SD - this, like naming a START, is the name of a control section.
3. a block of coding that can be relocated, independently of other coding, at load time without altering or impairing the operating logic of the program.
4. linkage editor
5. EXTRN or V-type address constant. If the EXTRN is used, the name appearing as the external reference appears in an A-type adcon in your control section. ER stands for external reference. The symbolic name associated with the ER is not defined in your control sections.
6. a. Define an entry point in the linkage editor entry statement.
   b. Define an entry point in the end card of the first phase.
   c. By default, it is the first byte of the first phase if neither of the first two options are used.
7. Use the entry name parameter in the fetch macro.
8. Use the // OPTION CATAL job control command.
9. payroll, the first doubleword following the supervisor, CSECT1 and CSECT3, mainline, all PTIME.
10. + displacement, F + address, NOREL

LINKAGE EDITOR OPERATION

1. a. 1
   b. 4
   c. 2
   d. 5
   e. 3
   f. 7
   g. 6
   h. 9
   i. 8
2.

Phase Name	Core Location	Entry Point	Disk Address
PHASE01	20500	20500	Cyl 30, Hd 7, Rec 2
PHASE02	20880	20880	Cyl 30, Hd 8, Rec 1

3. The assembler requires units SYSIPT, SYSLOG, SYSLST, SYSRDR, SYSLNK (for output), SYS001, SYS002, SYS003. SYS001, 002, and 003 are work files. Linkage editcr requires SYSLNK and SYS001.
4. Error has occurred during linkedit edit. You will find the actual error message on SYSLST linkedit map.

VIRTUAL STORAGE CONCEPTS

1.	b.	Real addresses -- prior to EOJ during IPL, DOS/VS executes as a single partition real system.
2.	False	These entries will contain the storage protect key of the partition and they will be marked as invalid address space -- high order bit will be ON.
3.	False	They are TFIXed.
4.	False	Some pages already read-in may have been paged out to make room for a program that exceeds the available real storage.
5.	False	The first PT entry for the partition contains the real address for the frame containing the partition savearea.
6.	b.	FETCH contains its own CCW Translation routines and does not require 'Copy Blocks'.
7.	False	
8.	True	
9.	True	Real storage above area specified by SIZE remains in the selection pool.
10.	b.	The area above SIZE minus 2K.
11.	False	Bit 15 is turned ON in the PT entries for all pages in the partition which in effect erases any pages on SYSVIS by indicating that no copy of the pages exists on SYSVIS -- they are not actually erased, however.
12.	False	PFIX is a virtual program function.
13.	True	Outstanding TFIXed frames must be TFREEd before the GETREAL function can be accomplished.
14.	d.	
15.	(a) 3 (b) 4 (c) 1 (d) 2	

VIRTUAL STORAGE MACROS

1. 2 -- The list is terminated by the non-zero X'01' in the second 'DC'. A range of 2304 addresses is specified therefore two page frames will be fixed.
2. is not -- PFIX byte must be equal to zero (0); no pages PFIXed in page frame.
3. False -- The return codes will be returned in Reg. 1.
4. X'088800' -- BGV partition beginning (512K=X'080000') plus SIZE area (32K=X'008000') plus 1K (X'000400') plus 30 bytes (X'00001E').
5. False -- at the address contained in Reg. 1.
6. True
7. False -- All page faults in the system are resolved by the PMGR; the USER PFA routine only determines when and in what sequence they are to be handled.
8. False -- The CCB, Channel Program CCWs, and the I/O areas associated with the EXCP, REAL must be PFIXed, not the EXCP,REAL itself.

9. False -- It will contain zero (0). The virtual address will be returned ONLY if the page contained in the frame is fixed. Because the frame is in the selection pool, it is NOT TFIXED or PFIXed.

DOS/VS SERVICEABILITY AIDS

1. False -- PDIADS reside in the Supervisor PD area. SDAIDs reduce the page pool.
2. can -- They must first be output to the tape and then listed via PDLIST. The cannot be directly output to a line printer.
3. SYS005 -- Same symbolic unit used when PDAID output is written on tape.
4. False -- It will be located in Event Handling Routine Area. The PD Buffer Area will be used as a rotating buffer to store the trace entries.
5. PDARPTR; System Communication Region
6. 40; 56 -- Refer to Appendix A in SADP (GC33-5380)
7. PDAIDTDT -- Refer to PDAID Chart 01 in DOS/VS System Serviceability Aids (SY33-8554).
8. 12-13; PD Standard Preface -- Appendix A in SADP
9. 0-3; PD Address -- Appendix A in SADP
10. Dump: XXXXXX,XXXXXX
11. 20-23; 24-27; PD Standard Preface
12. False -- This would be true only if one or the other of these aids were using the alternate area.
13. True
14. False -- Only the PGMCHK event will be traced (by default).
15. 90004444
16. False -- PGMCHK - only event selected when all events defaulted provides complete supervisor output which includes these tables.
17. False -- A PDUMP can be obtained without STOP ON EVENT
18. SDEHR
19. False -- can also be terminated by AR routine
20. True
21. SYS000; SYS001; SYSLST
22. False -- The SA trace function of SDAIDS is not active during I/O channel operations (i.e, during loading or fetching).

DOCUMENTATION AND OLTEP

1. d
2. a
3. True
4. e (Must be // EXEC IJZADOLT,REAL)
5. e (AK)

PROGRAM SUPPORT RESOURCES

1. d (CE should notify dispatch to call a PSR).
2. e (PROGCK should be used for DOS/VS - not ABENDXXX. Refer to PSGI Handbook - PSM 16.)
3. PIN5745-BB-PTF/060174/END (Refer to 'FORMATS FOR REQUESTING ITEMS IN THE PIN PROGRAM OF RETAIN' in PSM 12 and 'How to Use the BB-PTF Section of the DOS Symptom Index' in PSM 13 of the PSGI Handbook).
4. PIN5745-RL-290/ALL (Bucket SRAID-039, now on EWS microfiche, announced two new RETAIN/360 buckets for DOS/VS Release 29 information. Bucket AR-290 contains DOS/VS Release 29 PTF information and bucket RL-290 contains DOS/VS Release 29 SYSGEN planning information.)

INTRODUCTION TO SCP INSTALLATION

1. a. Pre-installation planning
   b. Installing the SCP
   c. Verification of the SCP
   d. Customer Education
2. Program Status Document
3. decide on the number of system packs (Figure 1-1 in the SYSGEN SRL)
4. PSAL (Programming Systems Activity Log)

PID SYSTEM

1. Cylinder 695
2. conflicting job specification
3. // FILEST SYSIPT,1
4. RTPDK

INITIAL PROGRAM LOAD

1. a. Cylinder 0, Head 1 (track), record 5
2. d,e SYSRES and SYSUSE
3. b. P5 would then have the entry for X'021' built in it.
4. a. Only LUB entries that point to a PUB that is moved are affected.
5. a. Same as for question 4
6. b. Six (6)
7. e. $IPLRT4 would process a SET statement.
8. False INITDAT
9. d. IPL ($$A$IPL2)
10. 180 Nine full cylinders, even though only 171 tracks are needed.
11. False DPD must be issued, even if no operands are specified.
12. False Only if it was called by a DPD command; not when called by a CAT command.
13. True $$A$IPL2 does this also.

DOS/VS LIBRARIAN PROGRAMS

1. DSPLY RD or DSPLYS RD
2. have the private SSL assigned
3. False The MAINT programs supply the catalog function.
4. CORGZ
5. LNKEDT

SUPERVISOR GENERATION

1. Set address of PPBEG to next 2K boundary.
2. DVCGEN One set of parameters for each I/O device.
3. DASDFP = (1,3) No disk type is required due to default values.
4. False This SYSGEN macro must appear in the deck. If the default values are correct for STDJC the parameters may be omitted.
5. the 115 and 125
6. SUPVR macro RMS, CHAN and MCH parameters.
7. False Under the Supervisor/Generation macros in SYSGEN manual, see Rules for Using Supervisor Generation Macros.
8. SYSLNK, SYS001, SYS002, SYS003
9. The RSIZE parameter is greater than 96K. PID system specifies RSIZE=96K.

INSTALLATION VERIFICATION PROCEDURES (IVP)

1. DELUNSD
2. 14K

JOB CONTROL

1. e. $JOBCTLD does the actual processing of an ASSGN statement -- not $JOBCTLA.
2. a. F (ALLOCR)
   b. T
   c. F 64 bytes from origin address
   d. F Unconditional SYSLOG and conditional SYSLST logging.
   e. T
   f. T
3. False 748 bytes -- only one TXTRCD is indicated and it is therefore also the last TXTRCD.
4. False The eighth byte in $JOBCTLA will indicate the name of the phase in the overlay area.
5. False (DOS/VS Release 29 and later automatically support generic assignment.)
6. d. (address-list)

POWER GENERATION

1. Record and monitor POWER events for PSR debugging purposes.
2. INIT. An entry statement with this operand is required when linkediting POWER.
3. 1,350
4. MINISIZE
5. FGPSPOOL
6. a. FGP.ALL
   b. $$BPOWR1
   c. IO27X0
   d. IO2540

UTILITY PROGRAMS

1. CLRDK
2. SYS000
3. immediately before ZZZZ0001 card.
4. False. The end of data requires /* EOD card followed by /&.
5. LVTOC

SUPERVISOR INTRODUCTION

1. Foreground 2 or F2
2. X'80'
3. IODEV=
4. 3330
5. True
6. X'EC' or 236
7. Byte 57, bit 3 of COMREG

TASK SELECTION

1. False
2. Off
3. TRTFLD
4. SVRETURN — PIBDATFL would be X'01' and the routine DATEXIT would branch to SVRETURN.
5. SVC 33
6. Bytes 4-7 of the PIB Extension
7. Byte 1 of PIB
8. LPSW from save area (savearea address in PIB)
9. In F1 PIB bytes 5-7
10. Bytes 0 and 1 in PIB extension
11. Indicates that the associated resource is not available for use.
12. X'2E' or 46 dec., X'10' or 16 dec. NOTE that F3 has a SP key equal to 3 and PIK is X'30'.
13. LTA is in use by a F2 (PIK=X'20') program
14. In the partition 'COMREG' bytes X'6E' and '6F' or 110 and 111 dec.

CHANNEL SCHEDULER AND I/O INTERRUPT ROUTINES

1. c
2. d
3. d
4. a. 02
   b. 83
   c. 50
   d. is
   e. is
   f. false
   g. is
   h. 9 trk tape
5. LISTIO UNITS — LISTIO ALL would be incorrect because it does not show units in PUB table that are unassigned or down. See DOS/VS System Control Statements LISTIO.
6. Channel Bucket
7. F3
8. Ignore — Note that if a device is assigned to ignore, no errors will occur when doing I/O on device. No I/O will occur.

ERROR RECOVERY PROCEDURES

1. Bytes 8-9 give the displacement into the PUB table. See the DOS/VS Error Recovery and Recording Transients PLM (Figure 3)
2. $$ABERRY (Figure 2 in the PLM)
3. a. X'00E'
   b. BG
   c. OB
   d. Unit Check
   e. X'022AD8'
   f. X'022B48' — In some cases the CSW command address is updated by 8. In other cases, it is not. Refer to Channel Status Word Command Address in the Principles of Operation manual.
   g. X'01' — Channel 9 Overflow (carriage tape). Refer to the figure in the PLM that shows 'Sense Information for Devices Supported by Device Error Recovery'.
   h. 1 (Background issued the message)
4. $$ABERAA (See SUPERVISOR PLM CHART 07)
5. Displacement of X'00' in SYSCOM contains a two-byte pointer to a channel scheduler error block. The two bytes preceding this error block contain the address of the error queue (or add X'10' to the address in SYSCOM.
6. Flow Charts in DOS/VS SADP manual or in APPENDIX B of this manual.
7. $$ABERRS (Refer to Appendix B in the Error Recovery PLM).
8. X'4A' or 74 -- Figure 33
9. X'41' or 65 -- Figure 33 and Figure 48
10. Store statistical data for the RMSR routines.

MACHINE CHECK AND CHANNEL CHECK HANDLING (MCAR/CCH)

There are no self-evaluation questions for this topic.

SUPERVISOR TASK (FETCH) CONCEPTS AND TABLES

1. b
2. F/L TRACE
3. d
4. a
5. c
6. b
7. d
8. a. 3
   b. 1
   c. 4
   d. 2

SUPERVISOR (FETCH) TASK OPERATION

There are no self-evaluation questions for this topic.

SHARED VIRTUAL AREA (SVA)

1. True
2. a. Saves disk search on FETCH
   b. Only one copy of an SVA phase in real storage
   c. SVA phases do not have to be loaded from disk
3. a. LDL
   b. PCIL/LD
   c. PSLD
   d. SDL
   e. SLD
4. a. SET SDL=CREATE
   b. JACK,SVA
   c. /*
5. PHASE JACK,*,SVA

DOS/VS TIMERS

1. Terminate the linkage to a user's routine
2. False -- Maximum is 15 hours, 31 minutes, 58 seconds
3. is not
4. WAIT and TECB Macros
5. 30 minutes
6. TOD clock
7. zeros instead of valid TOD

PAGE MANAGER CONCEPTS AND TABLES

1. b -- See DOS/VS Supervisor Logic - Page Table
2. d
3. True -- Used by DAT hardware for address translation
4. a

PAGE MANAGER INITIALIZATION

1. X'8001'
2. SVC 33
3. SVC 59
4. the Supervisor
5. 0055
6. FFFF

PAGE MANAGER SERVICES

1. 90 (Hex) or 144 (Dec)
2. Byte 3 (=Select)
3. the page is not in the selection pool
4. False
5. if a page fault has occurred at a valid point in the Supervisor.
6. Byte 0, bits 4-7 (WID)
7. PFIX, page frame

PAGE REPLACEMENT ALGORITHM

1. the least recently used page.
2. Queue switch
3. False. Only a pointer relative to PFT begin.
4. No entries in this queue.
5. Reset Reference Bit
6. ACONST = Maximum number of page-ins per second and BCONST = Maximum re-entry rate.
7. 8001
8. True

PAGE MANAGER OPTIMIZATION

1. False. The FCEPGOUT macro merely promotes the page frames to the head of the replacement queues. The affected page frames <u>may</u> still be in real storage.
2. REAL parameter is ignored.
3. The page table (PAGETAB) is full, this request was ignored.
4. discontinue processing this page and set a return code of X'08'.

CCW TRANSLATION

1. True
2. a dynamic work and save area.
3. 72 (Decimal). All copy blocks are 72 bytes.
4. FIX BLOCK

RESOURCE MANAGEMENT

1. 63 (X'3F')
2. False - The request for exclusive use of the resource must wait until the resource is no longer shared.
3. False
4. 5
5. SYSVTOC
6. $JOBCTLN
7. byte 75, JA Interface Partition Table
8. c. interval timer
9. 13

DASD FILE PROTECT AND SEEK SEPARATION

1. FOPT
2. The range of channels to be protected by DASD File Protection.
3. DASDFP = (1,1) - 2311 and 2314 are defaults.
4. Supervisor (Channel Scheduler Routine).
5. No (Only the user's seek field is used. The address of this field is inserted in the data address field of the seek CCW that is generated for DASDFP).
6. JIB (Job Information Block).
7. LUB (Logical Unit Block - byte 01).
8. FOPT
9. SKSEP
10. The 'n' parameter can be used to generate additional SAB entries for future expansion. This parameter must be equal to or greater than the number of DASD devices specified in DVCGEN macros at system generation time.
11. SAB (Seek Address Block)
12. X'38'
13. a. CCW command code not a long seek (X'07')
    b. CCW seek address same as seek address contained in SAB entry.
    c. New seek field not in real storage.
    d. Seek is not chained.

SYSTEM FILES ON DISK

1. ~~a~~ e
2. d
3. b
4. d
5. True
6. d

LIOCS CONCEPTS/MACROS

1. DTF
2. MOD
3. 0, 15, 14, 1
4. OPEN
5. Logical
6. c,d
7. c,d
8. a - c,d
   b - a,b,c,d
   c - c,d
   d - c,d
9. /*, B , Tape Mark, last line printed, end-of-file, record (data count=0)
10. c, f, h, i
11. Index Sequential
12. Sequential, random, index sequential
13. 5

UNIT RECORD FILES/MACROS

1. e
2. 1287 or 1288 (Reference Sup and I/O Macros SRL - DTFOR)
3. c
4. d
5. False - This is the programmer's responsibility
6. a, c, d
7. 1 - c
   2 - a
   3 - e
   4 - b

MAGNETIC TAPE FILES/MACROS

1. When the last record in the I/O area has been passed to the problem program.
2. No. If WORKA=YES, omit IOREG=
3. Yes. ERROPT=ERRUT will cause LIOCS to branch to the label ERRUT in the problem program to process errors.
4. 4 - The physical record is 320 bytes in length and each logical record is 80 bytes long.
5. __b__ TRUNC
   __f__ RELSE
   __e__ VARBLD
   __a__ IOREG
   __d__ IOAREA1
   __c__ WORKA
6. IJFFZZWZ
7. 80
8. SEPASMB=YES
9. Chart DD (LIOCS - Vol 2)
10. 72-75
11. 80-83
12. c - With blocked records, a work area or a register must be used
13. b

MAGNETIC TAPE LABELS

1. d
2. d
3. d
4. b
5. a, i, d, b (//JOB, //OPTION PARSTD, TLBL, /&)
6. d, b, e - Block count is a field in all file labels, but is only valid in a trailer label.
7. EOF, EOV
8. a - Volume
   b - Standard Header
   c - User Header
   d - Standard Trailer
   e - User Trailer
9. DITTO or the Tape Print Utility
10. a - January 23, 1970
    b - 7
    c - EOF (trailer label)
    d - 111111
    e - December 31, 1970
    f - 1 (Field 6 determines this)

11. Yes
12. Volume Label - written with initialize tape program
    TM
    Data record
13. a - 2, 3, 4
    b - 1, 3
    c - 1, 3 - checked on output only the first time the volume is written
    d - 3, 4, 7, 8
    e - 5, 6
    f - 5, 6
14. j, g, f, c, e, d, h, a, n, b, m, e, p, n, k, n, n, 1 ?
    (b and m occur at the same time)
15. True
16. This macro must be issued by the problem programmer to return back to LIOCS after processing user labels.
17. Branch to user routine. (LIOCS will not read, write, or process non-standard labels). They are the user's responsibility.

SEQUENTIAL DISK FILES/MACROS

1. Anytime on output files - following a GET on input files
2. 60, 61, 62, 63, 64
3. 22-28
4. 248 - must include 8 bytes to build a count field
5. IJGFOZZZ
6. IJGCUCTC
7. False
8. ERROPT=
9. ERREXT
10. False
11. b, e
12. d
13. a - address of the DTF that failed
    b - address of the error block

SEQUENTIAL DISK LABELS

1. OPEN
2. True
3. a - 3
   b - 3
   c - 7
   d - 7
   e - 1
   f - 8
4. a - 2
   b - 6
   c - 1
   d - 3
   e - 4
   f - 7 (Reference DASD Label SRL)
   g - 5
   h - 5
   i - 5
   j - 5
5. On the first track of the first extent
6. 8
   2
   3
   1
   5
   6
   4
   7
7. f
8. 10 - one extent gives 1 track and the other gives 9 more.
9. Hex 3C, decimal 60 of the partition COMREG
10.
```
// JOB
// ASSGN SYS004,X'CUU'  (Disk Address)
// ASSGN SYS005,X'CUU'  (Printer Address)
// EXEC LVTOC
/&
```
11. Field 5 of the (first) volume label
12. 22 to 28
13. Format 1 file label. If more than three extents are required, additional extents are defined with format 3 file labels.
14. a
15.
```
// EXTENT SYS001,222222,8,1,0010,0060,2
// EXTENT SYS002,222222,8,1,0013,0060,5
// EXTENT SYS003,222222,8,1,0016,0080
```

DIRECT ACCESS DISK FILES/MACROS

1. True
2. An automatic seek overlap on all read, write and control requests
3. Each time a read/write is issued by the problem program
4. By interrogating the test byte (macro switch)
5. a - 4
   b - 1
   c - 3
6. a - 44-45
   b - 41-43
   c - 64-71
   d - 48-63
   e - 96-143
7. ID of last record, the number of unused bytes
8. 'A7189A881014'
9. a - 1
   b - 2, 3
10. No room found while processing the WRITE AFTER macro
11. To write an EOF record - now the data can be read sequentially from the file
12. To generate a seek address for a given data record
13. Clear disk - this utility formats the disk pack into fixed - length blocks that contain the count, key and data areas
14. a - 3
    b - 2
    c - 6
    d - 4
    e - 5
    f - 1
15. no
16. It should be 8 bytes long (mbbcchhr) and the bin reference bytes should be 0000 for a 2314.

DIRECT ACCESS FILE LABELS

1. When the programmer wants to process label extent information
2. The symbolic units used in the extents must be contiguous (SYS004, SYS005, SYS006, etc)
3. True
4. 3400 is the relative track (cylinder 170, track 0) and the 100 is the number of tracks to be used for that extent
5. No - Split cylinder is not used in DA Files
6. The extent information for the job being processed overlaps the SYSRES file
7. Display the VTOC and CANCEL the job
8. The extent information passed to the problem program at XTNTXIT time determines the upper and lower limits of the extent to be formatted on the disk.
9.

BYTE -	0	1	2	3	4	5	6	7	8	9	10	11	12	13
VALUE	01	01	00	AA	00	00	00	AE	00	19	01	04	00	00

INDEX SEQUENTIAL FILE CONCEPTS

1. a - 2
   b - 1
   c - 5
   d - 3
   e - 4
   f - 7
   g - 6
2. KEY = 120, DATA = Track 1 Address
3. The highest key ever associated with track one is 150
4. This is a pointer to the overflow area so the record with a key of 150 can be found. After creation of this file, records were added and the record with the key of 150 was forced into the cylinder overflow.
5. a - No change to master index
   b - No change to cylinder index
   c - Track index - record 5 key area will be changed to 235 and record 6 data area will be changed to track 8 record 6
   d - Track 1 no change
   e - Track 2 record with key of 235 will displace record with key of 240
   f - Track 8 record with key of 240 will be added as record 6 and a sequence link field will be created
   g - COCR record will indicate that track 8 record 6 is the last record written in the cylinder overflow area
6. Master, cylinder, and track indexes will all have to be updated to indicate the highest key in the file.
7. a - All records must be fixed length
   b - All keys must be physically located in the same place in each record
   c - There may be no records with duplicate keys
   d - All records to be loaded must be in sequence by key
8. The extend function consists of adding records to an existing IS file and all records are used to extend the file must be higher than the highest key presently in the file.
9. The EOF record becomes the first record on a prime data track

INDEX SEQUENTIAL IMPLEMENTATION

1. a - INDAREA=
   b - INDSKIP=
   c - INDSIZE=
2. False - CORINDX parameter in the ISMOD allows for the cylinder index in virtual storage
3. X'02' Refer to LIOCS - Volume 2 DTFIS Load Table
4. ISFILE is never opened and there can be no WAITF after a sequential WRITE
5. a, d
6. a - 2
   b - 1
   c - 6
   d - 3
   e - 1
7. SETL, ISFILE, BOF
8. 117-124 (DASD Labels - Format 2 label contents)
9. 92-93, 1, OPEN
10. a - // DLBL ISBUILD,'PAYROLL 01',74/365,ISC
    b - // EXTENT SYS005,000001,4,0,1000,20
    c - // EXTENT SYS005,000001,4,1,1020,140
    d - // EXTENT SYS005,000001,1,2,3000,1000
    e - // EXTENT SYS006,000002,1,3,0020,3960
    f - // EXTENT SYS007,000003,1,4,0020,1160
    g - // EXTENT SYS007,000003,2,5,1180,1440
11. False

INDEX SEQUENTIAL INTERNALS

1. OPEN
2. a - The master and cylinder indexes must be on the same symbolic unit and have only one entry in the M table
3. c
4. X'06'
5. IJHAHRAA + 12 decimal - Use the ADDRTR program listing of the the ISMOD to determine this
6. 4
7. a - 1
   b - 2
   c - 3
   d - 4
8. ISBUILD.E
9. 4X'FF'
10. 17 decimal - Refer to the ERREXT parameter for ISAM in the Supervisor and I/O Macro SRL
11. False
12. To test for an EOF record on either the independent overflow area or prime data area.

DISK WORK AND DEVICE INDEPENDENT FILES

1. True
2. False
3. 3
   4
   2
   5
   1
4. 1 - Only fixed unblocked records are supported
   2 - Only forward reading is allowed
   3 - Rewind options are not provided
   4 - Combined file processing is not supported for reader punches
   5 - CNTRL and PRTOV macros cannot be used with this macro
   6 - Reading and writing of standard or user - standard labels for tape/disk is not supported.
   7 - If ASA control character code is used in a multi-tasking environment and more than one DTF uses the same module with RDONLY=YES, overprinting may occur
   8 - If DTFDI is used with DASD, FOPT SYSFIL must have been specified at system generation time
5. DELETE=NO
   NOTEPNT= (Used for work files in general)
   TYPEFILE=
6. Chart PA
7. 0S04I 'ILLEGAL SVC 50" message - Use LIOCS - Volume 2 Chart PA for 1 - I/O Area or Chart PB for 2 - I/O Areas

CHECKPOINT/RESTART

1. False
2. RSTADR (2nd operand)
3. b, d
4. The number of a previously taken checkpoint at which the program is to be restarted
5. c
6. True
7. c
8. True
9. e (Bytes 0 to 8 of the record will contain /// CHKPT and byte 9 will contain X'40'.)
10. False - (GP regs are saved in bytes 16 to 79 of the first record written on disk - the header record)
11. True - (This bit being 0 indicates that the program being checkpointed (on tape) was executing in real mode)
12. False
13. c (The third operand in a CHKPT macro has been improperly specified)
14. c (The checkpoint record is an extent record (XTN in first 3 bytes) which was written because the Supervisor had been generated with the DASD file protect feature)

PRIME DATA CYLINDER 160

Head \ Record	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	40	41
0	COCR	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	TIN	TIO	6	7
1		15	16	18	19	22	23	25	26	28	30	31	33	34	37	41	46	47	49		
2		102	104	105	107	109	110	111	114	119	122	126	132	139	145	150	156	161	169		
3		198	199	203	301	303	400	550	575	695	783	888	996	1011	1050	EOF					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					
18																					
19		14	8	9	10	11	12	13	99	94	91	89	84	75	70	60	57	54	61		

HEAD

Cylinder Overflow Track (head 19)

LEGEND:
- COCR= Cylinder Overflow Control Record
- TIN= Track Index (normal entry)
- TIO= Track Index (overflow entry)
- [box with corner mark] = Added Record (after file was originally created)

INDEPENDENT OVERFLOW CYLINDER 155

Head \ Record	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0		63	197	196	195	194	187	177	EOF										
1																			
2																			
3																			
4																			

Map of the Records Contained in the ISAM File for Work Project 13.

DOS/VS PROBLEM DETERMINATION TECHNIQUES

The following information is provided to assist you in developing a logical approach to programming oriented problems. Use of the DOS/VS SADP manual further explains this approach and will be referenced where applicable. Consider the following points:

- Program troubleshooting can be simplified by following a few simple techniques.
- The key to effective troubleshooting is the obtaining of all possible documentation and the recording of the error indications. The documentation should include program descriptions, listings, flowcharts, and a storage dump.
- The following items should be determined and/or obtained when debugging programs:
  1. Type of Failure
     - Incorrect output
     - Error message(s)
     - System goes into wait state
     - Program goes into non-ending loop
  2. Indications
     - SYSLOG message(s)
     - Storage dump
     - Console indicators and low
     - Storage messages
     - Status of I/O devices
  3. Program Operating Environment
     - DOS/VS with POWER, HASP, CICS, etc
  4. Program or Phase-In Control at the time of the failure
     - The partition communication region contains the name of the program that was being executed when the failure occurred.

Reference the flowchart (Figure 1) and read the following text which describes the significance of each block in the chart.

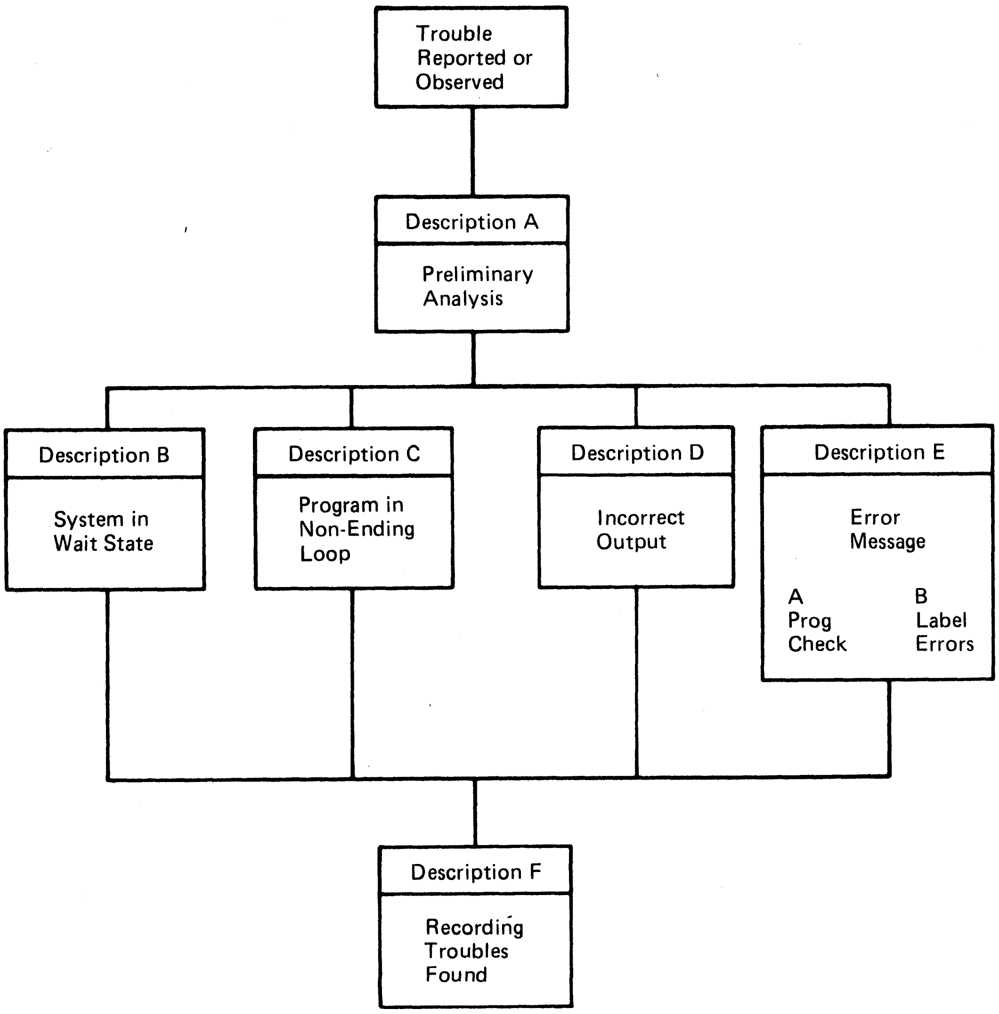


Figure 1 - Generalized Flowchart for Troubleshooting

APPENDIX B (Part 2 of 8)

Description A - Preliminary Analysis

- Is the problem such that wrong output was obtained from an apparently good run? For instance, was the OPTION statement card ignored during an assembly, but the assembly otherwise okay? If this is your problem, go directly to Description D; if not, continue on.

- Now determine the program and/or phase that was in control. You can look in the communication region (bytes 36-39) for the last phase fetched high core address. The address of the communication region can be found in bytes 16-17 (hex).

- Was the problem an error message? If so, go directly to Description E; if not, continue on.

- Is the machine in the wait state? If so, go to Description C; if not, continue on.

- If you arrived at this point, you will need to use your own troubleshooting techniques. Remember that you should obtain all possible documentation including storage dumps, program listings, LIST I/O, MAP, DSERV of core image library, change level macro, supervisor listing, and phase trace if available.

Description B - Machine in Wait State

- Only two ways a wait state can be entered:
  1. An interrupt
  2. A LPSW instruction. Storage Address Register (SAR) will point to the PSW that was loaded.

- Utilize Chart 03 (6 parts) in Section 3 of the SADP manual to determine the course of action.

- Interrogate any message associated with the WAIT to determine if there is an alternate course of action.

- A wait state is also entered if all problem programs are waiting for an I/O interrupt.

- Reference Section 1 in the SADP manual for further information in determining the cause of a wait state.

Description C - Program in Non-Ending Loop (Section 3 of SADP)

- Stop the CPU and use the documentary console to display the current PSW via the DP command.

- Utilize SDAIDS with Instruction Fetch (IF) Trace to determine the addresses and instructions involved in the loop.

- Obtain a storage dump of the looping program.

- Whileaway from the machine, analyze the program listing to determine the cause of the non-ending loop.

Description D - Wrong Output (Section 3 of SADP)

- If the problem is an assembler or compiler error, try to assemble or compile the smallest input deck that will still show up the error.
  1. Once the failing input card type has been determined, consult the necessary PLM to determine what phase of the program processes that card type.
  2. It may be necessary to get a storage dump with a particular phase in storage.

     Suggestions on how to do this:
     a. Unready some I/O device which will be used by that phase.
     b. SAR STOP DELAY in the fetch routine and examine the partition communication region bytes (36-39).
     c. Enter a phase trace routine. (PDAIDS, F/L trace)
     d. Once the correct phase is in storage, take a standalone dump or force a program check by altering some instruction.

Questions to ask yourself:

1. Was the physical record duplicated, missing, or wrong length?
2. Was a logical record duplicated, missing or wrong length?
3. Did an I/O error occur, causing error recovery routines to be used?
4. Was the file opened and closed properly?
5. Was the alternate device being used?
6. Did the error occur at the same time as some physical operation (ie, sensing of tape load point, EOF)?

Description E - Error Message
(Reference Message Manual - Introductory Section)

- Multiprogram ID:

  BG - Background program
  F1 - Foreground 1 program
  F2 - Foreground 2 program
  F3 - Foreground 3 program
  F4 - Foreground 4 program
  AR - Attention routine

Consider the following:

- Program Check - 0S03I
  - Check interruption code (refer to the Reference Summary Card and the Principals of Operations SRL).
  - Location - Where the op code for the failing instruction is located.
  - Condition Code - Obtain from the PSW.

  How far did the program run?
  1. Check what I/O operation occurred
  2. Look at the GP registers
     a. 1 may be pointing to a DTF or CCB
     b. 14 may have a return point address (link register)
     c. 15 may be pointing to a logic module or subroutine.
  3. Is its base register loaded?

- Program Check 0S11I
  - Occurred in the logical transient area.
  - Rerun the program with the wait bit on in the Program Check New PSW. Then take a standalone dump. Instruction on how to do this can be found under the message 0S11I.

- Label error messages will usually have a 4Xnn format. The '4' character logical IOCS. The 'X' character (when it equals 2 through 9) indicates the type of file or operation (IS, SEQ, DA, TAPE, WORK FILES, OPEN/CLOSE), and 'n' is the message number. Messages pertaining to disk OPEN or CLOSE can be answered with DSPLYV to obtain VTOC information.

- If a message must be looked at in depth, use the appropriate PLM for system control or LIOCS to find (in the message cross-reference chart) which routine issued the message.

Description F - Recording Troubles Found

- Consult the PSGI Handbook (General PSM 4) for information on APAR Procedures.

For additional and more detailed approaches to programming problems, consult the SADP manual (in the Introduction Section, under the title "Types of Malfunctions").

FETCH ROUTINE REGISTER CONVENTIONS

Fetch Any Phase

```
SVC 1      R1 = Address of the phase name to be fetched.
           R0 = May contain '0' or an entry address which
                overrides the link edited entry address.
```

Fetch A Logical (B) Transient

```
SVC 2      R1 = Address of the B-transient name to be fetched
           R0 = Ignored
          R15 = Is set equal to the address of the LTA by the fetch
                routine.  Control is passed to the LTA address +8.
```

Fetch or Return from a Physical (A) Transient

```
SVC 3      R1 - Address of the A-transient name
           R0 = Ignored
          R11 = Is set equal to the address of the PTA by the
                fetch routine.  Control is passed to the PTA address +8
```

Load Any Phase

```
SVC 4      R1 - Address of the phase name when issuing the SVC 4,
                upon return to the user R1 = the entry address.
           R0 = May contain '0' or a load address which overrides the
                linkedited load address.
```

Load Phase Header

```
SVC 23     R1 = Address of the phase name
           R0 = Address of where the load address is to be stored
```

NOTE: This SVC can only be issued in a MPS supervisor by a program whose protection key is '0'. (Normally, job control and B-transients).

LOGICAL IOCS REGISTER CONVENTIONS

Register 15	Points to the beginning of the logic module. (Branch instructions using this register will also have a displacement to allow entering the module at specific locations.)
Register 14	Linkage register. It points to the instruction in the main program to which the logic module will return control. (The instruction following the branch to the logic module).
Register 1	Points to the first byte of the DTF table (which is the beginning of the CCB).
Register 0	Parameter register containing different values for OPEN/CLOSE or GET/PUT. OPEN/CLOSE - Points to a list of adcons that contain addresses of the DTFs to be opened or closed. The end of the DTF list is indicated by the high order byte of the adcon being non-zero. GET/PUT - Register 0 points to an adcon containing the address of the work area if one is used.

USING LISTIO AT IPL TIME

If you are unfamiliar with a given system, the following procedures will allow you to determine the size and entries in the PUB and LUB tables.

1. IPL in the normal manner using the console for a communications device.
2. Enter LISTIO ALL to determine the assignments.
3. Enter LISTIO UP to determine PUB values that are not currently assigned because the operator had flagged them as being down.

***********************************DOS/VS SYSTEM CONTROL BLOCKS*************************************

ABTAB	ABNORMAL TERMINATION OPTION TABLE	X'54-57' SYSCOM DOS/VS HANDBOOK
ACCTCOMN	JOB ACCOUNTING INTERFACE COMMON TABLE	X'7C-7F' SYSCOM DOS/VS HANDBOOK
ACCTPP	JOB ACCOUNTING INTERFACE PARTITION TABLE	X'74-77' COMREG DOS/VS HANDBOOK
ANCHTAB	ANCHOR TABLE	GETVIS AREA-VIRT PAR SUPERVISOR PLM
ASYSBLK0	ADDR OF DUMMY (FIRST)SYS TASK BLOCK	X'98-9B' SYSCOM DOS/VS HANDBOOK
ASYSBLKX	ADDR OF TASK BLOCK OF ACTIVE SYS BLOCK	X'9C-9B' SYSCOM DOS/VS HANDBOOK
BBOX	BOUNDARY BOX	X'DC-DF' SYSCOM DOS/VS HANDBOOK
CCB	COMMAND CONTROL BLOCK	GENERAL REG 1 DOS/VS HANDBOOK
CCB COPY BLOCK		X'14-17' TCB DOS/VS HANDBOOK
CCW	CHANNEL COMMAND WORD	CCB YELLOW CARD
CCW COPY BLOCK		X'20' CCB COPY BLOCK DOS/VS HANDBOOK

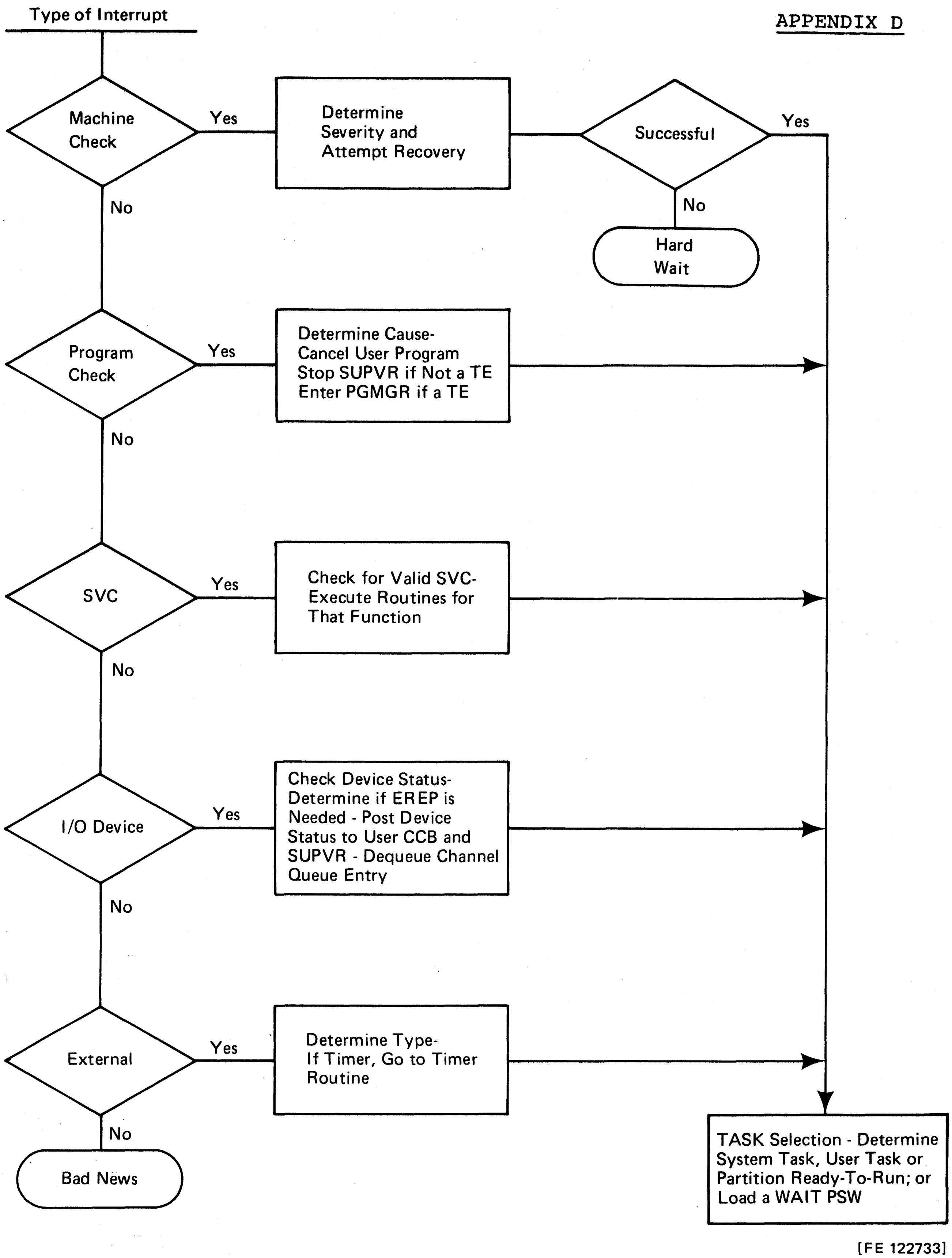
CCWTADR	CHANNEL PROGRAM TRANSLATION ROUTINE	X'84-87' SYSCOM DOS/VS HANDBOOK
CHANQ	CHANNEL QUEUE TABLE	X'25-27' SYSCOM DOS/VS HANDBOOK
CHNTAB	CHANNEL CONTROL TABLE	X'3C-3F' SYSCOM DOS/VS HANDBOOK
COMREG	PARTITION COMMUNICATIONS REGION	X'14-17' MAIN STORAG DOS/VS HANDBOOK
CRTTAB	CRT CONSTANT TABLE	X'34-37' SYSCOM DOS/VS HANDBOOK
DIBTAB	DISK INFORMATION BLOCK TABLE	X'60-61' COMREG DOS/VS HANDBOOK
DPDTAB	PAGE DATA SET TABLE	X'E0-E3' SYSCOM DOS/VS HANDBOOK
ECB	EVENT CONTROL BLOCK	DOS/VS HANDBOOK
ERBLOC	ERROR RECOVERY BLOCK	X'0-3' SYSCOM DOS/VS HANDBOOK
ERPIBQ	ERROR RECOVERY PROCEDURE INFO BLOCK	SUPERVISOR LISTING DOS/VS HANDBOOK
ERQ1	ERROR QUEUE ENTRY	X'10' ERBLOC DOS/VS HANDBOOK
FAVP	FIRST AVAILABLE POINTER SPACE IN JIBTAB	X'42-43' COMREG
FICL	FIRST IN CLASS LIST POINTS TO FIRST ENTRY IN LUBTAB FOR PARTITION	X'48-49' COMPEG
FLPTR	FREE LIST POINTER DISPLACEMENT INDEX INTO CHANNEL QUEUE	X'24' SYSCOM

FOCL	FIRST ON CHANNEL LIST	X'3E-3F' COMREG SUPERVISOR PLM
FTTAB	FETCH TABLE	X'F0-F3' SYSCOM DOS/VS HANDBOOK
HLDPSW	LAST SAVED CURRENT PSW	LABEL IN SUPERVISOR
HQPUBTAB	HEADQUEUE PUB TABLE	X'14-17' RASLINK DOS/VS HANDBOOK
IDAL	INDIRECT DATA ADDRESS LIST	X'1-3' COPIED CCW SUPERVISOR PLM
ITREQ	INTERVAL TIMER REQ TABLE	X'50-53' SYSCOM DOS/VS HANDBOOK
ITTAB	INTERVAL TIMER OPTION TABLE	X'66-67' SYSCOM DOS/VS HANDBOOK
JIBTAB	JOB INFORMATION BLOCK	X'44-45' COMREG DOS/VS HANDBOOK
LIK	LOGICAL TRANSIENT ID KEY	X'58-59' SYSCOM DOS/VS HANDBOOK
LMT	LINE MODE TABLE	X'8C-8F' SYSCOM DOS/VS HANDBOOK
LTA	LOGICAL TRANSIENT AREA	X'1C-1F' SYSCOM
LTK	LOGICAL TRANSIENT KEY	X'6E-6F' COMREG DOS/VS HANDBOOK
LUBTAB	LOGICAL UNIT BLOCK TABLE	X'4C-4D' COMREG DOS/VS HANDBOOK
MODTAB (LMT)	LINE MODE TABLE	X'8C-8F' SYSCOM DOS/VS HANDBOOK
MVCFLD	MOVE CHARACTER FIELD (TASK SELECTION)	X'B4-B7' SYSCOM SUPERVISOR PLM
NICL	NUMBER IN CLASS LIST HAS NUMBER OF LUBS IN PARTITION	X'4A-4B' COMREG

OCTAB	OPERATOR COMMUNICATION OPTION TABLE	X'68-69' COMREG DOS/VS HANDBOOK
PAGETAB	PAGEIN TABLE	LABEL PAGETAB SUP LI DOS/VS HANDBOOK
PCTAB	PROGRAM CHECK OPTION TABLE	X'64-65' COMREG DOS/VS HANDBOOK
PDTABA	MICR DTF ADDRESSES	X'7E-7F' COMREG DOS/VS HANDBOOK
PDTABB	MICR DTF POINTERS	X'7E-7F' COMREG DOS/VS HANDBOOK
PFATAB	PAGE FAULT HANDLING OVERLAP TABLE	DOS/VS HANDBOOK
PFT	PAGE FRAME TABLE	X'D4-D7' SYSCOM DOS/VS HANDBOOK
PFTX	PAGE FRAME TABLE EXTENTION	X'D8-DB' SYSCOM DOS/VS HANDBOOK
PGQU	PAGE QUEUE TABLE	X'1C-1F' RASLINK DOS/VS HANDBOOK
PIBTAB	PROGRAM INFORMATION BLOCK	X'5A-5B' COMREG DOS/VS HANDBOOK
PIB2TAB	PROGRAM INFORMATION BLOCK EXTENTION	X'7C-7D' COMREG DOS/VS HANDBOOK
PIK	PARTITION ID KEY	X'2E-2F' COMREG DOS/VS HANDBOOK
POWERTAB	POWER TABLE	X'5C-5F' SYSCOM DOS/VS HANDBOOK
PSW	PROGRAM STATUS WORD	LOW CORE YELLOW CARD
PT	PAGE TABLE	SEGMENT TABLE DOS/VS HANDBOOK

PTA	PHYSICAL TRANSIENT AREA	X'94-97' SYSCOM
PUBOWNER	PHYSICAL UNIT BLOCK OWNERSHIP TABLE	X'78-7B' SYSCOM DOS/VS HANDBOOK
PUBTAB	PHYSICAL UNIT BLOCK TABLE	X'40-41' COMREG DOS/VS HANDBOOK
PUB2AREA	PUB 2 AREA	X'30' RFTAB DOS/VS HANDBOOK
RASLINK	RAS LINKAGE AREA	X'70-73' SYSCOM DOS/VS HANDBOOK
RASTAB	RAS TABLE	X'0C-0F' RASLINK SUPERVISOR PLM
RCB	RESOURCE CONTROL BLOCK	DOS/VS HANDBOOK
REGSAV	CHANNEL BUCKETS	X'30-33' SYSCOM DOS/VS HANDBOOK
RFTAB	RECORDER FILE TABLE	X'64-67' SYSCOM DOS/VS HANDBOOK
RTA	RECOVERY (RAS) TRANSIENT AREA	X'68-6F' (CCW) RASTA
RID	ROUTINE ID OR REQUESTOR ID	LABEL IN SUPERVISOR SUPERVISOR PLM
RURTAB	RESOURCE USAGE RECORD TABLE	LABEL RURTAB SUP LIS DOS/VS HANDBOOK
SAB	SEEK ADDRESS BLOCK	X'38-3B' SYSCOM DOS/VS HANDBOOK
SAVEAREAS	PARTITION SYSTEM PARTITION SYSTEM TASK	X'05-08' JIB X'09-0C' JIB X'05-08' STCB
SLD	SECOND LEVEL DIRECTORY	X'1-3' FTTAB DOS/VS HANDBOOK

STAB	SEGMENT TABLE	X'D0-D3' IN SYSCOM DOS/VS HANDBOOK
STCB	SYSTEM TASK CONTROL BLOCK	X'90-9B' SYSCOM PLUS SYSPTR DOS/VS HANDBOOK
STID	SYSTEM TASK ID FIELD(SELECT BYTE)	X'44-45' SYSCOM DOS/VS HANDBOOK
STOW TABLE	COMMUNICATION AREA FOR JOB CONTROL AND $MAINDIR	X'18-24' SVA
SVA	SHARED VIRTUAL AREA	X'F5-F7' SYSCOM DOS/VS HANDBOOK
SYSCOM	SYSTEM CONTROL PROGRAM COMMUNICATION REGION	X'80-84' LOW CORE DOS/VS HANDBOOK
SYSTEM TASK BLOCKS		X'98-9B' SYSCOM DOS/VS HANDBOOK
TCB	TRANSLATION CONTROL BLOCK	X'09' PIBTAB + X'50' DOS/VS HANDBOOK
TIDFLD (MVCFLD)	SYSTEM PIK OR TIC	X'B4-B7' SYSCOM SUPERVISOR PLM
TIK	TASK IDENTIFICATION KEY	X'5A-5B' SYSCOM DOS/VS HANDBOOK
TRTFLD (TRFLD)	TRANSLATE AND TEST FIELD	LABEL IN SUPERVISOR SUPERVISOR PLM



DOS/VS INTERRUPT HANDLING

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